



ESTACION : MONTERIA



EVALUACIÓN ESTRUCTURAL

ESTACIÓN MONTERIA

TORRE CUADRADA DE SECCIÓN VARIABLE

ALTURA 100m

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MATRICULA No 25202-45957 CND

Enero 23 de 2011

ESPECIFICACION GENERAL

INTRODUCCIÓN

En el éste documento se describe la memoria de la evaluación estructural de la torre auto soportada cuadrada de sección variable con una altura de 100 m ubicada en la estación MONTERIA - RTVC, en el municipio de Ciénaga de Oro - Córdoba. Para el análisis se utilizó velocidad de viento de diseño de 120 Km/h. y velocidad de servicio de 60 Km/h

En una primera parte se incluye la descripción de la estructura estudiada, luego los criterios básicos para el análisis y el diseño, evaluación de cargas, y por último el listado de datos de entrada y de salida del programa RISA Tower.

La evaluación estructural fue realiza de acuerdo con los datos de campo levantados en la estación base MONTERIA, cualquier cambio de cargas a la estructura, genera un estudio diferente. La torre en estudio tiene instaladas antenas para la transmisión de señal de televisión.

DESCRIPCIÓN DE LA ESTRUCTURA EXISTENTE

La torre actual está conformada por una estructura tronco piramidal de base cuadrada y sección variable. Arranca con una sección en la base de 11.95 m entre ejes y va reduciendo su sección con una pendiente constante hasta la altura de 56.50 m con sección de 2.80 m, y a partir de esta sección continua un tramo de sección constante de 2.80 m entre ejes y hasta la altura de 79 m. A partir de esta altura, la torre comienza una transición tronco piramidal de 3.00 m hasta la altura de 82 m, donde la sección transversal es de 1.22 m entre ejes, a partir de esta sección continua un tramo de sección constante de 1.22 m entre ejes y hasta la altura de 92 m A partir de esta altura, la torre comienza una transición tronco piramidal de 3.00 m hasta la altura de 95 m, donde la sección transversal es de .055 m entre ejes. A partir de esta altura, la sección de la torre es constante de 0.55 m hasta la parte superior hasta la altura de 100 m.

La torre cuenta con las siguientes plataforma de descanso

- Nivel +11.85 m
- Nivel + 29.50 m
- Nivel + 43.00 m
- Nivel + 56.50 m
- Nivel + 66.50 m
- Nivel + 79.00 m
- Nivel + 83.50 m

Para el mantenimiento, la estructura cuenta con una escalera de acceso, con guardacuerpo.

La escalera Guia Onda se encuentran una instalada, con un ancho de 60 cm.

CONDICIONES DE CARGA

CARGAS ACTUALES DE LA TORRE

(ESTADO ACTUAL)

De acuerdo con los requerimientos del cliente, la hipótesis de carga en que se encuentra la estructura actualmente, se le realiza la evaluación estructural en un análisis para una velocidad de viento de diseño de 120 kph.

De acuerdo con el Estado Actual las cargas de la torre estan de la siguiente manera:

UBICACIÓN	CANT.	TIPO DE ANTENA	DIMENSIONES	NIVEL
CARA A	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA B	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA C	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA D	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA A	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA B	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA C	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA D	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA D	1	ANTENA PARABOLICA MW	Diametro de 2.40 m	Nivel +14.40 m

HIPOTESIS 1 – ESTADO ACTUAL TORRE REFORZADA

Luego del análisis y calculo de la estructura con las cargas actuales y realizando el diseño del reforzamiento de la torre se presenta su análisis y recomendaciones de reforzamiento.

El cuadro de cargas con el cual la torre funciona con su reforzamiento es el siguiente.

HIPOTESIS 1 CARGAS ACTUALES

UBICACIÓN	CANT.	TIPO DE ANTENA	DIMENSIONES	NIVEL
CARA A	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA B	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA C	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA D	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA A	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA B	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA C	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA D	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA D	1	ANTENA PARABOLICA MW	Diametro de 2.40 m	Nivel +14.40 m

HIPOTESIS 2 (CARGAS ADICIONALES FUTURAS)

En esta hipótesis se analizara la torre considerando todas las antenas y equipos existentes e instalados en ella, pero adicionalmente se considera el montaje de 20 antenas con una distribución (5-5-5-5) (cinco antenas en cada cara) banda UHF digital. (futuro) a una altura entre 95 y 100 m.

Con los requerimientos anteriores se realizara los cálculos de la torre el cual quedan sus cargas de la siguiente manera.

