

***MEMORIA DE CÁLCULO  
EVALUACION ESTRUCTURAL.  
TORRE CUADRADA SECCION  
VARIABLE  $H=40.0m$ .  
ANCHO DE PATA = 7.45m  
ESTACION: CERRÓ MONTEZUMA.  
Municipio de Pueblo Rico.  
Departamento de Risaralda.***

*Abril 2016.*

***Rev. 0.***

***INFORME TECNICO.***

***Para la Condición Nueva (Futura), Se requiere refuerzo.  
Eficiencia General Condición Nueva (Futura) + Refuerzo: Montantes  
79.2%, Diagonales 81.3%, Horizontales 44.2% y Tornillos  
71.8%. Deflexión Máxima = 67.53 mm < 240 mm. OK.***



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## INTRODUCCION

### 1.1 OBJETO

El objeto de este documento es la verificación del diseño estructural de la torre metálica cuadrada de sección variable de 40.0 metros de altura. Ubicada en la estación: **CERRÓ MONTEZUMA**, Municipio de Pueblo Rico, Departamento de Risaralda. Que soporta antenas de MW y Omni.

La torre es de sección cuadrada, montantes, diagonales y horizontales a base de ángulos de lados iguales, el ancho de la pata es de 7.45 m. Esta medida es variable hasta llegar a una altura de 28.0 m, donde es 2.00 m. Continuando en sección constante hasta los 40.0 m.

#### CONDICION ACTUAL (Antenas existentes):

- 1 CARGA POR MANTENIMIENTO (4 personas) – NIVEL 40.0 m
- 1 ANTENA OMNI – NIVEL 36.0 m – B.
- 1 ANTENA OMNI – NIVEL 36.0 m – D.
- 1 ANTENA RF 0.30x1.30m – NIVEL 35.0 m – B.
- 1 ANTENA MW Ø3.70m – NIVEL 33.0 m – D
- 1 ANTENA MW Ø3.70m – NIVEL 31.0 m – B
- 2 ANTENAS GRILLA TV – NIVEL 26.0 al NIVEL 18 m – B.
- 2 ANTENAS GRILLA TV – NIVEL 26.0 al NIVEL 18 m – “B”.
- 1 ANTENA MW Ø3.70m – NIVEL 23.5 m – D.
- 1 ANTENA GRILLA TV 2.25x2.25 m – NIVEL 15.5 m – C
- 1 ANTENA GRILLA TV 2.25x2.25 m – NIVEL 13.0 m
- C 1 ANTENA GRILLA TV 2.25x2.25 m – NIVEL 10.5 m – C
- 1 ANTENA GRILLA TV 2.25x2.25 m – NIVEL 8.0 m – C
- 4 CABLES Ø7/8”, PARA ANTENAS MW y RF
- 16 CABLES Ø1/2”, PARA ANTENAS OMNI y TV
- 2 ANTENAS MW Ø3.70m – NIVEL 40.0 m – C y D.
- 2 ANTENAS OMNI (TIPO VELA) – NIVEL 40.0 m – B.
- 2 CABLES Ø7/8”, PARA ANTENAS MW.
- 2 CABLES Ø1/2”, PARA ANTENAS OMNI.

#### CONDICION NUEVA (FUTURA): RTVC 6:6:

- 1 EXTENSION DE 10.0 METROS – NIVEL 40.0m AL NIVEL 50.0m.
- 2 ANTENAS PANEL (1.0x0.50x0.19m) – NIVEL 49.5m C y D.
- 2 ANTENAS PANEL (1.0x0.50x0.19m) – NIVEL 48.5m C y D.
- 2 ANTENAS PANEL (1.0x0.50x0.19m) – NIVEL 47.5m C y D.
- 2 ANTENAS PANEL (1.0x0.50x0.19m) – NIVEL 46.5m C y D.
- 2 ANTENAS PANEL (1.0x0.50x0.19m) – NIVEL 45.5m C y D.
- 2 ANTENAS PANEL (1.0x0.50x0.19m) – NIVEL 44.5m C y D.



**NOTA:**

*A CONTINUACION SE MUESTRAN LOS AZIMUT DE LAS CARAS DE LA TORRE:*

*AZIMUT DE LA CARA A: 63°*

*AZIMUT DE LA CARA B: 153°*

*AZIMUT DE LA CARA C: 243°*

*AZIMUT DE LA CARA D: 333°*





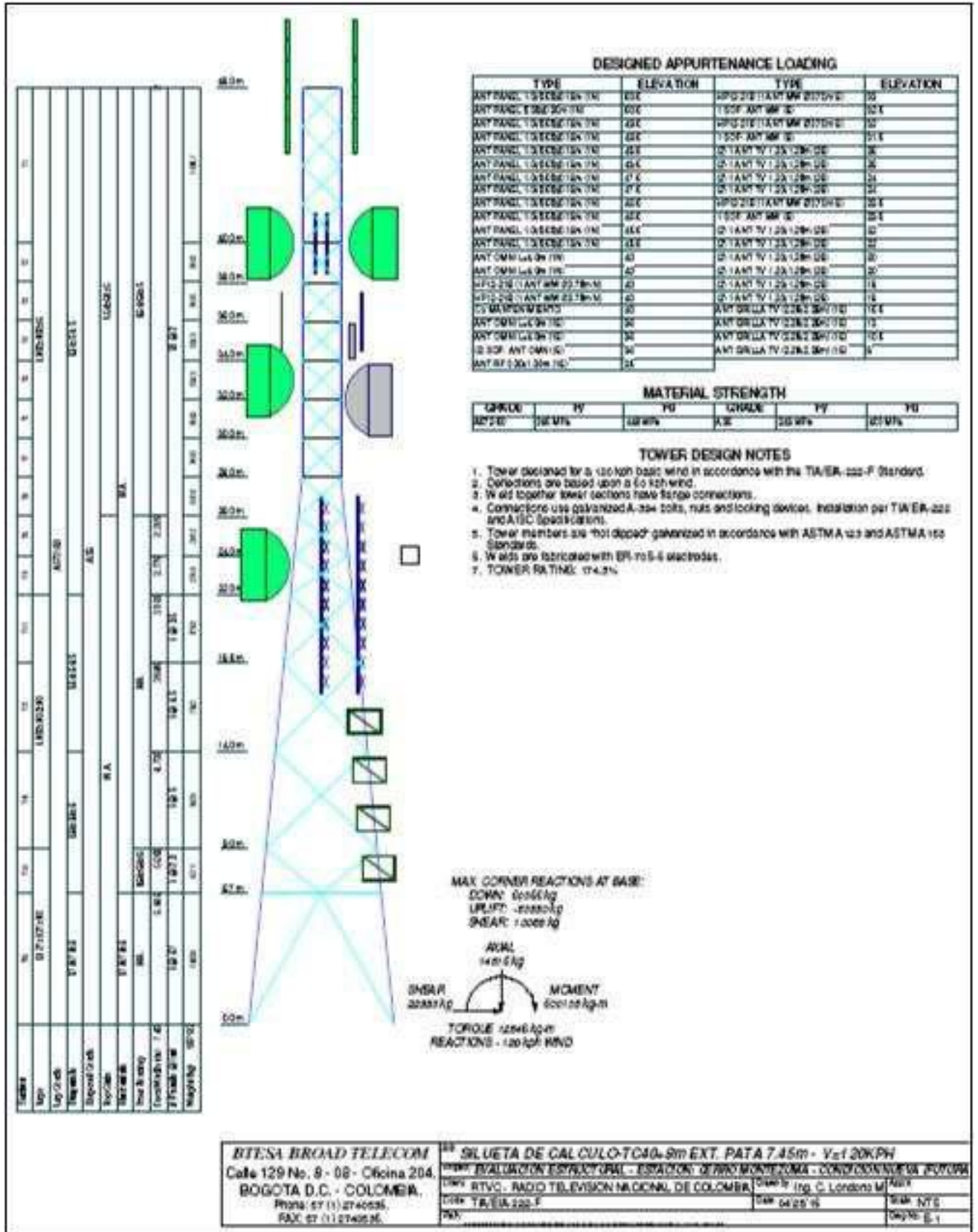
**PANORAMICA TC40m – ESTADO ACTUAL.**







## SILUETA DE CALCULO CONDICION NUEVA.





## 1.2 CODIGOS Y NORMAS:

NSR-10  
AISC  
TIA/EIA 222-F  
ASCE, Report 52  
ANSI/ASCE 10-90  
ANDREWS, Bulletin 1015F  
ASTM (normas aplicables)  
ACI 318 última edición  
AWS

## 1.3 MATERIALES ESTRUCTURALES:

Perfiles estructurales de montantes:	ASTM A-36.
Perfiles estructurales de diagonales, horizontales redundantes y laminas:	ASTM A –36.
Tornillos:	ASTM A-394 T0.
Anclajes:	CON STUB.
Soldadura:	AWS.

## 1.4 DOCUMENTOS DE REFERENCIA

Esquemas de diseño del levantamiento de la estructura de la torre.

## 1.5 CARGAS

Las siguientes cargas serán consideradas en el análisis estructural.

-Cargas muertas, CM, correspondientes a los pesos propios de la estructura, plataformas de operación, revestimientos y accesorios.

-Cargas vivas, 4 personas de 80 Kg. Cada una por mantenimiento,

CV. -Cargas de viento, CW.

Las combinaciones de estas cargas para incluirlas en los análisis y diseños Estructurales estarán de acuerdo con la Norma TIA/EIA-222-F.

## 1.6 SISTEMAS DE MEDIDA

Longitud	m, mm
Coordenadas	m
Áreas	m <sup>2</sup> , cm <sup>2</sup>
Fuerza	Kg.
Presión	kgm
Esfuerzo	kPa
Momentos	Kg-m
Modulo	kPa
Propiedades	mm
Deflexiones	mm

En caso contrario se indicara el tipo de unidad utilizado. De todas maneras las unidades empleadas para un evento determinado serán compatibles entre sí.



### **1.0 CARGAS MUERTAS, CM**

*Las cargas muertas corresponderán a los pesos propios de los elementos estructurales, revestimiento, escaleras de acceso y guía de ondas, soportes de antenas y demás accesorios.*

*El cálculo de los pesos de los elementos estructurales los realiza internamente el programa, incluyendo un factor de 1.50, de sobre peso por elementos redundantes, platinas, tornillos y galvanizado, y lo distribuye sobre los nudos correspondientes.*

### **2.0 CARGAS VIVAS**

*La carga viva considerada consistirá en 4 personas de 80 Kg. Cada una por mantenimiento.*

### **3.0 CARGAS DE VIENTO**

*Las cargas de viento se calcularan de acuerdo a la norma TIA/EIA 222 F-1996.*

*Velocidad básica de viento,*

*V = 120 KPH (Zona 4)*

*Deflexiones se calculan con Velocidad de viento,*

*V = 60 KPH.*



## **5.0 ANALISIS Y DISEÑOS ESTRUCTURALES**

### **5.1 ANALISIS ESTRUCTURAL**

*En la Fig. 1 del Anexo se presenta la silueta del análisis y diseño estructural de la torre de sección cuadrada de 40.0 m. De altura, objeto de este documento.*

*Se consideran siete hipótesis de carga:*

*1- Carga Muerta*

*2- Viento (120 KPH) Carga Muerta + Viento en dirección normal de una cara de la torre, dirección Z, ángulo de incidencia 0°.*

*3- Viento (120 KPH) Carga Muerta + Viento en dirección diagonal, sobre un vértice de la torre, ángulo de incidencia de 45°.*

*4- Viento (120 KPH) Carga Muerta + Viento en dirección normal de una cara de la torre, dirección Z, ángulo de incidencia 90°.*

*5- Viento (60 KPH) Carga Muerta + Viento en dirección normal de una cara de la torre, dirección Z, ángulo de incidencia 0°, con cargas de operación.*

*6- Viento (60 KPH) Carga Muerta + Viento en dirección diagonal, sobre un vértice de la torre, ángulo de incidencia de 45°, con cargas de operación.*

*7- Viento (60 KPH) Carga Muerta + Viento en dirección normal de una cara de la torre, dirección Z, ángulo de incidencia 90°, con cargas de operación.*

*Igualmente en el ANEXO A se presentan los datos de entrada y los resultados del análisis estructural para los diferentes elementos que conforman la torre de sección cuadrada, realizado por el programa para diseño de torres RISATower, Versión 5.4.1.8 – 8 de Abril de 2010, de RISA TECHNOLOGIES.*

*También se incluye un control de deflexiones en la parte superior de la torre (Nivel 40.0 + 8.0 m de Extensión) de tal manera que cumpla con el requisito de que, la deflexión en este punto, a 60 KPH, sea menor o igual a  $h/200$ .*



## **5.2 DISEÑOS ESTRUCTURALES**

*Con base en el dimensionamiento y en los resultados de modelo, se evalúan las cargas máximas actuantes y admisibles en cada tramo, considerando los efectos simultáneos de Axial y de Flexión. Para una mayor precisión, se consideran también los efectos de segundo orden (P-Delta)*

*En la fase, para el caso de cargas de diseño, se verifica que en los elementos estructurales no se sobrepasen sus capacidades admisibles de compresión y tracción establecidas por la norma.*

*También se verifica que en las conexiones propuestas tampoco se sobrepasen sus capacidades admisibles de corte y aplastamiento establecidas por la norma.*

*Anexos:*

*Silueta del levantamiento y refuerzo.*

*Ver salida 1 – Condición Actual.*

*Ver salida 2 – Condición Nueva (Futura).*

*Ver salida 3 – Condición Nueva (Futura) + Refuerzo, datos de entrada y salida de los resultados del análisis y los diseños.*

## 6.0 CONCLUSIONES:

En la **CONDICION ACTUAL**, con las antenas relacionadas y las características estructurales de la torre para una velocidad de viento de 120 Kph. Después del análisis y verificación de esfuerzos de los materiales de la estructura de la torre de 40.0m, de la **ESTACION: CERRÓ MONTEZUMA** – Ubicada en Municipio de Pueblo Rico, Departamento de Risaralda, tenemos: **LA TORRE CUMPLE.**

Porcentaje máximo de utilización Diagonal (T14) 79.7% < 100%. **Ok. Cumple.**

### PORCENTAJE DE USO DE ELEMENTOS CONDICION ACTUAL.

Section Capacity Table								
Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P <sub>allow</sub> kg	% Capacity	Pass/Fail
T1	40 - 38	Leg	L102x102x6	3	-170.06	24666.48	0.7	Pass
		Diagonal	L51x51x5	14	-67.62	3588.13	1.9	Pass
		Top Girt	L64x64x5	8	3.91	7509.63	0.2	Pass
		Inner Bracing	L64x64x5	5	3.91	8837.43	0.2	Pass
T2	38 - 36	Leg	L102x102x6	21	-471.28	24666.48	1.9	Pass
		Diagonal	L51x51x5	35	-218.73	3588.13	6.1	Pass
		Top Girt	L64x64x5	27	31.41	10010.34	0.3	Pass
		Inner Bracing	L64x64x5	23	17.02	8837.43	0.2	Pass
T3	36 - 34	Leg	L102x102x6	39	-1108.74	24666.48	4.5	Pass
		Diagonal	L51x51x5	50	-381.38	3588.13	10.6	Pass
		Top Girt	L64x64x5	44	77.57	10010.34	0.8	Pass
		Inner Bracing	L64x64x5	42	26.49	8837.43	0.3	Pass
T4	34 - 32	Leg	L102x102x6	57	-2256.96	24666.48	9.1	Pass
		Diagonal	L51x51x5	66	-959.42	3588.13	26.7	Pass
		Top Girt	L64x64x5	64	-89.72	3572.37	2.3	Pass
		Inner Bracing	L64x64x5	60	38.90	8837.43	0.4	Pass
T5	32 - 30	Leg	L102x102x6	75	-4944.75	24666.48	20.0	Pass
		Diagonal	L51x51x5	84	-1844.81	3588.13	51.4	Pass
		Top Girt	L64x64x5	82	-242.45	3572.37	6.8	Pass
		Inner Bracing	L64x64x5	78	59.85	8837.43	0.7	Pass
T6	30 - 28	Leg	L102x102x6	93	-8201.59	24666.48	33.2	Pass
		Diagonal	L51x51x5	104	-1991.45	3588.13	55.5	Pass
		Top Girt	L64x64x5	100	-612.30	3572.37	17.1	Pass
		Inner Bracing	L64x64x5	96	82.86	8837.43	0.9	Pass
T7	28 - 26	Leg	L102x102x6	111	-11552.05	24603.78	47.0	Pass
		Diagonal	L51x51x5	122	-1041.17	5666.81	18.4	Pass
		Top Girt	L64x64x5	115	-191.84	3572.37	5.4	Pass
		Inner Bracing	L64x64x5	114	39.59	11780.30	0.3	Pass
T8	26 - 24	Leg	L102x102x6	129	-14225.98	24603.78	57.8	Pass
		Diagonal	L51x51x5	137	-792.64	5148.89	15.4	Pass
T9	24 - 22	Leg	L102x102x6	141	-15496.26	24603.78	63.0	Pass
		Diagonal	L51x51x5	149	-1370.43	4563.25	30.0	Pass
T10	22 - 18.5	Leg	L102x102x10	153	-19038.64	43645.55	43.6	Pass
		Diagonal	L51x51x5	161	-1690.32	6411.23	26.4	Pass
T11	18.5 - 14	Leg	L102x102x10	165	-21983.41	40234.18	54.6	Pass
		Diagonal	L64x64x5	173	-1840.51	8064.79	22.8	Pass
T12	14 - 9	Leg	L102x102x10	177	-26226.08	38375.33	68.3	Pass
		Diagonal	L64x64x6	185	-1779.47	9383.51	19.0	Pass
T13	9 - 6.7	Leg	L127x127x10	189	-28973.54	54376.44	53.3	Pass
		Diagonal	L64x64x6	202	-1518.66	5148.92	29.5	Pass
T14	6.7 - 0	Leg	L127x127x10	205	-29173.30	51788.22	56.3	Pass
		Diagonal	L76x76x6	213	-3341.57	4194.11	79.7	Pass
		Horizontal	L76x76x6	191	-421.85	8010.38	5.3	Pass
						Summary		
						Leg (T12)	68.3	Pass
						Diagonal (T14)	79.7	Pass
						Horizontal (T14)	5.3	Pass
						Top Girt (T6)	17.1	Pass
						Bolt Checks	39.5	Pass
						RATING =	79.7	Pass

Ver Salida 1 – Condición Actual.





En la **CONDICION NUEVA (FUTURA)**, con las antenas relacionadas (Existentes) más una (1) Extensión de 10m, más dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 49.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 48.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 47.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 46.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 45.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 44.5m y las características estructurales de la torre para una velocidad de viento de 120 Kph. Después del análisis y verificación de esfuerzos de los materiales de la estructura de la torre de 40.0m + 10.0m de Extensión, de la **ESTACION: CERRÓ MONTEZUMA** – Ubicada en Municipio de Pueblo Rico, Departamento de Risaralda, tenemos: **LA TORRE NO CUMPLE**. Fallan los Montantes (T15 al T6) y las Diagonales (T7, T6 y T5). Porcentaje máximo de utilización Montante (T9) 174.3% > 100%. **NO Cumple**.

**PORCENTAJE DE USO DE ELEMENTOS CONDICION NUEVA.**

Section Capacity Table									
Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P <sub>allow</sub> kg	% Capacity	Pass/Fail	
T1	48 - 40	Leg	L102x102x6	3	-3143.48	24666.48	12.7	Pass	
		Diagonal	L51x51x5	12	-772.04	3588.13	21.5	Pass	
		Top Girt	L64x64x5	8	-20.32	3572.37	0.6	Pass	
T2	40 - 38	Leg	L102x102x6	45	-5518.77	24666.48	22.4	Pass	
		Diagonal	L51x51x5	54	-2922.51	3588.13	81.4	Pass	
		Top Girt	L64x64x5	52	-291.43	3572.37	8.2	Pass	
T3	38 - 36	Leg	L102x102x6	63	-9517.01	24666.48	38.6	Pass	
		Diagonal	L51x51x5	72	-3131.20	3588.13	87.3	Pass	
		Top Girt	L64x64x5	70	-712.64	3572.37	19.9	Pass	
T4	36 - 34	Leg	L102x102x6	81	-13918.89	24666.48	56.4	Pass	
		Diagonal	L51x51x5	92	-3324.34	3588.13	92.6	Pass	
		Top Girt	L64x64x5	88	-1150.21	3572.37	32.2	Pass	
T5	34 - 32	Leg	L102x102x6	99	-18913.95	24666.48	76.7	Pass	
		Diagonal	L51x51x5	108	-3993.42	3588.13	111.3	Fail X	
		Top Girt	L64x64x5	106	-1618.66	3572.37	45.3	Pass	
T6	32 - 30	Leg	L102x102x6	117	-25506.64	24666.48	103.4	Fail X	
		Diagonal	L51x51x5	128	-5063.54	3588.13	141.1	Fail X	
		Top Girt	L64x64x5	124	-2187.94	3572.37	61.2	Pass	
T7	30 - 28	Leg	L102x102x6	135	-32233.55	24666.48	130.7	Fail X	
		Diagonal	L51x51x5	146	-6072.24	3588.13	169.2	Fail X	
		Top Girt	L64x64x5	139	-3225.70	3572.37	90.3	Pass	
T8	28 - 26	Leg	L102x102x6	153	-39366.61	24603.78	160.0	Fail X	
		Diagonal	L51x51x5	164	-2285.02	5666.81	40.3	Pass	
		Top Girt	L64x64x5	157	-625.45	3572.37	17.5	Pass	
T9	26 - 24	Leg	L102x102x6	171	-42889.35	24603.48	174.3	Fail X	
		Diagonal	L51x51x5	180	-1407.09	5148.89	27.3	Pass	
		Top Girt	L64x64x5	183	-42815.91	24603.78	174.0	Fail X	
T10	24 - 22	Leg	L102x102x6	188	-1802.71	7574.79	23.8	Pass	
		Diagonal	L51x51x5	195	-46827.08	43645.55	107.3	Fail X	
		Top Girt	L64x64x5	198	-2012.12	9121.58	22.1	Pass	
T11	18.5 - 14	Leg	L102x102x10	207	-48580.21	40234.18	120.7	Fail X	
		Diagonal	L64x64x5	210	-2230.50	8064.79	27.7	Pass	
		Top Girt	L64x64x6	219	-53341.12	38375.33	139.0	Fail X	
T12	14 - 9	Leg	L102x102x10	222	-2185.03	2713.39	80.5	Pass	
		Diagonal	L64x64x6	231	-55684.83	54376.44	102.4	Fail X	
		Top Girt	L64x64x6	234	-1885.97	5148.92	36.6	Pass	
T13	9 - 6.7	Leg	L127x127x10	247	-131.62	884.85	14.9	Pass	
		Diagonal	L64x64x6	251	-55870.35	51788.22	107.9	Fail X	
		Top Girt	L76x76x6	254	-4155.54	4194.11	99.1	Pass	
T14	6.7 - 0	Leg	L127x127x10	233	-612.27	8010.38	7.6	Pass	
		Diagonal	L76x76x6						
		Horizontal	L76x76x6						
T15	6.7 - 0	Leg							
		Diagonal							
		Horizontal							
		Summary							
		Leg (T9)		174.3	Fail X				
		Diagonal (T7)		169.2	Fail X				
Horizontal (T15)							7.6	Pass	
Top Girt (T7)							90.3	Pass	
Bolt Checks							133.3	Fail X	
RATING =							174.3	Fail X	

Ver Salida 2 – Condición Nueva.

En la **CONDICION NUEVA (FUTURA) + REFUERZO**, con las antenas relacionadas (Existentes) más una (1) Extensión de 10m, más dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 49.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 48.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 47.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 46.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 45.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 44.5m y las características estructurales de la torre para una velocidad de viento de 120 Kph. Después del análisis y verificación de esfuerzos de los materiales de la estructura de la torre de 40.0m + 10.0m de Extensión, de la **ESTACION: CERRÓ MONTEZUMA** – Ubicada en Municipio de Pueblo Rico, Departamento de Risaralda, tenemos: **LA TORRE CUMPLE**. Porcentaje máximo de utilización Diagonal (T4) 81.3% < 100%. **OK. Cumple.**

**PORCENTAJE DE USO DE ELEMENTOS CONDICION NUEVA+REFUERZO.**

Section Capacity Table								
Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P <sub>allow</sub> kg	% Capacity	Pass/Fail
T1	48 - 40	Leg	L102x102x6	3	-3019.85	24666.48	12.2	Pass
		Diagonal	L51x51x5	12	-763.33	3588.13	21.3	Pass
		Top Girt	L64x64x5	9	-19.46	3572.37	0.5	Pass
T2	40 - 38	Leg	L102x102x6	45	-5371.94	24666.48	21.8	Pass
		Diagonal	L51x51x5	54	-2901.92	3588.13	80.9	Pass
		Top Girt	L64x64x5	52	-297.37	3572.37	8.3	Pass
T3	38 - 36	Leg	L102x102x6	63	-9339.97	24666.48	37.9	Pass
		Diagonal	L51x51x5	72	-3082.76	3975.76	77.5	Pass
		Top Girt	L64x64x5	70	-715.55	3572.37	20.0	Pass
T4	36 - 34	Leg	L102x102x6	81	-13626.15	24666.48	55.2	Pass
		Diagonal	L51x51x5	92	-3371.16	4146.80	81.3	Pass
		Top Girt	L64x64x5	88	-1207.49	3572.37	33.8	Pass
T5	34 - 32	Leg	L102x6+L102x6	99	-19295.69	57300.83	33.7	Pass
		Diagonal	L64x64x5	108	-3697.21	6600.84	56.0	Pass
		Top Girt	L64x64x5	106	-1204.82	3572.37	33.7	Pass
T6	32 - 30	Leg	L102x6+L102x6	117	-25647.12	57300.83	44.8	Pass
		Diagonal	L64x64x5	126	-4727.66	6602.41	71.6	Pass
		Top Girt	L64x64x5	124	-1391.18	3573.87	38.9	Pass
T7	30 - 28	Inner Bracing	L64x64x5	120	63.08	8837.43	0.7	Pass
		Leg	L102x6+L102x6	135	-32428.23	57300.83	56.6	Pass
		Diagonal	L64x64x5	146	-4961.17	6602.41	75.1	Pass
T8	28 - 26	Top Girt	L64x64x5	139	-1579.69	3573.87	44.2	Pass
		Inner Bracing	L64x64x5	138	70.07	8837.43	0.8	Pass
		Leg	L102x6+L102x6	153	-38221.38	57130.81	66.9	Pass
T9	26 - 24	Diagonal	L51x51x5	164	-2076.37	5667.74	36.6	Pass
		Top Girt	L64x64x5	157	-485.53	3573.87	13.6	Pass
		Inner Bracing	L64x64x5	155	-92.71	4278.51	2.2	Pass
T10	24 - 22	Leg	L102x6+L102x6	171	-40746.71	57129.96	71.3	Pass
		Diagonal	L51x51x5	174	-1182.81	5149.81	23.0	Pass
		Leg	L102x6+L102x6	183	-42089.89	57130.81	73.7	Pass
T11	22 - 18.5	Diagonal	L51x51x5	186	-1576.93	7575.10	20.8	Pass
		Leg	L102x10+L102x6	195	-44298.12	73251.38	60.5	Pass
		Diagonal	L64x64x5	198	-2017.76	9121.94	22.1	Pass
T12	18.5 - 14	Leg	L102x10+L102x6	207	-46825.71	67526.06	69.3	Pass
		Diagonal	L64x64x5	210	-2013.76	8065.22	25.0	Pass
		Leg	L102x10+L102x6	219	-50979.26	64406.12	79.2	Pass
T13	14 - 9	Diagonal	L64x64x6	222	-2056.14	2713.78	75.8	Pass
		Leg	L127x10+L102x6	231	-51703.65	83682.61	61.8	Pass
		Diagonal	L64x64x6	237	-2224.80	5149.65	43.2	Pass
T14	9 - 6.7	Inner Bracing	L64x64x6	245	-77.50	884.85	8.8	Pass
		Leg	L127x10+L102x6	251	-51594.33	79695.62	64.7	Pass
		Diagonal	L76x76x6	254	-3812.98	4717.89	80.8	Pass
T15	6.7 - 0	Horizontal	L76x76x6	233	-840.24	8010.38	10.5	Pass
		Summary						
		Leg (T13)	79.2	Pass				
Diagonal (T4)							81.3	Pass
Horizontal (T15)							10.5	Pass
Top Girt (T7)							44.2	Pass
Bolt Checks							71.8	Pass
RATING =							81.3	Pass

Ver Salida 3 – Condición Nueva + Refuerzo.







## 7.0 RECOMENDACIONES:

-La torre en la Condición Actual soporta las antenas existentes.

**-La torre para la Condición Nueva (Futura) debe ser reforzada.**

-Se instalara una extensión de 10m, que va desde el nivel 40.0m hasta el nivel 48.0m. Allí estarán las antenas proyectadas para RTVC.

### REFUERZO MONTANTES:

-Desde el Nivel 0.0m al Nivel 32.0m, Montantes (T15, T14, T13, T12, T11, T10, T9, T8, T7 y T6), en L102x102x6.4H. Paralelo que tenga continuidad con el anclaje de la cimentación y con el montante existente (se debe soldar el montante del refuerzo a la placa base de la torre. (Ver silueta de refuerzo plano No. 2/2).

### REFUERZO DIAGONALES:

-Desde el nivel 28.0m al nivel 34.0m (T7, T6 y T5), Reemplazar el diagonal existente (L51x51x4.8), por un (1) L64x64x4.8H. (Ver silueta de refuerzo plano No. 2/2)

Una vez realizado el refuerzo se puede proceder a la instalación de la nueva extensión de 10.0m de altura y las nuevas antenas: Dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 49.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 48.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 47.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 46.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 45.5m, dos (2) antenas panel (1.0x0.50x0.19m), en el nivel 44.5m

MATERIAL APROXIMADO DE EXTENSION H=10m:	
Montantes (T1) en L102x102x6.4H	418 Kg
Diagonales (T1) en L51x51x4.8H	398 Kg
Horizontales (T1) en L64x64x4.8H	128 Kg
Horizontales Redundantes (T1) en L51x51x4.8H	178 Kg
Lámina de uniones (T1) en Lámina de 6.4mm	198 Kg
Tornillos en la extensión	118 Kg
Peso aproximado de la Extensión	1438 Kg

<b>MATERIAL APROXIMADO DE REFUERZO EN TORRE:</b>		
Refuerzo Montantes (T15 al T6) en	L 102x102x6.4H, desde el Nivel 0.0m al nivel 32.0m	1850 Kg
Refuerzo Montantes (T15 y T6) en	Lámina de 6.4mm, desde el Nivel 0.0m al nivel 32.0m	90 Kg
Refuerzo Diagonales (T7, T6 y T5) en	L 64x64x4.8H, desde el Nivel 28.0 al Nivel 34.0m	330 Kg
Tornillos en refuerzo de Montantes y Diagonales		280 Kg
Peso aproximado del Refuerzo		2550 Kg

<b>RESUMEN DE PORCENTAJE DE USO DE LOS ELEMENTOS DE LA TORRE</b>			
ELEMENTO:	C. ACTUAL	C. NUEVA	C. NUEVA+REF
MONTANTE	(T12) 68.3%	(T9) 174.3%	(T3) 79.2%
DIAGONAL	(T14) 79.7%	(T7) 169.2%	(T4) 81.3%
HORIZONTAL	(T6) 17.1%	(T7) 90.3%	(T7) 44.2%
TORNILLOS	39.5%	133.3%	71.8%

## 8.0 CIMENTACION:

Tipo zapata aislada.

De acuerdo a las excavaciones se determinaron, pedestales de 0.60x0.60x0.60 m sobre el nivel de piso y 0.96X0.96x2.50 de profundidad, pero no se pudo determinar las dimensiones de la zapata.

La torre se ancla con Stub.

## 9.0 INSPECCION TECNICA.

**PINTURA:** Se encuentra en mal estado, se recomienda raspado, lavado y pintura de toda la estructura.

**ESCALERA DE ACCESO:** Por uno de los vértices de la torre.

**LINEA DE VIDA:** No se tiene línea de vida. Se recomienda la instalación de una línea de vida que cumpla con los sistemas de seguridad.

**ESCALERA DE CABLES:** Una (1) por uno de los vértices de la torre en un 65% de uso.

**LUCES DE OBSTRUCCION:** En mal estado, se recomienda su mantenimiento.

**SISTEMA DE TIERRAS:** En buen estado.



**PARARRAYOS:** *En buen estado y funcionando.*

**TORNILLOS:** *ASTM A-394 T0, en buen estado, se recomienda torque general de la tornillería. En caso de llevarse a cabo el refuerzo se debe cambiar la tornillería que resulte afectada, usando tornillos ASTM A-394 Tipo 0.*

*Anexos:*

*Registro Fotográfico.*

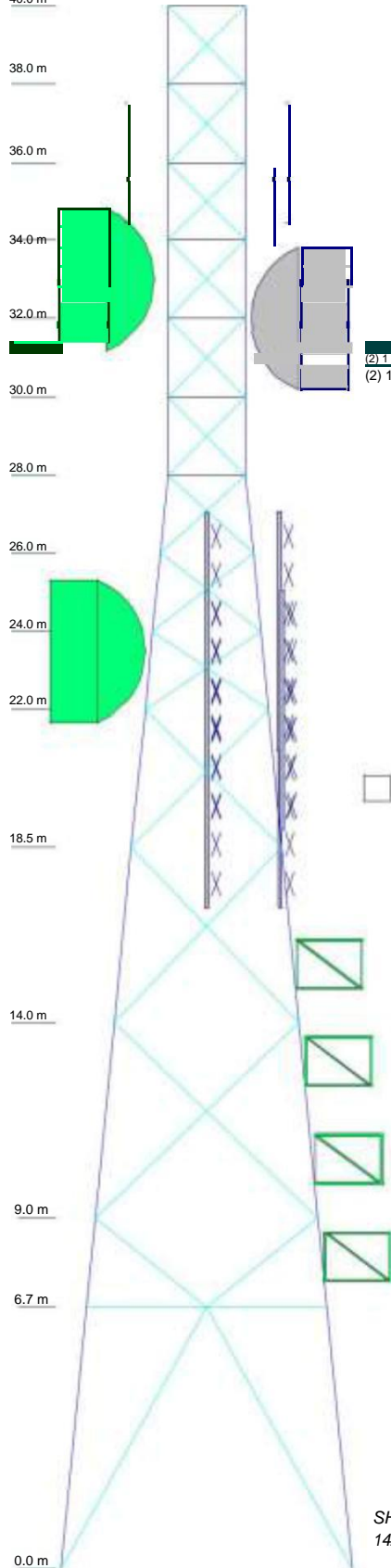




***CONDICION ACTUAL.***  
***ESTACION: CERRÓ MONTEZUMA.***



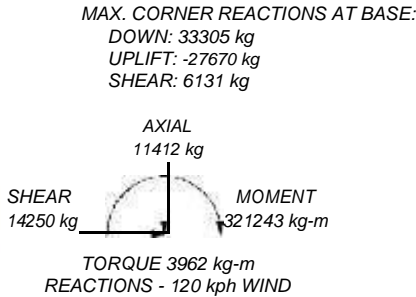
Section	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs														
Leg Grade														
Diagonals														
Diagonal Grade														
Top Girts	L127x127x10	L76x76x6	L64x64x6	N.A.	L102x102x10	A36	A572-50	5	L102x102x6	L64x64x5				
Horizontals	L76x76x6	L64x64x6	N.A.	N.A.	N.A.									
Bracing section	L64x64x6	6.146	5.698	1 @ 2.3	519.9	1 @ 6.7	354.1							
4 bolts @														
min spacing @														
1														



DESIGNED APPURTENANCE LOADING			
TYPE	ELEVATION	TYPE	ELEVATION
C x MANTENIMIENTO	40	HP12-21B (1 ANT MW Ø3.70m E)	23.5
ANT OMNI L=4.0m (1E)	36	1 SOP. ANT MW (E)	23.5
ANT OMNI L=4.0m (1E)	36	(2) 1 ANT TV 1.20x1.20m (2E)	22
(2) SOP. ANT OMNI (E)	36	(2) 1 ANT TV 1.20x1.20m (2E)	22
ANT RF 0.30x1.30m (1E)	35	(2) 1 ANT TV 1.20x1.20m (2E)	20
HP12-21B (1 ANT MW Ø3.70m E)	33	(2) 1 ANT TV 1.20x1.20m (2E)	20
1 SOP. ANT MW (E)	32.5	(2) 1 ANT TV 1.20x1.20m (2E)	18
HP12-21B (1 ANT MW Ø3.70m E)	32	(2) 1 ANT TV 1.20x1.20m (2E)	18
1 SOP. ANT MW (E)	31.5	ANT GRILLA TV (2.25x2.25m) (1E)	15.5
(2) 1 ANT TV 1.20x1.20m (2E)	26	ANT GRILLA TV (2.25x2.25m) (1E)	13
(2) 1 ANT TV 1.20x1.20m (2E)	26	ANT GRILLA TV (2.25x2.25m) (1E)	10.5
(2) 1 ANT TV 1.20x1.20m (2E)	24	ANT GRILLA TV (2.25x2.25m) (1E)	8
(2) 1 ANT TV 1.20x1.20m (2E)	24		

MATERIAL STRENGTH					
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	345 MPa	448 MPa	A36	248 MPa	400 MPa

- TOWER DESIGN NOTES**
1. Tower designed for a 120 kph basic wind in accordance with the TIA/EIA-222-F Standard.
  2. Deflections are based upon a 60 kph wind.
  3. Weld together tower sections have flange connections.
  4. Connections use galvanized A-394 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
  5. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
  6. Welds are fabricated with ER-70S-6 electrodes.
  7. TOWER RATING: 79.7%



<b>BTESA BROAD TELECOM</b>		Job: <b>SILUETA DE CALCULO-TC40m PATA 7.45m - V=120KPH</b>	
Calle 129 No. 8 - 08 - Oficina 204.		EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	
BOGOTA D.C. - COLOMBIA.		Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	Drawn by: Ing. C. Londoño M.
Phone: 57 (1) 2740536.		TIA/EIA-222-F	04/25/16
FAX: 57 (1) 2740536.		Path:	Scale: NTS
			Dwg No. E-1

<b><i>RISATower</i></b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 1 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

SALIDA 1 – CONDICION ACTUAL.

## Tower Input Data

The main tower is a 4x free standing tower with an overall height of 40.0000 m above the ground line. The base of the tower is set at an elevation of 0.0000 m above the ground line.

The face width of the tower is 2.0000 m at the top and 7.4500 m at the base. This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 120 kph.

Deflections calculated using a wind speed of 60 kph.

Weld together tower sections have flange connections.

Connections use galvanized A-394 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards. Welds are fabricated with ER-70S-6 electrodes.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

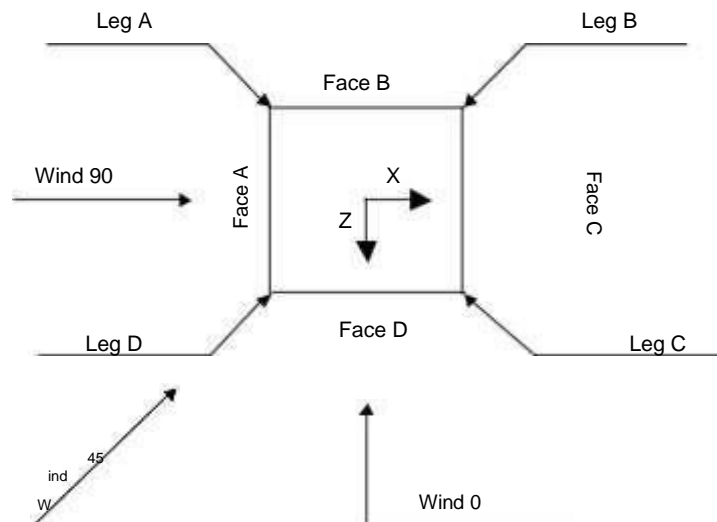
Stress ratio used in tower member design is 1.333.

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

## Options

Consider Moments - Legs	√ Distribute Leg Loads As Uniform	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	√ Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 2 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.



**Square To wer**

## Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	m			m		m
T1	40.0000-38.0000			2.0000	1	2.0000
T2	38.0000-36.0000			2.0000	1	2.0000
T3	36.0000-34.0000			2.0000	1	2.0000
T4	34.0000-32.0000			2.0000	1	2.0000
T5	32.0000-30.0000			2.0000	1	2.0000
T6	30.0000-28.0000			2.0000	1	2.0000
T7	28.0000-26.0000			2.0000	1	2.0000
T8	26.0000-24.0000			2.3890	1	2.0000
T9	24.0000-22.0000			2.7790	1	2.0000
T10	22.0000-18.5000			3.1680	1	3.5000
T11	18.5000-14.0000			3.8490	1	4.5000
T12	14.0000-9.0000			4.7250	1	5.0000
T13	9.0000-6.7000			5.6980	1	2.3000
T14	6.7000-0.0000			6.1460	1	6.7000

## Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	m	m				mm	mm
T1	40.0000-38.0000	2.0000	X Brace	No	No	0	0
T2	38.0000-36.0000	2.0000	X Brace	No	No	0	0
T3	36.0000-34.0000	2.0000	X Brace	No	No	0	0
T4	34.0000-32.0000	2.0000	X Brace	No	No	0	0
T5	32.0000-30.0000	2.0000	X Brace	No	No	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 3 of 48
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Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	m	m				mm	mm
T6	30.0000-28.0000	2.0000	X Brace	No	No	0	0
T7	28.0000-26.0000	2.0000	X Brace	No	No	0	0
T8	26.0000-24.0000	2.0000	X Brace	No	No	0	0
T9	24.0000-22.0000	2.0000	X Brace	No	No	0	0
T10	22.0000-18.5000	3.5000	X Brace	No	No	0	0
T11	18.5000-14.0000	4.5000	X Brace	No	No	0	0
T12	14.0000-9.0000	5.0000	X Brace	No	No	0	0
T13	9.0000-6.7000	2.3000	K Brace Up	No	Yes	0	0
T14	6.7000-0.0000	6.7000	K Brace Down	No	Yes	0	0

### Tower Section Geometry (cont'd)

Tower Elevation m	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 40.0000-38.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T2 38.0000-36.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T3 36.0000-34.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T4 34.0000-32.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T5 32.0000-30.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T6 30.0000-28.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T7 28.0000-26.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T8 26.0000-24.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T9 24.0000-22.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T10 22.0000-18.5000	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T11 18.5000-14.0000	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T12 14.0000-9.0000	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x6	A36 (248 MPa)
T13 9.0000-6.7000	Equal Angle	L127x127x10	A572-50 (345 MPa)	Equal Angle	L64x64x6	A36 (248 MPa)
T14 6.7000-0.0000	Equal Angle	L127x127x10	A572-50 (345 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 4 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### Tower Section Geometry (cont'd)

Tower Elevation m	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 40.0000-38.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T2 38.0000-36.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T3 36.0000-34.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T4 34.0000-32.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T5 32.0000-30.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T6 30.0000-28.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T7 28.0000-26.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation m	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T13 9.0000-6.7000	None	Flat Bar		A36 (248 MPa)	Solid Round	8	A36 (248 MPa)
T14 6.7000-0.0000	None	Flat Bar		A36 (248 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation m	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 40.0000-38.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T2 38.0000-36.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T3 36.0000-34.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T4 34.0000-32.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T5 32.0000-30.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T6 30.0000-28.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T7 28.0000-26.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T14 6.7000-0.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x6	A36 (248 MPa)

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### 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<sub>r</sub></i>	<i>Adjust. Factor A<sub>r</sub></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>m<sup>2</sup></i>	<i>mm</i>					<i>mm</i>	<i>mm</i>
T1 40.0000-38.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T2 38.0000-36.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T3 36.0000-34.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T4 34.0000-32.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T5 32.0000-30.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T6 30.0000-28.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T7 28.0000-26.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T8 26.0000-24.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T9 24.0000-22.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T10 22.0000-18.50 00	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T11 18.5000-14.00 00	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T12 14.0000-9.000 0	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T13 9.0000-6.7000	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T14 6.7000-0.0000	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0

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## Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors <sup>1</sup>							
			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 40.0000-38.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 38.0000-36.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 36.0000-34.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 34.0000-32.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 32.0000-30.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 30.0000-28.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 28.0000-26.00 00	No	No	0.5	1 0.25	1 1	1 1	1 1	1 1	1 1	1 0.5
T8 26.0000-24.00 00	No	No	0.5	1 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T9 24.0000-22.00 00	No	No	0.5	1 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T10 22.0000-18.50 00	No	No	0.25	0.5 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T11 18.5000-14.00 00	No	No	0.25	0.5 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T12 14.0000-9.000 0	No	No	0.25	0.5 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T13 9.0000-6.7000	No	No	0.5	1 1	0.5 0.5	1 1	1 1	1 1	1 1	1 1
T14 6.7000-0.0000	No	No	0.2	1 1	0.4 0.35	1 1	1 1	1 0.5	1 1	0.5 0.5

<sup>1</sup>Note: 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.

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### Tower Section Geometry (cont'd)

Tower Elevation m	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 40.0000-38.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T2 38.0000-36.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T3 36.0000-34.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T4 34.0000-32.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T5 32.0000-30.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T6 30.0000-28.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T7 28.0000-26.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T8 26.0000-24.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T9 24.0000-22.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T10 22.0000-18.50 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T11 18.5000-14.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T12 14.0000-9.0000 0	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T13 9.0000-6.7000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T14 6.7000-0.0000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75



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## Tower Section Geometry (cont'd)

Tower Elevation m	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 40.0000-38.00 00	Sleeve SS	16 A394T0	4	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T2 38.0000-36.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T3 36.0000-34.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T4 34.0000-32.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T5 32.0000-30.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T6 30.0000-28.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T7 28.0000-26.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T8 26.0000-24.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T9 24.0000-22.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T10 22.0000-18.50 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T11 18.5000-14.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T12 14.0000-9.000 0	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T13 9.0000-6.7000	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T14 6.7000-0.0000	Sleeve SS	16 A394T0	16	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	2	16 A394T0	0

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## Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement m	Total Number	Number Per Row	Clear Spacing mm	Width or Diameter mm	Perimeter mm	Weight kg/m
1/2 (2 ANT OMNI E)	D	No	Ar (CfAe)	36.0000 - 0.0000	2	2	15	15		0.37
7/8 (1 ANT RF E)	D	No	Ar (CfAe)	35.0000 - 0.0000	1	1	28	28		0.80
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	32.5000 - 0.0000	1	1	28	28		0.80
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	31.5000 - 0.0000	1	1	28	28		0.80
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	26.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	24.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	22.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	20.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	18.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	15.5000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	13.0000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	10.5000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	8.0000 - 0.0000	1	1	15	15		0.37
7/8 (1 ANT GRILLA E)	D	No	Ar (CfAe)	23.5000 - 0.0000	1	1	28	28		0.80
(1 ANT MW E)										

## Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation m	Face	A <sub>R</sub> m	A <sub>F</sub> m	C <sub>A</sub> A <sub>A</sub> In Face m	C <sub>A</sub> A <sub>A</sub> Out Face m	Weight kg
T1	40.0000-38.0000	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
		D	0.000	0.000	0.000	0.000	0.00
T2	38.0000-36.0000	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
		D	0.000	0.000	0.000	0.000	0.00
T3	36.0000-34.0000	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
		D	0.087	0.000	0.000	0.000	2.29
T4	34.0000-32.0000	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
		D	0.129	0.000	0.000	0.000	3.50
T5	32.0000-30.0000	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
		D	0.214	0.000	0.000	0.000	5.91

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Tower Section	Tower Elevation m	Face	AR m <sup>2</sup>	AF m <sup>2</sup>	CAA In Face m <sup>2</sup>	CAA Out Face m <sup>2</sup>	Weight kg
T6	30.0000-28.0000	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
		D	0.228	0.000	0.000	0.000	6.31
T7	28.0000-26.0000	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
		D	0.228	0.000	0.000	0.000	6.31
T8	26.0000-24.0000	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
		D	0.287	0.000	0.000	0.000	7.80
T9	24.0000-22.0000	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
		D	0.388	0.000	0.000	0.000	10.49
T10	22.0000-18.5000	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
		D	0.851	0.000	0.000	0.000	22.78
T11	18.5000-14.0000	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
		D	1.310	0.000	0.000	0.000	34.74
T12	14.0000-9.0000	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
		D	1.602	0.000	0.000	0.000	42.30
T13	9.0000-6.7000	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
		D	0.787	0.000	0.000	0.000	20.71
T14	6.7000-0.0000	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
		D	2.335	0.000	0.000	0.000	61.42

## Feed Line Center of Pressure

Section	Elevation m	CPX mm	CPZ mm	CPX Ice mm	CPZ Ice mm
T1	40.0000-38.0000	0	0	0	0
T2	38.0000-36.0000	0	0	0	0
T3	36.0000-34.0000	0	24	0	24
T4	34.0000-32.0000	0	36	0	36
T5	32.0000-30.0000	0	58	0	58
T6	30.0000-28.0000	0	62	0	62
T7	28.0000-26.0000	0	56	0	56
T8	26.0000-24.0000	0	92	0	92
T9	24.0000-22.0000	0	134	0	134
T10	22.0000-18.5000	0	186	0	186
T11	18.5000-14.0000	0	246	0	246
T12	14.0000-9.0000	0	319	0	319
T13	9.0000-6.7000	0	331	0	331
T14	6.7000-0.0000	0	357	0	357

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## User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle		Weight	F <sub>x</sub>	F <sub>z</sub>	Wind Force	CAAC
	m	m	°		kg	kg	kg	kg	m <sup>2</sup>
C x MANTENIMIENTO	40.0000	0.0000	0.0000	No Ice	320.00	0.00	0.00	<b>0.00</b>	0.0000
				Service	320.00	0.00	0.00	<b>0.00</b>	0.0000
1 SOP. ANT MW (E)	32.5000	0.0000	0.0000	No Ice	150.00	20.00	-20.00	<b>0.00</b>	0.0000
				Service	150.00	5.00	-5.00	<b>0.00</b>	0.0000
1 SOP. ANT MW (E)	31.5000	0.0000	0.0000	No Ice	150.00	20.00	-20.00	<b>0.00</b>	0.0000
				Service	150.00	5.00	-5.00	<b>0.00</b>	0.0000
1 SOP. ANT MW (E)	23.5000	0.0000	0.0000	No Ice	150.00	20.00	-20.00	<b>0.00</b>	0.0000
				Service	150.00	5.00	-5.00	<b>0.00</b>	0.0000
(2) SOP. ANT OMNI (E)	36.0000	0.0000	0.0000	No Ice	20.00	0.00	0.00	<b>0.00</b>	0.0000
				Service	20.00	0.00	0.00	<b>0.00</b>	0.0000

## Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C <sub>A A</sub> Front m <sup>2</sup>	C <sub>A A</sub> Side m <sup>2</sup>	Weight kg
ANT OMNI L=4.0m (1E)	B	From Leg	1.5000 0.0000 0.0000	0.0000	36.0000	No Ice	1.3000	0.5500	60.00
ANT OMNI L=4.0m (1E)	D	From Leg	1.5000 0.0000 0.0000	0.0000	36.0000	No Ice	1.3000	0.5500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.0000 0.0000 0.0000	0.0000	26.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.6500 0.0000 0.0000	0.0000	24.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.5000 0.0000 0.0000	0.0000	22.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.1500 0.0000 0.0000	0.0000	20.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.0000 0.0000 0.0000	0.0000	18.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	26.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	24.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	22.0000	No Ice	0.6000	0.0500	60.00

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 12 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		CAA Front m <sup>2</sup>	CAA Side m <sup>2</sup>	Weight kg
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	20.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	18.0000	No Ice	0.6000	0.0500	60.00
ANT RF 0.30x1.30m (1E)	B	From Leg	0.8000 0.0000 0.0000	0.0000	35.0000	No Ice	0.3900	0.1950	15.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	1.3000 0.0000 0.0000	0.0000	15.5000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	1.3000 0.0000 0.0000	0.0000	13.0000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	1.3000 0.0000 0.0000	0.0000	10.5000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	1.3000 0.0000 0.0000	0.0000	8.0000	No Ice	1.2000	0.1500	110.00

## Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert m	Azimuth Adjustment °	3 dB Beam Width °	Elevation m	Outside Diameter m		Aperture Area m <sup>2</sup>	Weight kg
HP12-21B (1 ANT MW Ø3.70m E)	D	Paraboloid w/Shroud (HP)	From Leg	0.5000 0.0000 0.0000	Worst		33.0000	3.6576	No Ice	10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m E)	B	Paraboloid w/Shroud (HP)	From Leg	0.2000 0.0000 0.0000	Worst		32.0000	3.6576	No Ice	10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m E)	D	Paraboloid w/Shroud (HP)	From Leg	0.2000 0.0000 0.0000	Worst		23.5000	3.6576	No Ice	10.5064	385.55

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 13 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tower Pressures - No Ice

$$GH = 1.143$$

Section Elevation  m	z  m	KZ	qz  MPa	AG  m	F a c e  m	AF  m	AR  m	Aleg  m	Leg %	CAAA In Face m	CAAA Out Face m
T1 40.0000-38.00 00	39.0000	1.473	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.000		46.20	0.000	0.000
T2 38.0000-36.00 00	37.0000	1.451	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.000		46.20	0.000	0.000
T3 36.0000-34.00 00	35.0000	1.428	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.087		42.04	0.000	0.000
T4 34.0000-32.00 00	33.0000	1.404	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.129		40.27	0.000	0.000
T5 32.0000-30.00 00	31.0000	1.379	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.214		37.16	0.000	0.000
T6 30.0000-28.00 00	29.0000	1.353	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.228		36.69	0.000	0.000
T7 28.0000-26.00 00	27.0000	1.326	0.00	4.502	A	1.065	0.000	0.410	38.52	0.000	0.000
					B	1.065	0.000		38.52	0.000	0.000
					C	1.065	0.000		38.52	0.000	0.000
					D	1.065	0.228		31.73	0.000	0.000
T8 26.0000-24.00 00	25.0000	1.297	0.00	5.281	A	0.949	0.000	0.410	43.24	0.000	0.000
					B	0.949	0.000		43.24	0.000	0.000
					C	0.949	0.000		43.24	0.000	0.000
					D	0.949	0.287		33.20	0.000	0.000
T9 24.0000-22.00 00	23.0000	1.267	0.00	6.060	A	0.991	0.000	0.410	41.39	0.000	0.000
					B	0.991	0.000		41.39	0.000	0.000
					C	0.991	0.000		41.39	0.000	0.000
					D	0.991	0.388		29.74	0.000	0.000
T10 22.0000-18.50 00	20.2500	1.221	0.00	12.482	A	1.812	0.000	0.718	39.62	0.000	0.000
					B	1.812	0.000		39.62	0.000	0.000
					C	1.812	0.000		39.62	0.000	0.000
					D	1.812	0.851		26.95	0.000	0.000
T11 18.5000-14.00 00	16.2500	1.147	0.00	19.551	A	2.543	0.000	0.923	36.29	0.000	0.000
					B	2.543	0.000		36.29	0.000	0.000
					C	2.543	0.000		36.29	0.000	0.000
					D	2.543	1.310		23.95	0.000	0.000
T12 14.0000-9.000 0	11.5000	1.039	0.00	26.346	A	2.891	0.000	1.026	35.48	0.000	0.000
					B	2.891	0.000		35.48	0.000	0.000
					C	2.891	0.000		35.48	0.000	0.000
					D	2.891	1.602		22.83	0.000	0.000
T13 9.0000-6.7000	7.8500	1	0.00	13.784	A	1.571	0.000	0.590	37.54	0.000	0.000
					B	1.571	0.000		37.54	0.000	0.000
					C	1.571	0.000		37.54	0.000	0.000
					D	1.571	0.787		25.01	0.000	0.000
T14	3.3500	1	0.00	46.021	A	4.994	0.000	1.718	34.40	0.000	0.000

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	z	KZ	qz	AG	F a c e	AF	AR	A <sub>leg</sub>	Leg %	CAAA In Face m	CAAA Out Face m
m	m		MPa	m		m	m	m			
6.7000-0.0000					B	4.994	0.000		34.40	0.000	0.000
					C	4.994	0.000		34.40	0.000	0.000
					D	4.994	2.335		23.44	0.000	0.000

## Tower Pressure - Service

$$GH = 1.143$$

Section Elevation	z	KZ	qz	AG	F a c e	AF	AR	A <sub>leg</sub>	Leg %	CAAA In Face m <sup>2</sup>	CAAA Out Face m <sup>2</sup>
m	m		MPa	m <sup>2</sup>		m <sup>2</sup>	m <sup>2</sup>	m <sup>2</sup>			
T1 40.0000-38.00 00	39.0000	1.473	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.000		46.20	0.000	0.000
T2 38.0000-36.00 00	37.0000	1.451	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.000		46.20	0.000	0.000
T3 36.0000-34.00 00	35.0000	1.428	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.087		42.04	0.000	0.000
T4 34.0000-32.00 00	33.0000	1.404	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.129		40.27	0.000	0.000
T5 32.0000-30.00 00	31.0000	1.379	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.214		37.16	0.000	0.000
T6 30.0000-28.00 00	29.0000	1.353	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	0.228		36.69	0.000	0.000
T7 28.0000-26.00 00	27.0000	1.326	0.00	4.502	A	1.065	0.000	0.410	38.52	0.000	0.000
					B	1.065	0.000		38.52	0.000	0.000
					C	1.065	0.000		38.52	0.000	0.000
					D	1.065	0.228		31.73	0.000	0.000
T8 26.0000-24.00 00	25.0000	1.297	0.00	5.281	A	0.949	0.000	0.410	43.24	0.000	0.000
					B	0.949	0.000		43.24	0.000	0.000
					C	0.949	0.000		43.24	0.000	0.000
					D	0.949	0.287		33.20	0.000	0.000
T9 24.0000-22.00 00	23.0000	1.267	0.00	6.060	A	0.991	0.000	0.410	41.39	0.000	0.000
					B	0.991	0.000		41.39	0.000	0.000
					C	0.991	0.000		41.39	0.000	0.000
					D	0.991	0.388		29.74	0.000	0.000
T10 22.0000-18.50 00	20.2500	1.221	0.00	12.482	A	1.812	0.000	0.718	39.62	0.000	0.000
					B	1.812	0.000		39.62	0.000	0.000
					C	1.812	0.000		39.62	0.000	0.000
					D	1.812	0.851		26.95	0.000	0.000
T11 18.5000-14.00 00	16.2500	1.147	0.00	19.551	A	2.543	0.000	0.923	36.29	0.000	0.000
					B	2.543	0.000		36.29	0.000	0.000
					C	2.543	0.000		36.29	0.000	0.000
					D	2.543	1.310		23.95	0.000	0.000

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Section Elevation  m	z  m	KZ	qz  MPa	AG  m	F a c e	AF  m	AR  m <sup>2</sup>	A <sub>leg</sub>  m	Leg %  m	CAAA In Face m	CAAA Out Face m
T12 14.0000-9.0000 0	11.5000	1.039	0.00	26.346	A	2.891	0.000	1.026	35.48	0.000	0.000
					B	2.891	0.000		35.48	0.000	0.000
					C	2.891	0.000		35.48	0.000	0.000
					D	2.891	1.602		22.83	0.000	0.000
T13 9.0000-6.7000	7.8500	1	0.00	13.784	A	1.571	0.000	0.590	37.54	0.000	0.000
					B	1.571	0.000		37.54	0.000	0.000
					C	1.571	0.000		37.54	0.000	0.000
					D	1.571	0.787		25.01	0.000	0.000
T14 6.7000-0.0000	3.3500	1	0.00	46.021	A	4.994	0.000	1.718	34.40	0.000	0.000
					B	4.994	0.000		34.40	0.000	0.000
					C	4.994	0.000		34.40	0.000	0.000
					D	4.994	2.335		23.44	0.000	0.000

### Tower Forces - No Ice - Wind Normal To Face

Section Elevation  m	Add Weight  kg	Self Weight  kg	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>  m	F  kg	w  kg/m	Ctrl. Face
T1 40.0000-38.00 00	0.00	334.35	A	0.214	2.921	0.593	1	1	0.880	300.50	150.25	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.214	2.921	0.593	1	1	0.880			
T2 38.0000-36.00 00	0.00	334.35	A	0.214	2.921	0.593	1	1	0.880	296.01	148.01	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.214	2.921	0.593	1	1	0.880			
T3 36.0000-34.00 00	2.29	334.35	A	0.214	2.921	0.593	1	1	0.880	299.42	149.71	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.235	2.834	0.598	1	1	0.932			
T4 34.0000-32.00 00	3.50	334.35	A	0.214	2.921	0.593	1	1	0.880	298.16	149.08	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.245	2.793	0.601	1	1	0.957			
T5 32.0000-30.00 00	5.91	334.35	A	0.214	2.921	0.593	1	1	0.880	300.01	150.01	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.266	2.714	0.606	1	1	1.009			
T6 30.0000-28.00 00	6.31	334.35	A	0.214	2.921	0.593	1	1	0.880	295.49	147.75	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.269	2.701	0.607	1	1	1.018			
T7 28.0000-26.00 00	6.31	341.85	A	0.237	2.828	0.599	1	1	1.065	334.21	167.10	D
			B	0.237	2.828	0.599	1	1	1.065			
			C	0.237	2.828	0.599	1	1	1.065			
			D	0.287	2.635	0.612	1	1	1.204			
T8 26.0000-24.00 00	7.80	261.23	A	0.18	3.069	0.586	1	1	0.949	327.52	163.76	D
			B	0.18	3.069	0.586	1	1	0.949			
			C	0.18	3.069	0.586	1	1	0.949			
			D	0.234	2.838	0.598	1	1	1.120			
T9 24.0000-22.00 00	10.49	274.92	A	0.164	3.142	0.584	1	1	0.991	352.21	176.10	D
			B	0.164	3.142	0.584	1	1	0.991			
			C	0.164	3.142	0.584	1	1	0.991			
			D	0.228	2.864	0.596	1	1	1.223			
T10 22.0000-18.50	22.78	522.83	A	0.145	3.228	0.581	1	1	1.812	656.86	187.67	D
			B	0.145	3.228	0.581	1	1	1.812			



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 16 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
00			C	0.145	3.228	0.581	1	1	1.812			
T11	34.74	736.23	D	0.213	2.923	0.593	1	1	2.317			
18.5000-14.00			A	0.13	3.3	0.579	1	1	2.543	903.75	200.83	D
00			B	0.13	3.3	0.579	1	1	2.543			
			C	0.13	3.3	0.579	1	1	2.543			
T12	42.30	962.01	D	0.197	2.992	0.59	1	1	3.316			
14.0000-9.000			A	0.11	3.401	0.576	1	1	2.891	982.16	196.43	D
0			B	0.11	3.401	0.576	1	1	2.891			
			C	0.11	3.401	0.576	1	1	2.891			
T13	20.71	519.92	D	0.171	3.11	0.585	1	1	3.828			
9.0000-6.7000			A	0.114	3.38	0.577	1	1	1.571	501.24	217.93	D
			B	0.114	3.38	0.577	1	1	1.571			
			C	0.114	3.38	0.577	1	1	1.571			
T14	61.42	1841.06	D	0.171	3.108	0.585	1	1	2.031			
6.7000-0.0000			A	0.109	3.407	0.576	1	1	4.994	1595.51	238.14	D
			B	0.109	3.407	0.576	1	1	4.994			
			C	0.109	3.407	0.576	1	1	4.994			
Sum Weight:	224.56	7466.14	D	0.159	3.162	0.583	1	1	6.355			
								OTM	134735	7443.05		
									kg-m			

### Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T1	0.00	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	348.71	174.35	D
40.0000-38.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.214	2.921	0.593	1.16	1.16	1.021			
T2	0.00	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	343.50	171.75	D
38.0000-36.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.214	2.921	0.593	1.16	1.16	1.021			
T3	2.29	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	352.22	176.11	D
36.0000-34.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.235	2.834	0.598	1.176	1.176	1.096			
T4	3.50	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	353.04	176.52	D
34.0000-32.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.245	2.793	0.601	1.184	1.184	1.134			
T5	5.91	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	359.85	179.93	D
32.0000-30.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.266	2.714	0.606	1.199	1.199	1.211			
T6	6.31	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	354.59	177.30	D
30.0000-28.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.269	2.701	0.607	1.2	1.2	1.222			
T7	6.31	341.85	A	0.237	2.828	0.599	1.177	1.177	1.254	401.05	200.52	D
28.0000-26.00			B	0.237	2.828	0.599	1.177	1.177	1.254			
00			C	0.237	2.828	0.599	1.177	1.177	1.254			
			D	0.287	2.635	0.612	1.2	1.2	1.445			
T8	7.80	261.23	A	0.18	3.069	0.586	1.135	1.135	1.077	385.00	192.50	D

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 17 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> m	F kg	w kg/m	Ctrl. Face
26.0000-24.0000			B	0.18	3.069	0.586	1.135	1.135	1.077			
			C	0.18	3.069	0.586	1.135	1.135	1.077			
			D	0.234	2.838	0.598	1.176	1.176	1.317			
T9	10.49	274.92	A	0.164	3.142	0.584	1.123	1.123	1.113	412.34	206.17	D
24.0000-22.0000			B	0.164	3.142	0.584	1.123	1.123	1.113			
			C	0.164	3.142	0.584	1.123	1.123	1.113			
			D	0.228	2.864	0.596	1.171	1.171	1.431			
T10	22.78	522.83	A	0.145	3.228	0.581	1.109	1.109	2.009	761.98	217.71	D
22.0000-18.5000			B	0.145	3.228	0.581	1.109	1.109	2.009			
			C	0.145	3.228	0.581	1.109	1.109	2.009			
			D	0.213	2.923	0.593	1.16	1.16	2.688			
T11	34.74	736.23	A	0.13	3.3	0.579	1.098	1.098	2.792	1037.36	230.52	D
18.5000-14.0000			B	0.13	3.3	0.579	1.098	1.098	2.792			
			C	0.13	3.3	0.579	1.098	1.098	2.792			
			D	0.197	2.992	0.59	1.148	1.148	3.807			
T12	42.30	962.01	A	0.11	3.401	0.576	1.082	1.082	3.128	1107.78	221.56	D
14.0000-9.0000			B	0.11	3.401	0.576	1.082	1.082	3.128			
			C	0.11	3.401	0.576	1.082	1.082	3.128			
			D	0.171	3.11	0.585	1.128	1.128	4.317			
T13	20.71	519.92	A	0.114	3.38	0.577	1.085	1.085	1.705	565.54	245.89	D
9.0000-6.7000			B	0.114	3.38	0.577	1.085	1.085	1.705			
			C	0.114	3.38	0.577	1.085	1.085	1.705			
			D	0.171	3.108	0.585	1.128	1.128	2.292			
T14	61.42	1841.06	A	0.109	3.407	0.576	1.081	1.081	5.400	1786.08	266.58	D
6.7000-0.0000			B	0.109	3.407	0.576	1.081	1.081	5.400			
			C	0.109	3.407	0.576	1.081	1.081	5.400			
			D	0.159	3.162	0.583	1.119	1.119	7.114			
Sum Weight:	224.56	7466.14						OTM	157112 kg-m	8569.03		

### Tower Forces - Service - Wind Normal To Face

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> m	F kg	w kg/m	Ctrl. Face
T1	0.00	334.35	A	0.214	2.921	0.593	1	1	0.880	75.12	37.56	D
40.0000-38.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.214	2.921	0.593	1	1	0.880			
T2	0.00	334.35	A	0.214	2.921	0.593	1	1	0.880	74.00	37.00	D
38.0000-36.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.214	2.921	0.593	1	1	0.880			
T3	2.29	334.35	A	0.214	2.921	0.593	1	1	0.880	74.86	37.43	D
36.0000-34.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.235	2.834	0.598	1	1	0.932			
T4	3.50	334.35	A	0.214	2.921	0.593	1	1	0.880	74.54	37.27	D
34.0000-32.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.245	2.793	0.601	1	1	0.957			
T5	5.91	334.35	A	0.214	2.921	0.593	1	1	0.880	75.00	37.50	D
32.0000-30.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.266	2.714	0.606	1	1	1.009			

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 18 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T6 30.0000-28.00 00	6.31	334.35	A	0.214	2.921	0.593	1	1	0.880	73.87	36.94	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.269	2.701	0.607	1	1	1.018			
T7 28.0000-26.00 00	6.31	341.85	A	0.237	2.828	0.599	1	1	1.065	83.55	41.78	D
			B	0.237	2.828	0.599	1	1	1.065			
			C	0.237	2.828	0.599	1	1	1.065			
			D	0.287	2.635	0.612	1	1	1.204			
T8 26.0000-24.00 00	7.80	261.23	A	0.18	3.069	0.586	1	1	0.949	81.88	40.94	D
			B	0.18	3.069	0.586	1	1	0.949			
			C	0.18	3.069	0.586	1	1	0.949			
			D	0.234	2.838	0.598	1	1	1.120			
T9 24.0000-22.00 00	10.49	274.92	A	0.164	3.142	0.584	1	1	0.991	88.05	44.03	D
			B	0.164	3.142	0.584	1	1	0.991			
			C	0.164	3.142	0.584	1	1	0.991			
			D	0.228	2.864	0.596	1	1	1.223			
T10 22.0000-18.50 00	22.78	522.83	A	0.145	3.228	0.581	1	1	1.812	164.21	46.92	D
			B	0.145	3.228	0.581	1	1	1.812			
			C	0.145	3.228	0.581	1	1	1.812			
			D	0.213	2.923	0.593	1	1	2.317			
T11 18.5000-14.00 00	34.74	736.23	A	0.13	3.3	0.579	1	1	2.543	225.94	50.21	D
			B	0.13	3.3	0.579	1	1	2.543			
			C	0.13	3.3	0.579	1	1	2.543			
			D	0.197	2.992	0.59	1	1	3.316			
T12 14.0000-9.000 0	42.30	962.01	A	0.11	3.401	0.576	1	1	2.891	245.54	49.11	D
			B	0.11	3.401	0.576	1	1	2.891			
			C	0.11	3.401	0.576	1	1	2.891			
			D	0.171	3.11	0.585	1	1	3.828			
T13 9.0000-6.7000	20.71	519.92	A	0.114	3.38	0.577	1	1	1.571	125.31	54.48	D
			B	0.114	3.38	0.577	1	1	1.571			
			C	0.114	3.38	0.577	1	1	1.571			
			D	0.171	3.108	0.585	1	1	2.031			
T14 6.7000-0.0000	61.42	1841.06	A	0.109	3.407	0.576	1	1	4.994	398.88	59.53	D
			B	0.109	3.407	0.576	1	1	4.994			
			C	0.109	3.407	0.576	1	1	4.994			
			D	0.159	3.162	0.583	1	1	6.355			
Sum Weight:	224.56	7466.14						OTM	33684 kg-m	1860.76		

### Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m²	kg	kg/m	
T1 40.0000-38.00 00	0.00	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	87.18	43.59	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.214	2.921	0.593	1.16	1.16	1.021			
T2 38.0000-36.00 00	0.00	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	85.88	42.94	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.214	2.921	0.593	1.16	1.16	1.021			
T3 36.0000-34.00 00	2.29	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	88.06	44.03	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 19 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation  m	Add Weight  kg	Self Weight  kg	F a c e	e	CF	RR	DF	DR	AE  m	F  kg	w  kg/m	Ctrl. Face
T4 34.0000-32.00 00	3.50	334.35	D	0.235	2.834	0.598	1.176	1.176	1.096			
			A	0.214	2.921	0.593	1.16	1.16	1.021	88.26	44.13	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.245	2.793	0.601	1.184	1.184	1.134			
T5 32.0000-30.00 00	5.91	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	89.96	44.98	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.266	2.714	0.606	1.199	1.199	1.211			
T6 30.0000-28.00 00	6.31	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	88.65	44.32	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.269	2.701	0.607	1.2	1.2	1.222			
T7 28.0000-26.00 00	6.31	341.85	A	0.237	2.828	0.599	1.177	1.177	1.254	100.26	50.13	D
			B	0.237	2.828	0.599	1.177	1.177	1.254			
			C	0.237	2.828	0.599	1.177	1.177	1.254			
			D	0.287	2.635	0.612	1.2	1.2	1.445			
T8 26.0000-24.00 00	7.80	261.23	A	0.18	3.069	0.586	1.135	1.135	1.077	96.25	48.12	D
			B	0.18	3.069	0.586	1.135	1.135	1.077			
			C	0.18	3.069	0.586	1.135	1.135	1.077			
			D	0.234	2.838	0.598	1.176	1.176	1.317			
T9 24.0000-22.00 00	10.49	274.92	A	0.164	3.142	0.584	1.123	1.123	1.113	103.08	51.54	D
			B	0.164	3.142	0.584	1.123	1.123	1.113			
			C	0.164	3.142	0.584	1.123	1.123	1.113			
			D	0.228	2.864	0.596	1.171	1.171	1.431			
T10 22.0000-18.50 00	22.78	522.83	A	0.145	3.228	0.581	1.109	1.109	2.009	190.50	54.43	D
			B	0.145	3.228	0.581	1.109	1.109	2.009			
			C	0.145	3.228	0.581	1.109	1.109	2.009			
			D	0.213	2.923	0.593	1.16	1.16	2.688			
T11 18.5000-14.00 00	34.74	736.23	A	0.13	3.3	0.579	1.098	1.098	2.792	259.34	57.63	D
			B	0.13	3.3	0.579	1.098	1.098	2.792			
			C	0.13	3.3	0.579	1.098	1.098	2.792			
			D	0.197	2.992	0.59	1.148	1.148	3.807			
T12 14.0000-9.000 0	42.30	962.01	A	0.11	3.401	0.576	1.082	1.082	3.128	276.95	55.39	D
			B	0.11	3.401	0.576	1.082	1.082	3.128			
			C	0.11	3.401	0.576	1.082	1.082	3.128			
			D	0.171	3.11	0.585	1.128	1.128	4.317			
T13 9.0000-6.7000	20.71	519.92	A	0.114	3.38	0.577	1.085	1.085	1.705	141.39	61.47	D
			B	0.114	3.38	0.577	1.085	1.085	1.705			
			C	0.114	3.38	0.577	1.085	1.085	1.705			
			D	0.171	3.108	0.585	1.128	1.128	2.292			
T14 6.7000-0.0000	61.42	1841.06	A	0.109	3.407	0.576	1.081	1.081	5.400	446.52	66.64	D
			B	0.109	3.407	0.576	1.081	1.081	5.400			
			C	0.109	3.407	0.576	1.081	1.081	5.400			
			D	0.159	3.162	0.583	1.119	1.119	7.114			
Sum Weight:	224.56	7466.14						OTM	39278 kg-m	2142.26		

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 20 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### Mast Vectors - No Ice

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
T1	40.0000-38.0000	0	Wind Normal	300.50	0.00	-300.50	-11719	0	0
		45	Wind 90	348.71	246.57	-246.57	-9616	-9616	0
		90	Wind Normal	300.50	300.50	0.00	0	-11719	0
T2	38.0000-36.0000	0	Wind Normal	296.01	0.00	-296.01	-10952	0	0
		45	Wind 90	343.50	242.89	-242.89	-8987	-8987	0
		90	Wind Normal	296.01	296.01	0.00	0	-10952	0
T3	36.0000-34.0000	0	Wind Normal	299.42	0.00	-299.42	-10478	0	0
		45	Wind 90	352.22	249.06	-249.06	-8715	-8717	6
		90	Wind Normal	299.42	299.42	0.00	2	-10480	7
T4	34.0000-32.0000	0	Wind Normal	298.16	0.00	-298.16	-9836	0	0
		45	Wind 90	353.04	249.63	-249.63	-8234	-8238	9
		90	Wind Normal	298.16	298.16	0.00	4	-9839	11
T5	32.0000-30.0000	0	Wind Normal	300.01	0.00	-300.01	-9294	0	0
		45	Wind 90	359.85	254.46	-254.46	-7882	-7888	15
		90	Wind Normal	300.01	300.01	0.00	6	-9300	17
T6	30.0000-28.0000	0	Wind Normal	295.49	0.00	-295.49	-8563	0	0
		45	Wind 90	354.59	250.73	-250.73	-7265	-7271	15
		90	Wind Normal	295.49	295.49	0.00	6	-8569	18
T7	28.0000-26.0000	0	Wind Normal	334.21	0.00	-334.21	-9017	0	0
		45	Wind 90	401.05	283.58	-283.58	-7650	-7657	16
		90	Wind Normal	334.21	334.21	0.00	7	-9024	19
T8	26.0000-24.0000	0	Wind Normal	327.52	0.00	-327.52	-8178	0	0
		45	Wind 90	385.00	272.23	-272.23	-6796	-6806	25
		90	Wind Normal	327.52	327.52	0.00	10	-8188	30
T9	24.0000-22.0000	0	Wind Normal	352.21	0.00	-352.21	-8085	0	0
		45	Wind 90	412.34	291.57	-291.57	-6690	-6706	39
		90	Wind Normal	352.21	352.21	0.00	16	-8101	47
T10	22.0000-18.5000	0	Wind Normal	656.86	0.00	-656.86	-13261	0	0
		45	Wind 90	761.98	538.80	-538.80	-10870	-10911	100
		90	Wind Normal	656.86	656.86	0.00	40	-13301	122
T11	18.5000-14.0000	0	Wind Normal	903.75	0.00	-903.75	-14611	0	0
		45	Wind 90	1037.36	733.52	-733.52	-11845	-11920	181
		90	Wind Normal	903.75	903.75	0.00	75	-14686	223
T12	14.0000-9.0000	0	Wind Normal	982.16	0.00	-982.16	-11184	0	0
		45	Wind 90	1107.78	783.32	-783.32	-8897	-9008	250
		90	Wind Normal	982.16	982.16	0.00	111	-11295	313
T13	9.0000-6.7000	0	Wind Normal	501.24	0.00	-501.24	-3873	0	0
		45	Wind 90	565.54	399.90	-399.90	-3078	-3139	132
		90	Wind Normal	501.24	501.24	0.00	62	-3935	166
T14	6.7000-0.0000	0	Wind Normal	1595.51	0.00	-1595.51	-5136	0	0
		45	Wind 90	1786.08	1262.95	-1262.95	-4022	-4231	451
		90	Wind Normal	1595.51	1595.51	0.00	209	-5345	569

### Mast Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.00	-7443.05	-134187	0	0
45	6059.22	-6059.22	-110547	-111095	1239
90	7443.05	0.00	548	-134735	1542

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 21 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### Mast Vectors - Service

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
T1	40.0000-38.0000	0	Wind Normal	75.12	0.00	-75.12	-2930	0	0
		45	Wind 90	87.18	61.64	-61.64	-2404	-2404	0
T2	38.0000-36.0000	90	Wind Normal	75.12	75.12	0.00	0	-2930	0
		0	Wind Normal	74.00	0.00	-74.00	-2738	0	0
T3	36.0000-34.0000	45	Wind 90	85.88	60.72	-60.72	-2247	-2247	0
		90	Wind Normal	74.00	74.00	0.00	0	-2738	0
T4	34.0000-32.0000	0	Wind Normal	74.86	0.00	-74.86	-2618	0	0
		45	Wind 90	88.06	62.26	-62.26	-2177	-2179	2
T5	32.0000-30.0000	90	Wind Normal	74.86	74.86	0.00	2	-2620	2
		0	Wind Normal	74.54	0.00	-74.54	-2456	0	0
T6	30.0000-28.0000	45	Wind 90	88.26	62.41	-62.41	-2056	-2059	2
		90	Wind Normal	74.54	74.54	0.00	4	-2460	3
T7	28.0000-26.0000	0	Wind Normal	75.00	0.00	-75.00	-2319	0	0
		45	Wind 90	89.96	63.61	-63.61	-1966	-1972	4
T8	26.0000-24.0000	90	Wind Normal	75.00	75.00	0.00	6	-2325	4
		0	Wind Normal	73.87	0.00	-73.87	-2136	0	0
T9	24.0000-22.0000	45	Wind 90	88.65	62.68	-62.68	-1811	-1818	4
		90	Wind Normal	73.87	73.87	0.00	6	-2142	5
T10	22.0000-18.5000	0	Wind Normal	83.55	0.00	-83.55	-2249	0	0
		45	Wind 90	100.26	70.90	-70.90	-1907	-1914	4
T11	18.5000-14.0000	90	Wind Normal	83.55	83.55	0.00	7	-2256	5
		0	Wind Normal	81.88	0.00	-81.88	-2037	0	0
T12	14.0000-9.0000	45	Wind 90	96.25	68.06	-68.06	-1691	-1701	6
		90	Wind Normal	81.88	81.88	0.00	10	-2047	8
T13	9.0000-6.7000	0	Wind Normal	88.05	0.00	-88.05	-2009	0	0
		45	Wind 90	103.08	72.89	-72.89	-1661	-1676	10
T14	6.7000-0.0000	90	Wind Normal	88.05	88.05	0.00	16	-2025	12
		0	Wind Normal	164.21	0.00	-164.21	-3285	0	0
T15		45	Wind 90	190.50	134.70	-134.70	-2687	-2728	25
		90	Wind Normal	164.21	164.21	0.00	40	-3325	31
T16		0	Wind Normal	225.94	0.00	-225.94	-3597	0	0
		45	Wind 90	259.34	183.38	-183.38	-2905	-2980	45
T17		90	Wind Normal	225.94	225.94	0.00	75	-3671	56
		0	Wind Normal	245.54	0.00	-245.54	-2713	0	0
T18		45	Wind 90	276.95	195.83	-195.83	-2141	-2252	62
		90	Wind Normal	245.54	245.54	0.00	111	-2824	78
T19		0	Wind Normal	125.31	0.00	-125.31	-922	0	0
		45	Wind 90	141.39	99.97	-99.97	-723	-785	33
T20		90	Wind Normal	125.31	125.31	0.00	62	-984	41
		0	Wind Normal	398.88	0.00	-398.88	-1127	0	0
T21		45	Wind 90	446.52	315.74	-315.74	-848	-1058	113
		90	Wind Normal	398.88	398.88	0.00	209	-1336	142

### Mast Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.00	-1860.76	-33136	0	0
45	1514.81	-1514.81	-27226	-27774	310
90	1860.76	0.00	548	-33684	386

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 22 of 48
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## Discrete Appurtenance Pressures - No Ice $GH = 1.143$

Description	Aiming Azimuth °	Weight kg	Offsetx m	Offsetz m	z m	Kz	qz MPa	CAAC Front m	CAA C Side m
ANT OMNI L=4.0m	45.0000	60.00	2.0607	-2.0607	36.0000	1.440	0.00	1.3000	0.5500
ANT OMNI L=4.0m	225.0000	60.00	-2.0607	2.0607	36.0000	1.440	0.00	1.3000	0.5500
1 ANT TV 1.20x1.20m	45.0000	120.00	1.1945	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8491	-1.8491	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9376	-1.9376	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8846	-1.8846	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9732	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.3895	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.5840	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.7786	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
ANT RF 0.30x1.30m	45.0000	15.00	1.5657	-1.5657	35.0000	1.428	0.00	0.3900	0.1950
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.1357	3.1357	15.5000	1.132	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.3790	3.3790	13.0000	1.076	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.6223	3.6223	10.5000	1.012	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.8656	3.8656	8.0000	1.000	0.00	1.2000	0.1500
Sum Weight:		1775.00							

## Discrete Appurtenance Vectors - No Ice

ANT OMNI L=4.0m - Elevation 36 - From Leg B							
Wind Azimuth °	Fa kg	Fs kg	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m
0	105.07	44.45	42.86	-105.73	-3930	-1667	130
45	148.59	0.00	105.07	-105.07	-3906	-3906	0
90	105.07	44.45	105.73	-42.86	-1667	-3930	-130

ANT OMNI L=4.0m - Elevation 36 - From Leg D							
Wind Azimuth °	Fa kg	Fs kg	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m
0	105.07	44.45	42.86	-105.73	-3683	-1419	-130
45	148.59	0.00	105.07	-105.07	-3659	-3659	0
90	105.07	44.45	105.73	-42.86	-1419	-3683	130

1 ANT TV 1.20x1.20m - Elevation 26 - From Leg B							
Wind Azimuth °	Fa kg	Fs kg	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m



0	88.38	7.36	57.29	-67.70	-1904	-1633	12
45	124.99	0.00	88.38	-88.38	-2441	-2441	0
90	88.38	7.36	67.70	-57.29	-1633	-1904	-12

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 23 of 48
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1 ANT TV 1.20x1.20m - Elevation 24 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	86.38	7.20	55.99	-66.17	-1810	-1566	19
45	122.16	0.00	86.38	-86.38	-2295	-2295	0
90	86.38	7.20	66.17	-55.99	-1566	-1810	-19

1 ANT TV 1.20x1.20m - Elevation 22 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	84.26	7.02	54.62	-64.55	-1653	-1434	19
45	119.16	0.00	84.26	-84.26	-2086	-2086	0
90	84.26	7.02	64.55	-54.62	-1434	-1653	-19

1 ANT TV 1.20x1.20m - Elevation 20 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	82.00	6.83	53.15	-62.81	-1482	-1289	18
45	115.96	0.00	82.00	-82.00	-1866	-1866	0
90	82.00	6.83	62.81	-53.15	-1289	-1482	-18

1 ANT TV 1.20x1.20m - Elevation 18 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	79.56	6.63	51.57	-60.95	-1334	-1165	19
45	112.52	0.00	79.56	-79.56	-1669	-1669	0
90	79.56	6.63	60.95	-51.57	-1165	-1334	-19

1 ANT TV 1.20x1.20m - Elevation 26 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	124.99	0.00	0.00	-124.99	-3393	0	0
45	88.38	7.36	7.36	-88.38	-2441	-191	-9
90	0.00	10.42	10.42	0.00	-143	-271	-12

1 ANT TV 1.20x1.20m - Elevation 24 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	122.16	0.00	0.00	-122.16	-3099	0	0
45	86.38	7.20	7.20	-86.38	-2240	-173	-10
90	0.00	10.18	10.18	0.00	-167	-244	-14

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 24 of 48
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1 ANT TV 1.20x1.20m - Elevation 22 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	119.16	0.00	0.00	-119.16	-2812	0	0
45	84.26	7.02	7.02	-84.26	-2044	-154	-11
90	0.00	9.93	9.93	0.00	-190	-218	-16

1 ANT TV 1.20x1.20m - Elevation 20 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	115.96	0.00	0.00	-115.96	-2533	0	0
45	82.00	6.83	6.83	-82.00	-1853	-137	-12
90	0.00	9.66	9.66	0.00	-213	-193	-17

1 ANT TV 1.20x1.20m - Elevation 18 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	112.52	0.00	0.00	-112.52	-2262	0	0
45	79.56	6.63	6.63	-79.56	-1669	-119	-13
90	0.00	9.38	9.38	0.00	-237	-169	-19

ANT RF 0.30x1.30m - Elevation 35 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	31.27	15.63	11.06	-33.17	-1184	-410	35
45	44.22	0.00	31.27	-31.27	-1118	-1118	0
90	31.27	15.63	33.17	-11.06	-410	-1184	-35

ANT GRILLA TV (2.25x2.25m) - Elevation 15.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	76.24	9.53	-47.17	-60.65	-595	386	42
45	0.00	13.48	9.53	-9.53	197	-493	60
90	76.24	9.53	60.65	47.17	1076	-1285	42

ANT GRILLA TV (2.25x2.25m) - Elevation 13 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	72.50	9.06	-44.86	-57.67	-378	211	43
45	0.00	12.82	9.06	-9.06	254	-490	61
90	72.50	9.06	57.67	44.86	955	-1121	43

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 25 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT GRILLA TV (2.25x2.25m) - Elevation 10.5 - From Leg C							
Wind Azimuth °	Fa kg	Fs kg	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m
0	68.21	8.53	-42.20	-54.26	-171	45	44
45	0.00	12.06	8.53	-8.53	309	-488	62
90	68.21	8.53	54.26	42.20	842	-968	44

ANT GRILLA TV (2.25x2.25m) - Elevation 8 - From Leg C							
Wind Azimuth °	Fa kg	Fs kg	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m
0	67.38	8.42	-41.69	-53.60	-4	-92	46
45	0.00	11.91	8.42	-8.42	358	-493	65
90	67.38	8.42	53.60	41.69	759	-854	46

## Discrete Appurtenance Totals - No Ice

Wind Azimuth °	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m
0	193.48	-1387.77	-32225	-10033	297
45	732.58	-1118.11	-28170	-21778	193
90	842.55	-193.48	-7902	-22303	-25

## Discrete Appurtenance Pressures - Service

GH = 1.143

Description	Aiming Azimuth °	Weight kg	Offsetx m	Offsetz m	z m	Kz	qz MPa	CAAc Front m	CAAc Side m
ANT OMNI L=4.0m	45.0000	60.00	2.0607	-2.0607	36.0000	1.440	0.00	1.3000	0.5500
ANT OMNI L=4.0m	225.0000	60.00	-2.0607	2.0607	36.0000	1.440	0.00	1.3000	0.5500
1 ANT TV 1.20x1.20m	45.0000	120.00	1.1945	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8491	-1.8491	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9376	-1.9376	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8846	-1.8846	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9732	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.3895	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.5840	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.7786	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
ANT RF 0.30x1.30m	45.0000	15.00	1.5657	-1.5657	35.0000	1.428	0.00	0.3900	0.1950
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.1357	3.1357	15.5000	1.132	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.3790	3.3790	13.0000	1.076	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.6223	3.6223	10.5000	1.012	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	3.8656	3.8656	8.0000	1.000	0.00	1.2000	0.1500
Sum Weight:		1775.00							

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 26 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Discrete Appurtenance Vectors - Service

ANT OMNI L=4.0m - Elevation 36 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	26.27	11.11	10.72	-26.43	-1075	-509	32
45	37.15	0.00	26.27	-26.27	-1069	-1069	0
90	26.27	11.11	26.43	-10.72	-509	-1075	-32

ANT OMNI L=4.0m - Elevation 36 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	26.27	11.11	10.72	-26.43	-828	-262	-32
45	37.15	0.00	26.27	-26.27	-822	-822	0
90	26.27	11.11	26.43	-10.72	-262	-828	32

1 ANT TV 1.20x1.20m - Elevation 26 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	22.09	1.84	14.32	-16.93	-583	-516	3
45	31.25	0.00	22.09	-22.09	-718	-718	0
90	22.09	1.84	16.93	-14.32	-516	-583	-3

1 ANT TV 1.20x1.20m - Elevation 24 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	21.60	1.80	14.00	-16.54	-619	-558	5
45	30.54	0.00	21.60	-21.60	-740	-740	0
90	21.60	1.80	16.54	-14.00	-558	-619	-5

1 ANT TV 1.20x1.20m - Elevation 22 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	21.06	1.76	13.65	-16.14	-588	-533	5
45	29.79	0.00	21.06	-21.06	-696	-696	0
90	21.06	1.76	16.14	-13.65	-533	-588	-5

1 ANT TV 1.20x1.20m - Elevation 20 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	20.50	1.71	13.29	-15.70	-540	-492	5
45	28.99	0.00	20.50	-20.50	-636	-636	0
90	20.50	1.71	15.70	-13.29	-492	-540	-5

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 27 of 48
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1 ANT TV 1.20x1.20m - Elevation 18 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	19.89	1.66	12.89	-15.24	-511	-469	5
45	28.13	0.00	19.89	-19.89	-595	-595	0
90	19.89	1.66	15.24	-12.89	-469	-511	-5

1 ANT TV 1.20x1.20m - Elevation 26 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	31.25	0.00	0.00	-31.25	-956	0	0
45	22.09	1.84	1.84	-22.09	-718	-48	-2
90	0.00	2.60	2.60	0.00	-143	-68	-3

1 ANT TV 1.20x1.20m - Elevation 24 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.54	0.00	0.00	-30.54	-900	0	0
45	21.60	1.80	1.80	-21.60	-685	-43	-3
90	0.00	2.55	2.55	0.00	-167	-61	-4

1 ANT TV 1.20x1.20m - Elevation 22 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	29.79	0.00	0.00	-29.79	-845	0	0
45	21.06	1.76	1.76	-21.06	-654	-39	-3
90	0.00	2.48	2.48	0.00	-190	-55	-4

1 ANT TV 1.20x1.20m - Elevation 20 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	28.99	0.00	0.00	-28.99	-793	0	0
45	20.50	1.71	1.71	-20.50	-623	-34	-3
90	0.00	2.42	2.42	0.00	-213	-48	-4

1 ANT TV 1.20x1.20m - Elevation 18 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	28.13	0.00	0.00	-28.13	-743	0	0
45	19.89	1.66	1.66	-19.89	-595	-30	-3
90	0.00	2.34	2.34	0.00	-237	-42	-5



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 28 of 48
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ANT RF 0.30x1.30m - Elevation 35 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	7.82	3.91	2.76	-8.29	-314	-120	9
45	11.06	0.00	7.82	-7.82	-297	-297	0
90	7.82	3.91	8.29	-2.76	-120	-314	-9

ANT GRILLA TV (2.25x2.25m) - Elevation 15.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	19.06	2.38	-11.79	-15.16	110	-162	11
45	0.00	3.37	2.38	-2.38	308	-382	15
90	19.06	2.38	15.16	11.79	528	-580	11

ANT GRILLA TV (2.25x2.25m) - Elevation 13 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	18.12	2.27	-11.21	-14.42	184	-226	11
45	0.00	3.20	2.27	-2.27	342	-401	15
90	18.12	2.27	14.42	11.21	517	-559	11

ANT GRILLA TV (2.25x2.25m) - Elevation 10.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	17.05	2.13	-10.55	-13.56	256	-288	11
45	0.00	3.01	2.13	-2.13	376	-421	15
90	17.05	2.13	13.56	10.55	509	-541	11

ANT GRILLA TV (2.25x2.25m) - Elevation 8 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	16.84	2.11	-10.42	-13.40	318	-342	12
45	0.00	2.98	2.11	-2.11	408	-442	16
90	16.84	2.11	13.40	10.42	509	-532	12

## Discrete Appurtenance Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	48.37	-346.94	-8427	-4477	74
45	183.14	-279.53	-7413	-7413	48
90	210.64	-48.37	-2346	-7544	-6

<b>RISA Tower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 29 of 48
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### Dish Pressures - No Ice

Elevation m	Dish Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	K <sub>z</sub>	AA m	q <sub>z</sub> MPa
33.0000	HP12-21B	225.0000	385.55	-1.3536	1.3536	1.404	10.5064	0.00
32.0000	HP12-21B	45.0000	385.55	1.1414	-1.1414	1.392	10.5064	0.00
23.5000	HP12-21B	225.0000	385.55	-1.5795	1.5795	1.274	10.5064	0.00
		Sum	1156.65					
		Weight:						

### Dish Vectors - No Ice

HP12-21B - Elevation 33 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1478.02	0.00	0.00	0.00	-1478.02	-48253	522	-2001
45	0.003230	0.000000	0.000000	1478.02	0.00	0.00	1045.12	-1045.12	-33967	-33967	0
90	0.003230	0.000000	0.000000	1478.02	0.00	0.00	1478.02	0.00	522	-48253	2001

HP12-21B - Elevation 32 - From Leg B											
Wind Azimuth °	A	S	M	A	S	M	x	z	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1465.08	0.00	0.00	0.00	-1465.08	-47323	-440	1672
45	0.003230	0.000000	0.000000	1465.08	0.00	0.00	1035.97	-1035.97	-33591	-33591	0
90	0.003230	0.000000	0.000000	1465.08	0.00	0.00	1465.08	0.00	-440	-47323	-1672

HP12-21B - Elevation 23.5 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1341.38	0.00	0.00	0.00	-1341.38	-30913	609	-2119
45	0.003230	0.000000	0.000000	1341.38	0.00	0.00	948.50	-948.50	-21681	-21681	0
90	0.003230	0.000000	0.000000	1341.38	0.00	0.00	1341.38	0.00	609	-30913	2119

### Dish Totals - No Ice

Wind Azimuth °	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
	kg	kg	kg-m	kg-m	kg-m
0	0.00	-4284.48	-126489	691	-2447
45	3029.58	-3029.58	-89239	-89239	0
90	4284.48	0.00	691	-126489	2447

<b>RISA Tower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 30 of 48
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### Dish Pressures - Service

Elevation m	Dish Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	K <sub>z</sub>	AA m	q <sub>z</sub> MPa
33.0000	HP12-21B	225.0000	385.55	-1.3536	1.3536	1.404	10.5064	0.00
32.0000	HP12-21B	45.0000	385.55	1.1414	-1.1414	1.392	10.5064	0.00
23.5000	HP12-21B	225.0000	385.55	-1.5795	1.5795	1.274	10.5064	0.00
		Sum	1156.65					
		Weight:						

### Dish Vectors - Service

HP12-21B - Elevation 33 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	369.50	0.00	0.00	0.00	-369.50	-11672	522	-500
45	0.003230	0.000000	0.000000	369.50	0.00	0.00	261.28	-261.28	-8100	-8100	0
90	0.003230	0.000000	0.000000	369.50	0.00	0.00	369.50	0.00	522	-11672	500

HP12-21B - Elevation 32 - From Leg B											
Wind Azimuth °	A	S	M	A	S	M	x	z	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	366.27	0.00	0.00	0.00	-366.27	-12161	-440	418
45	0.003230	0.000000	0.000000	366.27	0.00	0.00	258.99	-258.99	-8728	-8728	0
90	0.003230	0.000000	0.000000	366.27	0.00	0.00	366.27	0.00	-440	-12161	-418

HP12-21B - Elevation 23.5 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	335.35	0.00	0.00	0.00	-335.35	-7272	609	-530
45	0.003230	0.000000	0.000000	335.35	0.00	0.00	237.12	-237.12	-4963	-4963	0
90	0.003230	0.000000	0.000000	335.35	0.00	0.00	335.35	0.00	609	-7272	530

### Dish Totals - Service

Wind Azimuth °	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
	kg	kg	kg-m	kg-m	kg-m
0	0.00	-1071.12	-31104	691	-612
45	757.40	-757.40	-21792	-21792	0
90	1071.12	0.00	691	-31104	612

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 31 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## User Load Vectors - No Ice

C x MANTENIMIENTO - Elevation 40								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

1 SOP. ANT MW (E) - Elevation 32.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0
45	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0
90	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0

1 SOP. ANT MW (E) - Elevation 31.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0
45	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0
90	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0

1 SOP. ANT MW (E) - Elevation 23.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0
45	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0
90	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0

(2) SOP. ANT OMNI (E) - Elevation 36								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

## User Load Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	60.00	-60.00	-1750	-1750	0
45	60.00	-60.00	-1750	-1750	0
90	60.00	-60.00	-1750	-1750	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 32 of 48
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## User Load Vectors - Service

C x MANTENIMIENTO - Elevation 40								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

1 SOP. ANT MW (E) - Elevation 32.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0
45	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0
90	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0

1 SOP. ANT MW (E) - Elevation 31.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0
45	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0
90	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0

1 SOP. ANT MW (E) - Elevation 23.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0
45	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0
90	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0

(2) SOP. ANT OMNI (E) - Elevation 36								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

## User Load Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	15.00	-15.00	-438	-438	0
45	15.00	-15.00	-438	-438	0
90	15.00	-15.00	-438	-438	0

<b>RISA Tower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 33 of 48
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## Force Totals

Load Case	Vertical Forces kg	Sum of Forces X kg	Sum of Forces Z kg	Sum of Overturning Moments, M <sub>x</sub> kg-m	Sum of Overturning Moments, M <sub>z</sub> kg-m	Sum of Torques kg-m
Leg Weight	3201.10					
Bracing Weight	4265.04					
Total Member Self-Weight	7466.14			745	-1934	
Total Weight	11412.35			745	-1934	
Wind 0 deg - No Ice		253.48	-13175.29	-294650	-11092	-2150
Wind 45 deg - No Ice		9881.39	-10266.91	-229706	-223862	1431
Wind 90 deg - No Ice		12630.07	-253.48	-8414	-285277	3965
Total Weight	11412.35			745	-1934	
Wind 0 deg - Service		63.37	-3293.82	-73652	-4223	-537
Wind 45 deg - Service		2470.35	-2566.73	-57416	-57416	358
Wind 90 deg - Service		3157.52	-63.37	-2093	-72769	991

## Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 45 deg - No Ice
4	Dead+Wind 90 deg - No Ice
5	Dead+Wind 0 deg - Service
6	Dead+Wind 45 deg - Service
7	Dead+Wind 90 deg - Service

## Maximum Member Forces

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T1	40 - 38	Leg	Max Tension	3	29.46	0	0
			Max. Compression	3	-170.06	-15	-15
			Max. Mx	4	-152.31	-21	2
			Max. My	2	-152.31	2	-21
			Max. Vy	4	48.38	-21	2
			Max. Vx	2	48.38	2	-21
		Diagonal	Max Tension	2	35.03	0	0
			Max. Compression	2	-67.62	0	0
			Max. Mx	2	-15.79	1	0
			Max. My	2	-19.80	1	0
			Max. Vy	2	-3.42	1	0
			Max. Vx	2	-0.03	0	0
		Top Girt	Max Tension	2	5.16	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	1	3.90	-3	0
			Max. My	4	3.97	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
		Inner Bracing	Max Tension	3	3.99	0	0



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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T2	38 - 36	Leg	Max. Compression	1	0.00	0	0
			Max. Mx	1	3.91	7	0
			Max. My	4	3.87	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	109.27	15	15
		Diagonal	Max. Compression	3	-471.28	0	0
			Max. Mx	4	-335.47	-21	2
			Max. My	2	-335.49	2	-21
			Max. Vy	4	-54.47	-21	2
			Max. Vx	2	-54.51	2	-21
			Max Tension	2	168.23	0	0
		Top Girt	Max. Compression	2	-218.73	0	0
			Max. Mx	4	162.75	1	0
			Max. My	2	-30.64	1	0
			Max. Vy	2	-3.44	1	0
			Max. Vx	2	-0.04	0	0
			Max Tension	2	31.41	0	0
T3	36 - 34	Inner Bracing	Max. Compression	1	0.00	0	0
			Max. Mx	1	17.08	-3	0
			Max. My	4	17.23	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	3	17.12	0	0
		Leg	Max. Compression	1	0.00	0	0
			Max. Mx	1	17.02	7	0
			Max. My	4	16.97	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	571.85	0	0
		Diagonal	Max. Compression	3	-1108.75	-53	-53
			Max. Mx	4	-753.32	-110	37
			Max. My	2	-752.22	37	-110
			Max. Vy	4	101.85	-110	37
			Max. Vx	4	-101.41	-37	110
			Max Tension	2	296.48	0	0
T4	34 - 32	Top Girt	Max. Compression	2	-381.38	0	0
			Max. Mx	3	179.15	1	0
			Max. My	2	-85.00	1	0
			Max. Vy	3	-3.50	1	0
			Max. Vx	2	0.05	0	0
			Max Tension	4	77.57	0	0
		Inner Bracing	Max. Compression	4	-24.76	0	0
			Max. Mx	1	25.79	-3	0
			Max. My	4	24.16	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	3	26.72	0	0
		Leg	Max. Compression	1	0.00	0	0
			Max. Mx	1	26.49	7	0
			Max. My	4	26.35	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	1603.21	53	53
		Diagonal	Max. Compression	3	-2256.96	-53	-53
			Max. Mx	4	-1571.97	221	39
			Max. My	2	-1569.18	38	221
			Max. Vy	4	353.04	-111	39
			Max. Vx	4	-352.43	-37	110
			Max Tension	4	849.35	0	0
			Max. Compression	4	-959.42	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 35 of 48
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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T5	32 - 30	Top Girt	Max. Mx	3	624.63	1	0
			Max. My	4	-946.79	1	0
			Max. Vy	3	3.61	1	0
			Max. Vx	4	0.14	1	0
			Max Tension	4	158.35	0	0
			Max. Compression	4	-80.72	0	0
			Max. Mx	1	43.66	-3	0
			Max. My	4	40.59	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	39.24	0	0
			Max. Compression	1	0.00	0	0
		Inner Bracing	Max. Mx	1	38.90	7	0
			Max. My	4	38.59	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	3647.90	-1	0
			Max. Compression	3	-4944.77	0	1
			Max. Mx	4	-3091.55	-110	39
			Max. My	2	-3088.85	39	-110
			Max. Vy	2	-626.19	-28	-45
			Max. Vx	4	-625.14	-45	-28
		Diagonal	Max Tension	4	1690.50	0	0
			Max. Compression	4	-1844.81	0	0
			Max. Mx	3	1418.88	2	0
			Max. My	4	-1831.46	1	0
			Max. Vy	3	3.90	2	0
			Max. Vx	4	0.14	1	0
		Top Girt	Max Tension	4	361.12	0	0
			Max. Compression	4	-242.45	0	0
			Max. Mx	1	66.15	-3	0
			Max. My	4	68.63	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
		Inner Bracing	Max Tension	3	61.64	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	1	59.85	7	0
			Max. My	4	59.68	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
T6	30 - 28	Leg	Max Tension	3	6845.86	-1	0
			Max. Compression	3	-8201.60	-21	-22
			Max. Mx	3	6815.28	22	22
			Max. My	3	6815.28	22	22
			Max. Vy	2	-47.46	15	13
			Max. Vx	4	-48.43	13	15
		Diagonal	Max Tension	3	1781.10	0	0
			Max. Compression	3	-1991.45	0	0
			Max. Mx	3	664.46	2	0
			Max. My	4	-1795.60	0	0
			Max. Vy	3	-4.32	2	0
			Max. Vx	4	0.12	0	0
		Top Girt	Max Tension	4	776.39	0	0
			Max. Compression	4	-612.30	0	0
			Max. Mx	1	86.07	-3	0
			Max. My	4	105.79	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
		Inner Bracing	Max Tension	6	82.86	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	1	82.86	7	0