HIPOTESIS 2

UBICACIÓN	CANT.	TIPO DE ANTENA	DIMENSIONES	NIVEL
CARA A	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA B	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA C	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA D	3	ANTENA PANEL VHF BANDA III – 4 DIPOLOS	1.10mx2.80m	Entre + 82.70 m y 91.50 m
CARA A	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA B	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA C	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m

UBICACIÓN	CANT.	TIPO DE ANTENA	DIMENSIONES	NIVEL
CARA D	3	ANTENA PANEL VHF BANDA I – 2 DIPOLOS	1.30mx3.10m	Entre + 56.50 m y 66.20 m
CARA D	1	ANTENA PARABOLICA MW	Diametro de 2.40 m	Nivel +14.40 m
CARGAS FUTURAS				
CARA A	5	RYMSA UHF/AT 15-250 TIPO PANEL	0.48mX0.98m	Entre + 95.00m y 100.00m
CARA B	5	RYMSA UHF/AT 15-250 TIPO PANEL	0.48mX0.98m	Entre + 95.00m y 100.00m
CARA C	5	RYMSA UHF/AT 15-250 TIPO PANEL	0.48mX0.98m	Entre + 95.00m y 100.00m
CARA D	5	RYMSA UHF/AT 15-250 TIPO PANEL	0.48mX0.98m	Entre + 95.00m y 100.00m

ESPECIFICACIONES TECNICAS

MATERIALES

Para la evaluación de la torre se tuvieron en cuenta los siguientes materiales:

Perfiles Acero ASTM A-36 A-572 GR50
 Platinas Acero ASTM A-36 A-572 GR50
 Tornillos ASTM A 394 T-0

NORMAS

AISC 2010
 ASCE, report 52
 EIA/TIA Standard, EIA/TIA-222-F (1996)
 ANSI/ASCE 10-90 (1991)
 ACI 318 – 08
 NSR-98 (1998)

CARGAS SOBRE LA TORRE

CARGAS DE VIENTO

Las cargas de viento sobre la estructura fueron evaluadas y aplicadas como fuerzas horizontales concentradas en los nudos superiores e inferiores de cada una de las secciones en que se halla dividida la estructura, las cuales fueron determinadas por el diseñador. El cálculo de las cargas de viento lo realiza el software Risa Tower siguiendo la metodología establecida por la Norma *TIA/EIA-*

222-F (Structural Standard for Steel Antenna Towers and Antenna Supporting Structures¹), para lo cual, el diseñador alimenta el programa con los datos de velocidad de viento de diseño, velocidad de viento de operación, tipo de estructura, categoría de la topografía y categoría de exposición.

CARGAS DE VIENTO SOBRE ANTENAS

Para el cálculo de las cargas de viento sobre antenas y accesorios, es necesario alimentar el programa con la información del tipo y dimensiones de la antena o accesorio y la altura a la que van a estar ubicados para que éste realice los cálculos y aplique las cargas de acuerdo al procedimiento de la norma². Para el caso de estudio, se utilizó una velocidad de viento de diseño de 120km/h y una velocidad de operación de 60 km/h.

Los coeficientes de forma varían con el ángulo de incidencia del viento sobre la antena y se evalúan con base en los valores máximos indicados en los manuales *Parabolic Antennas Andrew y Allen Telecom Group*³. Para propósitos de estas memorias, se supuso que la antena está siempre orientada de tal forma que produce la mayor carga y mayor torsión sobre la estructura.

A partir de ensayos en túnel de viento realizados a sus antenas, la firma Andrew propone descomponer las acciones del viento en dos fuerzas y un momento como se muestra en la figura 1.

⁴

La fuerza F_a que actúa según el eje de la antena

La fuerza F_s que actúa perpendicular a ese eje

Un momento que se supone aplicado en un plano horizontal y actuando en un vértice.

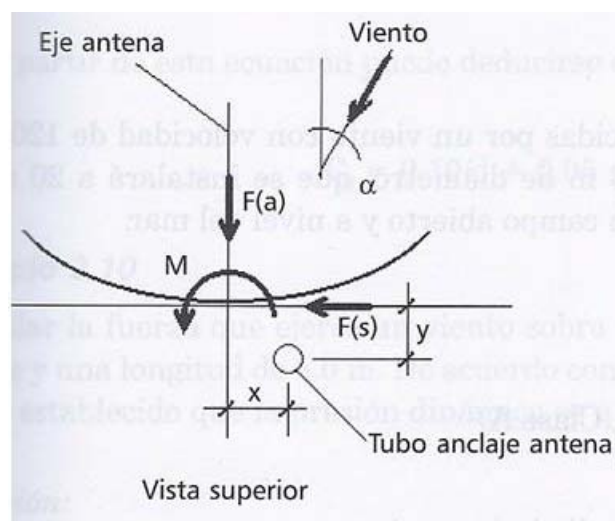


Figura 1. Acción del viento sobre antenas parabólicas

¹ Telecommunications Industry Association, TIA/EIA-222-F (revisión de la EIA/TIA- 222-F), Arlington, 1996

² RISA Technologies, RISA Tower General Reference, Foothill Ranch, California, 2010

³ Andrew Antenna Company, Wind Forces and Loads Produced by Parabolic Antennas, Bulletin 1015D, London, 1988.

⁴ Valencia Clement Gabriel, Acciones del Viento Sobre las Estructuras, Bogotá, 2002

En todos los casos, el área expuesta es el área proyectada sobre un plano normal al eje de la antena, independientemente del ángulo de incidencia del viento

La presión del viento se calculará de acuerdo con los artículos 2.3.2 y 2.3.3 del EIA Standard, es decir:

$$\text{Presión } q_z = 0.00256 \cdot k_z \cdot V^2 \text{ [1b/ft}^2\text{]; [V en MPH]}$$

$$q_z = 0.00483 \cdot k_z \cdot V^2 \text{ [kg/m}^2\text{]; [V en KPH]}$$

$$q_z = 69.552 \cdot k_z \text{ [kg/cm}^2\text{]}$$

Donde:

k_z = Coeficiente de exposición

$$K_z = [z/10]^{(2/7)} \quad z \text{ en m}$$

$$k_z < 2.58 < 2.58$$

Las fuerzas del viento sobre la torre se calcularán según artículo 2.3.2 con la siguiente ecuación:

$$\text{Fuerza del viento} \quad F = q_z \cdot G_h \cdot C_f \cdot A_e \quad (\text{Kg})$$

Donde:

C_f = Coeficiente de forma, según EIA Standard

$$C_f = 4.0 \cdot e^2 - 5.9 \cdot e + 4.0 \quad \text{art. 2.3.5}$$

$$\text{Relación de solidez} \quad e = A_n / A_t$$

A_t = Área perimetral total (m²)

A_n = Área neta expuesta (m²)

G_h = Factor de respuesta de ráfaga

$$G_h = 0.65 + 0.60 / (h/10)^{1/7} \quad \text{art. 2.3.4}$$

$$1.0 < G_h < 1.25$$

h = Altura total de la estructura (m)

Para la incidencia oblicua del viento, según ANSI⁵, el área neta oblicua será:

⁵ American National Standard Institute

$$A_{nob} = C_{ob} * A_n$$

Donde:

$C_{ob} = 0.75$ para incidencia a 60 grados

$C_{ob} = 1.00$ para incidencia normal

CARGAS DE VIENTO SEGUN NORMA NSR-98: Velocidad del viento (B.6.5)

Velocidad del viento básico $V = 120 \text{ Km/h}$

Velocidad de diseño (B.6.4-2) $V_s = V * S_1 * S_2 * S_3$

Donde:

$S_1 =$ Coeficiente de topografía $S_1 = 1.00$

$S_2 =$ Coeficiente de rugosidad del terreno (3) $S_2 = 0.99$

$S_3 =$ Coeficiente de grado de seguridad $S_3 = 1.05$

Presión Dinámica $q = 0.000048 * v_s^2 * S_4$ [KN/m²]

Donde:

$S_4 =$ Coeficiente de densidad del aire $S_4 = 0.94$

Presión ejercida sobre cualquier punto de la estructura

$$P = C_f * q$$

Donde:

$C_f =$ Coeficiente de fuerza (Tabla B.6.8-7 NSR-98)

Coeficiente de solidos de 0.25

$C_{fi} = 2.50$

$A_{e} =$ Área Frontal efectiva

$q =$ Presión dinámica = 0.4875 KN/m²

La fuerza total del viento sobre la estructura se calculara como:

$$F = C_f * q * A_e$$

Debido a que las fuerzas de viento calculadas con la metodología establecida por la Norma TIA/EIA-222-F son superiores a las calculadas mediante las ecuaciones de la Norma NSR-98, para el caso de estudio se va a seguir la metodología de la norma TIA/EIA-222-F

El área neta expuesta a la acción del viento incluye la correspondiente a los elementos estructurales, elementos redundantes, platinas, cartelas y a la escalerilla de acceso o la escalerilla para guía de onda. Se asume que una escalera, apantalla la otra.