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 37 of 48
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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T11	18.5 - 14	Leg	Max. Vy	3	7.11	5	2
			Max. Vx	2	-2.18	0	0
			Max Tension	3	18429.26	66	62
			Max. Compression	3	-21983.39	-103	-87
			Max. Mx	2	11871.99	123	15
			Max. My	4	11511.07	5	133
		Diagonal	Max. Vy	2	152.04	98	-10
			Max. Vx	2	165.25	-25	113
			Max Tension	2	1726.07	0	0
			Max. Compression	2	-1840.51	0	0
			Max. Mx	3	872.71	9	-4
			Max. My	4	-599.01	7	-4
		Leg	Max. Vy	2	10.55	9	3
			Max. Vx	4	2.43	0	0
			Max Tension	3	22077.95	98	114
			Max. Compression	3	-26226.09	-40	-27
			Max. Mx	2	14315.28	123	15
			Max. My	4	13754.37	5	133
T12	14 - 9	Leg	Max. Vy	2	148.01	123	15
			Max. Vx	4	160.72	5	133
			Max Tension	2	1760.40	0	0
			Max. Compression	2	-1779.47	0	0
			Max. Mx	3	993.32	17	7
			Max. My	2	-1754.75	10	10
		Diagonal	Max. Vy	3	17.01	17	7
			Max. Vx	2	-4.31	0	0
			Max Tension	3	24333.07	43	54
			Max. Compression	3	-28973.55	-214	-195
			Max. Mx	2	15622.28	262	30
			Max. My	4	14936.78	16	275
		Leg	Max. Vy	2	-139.88	262	30
			Max. Vx	4	-147.16	16	275
			Max Tension	2	1536.19	0	0
			Max. Compression	2	-1518.66	0	0
			Max. Mx	3	820.06	-12	0
			Max. My	3	-846.53	0	1
T13	9 - 6.7	Leg	Max. Vy	3	12.83	0	0
			Max. Vx	3	-1.62	0	0
			Max Tension	3	24158.70	213	234
			Max. Compression	3	-29173.29	0	0
			Max. Mx	2	15550.28	262	30
			Max. My	4	14865.18	16	275
		Diagonal	Max. Vy	2	246.97	262	30
			Max. Vx	4	259.29	16	275
			Max Tension	2	3123.33	0	0
			Max. Compression	2	-3341.57	0	0
			Max. Mx	2	3123.33	-39	0
			Max. My	2	-97.54	0	8
		Horizontal	Max. Vy	2	20.29	0	0
			Max. Vx	2	-4.09	0	0
			Max Tension	4	354.80	14	-3
			Max. Compression	4	-421.85	14	-3
			Max. Mx	2	-11.07	22	-1
			Max. My	2	336.54	14	-3
T14	6.7 - 0	Leg	Max. Vy	2	23.86	22	-1
			Max. Vx	2	2.55	14	-3
			Max Tension	3	10.88	0	0
			Max. Compression	3	-36.92	0	0
			Max. Mx	5	-13.61	-21	0
			Max. My	4	-14.67	0	0
		Inner Bracing	Max. Vy	5	19.64	0	0
			Max. Vx	5	19.64	0	0
			Max Tension	5	19.64	0	0
			Max. Compression	5	19.64	0	0
			Max. Mx	5	19.64	0	0
			Max. My	5	19.64	0	0
			Max. Vy	5	19.64	0	0
			Max. Vx	5	19.64	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 38 of 48
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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
			Max. Vx	4	0.02	0	0

## Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical kg	Horizontal, X kg	Horizontal, Z kg
Leg D	Max. Vert	1	2773.39	311.53	-293.28
	Max. H <sub>x</sub>	1	2773.39	311.53	-293.28
	Max. H <sub>z</sub>	3	-27670.32	-3780.66	3741.64
	Min. Vert	3	-27670.32	-3780.66	3741.64
	Min. H <sub>x</sub>	3	-27670.32	-3780.66	3741.64
	Min. H <sub>z</sub>	1	2773.39	311.53	-293.28
Leg C	Max. Vert	4	21465.59	-3533.76	-2023.57
	Max. H <sub>x</sub>	2	-16205.19	1699.15	2844.82
	Max. H <sub>z</sub>	2	-16205.19	1699.15	2844.82
	Min. Vert	2	-16205.19	1699.15	2844.82
	Min. H <sub>x</sub>	4	21465.59	-3533.76	-2023.57
	Min. H <sub>z</sub>	4	21465.59	-3533.76	-2023.57
Leg B	Max. Vert	3	33305.34	-4258.07	4411.19
	Max. H <sub>x</sub>	1	2932.79	-302.64	320.90
	Max. H <sub>z</sub>	3	33305.34	-4258.07	4411.19
	Min. Vert	1	2932.79	-302.64	320.90
	Min. H <sub>x</sub>	3	33305.34	-4258.07	4411.19
	Min. H <sub>z</sub>	1	2932.79	-302.64	320.90
Leg A	Max. Vert	2	21915.61	2146.46	3590.50
	Max. H <sub>x</sub>	2	21915.61	2146.46	3590.50
	Max. H <sub>z</sub>	2	21915.61	2146.46	3590.50
	Min. Vert	4	-15754.94	-2664.79	-1696.87
	Min. H <sub>x</sub>	4	-15754.94	-2664.79	-1696.87
	Min. H <sub>z</sub>	4	-15754.94	-2664.79	-1696.87

## Tower Mast Reaction Summary

Load Combination	Vertical kg	Shear <sub>x</sub> kg	Shear <sub>z</sub> kg	Overturning Moment, M <sub>x</sub> kg-m	Overturning Moment, M <sub>z</sub> kg-m	Torque kg-m
Dead Only	11412.35	0.00	0.00	746	-1934	0
Dead+Wind 0 deg - No Ice	11412.35	253.47	-13175.22	-295106	-11106	-2145
Dead+Wind 45 deg - No Ice	11412.35	9881.32	-10266.85	-230060	-224208	1433
Dead+Wind 90 deg - No Ice	11412.35	12630.00	-253.47	-8426	-285719	3962
Dead+Wind 0 deg - Service	11412.35	63.37	-3293.73	-73215	-4227	-536
Dead+Wind 45 deg - Service	11412.35	2470.28	-2566.66	-56952	-57500	358
Dead+Wind 90 deg - Service	11412.35	3157.43	-63.36	-1548	-72878	991

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## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX kg	PY kg	PZ kg	PX kg	PY kg	PZ kg	
1	-0.00	-11412.35	-0.00	-0.00	11412.35	-0.00	0.000%
2	253.48	-11412.35	-13175.29	-253.47	11412.35	13175.22	0.000%
3	9881.39	-11412.35	-10266.91	-9881.32	11412.35	10266.85	0.000%
4	12630.07	-11412.35	-253.48	-12630.00	11412.35	253.47	0.000%
5	63.37	-11412.35	-3293.82	-63.37	11412.35	3293.73	0.001%
6	2470.35	-11412.35	-2566.73	-2470.28	11412.35	2566.66	0.001%
7	3157.52	-11412.35	-63.37	-3157.43	11412.35	63.36	0.001%

## Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	8	0.00000001	0.00004309
3	Yes	8	0.00000001	0.00004387
4	Yes	8	0.00000001	0.00004283
5	Yes	7	0.00000001	0.00014680
6	Yes	7	0.00000001	0.00014975
7	Yes	7	0.00000001	0.00014609

## Maximum Tower Deflections - Service Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	40 - 38	33.11	6	0.0820	0.0080
T2	38 - 36	30.24	6	0.0819	0.0081
T3	36 - 34	27.36	6	0.0817	0.0080
T4	34 - 32	24.48	6	0.0811	0.0082
T5	32 - 30	21.59	6	0.0799	0.0072
T6	30 - 28	18.67	6	0.0765	0.0066
T7	28 - 26	15.90	6	0.0707	0.0063
T8	26 - 24	13.47	6	0.0629	0.0060
T9	24 - 22	11.32	6	0.0550	0.0058
T10	22 - 18.5	9.39	6	0.0481	0.0049
T11	18.5 - 14	6.45	6	0.0383	0.0033
T12	14 - 9	3.53	6	0.0282	0.0022
T13	9 - 6.7	1.40	6	0.0144	0.0015
T14	6.7 - 0	0.68	6	0.0115	0.0012



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### Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
40.0000	C x MANTENIMIENTO	6	33.11	0.0820	0.0080	321878
36.0000	ANT OMNI L=4.0m	6	27.36	0.0817	0.0080	Inf
35.0000	ANT RF 0.30x1.30m	6	25.92	0.0814	0.0082	Inf
33.0000	HP12-21B	6	23.04	0.0806	0.0078	95181
32.5000	1 SOP. ANT MW (E)	6	22.32	0.0803	0.0075	81601
32.0000	HP12-21B	6	21.59	0.0799	0.0072	97395
31.5000	1 SOP. ANT MW (E)	6	20.86	0.0793	0.0070	308105
26.0000	(2) 1 ANT TV 1.20x1.20m	6	13.47	0.0629	0.0060	14901
24.0000	(2) 1 ANT TV 1.20x1.20m	6	11.32	0.0550	0.0058	18693
23.5000	HP12-21B	6	10.82	0.0532	0.0057	19369
22.0000	(2) 1 ANT TV 1.20x1.20m	6	9.39	0.0481	0.0049	20981
20.0000	(2) 1 ANT TV 1.20x1.20m	6	7.64	0.0422	0.0039	21724
18.0000	(2) 1 ANT TV 1.20x1.20m	6	6.08	0.0372	0.0031	21456
15.5000	ANT GRILLA TV (2.25x2.25m)	6	4.39	0.0318	0.0025	19227
13.0000	ANT GRILLA TV (2.25x2.25m)	6	3.03	0.0253	0.0020	21081
10.5000	ANT GRILLA TV (2.25x2.25m)	6	1.96	0.0179	0.0016	35792
8.0000	ANT GRILLA TV (2.25x2.25m)	6	1.06	0.0130	0.0014	25458

### Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	m	mm		°	°
T1	40 - 38	131.00	3	0.3256	0.0322
T2	38 - 36	119.62	3	0.3254	0.0322
T3	36 - 34	108.19	3	0.3245	0.0320
T4	34 - 32	96.75	3	0.3220	0.0329
T5	32 - 30	85.26	3	0.3163	0.0287
T6	30 - 28	73.70	3	0.3026	0.0265
T7	28 - 26	62.76	3	0.2788	0.0252
T8	26 - 24	53.20	3	0.2474	0.0238
T9	24 - 22	44.73	3	0.2164	0.0234
T10	22 - 18.5	37.11	3	0.1886	0.0198
T11	18.5 - 14	25.57	3	0.1501	0.0133
T12	14 - 9	14.05	3	0.1107	0.0087
T13	9 - 6.7	5.63	3	0.0569	0.0058
T14	6.7 - 0	2.76	3	0.0454	0.0049

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## Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
40.0000	C x MANTENIMIENTO	3	131.00	0.3256	0.0322	81729
36.0000	ANT OMNI L=4.0m	3	108.19	0.3245	0.0320	Inf
35.0000	ANT RF 0.30x1.30m	3	102.47	0.3235	0.0328	Inf
33.0000	HP12-21B	3	91.02	0.3198	0.0311	26741
32.5000	1 SOP. ANT MW (E)	3	88.15	0.3183	0.0299	22644
32.0000	HP12-21B	3	85.26	0.3163	0.0287	27444
31.5000	1 SOP. ANT MW (E)	3	82.36	0.3138	0.0279	109171
26.0000	(2) 1 ANT TV 1.20x1.20m	3	53.20	0.2474	0.0238	3803
24.0000	(2) 1 ANT TV 1.20x1.20m	3	44.73	0.2164	0.0234	4626
23.5000	HP12-21B	3	42.75	0.2091	0.0228	4799
22.0000	(2) 1 ANT TV 1.20x1.20m	3	37.11	0.1886	0.0198	5346
20.0000	(2) 1 ANT TV 1.20x1.20m	3	30.25	0.1650	0.0158	5605
18.0000	(2) 1 ANT TV 1.20x1.20m	3	24.10	0.1457	0.0126	5542
15.5000	ANT GRILLA TV (2.25x2.25m)	3	17.45	0.1249	0.0099	4909
13.0000	ANT GRILLA TV (2.25x2.25m)	3	12.06	0.0995	0.0080	5352
10.5000	ANT GRILLA TV (2.25x2.25m)	3	7.81	0.0704	0.0065	9103
8.0000	ANT GRILLA TV (2.25x2.25m)	3	4.28	0.0511	0.0054	6483

## Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load Allowable	Allowable Ratio	Criteria
	m			mm		kg	kg			
T1	40	Leg	A394T0	16	4	85.03	5536.87	0.015	1.333	Bearing
		Diagonal	A394T0	16	2	33.81	3705.44	0.009	1.333	Member Bearing
		Top Girt	A394T0	16	2	2.58	3705.44	0.001	1.333	Member Bearing
T2	38	Diagonal	A394T0	16	2	109.36	3705.44	0.030	1.333	Member Bearing
		Top Girt	A394T0	16	2	15.71	3705.44	0.004	1.333	Member Bearing
T3	36	Leg	A394T0	16	12	184.79	5536.87	0.033	1.333	Bearing
		Diagonal	A394T0	16	2	190.69	3705.44	0.051	1.333	Member Bearing
		Top Girt	A394T0	16	2	38.78	3705.44	0.010	1.333	Member Bearing
T4	34	Leg	A394T0	16	12	376.16	5536.87	0.068	1.333	Bearing
		Diagonal	A394T0	16	2	479.71	3705.44	0.129	1.333	Member Bearing
		Top Girt	A394T0	16	2	79.18	3705.44	0.021	1.333	Member Bearing
T5	32	Diagonal	A394T0	16	2	922.40	3705.44	0.249	1.333	Member Bearing
		Top Girt	A394T0	16	2	180.56	3705.44	0.049	1.333	Member Bearing
T6	30	Leg	A394T0	16	12	1366.93	5536.87	0.247	1.333	Bearing
		Diagonal	A394T0	16	2	995.73	3705.44	0.269	1.333	Member Bearing
		Top Girt	A394T0	16	2	388.19	3705.44	0.105	1.333	Member Bearing
T7	28	Leg	A394T0	16	12	1925.35	5536.87	0.348	1.333	Bearing
		Diagonal	A394T0	16	2	520.59	3705.44	0.140	1.333	Member Bearing
		Top Girt	A394T0	16	2	117.36	3705.44	0.032	1.333	Member Bearing

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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
T8	26	Diagonal	A394T0	16	2	445.06	3705.44	0.120	1.333	Member Bearing
T9	24	Leg	A394T0	16	12	2582.71	5536.87	0.466	1.333	Bearing
		Diagonal	A394T0	16	2	685.21	3705.44	0.185	1.333	Member Bearing
T10	22	Diagonal	A394T0	16	2	861.07	3705.44	0.232	1.333	Member Bearing
T11	18.5	Leg	A394T0	16	12	3663.90	8305.28	0.441	1.333	Bearing
		Diagonal	A394T0	16	2	920.25	3705.44	0.248	1.333	Member Bearing
T12	14	Leg	A394T0	16	12	4371.02	8305.28	0.526	1.333	Bearing
		Diagonal	A394T0	16	2	889.74	4940.57	0.180	1.333	Member Bearing
T13	9	Diagonal	A394T0	16	2	768.10	4940.57	0.155	1.333	Member Bearing
T14	6.7	Leg	A394T0	16	16	3646.66	8305.28	0.439	1.333	Bearing
		Diagonal	A394T0	16	2	1670.79	4940.57	0.338	1.333	Member Bearing
		Horizontal	A394T0	16	2	210.93	4940.57	0.043	1.333	Member Bearing

## Compression Checks

### Leg Design Data (Compression)

Section No.	Elevation m	Size	L m	L <sub>u</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio P P <sub>a</sub>
T1	40 - 38	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-170.06	18504.49	0.009
T2	38 - 36	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-471.28	18504.49	0.025
T3	36 - 34	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-1108.74	18504.49	0.060
T4	34 - 32	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-2256.96	18504.49	0.122
T5	32 - 30	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-4944.75	18504.49	0.267
T6	30 - 28	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-8201.59	18504.49	0.443
T7	28 - 26	L102x102x6	2.0188	2.0188	50.0 K=0.50	145	1252	-11552.05	18457.45	0.626
T8	26 - 24	L102x102x6	2.0189	2.0189	50.0 K=0.50	145	1252	-14225.98	18457.22	0.771
T9	24 - 22	L102x102x6	2.0188	2.0188	50.0 K=0.50	145	1252	-15496.26	18457.45	0.840
T10	22 - 18.5	L102x102x10	3.5330	3.5330	44.1 K=0.25	174	1845	-19038.64	32742.35	0.581
T11	18.5 - 14	L102x102x10	4.5424	4.5424	56.7 K=0.25	160	1845	-21983.41	30183.18	0.728
T12	14 - 9	L102x102x10	5.0471	5.0471	63.0	153	1845	-26226.08	28788.70	0.911

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Section No.	Elevation m	Size	L m	L <sub>u</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio P P <sub>a</sub>
T13	9 - 6.7	L127x127x10	2.3217	2.3217	K=0.25 46.2 K=0.50	172	2329	-28973.54	40792.53	0.710
T14	6.7 - 0	L127x127x10	6.7632	6.7632	53.8 K=0.20	164	2329	-29173.30	38850.88	0.751

### Diagonal Design Data (Compression)






Section No.	Elevation m	Size	L m	L <sub>u</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio P P <sub>a</sub>
T1	40 - 38	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-67.62	2691.77	0.025
T2	38 - 36	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-218.73	2691.77	0.081
T3	36 - 34	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-381.38	2691.77	0.142
T4	34 - 32	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-959.42	2691.77	0.356
T5	32 - 30	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-1844.81	2691.77	0.685
T6	30 - 28	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-1991.45	2691.77	0.740
T7	28 - 26	L51x51x5	2.9755	1.5510	99.0 K=1.00	90	461	-1041.17	4251.17	0.245
T8	26 - 24	L51x51x5	3.2734	1.6960	108.2 K=1.00	82	461	-792.64	3862.63	0.205
T9	24 - 22	L51x51x5	3.5888	1.8506	118.1 K=1.00	73	461	-1370.43	3423.29	0.400
T10	22 - 18.5	L51x51x5	4.9675	2.6532	84.6 K=0.50	102	461	-1690.32	4809.62	0.351
T11	18.5 - 14	L64x64x5	6.2306	3.3601	85.0 K=0.50	102	582	-1840.51	6050.11	0.304
T12	14 - 9	L64x64x6	7.2385	3.8869	99.5 K=0.50	90	768	-1779.47	7039.39	0.253
T13	9 - 6.7	L64x64x6	3.6684	3.6032	144.5 K=0.50	49	768	-1518.66	3862.65	0.393
T14	6.7 - 0	L76x76x6	7.6936	7.5644	176.1 K=0.35	33	929	-3341.57	3146.37	1.062

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	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.



### Horizontal Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L<sub>u</sub></i> <i>m</i>	<i>Kl/r</i>	<i>F<sub>a</sub></i> <i>MPa</i>	<i>A</i> <i>mm<sup>2</sup></i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P<sub>a</sub></i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T14	6.7 - 0	L76x76x6	6.1460	3.0095	127.4 K=1.00	63	929	-421.85	6009.28	0.070 

### Top Girt Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L<sub>u</sub></i> <i>m</i>	<i>Kl/r</i>	<i>F<sub>a</sub></i> <i>MPa</i>	<i>A</i> <i>mm<sup>2</sup></i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P<sub>a</sub></i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T3	36 - 34	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-24.76	2679.95	0.009 
T4	34 - 32	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-80.72	2679.95	0.030 
T5	32 - 30	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-242.45	2679.95	0.090 
T6	30 - 28	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-612.30	2679.95	0.228 
T7	28 - 26	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-191.84	2679.95	0.072 

### Inner Bracing Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L<sub>u</sub></i> <i>m</i>	<i>Kl/r</i>	<i>F<sub>a</sub></i> <i>MPa</i>	<i>A</i> <i>mm<sup>2</sup></i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P<sub>a</sub></i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T7	28 - 26	L64x64x5	2.8284	2.7268	138.0 K=1.00	54	582	-1.95	3208.75	0.001 
T14	6.7 - 0	L64x64x6	4.3459	4.3459	174.2 K=0.50	34	768	-36.92	2655.21	0.014 

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tension Checks

## Leg Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L<sub>u</sub></i> <i>m</i>	<i>KI/r</i>	<i>F<sub>a</sub></i> <i>MPa</i>	<i>A</i> <i>mm<sup>2</sup></i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P<sub>a</sub></i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T1	40 - 38	L102x102x6	2.0000	2.0000	63.0	224	1009	29.46	23063.59	0.001
T2	38 - 36	L102x102x6	2.0000	2.0000	63.0	207	1252	109.27	26399.08	0.004
T3	36 - 34	L102x102x6	2.0000	2.0000	63.0	224	1009	571.85	23063.59	0.025
T4	34 - 32	L102x102x6	2.0000	2.0000	63.0	224	1009	1603.21	23063.59	0.070
T5	32 - 30	L102x102x6	2.0000	2.0000	63.0	207	1252	3647.90	26399.08	0.138
T6	30 - 28	L102x102x6	2.0000	2.0000	63.0	224	1009	6845.84	23063.59	0.297
T7	28 - 26	L102x102x6	2.0188	2.0188	63.6	224	1009	9833.79	23063.59	0.426
T8	26 - 24	L102x102x6	2.0189	2.0189	63.6	207	1252	11949.53	26399.08	0.453
T9	24 - 22	L102x102x6	2.0188	2.0188	63.6	224	1009	13105.51	23063.59	0.568
T10	22 - 18.5	L102x102x10	3.5330	3.5330	113.1	207	1845	15702.65	38918.24	0.403
T11	18.5 - 14	L102x102x10	4.5424	4.5424	145.4	224	1482	18429.28	33858.32	0.544
T12	14 - 9	L102x102x10	5.0471	5.0471	161.5	224	1482	22077.93	33858.32	0.652
T13	9 - 6.7	L127x127x10	2.3217	2.3217	58.6	207	2329	24333.06	49124.07	0.495
T14	6.7 - 0	L127x127x10	6.7632	6.7632	170.7	224	1966	24158.70	44914.64	0.538

<b>RISA Tower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 46 of 48
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio $\frac{P}{P_a}$
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	$\frac{P}{P_a}$
T1	40 - 38	L51x51x5	2.8284	1.3424	128.5	200	278	35.03	5664.74	0.006
T2	38 - 36	L51x51x5	2.8284	1.3424	128.5	200	278	168.23	5664.74	0.030
T3	36 - 34	L51x51x5	2.8284	1.3424	128.5	200	278	296.48	5664.74	0.052
T4	34 - 32	L51x51x5	2.8284	1.3424	128.5	200	278	849.35	5664.74	0.150
T5	32 - 30	L51x51x5	2.8284	1.3424	128.5	200	278	1690.50	5664.74	0.298
T6	30 - 28	L51x51x5	2.8284	1.3424	128.5	200	278	1781.10	5664.74	0.314
T7	28 - 26	L51x51x5	2.9755	1.5510	140.0	200	278	892.12	5664.74	0.157
T8	26 - 24	L51x51x5	3.2734	1.6960	154.5	200	278	890.12	5664.74	0.157
T9	24 - 22	L51x51x5	3.5888	1.8506	169.6	200	278	1275.13	5664.74	0.225
T10	22 - 18.5	L51x51x5	4.9675	2.6532	238.6	200	278	1722.14	5664.74	0.304
T11	18.5 - 14	L64x64x5	6.2306	3.3601	238.9	200	368	1726.07	7509.63	0.230
T12	14 - 9	L64x64x6	7.2385	3.8869	281.2	200	485	1760.40	9887.86	0.178
T13	9 - 6.7	L64x64x6	3.6684	3.6032	184.5	200	485	1536.19	9887.86	0.155
T14	6.7 - 0	L76x76x6	7.6936	7.5644	320.2	200	606	3123.33	12354.27	0.253

### Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio $\frac{P}{P_a}$
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	$\frac{P}{P_a}$
T14	6.7 - 0	L76x76x6	6.1460	3.0095	127.4	200	606	354.80	12354.27	0.029

### Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio $\frac{P}{P_a}$
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	$\frac{P}{P_a}$
T1	40 - 38	L64x64x5	2.0000	1.8984	96.1	200	368	3.91	7509.63	0.001*
T2	38 - 36	L64x64x5	2.0000	1.8984	96.1	200	368	31.41	7509.63	0.004



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Section No.	Elevation m	Size	L m	$L_u$ m	$KI/r$	$F_a$ MPa	A $mm^2$	Actual P kg	Allow. $P_a$ kg	Ratio $\frac{P}{P_a}$
T3	36 - 34	L64x64x5	2.0000	1.8984	96.1	200	368	77.57	7509.63	0.010
T4	34 - 32	L64x64x5	2.0000	1.8984	96.1	200	368	158.35	7509.63	0.021
T5	32 - 30	L64x64x5	2.0000	1.8984	96.1	200	368	361.12	7509.63	0.048
T6	30 - 28	L64x64x5	2.0000	1.8984	96.1	200	368	776.39	7509.63	0.103
T7	28 - 26	L64x64x5	2.0000	1.8984	96.1	200	368	234.71	7509.63	0.031

\* DL controls

### Inner Bracing Design Data (Tension)

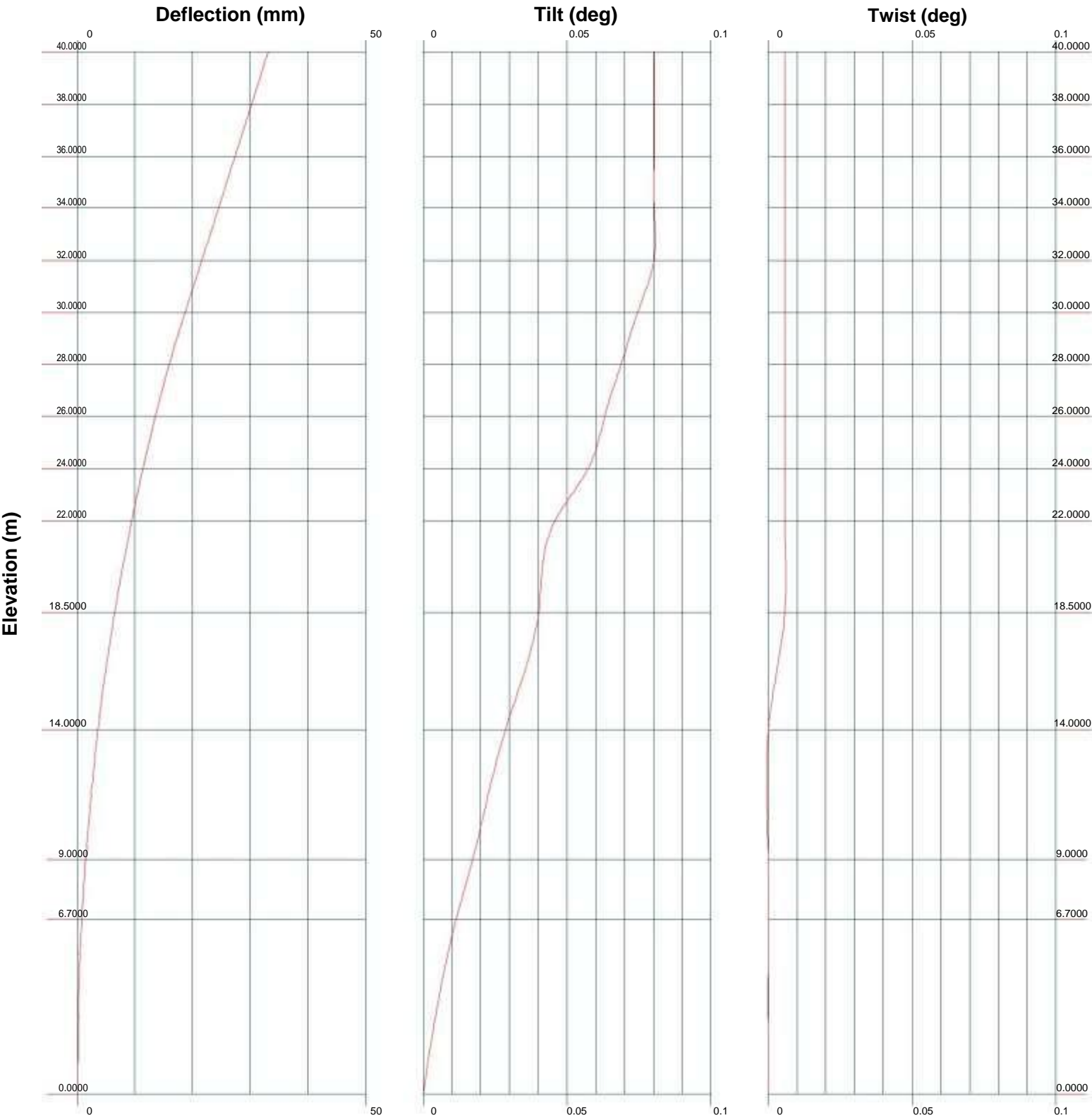
Section No.	Elevation m	Size	L m	$L_u$ m	$KI/r$	$F_a$ MPa	A $mm^2$	Actual P kg	Allow. $P_a$ kg	Ratio $\frac{P}{P_a}$
T1	40 - 38	L64x64x5	2.8284	2.7268	138.0	149	582	3.91	8837.43	0.000*
T2	38 - 36	L64x64x5	2.8284	2.7268	138.0	149	582	17.02	8837.43	0.002*
T3	36 - 34	L64x64x5	2.8284	2.7268	138.0	149	582	26.49	8837.43	0.003*
T4	34 - 32	L64x64x5	2.8284	2.7268	138.0	149	582	38.90	8837.43	0.004*
T5	32 - 30	L64x64x5	2.8284	2.7268	138.0	149	582	59.85	8837.43	0.007*
T6	30 - 28	L64x64x5	2.8284	2.7268	138.0	149	582	82.86	8837.43	0.009*
T7	28 - 26	L64x64x5	2.8284	2.7268	138.0	149	582	39.59	8837.43	0.004
T14	6.7 - 0	L64x64x6	4.3459	4.3459	222.5	149	768	10.88	11659.14	0.001

\* DL controls

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40m PATA 7.45m - V=120KPH	<b>Page</b> 48 of 48
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.	<b>Date</b> 07:51:53 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Section Capacity Table

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P <sub>allow</sub> kg	% Capacity	Pass Fail	
T1	40 - 38	Leg	L102x102x6	3	-170.06	24666.48	0.7	Pass	
		Diagonal	L51x51x5	14	-67.62	3588.13	1.9	Pass	
		Top Girt	L64x64x5	8	3.91	7509.63	0.2	Pass	
		Inner Bracing	L64x64x5	5	3.91	8837.43	0.2	Pass	
T2	38 - 36	Leg	L102x102x6	21	-471.28	24666.48	1.9	Pass	
		Diagonal	L51x51x5	35	-218.73	3588.13	6.1	Pass	
		Top Girt	L64x64x5	27	31.41	10010.34	0.3	Pass	
		Inner Bracing	L64x64x5	23	17.02	8837.43	0.2	Pass	
T3	36 - 34	Leg	L102x102x6	39	-1108.74	24666.48	4.5	Pass	
		Diagonal	L51x51x5	50	-381.38	3588.13	10.6	Pass	
		Top Girt	L64x64x5	44	77.57	10010.34	0.8	Pass	
		Inner Bracing	L64x64x5	42	26.49	8837.43	0.3	Pass	
T4	34 - 32	Leg	L102x102x6	57	-2256.96	24666.48	9.1	Pass	
		Diagonal	L51x51x5	66	-959.42	3588.13	26.7	Pass	
		Top Girt	L64x64x5	64	-80.72	3572.37	2.3	Pass	
		Inner Bracing	L64x64x5	60	38.90	8837.43	0.4	Pass	
T5	32 - 30	Leg	L102x102x6	75	-4944.75	24666.48	20.0	Pass	
		Diagonal	L51x51x5	84	-1844.81	3588.13	51.4	Pass	
		Top Girt	L64x64x5	82	-242.45	3572.37	6.8	Pass	
		Inner Bracing	L64x64x5	78	59.85	8837.43	0.7	Pass	
T6	30 - 28	Leg	L102x102x6	93	-8201.59	24666.48	33.2	Pass	
		Diagonal	L51x51x5	104	-1991.45	3588.13	55.5	Pass	
		Top Girt	L64x64x5	100	-612.30	3572.37	17.1	Pass	
		Inner Bracing	L64x64x5	96	82.86	8837.43	0.9	Pass	
T7	28 - 26	Leg	L102x102x6	111	-11552.05	24603.78	47.0	Pass	
		Diagonal	L51x51x5	122	-1041.17	5666.81	18.4	Pass	
		Top Girt	L64x64x5	115	-191.84	3572.37	5.4	Pass	
		Inner Bracing	L64x64x5	114	39.59	11780.30	0.3	Pass	
T8	26 - 24	Leg	L102x102x6	129	-14225.98	24603.48	57.8	Pass	
		Diagonal	L51x51x5	137	-792.64	5148.89	15.4	Pass	
T9	24 - 22	Leg	L102x102x6	141	-15496.26	24603.78	63.0	Pass	
		Diagonal	L51x51x5	149	-1370.43	4563.25	30.0	Pass	
T10	22 - 18.5	Leg	L102x102x10	153	-19038.64	43645.55	43.6	Pass	
		Diagonal	L51x51x5	161	-1690.32	6411.23	26.4	Pass	
T11	18.5 - 14	Leg	L102x102x10	165	-21983.41	40234.18	54.6	Pass	
		Diagonal	L64x64x5	173	-1840.51	8064.79	22.8	Pass	
T12	14 - 9	Leg	L102x102x10	177	-26226.08	38375.33	68.3	Pass	
		Diagonal	L64x64x6	185	-1779.47	9383.51	19.0	Pass	
T13	9 - 6.7	Leg	L127x127x10	189	-28973.54	54376.44	53.3	Pass	
		Diagonal	L64x64x6	202	-1518.66	5148.92	29.5	Pass	
T14	6.7 - 0	Leg	L127x127x10	205	-29173.30	51788.22	56.3	Pass	
		Diagonal	L76x76x6	213	-3341.57	4194.11	79.7	Pass	
		Horizontal	L76x76x6	191	-421.85	8010.38	5.3	Pass	
							Summary		
							Leg (T12)	68.3	Pass
							Diagonal (T14)	79.7	Pass
							Horizontal (T14)	5.3	Pass
							Top Girt (T6)	17.1	Pass
							Bolt Checks	39.5	Pass
							RATING =	79.7	Pass



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		<b>EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.</b>		
	Client:	RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	Drawn by:	Ing. C. Londoño M.
		TIA/EIA-222-F	04/25/16	App'd:
	Path:			Scale: NTS
				Dwg No. E-5

# Feedline Distribution Chart

0.0000 - 40.0000

Round

Flat

App In Face

App Out Face

Truss Leg

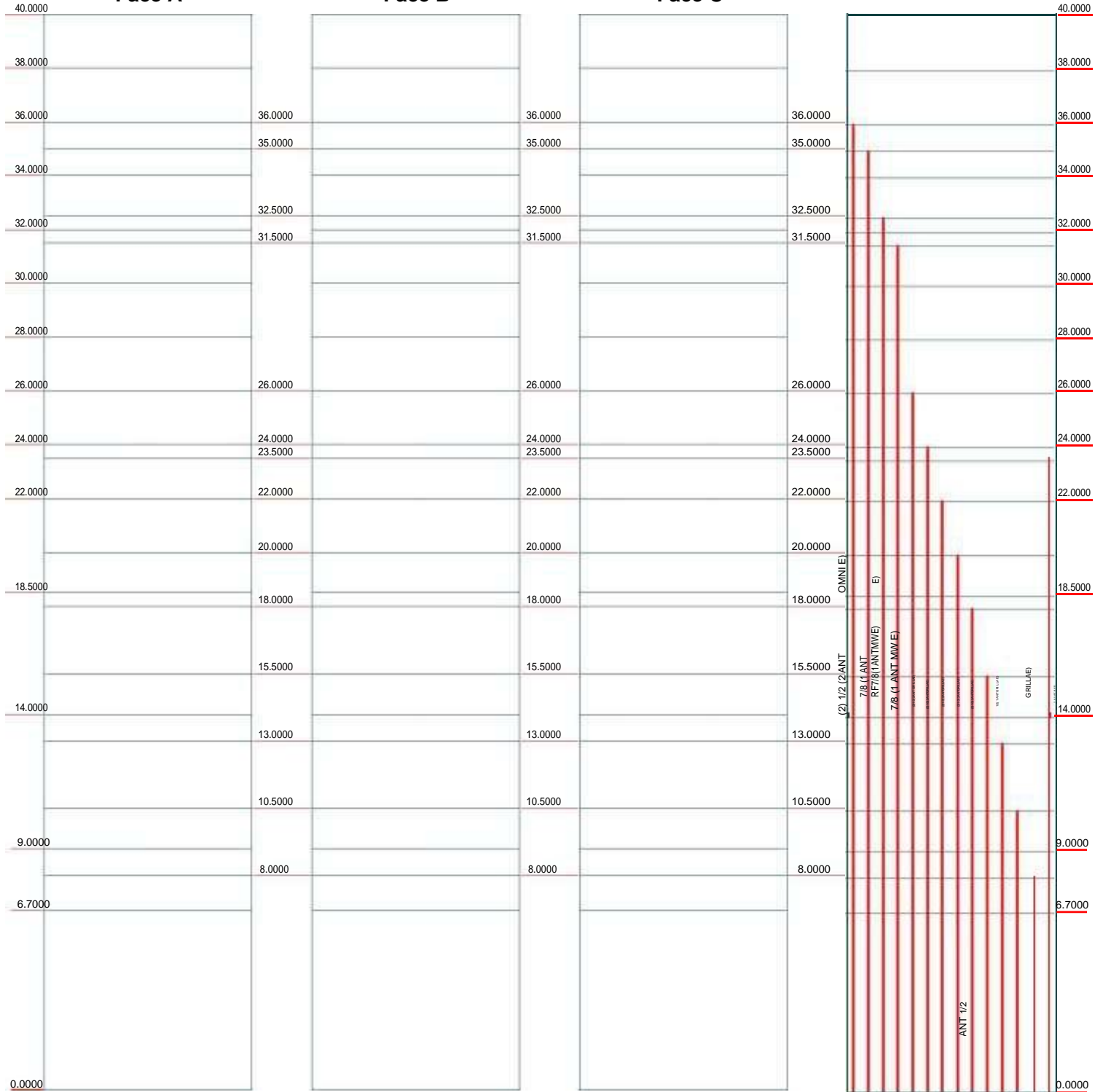
Face A

Face B

Face C

Face D

Elevation (m)



**BTESA BROAD TELECOM**  
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BOGOTA D.C. - COLOMBIA.  
Phone: 57 (1) 2740536.  
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Job: **DIAGRAMA CABLES GUIA DE ONDA-TC40m PATA 7.45m - V=120KPH**  
EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.  
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.  
Path: TIA/EIA-222-F  
Drawn by: Ing. C. Londoño M.  
App'd: 04/25/16  
Scale: NTS  
Dwg No. E-7

# Stress Distribution Chart

0.0000 - 40.0000

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

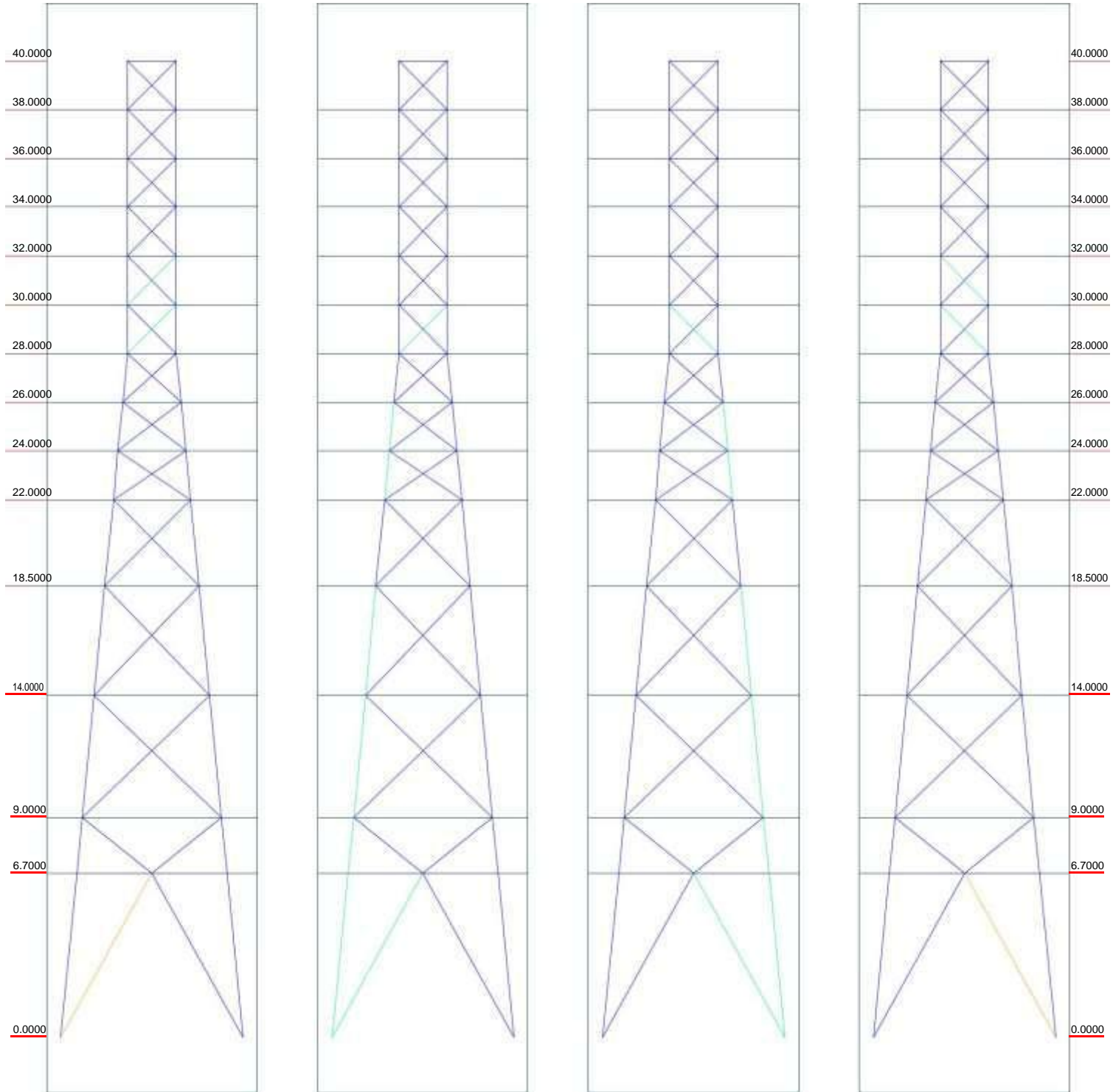
Face A

Face B

Face C

Face D

Elevation (m)



**BTESA BROAD TELECOM**  
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BOGOTA D.C. - COLOMBIA.  
Phone: 57 (1) 2740536.  
FAX: 57 (1) 2740536.

Job: **DIAGRAMA DE ESFUERZOS-TC40m PATA 7.45m - V=120KPH**  
EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION ACTUAL.  
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA. Drawn by: Ing. C. Londoño M.  
TIA/EIA-222-F 04/25/16 Scale: NTS  
Path: Dwg No. E-8



***CONDICION NUEVA (FUTURA).***  
***ESTACION: CERRÓ MONTEZUMA.***





<b><i>RISATower</i></b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 1 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

SALIDA 2 – CONDICION NUEVA (FUTURA).

## Tower Input Data

The main tower is a 4x free standing tower with an overall height of 48.0000 m above the ground line.

The base of the tower is set at an elevation of 0.0000 m above the ground line.

The face width of the tower is 2.0000 m at the top and 7.4500 m at the base. This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 120 kph.

Deflections calculated using a wind speed of 60 kph.

Weld together tower sections have flange connections.

Connections use galvanized A-394 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards. Welds are fabricated with ER-70S-6 electrodes.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

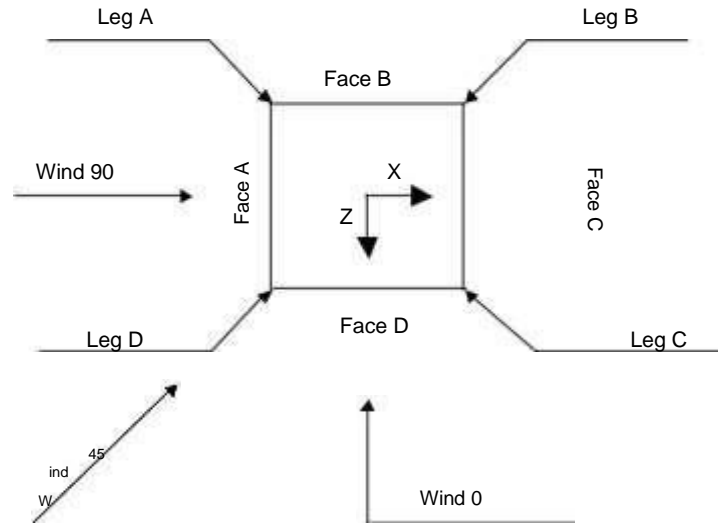
Stress ratio used in tower member design is 1.333.