PESO PROPIO DE LA ESTRUCTURA

El peso propio de la estructura corresponde al peso de los elementos estructurales, los cuales son calculados directamente por el software de análisis con base en el peso unitario teórico de cada uno de los perfiles utilizados, multiplicados por su longitud. Para tener en cuenta el peso aportado por elementos no estructurales tales como tornillos, platinas, elementos redundantes eclipsas y cubrejuntas de unión, galvanizado, escaleras, etc., el peso de la estructura se afecta por un factor de multiplicación del peso de 1.25

CARGAS VERTICALES

Las cargas verticales aplicadas al modelo matemático corresponden a la carga muerta, que está constituida por los elementos mencionados en el párrafo anterior, mas el peso aportado por las antenas, las plataformas de trabajo, las plataformas de descanso y los accesorios que sean instalados en la torre. Otra carga vertical que se tiene en cuenta es la carga viva, correspondiente a 3 operarios que estén trabajando simultáneamente en la estructura, con un peso por operario de 100 kg, que incluye herramienta y elementos de protección.

ANALISIS ESTRUCTURAL

El análisis y evaluación de la estructura se hará para las condiciones actuales de servicio y para las condiciones finales o proyectadas; para este último caso, se plantean análisis y calculo con modificaciones en la estructura en caso b de ser necesario.

El análisis hiperestático de la estructura se realizará por medio del software especializado para el diseño de torres de telecomunicaciones RISA Tower, que realiza de manera no lineal el análisis de primer orden y segundo orden para tener en cuenta los efectos geométricos ocasionados por los desplazamientos de la estructura. El software utiliza para sus cálculos el método de los elementos finitos basado en la solución de ecuaciones diferenciales asociadas a la geometría de la estructura, para determinar los desplazamientos en los nudos, y las fuerzas internas para cada uno de los elementos de acuerdo con las combinaciones de carga establecidas en cada hipótesis de diseño requerida.

Para cada una de las hipótesis analizadas, se presentan los listados de datos de entrada (Input) y datos de salida (Output) en el siguiente orden.

DATOS DE ENTRADA

- Listado de datos generales
- Listado de la geometría de la estructura (identificación de nudos, grupos de barras, apoyos, materiales, secciones, tornillos).
- Listado de cargas sobre los nudos de acuerdo con los sistemas de cargas.

RESULTADOS PARA LAS HIPOTESIS CONSIDERADAS

- Listado de fuerzas axiales sobre cada elemento de la estructura.
- Listado de reacciones en los apoyos.
- Listado de acciones y cargas admisibles críticas en los miembros típicos.
- Listado de desplazamientos de los nudos que conforman la estructura.

UNIDADES

Las unidades consideradas en los datos de entrada y salida son:

- Distancias en m, mm.
- Cargas en Kg
- Desplazamientos en m.
- Esfuerzos en Kgf
- Acciones y reacciones en Kg

DISEÑO DE LA ESTRUCTURA METALICA

El diseño de la estructura metálica se realizará de acuerdo con lo estipulado por las normas ANSI/EIA/TIA aplicables a las cargas de trabajo.

Si:

F_u = resistencia máxima a la tensión

F_y = esfuerzo de fluencia del material

Perfiles ASTM A-572 GR50 F_y = 3523 Kg/cm²

Perfiles ASTM A-36 F_y = 2535 Kg/cm²

Tornillo A 394 T-0 F_u = 5415 Kg/cm²

Los esfuerzos admisibles se calcularán de la siguiente manera:

Tensión: F_t = 0.50 F_u (sobre área neta)
 F_t = 0.60 F_y (sobre área bruta)