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

## Options

Consider Moments - Legs	√ Distribute Leg Loads As Uniform	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	√ Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

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**Square To wer**

## Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	m			m		m
T1	48.0000-40.0000			2.0000	1	8.0000
T2	40.0000-38.0000			2.0000	1	2.0000
T3	38.0000-36.0000			2.0000	1	2.0000
T4	36.0000-34.0000			2.0000	1	2.0000
T5	34.0000-32.0000			2.0000	1	2.0000
T6	32.0000-30.0000			2.0000	1	2.0000
T7	30.0000-28.0000			2.0000	1	2.0000
T8	28.0000-26.0000			2.0000	1	2.0000
T9	26.0000-24.0000			2.3890	1	2.0000
T10	24.0000-22.0000			2.7790	1	2.0000
T11	22.0000-18.5000			3.1680	1	3.5000
T12	18.5000-14.0000			3.8490	1	4.5000
T13	14.0000-9.0000			4.7250	1	5.0000
T14	9.0000-6.7000			5.6980	1	2.3000
T15	6.7000-0.0000			6.1460	1	6.7000

## Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	m	m				mm	mm
T1	48.0000-40.0000	2.0000	X Brace	No	No	0	0
T2	40.0000-38.0000	2.0000	X Brace	No	No	0	0
T3	38.0000-36.0000	2.0000	X Brace	No	No	0	0
T4	36.0000-34.0000	2.0000	X Brace	No	No	0	0

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Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	m	m				mm	mm
T5	34.0000-32.0000	2.0000	X Brace	No	No	0	0
T6	32.0000-30.0000	2.0000	X Brace	No	No	0	0
T7	30.0000-28.0000	2.0000	X Brace	No	No	0	0
T8	28.0000-26.0000	2.0000	X Brace	No	No	0	0
T9	26.0000-24.0000	2.0000	X Brace	No	No	0	0
T10	24.0000-22.0000	2.0000	X Brace	No	No	0	0
T11	22.0000-18.5000	3.5000	X Brace	No	No	0	0
T12	18.5000-14.0000	4.5000	X Brace	No	No	0	0
T13	14.0000-9.0000	5.0000	X Brace	No	No	0	0
T14	9.0000-6.7000	2.3000	K Brace Up	No	Yes	0	0
T15	6.7000-0.0000	6.7000	K Brace Down	No	Yes	0	0

### Tower Section Geometry (cont'd)

Tower Elevation m	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
48.0000-40.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T2	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
40.0000-38.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T3	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
38.0000-36.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T4	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
36.0000-34.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T5	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
34.0000-32.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T6	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
32.0000-30.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T7	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
30.0000-28.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T8	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
28.0000-26.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T9	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
26.0000-24.0000	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
T10	Equal Angle	L102x102x6	A572-50 (345 MPa)	Equal Angle	L51x51x5	A36 (248 MPa)
24.0000-22.0000	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T11	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
22.0000-18.5000	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T12	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
18.5000-14.0000	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x6	A36 (248 MPa)
T13	Equal Angle	L102x102x10	A572-50 (345 MPa)	Equal Angle	L64x64x6	A36 (248 MPa)
14.0000-9.0000	Equal Angle	L127x127x10	A572-50 (345 MPa)	Equal Angle	L64x64x6	A36 (248 MPa)
T14	Equal Angle	L127x127x10	A572-50 (345 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)
9.0000-6.7000	Equal Angle	L127x127x10	A572-50 (345 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)
T15	Equal Angle	L127x127x10	A572-50 (345 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)
6.7000-0.0000						

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### Tower Section Geometry (cont'd)

Tower Elevation m	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 48.0000-40.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T2 40.0000-38.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T3 38.0000-36.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T4 36.0000-34.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T5 34.0000-32.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T6 32.0000-30.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T7 30.0000-28.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T8 28.0000-26.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation m	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T14 9.0000-6.7000	None	Flat Bar		A36 (248 MPa)	Solid Round	8	A36 (248 MPa)
T15 6.7000-0.0000	None	Flat Bar		A36 (248 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation m	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 48.0000-40.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T2 40.0000-38.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T3 38.0000-36.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T4 36.0000-34.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T5 34.0000-32.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T6 32.0000-30.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T7	Solid Round		A572-50	Equal Angle	L64x64x5	A36

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Tower Elevation <i>m</i>	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
30.0000-28.0000 T8	Solid Round		(345 MPa) A572-50	Equal Angle	L64x64x5	(248 MPa) A36
28.0000-26.0000 T14	Solid Round		(345 MPa) A572-50	Equal Angle	L64x64x6	(248 MPa) A36
9.0000-6.7000 T15	Solid Round		(345 MPa) A572-50	Equal Angle	L64x64x6	(248 MPa) A36
6.7000-0.0000			(345 MPa)			(248 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Gusset Area (per face) <i>m²</i>	Gusset Thickness <i>mm</i>	Gusset Grade	Adjust. Factor <i>A<sub>f</sub></i>	Adjust. Factor <i>A<sub>r</sub></i>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals <i>mm</i>	Double Angle Stitch Bolt Spacing Horizontals <i>mm</i>
T1 48.0000-40.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T2 40.0000-38.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T3 38.0000-36.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T4 36.0000-34.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T5 34.0000-32.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T6 32.0000-30.00 00	0.0000	0	A36 (248 MPa)	1.1	1	1.5	0	0
T7 30.0000-28.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T8 28.0000-26.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T9 26.0000-24.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T10 24.0000-22.00 00	0.0000	0	A36 (248 MPa)	1.3	1	1.5	0	0
T11 22.0000-18.50 00	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T12 18.5000-14.00 00	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T13 14.0000-9.000 0	0.0000	0	A36 (248 MPa)	1.5	1	1.5	0	0
T14	0.0000	0	A36	1.5	1	1.5	0	0

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Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals mm	Double Angle Stitch Bolt Spacing Horizontal mm
m	m	mm						
9.0000-6.7000 T15	0.0000	0	(248 MPa) A36	1.5	1	1.5	0	0
6.7000-0.0000			(248 MPa)					

## Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors						
				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 48.0000-40.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 40.0000-38.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 38.0000-36.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 36.0000-34.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 34.0000-32.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 32.0000-30.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 30.0000-28.00 00	No	No	0.5	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 28.0000-26.00 00	No	No	0.5	1 0.25	1 1	1 1	1 1	1 1	1 1	1 0.5
T9 26.0000-24.00 00	No	No	0.5	1 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T10 24.0000-22.00 00	No	No	0.5	0.5 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T11 22.0000-18.50 00	No	No	0.25	0.5 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T12 18.5000-14.00 00	No	No	0.25	0.5 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T13 14.0000-9.000 0	No	No	0.25	1 0.25	1 1	1 1	1 1	1 1	1 1	1 1
T14 9.0000-6.7000	No	No	0.5	1 1	0.5 0.5	1 1	1 1	1 1	1 1	1 1
T15 6.7000-0.0000	No	No	0.2	1 1	0.4 0.35	1 1	1 1	1 0.5	1 1	0.5 0.5

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<sup>1</sup>Note: 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 m	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 48.0000-40.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T2 40.0000-38.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T3 38.0000-36.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T4 36.0000-34.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T5 34.0000-32.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T6 32.0000-30.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T7 30.0000-28.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T8 28.0000-26.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T9 26.0000-24.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T10 24.0000-22.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T11 22.0000-18.50 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T12 18.5000-14.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T13 14.0000-9.000 0	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T14 9.0000-6.7000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T15 6.7000-0.0000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75



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## Tower Section Geometry (cont'd)

Tower Elevation m	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 48.0000-40.00 00	Sleeve SS	16 A394T0	8	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T2 40.0000-38.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T3 38.0000-36.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T4 36.0000-34.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T5 34.0000-32.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T6 32.0000-30.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T7 30.0000-28.00 00	Sleeve SS	16 A394T0	8	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T8 28.0000-26.00 00	Sleeve SS	16 A394T0	8	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T9 26.0000-24.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T10 24.0000-22.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T11 22.0000-18.50 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T12 18.5000-14.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T13 14.0000-9.000 0	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T14 9.0000-6.7000	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T15 6.7000-0.0000	Sleeve SS	16 A394T0	16	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	2	16 A394T0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 9 of 57
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## Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement m	Total Number	Number Per Row	Clear Spacing mm	Width or Diameter mm	Perimeter mm	Weight kg/m
1/2 (2 ANT OMNI E)	D	No	Ar (CfAe)	36.0000 - 0.0000	2	2	15	15		0.37
7/8 (1 ANT RF E)	D	No	Ar (CfAe)	35.0000 - 0.0000	1	1	28	28		0.80
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	32.5000 - 0.0000	1	1	28	28		0.80
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	31.5000 - 0.0000	1	1	28	28		0.80
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	26.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	24.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	22.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	20.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	18.0000 - 0.0000	2	2	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	15.5000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	13.0000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	10.5000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	8.0000 - 0.0000	1	1	15	15		0.37
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	23.5000 - 0.0000	1	1	28	28		0.80
7/8 (2 ANT MW N)	D	No	Ar (CfAe)	40.0000 - 0.0000	2	2	28	28		0.80
7/8 (2 ANT OMNI N)	D	No	Ar (CfAe)	40.0000 - 0.0000	2	2	28	28		0.80
3 (6 ANT PANEL)	D	No	Ar (CfAe)	48.0000 - 0.0000	3	3	76	76		2.65
3 (6 ANT PANEL)	D	No	Ar (CfAe)	45.0000 - 0.0000	3	3	76	76		2.65

## Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation m	Face	AR m	AF m	CAAA In Face m	CAAA Out Face m	Weight kg
T1	48.0000-40.0000	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
		D	2.982	0.000	0.000	0.000	103.31
T2	40.0000-38.0000	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
		D	1.143	0.000	0.000	0.000	38.22
T3	38.0000-36.0000	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
		D	1.143	0.000	0.000	0.000	38.22

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Tower Section	Tower Elevation m	Face	AR m	AF m	CAA In Face m	CAA Out Face m	Weight kg
T4	36.0000-34.0000	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
		D	1.230	0.000	0.000	0.000	40.51
T5	34.0000-32.0000	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
		D	1.272	0.000	0.000	0.000	41.71
T6	32.0000-30.0000	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
		D	1.357	0.000	0.000	0.000	44.12
T7	30.0000-28.0000	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
		D	1.371	0.000	0.000	0.000	44.53
T8	28.0000-26.0000	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
		D	1.371	0.000	0.000	0.000	44.53
T9	26.0000-24.0000	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
		D	1.430	0.000	0.000	0.000	46.01
T10	24.0000-22.0000	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
		D	1.531	0.000	0.000	0.000	48.71
T11	22.0000-18.5000	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
		D	2.852	0.000	0.000	0.000	89.66
T12	18.5000-14.0000	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
		D	3.882	0.000	0.000	0.000	120.73
T13	14.0000-9.0000	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
		D	4.460	0.000	0.000	0.000	137.84
T14	9.0000-6.7000	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
		D	2.101	0.000	0.000	0.000	64.66
T15	6.7000-0.0000	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
		D	6.164	0.000	0.000	0.000	189.44

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## Feed Line Center of Pressure

Section	Elevation	CP <sub>X</sub>	CP <sub>Z</sub>	CP <sub>X</sub> Ice	CP <sub>Z</sub> Ice
	m	mm	mm	mm	mm
T1	48.0000-40.0000	0	200	0	200
T2	40.0000-38.0000	0	253	0	253
T3	38.0000-36.0000	0	253	0	253
T4	36.0000-34.0000	0	267	0	267
T5	34.0000-32.0000	0	274	0	274
T6	32.0000-30.0000	0	287	0	287
T7	30.0000-28.0000	0	255	0	255
T8	28.0000-26.0000	0	274	0	274
T9	26.0000-24.0000	0	362	0	362
T10	24.0000-22.0000	0	422	0	422
T11	22.0000-18.5000	0	469	0	469
T12	18.5000-14.0000	0	599	0	599
T13	14.0000-9.0000	0	733	0	733
T14	9.0000-6.7000	0	748	0	748
T15	6.7000-0.0000	0	807	0	807

## User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle	Weight	F <sub>x</sub>	F <sub>z</sub>	Wind Force	C <sub>A</sub> A <sub>C</sub>
	m	m	°	kg	kg	kg	kg	m <sup>2</sup>
C x MANTENIMIENTO	40.0000	0.0000	0.0000	No Ice Service	320.00 320.00	0.00 0.00	0.00 0.00	0.00 0.00
1 SOP. ANT MW (E)	32.5000	0.0000	0.0000	No Ice Service	150.00 150.00	0.00 5.00	0.00 -5.00	0.0000 0.0000
1 SOP. ANT MW (E)	31.5000	0.0000	0.0000	No Ice Service	150.00 150.00	20.00 5.00	-20.00 -5.00	0.0000 0.0000
1 SOP. ANT MW (E)	23.5000	0.0000	0.0000	No Ice Service	150.00 150.00	20.00 5.00	-20.00 -5.00	0.0000 0.0000
(2) SOP. ANT OMNI (E)	36.0000	0.0000	0.0000	No Ice Service	20.00 20.00	0.00 0.00	0.00 0.00	0.0000 0.0000

## Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	CAA Front	CAA Side	Weight
			m m m	°	m	m <sup>2</sup>	m <sup>2</sup>	kg
ANT OMNI L=4.0m (1E)	B	From Leg	1.5000 0.0000 0.0000	0.0000	36.0000	No Ice	1.3000	60.00
ANT OMNI L=4.0m (1E)	D	From Leg	1.5000 0.0000 0.0000	0.0000	36.0000	No Ice	1.3000	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.0000 0.0000 0.0000	0.0000	26.0000	No Ice	0.6000	60.00
(2) 1 ANT TV 1.20x1.20m	B	From Leg	0.6500	0.0000	24.0000	No Ice	0.6000	60.00

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		CAA Front m <sup>2</sup>	CAA Side m <sup>2</sup>	Weight kg
(2E)			0.0000 0.0000						
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.5000 0.0000 0.0000	0.0000	22.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.1500 0.0000 0.0000	0.0000	20.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.0000 0.0000 0.0000	0.0000	18.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	26.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	24.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	22.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	20.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	18.0000	No Ice	0.6000	0.0500	60.00
ANT RF 0.30x1.30m (1E)	B	From Leg	0.8000 0.0000 0.0000	0.0000	35.0000	No Ice	0.3900	0.1950	15.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	15.5000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	13.0000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	10.5000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	8.0000	No Ice	1.2000	0.1500	110.00
ANT OMNI L=4.0m (1N)	B	From Face	0.0000 -0.3000 0.0000	0.0000	40.0000	No Ice	1.3000	0.5500	60.00
ANT OMNI L=4.0m (1N)	B	From Face	0.0000 0.3000 0.0000	0.0000	40.0000	No Ice	1.3000	0.5500	60.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	50.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 0.30x0.30m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	50.5000	No Ice	0.0900	0.0300	12.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	49.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL	D	From Leg	1.0000	0.0000	49.5000	No Ice	0.5000	0.2000	20.00

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m	CAA Front	CAA Side	Weight kg
1.0x0.50x0.19m (1N) ANT PANEL	C	From Leg	0.0000 0.0000 1.0000	0.0000	48.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	D	From Leg	0.0000 0.0000 1.0000	0.0000	48.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	C	From Leg	0.0000 0.0000 1.0000	0.0000	47.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	D	From Leg	0.0000 0.0000 1.0000	0.0000	47.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	C	From Leg	0.0000 0.0000 1.0000	0.0000	46.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	D	From Leg	0.0000 0.0000 1.0000	0.0000	46.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	C	From Leg	0.0000 0.0000 1.0000	0.0000	45.5000	No Ice	0.5000	20.00
1.0x0.50x0.19m (1N) ANT PANEL	D	From Leg	0.0000 0.0000 1.0000	0.0000	45.5000	No Ice	0.5000	20.00

## Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert m	Azimuth Adjustment °	3 dB Beam Width °	Elevation m	Outside Diameter m	Aperture Area m <sup>2</sup>	Weight kg
HP12-21B (1 ANT MW Ø3.70m E)	D	Paraboloid w/Shroud (HP)	From Leg	0.6000 0.0000 0.0000	Worst		33.0000	3.6576	No Ice 10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m E)	B	Paraboloid w/Shroud (HP)	From Leg	0.3000 0.0000 0.0000	Worst		32.0000	3.6576	No Ice 10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m E)	D	Paraboloid w/Shroud (HP)	From Leg	0.3000 0.0000 0.0000	Worst		23.5000	3.6576	No Ice 10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m N)	C	Paraboloid w/Shroud (HP)	From Leg	0.6000 0.0000 0.0000	Worst		40.0000	3.6576	No Ice 10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m N)	D	Paraboloid w/Shroud (HP)	From Leg	0.6000 0.0000 0.0000	Worst		40.0000	3.6576	No Ice 10.5064	385.55

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 14 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tower Pressures - No Ice

$$GH = 1.130$$

Section Elevation	z	Kz	$q_z$	AG	Face	AF	AR	Aleg	Leg %	CAAA In Face	CAAA Out Face
m	m		MPa	m		m	m	m		m	m
T1 48.0000-40.00 00	44.0000	1.524	0.00	16.449	A	3.121	0.000	1.626	52.09	0.000	0.000
					B	3.121	0.000		52.09	0.000	0.000
					C	3.121	0.000		52.09	0.000	0.000
					D	3.121	2.982		26.64	0.000	0.000
T2 40.0000-38.00 00	39.0000	1.473	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T3 38.0000-36.00 00	37.0000	1.451	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T4 36.0000-34.00 00	35.0000	1.428	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.230		19.26	0.000	0.000
T5 34.0000-32.00 00	33.0000	1.404	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.272		18.88	0.000	0.000
T6 32.0000-30.00 00	31.0000	1.379	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.357		18.17	0.000	0.000
T7 30.0000-28.00 00	29.0000	1.353	0.00	4.112	A	1.040	0.000	0.406	39.09	0.000	0.000
					B	1.040	0.000		39.09	0.000	0.000
					C	1.040	0.000		39.09	0.000	0.000
					D	1.040	1.371		16.86	0.000	0.000
T8 28.0000-26.00 00	27.0000	1.326	0.00	4.502	A	1.065	0.000	0.410	38.52	0.000	0.000
					B	1.065	0.000		38.52	0.000	0.000
					C	1.065	0.000		38.52	0.000	0.000
					D	1.065	1.371		16.84	0.000	0.000
T9 26.0000-24.00 00	25.0000	1.297	0.00	5.281	A	0.949	0.000	0.410	43.24	0.000	0.000
					B	0.949	0.000		43.24	0.000	0.000
					C	0.949	0.000		43.24	0.000	0.000
					D	0.949	1.430		17.25	0.000	0.000
T10 24.0000-22.00 00	23.0000	1.267	0.00	6.060	A	0.991	0.000	0.410	41.39	0.000	0.000
					B	0.991	0.000		41.39	0.000	0.000
					C	0.991	0.000		41.39	0.000	0.000
					D	0.991	1.531		16.26	0.000	0.000
T11 22.0000-18.50 00	20.2500	1.221	0.00	12.482	A	1.996	0.000	0.718	35.97	0.000	0.000
					B	1.996	0.000		35.97	0.000	0.000
					C	1.996	0.000		35.97	0.000	0.000
					D	1.996	2.852		14.81	0.000	0.000
T12 18.5000-14.00 00	16.2500	1.147	0.00	19.551	A	2.543	0.000	0.923	36.29	0.000	0.000
					B	2.543	0.000		36.29	0.000	0.000
					C	2.543	0.000		36.29	0.000	0.000
					D	2.543	3.882		14.36	0.000	0.000
T13 14.0000-9.000 0	11.5000	1.039	0.00	26.346	A	2.891	0.000	1.026	35.48	0.000	0.000
					B	2.891	0.000		35.48	0.000	0.000
					C	2.891	0.000		35.48	0.000	0.000
					D	2.891	4.460		13.95	0.000	0.000
T14 9.0000-6.7000	7.8500	1	0.00	13.784	A	1.571	0.000	0.590	37.54	0.000	0.000
					B	1.571	0.000		37.54	0.000	0.000



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	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation  m	z  m	Kz	qz  MPa	AG  m	F a c e  m	AF  m	AR  m	A <sub>leg</sub>  m	Leg %  m	CAAA In Face m	CAAA Out Face m
T15 6.7000-0.0000	3.3500	1	0.00	46.021	C	1.571	0.000	1.718	37.54	0.000	0.000
					D	1.571	2.101		16.06	0.000	0.000
					A	4.994	0.000		34.40	0.000	0.000
					B	4.994	0.000		34.40	0.000	0.000
					C	4.994	0.000		34.40	0.000	0.000
					D	4.994	6.164		15.40	0.000	0.000

## Tower Pressure - Service

$$GH = 1.130$$

Section Elevation  m	z  m	Kz	qz  MPa	AG  m	F a c e  m	AF  m	AR  m	A <sub>leg</sub>  m	Leg %  m	CAAA In Face m	CAAA Out Face m
T1 48.0000-40.0000	44.0000	1.524	0.00	16.449	A	3.121	0.000	1.626	52.09	0.000	0.000
					B	3.121	0.000		52.09	0.000	0.000
					C	3.121	0.000		52.09	0.000	0.000
					D	3.121	2.982		26.64	0.000	0.000
T2 40.0000-38.0000	39.0000	1.473	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T3 38.0000-36.0000	37.0000	1.451	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T4 36.0000-34.0000	35.0000	1.428	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.230		19.26	0.000	0.000
T5 34.0000-32.0000	33.0000	1.404	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.272		18.88	0.000	0.000
T6 32.0000-30.0000	31.0000	1.379	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.357		18.17	0.000	0.000
T7 30.0000-28.0000	29.0000	1.353	0.00	4.112	A	1.040	0.000	0.406	39.09	0.000	0.000
					B	1.040	0.000		39.09	0.000	0.000
					C	1.040	0.000		39.09	0.000	0.000
					D	1.040	1.371		16.86	0.000	0.000
T8 28.0000-26.0000	27.0000	1.326	0.00	4.502	A	1.065	0.000	0.410	38.52	0.000	0.000
					B	1.065	0.000		38.52	0.000	0.000
					C	1.065	0.000		38.52	0.000	0.000
					D	1.065	1.371		16.84	0.000	0.000
T9 26.0000-24.0000	25.0000	1.297	0.00	5.281	A	0.949	0.000	0.410	43.24	0.000	0.000
					B	0.949	0.000		43.24	0.000	0.000
					C	0.949	0.000		43.24	0.000	0.000
					D	0.949	1.430		17.25	0.000	0.000
T10 24.0000-22.0000	23.0000	1.267	0.00	6.060	A	0.991	0.000	0.410	41.39	0.000	0.000
					B	0.991	0.000		41.39	0.000	0.000
					C	0.991	0.000		41.39	0.000	0.000
					D	0.991	1.531		16.26	0.000	0.000
T11	20.2500	1.221	0.00	12.482	A	1.996	0.000	0.718	35.97	0.000	0.000

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	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation <i>m</i>	<i>z</i> <i>m</i>	<i>KZ</i>	<i>qz</i> <i>MPa</i>	<i>AG</i> <i>m</i>	<i>F a c e</i> <i>m</i>	<i>AF</i> <i>m</i>	<i>AR</i> <i>m</i> <sup>2</sup>	<i>Aleg</i> <i>m</i>	<i>Leg</i> <i>%</i>	<i>CAA In Face</i> <i>m</i>	<i>CAA Out Face</i> <i>m</i>
22.0000-18.5000	16.2500	1.147	0.00	19.551	B	1.996	0.000	0.923	35.97	0.000	0.000
					C	1.996	0.000		35.97	0.000	0.000
					D	1.996	2.852		14.81	0.000	0.000
T12					A	2.543	0.000		36.29	0.000	0.000
18.5000-14.0000	11.5000	1.039	0.00	26.346	B	2.543	0.000	1.026	36.29	0.000	0.000
					C	2.543	0.000		36.29	0.000	0.000
					D	2.543	3.882		14.36	0.000	0.000
T13					A	2.891	0.000		35.48	0.000	0.000
14.0000-9.0000	7.8500	1	0.00	13.784	B	2.891	0.000	0.590	35.48	0.000	0.000
					C	2.891	0.000		35.48	0.000	0.000
					D	2.891	4.460		13.95	0.000	0.000
T14					A	1.571	0.000		37.54	0.000	0.000
9.0000-6.7000	3.3500	1	0.00	46.021	B	1.571	0.000	1.718	37.54	0.000	0.000
					C	1.571	0.000		37.54	0.000	0.000
					D	1.571	2.101		16.06	0.000	0.000
T15					A	4.994	0.000		34.40	0.000	0.000
6.7000-0.0000					B	4.994	0.000		34.40	0.000	0.000
					C	4.994	0.000		34.40	0.000	0.000
					D	4.994	6.164		15.40	0.000	0.000

## Tower Forces - No Ice - Wind Normal To Face

Section Elevation <i>m</i>	Add Weight <i>kg</i>	Self Weight <i>kg</i>	<i>F a c e</i>	<i>e</i>	<i>C<sub>F</sub></i>	<i>R<sub>R</sub></i>	<i>D<sub>F</sub></i>	<i>D<sub>R</sub></i>	<i>A<sub>E</sub></i> <i>m</i>	<i>F</i> <i>kg</i>	<i>w</i> <i>kg/m</i>	Ctrl. Face
T1	103.31	1056.68	A	0.19	3.025	0.588	1	1	3.121	1421.96	177.75	D
48.0000-40.0000			B	0.19	3.025	0.588	1	1	3.121			
			C	0.19	3.025	0.588	1	1	3.121			
			D	0.371	2.362	0.64	1	1	5.030			
T2	38.22	334.35	A	0.214	2.921	0.593	1	1	0.880	399.50	199.75	D
40.0000-38.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T3	38.22	334.35	A	0.214	2.921	0.593	1	1	0.880	393.54	196.77	D
38.0000-36.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T4	40.51	334.35	A	0.214	2.921	0.593	1	1	0.880	396.63	198.31	D
36.0000-34.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.513	2.026	0.704	1	1	1.746			
T5	41.71	334.35	A	0.214	2.921	0.593	1	1	0.880	394.66	197.33	D
34.0000-32.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.523	2.008	0.71	1	1	1.783			
T6	44.12	334.35	A	0.214	2.921	0.593	1	1	0.880	397.28	198.64	D
32.0000-30.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.544	1.974	0.721	1	1	1.858			
T7	44.53	334.35	A	0.253	2.764	0.603	1	1	1.040	419.70	209.85	D
30.0000-28.0000			B	0.253	2.764	0.603	1	1	1.040			
			C	0.253	2.764	0.603	1	1	1.040			
			D	0.586	1.916	0.745	1	1	2.061			
T8	44.53	341.85	A	0.237	2.828	0.599	1	1	1.065	422.56	211.28	D
28.0000-26.0000			B	0.237	2.828	0.599	1	1	1.065			
			C	0.237	2.828	0.599	1	1	1.065			

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	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation  m	Add Weight  kg	Self Weight  kg	F a c e	e	CF	RR	DF	DR	AE  m	F  kg	w  kg/m	Ctrl. Face
T9 26.0000-24.0000	46.01	261.23	D	0.541	1.979	0.719	1	1	2.051			
			A	0.18	3.069	0.586	1	1	0.949	419.43	209.71	D
			B	0.18	3.069	0.586	1	1	0.949			
			C	0.18	3.069	0.586	1	1	0.949			
T10 24.0000-22.0000	48.71	274.92	D	0.45	2.154	0.673	1	1	1.912			
			A	0.164	3.142	0.584	1	1	0.991	444.83	222.42	D
			B	0.164	3.142	0.584	1	1	0.991			
			C	0.164	3.142	0.584	1	1	0.991			
T11 22.0000-18.5000	89.66	579.28	D	0.416	2.237	0.658	1	1	1.999			
			A	0.16	3.159	0.583	1	1	1.996	851.55	243.30	D
			B	0.16	3.159	0.583	1	1	1.996			
			C	0.16	3.159	0.583	1	1	1.996			
T12 18.5000-14.0000	120.73	736.23	D	0.388	2.312	0.647	1	1	3.841			
			A	0.13	3.3	0.579	1	1	2.543	1115.86	247.97	D
			B	0.13	3.3	0.579	1	1	2.543			
			C	0.13	3.3	0.579	1	1	2.543			
T13 14.0000-9.0000	137.84	962.01	D	0.329	2.493	0.625	1	1	4.970			
			A	0.11	3.401	0.576	1	1	2.891	1219.85	243.97	D
			B	0.11	3.401	0.576	1	1	2.891			
			C	0.11	3.401	0.576	1	1	2.891			
T14 9.0000-6.7000	64.66	677.05	D	0.279	2.665	0.61	1	1	5.610			
			A	0.114	3.38	0.577	1	1	1.571	605.81	263.40	D
			B	0.114	3.38	0.577	1	1	1.571			
			C	0.114	3.38	0.577	1	1	1.571			
T15 6.7000-0.0000	189.44	1683.93	D	0.266	2.712	0.606	1	1	2.845			
			A	0.109	3.407	0.576	1	1	4.994	1914.29	285.72	D
			B	0.109	3.407	0.576	1	1	4.994			
			C	0.109	3.407	0.576	1	1	4.994			
Sum Weight:	1092.19	8579.27	D	0.242	2.805	0.6	1	1	8.692			
								OTM	236800 kg-m	10817.47		

#### Tower Forces - No Ice - Wind 45 To Face

Section Elevation  m	Add Weight  kg	Self Weight  kg	F a c e	e	CF	RR	DF	DR	AE  m	F  kg	w  kg/m	Ctrl. Face
T1 48.0000-40.0000	103.31	1056.68	A	0.19	3.025	0.588	1.142	1.142	3.565	1706.36	213.29	D
			B	0.19	3.025	0.588	1.142	1.142	3.565			
			C	0.19	3.025	0.588	1.142	1.142	3.565			
T2 40.0000-38.0000	38.22	334.35	D	0.371	2.362	0.64	1.2	1.2	6.036			
			A	0.214	2.921	0.593	1.16	1.16	1.021	479.40	239.70	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
T3 38.0000-36.0000	38.22	334.35	D	0.492	2.066	0.693	1.2	1.2	2.007			
			A	0.214	2.921	0.593	1.16	1.16	1.021	472.24	236.12	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
T4 36.0000-34.0000	40.51	334.35	D	0.492	2.066	0.693	1.2	1.2	2.007			
			A	0.214	2.921	0.593	1.16	1.16	1.021	475.95	237.98	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
T5 34.0000-32.0000	41.71	334.35	D	0.513	2.026	0.704	1.2	1.2	2.095			
			A	0.214	2.921	0.593	1.16	1.16	1.021	473.60	236.80	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 18 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m <sup>2</sup>	kg	kg/m	
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.523	2.008	0.71	1.2	1.2	2.139			
T6	44.12	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	476.74	238.37	D
32.0000-30.00			B	0.214	2.921	0.593	1.16	1.16	1.021			
00			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.544	1.974	0.721	1.2	1.2	2.229			
T7	44.53	334.35	A	0.253	2.764	0.603	1.19	1.19	1.237	503.64	251.82	D
30.0000-28.00			B	0.253	2.764	0.603	1.19	1.19	1.237			
00			C	0.253	2.764	0.603	1.19	1.19	1.237			
			D	0.586	1.916	0.745	1.2	1.2	2.474			
T8	44.53	341.85	A	0.237	2.828	0.599	1.177	1.177	1.254	507.07	253.54	D
28.0000-26.00			B	0.237	2.828	0.599	1.177	1.177	1.254			
00			C	0.237	2.828	0.599	1.177	1.177	1.254			
			D	0.541	1.979	0.719	1.2	1.2	2.461			
T9	46.01	261.23	A	0.18	3.069	0.586	1.135	1.135	1.077	503.31	251.66	D
26.0000-24.00			B	0.18	3.069	0.586	1.135	1.135	1.077			
00			C	0.18	3.069	0.586	1.135	1.135	1.077			
			D	0.45	2.154	0.673	1.2	1.2	2.294			
T10	48.71	274.92	A	0.164	3.142	0.584	1.123	1.123	1.113	533.80	266.90	D
24.0000-22.00			B	0.164	3.142	0.584	1.123	1.123	1.113			
00			C	0.164	3.142	0.584	1.123	1.123	1.113			
			D	0.416	2.237	0.658	1.2	1.2	2.399			
T11	89.66	579.28	A	0.16	3.159	0.583	1.12	1.12	2.235	1021.87	291.96	D
22.0000-18.50			B	0.16	3.159	0.583	1.12	1.12	2.235			
00			C	0.16	3.159	0.583	1.12	1.12	2.235			
			D	0.388	2.312	0.647	1.2	1.2	4.609			
T12	120.73	736.23	A	0.13	3.3	0.579	1.098	1.098	2.792	1339.04	297.56	D
18.5000-14.00			B	0.13	3.3	0.579	1.098	1.098	2.792			
00			C	0.13	3.3	0.579	1.098	1.098	2.792			
			D	0.329	2.493	0.625	1.2	1.2	5.964			
T13	137.84	962.01	A	0.11	3.401	0.576	1.082	1.082	3.128	1463.82	292.76	D
14.0000-9.000			B	0.11	3.401	0.576	1.082	1.082	3.128			
0			C	0.11	3.401	0.576	1.082	1.082	3.128			
			D	0.279	2.665	0.61	1.2	1.2	6.732			
T14	64.66	677.05	A	0.114	3.38	0.577	1.085	1.085	1.705	726.86	316.03	D
9.0000-6.7000			B	0.114	3.38	0.577	1.085	1.085	1.705			
			C	0.114	3.38	0.577	1.085	1.085	1.705			
			D	0.266	2.712	0.606	1.2	1.2	3.413			
T15	189.44	1683.93	A	0.109	3.407	0.576	1.081	1.081	5.400	2262.38	337.67	D
6.7000-0.0000			B	0.109	3.407	0.576	1.081	1.081	5.400			
			C	0.109	3.407	0.576	1.081	1.081	5.400			
			D	0.242	2.805	0.6	1.182	1.182	10.273			
Sum Weight:	1092.19	8579.27						OTM	284043	12946.08		
									kg-m			

## Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m <sup>2</sup>	kg	kg/m	
T1	103.31	1056.68	A	0.19	3.025	0.588	1	1	3.121	355.49	44.44	D
48.0000-40.00			B	0.19	3.025	0.588	1	1	3.121			
00			C	0.19	3.025	0.588	1	1	3.121			
			D	0.371	2.362	0.64	1	1	5.030			
T2	38.22	334.35	A	0.214	2.921	0.593	1	1	0.880	99.88	49.94	D

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 19 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
40.0000-38.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T3	38.22	334.35	A	0.214	2.921	0.593	1	1	0.880	98.38	49.19	D
38.0000-36.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T4	40.51	334.35	A	0.214	2.921	0.593	1	1	0.880	99.16	49.58	D
36.0000-34.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.513	2.026	0.704	1	1	1.746			
T5	41.71	334.35	A	0.214	2.921	0.593	1	1	0.880	98.67	49.33	D
34.0000-32.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.523	2.008	0.71	1	1	1.783			
T6	44.12	334.35	A	0.214	2.921	0.593	1	1	0.880	99.32	49.66	D
32.0000-30.0000			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.544	1.974	0.721	1	1	1.858			
T7	44.53	334.35	A	0.253	2.764	0.603	1	1	1.040	104.93	52.46	D
30.0000-28.0000			B	0.253	2.764	0.603	1	1	1.040			
			C	0.253	2.764	0.603	1	1	1.040			
			D	0.586	1.916	0.745	1	1	2.061			
T8	44.53	341.85	A	0.237	2.828	0.599	1	1	1.065	105.64	52.82	D
28.0000-26.0000			B	0.237	2.828	0.599	1	1	1.065			
			C	0.237	2.828	0.599	1	1	1.065			
			D	0.541	1.979	0.719	1	1	2.051			
T9	46.01	261.23	A	0.18	3.069	0.586	1	1	0.949	104.86	52.43	D
26.0000-24.0000			B	0.18	3.069	0.586	1	1	0.949			
			C	0.18	3.069	0.586	1	1	0.949			
			D	0.45	2.154	0.673	1	1	1.912			
T10	48.71	274.92	A	0.164	3.142	0.584	1	1	0.991	111.21	55.60	D
24.0000-22.0000			B	0.164	3.142	0.584	1	1	0.991			
			C	0.164	3.142	0.584	1	1	0.991			
			D	0.416	2.237	0.658	1	1	1.999			
T11	89.66	579.28	A	0.16	3.159	0.583	1	1	1.996	212.89	60.83	D
22.0000-18.5000			B	0.16	3.159	0.583	1	1	1.996			
			C	0.16	3.159	0.583	1	1	1.996			
			D	0.388	2.312	0.647	1	1	3.841			
T12	120.73	736.23	A	0.13	3.3	0.579	1	1	2.543	278.97	61.99	D
18.5000-14.0000			B	0.13	3.3	0.579	1	1	2.543			
			C	0.13	3.3	0.579	1	1	2.543			
			D	0.329	2.493	0.625	1	1	4.970			
T13	137.84	962.01	A	0.11	3.401	0.576	1	1	2.891	304.96	60.99	D
14.0000-9.0000			B	0.11	3.401	0.576	1	1	2.891			
			C	0.11	3.401	0.576	1	1	2.891			
			D	0.279	2.665	0.61	1	1	5.610			
T14	64.66	677.05	A	0.114	3.38	0.577	1	1	1.571	151.45	65.85	D
9.0000-6.7000			B	0.114	3.38	0.577	1	1	1.571			
			C	0.114	3.38	0.577	1	1	1.571			
			D	0.266	2.712	0.606	1	1	2.845			
T15	189.44	1683.93	A	0.109	3.407	0.576	1	1	4.994	478.57	71.43	D
6.7000-0.0000			B	0.109	3.407	0.576	1	1	4.994			
			C	0.109	3.407	0.576	1	1	4.994			
			D	0.242	2.805	0.6	1	1	8.692			
Sum Weight:	1092.19	8579.27						OTM	59200 kg-m	2704.37		

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 20 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m <sup>2</sup>	kg	kg/m	
T1 48.0000-40.00 00	103.31	1056.68	A	0.19	3.025	0.588	1.142	1.142	3.565	426.59	53.32	D
			B	0.19	3.025	0.588	1.142	1.142	3.565			
			C	0.19	3.025	0.588	1.142	1.142	3.565			
			D	0.371	2.362	0.64	1.2	1.2	6.036			
T2 40.0000-38.00 00	38.22	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	119.85	59.93	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.492	2.066	0.693	1.2	1.2	2.007			
T3 38.0000-36.00 00	38.22	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	118.06	59.03	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.492	2.066	0.693	1.2	1.2	2.007			
T4 36.0000-34.00 00	40.51	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	118.99	59.49	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.513	2.026	0.704	1.2	1.2	2.095			
T5 34.0000-32.00 00	41.71	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	118.40	59.20	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.523	2.008	0.71	1.2	1.2	2.139			
T6 32.0000-30.00 00	44.12	334.35	A	0.214	2.921	0.593	1.16	1.16	1.021	119.19	59.59	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.544	1.974	0.721	1.2	1.2	2.229			
T7 30.0000-28.00 00	44.53	334.35	A	0.253	2.764	0.603	1.19	1.19	1.237	125.91	62.96	D
			B	0.253	2.764	0.603	1.19	1.19	1.237			
			C	0.253	2.764	0.603	1.19	1.19	1.237			
			D	0.586	1.916	0.745	1.2	1.2	2.474			
T8 28.0000-26.00 00	44.53	341.85	A	0.237	2.828	0.599	1.177	1.177	1.254	126.77	63.38	D
			B	0.237	2.828	0.599	1.177	1.177	1.254			
			C	0.237	2.828	0.599	1.177	1.177	1.254			
			D	0.541	1.979	0.719	1.2	1.2	2.461			
T9 26.0000-24.00 00	46.01	261.23	A	0.18	3.069	0.586	1.135	1.135	1.077	125.83	62.91	D
			B	0.18	3.069	0.586	1.135	1.135	1.077			
			C	0.18	3.069	0.586	1.135	1.135	1.077			
			D	0.45	2.154	0.673	1.2	1.2	2.294			
T10 24.0000-22.00 00	48.71	274.92	A	0.164	3.142	0.584	1.123	1.123	1.113	133.45	66.72	D
			B	0.164	3.142	0.584	1.123	1.123	1.113			
			C	0.164	3.142	0.584	1.123	1.123	1.113			
			D	0.416	2.237	0.658	1.2	1.2	2.399			
T11 22.0000-18.50 00	89.66	579.28	A	0.16	3.159	0.583	1.12	1.12	2.235	255.47	72.99	D
			B	0.16	3.159	0.583	1.12	1.12	2.235			
			C	0.16	3.159	0.583	1.12	1.12	2.235			
			D	0.388	2.312	0.647	1.2	1.2	4.609			
T12 18.5000-14.00 00	120.73	736.23	A	0.13	3.3	0.579	1.098	1.098	2.792	334.76	74.39	D
			B	0.13	3.3	0.579	1.098	1.098	2.792			
			C	0.13	3.3	0.579	1.098	1.098	2.792			
			D	0.329	2.493	0.625	1.2	1.2	5.964			
T13 14.0000-9.000 0	137.84	962.01	A	0.11	3.401	0.576	1.082	1.082	3.128	365.95	73.19	D
			B	0.11	3.401	0.576	1.082	1.082	3.128			
			C	0.11	3.401	0.576	1.082	1.082	3.128			
			D	0.279	2.665	0.61	1.2	1.2	6.732			
T14 9.0000-6.7000	64.66	677.05	A	0.114	3.38	0.577	1.085	1.085	1.705	181.72	79.01	D
			B	0.114	3.38	0.577	1.085	1.085	1.705			
			C	0.114	3.38	0.577	1.085	1.085	1.705			

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 21 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).	<b>Date</b> 12:23:19 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T15 6.7000-0.0000	189.44	1683.93	D	0.266	2.712	0.606	1.2	1.2	3.413			
			A	0.109	3.407	0.576	1.081	1.081	5.400	565.60	84.42	D
			B	0.109	3.407	0.576	1.081	1.081	5.400			
			C	0.109	3.407	0.576	1.081	1.081	5.400			
			D	0.242	2.805	0.6	1.182	1.182	10.273			
Sum Weight:	1092.19	8579.27						OTM	71011	3236.52		
									kg-m			

## Mast Vectors - No Ice

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
T1	48.0000-40.0000	0	Wind Normal	1421.96	0.00	-1421.96	-62459	0	0
		45	Wind 90	1706.36	1206.58	-1206.58	-52982	-53089	242
		90	Wind Normal	1421.96	1421.96	0.00	107	-62566	285
T2	40.0000-38.0000	0	Wind Normal	399.50	0.00	-399.50	-15541	0	0
		45	Wind 90	479.40	338.99	-338.99	-13181	-13221	86
		90	Wind Normal	399.50	399.50	0.00	40	-15581	101
T3	38.0000-36.0000	0	Wind Normal	393.54	0.00	-393.54	-14521	0	0
		45	Wind 90	472.24	333.93	-333.93	-12316	-12355	85
		90	Wind Normal	393.54	393.54	0.00	40	-14561	100
T4	36.0000-34.0000	0	Wind Normal	396.63	0.00	-396.63	-13840	0	0
		45	Wind 90	475.95	336.55	-336.55	-11737	-11779	90
		90	Wind Normal	396.63	396.63	0.00	42	-13882	106
T5	34.0000-32.0000	0	Wind Normal	394.66	0.00	-394.66	-12981	0	0
		45	Wind 90	473.60	334.88	-334.88	-11008	-11051	92
		90	Wind Normal	394.66	394.66	0.00	43	-13024	108
T6	32.0000-30.0000	0	Wind Normal	397.28	0.00	-397.28	-12270	0	0
		45	Wind 90	476.74	337.11	-337.11	-10405	-10450	97
		90	Wind Normal	397.28	397.28	0.00	46	-12316	114
T7	30.0000-28.0000	0	Wind Normal	419.70	0.00	-419.70	-12125	0	0
		45	Wind 90	503.64	356.13	-356.13	-10282	-10328	91
		90	Wind Normal	419.70	419.70	0.00	46	-12171	107
T8	28.0000-26.0000	0	Wind Normal	422.56	0.00	-422.56	-11359	0	0
		45	Wind 90	507.07	358.55	-358.55	-9631	-9681	98
		90	Wind Normal	422.56	422.56	0.00	50	-11409	116
T9	26.0000-24.0000	0	Wind Normal	419.43	0.00	-419.43	-10425	0	0
		45	Wind 90	503.31	355.89	-355.89	-8837	-8897	129
		90	Wind Normal	419.43	419.43	0.00	61	-10486	152
T10	24.0000-22.0000	0	Wind Normal	444.83	0.00	-444.83	-10157	0	0
		45	Wind 90	533.80	377.45	-377.45	-8608	-8681	159
		90	Wind Normal	444.83	444.83	0.00	74	-10231	188
T11	22.0000-18.5000	0	Wind Normal	851.55	0.00	-851.55	-17084	0	0
		45	Wind 90	1021.87	722.57	-722.57	-14472	-14632	339
		90	Wind Normal	851.55	851.55	0.00	160	-17244	399
T12	18.5000-14.0000	0	Wind Normal	1115.86	0.00	-1115.86	-17871	0	0
		45	Wind 90	1339.04	946.84	-946.84	-15124	-15386	568
		90	Wind Normal	1115.86	1115.86	0.00	262	-18133	669
T13	14.0000-9.0000	0	Wind Normal	1219.85	0.00	-1219.85	-13665	0	0
		45	Wind 90	1463.82	1035.08	-1035.08	-11540	-11903	758
		90	Wind Normal	1219.85	1219.85	0.00	363	-14028	894
T14	9.0000-6.7000	0	Wind Normal	605.81	0.00	-605.81	-4562	0	0
		45	Wind 90	726.86	513.97	-513.97	-3841	-4035	385
		90	Wind Normal	605.81	605.81	0.00	193	-4756	453
T15	6.7000-0.0000	0	Wind Normal	1914.29	0.00	-1914.29	-5764	0	0



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 22 of 57
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Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
		45	Wind 90	2262.38	1599.75	-1599.75	-4710	-5359	1291
		90	Wind Normal	1914.29	1914.29	0.00	649	-6413	1545

## Mast Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.00	-10817.47	-234625	0	0
45	9154.26	-9154.26	-198674	-200849	4509
90	10817.47	0.00	2175	-236800	5337

## Mast Vectors - Service

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
T1	48.0000-40.0000	0	Wind Normal	355.49	0.00	-355.49	-15534	0	0
		45	Wind 90	426.59	301.64	-301.64	-13165	-13272	60
		90	Wind Normal	355.49	355.49	0.00	107	-15642	71
T2	40.0000-38.0000	0	Wind Normal	99.88	0.00	-99.88	-3856	0	0
		45	Wind 90	119.85	84.75	-84.75	-3266	-3305	21
		90	Wind Normal	99.88	99.88	0.00	40	-3895	25
T3	38.0000-36.0000	0	Wind Normal	98.38	0.00	-98.38	-3601	0	0
		45	Wind 90	118.06	83.48	-83.48	-3049	-3089	21
		90	Wind Normal	98.38	98.38	0.00	40	-3640	25
T4	36.0000-34.0000	0	Wind Normal	99.16	0.00	-99.16	-3429	0	0
		45	Wind 90	118.99	84.14	-84.14	-2903	-2945	22
		90	Wind Normal	99.16	99.16	0.00	42	-3470	27
T5	34.0000-32.0000	0	Wind Normal	98.67	0.00	-98.67	-3213	0	0
		45	Wind 90	118.40	83.72	-83.72	-2720	-2763	23
		90	Wind Normal	98.67	98.67	0.00	43	-3256	27
T6	32.0000-30.0000	0	Wind Normal	99.32	0.00	-99.32	-3033	0	0
		45	Wind 90	119.19	84.28	-84.28	-2567	-2613	24
		90	Wind Normal	99.32	99.32	0.00	46	-3079	28
T7	30.0000-28.0000	0	Wind Normal	104.93	0.00	-104.93	-2997	0	0
		45	Wind 90	125.91	89.03	-89.03	-2536	-2582	23
		90	Wind Normal	104.93	104.93	0.00	46	-3043	27
T8	28.0000-26.0000	0	Wind Normal	105.64	0.00	-105.64	-2802	0	0
		45	Wind 90	126.77	89.64	-89.64	-2370	-2420	25
		90	Wind Normal	105.64	105.64	0.00	50	-2852	29
T9	26.0000-24.0000	0	Wind Normal	104.86	0.00	-104.86	-2561	0	0
		45	Wind 90	125.83	88.97	-88.97	-2163	-2224	32
		90	Wind Normal	104.86	104.86	0.00	61	-2621	38
T10	24.0000-22.0000	0	Wind Normal	111.21	0.00	-111.21	-2484	0	0
		45	Wind 90	133.45	94.36	-94.36	-2096	-2170	40
		90	Wind Normal	111.21	111.21	0.00	74	-2558	47
T11	22.0000-18.5000	0	Wind Normal	212.89	0.00	-212.89	-4151	0	0
		45	Wind 90	255.47	180.64	-180.64	-3498	-3658	85
		90	Wind Normal	212.89	212.89	0.00	160	-4311	100
T12	18.5000-14.0000	0	Wind Normal	278.97	0.00	-278.97	-4271	0	0
		45	Wind 90	334.76	236.71	-236.71	-3584	-3847	142



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 24 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Description	Aiming Azimuth °	Weight kg	Offsetx m	Offsetz m	z m	Kz	qz MPa	CAAC Front m	CAAC Side m
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
Sum Weight:		2127.00							

## Discrete Appurtenance Vectors - No Ice

ANT OMNI L=4.0m - Elevation 36 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	103.91	43.96	42.39	-104.56	-3888	-1650	128
45	146.95	0.00	103.91	-103.91	-3864	-3864	0
90	103.91	43.96	104.56	-42.39	-1650	-3888	-128

ANT OMNI L=4.0m - Elevation 36 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	103.91	43.96	42.39	-104.56	-3640	-1402	-128
45	146.95	0.00	103.91	-103.91	-3617	-3617	0
90	103.91	43.96	104.56	-42.39	-1402	-3640	128

1 ANT TV 1.20x1.20m - Elevation 26 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	87.40	7.28	56.65	-66.95	-1884	-1616	12
45	123.60	0.00	87.40	-87.40	-2416	-2416	0
90	87.40	7.28	66.95	-56.65	-1616	-1884	-12

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 25 of 57
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1 ANT TV 1.20x1.20m - Elevation 24 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	85.42	7.12	55.37	-65.44	-1792	-1551	19
45	120.81	0.00	85.42	-85.42	-2272	-2272	0
90	85.42	7.12	65.44	-55.37	-1551	-1792	-19

1 ANT TV 1.20x1.20m - Elevation 22 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	83.33	6.94	54.01	-63.83	-1637	-1421	19
45	117.84	0.00	83.33	-83.33	-2066	-2066	0
90	83.33	6.94	63.83	-54.01	-1421	-1637	-19

1 ANT TV 1.20x1.20m - Elevation 20 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	81.09	6.76	52.56	-62.12	-1468	-1277	18
45	114.67	0.00	81.09	-81.09	-1848	-1848	0
90	81.09	6.76	62.12	-52.56	-1277	-1468	-18

1 ANT TV 1.20x1.20m - Elevation 18 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	78.68	6.56	51.00	-60.27	-1322	-1155	18
45	111.27	0.00	78.68	-78.68	-1653	-1653	0
90	78.68	6.56	60.27	-51.00	-1155	-1322	-18

1 ANT TV 1.20x1.20m - Elevation 26 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	123.60	0.00	0.00	-123.60	-3357	0	0
45	87.40	7.28	7.28	-87.40	-2416	-189	-9
90	0.00	10.30	10.30	0.00	-143	-268	-12

1 ANT TV 1.20x1.20m - Elevation 24 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	120.81	0.00	0.00	-120.81	-3066	0	0
45	85.42	7.12	7.12	-85.42	-2217	-171	-10
90	0.00	10.07	10.07	0.00	-167	-242	-14

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 26 of 57
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1 ANT TV 1.20x1.20m - Elevation 22 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	117.84	0.00	0.00	-117.84	-2783	0	0
45	83.33	6.94	6.94	-83.33	-2023	-153	-11
90	0.00	9.82	9.82	0.00	-190	-216	-16

1 ANT TV 1.20x1.20m - Elevation 20 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	114.67	0.00	0.00	-114.67	-2507	0	0
45	81.09	6.76	6.76	-81.09	-1835	-135	-12
90	0.00	9.56	9.56	0.00	-213	-191	-17

1 ANT TV 1.20x1.20m - Elevation 18 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	111.27	0.00	0.00	-111.27	-2240	0	0
45	78.68	6.56	6.56	-78.68	-1653	-118	-13
90	0.00	9.27	9.27	0.00	-237	-167	-18

ANT RF 0.30x1.30m - Elevation 35 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.92	15.46	10.93	-32.80	-1171	-406	34
45	43.73	0.00	30.92	-30.92	-1106	-1106	0
90	30.92	15.46	32.80	-10.93	-406	-1171	-34

ANT GRILLA TV (2.25x2.25m) - Elevation 15.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	75.39	9.42	-46.65	-59.97	-686	479	30
45	0.00	13.33	9.42	-9.42	98	-390	42
90	75.39	9.42	59.97	46.65	967	-1173	30

ANT GRILLA TV (2.25x2.25m) - Elevation 13 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	71.70	8.96	-44.36	-57.03	-471	306	31
45	0.00	12.67	8.96	-8.96	154	-387	44
90	71.70	8.96	57.03	44.36	847	-1012	31

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 27 of 57
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ANT GRILLA TV (2.25x2.25m) - Elevation 10.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	67.45	8.43	-41.73	-53.66	-266	141	32
45	0.00	11.92	8.43	-8.43	209	-386	46
90	67.45	8.43	53.66	41.73	736	-861	32

ANT GRILLA TV (2.25x2.25m) - Elevation 8 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	66.63	8.33	-41.22	-53.00	-100	6	35
45	0.00	11.78	8.33	-8.33	257	-391	49
90	66.63	8.33	53.00	41.22	654	-748	35

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	151.44	0.00	0.00	-151.44	-6118	18	-45
45	107.08	45.30	45.30	-107.08	-4343	-1794	-77
90	0.00	64.07	64.07	0.00	-60	-2545	-64

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	151.44	0.00	0.00	-151.44	-6118	-18	45
45	107.08	45.30	45.30	-107.08	-4343	-1830	-13
90	0.00	64.07	64.07	0.00	-60	-2581	-64

ANT PANEL 1.0x0.50x0.19m - Elevation 50.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	44.02	17.61	-18.68	-43.58	-2167	909	43
45	0.00	24.90	17.61	-17.61	-855	-923	60
90	44.02	17.61	43.58	18.68	977	-2235	43

ANT PANEL 0.30x0.30m - Elevation 50.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	7.92	2.64	3.74	-7.47	-357	-168	-6
45	11.21	0.00	7.92	-7.92	-380	-380	0
90	7.92	2.64	7.47	-3.74	-168	-357	6

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 28 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.77	17.51	-18.57	-43.33	-2111	885	42
45	0.00	24.76	17.51	-17.51	-833	-901	60
90	43.77	17.51	43.33	18.57	953	-2179	42

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.77	17.51	18.57	-43.33	-2111	-885	-42
45	61.90	0.00	43.77	-43.77	-2133	-2133	0
90	43.77	17.51	43.33	-18.57	-885	-2111	42

ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.52	17.41	-18.46	-43.08	-2055	861	42
45	0.00	24.62	17.41	-17.41	-810	-878	59
90	43.52	17.41	43.08	18.46	930	-2123	42

ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.52	17.41	18.46	-43.08	-2055	-861	-42
45	61.54	0.00	43.52	-43.52	-2076	-2076	0
90	43.52	17.41	43.08	-18.46	-861	-2055	42

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.26	17.30	-18.35	-42.82	-2000	838	42
45	0.00	24.47	17.30	-17.30	-788	-856	59
90	43.26	17.30	42.82	18.35	906	-2068	42

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.26	17.30	18.35	-42.82	-2000	-838	-42
45	61.18	0.00	43.26	-43.26	-2021	-2021	0
90	43.26	17.30	42.82	-18.35	-838	-2000	42



<b><i>RISA</i>Tower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 29 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.00	17.20	-18.24	-42.56	-1945	814	42
45	0.00	24.32	17.20	-17.20	-766	-834	59
90	43.00	17.20	42.56	18.24	882	-2013	42

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.00	17.20	18.24	-42.56	-1945	-814	-42
45	60.81	0.00	43.00	-43.00	-1965	-1965	0
90	43.00	17.20	42.56	-18.24	-814	-1945	42

ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	42.73	17.09	-18.13	-42.30	-1891	791	41
45	0.00	24.17	17.09	-17.09	-744	-812	58
90	42.73	17.09	42.30	18.13	859	-1959	41

ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	42.73	17.09	18.13	-42.30	-1891	-791	-41
45	60.43	0.00	42.73	-42.73	-1910	-1910	0
90	42.73	17.09	42.30	-18.13	-791	-1891	41

## Discrete Appurtenance Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	176.39	-2154.51	-67040	-8805	284
45	1143.38	-1648.20	-52233	-40474	391
90	1440.60	-176.39	-7194	-49743	268

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 30 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Discrete Appurtenance Pressures - Service

$GH = 1.130$

Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	Z m	K <sub>z</sub>	q <sub>z</sub> MPa	CAAC Front m	CAAC Side m
ANT OMNI L=4.0m	45.0000	60.00	2.0607	-2.0607	36.0000	1.440	0.00	1.3000	0.5500
ANT OMNI L=4.0m	225.0000	60.00	-2.0607	2.0607	36.0000	1.440	0.00	1.3000	0.5500
1 ANT TV 1.20x1.20m	45.0000	120.00	1.1945	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8491	-1.8491	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9376	-1.9376	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8846	-1.8846	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9732	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.3895	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.5840	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.7786	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
ANT RF 0.30x1.30m	45.0000	15.00	1.5657	-1.5657	35.0000	1.428	0.00	0.3900	0.1950
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.2165	2.2165	15.5000	1.132	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.4598	2.4598	13.0000	1.076	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.7030	2.7030	10.5000	1.012	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.9464	2.9464	8.0000	1.000	0.00	1.2000	0.1500
ANT OMNI L=4.0m	0.0000	60.00	-0.3000	-1.0000	40.0000	1.484	0.00	1.3000	0.5500
ANT OMNI L=4.0m	0.0000	60.00	0.3000	-1.0000	40.0000	1.484	0.00	1.3000	0.5500
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	50.5000	1.586	0.00	0.5000	0.2000
ANT PANEL 0.30x0.30m	225.0000	12.00	-1.7071	1.7071	50.5000	1.586	0.00	0.0900	0.0300
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
Sum Weight:		2127.00							

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## Discrete Appurtenance Vectors - Service

ANT OMNI L=4.0m - Elevation 36 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	25.98	10.99	10.60	-26.14	-1065	-505	32
45	36.74	0.00	25.98	-25.98	-1059	-1059	0
90	25.98	10.99	26.14	-10.60	-505	-1065	-32

ANT OMNI L=4.0m - Elevation 36 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	25.98	10.99	10.60	-26.14	-817	-258	-32
45	36.74	0.00	25.98	-25.98	-812	-812	0
90	25.98	10.99	26.14	-10.60	-258	-817	32

1 ANT TV 1.20x1.20m - Elevation 26 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	21.85	1.82	14.16	-16.74	-579	-512	3
45	30.90	0.00	21.85	-21.85	-711	-711	0
90	21.85	1.82	16.74	-14.16	-512	-579	-3

1 ANT TV 1.20x1.20m - Elevation 24 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	21.36	1.78	13.84	-16.36	-615	-554	5
45	30.20	0.00	21.36	-21.36	-734	-734	0
90	21.36	1.78	16.36	-13.84	-554	-615	-5

1 ANT TV 1.20x1.20m - Elevation 22 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	20.83	1.74	13.50	-15.96	-584	-530	5
45	29.46	0.00	20.83	-20.83	-691	-691	0
90	20.83	1.74	15.96	-13.50	-530	-584	-5