Perfiles ASTM A-36 F_t = 2277 Kg/cm²

Perfiles ASTM A-572 GR50 F_t = 3168 Kg/cm²

Flexión: F_b = 0.60 F_y * 1.333

Perfiles ASTM A-36 F_b = 2025 Kg/cm²

Perfiles ASTM A-572 GR50 F_b = 2879 Kg/cm²

Compresión: F_a , según EIA/TIA/AISC con los factores SF_1 y SF_2

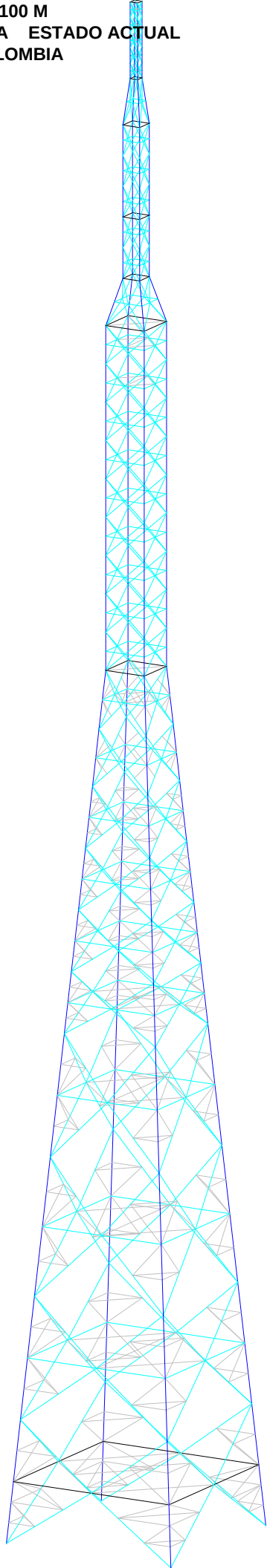
SF₁ Factor de seguridad entre 1.66 y 1.92
SF₂ Factor de seguridad igual a 23/12

La longitud efectiva y la relación de esbeltez, se calculan, de acuerdo con lo especificado en ASCE, report 52.

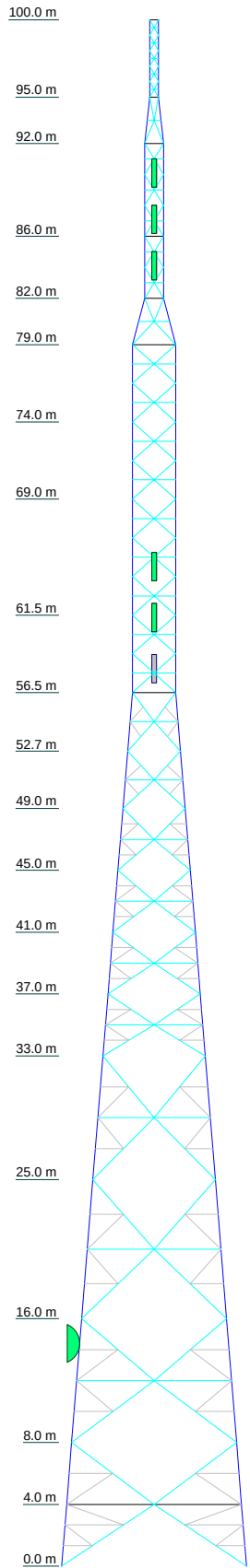
Cortante: Tornillo A 325 T-1 $F_v = 7385 \text{ Kg/cm}^2$
Aplastamiento: $F_p = 1.20 F_u$

Perfiles ASTM A-36	$F_p = 3795 \text{ Kg/cm}^2$
Perfiles ASTM A-572 GR50	$F_p = 5280 \text{ Kg/cm}^2$
Tornillo A 394 T-0	$F_p = 8862 \text{ Kg/cm}^2$

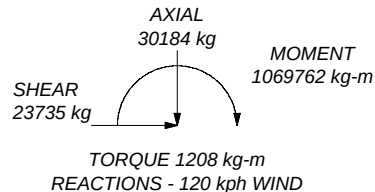
Project: TORRE CUADRADA SECCION VARIABLE DE 100 M
Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA



Section		T18	T19	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs					L152x152x16									L152x152x13	A		L102x102x8	L76x76x8		L64x64x5
Leg Grade																				
Diagonals																				
Diagonal Grade																				
Top Girts																				
Horizontal																				
Horizontal																				
Red. Horizontals																				
Red. Diagonals																				
Red. Hips																				
Inner Bracing																				
Face Width (m)	11.95	11.3022	10.6542	9.3588	7.9013	6.6058	5.958	5.3102	4.6824	4.0146	3.4154									
# Panels @ (m)			4 @ 4		2 @ 4			8 @ 2												
Weight (kg)	28558.0	2235.4	1024.0	301.6	3007.8	2028.6	1604.2	1449.4	1304.2	1203.9	1080.1	1331.0	1179.4	1764.6	1178.5	1163.5	932.3	466.3	576.6	203.8



MAX. CORNER REACTIONS AT BASE:
DOWN: 69742 kg
UPLIFT: -56859 kg
SHEAR: 11326 kg



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7	8 FT DISH	14.4

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L127x127x13	C	L64x64x6.4
B	L76x76x6.4	D	L64x64x4.8