1 ANT TV 1.20x1.20m - Elevation 20 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	20.27	1.69	13.14	-15.53	-537	-489	5
45	28.67	0.00	20.27	-20.27	-632	-632	0
90	20.27	1.69	15.53	-13.14	-489	-537	-5

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 32 of 57
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1 ANT TV 1.20x1.20m - Elevation 18 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	19.67	1.64	12.75	-15.07	-508	-466	5
45	27.82	0.00	19.67	-19.67	-591	-591	0
90	19.67	1.64	15.07	-12.75	-466	-508	-5

1 ANT TV 1.20x1.20m - Elevation 26 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.90	0.00	0.00	-30.90	-947	0	0
45	21.85	1.82	1.82	-21.85	-711	-47	-2
90	0.00	2.58	2.58	0.00	-143	-67	-3

1 ANT TV 1.20x1.20m - Elevation 24 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.20	0.00	0.00	-30.20	-892	0	0
45	21.36	1.78	1.78	-21.36	-679	-43	-2
90	0.00	2.52	2.52	0.00	-167	-60	-3

1 ANT TV 1.20x1.20m - Elevation 22 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	29.46	0.00	0.00	-29.46	-838	0	0
45	20.83	1.74	1.74	-20.83	-648	-38	-3
90	0.00	2.45	2.45	0.00	-190	-54	-4

1 ANT TV 1.20x1.20m - Elevation 20 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	28.67	0.00	0.00	-28.67	-787	0	0
45	20.27	1.69	1.69	-20.27	-619	-34	-3
90	0.00	2.39	2.39	0.00	-213	-48	-4

1 ANT TV 1.20x1.20m - Elevation 18 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	27.82	0.00	0.00	-27.82	-738	0	0
45	19.67	1.64	1.64	-19.67	-591	-30	-3
90	0.00	2.32	2.32	0.00	-237	-42	-5

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 33 of 57
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ANT RF 0.30x1.30m - Elevation 35 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	7.73	3.87	2.73	-8.20	-310	-119	9
45	10.93	0.00	7.73	-7.73	-294	-294	0
90	7.73	3.87	8.20	-2.73	-119	-310	-9

ANT GRILLA TV (2.25x2.25m) - Elevation 15.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	18.85	2.36	-11.66	-14.99	11	-63	7
45	0.00	3.33	2.36	-2.36	207	-280	10
90	18.85	2.36	14.99	11.66	425	-476	7

ANT GRILLA TV (2.25x2.25m) - Elevation 13 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	17.92	2.24	-11.09	-14.26	85	-126	8
45	0.00	3.17	2.24	-2.24	241	-300	11
90	17.92	2.24	14.26	11.09	415	-456	8

ANT GRILLA TV (2.25x2.25m) - Elevation 10.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	16.86	2.11	-10.43	-13.41	156	-188	8
45	0.00	2.98	2.11	-2.11	275	-319	11
90	16.86	2.11	13.41	10.43	407	-438	8

ANT GRILLA TV (2.25x2.25m) - Elevation 8 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	16.66	2.08	-10.31	-13.25	218	-242	9
45	0.00	2.94	2.08	-2.08	307	-341	12
90	16.66	2.08	13.25	10.31	407	-430	9

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	37.86	0.00	0.00	-37.86	-1574	18	-11
45	26.77	11.33	11.33	-26.77	-1131	-435	-19
90	0.00	16.02	16.02	0.00	-60	-623	-16

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 34 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	37.86	0.00	0.00	-37.86	-1574	-18	11
45	26.77	11.33	11.33	-26.77	-1131	-471	-3
90	0.00	16.02	16.02	0.00	-60	-659	-16

ANT PANEL 1.0x0.50x0.19m - Elevation 50.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	11.01	4.40	-4.67	-10.89	-516	202	11
45	0.00	6.23	4.40	-4.40	-188	-256	15
90	11.01	4.40	10.89	4.67	270	-584	11

ANT PANEL 0.30x0.30m - Elevation 50.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	1.98	0.66	0.93	-1.87	-74	-27	-2
45	2.80	0.00	1.98	-1.98	-80	-80	0
90	1.98	0.66	1.87	-0.93	-27	-74	2

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.94	4.38	-4.64	-10.83	-502	196	11
45	0.00	6.19	4.38	-4.38	-183	-251	15
90	10.94	4.38	10.83	4.64	264	-570	11

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.94	4.38	4.64	-10.83	-502	-196	-11
45	15.48	0.00	10.94	-10.94	-508	-508	0
90	10.94	4.38	10.83	-4.64	-196	-502	11

ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.88	4.35	-4.62	-10.77	-488	190	11
45	0.00	6.15	4.35	-4.35	-177	-245	15
90	10.88	4.35	10.77	4.62	258	-556	11

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 35 of 57
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ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.88	4.35	4.62	-10.77	-488	-190	-11
45	15.39	0.00	10.88	-10.88	-493	-493	0
90	10.88	4.35	10.77	-4.62	-190	-488	11

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.81	4.33	-4.59	-10.71	-474	184	10
45	0.00	6.12	4.33	-4.33	-171	-240	15
90	10.81	4.33	10.71	4.59	252	-543	10

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.81	4.33	4.59	-10.71	-474	-184	-10
45	15.29	0.00	10.81	-10.81	-480	-480	0
90	10.81	4.33	10.71	-4.59	-184	-474	10

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.75	4.30	-4.56	-10.64	-461	178	10
45	0.00	6.08	4.30	-4.30	-166	-234	15
90	10.75	4.30	10.64	4.56	246	-529	10

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.75	4.30	4.56	-10.64	-461	-178	-10
45	15.20	0.00	10.75	-10.75	-466	-466	0
90	10.75	4.30	10.64	-4.56	-178	-461	10

ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.68	4.27	-4.53	-10.58	-447	172	10
45	0.00	6.04	4.27	-4.27	-160	-229	15
90	10.68	4.27	10.58	4.53	240	-515	10



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ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.68	4.27	4.53	-10.58	-447	-172	-10
45	15.11	0.00	10.68	-10.68	-452	-452	0
90	10.68	4.27	10.58	-4.53	-172	-447	10

## Discrete Appurtenance Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	44.10	-538.63	-17227	-3877	71
45	285.85	-412.05	-13525	-11794	98
90	360.15	-44.10	-2266	-14111	67

## Dish Pressures - No Ice

Elevation m	Dish Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	K <sub>z</sub>	A <sub>A</sub> m²	q <sub>z</sub> MPa
33.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.404	10.5064	0.00
32.0000	HP12-21B	45.0000	385.55	1.2121	-1.2121	1.392	10.5064	0.00
23.5000	HP12-21B	225.0000	385.55	-1.6503	1.6503	1.274	10.5064	0.00
40.0000	HP12-21B	135.0000	385.55	1.4243	1.4243	1.484	10.5064	0.00
40.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.484	10.5064	0.00
	Sum		1927.75					
	Weight:							

## Dish Vectors - No Ice

HP12-21B - Elevation 33 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1461.64	0.00	0.00	0.00	-1461.64	-47685	549	-2082
45	0.003230	0.000000	0.000000	1461.64	0.00	0.00	1033.53	-1033.53	-33557	-33557	0
90	0.003230	0.000000	0.000000	1461.64	0.00	0.00	1461.64	0.00	549	-47685	2082

HP12-21B - Elevation 32 - From Leg B											
Wind Azimuth °	C <sub>A</sub>	C <sub>S</sub>	C <sub>M</sub>	F <sub>A</sub>	F <sub>S</sub>	F <sub>M</sub>	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1448.84	0.00	0.00	0.00	-1448.84	-46830	-467	1756
45	0.003230	0.000000	0.000000	1448.84	0.00	0.00	1024.49	-1024.49	-33251	-33251	0
90	0.003230	0.000000	0.000000	1448.84	0.00	0.00	1448.84	0.00	-467	-46830	-1756

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HP12-21B - Elevation 23.5 - From Leg D											
Wind Azimuth °	C <sub>A</sub>	C <sub>S</sub>	C <sub>M</sub>	F <sub>A</sub>	F <sub>S</sub>	F <sub>M</sub>	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1326.51	0.00	0.00	0.00	-1326.51	-30537	636	-2189
45	0.003230	0.000000	0.000000	1326.51	0.00	0.00	937.99	-937.99	-21406	-21406	0
90	0.003230	0.000000	0.000000	1326.51	0.00	0.00	1326.51	0.00	636	-30537	2189

HP12-21B - Elevation 40 - From Leg C											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1544.22	0.00	0.00	0.00	-1544.22	-61220	-549	2199
45	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1091.93	-1091.93	-43128	-44226	3110
90	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1544.22	0.00	549	-62318	2199

HP12-21B - Elevation 40 - From Leg D											
Wind Azimuth °	C <sub>A</sub>	C <sub>S</sub>	C <sub>M</sub>	F <sub>A</sub>	F <sub>S</sub>	F <sub>M</sub>	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1544.22	0.00	0.00	0.00	-1544.22	-61220	549	-2199
45	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1091.93	-1091.93	-43128	-43128	0
90	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1544.22	0.00	549	-61220	2199

### Dish Totals - No Ice

Wind Azimuth °	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
	kg	kg	kg-m	kg-m	kg-m
0	0.00	-7325.43	-247491	718	-2515
45	5179.86	-5179.86	-174471	-175569	3110
90	7325.43	0.00	1816	-248590	6913

### Dish Pressures - Service

Elevation m	Dish Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	K <sub>z</sub>	A <sub>A</sub> m <sup>2</sup>	q <sub>z</sub> MPa
33.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.404	10.5064	0.00
32.0000	HP12-21B	45.0000	385.55	1.2121	-1.2121	1.392	10.5064	0.00
23.5000	HP12-21B	225.0000	385.55	-1.6503	1.6503	1.274	10.5064	0.00
40.0000	HP12-21B	135.0000	385.55	1.4243	1.4243	1.484	10.5064	0.00
40.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.484	10.5064	0.00
	Sum		1927.75					
	Weight:							

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## Dish Vectors - Service

HP12-21B - Elevation 33 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	365.41	0.00	0.00	0.00	-365.41	-11509	549	-520
45	0.003230	0.000000	0.000000	365.41	0.00	0.00	258.38	-258.38	-7978	-7978	0
90	0.003230	0.000000	0.000000	365.41	0.00	0.00	365.41	0.00	549	-11509	520

HP12-21B - Elevation 32 - From Leg B											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	362.21	0.00	0.00	0.00	-362.21	-12058	-467	439
45	0.003230	0.000000	0.000000	362.21	0.00	0.00	256.12	-256.12	-8663	-8663	0
90	0.003230	0.000000	0.000000	362.21	0.00	0.00	362.21	0.00	-467	-12058	-439

HP12-21B - Elevation 23.5 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	331.63	0.00	0.00	0.00	-331.63	-7157	636	-547
45	0.003230	0.000000	0.000000	331.63	0.00	0.00	234.50	-234.50	-4874	-4874	0
90	0.003230	0.000000	0.000000	331.63	0.00	0.00	331.63	0.00	636	-7157	547

HP12-21B - Elevation 40 - From Leg C											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	386.06	0.00	0.00	0.00	-386.06	-14893	-549	550
45	0.003230	0.000000	0.000000	386.06	0.00	0.00	272.98	-272.98	-10370	-11468	778
90	0.003230	0.000000	0.000000	386.06	0.00	0.00	386.06	0.00	549	-15991	550

HP12-21B - Elevation 40 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	386.06	0.00	0.00	0.00	-386.06	-14893	549	-550
45	0.003230	0.000000	0.000000	386.06	0.00	0.00	272.98	-272.98	-10370	-10370	0
90	0.003230	0.000000	0.000000	386.06	0.00	0.00	386.06	0.00	549	-14893	550

## Dish Totals - Service

Wind Azimuth °	Vx	Vz	OTMx	OTMz	Torque
	kg	kg	kg-m	kg-m	kg-m
0	0.00	-1831.36	-60511	718	-629
45	1294.97	-1294.97	-42255	-43354	778
90	1831.36	0.00	1816	-61609	1728

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## User Load Vectors - No Ice

C x MANTENIMIENTO - Elevation 40								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

1 SOP. ANT MW (E) - Elevation 32.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0
45	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0
90	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0

1 SOP. ANT MW (E) - Elevation 31.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0
45	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0
90	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0

1 SOP. ANT MW (E) - Elevation 23.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0
45	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0
90	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0

(2) SOP. ANT OMNI (E) - Elevation 36								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 40 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## User Load Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	60.00	-60.00	-1750	-1750	0
45	60.00	-60.00	-1750	-1750	0
90	60.00	-60.00	-1750	-1750	0

## User Load Vectors - Service

C x MANTENIMIENTO - Elevation 40

Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

1 SOP. ANT MW (E) - Elevation 32.5

Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0
45	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0
90	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0

1 SOP. ANT MW (E) - Elevation 31.5

Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0
45	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0
90	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0

1 SOP. ANT MW (E) - Elevation 23.5

Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0
45	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0
90	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0

(2) SOP. ANT OMNI (E) - Elevation 36

Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

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### User Load Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	15.00	-15.00	-438	-438	0
45	15.00	-15.00	-438	-438	0
90	15.00	-15.00	-438	-438	0

### Force Totals

Load Case	Vertical Forces kg	Sum of Forces X kg	Sum of Forces Z kg	Sum of Overturning Moments, M <sub>x</sub> kg-m	Sum of Overturning Moments, M <sub>z</sub> kg-m	Sum of Torques kg-m
Leg Weight	3672.65					
Bracing Weight	4906.62					
Total Member Self-Weight	8579.27			3368	-1516	
Total Weight	14516.21			3368	-1516	
Wind 0 deg - No Ice		236.39	-20357.41	-550906	-9837	-2230
Wind 45 deg - No Ice		15537.51	-16042.32	-427128	-418642	8010
Wind 90 deg - No Ice		19643.50	-236.39	-4953	-536882	12519
Total Weight	14516.21			3368	-1516	
Wind 0 deg - Service		59.10	-5089.35	-137375	-3596	-558
Wind 45 deg - Service		3884.38	-4010.58	-106430	-105797	2002
Wind 90 deg - Service		4910.87	-59.10	-887	-135357	3130

### Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 45 deg - No Ice
4	Dead+Wind 90 deg - No Ice
5	Dead+Wind 0 deg - Service
6	Dead+Wind 45 deg - Service
7	Dead+Wind 90 deg - Service

### Maximum Member Forces

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T1	48 - 40	Leg	Max Tension	3	2551.63	11	15
			Max. Compression	3	-3143.48	-10	-15
			Max. M <sub>x</sub>	4	-426.00	-35	6
			Max. M <sub>y</sub>	4	-18.77	-7	35

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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T2	40 - 38	Diagonal	Max. Vy	4	-151.33	0	0
			Max. Vx	4	147.71	0	0
			Max Tension	4	759.02	0	0
			Max. Compression	4	-772.04	0	0
			Max. Mx	4	88.51	2	0
			Max. My	3	-499.90	1	0
		Top Girt	Max. Vy	4	3.93	2	0
			Max. Vx	3	-0.24	0	0
			Max Tension	2	12.06	0	0
			Max. Compression	4	-20.32	0	0
			Max. Mx	1	-3.92	-3	0
			Max. My	4	-3.22	0	0
		Inner Bracing	Max. Vy	1	6.85	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	4	-5.04	0	0
			Max. Mx	3	-3.78	7	0
			Max. My	3	-4.08	0	0
		Leg	Max. Vy	3	-9.69	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	4931.39	14	10
			Max. Compression	3	-5518.77	-21	-16
			Max. Mx	4	-4396.27	-32	9
			Max. My	4	2451.54	-10	33
		Diagonal	Max. Vy	4	-1407.44	-6	-9
			Max. Vx	4	1395.19	8	6
			Max Tension	4	2654.61	0	0
			Max. Compression	4	-2922.51	0	0
			Max. Mx	3	2249.18	2	0
			Max. My	4	-2908.52	0	-1
		Top Girt	Max. Vy	3	4.14	2	0
			Max. Vx	4	0.95	0	-1
			Max Tension	4	366.75	0	0
			Max. Compression	4	-291.43	0	0
			Max. Mx	1	70.22	-3	0
			Max. My	4	1.13	0	0
		Inner Bracing	Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	4	40.77	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	38.64	7	0
			Max. My	3	33.53	0	0
T3	38 - 36	Leg	Max. Vy	3	-9.69	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	8235.62	15	21
			Max. Compression	3	-9516.99	-7	-5
			Max. Mx	4	-7042.18	-32	9
			Max. My	4	4954.68	-10	33
		Diagonal	Max. Vy	4	-72.78	-32	9
			Max. Vx	4	72.51	-10	33
			Max Tension	4	2851.04	0	0
			Max. Compression	4	-3131.20	0	0
			Max. Mx	3	2630.52	3	0
			Max. My	4	-3115.85	0	-1
		Top Girt	Max. Vy	3	4.58	3	0
			Max. Vx	4	1.01	0	-1
			Max Tension	4	856.04	0	0
			Max. Compression	4	-712.64	0	0
			Max. Mx	1	134.93	-3	0
			Max. My	4	0.96	0	0
			Max. Vy	1	6.85	0	0



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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T4	36 - 34	Inner Bracing	Max. Vx	4	-0.00	0	0
			Max Tension	1	73.89	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	72.19	7	0
			Max. My	4	71.03	0	0
			Max. Vy	3	-9.69	0	0
		Leg	Max. Vx	4	-0.00	0	0
			Max Tension	3	12456.61	5	8
			Max. Compression	3	-13918.89	-60	-58
			Max. Mx	4	-9968.59	-127	44
			Max. My	4	7595.33	-46	127
			Max. Vy	4	122.84	-127	44
		Diagonal	Max. Vx	4	-122.00	-46	127
			Max Tension	3	3049.41	0	0
			Max. Compression	3	-3324.34	0	0
			Max. Mx	3	3038.18	3	0
			Max. My	4	-3254.36	-1	-1
			Max. Vy	3	5.05	3	0
		Top Girt	Max. Vx	4	1.01	-1	-1
			Max Tension	4	1312.14	0	0
			Max. Compression	4	-1150.21	0	0
			Max. Mx	1	142.41	-3	0
			Max. My	4	10.08	0	0
			Max. Vy	1	6.85	0	0
T5	34 - 32	Inner Bracing	Max. Vx	4	-0.00	0	0
			Max Tension	1	83.09	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	81.03	7	0
			Max. My	4	79.87	0	0
			Max. Vy	3	-9.69	0	0
		Leg	Max. Vx	4	-0.00	0	0
			Max Tension	3	17336.09	57	61
			Max. Compression	3	-18913.97	-60	-58
			Max. Mx	4	-13324.56	218	44
			Max. My	4	10346.37	-46	-218
			Max. Vy	4	378.39	-129	44
		Diagonal	Max. Vx	4	-377.61	-46	129
			Max Tension	3	3689.27	0	0
			Max. Compression	4	-3993.42	0	0
			Max. Mx	3	3678.28	4	0
			Max. My	4	-3974.45	-1	-2
			Max. Vy	3	5.59	4	0
		Top Girt	Max. Vx	4	1.41	-1	-2
			Max Tension	4	1808.59	0	0
			Max. Compression	4	-1618.66	0	0
			Max. Mx	1	163.33	-3	0
			Max. My	4	15.95	0	0
			Max. Vy	1	6.85	0	0
T6	32 - 30	Inner Bracing	Max. Vx	4	-0.00	0	0
			Max Tension	1	96.46	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	92.21	7	0
			Max. My	4	92.08	0	0
			Max. Vy	3	-9.69	0	0
		Leg	Max. Vx	4	-0.00	0	0
			Max Tension	3	23361.58	2	6
			Max. Compression	3	-25506.64	-6	-2
			Max. Mx	4	-17450.14	-129	45
			Max. My	4	14507.95	-47	129
			Max. Vy	2	-643.09	-41	-42
			Max. Vx	2	637.06	39	41

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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T7	30 - 28	Diagonal	Max Tension	3	4734.58	0	0
			Max. Compression	3	-5063.53	0	0
			Max. Mx	3	4723.57	5	0
			Max. My	4	-4894.78	-2	-2
			Max. Vy	3	6.36	5	0
		Top Girt	Max. Vx	4	1.63	-2	-2
			Max Tension	4	2418.23	0	0
			Max. Compression	4	-2187.94	0	0
			Max. Mx	1	187.78	-3	0
			Max. My	4	40.06	0	0
		Inner Bracing	Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	1	118.21	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	108.22	7	0
		Leg	Max. My	4	112.57	0	0
			Max. Vy	3	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	30177.06	2	6
			Max. Compression	3	-32233.57	-41	-42
		Diagonal	Max. Mx	3	-1425.52	-46	45
			Max. My	3	-1425.52	-46	45
			Max. Vy	3	-73.42	-46	45
			Max. Vx	3	72.32	-46	45
			Max Tension	3	5698.77	0	0
		Top Girt	Max. Compression	3	-6072.26	0	0
			Max. Mx	3	-353.40	6	1
			Max. My	3	-4528.50	0	-3
			Max. Vy	3	-7.12	6	1
			Max. Vx	3	1.92	0	0
		Inner Bracing	Max Tension	2	3520.55	0	0
			Max. Compression	2	-3225.70	0	0
			Max. Mx	1	218.50	-3	0
			Max. My	4	59.50	0	0
			Max. Vy	1	6.85	0	0
T8	28 - 26	Leg	Max. Vx	4	-0.00	0	0
			Max Tension	3	145.22	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	1	145.01	7	0
			Max. My	4	136.76	0	0
		Diagonal	Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	36677.05	41	43
			Max. Compression	3	-39366.59	-4	1
			Max. Mx	3	-1564.04	-75	75
		Top Girt	Max. My	3	-1564.04	-75	75
			Max. Vy	3	85.95	-75	75
			Max. Vx	3	-88.84	-75	75
			Max Tension	4	1936.39	0	0
			Max. Compression	4	-2285.02	0	0
		Inner Bracing	Max. Mx	3	352.32	9	1
			Max. My	4	-1405.29	-3	-5
			Max. Vy	3	8.76	9	1
			Max. Vx	4	3.78	0	0
			Max Tension	2	676.59	0	0
		Top Girt	Max. Compression	2	-625.45	0	0
			Max. Mx	4	-620.40	-3	0
			Max. My	4	7.18	0	0
			Max. Vy	4	-6.82	0	0
			Max. Vx	4	-0.66	0	0
		Inner Bracing	Max Tension	3	198.79	0	0

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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T9	26 - 24	Leg	Max. Compression	3	-168.10	0	0
			Max. Mx	1	26.09	7	0
			Max. My	4	16.62	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	39050.23	-1	4
			Max. Compression	3	-42889.34	-57	-55
			Max. Mx	2	25397.48	108	-20
			Max. My	4	24822.86	-21	110
			Max. Vy	4	89.06	-104	31
			Max. Vx	4	-95.58	-21	110
			Max Tension	4	1743.13	0	0
			Max. Compression	4	-1407.09	0	0
			Max. Mx	3	567.81	9	-2
T10	24 - 22	Leg	Max. My	4	-313.50	5	-2
			Max. Vy	3	-9.09	9	-2
			Max. Vx	4	1.90	0	0
			Max Tension	3	38870.73	61	64
			Max. Compression	3	-42815.92	-73	-61
			Max. Mx	2	25425.91	-129	-19
			Max. My	4	24838.62	-21	-130
			Max. Vy	2	522.78	108	-19
			Max. Vx	4	503.46	-21	110
		Diagonal	Max Tension	4	1516.93	0	0
			Max. Compression	3	-1802.71	0	0
			Max. Mx	3	-403.90	6	-1
			Max. My	4	-1666.86	0	-2
			Max. Vy	3	-7.61	6	-1
			Max. Vx	4	1.55	0	0
T11	22 - 18.5	Leg	Max Tension	3	41726.21	67	72
			Max. Compression	3	-46827.10	-78	-49
			Max. Mx	3	-1825.60	-136	159
			Max. My	3	-1825.60	-136	159
			Max. Vy	2	-142.52	131	-26
			Max. Vx	2	-160.47	-41	145
		Diagonal	Max Tension	4	2051.99	0	0
			Max. Compression	4	-2012.12	0	0
			Max. Mx	3	91.22	12	-2
			Max. My	4	-1998.90	0	-8
			Max. Vy	3	11.13	12	-2
			Max. Vx	4	4.17	0	0
T12	18.5 - 14	Leg	Max Tension	3	43472.43	75	84
			Max. Compression	3	-48580.18	-150	-115
			Max. Mx	3	-48580.18	-150	-115
			Max. My	4	27411.71	7	168
			Max. Vy	2	181.38	131	-26
			Max. Vx	2	194.03	-41	145
		Diagonal	Max Tension	4	2009.16	0	0
			Max. Compression	4	-2230.50	0	0
			Max. Mx	3	83.65	14	-6
			Max. My	4	-1549.55	6	-7
			Max. Vy	3	-11.51	14	-6
			Max. Vx	4	3.38	0	0
T13	14 - 9	Leg	Max Tension	3	47901.07	123	159
			Max. Compression	3	-53341.19	-53	-26
			Max. Mx	3	-2403.86	-167	194
			Max. My	3	-2403.86	-167	194
			Max. Vy	4	-176.14	-147	-15
			Max. Vx	4	202.03	7	168
		Diagonal	Max Tension	4	2094.50	0	0
			Max. Compression	4	-2185.03	0	0

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Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T14	9 - 6.7	Leg	Max. Mx	3	530.06	21	-9
			Max. My	3	-2127.30	15	-16
			Max. Vy	3	18.09	21	-9
			Max. Vx	3	6.28	0	0
			Max Tension	3	49726.81	46	69
			Max. Compression	3	-55684.89	-302	-250
		Diagonal	Max. Mx	4	-36462.43	-327	8
			Max. My	4	30722.27	11	353
			Max. Vy	3	177.57	-302	-250
			Max. Vx	3	-186.96	266	321
			Max Tension	4	1880.80	0	0
			Max. Compression	4	-1885.97	0	0
		Inner Bracing	Max. Mx	3	448.46	-12	0
			Max. My	3	-411.30	0	1
			Max. Vy	3	12.85	0	0
			Max. Vx	3	-1.63	0	0
			Max Tension	3	106.45	0	0
			Max. Compression	3	-131.62	0	0
			Max. Mx	4	-15.31	-21	0
			Max. My	3	-131.62	0	0
T15	6.7 - 0	Leg	Max. Vy	4	19.64	0	0
			Max. Vx	3	0.02	0	0
			Max Tension	3	49505.24	266	321
			Max. Compression	3	-55870.49	0	0
			Max. Mx	4	-36452.13	-327	9
			Max. My	4	30631.14	11	353
		Diagonal	Max. Vy	4	-303.90	-327	9
			Max. Vx	4	330.15	11	353
			Max Tension	4	3916.15	0	0
			Max. Compression	4	-4155.54	0	0
			Max. Mx	4	3916.15	-39	0
			Max. My	2	171.74	0	8
		Horizontal	Max. Vy	4	20.29	0	0
			Max. Vx	2	-4.09	0	0
			Max Tension	4	400.83	14	-4
			Max. Compression	3	-612.27	2	0
			Max. Mx	2	-42.83	30	0
			Max. My	2	349.79	15	-5
			Max. Vy	2	26.61	30	0
			Max. Vx	2	3.16	15	-5

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## Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical kg	Horizontal, X kg	Horizontal, Z kg
Leg D	Max. Vert	1	3754.47	403.34	-371.05
	Max. H <sub>x</sub>	1	3754.47	403.34	-371.05
	Max. H <sub>z</sub>	3	-53550.38	-6748.96	6273.83
	Min. Vert	3	-53550.38	-6748.96	6273.83
	Min. H <sub>x</sub>	3	-53550.38	-6748.96	6273.83
	Min. H <sub>z</sub>	1	3754.47	403.34	-371.05
Leg C	Max. Vert	4	39455.41	-5662.64	-3504.32
	Max. H <sub>x</sub>	2	-32802.86	3420.19	4576.82
	Max. H <sub>z</sub>	2	-32802.86	3420.19	4576.82
	Min. Vert	2	-32802.86	3420.19	4576.82
	Min. H <sub>x</sub>	4	39455.41	-5662.64	-3504.32
	Min. H <sub>z</sub>	4	39455.41	-5662.64	-3504.32
Leg B	Max. Vert	3	60366.00	-6825.66	7428.55
	Max. H <sub>x</sub>	1	3503.61	-360.35	392.63
	Max. H <sub>z</sub>	3	60366.00	-6825.66	7428.55
	Min. Vert	1	3503.61	-360.35	392.63
	Min. H <sub>x</sub>	3	60366.00	-6825.66	7428.55
	Min. H <sub>z</sub>	1	3503.61	-360.35	392.63
Leg A	Max. Vert	2	40070.29	3944.33	5464.97
	Max. H <sub>x</sub>	2	40070.29	3944.33	5464.97
	Max. H <sub>z</sub>	2	40070.29	3944.33	5464.97
	Min. Vert	4	-32194.32	-4079.86	-3669.37
	Min. H <sub>x</sub>	4	-32194.32	-4079.86	-3669.37
	Min. H <sub>z</sub>	4	-32194.32	-4079.86	-3669.37

## Tower Mast Reaction Summary

Load Combination	Vertical kg	Shear <sub>x</sub> kg	Shear <sub>z</sub> kg	Overturning Moment, M <sub>x</sub> kg-m	Overturning Moment, M <sub>z</sub> kg-m	Torque kg-m
Dead Only	14516.21	-0.00	-0.04	3385	-1516	0
Dead+Wind 0 deg - No Ice	14516.21	236.37	-20357.05	-552812	-9907	-2224
Dead+Wind 45 deg - No Ice	14516.20	15537.23	-16042.03	-428572	-420105	8035
Dead+Wind 90 deg - No Ice	14516.21	19643.14	-236.36	-4972	-538763	12546
Dead+Wind 0 deg - Service	14516.21	59.10	-5089.27	-135666	-3602	-556
Dead+Wind 45 deg - Service	14516.21	3884.31	-4010.52	-104611	-106170	2009
Dead+Wind 90 deg - Service	14516.21	4910.79	-59.10	1305	-135832	3137

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX kg	PY kg	PZ kg	PX kg	PY kg	PZ kg	
1	-0.00	-14516.21	0.00	0.00	14516.21	0.04	0.000%
2	236.39	-14516.21	-20357.41	-236.37	14516.21	20357.05	0.001%
3	15537.51	-14516.21	-16042.32	-15537.23	14516.20	16042.03	0.002%
4	19643.50	-14516.21	-236.39	-19643.14	14516.21	236.36	0.001%
5	59.10	-14516.21	-5089.35	-59.10	14516.21	5089.27	0.001%
6	3884.38	-14516.21	-4010.58	-3884.31	14516.21	4010.52	0.001%
7	4910.87	-14516.21	-59.10	-4910.79	14516.21	59.10	0.001%

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## Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	8	0.00000001	0.00008084
2	Yes	10	0.00000001	0.00008440
3	Yes	10	0.00000001	0.00008605
4	Yes	10	0.00000001	0.00008479
5	Yes	10	0.00000001	0.00007931
6	Yes	10	0.00000001	0.00008022
7	Yes	10	0.00000001	0.00008033

## Maximum Tower Deflections - Service Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	48 - 40	118.88	6	0.2579	0.0668
T2	40 - 38	82.81	6	0.2545	0.0643
T3	38 - 36	73.76	6	0.2513	0.0589
T4	36 - 34	64.87	6	0.2451	0.0532
T5	34 - 32	56.22	6	0.2355	0.0478
T6	32 - 30	47.92	6	0.2223	0.0409
T7	30 - 28	40.06	6	0.2039	0.0344
T8	28 - 26	32.93	6	0.1801	0.0280
T9	26 - 24	27.10	6	0.1515	0.0227
T10	24 - 22	22.15	6	0.1276	0.0191
T11	22 - 18.5	17.95	6	0.1065	0.0155
T12	18.5 - 14	11.99	6	0.0814	0.0111
T13	14 - 9	6.23	6	0.0575	0.0071
T14	9 - 6.7	2.16	6	0.0292	0.0047
T15	6.7 - 0	0.79	6	0.0233	0.0039

## Critical Deflections and Radius of Curvature - Service Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
50.5000	ANT PANEL 1.0x0.50x0.19m	6	118.88	0.2579	0.0668	457021
49.5000	ANT PANEL 1.0x0.50x0.19m	6	118.88	0.2579	0.0668	457021
48.5000	ANT PANEL 1.0x0.50x0.19m	6	118.88	0.2579	0.0668	457021
47.5000	ANT PANEL 1.0x0.50x0.19m	6	116.63	0.2578	0.0671	457021
46.5000	ANT PANEL 1.0x0.50x0.19m	6	112.13	0.2577	0.0677	457021
45.5000	ANT PANEL 1.0x0.50x0.19m	6	107.63	0.2576	0.0682	278604
40.0000	HP12-21B	6	82.81	0.2545	0.0643	178336
36.0000	ANT OMNI L=4.0m	6	64.87	0.2451	0.0532	14464
35.0000	ANT RF 0.30x1.30m	6	60.51	0.2407	0.0506	12659
33.0000	HP12-21B	6	52.02	0.2295	0.0444	10101
32.5000	1 SOP. ANT MW (E)	6	49.96	0.2261	0.0426	9561
32.0000	HP12-21B	6	47.92	0.2223	0.0409	9009
31.5000	1 SOP. ANT MW (E)	6	45.91	0.2182	0.0392	8452
26.0000	(2) 1 ANT TV 1.20x1.20m	6	27.10	0.1515	0.0227	4685

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
24.0000	(2) 1 ANT TV 1.20x1.20m	6	22.15	0.1276	0.0191	5304
23.5000	HP12-21B	6	21.04	0.1220	0.0182	5482
22.0000	(2) 1 ANT TV 1.20x1.20m	6	17.95	0.1065	0.0155	6551
20.0000	(2) 1 ANT TV 1.20x1.20m	6	14.37	0.0905	0.0127	8499
18.0000	(2) 1 ANT TV 1.20x1.20m	6	11.25	0.0787	0.0106	10309
15.5000	ANT GRILLA TV (2.25x2.25m)	6	7.91	0.0658	0.0083	9143
13.0000	ANT GRILLA TV (2.25x2.25m)	6	5.26	0.0514	0.0064	10082
10.5000	ANT GRILLA TV (2.25x2.25m)	6	3.21	0.0361	0.0052	18714
8.0000	ANT GRILLA TV (2.25x2.25m)	6	1.50	0.0263	0.0044	12042

### Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	m	mm		°	°
T1	48 - 40	486.59	3	1.0693	0.2674
T2	40 - 38	337.23	3	1.0521	0.2575
T3	38 - 36	299.92	3	1.0364	0.2358
T4	36 - 34	263.30	3	1.0083	0.2131
T5	34 - 32	227.80	3	0.9665	0.1912
T6	32 - 30	193.81	3	0.9094	0.1636
T7	30 - 28	161.75	3	0.8318	0.1377
T8	28 - 26	132.72	3	0.7328	0.1123
T9	26 - 24	109.08	3	0.6142	0.0910
T10	24 - 22	89.09	3	0.5164	0.0765
T11	22 - 18.5	72.16	3	0.4295	0.0620
T12	18.5 - 14	48.19	3	0.3276	0.0446
T13	14 - 9	25.02	3	0.2318	0.0284
T14	9 - 6.7	8.61	3	0.1177	0.0187
T15	6.7 - 0	3.10	3	0.0941	0.0157

### Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
50.5000	ANT PANEL 1.0x0.50x0.19m	3	486.59	1.0693	0.2674	234680
49.5000	ANT PANEL 1.0x0.50x0.19m	3	486.59	1.0693	0.2674	234680
48.5000	ANT PANEL 1.0x0.50x0.19m	3	486.59	1.0693	0.2674	234680
47.5000	ANT PANEL 1.0x0.50x0.19m	3	477.26	1.0691	0.2687	234680
46.5000	ANT PANEL 1.0x0.50x0.19m	3	458.61	1.0687	0.2712	234680
45.5000	ANT PANEL 1.0x0.50x0.19m	3	439.96	1.0680	0.2731	143061
40.0000	HP12-21B	3	337.23	1.0521	0.2575	67925
36.0000	ANT OMNI L=4.0m	3	263.30	1.0083	0.2131	3546
35.0000	ANT RF 0.30x1.30m	3	245.38	0.9891	0.2026	3035
33.0000	HP12-21B	3	210.59	0.9403	0.1777	2332
32.5000	1 SOP. ANT MW (E)	3	202.14	0.9255	0.1706	2198
32.0000	HP12-21B	3	193.81	0.9094	0.1636	2077
31.5000	1 SOP. ANT MW (E)	3	185.60	0.8920	0.1569	1967
26.0000	(2) 1 ANT TV 1.20x1.20m	3	109.08	0.6142	0.0910	1146
24.0000	(2) 1 ANT TV 1.20x1.20m	3	89.09	0.5164	0.0765	1286
23.5000	HP12-21B	3	84.58	0.4936	0.0729	1331



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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
22.0000	(2) 1 ANT TV 1.20x1.20m	3	72.16	0.4295	0.0620	1611
20.0000	(2) 1 ANT TV 1.20x1.20m	3	57.73	0.3645	0.0510	2106
18.0000	(2) 1 ANT TV 1.20x1.20m	3	45.21	0.3166	0.0425	2568
15.5000	ANT GRILLA TV (2.25x2.25m)	3	31.78	0.2649	0.0331	2274
13.0000	ANT GRILLA TV (2.25x2.25m)	3	21.09	0.2070	0.0258	2508
10.5000	ANT GRILLA TV (2.25x2.25m)	3	12.84	0.1454	0.0208	4687
8.0000	ANT GRILLA TV (2.25x2.25m)	3	5.98	0.1059	0.0175	2983

## Bolt Design Data

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
T1	48	Leg	A394T0	16	8	106.50	5536.87	0.019	1.333	Bearing
		Diagonal	A394T0	16	2	386.02	3705.44	0.104	1.333	Member Bearing
		Top Girt	A394T0	16	2	10.16	3705.44	0.003	1.333	Member Bearing
T2	40	Leg	A394T0	16	12	919.79	5536.87	0.166	1.333	Bearing
		Diagonal	A394T0	16	2	1461.26	3705.44	0.394	1.333	Member Bearing
		Top Girt	A394T0	16	2	183.38	3705.44	0.049	1.333	Member Bearing
T3	38	Diagonal	A394T0	16	2	1565.60	3705.44	0.423	1.333	Member Bearing
		Top Girt	A394T0	16	2	428.02	3705.44	0.116	1.333	Member Bearing
T4	36	Leg	A394T0	16	12	2319.82	5536.87	0.419	1.333	Bearing
		Diagonal	A394T0	16	2	1662.17	3705.44	0.449	1.333	Member Bearing
		Top Girt	A394T0	16	2	656.07	3705.44	0.177	1.333	Member Bearing
T5	34	Leg	A394T0	16	12	3152.33	5536.87	0.569	1.333	Bearing
		Diagonal	A394T0	16	2	1996.71	3705.44	0.539	1.333	Member Bearing
		Top Girt	A394T0	16	2	904.30	3705.44	0.244	1.333	Member Bearing
T6	32	Diagonal	A394T0	16	2	2531.77	3705.44	0.683	1.333	Member Bearing
		Top Girt	A394T0	16	2	1209.11	3705.44	0.326	1.333	Member Bearing
T7	30	Leg	A394T0	16	8	8058.39	5536.87	1.455	1.333	Bearing
		Diagonal	A394T0	16	2	3036.13	3705.44	0.819	1.333	Member Bearing
		Top Girt	A394T0	16	2	1760.27	3705.44	0.475	1.333	Member Bearing
T8	28	Leg	A394T0	16	8	9841.64	5536.87	1.777	1.333	Bearing
		Diagonal	A394T0	16	2	1142.51	3705.44	0.308	1.333	Member Bearing
		Top Girt	A394T0	16	2	338.29	3705.44	0.091	1.333	Member Bearing
T9	26	Diagonal	A394T0	16	2	871.56	3705.44	0.235	1.333	Member Bearing
T10	24	Leg	A394T0	16	12	7136.01	5536.87	1.289	1.333	Bearing
		Diagonal	A394T0	16	2	901.36	3705.44	0.243	1.333	Member Bearing
T11	22	Diagonal	A394T0	16	2	1025.99	3705.44	0.277	1.333	Member Bearing
T12	18.5	Leg	A394T0	16	12	8096.72	8305.28	0.975	1.333	Bearing
		Diagonal	A394T0	16	2	1115.25	3705.44	0.301	1.333	Member Bearing



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Section No.	Elevation m	Size	L m	L <sub>U</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio $\frac{P}{P_a}$
T14	9 - 6.7	H1-3 (1.85 CR) - 219 L127x127x10	2.3217	2.3217	46.2 K=0.50	172	2329	-55684.83	40792.53	1.365 X
T15	6.7 - 0	H1-3 (1.37 CR) - 231 L127x127x10	6.7632	6.7632	53.8 K=0.20	164	2329	-55870.35	38850.88	1.438 X
		H1-3 (1.44 CR) - 251								

### Diagonal Design Data (Compression)

Section No.	Elevation m	Size	L m	L <sub>U</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio $\frac{P}{P_a}$
T1	48 - 40	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-772.04	2691.77	0.287
T2	40 - 38	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-2922.51	2691.77	1.086
T3	38 - 36	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-3131.20	2691.77	1.163
T4	36 - 34	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-3324.34	2691.77	1.235
T5	34 - 32	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-3993.42	2691.77	1.484 X
T6	32 - 30	H1-3 (1.48 CR) - 108 L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-5063.54	2691.77	1.881 X
T7	30 - 28	H1-3 (1.88 CR) - 128 L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-6072.24	2691.77	2.256 X
T8	28 - 26	H1-3 (2.26 CR) - 146 L51x51x5	2.9755	1.5510	99.0 K=1.00	90	461	-2285.02	4251.17	0.538
T9	26 - 24	L51x51x5	3.2734	1.6960	108.2 K=1.00	82	461	-1407.09	3862.63	0.364
T10	24 - 22	L51x51x5	3.5888	1.8506	59.0 K=0.50	121	461	-1802.71	5682.52	0.317
T11	22 - 18.5	L64x64x5	4.9675	2.6532	67.1 K=0.50	115	582	-2012.12	6842.90	0.294
T12	18.5 - 14	L64x64x5	6.2306	3.3601	85.0 K=0.50	102	582	-2230.50	6050.11	0.369
T13	14 - 9	L64x64x6	7.2385	3.8869	199.0 K=1.00	26	768	-2185.03	2035.55	1.073
T14	9 - 6.7	L64x64x6	3.6684	3.6032	144.5 K=0.50	49	768	-1885.97	3862.65	0.488
T15	6.7 - 0	L76x76x6	7.6936	7.5644	176.1 K=0.35	33	929	-4155.54	3146.37	1.321

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### Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T15	6.7 - 0	L76x76x6	6.1460	3.0095	127.4 K=1.00	63	929	-612.27	6009.28	0.102 

### Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T1	48 - 40	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-20.32	2679.95	0.008 
T2	40 - 38	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-291.43	2679.95	0.109 
T3	38 - 36	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-712.64	2679.95	0.266 
T4	36 - 34	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-1150.21	2679.95	0.429 
T5	34 - 32	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-1618.66	2679.95	0.604 
T6	32 - 30	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-2187.94	2679.95	0.816 
T7	30 - 28	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-3225.70	2679.95	1.204 
T8	28 - 26	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-625.45	2679.95	0.233 

### Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub> *
T1	48 - 40	L64x64x5	2.8284	2.7268	216.9 K=1.00	22	582	-4.09	1298.93	0.003 
T8	28 - 26	L64x64x5	2.8284	2.7268	138.0 K=1.00	54	582	-168.10	3208.75	0.052 
T14	9 - 6.7	L64x64x6	4.3459	4.3459	348.5 K=1.00	8	768	-131.62	663.81	0.198 
KL/R > 250 (C) - 247										

\* DL controls

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## Tension Checks

## Leg Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L<sub>u</sub></i> <i>m</i>	<i>KI/r</i>	<i>F<sub>a</sub></i> <i>MPa</i>	<i>A</i> <i>mm<sup>2</sup></i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P<sub>a</sub></i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T1	48 - 40	L102x102x6	8.0000	2.0000	63.0	224	1009	2551.63	23063.59	0.111
T2	40 - 38	L102x102x6	2.0000	2.0000	63.0	224	1009	4931.41	23063.59	0.214
T3	38 - 36	L102x102x6	2.0000	2.0000	63.0	207	1252	8235.61	26399.08	0.312
T4	36 - 34	L102x102x6	2.0000	2.0000	63.0	224	1009	12456.60	23063.59	0.540
T5	34 - 32	L102x102x6	2.0000	2.0000	63.0	224	1009	17336.08	23063.59	0.752
T6	32 - 30	L102x102x6	2.0000	2.0000	63.0	207	1252	23361.60	26399.08	0.885
T7	30 - 28	L102x102x6	2.0000	2.0000	63.0	224	1009	30177.06	23063.59	1.308
T8	28 - 26	L102x102x6	2.0188	2.0188	63.6	224	1009	36677.04	23063.59	1.590
T9	26 - 24	bolt (1.66 CR) - 151 L102x102x6	2.0189	2.0189	63.6	207	1252	39050.69	26399.08	1.479
T10	24 - 22	H2-1 (1.48 CR) - 169 L102x102x6	2.0188	2.0188	63.6	224	1009	38870.74	23063.59	1.685
T11	22 - 18.5	H2-1 (1.69 CR) - 181 L102x102x10	3.5330	3.5330	113.1	207	1845	41726.47	38918.24	1.072
T12	18.5 - 14	L102x102x10	4.5424	4.5424	145.4	224	1482	43472.44	33858.32	1.284
T13	14 - 9	L102x102x10	5.0471	5.0471	161.5	224	1482	47901.18	33858.32	1.415
T14	9 - 6.7	H2-1 (1.41 CR) - 217 L127x127x10	2.3217	2.3217	58.6	207	2329	49726.89	49124.07	1.012
T15	6.7 - 0	L127x127x10	6.7632	6.7632	170.7	224	1966	49505.09	44914.64	1.102

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### Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T1	48 - 40	L51x51x5	2.8284	1.3424	128.5	200	278	759.02	5664.74	0.134
T2	40 - 38	L51x51x5	2.8284	1.3424	128.5	200	278	2654.61	5664.74	0.469
T3	38 - 36	L51x51x5	2.8284	1.3424	128.5	200	278	2851.04	5664.74	0.503
T4	36 - 34	L51x51x5	2.8284	1.3424	128.5	200	278	3049.41	5664.74	0.538
T5	34 - 32	L51x51x5	2.8284	1.3424	128.5	200	278	3689.28	5664.74	0.651
T6	32 - 30	L51x51x5	2.8284	1.3424	128.5	200	278	4734.60	5664.74	0.836
T7	30 - 28	L51x51x5	2.8284	1.3424	128.5	200	278	5698.75	5664.74	1.006
T8	28 - 26	L51x51x5	2.9755	1.5510	140.0	200	278	1936.39	5664.74	0.342
T9	26 - 24	L51x51x5	3.2734	1.6960	154.5	200	278	1743.13	5664.74	0.308
T10	24 - 22	L51x51x5	3.5888	1.8506	169.6	200	278	1516.93	5664.74	0.268
T11	22 - 18.5	L64x64x5	4.9675	2.6532	189.2	200	368	2051.99	7509.63	0.273
T12	18.5 - 14	L64x64x5	6.2306	3.3601	238.9	200	368	2009.16	7509.63	0.268
T13	14 - 9	L64x64x6	7.2385	3.8869	281.2	200	485	2094.50	9887.86	0.212
T14	9 - 6.7	L64x64x6	3.6684	3.6032	184.5	200	485	1880.80	9887.86	0.190
T15	6.7 - 0	L76x76x6	7.6936	7.5644	320.2	200	606	3916.15	12354.27	0.317

### Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T15	6.7 - 0	L76x76x6	6.1460	3.0095	127.4	200	606	400.83	12354.27	0.032

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## Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T1	48 - 40	L64x64x5	2.0000	1.8984	96.1	200	368	12.06	7509.63	0.002
T2	40 - 38	L64x64x5	2.0000	1.8984	96.1	200	368	366.75	7509.63	0.049
T3	38 - 36	L64x64x5	2.0000	1.8984	96.1	200	368	856.04	7509.63	0.114
T4	36 - 34	L64x64x5	2.0000	1.8984	96.1	200	368	1312.13	7509.63	0.175
T5	34 - 32	L64x64x5	2.0000	1.8984	96.1	200	368	1808.59	7509.63	0.241
T6	32 - 30	L64x64x5	2.0000	1.8984	96.1	200	368	2418.22	7509.63	0.322
T7	30 - 28	L64x64x5	2.0000	1.8984	96.1	200	368	3520.55	7509.63	0.469
T8	28 - 26	L64x64x5	2.0000	1.8984	96.1	200	368	676.58	7509.63	0.090

## Inner Bracing Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T2	40 - 38	L64x64x5	2.8284	2.7268	138.0	149	582	37.77	8837.43	0.004*
T3	38 - 36	L64x64x5	2.8284	2.7268	138.0	149	582	73.89	8837.43	0.008*
T4	36 - 34	L64x64x5	2.8284	2.7268	138.0	149	582	83.09	8837.43	0.009*
T5	34 - 32	L64x64x5	2.8284	2.7268	138.0	149	582	96.46	8837.43	0.011*
T6	32 - 30	L64x64x5	2.8284	2.7268	138.0	149	582	118.21	8837.43	0.013*
T7	30 - 28	L64x64x5	2.8284	2.7268	138.0	149	582	145.01	8837.43	0.016*
T8	28 - 26	L64x64x5	2.8284	2.7268	138.0	149	582	198.79	8837.43	0.022
T14	9 - 6.7	L64x64x6	4.3459	4.3459	222.5	149	768	106.45	11659.14	0.009

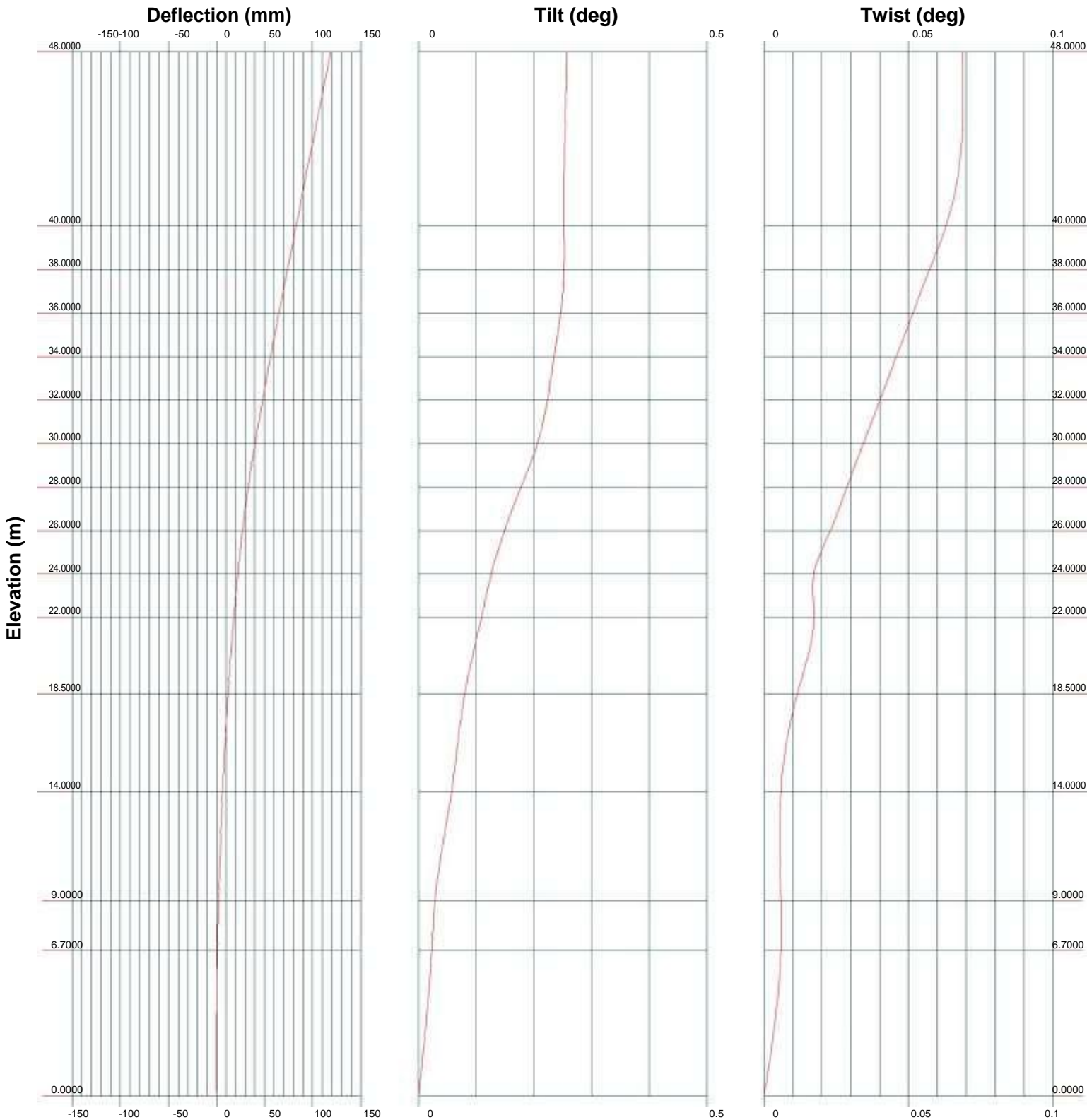
\* DL controls

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## Section Capacity Table

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P <sub>allow</sub> kg	% Capacity	Pass Fail
T1	48 - 40	Leg	L102x102x6	3	-3143.48	24666.48	12.7	Pass
		Diagonal	L51x51x5	12	-772.04	3588.13	21.5	Pass
		Top Girt	L64x64x5	8	-20.32	3572.37	0.6	Pass
T2	40 - 38	Leg	L102x102x6	45	-5518.77	24666.48	22.4	Pass
		Diagonal	L51x51x5	54	-2922.51	3588.13	81.4	Pass
		Top Girt	L64x64x5	52	-291.43	3572.37	8.2	Pass
T3	38 - 36	Leg	L102x102x6	63	-9517.01	24666.48	38.6	Pass
		Diagonal	L51x51x5	72	-3131.20	3588.13	87.3	Pass
		Top Girt	L64x64x5	70	-712.64	3572.37	19.9	Pass
T4	36 - 34	Leg	L102x102x6	81	-13918.89	24666.48	56.4	Pass
		Diagonal	L51x51x5	92	-3324.34	3588.13	92.6	Pass
		Top Girt	L64x64x5	88	-1150.21	3572.37	32.2	Pass
T5	34 - 32	Leg	L102x102x6	99	-18913.95	24666.48	76.7	Pass
		Diagonal	L51x51x5	108	-3993.42	3588.13	111.3	Fail
		Top Girt	L64x64x5	106	-1618.66	3572.37	45.3	Pass
T6	32 - 30	Leg	L102x102x6	117	-25506.64	24666.48	103.4	Fail
		Diagonal	L51x51x5	128	-5063.54	3588.13	141.1	Fail
		Top Girt	L64x64x5	124	-2187.94	3572.37	61.2	Pass
T7	30 - 28	Leg	L102x102x6	135	-32233.55	24666.48	130.7	Fail
		Diagonal	L51x51x5	146	-6072.24	3588.13	169.2	Fail
		Top Girt	L64x64x5	139	-3225.70	3572.37	90.3	Pass
T8	28 - 26	Leg	L102x102x6	153	-39366.61	24603.78	160.0	Fail
		Diagonal	L51x51x5	164	-2285.02	5666.81	40.3	Pass
		Top Girt	L64x64x5	157	-625.45	3572.37	17.5	Pass
T9	26 - 24	Leg	L102x102x6	171	-42889.35	24603.48	174.3	Fail
		Diagonal	L51x51x5	180	-1407.09	5148.89	27.3	Pass
T10	24 - 22	Leg	L102x102x6	183	-42815.91	24603.78	174.0	Fail
		Diagonal	L51x51x5	188	-1802.71	7574.79	23.8	Pass
T11	22 - 18.5	Leg	L102x102x10	195	-46827.08	43645.55	107.3	Fail
		Diagonal	L64x64x5	198	-2012.12	9121.58	22.1	Pass
T12	18.5 - 14	Leg	L102x102x10	207	-48580.21	40234.18	120.7	Fail
		Diagonal	L64x64x5	210	-2230.50	8064.79	27.7	Pass
T13	14 - 9	Leg	L102x102x10	219	-53341.12	38375.33	139.0	Fail
		Diagonal	L64x64x6	222	-2185.03	2713.39	80.5	Pass
T14	9 - 6.7	Leg	L127x127x10	231	-55684.83	54376.44	102.4	Fail
		Diagonal	L64x64x6	234	-1885.97	5148.92	36.6	Pass
		Inner Bracing	L64x64x6	247	-131.62	884.85	14.9	Pass
T15	6.7 - 0	Leg	L127x127x10	251	-55870.35	51788.22	107.9	Fail
		Diagonal	L76x76x6	254	-4155.54	4194.11	99.1	Pass
		Horizontal	L76x76x6	233	-612.27	8010.38	7.6	Pass
							Summary	
							Leg (T9)	174.3 Fail
							Diagonal (T7)	169.2 Fail
							Horizontal (T15)	7.6 Pass
							Top Girt (T7)	90.3 Pass
							Bolt Checks	133.3 Fail
							<b>RATING =</b>	<b>174.3 Fail </b>





<b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204. <b>BOGOTA D.C. - COLOMBIA.</b> Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	Job:	<b>DIAGRAMA DE DEFLEXIONES-TC40+10m EXT. PATA 7.45m - V=120KPH</b>		
		<b>EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).</b>		
	Client:	RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.		Drawn by: Ing. C. Londoño M.
		TIA/EIA-222-F		App'd: 04/25/16
	Path:			Scale: NTS Dwg No. E-5

# Feedline Distribution Chart

0.0000 - 48.0000

Round

Flat

App In Face

App Out Face

Truss Leg

Face A

Face B

Face C

Face D

Elevation (m)



**BTESA BROAD TELECOM**

Calle 129 No. 8 - 08 - Oficina 204.