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	345 MPa	448 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 A394 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 AWS E60XX/E70XX electrodes.
7. All welded joints and connection flanges certified for integrity an quality per AWS D1:1
8. RF antennas feeders shall be 1-5/8" and installed 48 feeders per side
9. MW dishes feeders shall be 1/2" and installed 8 feeders per side
10. TOWER RATING: 953.1%

INSTATEL COLOMBIA
Carrera 124 No 17 - 98
Bogotá - Colombia
Phone: (57-1) 547 07 90
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Job: **ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL**

Project: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

Client: **RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA**

Code: **TIA/EIA-222-F**

Path:

Drawn by: **Ing Jaime Gutierrez C.**

Date: **01/06/11**

Scale: **NTS**

Dwg No. **E-1**

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RESULTADOS HIPOTESIS 1

ESTADO ACTUAL

ESTACION : MONTERIA

Enero 5 de 2011



CONCLUSIONES Y RESULTADOS

ESTADO DE LA ESTRUCTURA

PINTURA

La pintura de estructura de la torre se encuentra en buen estado, con un problema que se encuentra manchada por los excrementos de las aves de la zona

TORQUEO

Se realizó una inspección aleatoria a la torre y se encontró que la tornillería está cumpliendo con el torque solicitado en las norma.

TORNILLERIA

Se encuentra dentro de los elementos completa

ESCALERA DE ACCESO

Se encuentra escalera de acceso pero normal cumpliendo con el mínimo ancho de la norma no tiene línea de vida, pero en su reemplazo tiene guarda cuerpo de protección.

LUCES DE OBSTRUCCION

Tienen sus luces de obstrucción e intermedias funcionando correctamente

ESTADO ACTUAL DE LA TORRE

Al realizar el análisis del cálculo estructural de la torre con las cargas actuales se llegó al siguiente resultado:

Para la velocidad de viento solicitada que es a 120 kph la estructura no está cumpliendo ya que unos elementos están trabajando a más del 100%.

Para 120 kph la estructura está trabajando a la falla de los siguientes elementos

DIAGONALES

- Del nivel +4.00 al nivel +8.00 m estas diagonales se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- Del nivel +8.00 al nivel +16.00 m estas diagonales se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- Del nivel +16.00 al nivel +25.00 m estas diagonales se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- Del nivel +25.00 al nivel +33.00 m estas diagonales se encuentra trabajando a más del 100% por lo tanto se debe reemplazar

REDUNDANTES

- El redundante diagonal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- El redundante Horizontal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- Los dos redundantes Diagonales entre en nivel +4.00 m al nivel + 8.00 m se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- Los dos redundantes Diagonales entre en nivel +8.00 m al nivel + 16.00 m se encuentra trabajando a más del 100% por lo tanto se debe reemplazar
- Los dos redundantes Diagonales entre en nivel +16.00 m al nivel + 25.00 m se encuentra trabajando a más del 100% por lo tanto se debe reemplazar

Otros elementos como redundantes y cierres intermedios que en la memoria se ven que están trabajando más del 100% estos no se deben tener en cuenta ya que el elemento como la diagonal estén sobrepasando los límites de la elongación del material estos entra a trabajar como principales y por lo tanto también fallan.

DEFLEXION DE LA TORRE

Luego de análisis de la torre en el estado actual y teniendo en cuenta la velocidad de viento de operación de 60 kph verificamos el desplazamiento de la torre está cumpliendo dentro de los parámetros establecidos.

CIMENTACION

Luego de realizado los cálculos de la evaluación de la cimentación esta cumple con capacidad portante arrancamiento y vuelco.

La cimentación para esta Hipótesis está cumpliendo al límite, por lo tanto cualquier adición de carga la cimentación se deberá entrar a reforzar

Se analizara la cimentación en el estado reforzado que es como debe quedar trabajando la torre.