BOGOTA D.C. - COLOMBIA.

Phone: 57 (1) 2740536.

FAX: 57 (1) 2740536.

Job:

**DIAGRAMA CABLES GUIA DE ONDA-TC40+10m EXT PATA 7.45m - V=120KPH**

Client:

**EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).**

Path:

RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.

TIA/EIA-222-F

Drawn by:

Ing. C. Londoño M.

04/25/16

App'd:

Scale: NTS

Dwg No. E-7

# Stress Distribution Chart

0.0000 - 48.0000

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

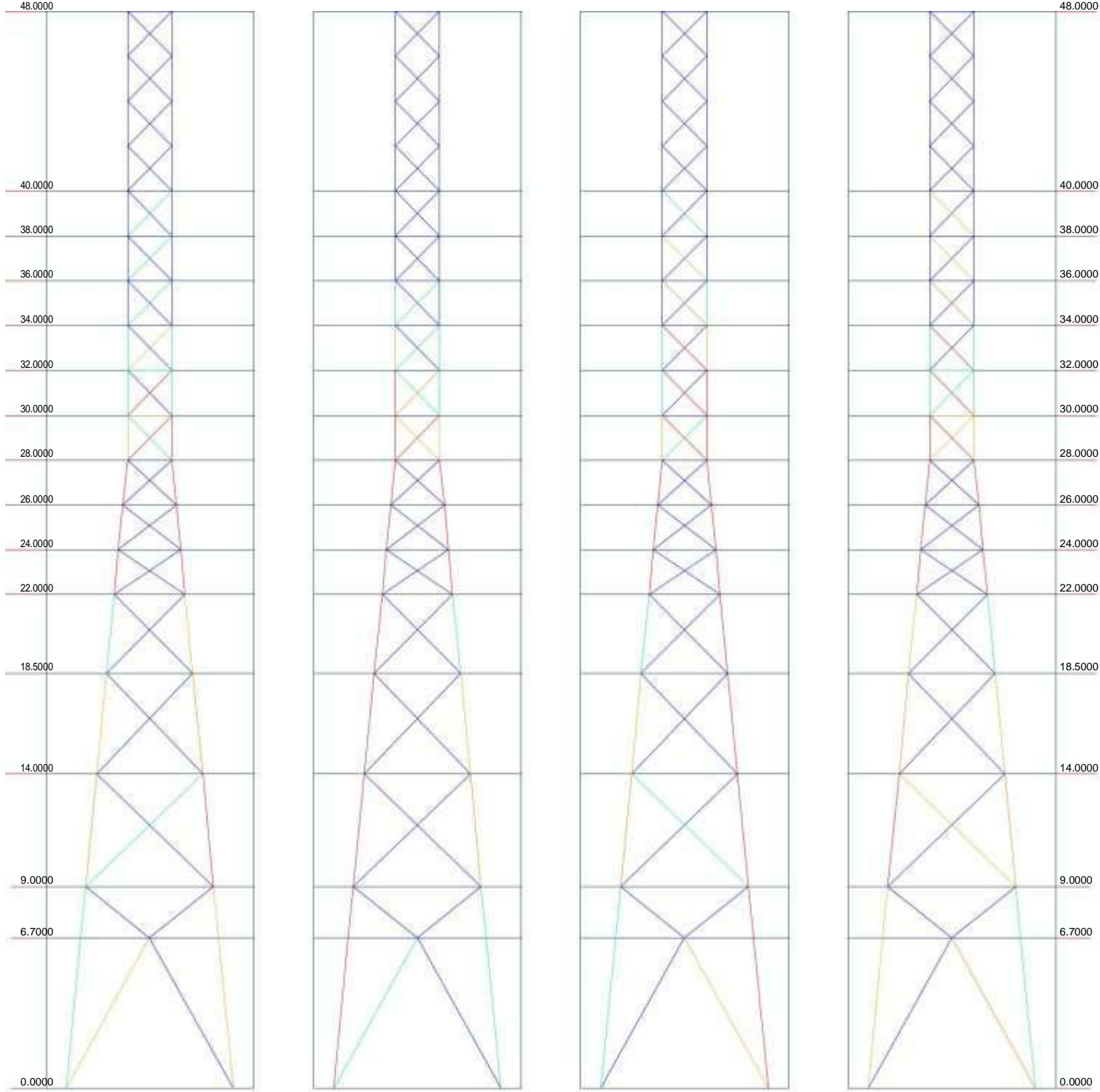
Face A

Face B

Face C

Face D

Elevation (m)

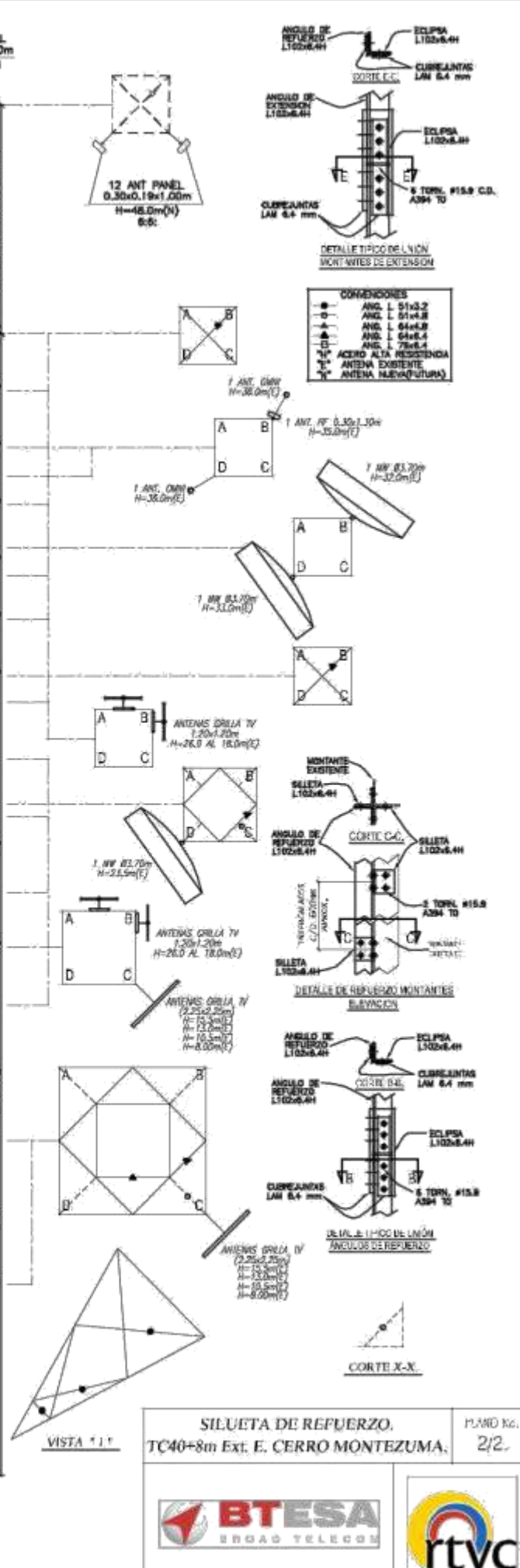
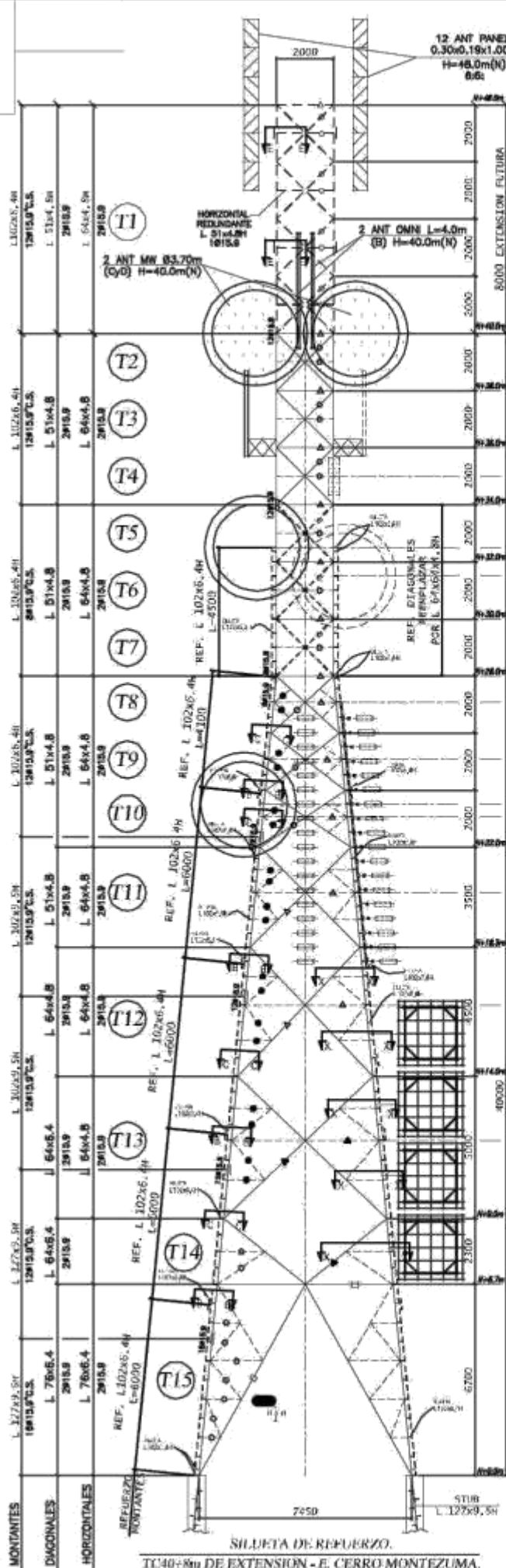


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FAX: 57 (1) 2740536.

Job: **DIAGRAMA DE ESFUERZOS-TC40+10m EXT. PATA 7.45m - V=120KPH**  
EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA).  
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.  
TIA/EIA-222-F  
Path:  
Drawn by: Ing. C. Londoño M.  
App'd:  
Scale: NTS  
Dwg No. E-8



***CONDICION NUEVA (FUTURA)+REFUERZO.  
ESTACION: CERRÓ MONTEZUMA.***







<b><i>RISATower</i></b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 1 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

SALIDA 3 – CONDICION NUEVA (FUTURA) + REFUERZO.

## Tower Input Data

The main tower is a 4x free standing tower with an overall height of 48.0000 m above the ground line. The base of the tower is set at an elevation of 0.0000 m above the ground line.

The face width of the tower is 2.0000 m at the top and 7.4500 m at the base. This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 120 kph.

Deflections calculated using a wind speed of 60 kph.

Weld together tower sections have flange connections.

Connections use galvanized A-394 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards. Welds are fabricated with ER-70S-6 electrodes.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

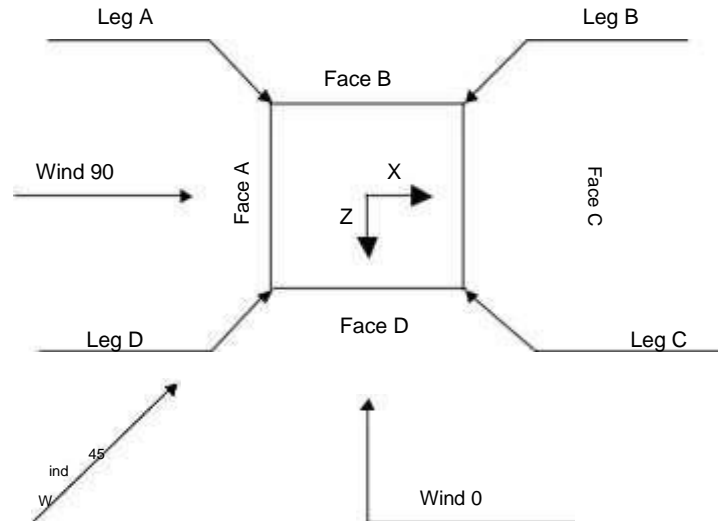
Stress ratio used in tower member design is 1.333.

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

## Options

Consider Moments - Legs	√ Distribute Leg Loads As Uniform	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	√ Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 2 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.



### Square To wer

## Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	m			m		m
T1	48.0000-40.0000			2.0000	1	8.0000
T2	40.0000-38.0000			2.0000	1	2.0000
T3	38.0000-36.0000			2.0000	1	2.0000
T4	36.0000-34.0000			2.0000	1	2.0000
T5	34.0000-32.0000			2.0000	1	2.0000
T6	32.0000-30.0000			2.0000	1	2.0000
T7	30.0000-28.0000			2.0000	1	2.0000
T8	28.0000-26.0000			2.0000	1	2.0000
T9	26.0000-24.0000			2.3890	1	2.0000
T10	24.0000-22.0000			2.7790	1	2.0000
T11	22.0000-18.5000			3.1680	1	3.5000
T12	18.5000-14.0000			3.8490	1	4.5000
T13	14.0000-9.0000			4.7250	1	5.0000
T14	9.0000-6.7000			5.6980	1	2.3000
T15	6.7000-0.0000			6.1460	1	6.7000



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### Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	m	m				mm	mm
T1	48.0000-40.0000	2.0000	X Brace	No	No	0	0
T2	40.0000-38.0000	2.0000	X Brace	No	No	0	0
T3	38.0000-36.0000	2.0000	X Brace	No	No	0	0
T4	36.0000-34.0000	2.0000	X Brace	No	No	0	0
T5	34.0000-32.0000	2.0000	X Brace	No	No	0	0
T6	32.0000-30.0000	2.0000	X Brace	No	No	0	0
T7	30.0000-28.0000	2.0000	X Brace	No	No	0	0
T8	28.0000-26.0000	2.0000	X Brace	No	No	0	0
T9	26.0000-24.0000	2.0000	X Brace	No	No	0	0
T10	24.0000-22.0000	2.0000	X Brace	No	No	0	0
T11	22.0000-18.5000	3.5000	X Brace	No	No	0	0
T12	18.5000-14.0000	4.5000	X Brace	No	No	0	0
T13	14.0000-9.0000	5.0000	X Brace	No	No	0	0
T14	9.0000-6.7000	2.3000	K Brace Up	No	Yes	0	0
T15	6.7000-0.0000	6.7000	K Brace Down	No	Yes	0	0

### Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
m						
T1	Equal Angle	L102x102x6	A572-50	Equal Angle	L51x51x5	A36
48.0000-40.0000			(345 MPa)			(248 MPa)
T2	Equal Angle	L102x102x6	A572-50	Equal Angle	L51x51x5	A36
40.0000-38.0000			(345 MPa)			(248 MPa)
T3	Equal Angle	L102x102x6	A572-50	Equal Angle	L51x51x5	A36
38.0000-36.0000			(345 MPa)			(248 MPa)
T4	Equal Angle	L102x102x6	A572-50	Equal Angle	L51x51x5	A36
36.0000-34.0000			(345 MPa)			(248 MPa)
T5	Arbitrary Shape	L102x6+L102x6	A572-50	Equal Angle	L64x64x5	A36
34.0000-32.0000			(345 MPa)			(248 MPa)
T6	Arbitrary Shape	L102x6+L102x6	A572-50	Equal Angle	L64x64x5	A36
32.0000-30.0000			(345 MPa)			(248 MPa)
T7	Arbitrary Shape	L102x6+L102x6	A572-50	Equal Angle	L64x64x5	A36
30.0000-28.0000			(345 MPa)			(248 MPa)
T8	Arbitrary Shape	L102x6+L102x6	A572-50	Equal Angle	L51x51x5	A36
28.0000-26.0000			(345 MPa)			(248 MPa)
T9	Arbitrary Shape	L102x6+L102x6	A572-50	Equal Angle	L51x51x5	A36
26.0000-24.0000			(345 MPa)			(248 MPa)
T10	Arbitrary Shape	L102x6+L102x6	A572-50	Equal Angle	L51x51x5	A36
24.0000-22.0000			(345 MPa)			(248 MPa)
T11	Arbitrary Shape	L102x10+L102x6	A572-50	Equal Angle	L64x64x5	A36
22.0000-18.5000			(345 MPa)			(248 MPa)
T12	Arbitrary Shape	L102x10+L102x6	A572-50	Equal Angle	L64x64x5	A36
18.5000-14.0000			(345 MPa)			(248 MPa)
T13	Arbitrary Shape	L102x10+L102x6	A572-50	Equal Angle	L64x64x6	A36
14.0000-9.0000			(345 MPa)			(248 MPa)
T14	Arbitrary Shape	L127x10+L102x6	A572-50	Equal Angle	L64x64x6	A36
9.0000-6.7000			(345 MPa)			(248 MPa)
T15	Arbitrary Shape	L127x10+L102x6	A572-50	Equal Angle	L76x76x6	A36
6.7000-0.0000			(345 MPa)			(248 MPa)

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 4 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### Tower Section Geometry (cont'd)

Tower Elevation m	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 48.0000-40.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T2 40.0000-38.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T3 38.0000-36.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T4 36.0000-34.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T5 34.0000-32.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T6 32.0000-30.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T7 30.0000-28.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)
T8 28.0000-26.0000	Equal Angle	L64x64x5	A36 (248 MPa)	Solid Round		A572-50 (345 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation m	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T14 9.0000-6.7000	None	Flat Bar		A36 (248 MPa)	Solid Round	8	A36 (248 MPa)
T15 6.7000-0.0000	None	Flat Bar		A36 (248 MPa)	Equal Angle	L76x76x6	A36 (248 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation m	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 48.0000-40.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T2 40.0000-38.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T3 38.0000-36.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T4 36.0000-34.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T5 34.0000-32.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T6 32.0000-30.0000	Solid Round		A572-50 (345 MPa)	Equal Angle	L64x64x5	A36 (248 MPa)
T7	Solid Round		A572-50	Equal Angle	L64x64x5	A36

<b><i>RISA</i>Tower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 5 of 57
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Tower Elevation	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
<i>m</i>						
30.0000-28.0000			(345 MPa)			(248 MPa)
T8	Solid Round		A572-50	Equal Angle	L64x64x5	A36
28.0000-26.0000			(345 MPa)			(248 MPa)
T14	Solid Round		A572-50	Equal Angle	L64x64x6	A36
9.0000-6.7000			(345 MPa)			(248 MPa)
T15	Solid Round		A572-50	Equal Angle	L64x64x6	A36
6.7000-0.0000			(345 MPa)			(248 MPa)

### Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_f$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals mm	Double Angle Stitch Bolt Spacing Horizontals mm
<i>m</i>	<i>m²</i>	<i>mm</i>						
T1	0.0000	0	A36	1.1	1	1.5	0	0
48.0000-40.0000			(248 MPa)					
T2	0.0000	0	A36	1.1	1	1.5	0	0
40.0000-38.0000			(248 MPa)					
T3	0.0000	0	A36	1.1	1	1.5	0	0
38.0000-36.0000			(248 MPa)					
T4	0.0000	0	A36	1.1	1	1.5	0	0
36.0000-34.0000			(248 MPa)					
T5	0.0000	0	A36	1.1	1	1.5	0	0
34.0000-32.0000			(248 MPa)					
T6	0.0000	0	A36	1.1	1	1.5	0	0
32.0000-30.0000			(248 MPa)					
T7	0.0000	0	A36	1.3	1	1.5	0	0
30.0000-28.0000			(248 MPa)					
T8	0.0000	0	A36	1.3	1	1.5	0	0
28.0000-26.0000			(248 MPa)					
T9	0.0000	0	A36	1.3	1	1.5	0	0
26.0000-24.0000			(248 MPa)					
T10	0.0000	0	A36	1.3	1	1.5	0	0
24.0000-22.0000			(248 MPa)					
T11	0.0000	0	A36	1.5	1	1.5	0	0
22.0000-18.5000			(248 MPa)					
T12	0.0000	0	A36	1.5	1	1.5	0	0
18.5000-14.0000			(248 MPa)					
T13	0.0000	0	A36	1.5	1	1.5	0	0
14.0000-9.0000			(248 MPa)					
0								
T14	0.0000	0	A36	1.5	1	1.5	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 6 of 57
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Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals mm	Double Angle Stitch Bolt Spacing Horizontals mm
m	m <sup>2</sup>	mm						
9.0000-6.7000			(248 MPa)					
T15	0.0000	0	A36	1.5	1	1.5	0	0
6.7000-0.0000			(248 MPa)					

## Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors <sup>1</sup>							
			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	No	No	0.5	1	1	1	1	1	1	1
48.0000-40.0000				1	1	1	1	1	1	1
T2	No	No	0.5	1	1	1	1	1	1	1
40.0000-38.0000				1	1	1	1	1	1	1
T3	No	No	0.5	1	1	1	1	1	1	1
38.0000-36.0000				1	1	1	1	1	1	1
T4	No	No	0.5	1	1	1	1	1	1	1
36.0000-34.0000				1	1	1	1	1	1	1
T5	No	No	0.5	1	1	1	1	1	1	1
34.0000-32.0000				1	1	1	1	1	1	1
T6	No	No	0.5	1	1	1	1	1	1	1
32.0000-30.0000				1	1	1	1	1	1	1
T7	No	No	0.5	1	1	1	1	1	1	1
30.0000-28.0000				1	1	1	1	1	1	1
T8	No	No	0.5	1	1	1	1	1	1	1
28.0000-26.0000				0.25	1	1	1	1	1	0.5
T9	No	No	0.5	1	1	1	1	1	1	1
26.0000-24.0000				0.25	1	1	1	1	1	1
T10	No	No	0.5	0.5	1	1	1	1	1	1
24.0000-22.0000				0.25	1	1	1	1	1	1
T11	No	No	0.25	0.5	1	1	1	1	1	1
22.0000-18.5000				0.25	1	1	1	1	1	1
T12	No	No	0.25	0.5	1	1	1	1	1	1
18.5000-14.0000				0.25	1	1	1	1	1	1
T13	No	No	0.25	1	1	1	1	1	1	1
14.0000-9.0000				0.25	1	1	1	1	1	1
T14	No	No	0.5	1	0.5	1	1	1	1	1
9.0000-6.7000				1	0.5	1	1	1	1	1
T15	No	No	0.2	1	0.4	1	1	1	1	0.5
6.7000-0.0000				1	0.33	1	1	0.5	1	0.5

<sup>1</sup>Note: 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.

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 7 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tower Section Geometry (cont'd)

Tower Elevation m	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 48.0000-40.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T2 40.0000-38.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T3 38.0000-36.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T4 36.0000-34.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T5 34.0000-32.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T6 32.0000-30.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T7 30.0000-28.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T8 28.0000-26.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T9 26.0000-24.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T10 24.0000-22.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T11 22.0000-18.50 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T12 18.5000-14.00 00	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T13 14.0000-9.000 0	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T14 9.0000-6.7000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T15 6.7000-0.0000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75

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## Tower Section Geometry (cont'd)

Tower Elevation m	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 48.0000-40.00 00	Sleeve SS	16 A394T0	8	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T2 40.0000-38.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T3 38.0000-36.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T4 36.0000-34.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T5 34.0000-32.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T6 32.0000-30.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T7 30.0000-28.00 00	Sleeve SS	16 A394T0	8	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T8 28.0000-26.00 00	Sleeve SS	16 A394T0	8	16 A394T0	2	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T9 26.0000-24.00 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T10 24.0000-22.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T11 22.0000-18.50 00	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T12 18.5000-14.00 00	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T13 14.0000-9.000 0	Sleeve SS	16 A394T0	12	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T14 9.0000-6.7000	Sleeve SS	16 A394T0	0	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	0
T15 6.7000-0.0000	Sleeve SS	16 A394T0	16	16 A394T0	2	16 A394T0	0	16 A394T0	0	16 A394T0	0	16 A394T0	2	16 A394T0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 9 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement m	Total Number	Number Per Row	Clear Spacing mm	Width or Diameter mm	Perimeter mm	Weight kg/m
1/2 (2 ANT OMNI E)	D	No	Ar (CfAe)	36.0000 - 0.0000	2	2	15	15		0.37
7/8 (1 ANT RF E)	D	No	Ar (CfAe)	35.0000 - 0.0000	1	1	28	28		0.80
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	32.5000 - 0.0000	1	1	28	28		0.80
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	31.5000 - 0.0000	1	1	28	28		0.80
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	26.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	24.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	22.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	20.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	18.0000 - 0.0000	2	2	15	15		0.37
1/2 (2 ANT GRILLA E)	D	No	Ar (CfAe)	15.5000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	13.0000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	10.5000 - 0.0000	1	1	15	15		0.37
1/2 (1 ANT GRILLA E)	D	No	Ar (CfAe)	8.0000 - 0.0000	1	1	15	15		0.37
7/8 (1 ANT MW E)	D	No	Ar (CfAe)	23.5000 - 0.0000	1	1	28	28		0.80
7/8 (2 ANT MW N)	D	No	Ar (CfAe)	40.0000 - 0.0000	2	2	28	28		0.80
7/8 (2 ANT OMNI N)	D	No	Ar (CfAe)	40.0000 - 0.0000	2	2	28	28		0.80
3 (6 ANT PANEL)	D	No	Ar (CfAe)	48.0000 - 0.0000	3	3	76	76		2.65
3 (6 ANT PANEL)	D	No	Ar (CfAe)	45.0000 - 0.0000	3	3	76	76		2.65

## Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation m	Face	AR m	AF m	CAA In Face m	CAA Out Face m	Weight kg
T1	48.0000-40.0000	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
		D	2.982	0.000	0.000	0.000	103.31
T2	40.0000-38.0000	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
		D	1.143	0.000	0.000	0.000	38.22
T3	38.0000-36.0000	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
		D	1.143	0.000	0.000	0.000	38.22

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Tower Section	Tower Elevation m	Face	AR m <sup>2</sup>	AF m <sup>2</sup>	CAA In Face m <sup>2</sup>	CAA Out Face m <sup>2</sup>	Weight kg
T4	36.0000-34.0000	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
		D	1.230	0.000	0.000	0.000	40.51
T5	34.0000-32.0000	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
		D	1.272	0.000	0.000	0.000	41.71
T6	32.0000-30.0000	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
		D	1.357	0.000	0.000	0.000	44.12
T7	30.0000-28.0000	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
		D	1.371	0.000	0.000	0.000	44.53
T8	28.0000-26.0000	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
		D	1.371	0.000	0.000	0.000	44.53
T9	26.0000-24.0000	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
		D	1.430	0.000	0.000	0.000	46.01
T10	24.0000-22.0000	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
		D	1.531	0.000	0.000	0.000	48.71
T11	22.0000-18.5000	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
		D	2.852	0.000	0.000	0.000	89.66
T12	18.5000-14.0000	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
		D	3.882	0.000	0.000	0.000	120.73
T13	14.0000-9.0000	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
		D	4.460	0.000	0.000	0.000	137.84
T14	9.0000-6.7000	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
		D	2.101	0.000	0.000	0.000	64.66
T15	6.7000-0.0000	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
		D	6.164	0.000	0.000	0.000	189.44

## Feed Line Center of Pressure

Section	Elevation	CPX	CPZ	CPX Ice	CPZ Ice
	m	mm	mm	mm	mm
T1	48.0000-40.0000	0	200	0	200
T2	40.0000-38.0000	0	253	0	253
T3	38.0000-36.0000	0	253	0	253
T4	36.0000-34.0000	0	267	0	267



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Section	Elevation	CPX	CPZ	CPX Ice	CPZ Ice
	m	mm	mm	mm	mm
T5	34.0000-32.0000	0	397	0	397
T6	32.0000-30.0000	0	413	0	413
T7	30.0000-28.0000	0	375	0	375
T8	28.0000-26.0000	0	442	0	442
T9	26.0000-24.0000	0	611	0	611
T10	24.0000-22.0000	0	690	0	690
T11	22.0000-18.5000	0	779	0	779
T12	18.5000-14.0000	0	989	0	989
T13	14.0000-9.0000	0	1190	0	1190
T14	9.0000-6.7000	0	1295	0	1295
T15	6.7000-0.0000	0	1333	0	1333

## User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle		Weight	F <sub>x</sub>	F <sub>z</sub>	Wind Force	C <sub>AAC</sub>
	m	m	°		kg	kg	kg	kg	m <sup>2</sup>
C x MANTENIMIENTO	40.0000	0.0000	0.0000	No Ice	320.00	0.00	0.00	0.00	0.0000
				Service	320.00	0.00	0.00	0.00	0.0000
1 SOP. ANT MW (E)	32.5000	0.0000	0.0000	No Ice	150.00	20.00	-20.00	0.00	0.0000
				Service	150.00	5.00	-5.00	0.00	0.0000
1 SOP. ANT MW (E)	31.5000	0.0000	0.0000	No Ice	150.00	20.00	-20.00	0.00	0.0000
				Service	150.00	5.00	-5.00	0.00	0.0000
1 SOP. ANT MW (E)	23.5000	0.0000	0.0000	No Ice	150.00	20.00	-20.00	0.00	0.0000
				Service	150.00	5.00	-5.00	0.00	0.0000
(2) SOP. ANT OMNI (E)	36.0000	0.0000	0.0000	No Ice	20.00	0.00	0.00	0.00	0.0000
				Service	20.00	0.00	0.00	0.00	0.0000

## Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C <sub>A</sub> A <sub>Front</sub>	C <sub>A</sub> A <sub>Side</sub>	Weight
			m m m	°	m		m <sup>2</sup>	m <sup>2</sup>	kg
ANT OMNI L=4.0m (1E)	B	From Leg	1.5000 0.0000 0.0000	0.0000	36.0000	No Ice	1.3000	0.5500	60.00
ANT OMNI L=4.0m (1E)	D	From Leg	1.5000 0.0000 0.0000	0.0000	36.0000	No Ice	1.3000	0.5500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.0000 0.0000 0.0000	0.0000	26.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.6500 0.0000 0.0000	0.0000	24.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.5000 0.0000 0.0000	0.0000	22.0000	No Ice	0.6000	0.0500	60.00

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		CAA Front m <sup>2</sup>	CAA Side m <sup>2</sup>	Weight kg
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.1500 0.0000 0.0000	0.0000	20.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Leg	0.0000 0.0000 0.0000	0.0000	18.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	26.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	24.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	22.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	20.0000	No Ice	0.6000	0.0500	60.00
(2) 1 ANT TV 1.20x1.20m (2E)	B	From Face	0.0000 0.0000 0.0000	0.0000	18.0000	No Ice	0.6000	0.0500	60.00
ANT RF 0.30x1.30m (1E)	B	From Leg	0.8000 0.0000 0.0000	0.0000	35.0000	No Ice	0.3900	0.1950	15.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	15.5000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	13.0000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	10.5000	No Ice	1.2000	0.1500	110.00
ANT GRILLA TV (2.25x2.25m) (1E)	C	From Leg	0.0000 0.0000 0.0000	0.0000	8.0000	No Ice	1.2000	0.1500	110.00
ANT OMNI L=4.0m (1N)	B	From Face	0.0000 -0.3000 0.0000	0.0000	40.0000	No Ice	1.3000	0.5500	60.00
ANT OMNI L=4.0m (1N)	B	From Face	0.0000 0.3000 0.0000	0.0000	40.0000	No Ice	1.3000	0.5500	60.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	50.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 0.30x0.30m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	50.5000	No Ice	0.0900	0.0300	12.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	49.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	49.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	48.5000	No Ice	0.5000	0.2000	20.00

<b><i>RISATower</i></b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 13 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		CAA Front m <sup>2</sup>	CAA Side m <sup>2</sup>	Weight kg
ANT PANEL 1.0x0.50x0.19m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	48.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	47.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	47.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	46.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	46.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	C	From Leg	1.0000 0.0000 0.0000	0.0000	45.5000	No Ice	0.5000	0.2000	20.00
ANT PANEL 1.0x0.50x0.19m (1N)	D	From Leg	1.0000 0.0000 0.0000	0.0000	45.5000	No Ice	0.5000	0.2000	20.00

## Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	3 dB Beam Width °	Elevation m	Outside Diameter m		Aperture Area m <sup>2</sup>	Weight kg
HP12-21B (1 ANT MW Ø3.70m E)	D	Paraboloid w/Shroud (HP)	From Leg	0.6000 0.0000 0.0000	Worst		33.0000	3.6576	No Ice	10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m E)	B	Paraboloid w/Shroud (HP)	From Leg	0.3000 0.0000 0.0000	Worst		32.0000	3.6576	No Ice	10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m E)	D	Paraboloid w/Shroud (HP)	From Leg	0.3000 0.0000 0.0000	Worst		23.5000	3.6576	No Ice	10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m N)	C	Paraboloid w/Shroud (HP)	From Leg	0.6000 0.0000 0.0000	Worst		40.0000	3.6576	No Ice	10.5064	385.55
HP12-21B (1 ANT MW Ø3.70m N)	D	Paraboloid w/Shroud (HP)	From Leg	0.6000 0.0000 0.0000	Worst		40.0000	3.6576	No Ice	10.5064	385.55

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 14 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tower Pressures - No Ice

$$GH = 1.130$$

Section Elevation  m	z  m	$K_z$  	$q_z$  MPa	$A_G$  m	F a c e	$A_F$  m	$A_R$  m	$A_{leg}$  m	Leg %  	$C_{A^*A}$ In Face m	$C_{A^*A}$ Out Face m
T1 48.0000-40.00 00	44.0000	1.524	0.00	16.449	A	3.121	0.000	1.626	52.09	0.000	0.000
					B	3.121	0.000		52.09	0.000	0.000
					C	3.121	0.000		52.09	0.000	0.000
					D	3.121	2.982		26.64	0.000	0.000
T2 40.0000-38.00 00	39.0000	1.473	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T3 38.0000-36.00 00	37.0000	1.451	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T4 36.0000-34.00 00	35.0000	1.428	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.230		19.26	0.000	0.000
T5 34.0000-32.00 00	33.0000	1.404	0.00	4.204	A	0.508	0.000	0.000	0.00	0.000	0.000
					B	0.508	0.000		0.00	0.000	0.000
					C	0.508	0.000		0.00	0.000	0.000
					D	0.508	1.272		0.00	0.000	0.000
T6 32.0000-30.00 00	31.0000	1.379	0.00	4.204	A	0.508	0.000	0.000	0.00	0.000	0.000
					B	0.508	0.000		0.00	0.000	0.000
					C	0.508	0.000		0.00	0.000	0.000
					D	0.508	1.357		0.00	0.000	0.000
T7 30.0000-28.00 00	29.0000	1.353	0.00	4.204	A	0.600	0.000	0.000	0.00	0.000	0.000
					B	0.600	0.000		0.00	0.000	0.000
					C	0.600	0.000		0.00	0.000	0.000
					D	0.600	1.371		0.00	0.000	0.000
T8 28.0000-26.00 00	27.0000	1.326	0.00	4.594	A	0.531	0.000	0.000	0.00	0.000	0.000
					B	0.531	0.000		0.00	0.000	0.000
					C	0.531	0.000		0.00	0.000	0.000
					D	0.531	1.371		0.00	0.000	0.000
T9 26.0000-24.00 00	25.0000	1.297	0.00	5.373	A	0.415	0.000	0.000	0.00	0.000	0.000
					B	0.415	0.000		0.00	0.000	0.000
					C	0.415	0.000		0.00	0.000	0.000
					D	0.415	1.430		0.00	0.000	0.000
T10 24.0000-22.00 00	23.0000	1.267	0.00	6.152	A	0.458	0.000	0.000	0.00	0.000	0.000
					B	0.458	0.000		0.00	0.000	0.000
					C	0.458	0.000		0.00	0.000	0.000
					D	0.458	1.531		0.00	0.000	0.000
T11 22.0000-18.50 00	20.2500	1.221	0.00	12.638	A	0.919	0.000	0.000	0.00	0.000	0.000
					B	0.919	0.000		0.00	0.000	0.000
					C	0.919	0.000		0.00	0.000	0.000
					D	0.919	2.852		0.00	0.000	0.000
T12 18.5000-14.00 00	16.2500	1.147	0.00	19.753	A	1.159	0.000	0.000	0.00	0.000	0.000
					B	1.159	0.000		0.00	0.000	0.000
					C	1.159	0.000		0.00	0.000	0.000
					D	1.159	3.882		0.00	0.000	0.000
T13 14.0000-9.000 0	11.5000	1.039	0.00	26.570	A	1.352	0.000	0.000	0.00	0.000	0.000
					B	1.352	0.000		0.00	0.000	0.000
					C	1.352	0.000		0.00	0.000	0.000
					D	1.352	4.460		0.00	0.000	0.000

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 15 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation  m	z  m	KZ	qz  MPa	AG  m	F a c e	AF  m	AR  m	A <sub>leg</sub>  m	Leg %	CAAA In Face m	CAAA Out Face m
T14 9.0000-6.7000	7.8500	1	0.00	13.914	A	0.686	0.000	0.000	0.00	0.000	0.000
					B	0.686	0.000		0.00	0.000	0.000
					C	0.686	0.000		0.00	0.000	0.000
					D	0.686	2.101		0.00	0.000	0.000
T15 6.7000-0.0000	3.3500	1	0.00	46.402	A	2.417	0.000	0.000	0.00	0.000	0.000
					B	2.417	0.000		0.00	0.000	0.000
					C	2.417	0.000		0.00	0.000	0.000
					D	2.417	6.164		0.00	0.000	0.000

## Tower Pressure - Service

$$GH = 1.130$$

Section Elevation  m	z  m	KZ	qz  MPa	AG  m²	F a c e	AF  m²	AR  m²	A <sub>leg</sub>  m²	Leg %	CAAA In Face m²	CAAA Out Face m²
T1 48.0000-40.0000	44.0000	1.524	0.00	16.449	A	3.121	0.000	1.626	52.09	0.000	0.000
					B	3.121	0.000		52.09	0.000	0.000
					C	3.121	0.000		52.09	0.000	0.000
					D	3.121	2.982		26.64	0.000	0.000
T2 40.0000-38.0000	39.0000	1.473	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T3 38.0000-36.0000	37.0000	1.451	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.143		20.09	0.000	0.000
T4 36.0000-34.0000	35.0000	1.428	0.00	4.112	A	0.880	0.000	0.406	46.20	0.000	0.000
					B	0.880	0.000		46.20	0.000	0.000
					C	0.880	0.000		46.20	0.000	0.000
					D	0.880	1.230		19.26	0.000	0.000
T5 34.0000-32.0000	33.0000	1.404	0.00	4.204	A	0.508	0.000	0.000	0.00	0.000	0.000
					B	0.508	0.000		0.00	0.000	0.000
					C	0.508	0.000		0.00	0.000	0.000
					D	0.508	1.272		0.00	0.000	0.000
T6 32.0000-30.0000	31.0000	1.379	0.00	4.204	A	0.508	0.000	0.000	0.00	0.000	0.000
					B	0.508	0.000		0.00	0.000	0.000
					C	0.508	0.000		0.00	0.000	0.000
					D	0.508	1.357		0.00	0.000	0.000
T7 30.0000-28.0000	29.0000	1.353	0.00	4.204	A	0.600	0.000	0.000	0.00	0.000	0.000
					B	0.600	0.000		0.00	0.000	0.000
					C	0.600	0.000		0.00	0.000	0.000
					D	0.600	1.371		0.00	0.000	0.000
T8 28.0000-26.0000	27.0000	1.326	0.00	4.594	A	0.531	0.000	0.000	0.00	0.000	0.000
					B	0.531	0.000		0.00	0.000	0.000
					C	0.531	0.000		0.00	0.000	0.000
					D	0.531	1.371		0.00	0.000	0.000
T9 26.0000-24.0000	25.0000	1.297	0.00	5.373	A	0.415	0.000	0.000	0.00	0.000	0.000
					B	0.415	0.000		0.00	0.000	0.000
					C	0.415	0.000		0.00	0.000	0.000
					D	0.415	1.430		0.00	0.000	0.000
T10 24.0000-22.0000	23.0000	1.267	0.00	6.152	A	0.458	0.000	0.000	0.00	0.000	0.000
					B	0.458	0.000		0.00	0.000	0.000
					C	0.458	0.000		0.00	0.000	0.000

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Section Elevation  m	z  m	KZ	qz  MPa	AG  m	F a c e	AF  m	AR  m <sup>2</sup>	A <sub>leg</sub>  m	Leg %	CAA In Face m	CAA Out Face m
T11 22.0000-18.50 00	20.2500	1.221	0.00	12.638	D	0.458	1.531		0.00	0.000	0.000
					A	0.919	0.000	0.000	0.00	0.000	0.000
					B	0.919	0.000		0.00	0.000	0.000
					C	0.919	0.000		0.00	0.000	0.000
					D	0.919	2.852		0.00	0.000	0.000
T12 18.5000-14.00 00	16.2500	1.147	0.00	19.753	A	1.159	0.000	0.000	0.00	0.000	0.000
					B	1.159	0.000		0.00	0.000	0.000
					C	1.159	0.000		0.00	0.000	0.000
					D	1.159	3.882		0.00	0.000	0.000
T13 14.0000-9.000 0	11.5000	1.039	0.00	26.570	A	1.352	0.000	0.000	0.00	0.000	0.000
					B	1.352	0.000		0.00	0.000	0.000
					C	1.352	0.000		0.00	0.000	0.000
					D	1.352	4.460		0.00	0.000	0.000
T14 9.0000-6.7000	7.8500	1	0.00	13.914	A	0.686	0.000	0.000	0.00	0.000	0.000
					B	0.686	0.000		0.00	0.000	0.000
					C	0.686	0.000		0.00	0.000	0.000
					D	0.686	2.101		0.00	0.000	0.000
T15 6.7000-0.0000	3.3500	1	0.00	46.402	A	2.417	0.000	0.000	0.00	0.000	0.000
					B	2.417	0.000		0.00	0.000	0.000
					C	2.417	0.000		0.00	0.000	0.000
					D	2.417	6.164		0.00	0.000	0.000

### Tower Forces - No Ice - Wind Normal To Face

Section Elevation  m	Add Weight  kg	Self Weight  kg	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>  m <sup>2</sup>	F  kg	w  kg/m	Ctrl. Face
T1 48.0000-40.00 00	103.31	585.13	A	0.19	3.025	0.588	1	1	3.121	1421.96	177.75	D
			B	0.19	3.025	0.588	1	1	3.121			
			C	0.19	3.025	0.588	1	1	3.121			
			D	0.371	2.362	0.64	1	1	5.030			
T2 40.0000-38.00 00	38.22	216.46	A	0.214	2.921	0.593	1	1	0.880	399.50	199.75	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T3 38.0000-36.00 00	38.22	216.46	A	0.214	2.921	0.593	1	1	0.880	393.54	196.77	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T4 36.0000-34.00 00	40.51	216.46	A	0.214	2.921	0.593	1	1	0.880	396.63	198.31	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.513	2.026	0.704	1	1	1.746			
T5 34.0000-32.00 00	41.71	248.60	A	0.121	3.346	0.577	1	1	0.508	330.11	165.06	D
			B	0.121	3.346	0.577	1	1	0.508			
			C	0.121	3.346	0.577	1	1	0.508			
			D	0.423	2.219	0.661	1	1	1.349			
T6 32.0000-30.00 00	44.12	248.60	A	0.121	3.346	0.577	1	1	0.508	333.09	166.55	D
			B	0.121	3.346	0.577	1	1	0.508			
			C	0.121	3.346	0.577	1	1	0.508			
			D	0.444	2.17	0.67	1	1	1.417			
T7 30.0000-28.00 00	44.53	248.60	A	0.143	3.24	0.58	1	1	0.600	344.70	172.35	D
			B	0.143	3.24	0.58	1	1	0.600			
			C	0.143	3.24	0.58	1	1	0.600			
			D	0.469	2.113	0.682	1	1	1.535			
T8	44.53	222.85	A	0.116	3.371	0.577	1	1	0.531	334.58	167.29	D

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 17 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	CF	RR	DF	DR	AE m	F kg	w kg/m	Ctrl. Face
28.0000-26.0000			B	0.116	3.371	0.577	1	1	0.531			
			C	0.116	3.371	0.577	1	1	0.531			
			D	0.414	2.243	0.657	1	1	1.433			
T9	46.01	142.22	A	0.077	3.568	0.573	1	1	0.415	327.90	163.95	D
26.0000-24.0000			B	0.077	3.568	0.573	1	1	0.415			
			C	0.077	3.568	0.573	1	1	0.415			
			D	0.343	2.445	0.63	1	1	1.316			
T10	48.71	155.93	A	0.074	3.583	0.573	1	1	0.458	352.62	176.31	D
24.0000-22.0000			B	0.074	3.583	0.573	1	1	0.458			
			C	0.074	3.583	0.573	1	1	0.458			
			D	0.323	2.511	0.623	1	1	1.412			
T11	89.66	272.27	A	0.073	3.592	0.573	1	1	0.919	665.63	190.18	D
22.0000-18.5000			B	0.073	3.592	0.573	1	1	0.919			
			C	0.073	3.592	0.573	1	1	0.919			
			D	0.298	2.596	0.615	1	1	2.674			
T12	120.73	341.51	A	0.059	3.668	0.572	1	1	1.159	868.47	192.99	D
18.5000-14.0000			B	0.059	3.668	0.572	1	1	1.159			
			C	0.059	3.668	0.572	1	1	1.159			
			D	0.255	2.755	0.603	1	1	3.501			
T13	137.84	523.44	A	0.051	3.71	0.571	1	1	1.352	947.40	189.48	D
14.0000-9.0000			B	0.051	3.71	0.571	1	1	1.352			
			C	0.051	3.71	0.571	1	1	1.352			
			D	0.219	2.901	0.594	1	1	4.003			
T14	64.66	422.40	A	0.049	3.719	0.571	1	1	0.686	450.71	195.96	D
9.0000-6.7000			B	0.049	3.719	0.571	1	1	0.686			
			C	0.049	3.719	0.571	1	1	0.686			
			D	0.2	2.979	0.59	1	1	1.927			
T15	189.44	942.12	A	0.052	3.704	0.571	1	1	2.417	1444.07	215.53	D
6.7000-0.0000			B	0.052	3.704	0.571	1	1	2.417			
			C	0.052	3.704	0.571	1	1	2.417			
			D	0.185	3.046	0.587	1	1	6.038			
Sum Weight:	1092.19	5003.04						OTM	210009 kg-m	9010.90		

#### Tower Forces - No Ice - Wind 45 To Face

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	CF	RR	DF	DR	AE m	F kg	w kg/m	Ctrl. Face
T1	103.31	585.13	A	0.19	3.025	0.588	1.142	1.142	3.565	1706.36	213.29	D
48.0000-40.0000			B	0.19	3.025	0.588	1.142	1.142	3.565			
			C	0.19	3.025	0.588	1.142	1.142	3.565			
			D	0.371	2.362	0.64	1.2	1.2	6.036			
T2	38.22	216.46	A	0.214	2.921	0.593	1.16	1.16	1.021	479.40	239.70	D
40.0000-38.0000			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.492	2.066	0.693	1.2	1.2	2.007			
T3	38.22	216.46	A	0.214	2.921	0.593	1.16	1.16	1.021	472.24	236.12	D
38.0000-36.0000			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.492	2.066	0.693	1.2	1.2	2.007			
T4	40.51	216.46	A	0.214	2.921	0.593	1.16	1.16	1.021	475.95	237.98	D
36.0000-34.0000			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.513	2.026	0.704	1.2	1.2	2.095			

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 18 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T5 34.0000-32.00 00	41.71	248.60	A	0.121	3.346	0.577	1.091	1.091	0.554	396.14	198.07	D
			B	0.121	3.346	0.577	1.091	1.091	0.554			
			C	0.121	3.346	0.577	1.091	1.091	0.554			
			D	0.423	2.219	0.661	1.2	1.2	1.619			
T6 32.0000-30.00 00	44.12	248.60	A	0.121	3.346	0.577	1.091	1.091	0.554	399.71	199.86	D
			B	0.121	3.346	0.577	1.091	1.091	0.554			
			C	0.121	3.346	0.577	1.091	1.091	0.554			
			D	0.444	2.17	0.67	1.2	1.2	1.701			
T7 30.0000-28.00 00	44.53	248.60	A	0.143	3.24	0.58	1.107	1.107	0.664	413.64	206.82	D
			B	0.143	3.24	0.58	1.107	1.107	0.664			
			C	0.143	3.24	0.58	1.107	1.107	0.664			
			D	0.469	2.113	0.682	1.2	1.2	1.842			
T8 28.0000-26.00 00	44.53	222.85	A	0.116	3.371	0.577	1.087	1.087	0.578	401.50	200.75	D
			B	0.116	3.371	0.577	1.087	1.087	0.578			
			C	0.116	3.371	0.577	1.087	1.087	0.578			
			D	0.414	2.243	0.657	1.2	1.2	1.720			
T9 26.0000-24.00 00	46.01	142.22	A	0.077	3.568	0.573	1.058	1.058	0.439	393.49	196.74	D
			B	0.077	3.568	0.573	1.058	1.058	0.439			
			C	0.077	3.568	0.573	1.058	1.058	0.439			
			D	0.343	2.445	0.63	1.2	1.2	1.580			
T10 24.0000-22.00 00	48.71	155.93	A	0.074	3.583	0.573	1.056	1.056	0.483	423.14	211.57	D
			B	0.074	3.583	0.573	1.056	1.056	0.483			
			C	0.074	3.583	0.573	1.056	1.056	0.483			
			D	0.323	2.511	0.623	1.2	1.2	1.695			
T11 22.0000-18.50 00	89.66	272.27	A	0.073	3.592	0.573	1.055	1.055	0.969	798.75	228.21	D
			B	0.073	3.592	0.573	1.055	1.055	0.969			
			C	0.073	3.592	0.573	1.055	1.055	0.969			
			D	0.298	2.596	0.615	1.2	1.2	3.209			
T12 18.5000-14.00 00	120.73	341.51	A	0.059	3.668	0.572	1.044	1.044	1.210	1034.70	229.93	D
			B	0.059	3.668	0.572	1.044	1.044	1.210			
			C	0.059	3.668	0.572	1.044	1.044	1.210			
			D	0.255	2.755	0.603	1.191	1.191	4.171			
T13 14.0000-9.000 0	137.84	523.44	A	0.051	3.71	0.571	1.038	1.038	1.404	1102.83	220.57	D
			B	0.051	3.71	0.571	1.038	1.038	1.404			
			C	0.051	3.71	0.571	1.038	1.038	1.404			
			D	0.219	2.901	0.594	1.164	1.164	4.660			
T14 9.0000-6.7000	64.66	422.40	A	0.049	3.719	0.571	1.037	1.037	0.712	518.43	225.41	D
			B	0.049	3.719	0.571	1.037	1.037	0.712			
			C	0.049	3.719	0.571	1.037	1.037	0.712			
			D	0.2	2.979	0.59	1.15	1.15	2.217			
T15 6.7000-0.0000	189.44	942.12	A	0.052	3.704	0.571	1.039	1.039	2.512	1644.36	245.43	D
			B	0.052	3.704	0.571	1.039	1.039	2.512			
			C	0.052	3.704	0.571	1.039	1.039	2.512			
			D	0.185	3.046	0.587	1.139	1.139	6.876			
Sum Weight:	1092.19	5003.04						OTM	251026 kg-m	10660.63		

### Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T1 48.0000-40.00 00	103.31	585.13	A	0.19	3.025	0.588	1	1	3.121	355.49	44.44	D
			B	0.19	3.025	0.588	1	1	3.121			
			C	0.19	3.025	0.588	1	1	3.121			
			D	0.371	2.362	0.64	1	1	5.030			



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	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	F a c e	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T2 40.0000-38.00 00	38.22	216.46	A	0.214	2.921	0.593	1	1	0.880	99.88	49.94	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T3 38.0000-36.00 00	38.22	216.46	A	0.214	2.921	0.593	1	1	0.880	98.38	49.19	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.492	2.066	0.693	1	1	1.672			
T4 36.0000-34.00 00	40.51	216.46	A	0.214	2.921	0.593	1	1	0.880	99.16	49.58	D
			B	0.214	2.921	0.593	1	1	0.880			
			C	0.214	2.921	0.593	1	1	0.880			
			D	0.513	2.026	0.704	1	1	1.746			
T5 34.0000-32.00 00	41.71	248.60	A	0.121	3.346	0.577	1	1	0.508	82.53	41.26	D
			B	0.121	3.346	0.577	1	1	0.508			
			C	0.121	3.346	0.577	1	1	0.508			
			D	0.423	2.219	0.661	1	1	1.349			
T6 32.0000-30.00 00	44.12	248.60	A	0.121	3.346	0.577	1	1	0.508	83.27	41.64	D
			B	0.121	3.346	0.577	1	1	0.508			
			C	0.121	3.346	0.577	1	1	0.508			
			D	0.444	2.17	0.67	1	1	1.417			
T7 30.0000-28.00 00	44.53	248.60	A	0.143	3.24	0.58	1	1	0.600	86.17	43.09	D
			B	0.143	3.24	0.58	1	1	0.600			
			C	0.143	3.24	0.58	1	1	0.600			
			D	0.469	2.113	0.682	1	1	1.535			
T8 28.0000-26.00 00	44.53	222.85	A	0.116	3.371	0.577	1	1	0.531	83.65	41.82	D
			B	0.116	3.371	0.577	1	1	0.531			
			C	0.116	3.371	0.577	1	1	0.531			
			D	0.414	2.243	0.657	1	1	1.433			
T9 26.0000-24.00 00	46.01	142.22	A	0.077	3.568	0.573	1	1	0.415	81.98	40.99	D
			B	0.077	3.568	0.573	1	1	0.415			
			C	0.077	3.568	0.573	1	1	0.415			
			D	0.343	2.445	0.63	1	1	1.316			
T10 24.0000-22.00 00	48.71	155.93	A	0.074	3.583	0.573	1	1	0.458	88.15	44.08	D
			B	0.074	3.583	0.573	1	1	0.458			
			C	0.074	3.583	0.573	1	1	0.458			
			D	0.323	2.511	0.623	1	1	1.412			
T11 22.0000-18.50 00	89.66	272.27	A	0.073	3.592	0.573	1	1	0.919	166.41	47.54	D
			B	0.073	3.592	0.573	1	1	0.919			
			C	0.073	3.592	0.573	1	1	0.919			
			D	0.298	2.596	0.615	1	1	2.674			
T12 18.5000-14.00 00	120.73	341.51	A	0.059	3.668	0.572	1	1	1.159	217.12	48.25	D
			B	0.059	3.668	0.572	1	1	1.159			
			C	0.059	3.668	0.572	1	1	1.159			
			D	0.255	2.755	0.603	1	1	3.501			
T13 14.0000-9.000 0	137.84	523.44	A	0.051	3.71	0.571	1	1	1.352	236.85	47.37	D
			B	0.051	3.71	0.571	1	1	1.352			
			C	0.051	3.71	0.571	1	1	1.352			
			D	0.219	2.901	0.594	1	1	4.003			
T14 9.0000-6.7000	64.66	422.40	A	0.049	3.719	0.571	1	1	0.686	112.68	48.99	D
			B	0.049	3.719	0.571	1	1	0.686			
			C	0.049	3.719	0.571	1	1	0.686			
			D	0.2	2.979	0.59	1	1	1.927			
T15 6.7000-0.0000	189.44	942.12	A	0.052	3.704	0.571	1	1	2.417	361.02	53.88	D
			B	0.052	3.704	0.571	1	1	2.417			
			C	0.052	3.704	0.571	1	1	2.417			
			D	0.185	3.046	0.587	1	1	6.038			
Sum Weight:	1092.19	5003.04						OTM	52502 kg-m	2252.73		

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 20 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T1 48.0000-40.00	103.31	585.13	A	0.19	3.025	0.588	1.142	1.142	3.565	426.59	53.32	D
			B	0.19	3.025	0.588	1.142	1.142	3.565			
			C	0.19	3.025	0.588	1.142	1.142	3.565			
			D	0.371	2.362	0.64	1.2	1.2	6.036			
T2 40.0000-38.00	38.22	216.46	A	0.214	2.921	0.593	1.16	1.16	1.021	119.85	59.93	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.492	2.066	0.693	1.2	1.2	2.007			
T3 38.0000-36.00	38.22	216.46	A	0.214	2.921	0.593	1.16	1.16	1.021	118.06	59.03	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.492	2.066	0.693	1.2	1.2	2.007			
T4 36.0000-34.00	40.51	216.46	A	0.214	2.921	0.593	1.16	1.16	1.021	118.99	59.49	D
			B	0.214	2.921	0.593	1.16	1.16	1.021			
			C	0.214	2.921	0.593	1.16	1.16	1.021			
			D	0.513	2.026	0.704	1.2	1.2	2.095			
T5 34.0000-32.00	41.71	248.60	A	0.121	3.346	0.577	1.091	1.091	0.554	99.03	49.52	D
			B	0.121	3.346	0.577	1.091	1.091	0.554			
			C	0.121	3.346	0.577	1.091	1.091	0.554			
			D	0.423	2.219	0.661	1.2	1.2	1.619			
T6 32.0000-30.00	44.12	248.60	A	0.121	3.346	0.577	1.091	1.091	0.554	99.93	49.96	D
			B	0.121	3.346	0.577	1.091	1.091	0.554			
			C	0.121	3.346	0.577	1.091	1.091	0.554			
			D	0.444	2.17	0.67	1.2	1.2	1.701			
T7 30.0000-28.00	44.53	248.60	A	0.143	3.24	0.58	1.107	1.107	0.664	103.41	51.70	D
			B	0.143	3.24	0.58	1.107	1.107	0.664			
			C	0.143	3.24	0.58	1.107	1.107	0.664			
			D	0.469	2.113	0.682	1.2	1.2	1.842			
T8 28.0000-26.00	44.53	222.85	A	0.116	3.371	0.577	1.087	1.087	0.578	100.38	50.19	D
			B	0.116	3.371	0.577	1.087	1.087	0.578			
			C	0.116	3.371	0.577	1.087	1.087	0.578			
			D	0.414	2.243	0.657	1.2	1.2	1.720			
T9 26.0000-24.00	46.01	142.22	A	0.077	3.568	0.573	1.058	1.058	0.439	98.37	49.19	D
			B	0.077	3.568	0.573	1.058	1.058	0.439			
			C	0.077	3.568	0.573	1.058	1.058	0.439			
			D	0.343	2.445	0.63	1.2	1.2	1.580			
T10 24.0000-22.00	48.71	155.93	A	0.074	3.583	0.573	1.056	1.056	0.483	105.78	52.89	D
			B	0.074	3.583	0.573	1.056	1.056	0.483			
			C	0.074	3.583	0.573	1.056	1.056	0.483			
			D	0.323	2.511	0.623	1.2	1.2	1.695			
T11 22.0000-18.50	89.66	272.27	A	0.073	3.592	0.573	1.055	1.055	0.969	199.69	57.05	D
			B	0.073	3.592	0.573	1.055	1.055	0.969			
			C	0.073	3.592	0.573	1.055	1.055	0.969			
			D	0.298	2.596	0.615	1.2	1.2	3.209			
T12 18.5000-14.00	120.73	341.51	A	0.059	3.668	0.572	1.044	1.044	1.210	258.67	57.48	D
			B	0.059	3.668	0.572	1.044	1.044	1.210			
			C	0.059	3.668	0.572	1.044	1.044	1.210			
			D	0.255	2.755	0.603	1.191	1.191	4.171			
T13 14.0000-9.0000	137.84	523.44	A	0.051	3.71	0.571	1.038	1.038	1.404	275.71	55.14	D
			B	0.051	3.71	0.571	1.038	1.038	1.404			
			C	0.051	3.71	0.571	1.038	1.038	1.404			
			D	0.219	2.901	0.594	1.164	1.164	4.660			
T14 9.0000-6.7000	64.66	422.40	A	0.049	3.719	0.571	1.037	1.037	0.712	129.61	56.35	D
			B	0.049	3.719	0.571	1.037	1.037	0.712			

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 21 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section Elevation	Add Weight	Self Weight	Face	e	CF	RR	DF	DR	AE	F	w	Ctrl. Face
m	kg	kg							m	kg	kg/m	
T15 6.7000-0.0000	189.44	942.12	C	0.049	3.719	0.571	1.037	1.037	0.712			
			D	0.2	2.979	0.59	1.15	1.15	2.217			
			A	0.052	3.704	0.571	1.039	1.039	2.512	411.09	61.36	D
			B	0.052	3.704	0.571	1.039	1.039	2.512			
			C	0.052	3.704	0.571	1.039	1.039	2.512			
			D	0.185	3.046	0.587	1.139	1.139	6.876			
Sum Weight:	1092.19	5003.04						OTM	62756	2665.16		
									kg-m			

## Mast Vectors - No Ice

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	Vx kg	Vz kg	OTMx kg-m	OTMz kg-m	Torque kg-m
T1	48.0000-40.0000	0	Wind Normal	1421.96	0.00	-1421.96	-62459	0	0
		45	Wind 90	1706.36	1206.58	-1206.58	-52982	-53089	242
		90	Wind Normal	1421.96	1421.96	0.00	107	-62566	285
T2	40.0000-38.0000	0	Wind Normal	399.50	0.00	-399.50	-15541	0	0
		45	Wind 90	479.40	338.99	-338.99	-13181	-13221	86
		90	Wind Normal	399.50	399.50	0.00	40	-15581	101
T3	38.0000-36.0000	0	Wind Normal	393.54	0.00	-393.54	-14521	0	0
		45	Wind 90	472.24	333.93	-333.93	-12316	-12355	85
		90	Wind Normal	393.54	393.54	0.00	40	-14561	100
T4	36.0000-34.0000	0	Wind Normal	396.63	0.00	-396.63	-13840	0	0
		45	Wind 90	475.95	336.55	-336.55	-11737	-11779	90
		90	Wind Normal	396.63	396.63	0.00	42	-13882	106
T5	34.0000-32.0000	0	Wind Normal	330.11	0.00	-330.11	-10851	0	0
		45	Wind 90	396.14	280.11	-280.11	-9201	-9244	111
		90	Wind Normal	330.11	330.11	0.00	43	-10894	131
T6	32.0000-30.0000	0	Wind Normal	333.09	0.00	-333.09	-10280	0	0
		45	Wind 90	399.71	282.64	-282.64	-8716	-8762	117
		90	Wind Normal	333.09	333.09	0.00	46	-10326	137
T7	30.0000-28.0000	0	Wind Normal	344.70	0.00	-344.70	-9950	0	0
		45	Wind 90	413.64	292.49	-292.49	-8436	-8482	110
		90	Wind Normal	344.70	344.70	0.00	46	-9996	129
T8	28.0000-26.0000	0	Wind Normal	334.58	0.00	-334.58	-8984	0	0
		45	Wind 90	401.50	283.90	-283.90	-7615	-7665	125
		90	Wind Normal	334.58	334.58	0.00	50	-9034	148
T9	26.0000-24.0000	0	Wind Normal	327.90	0.00	-327.90	-8137	0	0
		45	Wind 90	393.49	278.24	-278.24	-6895	-6956	170
		90	Wind Normal	327.90	327.90	0.00	61	-8198	200
T10	24.0000-22.0000	0	Wind Normal	352.62	0.00	-352.62	-8036	0	0
		45	Wind 90	423.14	299.20	-299.20	-6808	-6882	206
		90	Wind Normal	352.62	352.62	0.00	74	-8110	243
T11	22.0000-18.5000	0	Wind Normal	665.63	0.00	-665.63	-13319	0	0
		45	Wind 90	798.75	564.80	-564.80	-11277	-11437	440
		90	Wind Normal	665.63	665.63	0.00	160	-13479	518
T12	18.5000-14.0000	0	Wind Normal	868.47	0.00	-868.47	-13850	0	0
		45	Wind 90	1034.70	731.64	-731.64	-11627	-11889	724
		90	Wind Normal	868.47	868.47	0.00	262	-14113	859
T13	14.0000-9.0000	0	Wind Normal	947.40	0.00	-947.40	-10532	0	0
		45	Wind 90	1102.83	779.82	-779.82	-8605	-8968	928
		90	Wind Normal	947.40	947.40	0.00	363	-10895	1127
T14	9.0000-6.7000	0	Wind Normal	450.71	0.00	-450.71	-3345	0	0
		45	Wind 90	518.43	366.59	-366.59	-2685	-2878	475
		90	Wind Normal	450.71	450.71	0.00	193	-3538	583
T15	6.7000-0.0000	0	Wind Normal	1444.07	0.00	-1444.07	-4189	0	0

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
		45	Wind 90	1644.36	1162.74	-1162.74	-3246	-3895	1550
		90	Wind Normal	1444.07	1444.07	0.00	649	-4838	1925

## Mast Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.00	-9010.90	-207834	0	0
45	7538.20	-7538.20	-175327	-177502	5457
90	9010.90	0.00	2175	-210009	6594

## Mast Vectors - Service

Section No.	Section Elevation m	Wind Azimuth °	Directionality	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
T1	48.0000-40.0000	0	Wind Normal	355.49	0.00	-355.49	-15534	0	0
		45	Wind 90	426.59	301.64	-301.64	-13165	-13272	60
		90	Wind Normal	355.49	355.49	0.00	107	-15642	71
T2	40.0000-38.0000	0	Wind Normal	99.88	0.00	-99.88	-3856	0	0
		45	Wind 90	119.85	84.75	-84.75	-3266	-3305	21
		90	Wind Normal	99.88	99.88	0.00	40	-3895	25
T3	38.0000-36.0000	0	Wind Normal	98.38	0.00	-98.38	-3601	0	0
		45	Wind 90	118.06	83.48	-83.48	-3049	-3089	21
		90	Wind Normal	98.38	98.38	0.00	40	-3640	25
T4	36.0000-34.0000	0	Wind Normal	99.16	0.00	-99.16	-3429	0	0
		45	Wind 90	118.99	84.14	-84.14	-2903	-2945	22
		90	Wind Normal	99.16	99.16	0.00	42	-3470	27
T5	34.0000-32.0000	0	Wind Normal	82.53	0.00	-82.53	-2680	0	0
		45	Wind 90	99.03	70.03	-70.03	-2268	-2311	28
		90	Wind Normal	82.53	82.53	0.00	43	-2723	33
T6	32.0000-30.0000	0	Wind Normal	83.27	0.00	-83.27	-2536	0	0
		45	Wind 90	99.93	70.66	-70.66	-2145	-2190	29
		90	Wind Normal	83.27	83.27	0.00	46	-2581	34
T7	30.0000-28.0000	0	Wind Normal	86.17	0.00	-86.17	-2453	0	0
		45	Wind 90	103.41	73.12	-73.12	-2075	-2121	27
		90	Wind Normal	86.17	86.17	0.00	46	-2499	32
T8	28.0000-26.0000	0	Wind Normal	83.65	0.00	-83.65	-2208	0	0
		45	Wind 90	100.38	70.98	-70.98	-1866	-1916	31
		90	Wind Normal	83.65	83.65	0.00	50	-2258	37
T9	26.0000-24.0000	0	Wind Normal	81.98	0.00	-81.98	-1989	0	0
		45	Wind 90	98.37	69.56	-69.56	-1678	-1739	43
		90	Wind Normal	81.98	81.98	0.00	61	-2049	50
T10	24.0000-22.0000	0	Wind Normal	88.15	0.00	-88.15	-1954	0	0
		45	Wind 90	105.78	74.80	-74.80	-1647	-1720	52
		90	Wind Normal	88.15	88.15	0.00	74	-2028	61
T11	22.0000-18.5000	0	Wind Normal	166.41	0.00	-166.41	-3210	0	0
		45	Wind 90	199.69	141.20	-141.20	-2699	-2859	110
		90	Wind Normal	166.41	166.41	0.00	160	-3370	130
T12	18.5000-14.0000	0	Wind Normal	217.12	0.00	-217.12	-3266	0	0
		45	Wind 90	258.67	182.91	-182.91	-2710	-2972	181



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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	z m	K <sub>z</sub>	q <sub>z</sub> MPa	CAAC Front m	CAAC Side m
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
Sum Weight:		2127.00							

## Discrete Appurtenance Vectors - No Ice

ANT OMNI L=4.0m - Elevation 36 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	103.91	43.96	42.39	-104.56	-3888	-1650	128
45	146.95	0.00	103.91	-103.91	-3864	-3864	0
90	103.91	43.96	104.56	-42.39	-1650	-3888	-128

ANT OMNI L=4.0m - Elevation 36 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	103.91	43.96	42.39	-104.56	-3640	-1402	-128
45	146.95	0.00	103.91	-103.91	-3617	-3617	0
90	103.91	43.96	104.56	-42.39	-1402	-3640	128

1 ANT TV 1.20x1.20m - Elevation 26 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	87.40	7.28	56.65	-66.95	-1884	-1616	12
45	123.60	0.00	87.40	-87.40	-2416	-2416	0
90	87.40	7.28	66.95	-56.65	-1616	-1884	-12

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 25 of 57
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1 ANT TV 1.20x1.20m - Elevation 24 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	85.42	7.12	55.37	-65.44	-1792	-1551	19
45	120.81	0.00	85.42	-85.42	-2272	-2272	0
90	85.42	7.12	65.44	-55.37	-1551	-1792	-19

1 ANT TV 1.20x1.20m - Elevation 22 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	83.33	6.94	54.01	-63.83	-1637	-1421	19
45	117.84	0.00	83.33	-83.33	-2066	-2066	0
90	83.33	6.94	63.83	-54.01	-1421	-1637	-19

1 ANT TV 1.20x1.20m - Elevation 20 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	81.09	6.76	52.56	-62.12	-1468	-1277	18
45	114.67	0.00	81.09	-81.09	-1848	-1848	0
90	81.09	6.76	62.12	-52.56	-1277	-1468	-18

1 ANT TV 1.20x1.20m - Elevation 18 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	78.68	6.56	51.00	-60.27	-1322	-1155	18
45	111.27	0.00	78.68	-78.68	-1653	-1653	0
90	78.68	6.56	60.27	-51.00	-1155	-1322	-18

1 ANT TV 1.20x1.20m - Elevation 26 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	123.60	0.00	0.00	-123.60	-3357	0	0
45	87.40	7.28	7.28	-87.40	-2416	-189	-9
90	0.00	10.30	10.30	0.00	-143	-268	-12

1 ANT TV 1.20x1.20m - Elevation 24 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	120.81	0.00	0.00	-120.81	-3066	0	0
45	85.42	7.12	7.12	-85.42	-2217	-171	-10
90	0.00	10.07	10.07	0.00	-167	-242	-14

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1 ANT TV 1.20x1.20m - Elevation 22 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	117.84	0.00	0.00	-117.84	-2783	0	0
45	83.33	6.94	6.94	-83.33	-2023	-153	-11
90	0.00	9.82	9.82	0.00	-190	-216	-16

1 ANT TV 1.20x1.20m - Elevation 20 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	114.67	0.00	0.00	-114.67	-2507	0	0
45	81.09	6.76	6.76	-81.09	-1835	-135	-12
90	0.00	9.56	9.56	0.00	-213	-191	-17

1 ANT TV 1.20x1.20m - Elevation 18 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	111.27	0.00	0.00	-111.27	-2240	0	0
45	78.68	6.56	6.56	-78.68	-1653	-118	-13
90	0.00	9.27	9.27	0.00	-237	-167	-18

ANT RF 0.30x1.30m - Elevation 35 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.92	15.46	10.93	-32.80	-1171	-406	34
45	43.73	0.00	30.92	-30.92	-1106	-1106	0
90	30.92	15.46	32.80	-10.93	-406	-1171	-34

ANT GRILLA TV (2.25x2.25m) - Elevation 15.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	75.39	9.42	-46.65	-59.97	-686	479	30
45	0.00	13.33	9.42	-9.42	98	-390	42
90	75.39	9.42	59.97	46.65	967	-1173	30

ANT GRILLA TV (2.25x2.25m) - Elevation 13 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	71.70	8.96	-44.36	-57.03	-471	306	31
45	0.00	12.67	8.96	-8.96	154	-387	44
90	71.70	8.96	57.03	44.36	847	-1012	31



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 27 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT GRILLA TV (2.25x2.25m) - Elevation 10.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	67.45	8.43	-41.73	-53.66	-266	141	32
45	0.00	11.92	8.43	-8.43	209	-386	46
90	67.45	8.43	53.66	41.73	736	-861	32

ANT GRILLA TV (2.25x2.25m) - Elevation 8 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	66.63	8.33	-41.22	-53.00	-100	6	35
45	0.00	11.78	8.33	-8.33	257	-391	49
90	66.63	8.33	53.00	41.22	654	-748	35

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	151.44	0.00	0.00	-151.44	-6118	18	-45
45	107.08	45.30	45.30	-107.08	-4343	-1794	-77
90	0.00	64.07	64.07	0.00	-60	-2545	-64

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	151.44	0.00	0.00	-151.44	-6118	-18	45
45	107.08	45.30	45.30	-107.08	-4343	-1830	-13
90	0.00	64.07	64.07	0.00	-60	-2581	-64

ANT PANEL 1.0x0.50x0.19m - Elevation 50.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	44.02	17.61	-18.68	-43.58	-2167	909	43
45	0.00	24.90	17.61	-17.61	-855	-923	60
90	44.02	17.61	43.58	18.68	977	-2235	43

ANT PANEL 0.30x0.30m - Elevation 50.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	7.92	2.64	3.74	-7.47	-357	-168	-6
45	11.21	0.00	7.92	-7.92	-380	-380	0
90	7.92	2.64	7.47	-3.74	-168	-357	6

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 28 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.77	17.51	-18.57	-43.33	-2111	885	42
45	0.00	24.76	17.51	-17.51	-833	-901	60
90	43.77	17.51	43.33	18.57	953	-2179	42

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.77	17.51	18.57	-43.33	-2111	-885	-42
45	61.90	0.00	43.77	-43.77	-2133	-2133	0
90	43.77	17.51	43.33	-18.57	-885	-2111	42

ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.52	17.41	-18.46	-43.08	-2055	861	42
45	0.00	24.62	17.41	-17.41	-810	-878	59
90	43.52	17.41	43.08	18.46	930	-2123	42

ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.52	17.41	18.46	-43.08	-2055	-861	-42
45	61.54	0.00	43.52	-43.52	-2076	-2076	0
90	43.52	17.41	43.08	-18.46	-861	-2055	42

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.26	17.30	-18.35	-42.82	-2000	838	42
45	0.00	24.47	17.30	-17.30	-788	-856	59
90	43.26	17.30	42.82	18.35	906	-2068	42

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.26	17.30	18.35	-42.82	-2000	-838	-42
45	61.18	0.00	43.26	-43.26	-2021	-2021	0
90	43.26	17.30	42.82	-18.35	-838	-2000	42

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 29 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.00	17.20	-18.24	-42.56	-1945	814	42
45	0.00	24.32	17.20	-17.20	-766	-834	59
90	43.00	17.20	42.56	18.24	882	-2013	42

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	43.00	17.20	18.24	-42.56	-1945	-814	-42
45	60.81	0.00	43.00	-43.00	-1965	-1965	0
90	43.00	17.20	42.56	-18.24	-814	-1945	42

ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	42.73	17.09	-18.13	-42.30	-1891	791	41
45	0.00	24.17	17.09	-17.09	-744	-812	58
90	42.73	17.09	42.30	18.13	859	-1959	41

ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	42.73	17.09	18.13	-42.30	-1891	-791	-41
45	60.43	0.00	42.73	-42.73	-1910	-1910	0
90	42.73	17.09	42.30	-18.13	-791	-1891	41

## Discrete Appurtenance Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	176.39	-2154.51	-67040	-8805	284
45	1143.38	-1648.20	-52233	-40474	391
90	1440.60	-176.39	-7194	-49743	268

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Discrete Appurtenance Pressures - Service

$GH = 1.130$

Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	z m	K <sub>z</sub>	q <sub>z</sub> MPa	CAAC Front m	CAAC Side m
ANT OMNI L=4.0m	45.0000	60.00	2.0607	-2.0607	36.0000	1.440	0.00	1.3000	0.5500
ANT OMNI L=4.0m	225.0000	60.00	-2.0607	2.0607	36.0000	1.440	0.00	1.3000	0.5500
1 ANT TV 1.20x1.20m	45.0000	120.00	1.1945	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8491	-1.8491	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9376	-1.9376	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.8846	-1.8846	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	45.0000	120.00	1.9732	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.1945	26.0000	1.312	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.3895	24.0000	1.282	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.5840	22.0000	1.251	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.7786	20.0000	1.217	0.00	1.2000	0.1000
1 ANT TV 1.20x1.20m	0.0000	120.00	0.0000	-1.9732	18.0000	1.181	0.00	1.2000	0.1000
ANT RF 0.30x1.30m	45.0000	15.00	1.5657	-1.5657	35.0000	1.428	0.00	0.3900	0.1950
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.2165	2.2165	15.5000	1.132	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.4598	2.4598	13.0000	1.076	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.7030	2.7030	10.5000	1.012	0.00	1.2000	0.1500
ANT GRILLA TV (2.25x2.25m)	135.0000	110.00	2.9464	2.9464	8.0000	1.000	0.00	1.2000	0.1500
ANT OMNI L=4.0m	0.0000	60.00	-0.3000	-1.0000	40.0000	1.484	0.00	1.3000	0.5500
ANT OMNI L=4.0m	0.0000	60.00	0.3000	-1.0000	40.0000	1.484	0.00	1.3000	0.5500
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	50.5000	1.586	0.00	0.5000	0.2000
ANT PANEL 0.30x0.30m	225.0000	12.00	-1.7071	1.7071	50.5000	1.586	0.00	0.0900	0.0300
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	49.5000	1.577	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	48.5000	1.567	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	47.5000	1.558	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	46.5000	1.549	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	135.0000	20.00	1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
ANT PANEL 1.0x0.50x0.19m	225.0000	20.00	-1.7071	1.7071	45.5000	1.539	0.00	0.5000	0.2000
Sum Weight:		2127.00							

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 31 of 57
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## Discrete Appurtenance Vectors - Service

ANT OMNI L=4.0m - Elevation 36 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	25.98	10.99	10.60	-26.14	-1065	-505	32
45	36.74	0.00	25.98	-25.98	-1059	-1059	0
90	25.98	10.99	26.14	-10.60	-505	-1065	-32

ANT OMNI L=4.0m - Elevation 36 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	25.98	10.99	10.60	-26.14	-817	-258	-32
45	36.74	0.00	25.98	-25.98	-812	-812	0
90	25.98	10.99	26.14	-10.60	-258	-817	32

1 ANT TV 1.20x1.20m - Elevation 26 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	21.85	1.82	14.16	-16.74	-579	-512	3
45	30.90	0.00	21.85	-21.85	-711	-711	0
90	21.85	1.82	16.74	-14.16	-512	-579	-3

1 ANT TV 1.20x1.20m - Elevation 24 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	21.36	1.78	13.84	-16.36	-615	-554	5
45	30.20	0.00	21.36	-21.36	-734	-734	0
90	21.36	1.78	16.36	-13.84	-554	-615	-5

1 ANT TV 1.20x1.20m - Elevation 22 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	20.83	1.74	13.50	-15.96	-584	-530	5
45	29.46	0.00	20.83	-20.83	-691	-691	0
90	20.83	1.74	15.96	-13.50	-530	-584	-5

1 ANT TV 1.20x1.20m - Elevation 20 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	20.27	1.69	13.14	-15.53	-537	-489	5
45	28.67	0.00	20.27	-20.27	-632	-632	0
90	20.27	1.69	15.53	-13.14	-489	-537	-5

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 32 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

1 ANT TV 1.20x1.20m - Elevation 18 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	19.67	1.64	12.75	-15.07	-508	-466	5
45	27.82	0.00	19.67	-19.67	-591	-591	0
90	19.67	1.64	15.07	-12.75	-466	-508	-5

1 ANT TV 1.20x1.20m - Elevation 26 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.90	0.00	0.00	-30.90	-947	0	0
45	21.85	1.82	1.82	-21.85	-711	-47	-2
90	0.00	2.58	2.58	0.00	-143	-67	-3

1 ANT TV 1.20x1.20m - Elevation 24 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	30.20	0.00	0.00	-30.20	-892	0	0
45	21.36	1.78	1.78	-21.36	-679	-43	-2
90	0.00	2.52	2.52	0.00	-167	-60	-3

1 ANT TV 1.20x1.20m - Elevation 22 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	29.46	0.00	0.00	-29.46	-838	0	0
45	20.83	1.74	1.74	-20.83	-648	-38	-3
90	0.00	2.45	2.45	0.00	-190	-54	-4

1 ANT TV 1.20x1.20m - Elevation 20 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	28.67	0.00	0.00	-28.67	-787	0	0
45	20.27	1.69	1.69	-20.27	-619	-34	-3
90	0.00	2.39	2.39	0.00	-213	-48	-4

1 ANT TV 1.20x1.20m - Elevation 18 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	27.82	0.00	0.00	-27.82	-738	0	0
45	19.67	1.64	1.64	-19.67	-591	-30	-3
90	0.00	2.32	2.32	0.00	-237	-42	-5

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 33 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT RF 0.30x1.30m - Elevation 35 - From Leg B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	7.73	3.87	2.73	-8.20	-310	-119	9
45	10.93	0.00	7.73	-7.73	-294	-294	0
90	7.73	3.87	8.20	-2.73	-119	-310	-9

ANT GRILLA TV (2.25x2.25m) - Elevation 15.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	18.85	2.36	-11.66	-14.99	11	-63	7
45	0.00	3.33	2.36	-2.36	207	-280	10
90	18.85	2.36	14.99	11.66	425	-476	7

ANT GRILLA TV (2.25x2.25m) - Elevation 13 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	17.92	2.24	-11.09	-14.26	85	-126	8
45	0.00	3.17	2.24	-2.24	241	-300	11
90	17.92	2.24	14.26	11.09	415	-456	8

ANT GRILLA TV (2.25x2.25m) - Elevation 10.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	16.86	2.11	-10.43	-13.41	156	-188	8
45	0.00	2.98	2.11	-2.11	275	-319	11
90	16.86	2.11	13.41	10.43	407	-438	8

ANT GRILLA TV (2.25x2.25m) - Elevation 8 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	16.66	2.08	-10.31	-13.25	218	-242	9
45	0.00	2.94	2.08	-2.08	307	-341	12
90	16.66	2.08	13.25	10.31	407	-430	9

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	37.86	0.00	0.00	-37.86	-1574	18	-11
45	26.77	11.33	11.33	-26.77	-1131	-435	-19
90	0.00	16.02	16.02	0.00	-60	-623	-16

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

ANT OMNI L=4.0m - Elevation 40 - From Face B							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	37.86	0.00	0.00	-37.86	-1574	-18	11
45	26.77	11.33	11.33	-26.77	-1131	-471	-3
90	0.00	16.02	16.02	0.00	-60	-659	-16

ANT PANEL 1.0x0.50x0.19m - Elevation 50.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	11.01	4.40	-4.67	-10.89	-516	202	11
45	0.00	6.23	4.40	-4.40	-188	-256	15
90	11.01	4.40	10.89	4.67	270	-584	11

ANT PANEL 0.30x0.30m - Elevation 50.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	1.98	0.66	0.93	-1.87	-74	-27	-2
45	2.80	0.00	1.98	-1.98	-80	-80	0
90	1.98	0.66	1.87	-0.93	-27	-74	2

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.94	4.38	-4.64	-10.83	-502	196	11
45	0.00	6.19	4.38	-4.38	-183	-251	15
90	10.94	4.38	10.83	4.64	264	-570	11

ANT PANEL 1.0x0.50x0.19m - Elevation 49.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.94	4.38	4.64	-10.83	-502	-196	-11
45	15.48	0.00	10.94	-10.94	-508	-508	0
90	10.94	4.38	10.83	-4.64	-196	-502	11

ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.88	4.35	-4.62	-10.77	-488	190	11
45	0.00	6.15	4.35	-4.35	-177	-245	15
90	10.88	4.35	10.77	4.62	258	-556	11



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ANT PANEL 1.0x0.50x0.19m - Elevation 48.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.88	4.35	4.62	-10.77	-488	-190	-11
45	15.39	0.00	10.88	-10.88	-493	-493	0
90	10.88	4.35	10.77	-4.62	-190	-488	11

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.81	4.33	-4.59	-10.71	-474	184	10
45	0.00	6.12	4.33	-4.33	-171	-240	15
90	10.81	4.33	10.71	4.59	252	-543	10

ANT PANEL 1.0x0.50x0.19m - Elevation 47.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.81	4.33	4.59	-10.71	-474	-184	-10
45	15.29	0.00	10.81	-10.81	-480	-480	0
90	10.81	4.33	10.71	-4.59	-184	-474	10

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.75	4.30	-4.56	-10.64	-461	178	10
45	0.00	6.08	4.30	-4.30	-166	-234	15
90	10.75	4.30	10.64	4.56	246	-529	10

ANT PANEL 1.0x0.50x0.19m - Elevation 46.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.75	4.30	4.56	-10.64	-461	-178	-10
45	15.20	0.00	10.75	-10.75	-466	-466	0
90	10.75	4.30	10.64	-4.56	-178	-461	10

ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg C							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.68	4.27	-4.53	-10.58	-447	172	10
45	0.00	6.04	4.27	-4.27	-160	-229	15
90	10.68	4.27	10.58	4.53	240	-515	10

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ANT PANEL 1.0x0.50x0.19m - Elevation 45.5 - From Leg D							
Wind Azimuth °	F <sub>a</sub> kg	F <sub>s</sub> kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	10.68	4.27	4.53	-10.58	-447	-172	-10
45	15.11	0.00	10.68	-10.68	-452	-452	0
90	10.68	4.27	10.58	-4.53	-172	-447	10

## Discrete Appurtenance Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	44.10	-538.63	-17227	-3877	71
45	285.85	-412.05	-13525	-11794	98
90	360.15	-44.10	-2266	-14111	67

## Dish Pressures - No Ice

Elevation m	Dish Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	K <sub>z</sub>	AA m <sup>2</sup>	q <sub>z</sub> MPa
33.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.404	10.5064	0.00
32.0000	HP12-21B	45.0000	385.55	1.2121	-1.2121	1.392	10.5064	0.00
23.5000	HP12-21B	225.0000	385.55	-1.6503	1.6503	1.274	10.5064	0.00
40.0000	HP12-21B	135.0000	385.55	1.4243	1.4243	1.484	10.5064	0.00
40.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.484	10.5064	0.00
	Sum		1927.75					
	Weight:							

## Dish Vectors - No Ice

HP12-21B - Elevation 33 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1461.64	0.00	0.00	0.00	-1461.64	-47685	549	-2083
45	0.003230	0.000000	0.000000	1461.64	0.00	0.00	1033.53	-1033.53	-33557	-33557	0
90	0.003230	0.000000	0.000000	1461.64	0.00	0.00	1461.64	0.00	549	-47685	2083

HP12-21B - Elevation 32 - From Leg B											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1448.84	0.00	0.00	0.00	-1448.84	-46830	-467	1756
45	0.003230	0.000000	0.000000	1448.84	0.00	0.00	1024.49	-1024.49	-33251	-33251	0
90	0.003230	0.000000	0.000000	1448.84	0.00	0.00	1448.84	0.00	-467	-46830	-1756

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HP12-21B - Elevation 23.5 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1326.51	0.00	0.00	0.00	-1326.51	-30537	636	-2189
45	0.003230	0.000000	0.000000	1326.51	0.00	0.00	937.99	-937.99	-21406	-21406	0
90	0.003230	0.000000	0.000000	1326.51	0.00	0.00	1326.51	0.00	636	-30537	2189

HP12-21B - Elevation 40 - From Leg C											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1544.22	0.00	0.00	0.00	-1544.22	-61220	-549	2199
45	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1091.93	-1091.93	-43128	-44226	3110
90	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1544.22	0.00	549	-62318	2199

HP12-21B - Elevation 40 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	1544.22	0.00	0.00	0.00	-1544.22	-61220	549	-2199
45	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1091.93	-1091.93	-43128	-43128	0
90	0.003230	0.000000	0.000000	1544.22	0.00	0.00	1544.22	0.00	549	-61220	2199

### Dish Totals - No Ice

Wind Azimuth °	V <sub>x</sub>	V <sub>z</sub>	OTM <sub>x</sub>	OTM <sub>z</sub>	Torque
	kg	kg	kg-m	kg-m	kg-m
0	0.00	-7325.43	-247491	718	-2515
45	5179.86	-5179.86	-174471	-175569	3110
90	7325.43	0.00	1816	-248590	6913

### Dish Pressures - Service

Elevation m	Dish Description	Aiming Azimuth °	Weight kg	Offset <sub>x</sub> m	Offset <sub>z</sub> m	K <sub>z</sub>	A <sub>A</sub> m <sup>2</sup>	q <sub>z</sub> MPa
33.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.404	10.5064	0.00
32.0000	HP12-21B	45.0000	385.55	1.2121	-1.2121	1.392	10.5064	0.00
23.5000	HP12-21B	225.0000	385.55	-1.6503	1.6503	1.274	10.5064	0.00
40.0000	HP12-21B	135.0000	385.55	1.4243	1.4243	1.484	10.5064	0.00
40.0000	HP12-21B	225.0000	385.55	-1.4243	1.4243	1.484	10.5064	0.00
	Sum		1927.75					
	Weight:							

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Dish Vectors - Service

HP12-21B - Elevation 33 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	365.41	0.00	0.00	0.00	-365.41	-11509	549	-520
45	0.003230	0.000000	0.000000	365.41	0.00	0.00	258.38	-258.38	-7978	-7978	0
90	0.003230	0.000000	0.000000	365.41	0.00	0.00	365.41	0.00	549	-11509	520

HP12-21B - Elevation 32 - From Leg B											
Wind Azimuth °	A	S	M	A	S	M	x	z	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	362.21	0.00	0.00	0.00	-362.21	-12058	-467	439
45	0.003230	0.000000	0.000000	362.21	0.00	0.00	256.12	-256.12	-8663	-8663	0
90	0.003230	0.000000	0.000000	362.21	0.00	0.00	362.21	0.00	-467	-12058	-439

HP12-21B - Elevation 23.5 - From Leg D											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	331.63	0.00	0.00	0.00	-331.63	-7157	636	-547
45	0.003230	0.000000	0.000000	331.63	0.00	0.00	234.50	-234.50	-4874	-4874	0
90	0.003230	0.000000	0.000000	331.63	0.00	0.00	331.63	0.00	636	-7157	547

HP12-21B - Elevation 40 - From Leg C											
Wind Azimuth °	CA	CS	CM	FA	FS	FM	Vx	Vz	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	386.06	0.00	0.00	0.00	-386.06	-14893	-549	550
45	0.003230	0.000000	0.000000	386.06	0.00	0.00	272.98	-272.98	-10370	-11468	778
90	0.003230	0.000000	0.000000	386.06	0.00	0.00	386.06	0.00	549	-15991	550

HP12-21B - Elevation 40 - From Leg D											
Wind Azimuth °	A	S	M	A	S	M	x	z	OTMx	OTMz	Torque
				kg	kg	kg	kg	kg	kg-m	kg-m	kg-m
0	0.003230	0.000000	0.000000	386.06	0.00	0.00	0.00	-386.06	-14893	549	-550
45	0.003230	0.000000	0.000000	386.06	0.00	0.00	272.98	-272.98	-10370	-10370	0
90	0.003230	0.000000	0.000000	386.06	0.00	0.00	386.06	0.00	549	-14893	550

## Dish Totals - Service

Wind Azimuth °	Vx	Vz	OTMx	OTMz	Torque
	kg	kg	kg-m	kg-m	kg-m
0	0.00	-1831.36	-60511	718	-629
45	1294.97	-1294.97	-42255	-43354	778
90	1831.36	0.00	1816	-61609	1728

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m. - V=120KPH	<b>Page</b> 39 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## User Load Vectors - No Ice

C x MANTENIMIENTO - Elevation 40								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

1 SOP. ANT MW (E) - Elevation 32.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0
45	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0
90	0.0000	0.0000	0.00	20.00	-20.00	-650	-650	0

1 SOP. ANT MW (E) - Elevation 31.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0
45	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0
90	0.0000	0.0000	0.00	20.00	-20.00	-630	-630	0

1 SOP. ANT MW (E) - Elevation 23.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0
45	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0
90	0.0000	0.0000	0.00	20.00	-20.00	-470	-470	0

(2) SOP. ANT OMNI (E) - Elevation 36								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

## User Load Totals - No Ice

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	60.00	-60.00	-1750	-1750	0
45	60.00	-60.00	-1750	-1750	0
90	60.00	-60.00	-1750	-1750	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 40 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## User Load Vectors - Service

C x MANTENIMIENTO - Elevation 40								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

1 SOP. ANT MW (E) - Elevation 32.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0
45	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0
90	0.0000	0.0000	0.00	5.00	-5.00	-163	-163	0

1 SOP. ANT MW (E) - Elevation 31.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0
45	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0
90	0.0000	0.0000	0.00	5.00	-5.00	-158	-158	0

1 SOP. ANT MW (E) - Elevation 23.5								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0
45	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0
90	0.0000	0.0000	0.00	5.00	-5.00	-118	-118	0

(2) SOP. ANT OMNI (E) - Elevation 36								
Wind Azimuth °	Offset <sub>x</sub> m	Offset <sub>z</sub> m	F kg	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	0.0000	0.0000	0.00	0.00	0.00	0	0	0
45	0.0000	0.0000	0.00	0.00	0.00	0	0	0
90	0.0000	0.0000	0.00	0.00	0.00	0	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m. - V=120KPH	<b>Page</b> 41 of 57
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## User Load Totals - Service

Wind Azimuth °	V <sub>x</sub> kg	V <sub>z</sub> kg	OTM <sub>x</sub> kg-m	OTM <sub>z</sub> kg-m	Torque kg-m
0	15.00	-15.00	-438	-438	0
45	15.00	-15.00	-438	-438	0
90	15.00	-15.00	-438	-438	0

## Force Totals

Load Case	Vertical Forces kg	Sum of Forces X kg	Sum of Forces Z kg	Sum of Overturning Moments, M <sub>x</sub> kg-m	Sum of Overturning Moments, M <sub>z</sub> kg-m	Sum of Torques kg-m
Leg Weight	0.00					
Bracing Weight	5003.04					
Total Member Self-Weight	5003.04			3368	-1516	
Total Weight	10939.98			3368	-1516	
Wind 0 deg - No Ice		236.39	-18550.85	-524115	-9837	-2230
Wind 45 deg - No Ice		13921.45	-14426.26	-403781	-395295	8958
Wind 90 deg - No Ice		17836.93	-236.39	-4953	-510092	13775
Total Weight	10939.98			3368	-1516	
Wind 0 deg - Service		59.10	-4637.71	-130677	-3596	-558
Wind 45 deg - Service		3480.36	-3606.57	-100594	-99961	2240
Wind 90 deg - Service		4459.23	-59.10	-887	-128660	3444

## Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 45 deg - No Ice
4	Dead+Wind 90 deg - No Ice
5	Dead+Wind 0 deg - Service
6	Dead+Wind 45 deg - Service
7	Dead+Wind 90 deg - Service

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## Maximum Member Forces

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T1	48 - 40	Leg	Max Tension	3	2613.29	10	15
			Max. Compression	3	-3019.85	-14	-10
			Max. Mx	4	-395.06	-35	7
			Max. My	4	10.67	-7	35
			Max. Vy	4	-148.84	0	0
		Diagonal	Max. Vx	4	146.63	0	0
			Max Tension	4	754.38	0	0
			Max. Compression	4	-763.33	0	0
			Max. Mx	3	564.45	2	0
			Max. My	4	-588.68	1	0
		Top Girt	Max. Vy	3	-3.88	2	0
			Max. Vx	4	0.22	1	0
			Max Tension	2	12.51	0	0
			Max. Compression	2	-19.46	0	0
			Max. Mx	1	-3.25	-3	0
		Inner Bracing	Max. My	4	-2.87	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	4	-3.98	0	0
			Max. Mx	3	-3.24	7	0
			Max. My	3	-3.43	0	0
			Max. Vy	3	-9.69	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	4992.22	15	11
T2	40 - 38	Leg	Max. Compression	3	-5371.96	-18	-13
			Max. Mx	4	-4264.21	-27	8
			Max. My	4	2541.84	-9	28
			Max. Vy	4	-1393.16	-7	-8
			Max. Vx	4	1387.49	8	7
		Diagonal	Max Tension	4	2662.26	0	0
			Max. Compression	4	-2901.92	0	0
			Max. Mx	3	2255.40	2	0
			Max. My	4	-2888.01	0	-1
			Max. Vy	3	4.03	2	0
		Top Girt	Max. Vx	4	0.94	0	-1
			Max Tension	4	358.55	0	0
			Max. Compression	4	-297.57	0	0
			Max. Mx	1	62.69	-3	0
			Max. My	4	-6.55	0	0
		Inner Bracing	Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	4	32.39	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	31.04	7	0
			Max. My	4	32.39	0	0
			Max. Vy	3	-9.69	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	3	8296.89	13	19
T3	38 - 36	Leg	Max. Compression	3	-9339.97	-18	-13
			Max. Mx	4	-6903.79	-27	8
			Max. My	4	5028.03	-9	28
			Max. Vy	4	-58.95	-27	8
			Max. Vx	4	58.94	-9	28
		Diagonal	Max Tension	4	2837.29	0	0



<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 43 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T4	36 - 34	Top Girt	Max. Compression	4	-3082.76	0	0
			Max. Mx	3	2622.15	2	0
			Max. My	4	-3067.51	0	-1
			Max. Vy	3	4.48	2	0
			Max. Vx	4	1.00	0	-1
			Max Tension	4	831.80	0	0
			Max. Compression	4	-715.55	0	0
			Max. Mx	1	120.28	-3	0
			Max. My	4	-13.27	0	0
			Max. Vy	1	6.85	0	0
		Inner Bracing	Max. Vx	4	-0.00	0	0
			Max Tension	1	59.49	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	3	58.78	7	0
			Max. My	4	57.77	0	0
			Max. Vy	3	-9.69	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	3	12466.43	14	17
			Max. Compression	3	-13626.14	-27	-20
		Diagonal	Max. Mx	3	-860.44	-48	47
			Max. My	4	7674.87	-19	48
			Max. Vy	2	-98.56	-21	3
			Max. Vx	2	98.41	-3	21
			Max Tension	3	3130.58	0	0
			Max. Compression	3	-3371.16	0	0
			Max. Mx	3	149.09	3	0
			Max. My	4	-3295.47	-1	-1
			Max. Vy	3	-4.89	3	0
			Max. Vx	4	0.95	-1	-1
		Top Girt	Max Tension	4	1339.67	0	0
			Max. Compression	4	-1207.49	0	0
			Max. Mx	1	127.93	-3	0
			Max. My	4	-7.91	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
		Inner Bracing	Max Tension	1	67.05	0	0
			Max. Compression	1	0.00	0	0
			Max. Mx	1	67.05	7	0
			Max. My	4	64.52	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	0.00	0	0
T5	34 - 32	Leg	Max Tension	3	17910.92	-33	-6
			Max. Compression	3	-19295.71	33	-5
			Max. Mx	3	-19139.97	326	2
			Max. My	4	10771.19	-203	-231
			Max. Vy	3	384.15	-323	-3
			Max. Vx	4	448.05	-203	-231
		Diagonal	Max Tension	4	3512.65	0	0
			Max. Compression	4	-3697.22	0	0
			Max. Mx	3	3114.57	4	-1
			Max. My	4	-3676.68	-1	-2
			Max. Vy	3	6.54	4	-1
			Max. Vx	4	1.45	-1	-2
		Top Girt	Max Tension	4	1324.32	0	0
			Max. Compression	4	-1204.82	0	0
			Max. Mx	1	110.95	-3	0
			Max. My	4	-1.96	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
		Inner Bracing	Max Tension	1	60.25	0	0
			Max. Compression	1	0.00	0	0