ANEXO SE PRESENTA:

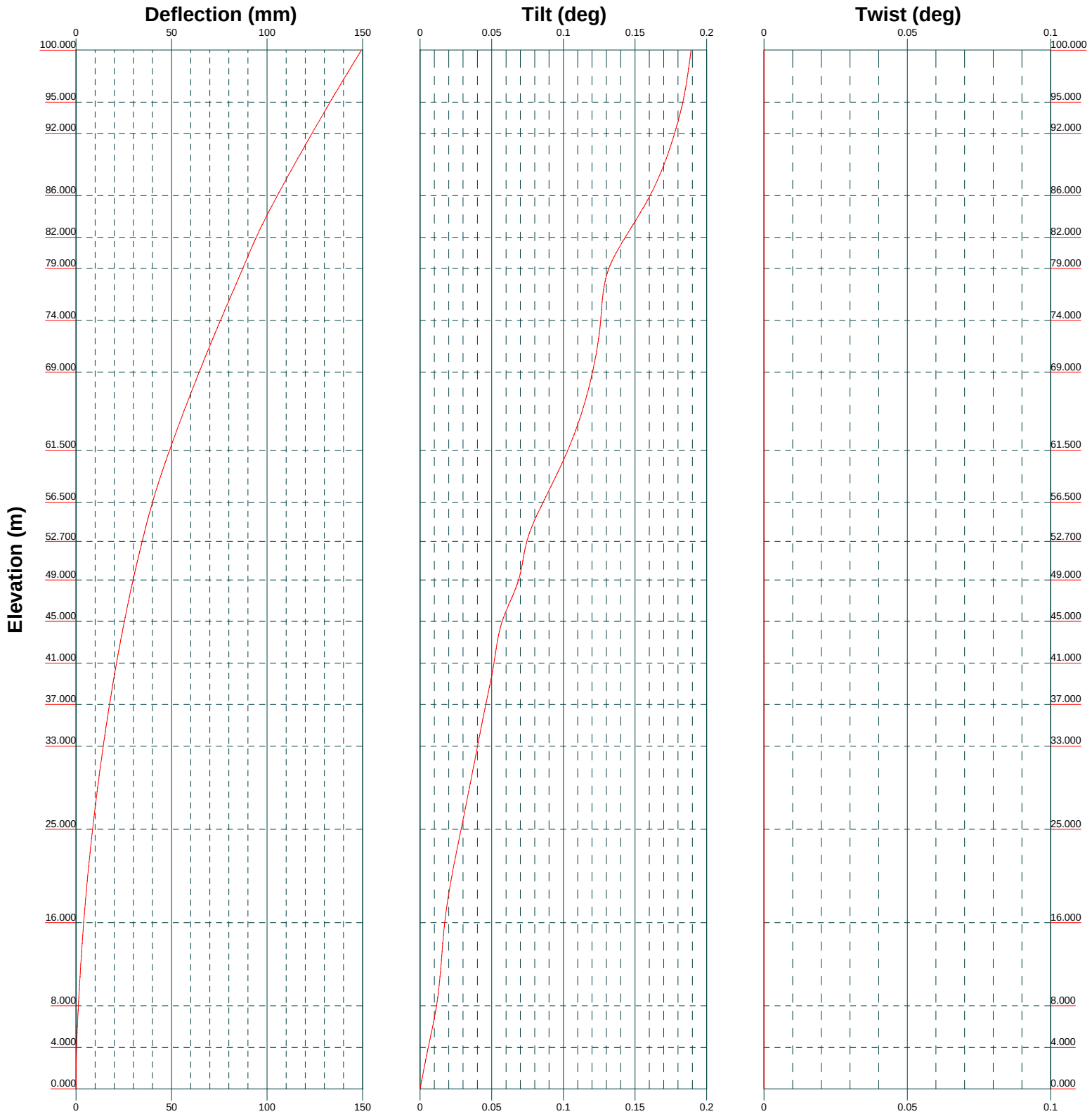
ISOMETRICO TORRE

SILUETA HIPOTESIS 1 ESTADO ACTUAL

DEFORMADA HIPOTESIS 1 ESTADO ACTUAL

CALCULO DE PLACA BASE Y PERNOS ANCLAJE

CALCULO ESTRUCTURAL HIPOTESIS 1 ESTADO ACTUAL

**INSTATEL COLOMBIA**

Carrera 124 No 17 - 98

Bogotá - Colombia

Phone: (57-1) 547 07 90

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Drawn by: Ing Jaime Gutierrez C.