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 44 of 57
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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T6	32 - 30	Leg	Max. Mx	1	60.25	7	0
			Max. My	4	57.58	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	3	23718.54	-127	-3
			Max. Compression	3	-25647.12	109	2
		Diagonal	Max. Mx	3	-25295.04	326	2
			Max. My	3	-1229.06	-4	-497
			Max. Vy	3	528.87	326	2
			Max. Vx	2	-465.74	-209	-68
			Max Tension	4	4497.09	0	0
			Max. Compression	4	-4727.68	0	0
		Top Girt	Max. Mx	3	4154.04	5	0
			Max. My	4	-4704.88	-2	-2
			Max. Vy	3	7.20	5	0
			Max. Vx	4	1.57	-2	-2
			Max Tension	4	1514.49	0	0
			Max. Compression	4	-1391.18	0	0
		Inner Bracing	Max. Mx	1	105.43	-3	0
			Max. My	4	17.86	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	1	63.08	0	0
			Max. Compression	1	0.00	0	0
T7	30 - 28	Leg	Max. Mx	1	63.08	7	0
			Max. My	4	60.50	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	0.00	0	0
			Max Tension	3	30466.54	-127	-3
			Max. Compression	3	-32428.22	109	2
		Diagonal	Max. Mx	3	-32415.92	1156	-6
			Max. My	3	-1247.26	-4	-497
			Max. Vy	3	-574.98	1156	-6
			Max. Vx	3	-282.87	-4	-497
			Max Tension	3	4706.68	0	0
			Max. Compression	3	-4961.18	0	0
		Top Girt	Max. Mx	3	386.26	7	-1
			Max. My	4	-2504.43	-3	-2
			Max. Vy	3	-8.05	7	-1
			Max. Vx	4	1.50	-3	-2
			Max Tension	2	1724.82	0	0
			Max. Compression	2	-1579.69	0	0
		Inner Bracing	Max. Mx	1	106.25	-3	0
			Max. My	4	26.97	0	0
			Max. Vy	1	6.85	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	75.40	0	0
			Max. Compression	1	0.00	0	0
T8	28 - 26	Leg	Max. Mx	1	70.06	7	0
			Max. My	4	67.16	0	0
			Max. Vy	1	-9.69	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	35843.35	-46	-8
			Max. Compression	3	-38221.37	11	-2
		Diagonal	Max. Mx	3	-38219.66	1156	-6
			Max. My	3	-1320.63	-18	-689
			Max. Vy	3	617.60	1156	-6
			Max. Vx	3	374.79	-18	-689
			Max Tension	4	1835.53	0	0
			Max. Compression	4	-2076.37	0	0
			Max. Mx	3	435.21	5	0

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m		
T9	26 - 24	Top Girt	Max. My	4	-1528.97	-1	-3		
			Max. Vy	3	6.04	5	0		
			Max. Vx	4	2.28	0	0		
			Max Tension	2	492.90	0	0		
			Max. Compression	2	-485.52	0	0		
			Max. Mx	4	-484.57	-3	0		
		Inner Bracing	Max. My	4	-11.88	0	0		
			Max. Vy	4	-6.82	0	0		
			Max. Vx	4	0.66	0	0		
			Max Tension	3	89.85	0	0		
			Max. Compression	3	-92.71	0	0		
			Max. Mx	1	9.56	7	0		
		Leg	Max. My	4	0.94	0	0		
			Max. Vy	1	-9.69	0	0		
			Max. Vx	4	-0.00	0	0		
			Max Tension	3	37839.36	-437	-1		
			Max. Compression	3	-40746.72	456	2		
			Max. Mx	3	-40746.72	456	2		
			Max. My	3	-1297.98	-18	-689		
			Max. Vy	3	-270.05	456	2		
			Max. Vx	3	-279.78	-18	-689		
			Max Tension	4	1149.64	0	0		
			Max. Compression	4	-1182.81	0	0		
			Max. Mx	3	-166.61	4	-1		
			Max. My	4	-764.56	3	-1		
			Max. Vy	3	-6.08	4	-1		
		T10	24 - 22	Leg	Max. Vx	4	1.27	0	0
					Max Tension	3	38854.13	-437	-1
					Max. Compression	3	-42089.87	517	-18
					Max. Mx	3	-42089.87	517	-18
					Max. My	3	-1389.23	4	248
					Max. Vy	3	-358.61	-437	-1
				Diagonal	Max. Vx	2	469.74	301	168
					Max Tension	4	1535.73	0	0
					Max. Compression	4	-1576.93	0	0
					Max. Mx	3	31.66	4	-1
Max. My	4				-1571.11	1	-2		
Max. Vy	3				6.40	4	-1		
Leg	Max. Vx			4	1.47	0	0		
	Max Tension			3	40407.94	-48	-4		
	Max. Compression			3	-44298.13	-16	-17		
	Max. Mx			3	-44136.30	517	-18		
	Max. My			3	-1438.54	-36	-536		
	Max. Vy			3	262.01	517	-18		
T11	22 - 18.5	Diagonal	Max. Vx	3	241.74	-36	-536		
			Max Tension	4	1978.22	0	0		
			Max. Compression	4	-2017.76	0	0		
			Max. Mx	3	431.35	9	-2		
			Max. My	4	-2004.57	2	-5		
			Max. Vy	3	9.73	9	-2		
		Leg	Max. Vx	4	2.90	0	0		
			Max Tension	3	42752.70	-690	-35		
			Max. Compression	3	-46825.61	772	-38		
			Max. Mx	3	-46825.61	772	-38		
			Max. My	3	-1356.91	-37	-536		
			Max. Vy	3	-305.98	772	-38		
T12	18.5 - 14	Diagonal	Max. Vx	3	-310.75	-37	-536		
			Max Tension	4	1895.81	0	0		
			Max. Compression	4	-2013.77	0	0		
			Max. Mx	3	794.16	9	-3		
			Max. My	4	-1299.50	6	-5		
			Max. Vy	3	-1299.50	6	-5		

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T13	14 - 9	Leg	Max. Vy	3	10.83	9	-3
			Max. Vx	4	2.78	0	0
			Max Tension	3	46539.99	-690	-35
			Max. Compression	3	-50979.15	-646	-25
			Max. Mx	3	-50921.16	772	-38
			Max. My	3	-1838.18	-66	-812
		Diagonal	Max. Vy	3	419.20	772	-38
			Max. Vx	3	330.30	-66	-812
			Max Tension	3	2077.70	0	0
			Max. Compression	3	-2056.14	0	0
			Max. Mx	3	253.29	17	-9
			Max. My	3	-2031.41	13	-13
T14	9 - 6.7	Leg	Max. Vy	3	17.13	17	-9
			Max. Vx	3	5.23	0	0
			Max Tension	3	47221.55	495	-13
			Max. Compression	3	-51703.48	976	-22
			Max. Mx	3	-51703.48	976	-22
			Max. My	3	-1889.70	-67	-812
		Diagonal	Max. Vy	3	-763.58	976	-22
			Max. Vx	3	-348.63	-67	-812
			Max Tension	3	2093.14	0	0
			Max. Compression	3	-2224.80	0	0
			Max. Mx	3	-629.18	-12	0
			Max. My	3	407.09	0	1
T15	6.7 - 0	Inner Bracing	Max. Vy	3	12.84	0	0
			Max. Vx	3	-1.62	0	0
			Max Tension	3	49.87	0	0
			Max. Compression	3	-77.50	0	0
			Max. Mx	1	-13.67	-21	0
			Max. My	3	49.08	0	0
		Leg	Max. Vy	1	19.64	0	0
			Max. Vx	3	0.02	0	0
			Max Tension	3	47023.30	0	0
			Max. Compression	3	-51594.35	0	0
			Max. Mx	3	-51585.72	976	-22
			Max. My	3	-2007.66	28	325
T15	6.7 - 0	Diagonal	Max. Vy	3	351.15	976	-22
			Max. Vx	3	-274.60	28	-193
			Max Tension	4	3503.24	0	0
			Max. Compression	4	-3812.98	0	0
			Max. Mx	4	3503.24	-39	0
			Max. My	2	622.90	0	8
		Horizontal	Max. Vy	4	20.29	0	0
			Max. Vx	2	-4.09	0	0
			Max Tension	3	760.20	20	-2
			Max. Compression	3	-840.24	7	-1
			Max. Mx	2	490.38	22	0
			Max. My	2	-489.24	14	-3
T15	6.7 - 0	Horizontal	Max. Vy	2	-23.89	22	0
			Max. Vx	2	2.73	13	-3

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## Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical kg	Horizontal, X kg	Horizontal, Z kg
Leg D	Max. Vert	1	2859.76	335.63	-301.19
	Max. H <sub>X</sub>	1	2859.76	335.63	-301.19
	Max. H <sub>Z</sub>	3	-51093.42	-6386.12	5846.29
	Min. Vert	3	-51093.42	-6386.12	5846.29
	Min. H <sub>X</sub>	3	-51093.42	-6386.12	5846.29
	Min. H <sub>Z</sub>	1	2859.76	335.63	-301.19
Leg C	Max. Vert	4	36698.14	-5185.78	-3421.59
	Max. H <sub>X</sub>	2	-31836.33	3453.65	4186.41
	Max. H <sub>Z</sub>	2	-31836.33	3453.65	4186.41
	Min. Vert	2	-31836.33	3453.65	4186.41
	Min. H <sub>X</sub>	4	36698.14	-5185.78	-3421.59
	Min. H <sub>Z</sub>	4	36698.14	-5185.78	-3421.59
Leg B	Max. Vert	3	56344.01	-6342.33	7004.98
	Max. H <sub>X</sub>	1	2610.16	-290.46	324.91
	Max. H <sub>Z</sub>	3	56344.01	-6342.33	7004.98
	Min. Vert	1	2610.16	-290.46	324.91
	Min. H <sub>X</sub>	3	56344.01	-6342.33	7004.98
	Min. H <sub>Z</sub>	1	2610.16	-290.46	324.91
Leg A	Max. Vert	2	37311.06	3909.30	4944.40
	Max. H <sub>X</sub>	2	37311.06	3909.30	4944.40
	Max. H <sub>Z</sub>	2	37311.06	3909.30	4944.40
	Min. Vert	4	-31226.24	-3650.14	-3741.14
	Min. H <sub>X</sub>	4	-31226.24	-3650.14	-3741.14
	Min. H <sub>Z</sub>	4	-31226.24	-3650.14	-3741.14

## Tower Mast Reaction Summary

Load Combination	Vertical kg	Shear <sub>x</sub> kg	Shear <sub>z</sub> kg	Overturning Moment, M <sub>x</sub> kg-m	Overturning Moment, M <sub>z</sub> kg-m	Torque kg-m
Dead Only	10939.98	-0.00	-0.05	3374	-1514	0
Dead+Wind 0 deg - No Ice	10939.97	236.39	-18550.31	-524990	-9842	-2226
Dead+Wind 45 deg - No Ice	10939.97	13921.06	-14425.85	-404432	-395977	8973
Dead+Wind 90 deg - No Ice	10939.97	17836.40	-236.38	-4920	-510957	13790
Dead+Wind 0 deg - Service	10939.98	59.10	-4637.60	-128715	-3598	-556
Dead+Wind 45 deg - Service	10939.98	3480.27	-3606.48	-98574	-100131	2244
Dead+Wind 90 deg - Service	10939.98	4459.12	-59.10	1300	-128876	3448

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX kg	PY kg	PZ kg	PX kg	PY kg	PZ kg	
1	0.00	-10939.98	0.00	0.00	10939.98	0.05	0.000%
2	236.39	-10939.98	-18550.85	-236.39	10939.97	18550.31	0.003%
3	13921.45	-10939.98	-14426.26	-13921.06	10939.97	14425.85	0.002%
4	17836.93	-10939.98	-236.39	-17836.40	10939.97	236.38	0.003%
5	59.10	-10939.98	-4637.71	-59.10	10939.98	4637.60	0.001%
6	3480.36	-10939.98	-3606.57	-3480.27	10939.98	3606.48	0.001%
7	4459.23	-10939.98	-59.10	-4459.12	10939.98	59.10	0.001%

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## Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00010654
2	Yes	8	0.00000001	0.00012680
3	Yes	8	0.00000001	0.00012827
4	Yes	8	0.00000001	0.00012804
5	Yes	8	0.00000001	0.00011918
6	Yes	8	0.00000001	0.00012085
7	Yes	8	0.00000001	0.00012180

## Maximum Tower Deflections - Service Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	48 - 40	67.53	6	0.1469	0.0638
T2	40 - 38	46.96	6	0.1435	0.0613
T3	38 - 36	41.79	6	0.1404	0.0559
T4	36 - 34	36.76	6	0.1342	0.0503
T5	34 - 32	31.98	6	0.1247	0.0446
T6	32 - 30	27.52	6	0.1180	0.0393
T7	30 - 28	23.24	6	0.1086	0.0341
T8	28 - 26	19.34	6	0.0967	0.0291
T9	26 - 24	16.13	6	0.0832	0.0237
T10	24 - 22	13.37	6	0.0716	0.0199
T11	22 - 18.5	10.94	6	0.0612	0.0163
T12	18.5 - 14	7.42	6	0.0476	0.0118
T13	14 - 9	3.98	6	0.0333	0.0076
T14	9 - 6.7	1.49	6	0.0177	0.0051
T15	6.7 - 0	0.66	6	0.0139	0.0043

## Critical Deflections and Radius of Curvature - Service Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
50.5000	ANT PANEL 1.0x0.50x0.19m	6	67.53	0.1469	0.0638	445480
49.5000	ANT PANEL 1.0x0.50x0.19m	6	67.53	0.1469	0.0638	445480
48.5000	ANT PANEL 1.0x0.50x0.19m	6	67.53	0.1469	0.0638	445480
47.5000	ANT PANEL 1.0x0.50x0.19m	6	66.25	0.1469	0.0641	445480
46.5000	ANT PANEL 1.0x0.50x0.19m	6	63.69	0.1468	0.0647	445480
45.5000	ANT PANEL 1.0x0.50x0.19m	6	61.13	0.1467	0.0652	271576
40.0000	HP12-21B	6	46.96	0.1435	0.0613	177295
36.0000	ANT OMNI L=4.0m	6	36.76	0.1342	0.0503	15047
35.0000	ANT RF 0.30x1.30m	6	34.33	0.1294	0.0474	12548
33.0000	HP12-21B	6	29.72	0.1212	0.0419	16056
32.5000	1 SOP. ANT MW (E)	6	28.61	0.1196	0.0406	20044

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
32.0000	HP12-21B	6	27.52	0.1180	0.0393	23080
31.5000	1 SOP. ANT MW (E)	6	26.43	0.1160	0.0380	22036
26.0000	(2) 1 ANT TV 1.20x1.20m	6	16.13	0.0832	0.0237	9514
24.0000	(2) 1 ANT TV 1.20x1.20m	6	13.37	0.0716	0.0199	11912
23.5000	HP12-21B	6	12.73	0.0689	0.0190	12050
22.0000	(2) 1 ANT TV 1.20x1.20m	6	10.94	0.0612	0.0163	12623
20.0000	(2) 1 ANT TV 1.20x1.20m	6	8.83	0.0528	0.0135	15204
18.0000	(2) 1 ANT TV 1.20x1.20m	6	6.98	0.0460	0.0113	17693
15.5000	ANT GRILLA TV (2.25x2.25m)	6	4.99	0.0381	0.0089	16158
13.0000	ANT GRILLA TV (2.25x2.25m)	6	3.38	0.0299	0.0069	17659
10.5000	ANT GRILLA TV (2.25x2.25m)	6	2.13	0.0216	0.0056	28838
8.0000	ANT GRILLA TV (2.25x2.25m)	6	1.09	0.0159	0.0047	20398

### Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	m	mm		°	°
T1	48 - 40	276.99	3	0.6138	0.2551
T2	40 - 38	191.23	3	0.5967	0.2453
T3	38 - 36	169.82	3	0.5811	0.2235
T4	36 - 34	149.09	3	0.5531	0.2011
T5	34 - 32	129.46	3	0.5118	0.1785
T6	32 - 30	111.18	3	0.4825	0.1573
T7	30 - 28	93.74	3	0.4433	0.1365
T8	28 - 26	77.87	3	0.3933	0.1164
T9	26 - 24	64.90	3	0.3376	0.0948
T10	24 - 22	53.73	3	0.2897	0.0797
T11	22 - 18.5	43.95	3	0.2471	0.0653
T12	18.5 - 14	29.79	3	0.1916	0.0473
T13	14 - 9	15.95	3	0.1343	0.0305
T14	9 - 6.7	5.92	3	0.0715	0.0202
T15	6.7 - 0	2.59	3	0.0559	0.0170

### Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
50.5000	ANT PANEL 1.0x0.50x0.19m	3	276.99	0.6138	0.2551	223353
49.5000	ANT PANEL 1.0x0.50x0.19m	3	276.99	0.6138	0.2551	223353
48.5000	ANT PANEL 1.0x0.50x0.19m	3	276.99	0.6138	0.2551	223353
47.5000	ANT PANEL 1.0x0.50x0.19m	3	271.64	0.6137	0.2565	223353
46.5000	ANT PANEL 1.0x0.50x0.19m	3	260.94	0.6133	0.2590	223353
45.5000	ANT PANEL 1.0x0.50x0.19m	3	250.24	0.6127	0.2609	136156
40.0000	HP12-21B	3	191.23	0.5967	0.2453	68577
36.0000	ANT OMNI L=4.0m	3	149.09	0.5531	0.2011	3685
35.0000	ANT RF 0.30x1.30m	3	139.10	0.5322	0.1898	2995
33.0000	HP12-21B	3	120.18	0.4965	0.1678	3698
32.5000	1 SOP. ANT MW (E)	3	115.66	0.4897	0.1625	4581

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	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
32.0000	HP12-21B	3	111.18	0.4825	0.1573	5257
31.5000	1 SOP. ANT MW (E)	3	106.74	0.4741	0.1520	5074
26.0000	(2) 1 ANT TV 1.20x1.20m	3	64.90	0.3376	0.0948	2329
24.0000	(2) 1 ANT TV 1.20x1.20m	3	53.73	0.2897	0.0797	2873
23.5000	HP12-21B	3	51.16	0.2786	0.0761	2913
22.0000	(2) 1 ANT TV 1.20x1.20m	3	43.95	0.2471	0.0653	3111
20.0000	(2) 1 ANT TV 1.20x1.20m	3	35.46	0.2128	0.0541	3781
18.0000	(2) 1 ANT TV 1.20x1.20m	3	28.02	0.1850	0.0452	4416
15.5000	ANT GRILLA TV (2.25x2.25m)	3	20.01	0.1537	0.0354	4017
13.0000	ANT GRILLA TV (2.25x2.25m)	3	13.56	0.1206	0.0278	4389
10.5000	ANT GRILLA TV (2.25x2.25m)	3	8.50	0.0872	0.0226	7233
8.0000	ANT GRILLA TV (2.25x2.25m)	3	4.34	0.0641	0.0189	5046

## Bolt Design Data

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
T1	48	Leg	A394T0	16	8	98.77	5536.87	0.018	1.333	Bearing
		Diagonal	A394T0	16	2	381.66	3705.44	0.103	1.333	Member Bearing
		Top Girt	A394T0	16	2	9.73	3705.44	0.003	1.333	Member Bearing
T2	40	Leg	A394T0	16	12	895.33	5536.87	0.162	1.333	Bearing
		Diagonal	A394T0	16	2	1450.96	3705.44	0.392	1.333	Member Bearing
		Top Girt	A394T0	16	2	179.28	3705.44	0.048	1.333	Member Bearing
T3	38	Diagonal	A394T0	16	2	1541.38	3705.44	0.416	1.333	Member Bearing
		Top Girt	A394T0	16	2	415.90	3705.44	0.112	1.333	Member Bearing
T4	36	Leg	A394T0	16	12	2271.02	5536.87	0.410	1.333	Bearing
		Diagonal	A394T0	16	2	1685.58	3705.44	0.455	1.333	Member Bearing
		Top Girt	A394T0	16	2	669.83	3705.44	0.181	1.333	Member Bearing
T5	34	Leg	A394T0	16	12	3215.95	9979.03	0.322	1.333	Bolt SS
		Diagonal	A394T0	16	2	1848.61	3705.44	0.499	1.333	Member Bearing
		Top Girt	A394T0	16	2	662.16	3705.44	0.179	1.333	Member Bearing
T6	32	Diagonal	A394T0	16	2	2363.84	3705.44	0.638	1.333	Member Bearing
		Top Girt	A394T0	16	2	757.25	3705.44	0.204	1.333	Member Bearing
T7	30	Leg	A394T0	16	8	8107.06	9979.03	0.812	1.333	Bolt SS
		Diagonal	A394T0	16	2	2480.59	3705.44	0.669	1.333	Member Bearing
		Top Girt	A394T0	16	2	862.41	3705.44	0.233	1.333	Member Bearing
T8	28	Leg	A394T0	16	8	9555.33	9979.03	0.958	1.333	Bolt SS
		Diagonal	A394T0	16	2	1038.19	3705.44	0.280	1.333	Member Bearing
		Top Girt	A394T0	16	2	246.45	3705.44	0.067	1.333	Member Bearing
T9	26	Diagonal	A394T0	16	2	591.40	3705.44	0.160	1.333	Member Bearing
T10	24	Leg	A394T0	16	12	7014.99	9979.03	0.703	1.333	Bolt SS
		Diagonal	A394T0	16	2	788.47	3705.44	0.213	1.333	Member Bearing



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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
T11	22	Diagonal	A394T0	16	2	1008.88	3705.44	0.272	1.333	Member Bearing
T12	18.5	Leg	A394T0	16	12	7804.29	9979.03	0.782	1.333	Bolt SS
		Diagonal	A394T0	16	2	1006.88	3705.44	0.272	1.333	Member Bearing
T13	14	Leg	A394T0	16	12	8496.51	9979.03	0.851	1.333	Bolt SS
		Diagonal	A394T0	16	2	1038.85	4940.57	0.210	1.333	Member Bearing
T14	9	Diagonal	A394T0	16	2	1112.40	4940.57	0.225	1.333	Member Bearing
T15	6.7	Leg	A394T0	16	16	6449.31	9979.03	0.646	1.333	Bolt SS
		Diagonal	A394T0	16	2	1906.49	4940.57	0.386	1.333	Member Bearing
		Horizontal	A394T0	16	2	420.12	4940.57	0.085	1.333	Member Bearing

## Compression Checks

## Leg Design Data (Compression)

Section No.	Elevation m	Size	L m	L <sub>u</sub> m	Kl/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio P P <sub>a</sub>
T1	48 - 40	L102x102x6	8.0000	2.0000	49.5 K=0.50	145	1252	-3019.85	18504.49	0.163
T2	40 - 38	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-5371.94	18504.49	0.290
T3	38 - 36	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-9339.97	18504.49	0.505
T4	36 - 34	L102x102x6	2.0000	2.0000	49.5 K=0.50	145	1252	-13626.15	18504.49	0.736
T5	34 - 32	L102x6+L102x6	2.0000	2.0000	49.5 K=0.50	168	2503	-19295.69	42986.37	0.449
T6	32 - 30	L102x6+L102x6	2.0000	2.0000	49.5 K=0.50	168	2503	-25647.12	42986.37	0.597
T7	30 - 28	L102x6+L102x6	2.0000	2.0000	49.5 K=0.50	168	2503	-32428.23	42986.37	0.754
T8	28 - 26	L102x6+L102x6	2.0188	2.0188	50.0 K=0.50	168	2503	-38221.38	42858.82	0.892
T9	26 - 24	L102x6+L102x6	2.0189	2.0189	50.0 K=0.50	168	2503	-40746.71	42858.19	0.951
T10	24 - 22	L102x6+L102x6	2.0188	2.0188	50.0 K=0.50	168	2503	-42089.89	42858.82	0.982
T11	22 - 18.5	L102x10+L102x6	3.5330	3.5330	44.1 K=0.25	174	3097	-44298.12	54952.28	0.806
T12	18.5 - 14	L102x10+L102x6	4.5424	4.5424	56.7 K=0.25	160	3097	-46825.71	50657.21	0.924
T13	14 - 9	L102x10+L102x6	5.0471	5.0471	63.0 K=0.25	153	3097	-50979.26	48316.67	1.055

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Section No.	Elevation	Size	L	L <sub>U</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T14	9 - 6.7	L127x10+L102x6	2.3217	2.3217	46.2 K=0.50	172	3581	-51703.65	62777.66	0.824
T15	6.7 - 0	L127x10+L102x6	6.7632	6.7632	53.8 K=0.20	164	3581	-51594.33	59786.67	0.863

### Diagonal Design Data (Compression)









Section No.	Elevation	Size	L	L <sub>U</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T1	48 - 40	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-763.33	2691.77	0.284
T2	40 - 38	L51x51x5	2.8284	1.3424	134.1 K=1.00	57	461	-2901.92	2691.77	1.078
T3	38 - 36	L51x51x5	2.8284	1.3424	127.4 K=0.95	63	461	-3082.76	2982.57	1.034
T4	36 - 34	L51x51x5	2.8284	1.3424	124.7 K=0.93	66	461	-3371.16	3110.88	1.084
T5	34 - 32	L64x64x5	2.8284	1.3424	106.8 K=1.00	83	582	-3697.21	4951.87	0.747
T6	32 - 30	L64x64x5	2.8284	1.3421	106.7 K=1.00	83	582	-4727.66	4953.05	0.954
T7	30 - 28	L64x64x5	2.8284	1.3421	106.7 K=1.00	83	582	-4961.17	4953.05	1.002
T8	28 - 26	L51x51x5	2.9755	1.5507	99.0 K=1.00	90	461	-2076.37	4251.87	0.488
T9	26 - 24	L51x51x5	3.2734	1.6958	108.2 K=1.00	82	461	-1182.81	3863.32	0.306
T10	24 - 22	L51x51x5	3.5888	1.8504	59.0 K=0.50	121	461	-1576.93	5682.74	0.277
T11	22 - 18.5	L64x64x5	4.9675	2.6529	67.1 K=0.50	115	582	-2017.76	6843.17	0.295
T12	18.5 - 14	L64x64x5	6.2306	3.3598	85.0 K=0.50	102	582	-2013.76	6050.43	0.333
T13	14 - 9	L64x64x6	7.2385	3.8866	199.0 K=1.00	26	768	-2056.14	2035.84	1.010
T14	9 - 6.7	L64x64x6	3.6684	3.6029	144.4 K=0.50	49	768	-2224.80	3863.20	0.576
T15	6.7 - 0	L76x76x6	7.6936	7.5644	166.0 K=0.33	37	929	-3812.98	3539.30	1.077

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### Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P/P <sub>a</sub>
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	
T15	6.7 - 0	L76x76x6	6.1460	3.0095	127.4 K=1.00	63	929	-840.24	6009.28	0.140 

### Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P/P <sub>a</sub>
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	
T1	48 - 40	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-19.46	2679.95	0.007 
T2	40 - 38	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-297.57	2679.95	0.111 
T3	38 - 36	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-715.55	2679.95	0.267 
T4	36 - 34	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-1207.49	2679.95	0.451 
T5	34 - 32	L64x64x5	2.0000	1.8984	151.0 K=1.00	45	582	-1204.82	2679.95	0.450 
T6	32 - 30	L64x64x5	2.0000	1.8980	151.0 K=1.00	45	582	-1391.18	2681.08	0.519 
T7	30 - 28	L64x64x5	2.0000	1.8980	151.0 K=1.00	45	582	-1579.69	2681.08	0.589 
T8	28 - 26	L64x64x5	2.0000	1.8980	151.0 K=1.00	45	582	-485.53	2681.08	0.181 

### Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P/P <sub>a</sub>
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	
T1	48 - 40	L64x64x5	2.8284	2.7268	216.9 K=1.00	22	582	-3.43	1298.93	0.003 
T8	28 - 26	L64x64x5	2.8284	2.7264	138.0 K=1.00	54	582	-92.71	3209.68	0.029 
T14	9 - 6.7	L64x64x6	4.3459	4.3459	348.5 K=1.00	8	768	-77.50	663.81	0.117 

KL/R > 250 (C) - 245

\* DL controls

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## Tension Checks

Leg Design Data (Tension)										
Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L<sub>u</sub></i> <i>m</i>	<i>KI/r</i>	<i>F<sub>a</sub></i> <i>MPa</i>	<i>A</i> <i>mm<sup>2</sup></i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P<sub>a</sub></i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T1	48 - 40	L102x102x6	8.0000	2.0000	63.0	224	1009	2613.29	23063.59	0.113
T2	40 - 38	L102x102x6	2.0000	2.0000	63.0	224	1009	4992.24	23063.59	0.216
T3	38 - 36	L102x102x6	2.0000	2.0000	63.0	207	1252	8296.89	26399.08	0.314
T4	36 - 34	L102x102x6	2.0000	2.0000	63.0	224	1009	12466.45	23063.59	0.541
T5	34 - 32	L102x6+L102x6	2.0000	2.0000	99.0	207	2503	17910.92	52798.17	0.339
T6	32 - 30	L102x6+L102x6	2.0000	2.0000	99.0	207	2503	23718.53	52798.17	0.449
T7	30 - 28	L102x6+L102x6	2.0000	2.0000	99.0	207	2503	30466.54	52798.17	0.577
T8	28 - 26	L102x6+L102x6	2.0188	2.0188	100.0	207	2503	35843.33	52798.17	0.679
T9	26 - 24	L102x6+L102x6	2.0189	2.0189	100.0	207	2503	37839.37	52798.17	0.717
T10	24 - 22	L102x6+L102x6	2.0188	2.0188	100.0	207	2503	38854.15	52798.17	0.736
T11	22 - 18.5	L102x10+L102x6	3.5330	3.5330	176.5	207	3097	40407.93	65317.32	0.619
T12	18.5 - 14	L102x10+L102x6	4.5424	4.5424	226.9	207	3097	42752.68	65317.32	0.655
T13	14 - 9	L102x10+L102x6	5.0471	5.0471	252.2	207	3097	46539.95	65317.32	0.713
T14	9 - 6.7	L127x10+L102x6	2.3217	2.3217	92.3	207	3581	47221.70	75523.15	0.625
T15	6.7 - 0	L127x10+L102x6	6.7632	6.7632	269.0	207	3581	47023.48	75523.15	0.623

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### Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T1	48 - 40	L51x51x5	2.8284	1.3424	128.5	200	278	754.38	5664.74	0.133
T2	40 - 38	L51x51x5	2.8284	1.3424	128.5	200	278	2662.26	5664.74	0.470
T3	38 - 36	L51x51x5	2.8284	1.3424	128.5	200	278	2837.29	5664.74	0.501
T4	36 - 34	L51x51x5	2.8284	1.3424	128.5	200	278	3130.58	5664.74	0.553
T5	34 - 32	L64x64x5	2.8284	1.3424	101.9	200	368	3512.66	7509.63	0.468
T6	32 - 30	L64x64x5	2.8284	1.3421	101.9	200	368	4497.09	7509.63	0.599
T7	30 - 28	L64x64x5	2.8284	1.3421	101.9	200	368	4706.70	7509.63	0.627
T8	28 - 26	L51x51x5	2.9755	1.5507	140.0	200	278	1835.53	5664.74	0.324
T9	26 - 24	L51x51x5	3.2734	1.6958	154.4	200	278	1149.64	5664.74	0.203
T10	24 - 22	L51x51x5	3.5888	1.8504	169.6	200	278	1535.73	5664.74	0.271
T11	22 - 18.5	L64x64x5	4.9675	2.6529	189.2	200	368	1978.22	7509.63	0.263
T12	18.5 - 14	L64x64x5	6.2306	3.3598	238.9	200	368	1895.81	7509.63	0.252
T13	14 - 9	L64x64x6	7.2385	3.8866	281.2	200	485	2077.70	9887.86	0.210
T14	9 - 6.7	L64x64x6	3.6684	3.6029	184.5	200	485	2093.14	9887.86	0.212
T15	6.7 - 0	L76x76x6	7.6936	7.5644	320.2	200	606	3503.24	12354.27	0.284

### Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L <sub>u</sub>	KI/r	F <sub>a</sub>	A	Actual P	Allow. P <sub>a</sub>	Ratio P
	m		m	m		MPa	mm <sup>2</sup>	kg	kg	P <sub>a</sub>
T15	6.7 - 0	L76x76x6	6.1460	3.0095	127.4	200	606	760.20	12354.27	0.062

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m V=120KPH	<b>Page</b> 56 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

### Top Girt Design Data (Tension)

Section No.	Elevation m	Size	L m	L <sub>u</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio $\frac{P}{P_a}$
T1	48 - 40	L64x64x5	2.0000	1.8984	96.1	200	368	12.51	7509.63	0.002
T2	40 - 38	L64x64x5	2.0000	1.8984	96.1	200	368	358.55	7509.63	0.048
T3	38 - 36	L64x64x5	2.0000	1.8984	96.1	200	368	831.80	7509.63	0.111
T4	36 - 34	L64x64x5	2.0000	1.8984	96.1	200	368	1339.67	7509.63	0.178
T5	34 - 32	L64x64x5	2.0000	1.8984	96.1	200	368	1324.32	7509.63	0.176
T6	32 - 30	L64x64x5	2.0000	1.8980	96.0	200	368	1514.50	7509.63	0.202
T7	30 - 28	L64x64x5	2.0000	1.8980	96.0	200	368	1724.83	7509.63	0.230
T8	28 - 26	L64x64x5	2.0000	1.8980	96.0	200	368	492.91	7509.63	0.066

### Inner Bracing Design Data (Tension)

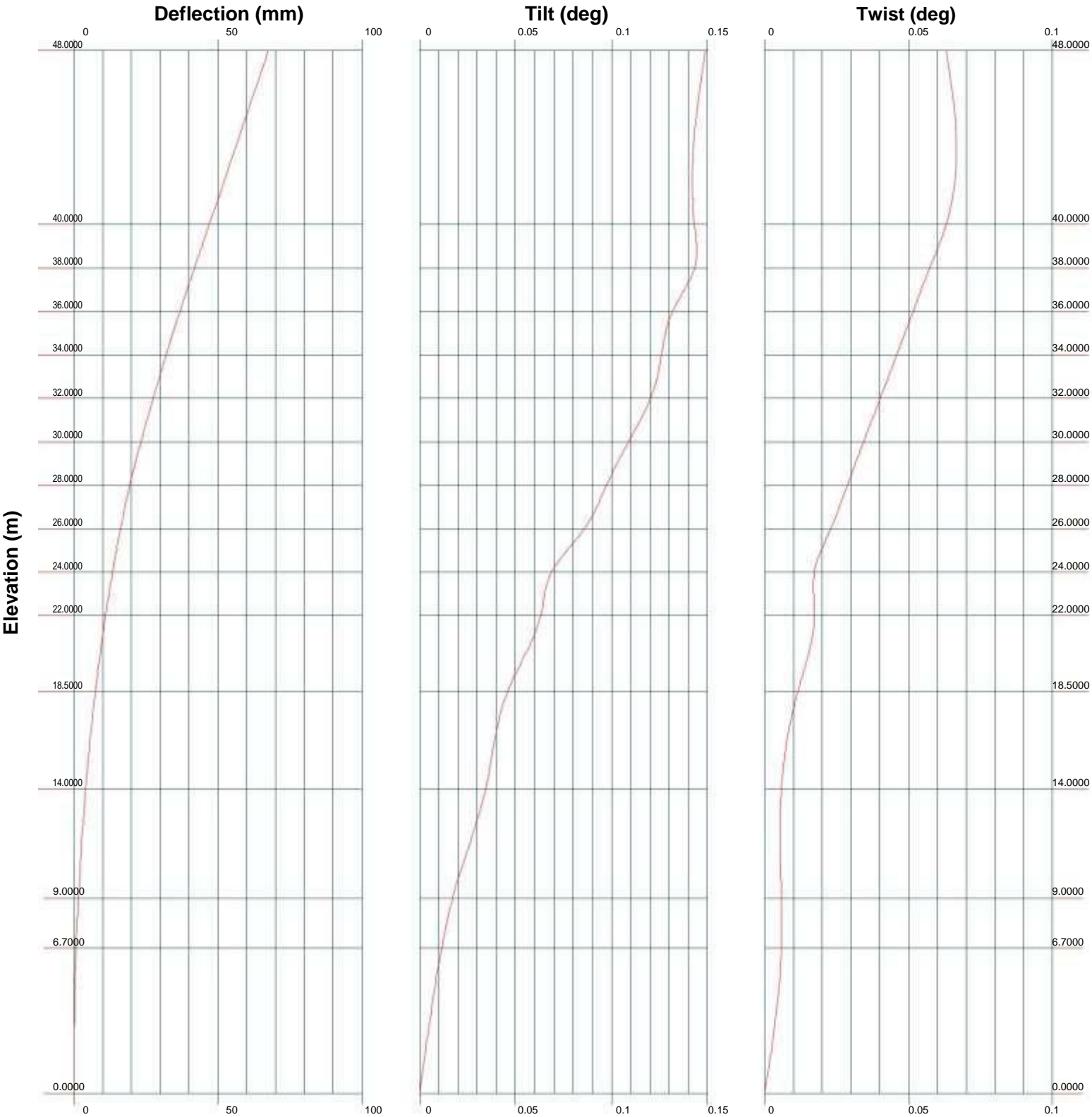
Section No.	Elevation m	Size	L m	L <sub>u</sub> m	KI/r	F <sub>a</sub> MPa	A mm <sup>2</sup>	Actual P kg	Allow. P <sub>a</sub> kg	Ratio $\frac{P}{P_a}$
T2	40 - 38	L64x64x5	2.8284	2.7268	138.0	149	582	30.24	8837.43	0.003*
T3	38 - 36	L64x64x5	2.8284	2.7268	138.0	149	582	59.49	8837.43	0.007*
T4	36 - 34	L64x64x5	2.8284	2.7268	138.0	149	582	67.05	8837.43	0.008*
T5	34 - 32	L64x64x5	2.8284	2.7268	138.0	149	582	60.25	8837.43	0.007*
T6	32 - 30	L64x64x5	2.8284	2.7264	138.0	149	582	63.08	8837.43	0.007*
T7	30 - 28	L64x64x5	2.8284	2.7264	138.0	149	582	70.07	8837.43	0.008*
T8	28 - 26	L64x64x5	2.8284	2.7264	138.0	149	582	89.85	8837.43	0.010
T14	9 - 6.7	L64x64x6	4.3459	4.3459	222.5	149	768	49.87	11659.14	0.004

\* DL controls

<b>RISATower</b>  <b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job</b> TORRE SECCION CUADRADA H=40+10m EXT. PATA 7.45m - V=120KPH	<b>Page</b> 57 of 57
	<b>Project</b> EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.	<b>Date</b> 13:47:12 04/25/16
	<b>Client</b> RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Designed by</b> Ing. C. Londoño M.

## Section Capacity Table

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P <sub>allow</sub> kg	% Capacity	Pass Fail
T1	48 - 40	Leg	L102x102x6	3	-3019.85	24666.48	12.2	Pass
		Diagonal	L51x51x5	12	-763.33	3588.13	21.3	Pass
		Top Girt	L64x64x5	9	-19.46	3572.37	0.5	Pass
T2	40 - 38	Leg	L102x102x6	45	-5371.94	24666.48	21.8	Pass
		Diagonal	L51x51x5	54	-2901.92	3588.13	80.9	Pass
		Top Girt	L64x64x5	52	-297.57	3572.37	8.3	Pass
T3	38 - 36	Leg	L102x102x6	63	-9339.97	24666.48	37.9	Pass
		Diagonal	L51x51x5	72	-3082.76	3975.76	77.5	Pass
		Top Girt	L64x64x5	70	-715.55	3572.37	20.0	Pass
T4	36 - 34	Leg	L102x102x6	81	-13626.15	24666.48	55.2	Pass
		Diagonal	L51x51x5	92	-3371.16	4146.80	81.3	Pass
		Top Girt	L64x64x5	88	-1207.49	3572.37	33.8	Pass
T5	34 - 32	Leg	L102x6+L102x6	99	-19295.69	57300.83	33.7	Pass
		Diagonal	L64x64x5	108	-3697.21	6600.84	56.0	Pass
		Top Girt	L64x64x5	106	-1204.82	3572.37	33.7	Pass
T6	32 - 30	Leg	L102x6+L102x6	117	-25647.12	57300.83	44.8	Pass
		Diagonal	L64x64x5	126	-4727.66	6602.41	71.6	Pass
		Top Girt	L64x64x5	124	-1391.18	3573.87	38.9	Pass
		Inner Bracing	L64x64x5	120	63.08	8837.43	0.7	Pass
T7	30 - 28	Leg	L102x6+L102x6	135	-32428.23	57300.83	56.6	Pass
		Diagonal	L64x64x5	146	-4961.17	6602.41	75.1	Pass
		Top Girt	L64x64x5	139	-1579.69	3573.87	44.2	Pass
		Inner Bracing	L64x64x5	138	70.07	8837.43	0.8	Pass
T8	28 - 26	Leg	L102x6+L102x6	153	-38221.38	57130.81	66.9	Pass
		Diagonal	L51x51x5	164	-2076.37	5667.74	36.6	Pass
		Top Girt	L64x64x5	157	-485.53	3573.87	13.6	Pass
		Inner Bracing	L64x64x5	155	-92.71	4278.51	2.2	Pass
T9	26 - 24	Leg	L102x6+L102x6	171	-40746.71	57129.96	71.3	Pass
		Diagonal	L51x51x5	174	-1182.81	5149.81	23.0	Pass
T10	24 - 22	Leg	L102x6+L102x6	183	-42089.89	57130.81	73.7	Pass
		Diagonal	L51x51x5	186	-1576.93	7575.10	20.8	Pass
T11	22 - 18.5	Leg	L102x10+L102x6	195	-44298.12	73251.38	60.5	Pass
		Diagonal	L64x64x5	198	-2017.76	9121.94	22.1	Pass
T12	18.5 - 14	Leg	L102x10+L102x6	207	-46825.71	67526.06	69.3	Pass
		Diagonal	L64x64x5	210	-2013.76	8065.22	25.0	Pass
T13	14 - 9	Leg	L102x10+L102x6	219	-50979.26	64406.12	79.2	Pass
		Diagonal	L64x64x6	222	-2056.14	2713.78	75.8	Pass
T14	9 - 6.7	Leg	L127x10+L102x6	231	-51703.65	83682.61	61.8	Pass
		Diagonal	L64x64x6	237	-2224.80	5149.65	43.2	Pass
		Inner Bracing	L64x64x6	245	-77.50	884.85	8.8	Pass
T15	6.7 - 0	Leg	L127x10+L102x6	251	-51594.33	79695.62	64.7	Pass
		Diagonal	L76x76x6	254	-3812.98	4717.89	80.8	Pass
		Horizontal	L76x76x6	233	-840.24	8010.38	10.5	Pass
							Summary	
							Leg (T13)	79.2 Pass
							Diagonal (T4)	81.3 Pass
							Horizontal (T15)	10.5 Pass
							Top Girt (T7)	44.2 Pass
							Bolt Checks	71.8 Pass
							<b>RATING =</b>	<b>81.3 Pass</b>



<b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204.  BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	<b>Job:</b> <b>DIAGRAMA DE DEFLEXIONES-TC40+10m EXT. PATA 7.45m - V=120KPH</b>		
	<b>EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.</b>		
	<b>Client:</b>	RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.	<b>Drawn by:</b> Ing. C. Londoño M.
	<b>Path:</b>	TIA/EIA-222-F	04/25/16
			<b>App'd:</b> <b>Scale:</b> NTS <b>Dwg No.</b> E-5



# Feedline Distribution Chart

0.0000 - 48.0000

Round

Flat

App In Face

App Out Face

Truss Leg

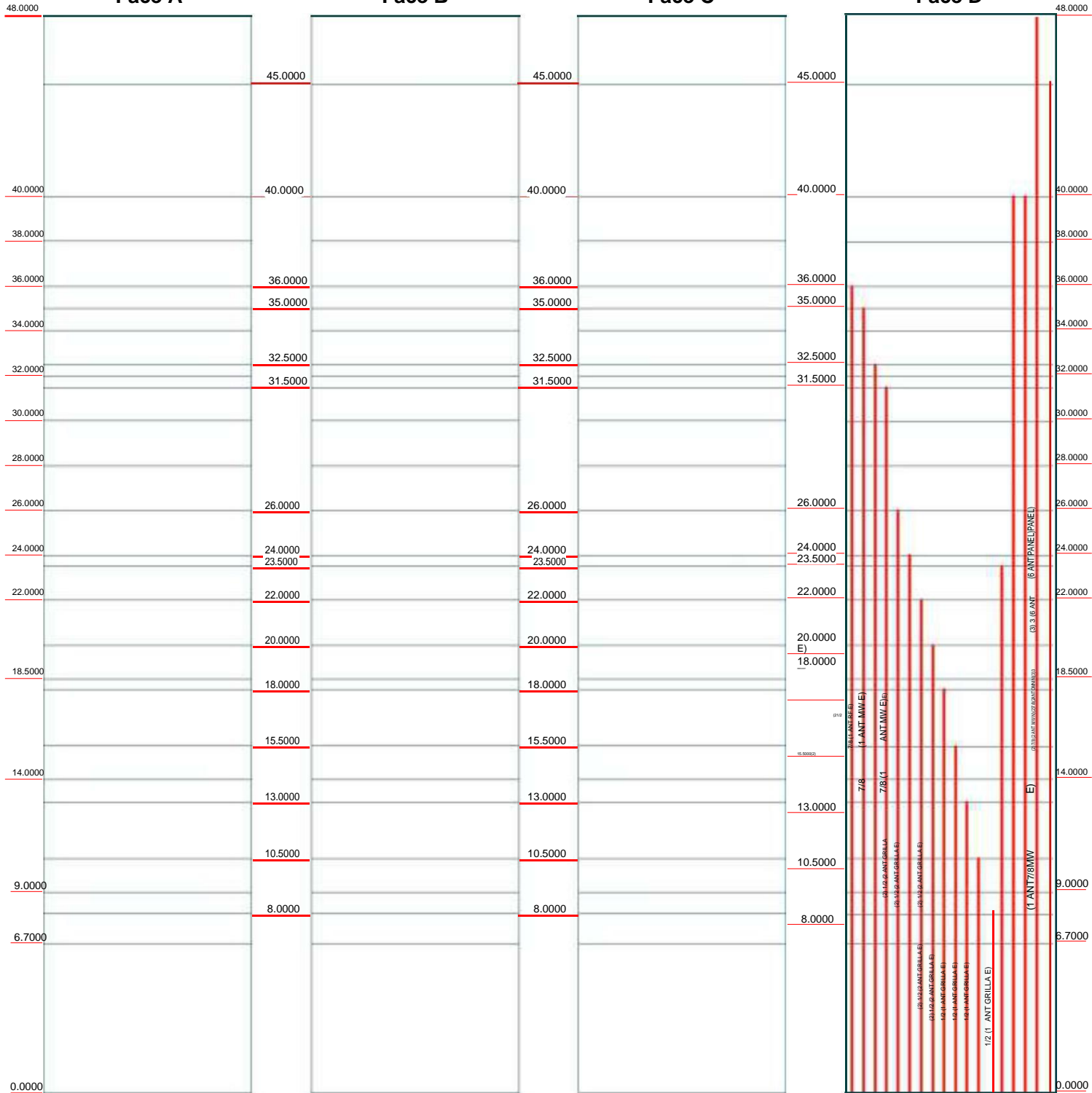
Face A

Face B

Face C

Face D

Elevation (m)



**BTESA BROAD TELECOM**  
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BOGOTA D.C. - COLOMBIA.  
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FAX: 57 (1) 2740536.

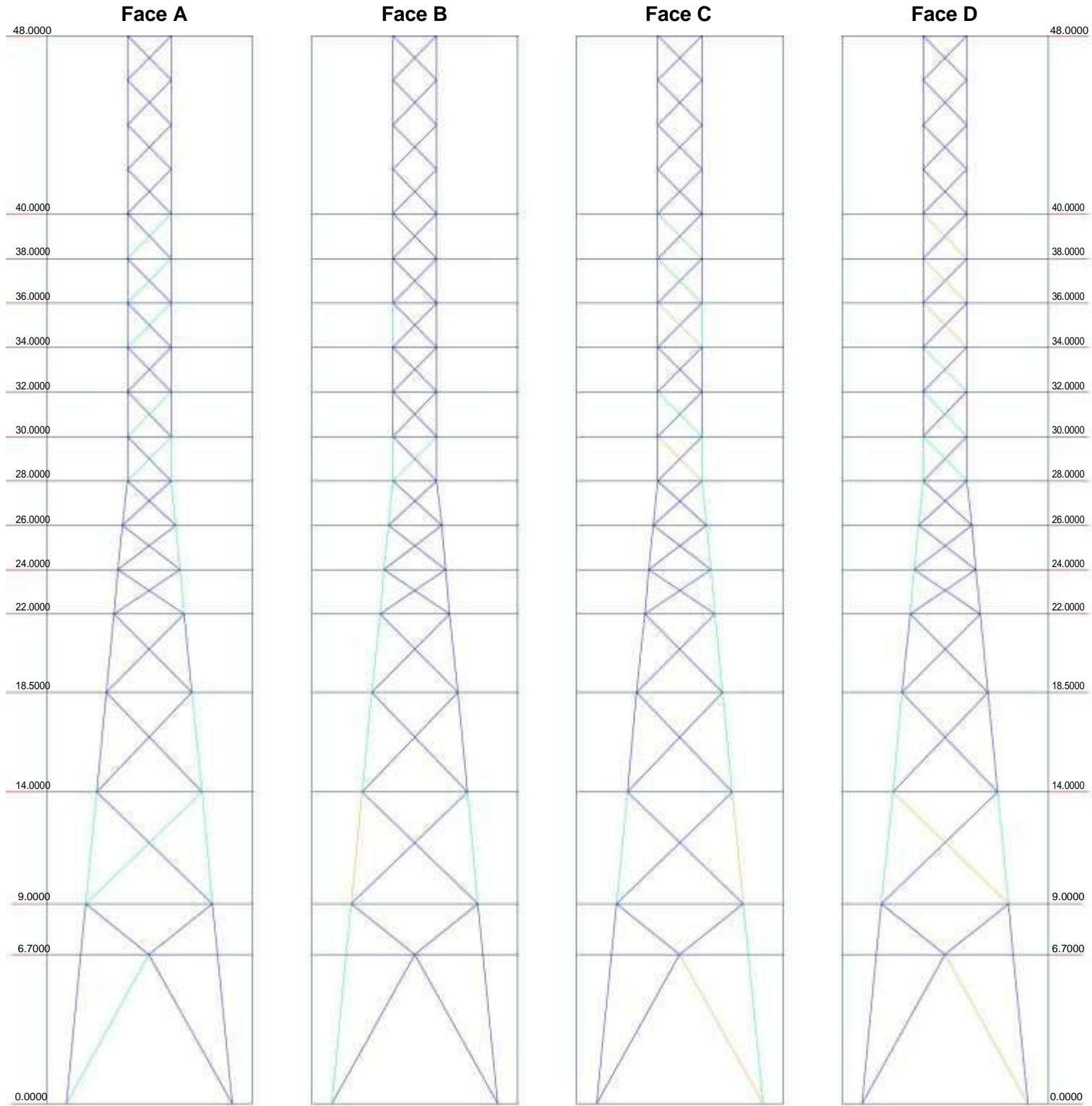
Job: **DIAGRAMA CABLES GUIA DE ONDA-TC40+10m EXT. PATA 7.45m - V=120KPH**  
EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.  
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.  
TIA/EIA-222-F  
Path:  
Drawn by: Ing. C. Londoño M.  
04/25/16  
Scale: NTS  
App'd:  
Dwg No. **E-7**

# Stress Distribution Chart

0.0000 - 48.0000

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

Elevation (m)



<b>BTESA BROAD TELECOM</b> Calle 129 No. 8 - 08 - Oficina 204. BOGOTA D.C. - COLOMBIA. Phone: 57 (1) 2740536. FAX: 57 (1) 2740536.	Job: <b>DIAGRAMA DE ESFUERZOS-TC40+10m EXT. PATA 7.45m - V=120KPH</b>		
	EVALUACION ESTRUCTURAL - ESTACION: CERRO MONTEZUMA - CONDICION NUEVA (FUTURA) + REFUERZO.		
	Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA.		Drawn by: Ing. C. Londoño M.
	TIA/EIA-222-F		04/25/16
	Path:		Scale: NTS Dwg No. E-8



Bogotá, D.C., 25 de Abril de 2016.

### MEMORIAL DE RESPONSABILIDAD.

Yo, CARLOS EDUARDO LONDOÑO MESA, Ingeniero Civil, debidamente Titulado e inscrito con matrícula profesional No. 25202-37439 CND, he realizado LA EVALUACION ESTRUCTURAL PARA UNA TORRE CUADRADA DE SECCION VARIABLE de 40.0 metros de altura, con ancho entre patas de 7.45 metros, Localizada en **LA ESTACION: CERRÓ MONTEZUMA** – Municipio de Pueblo Rico, Departamento de Risaralda, para una velocidad de viento de 120 Kph, que soporta antenas de MW y Omni.

La evaluación y recomendaciones han sido hechas siguiendo los parámetros establecidos en la NORMA TIA/EIA-222-F y las NORMAS COLOMBIANAS DE DISEÑO Y CONSTRUCCIÓN SISMO-RESISTENTE, NSR-10.

Por lo tanto, asumo la responsabilidad por los perjuicios que puedan ocasionar los diseños presentados y exonero a: Radio Televisión Nacional de Colombia (RTVC) de cualquier eventualidad referente a la evaluación de dicha estructura, bajo las condiciones anteriormente expuestas y descritas en la memoria de cálculo.

ATENTAMENTE.,

ING. Carlos Eduardo Londoño Mesa.  
MAT.PROF. 25202 - 37439 CND.