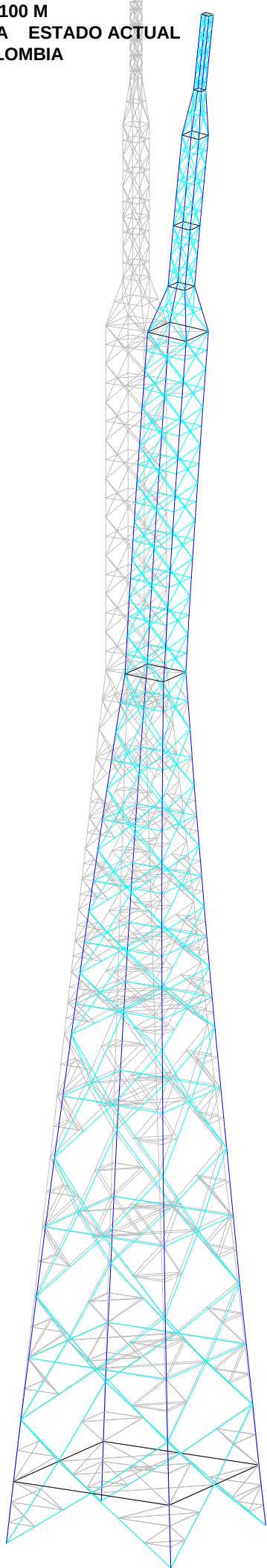
Date: 01/06/11

App'd:

Scale: NTS

Dwg No. E-5

Project: TORRE CUADRADA SECCION VARIABLE DE 100 M
Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA
LC:8 Dead+Wind 90 deg - Service
Max. Disp.129.40 mm @ 100.000 m
Scaling 40





Calculo: Ing. Jaime Gutierrez C:

Fecha: Enero 5 de 2011

ESTACION: MONTERIA

ESTADO ACTUAL

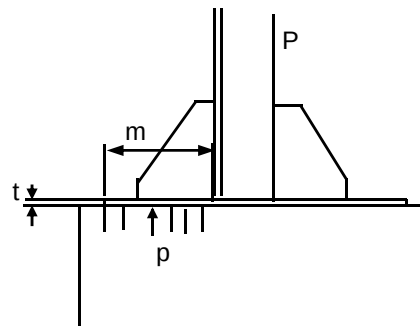
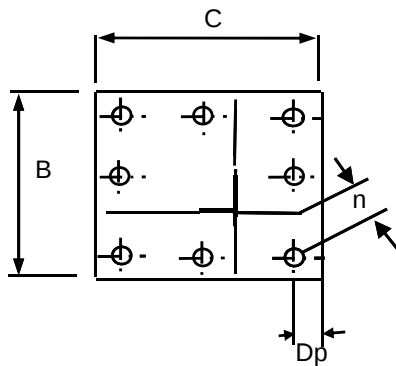
ESTRUCTURA: TORRE CUADRADA 100 m SECCION VARIABLE

CARGAS ACTUANTES

Tension Maxima	T	(ton)		69,742
Compresion Maxima	C	(ton)	-56,858	
Fuerza Longitudinal en X	Hx	(ton)	6,477	-8,021
Fuerza Transversal en Y	Hy	(ton)	6,596	7,997

CALCULO DE PLACA - BASE

PLACA BASE	B	C	t	Dp	m	Dimension pedestal (cm)		No pernos
	cm.	cm.	cm	cm	cm.	Bp	Cp	un
	120	120	3,8	8,0	40,0	125	125	8,0



Area Placa Colocada	Ac	14.400	cm ²				
Acero A-36	Fy=	2.530	Kg / cm ²	Concreto.	f'c=	210	Kg / cm ²
Distancia	n	8,0	cm				
Area Requerida placa base	Ar	743	cm ²				
Apoyo contacto pedestal	Fp	76,563	Kg / cm ²				
Presion de Apoyo	pp	3,948	kg / cm ²				
Esfuerzo de Flexion por Compresion	Fb						
Esfuerzo de Flexion	Fb	1.645	Kg / cm ²			Acero A-36	
Distancia al borde	m	40	cm				
Espesor Placa Base C	t	0,68	cm				
Esfuerzo de Flexion por Arranque	Fb''						
Distancia al perno	Dp	8	cm				
Fuerza en el Perno	Pt	8,72	Ton				
Momento de Flexion	Mf	69,7	Ton - cm				
Espesor de la Placa Base Arr	t	2,06	cm				
Espesor Minimo Placa Base	t	2,06	cm				
Lado de la placa Base	B	1.200	mm				
Espesor de la Placa Base	t	38	mm			OK CUMPLE	



Calculo: Ing. Jaime Gutierrez C:
Fecha: Enero 5 de 2011



ESTACION: MONTERIA

ESTADO ACTUAL

ESTRUCTURA: TORRE CUADRADA 100 m SECCION VARIABLE

DISEÑO DE PERNOS DE ANCLAJE

Diametro de los Pernos	dp	1,00	plg
	dp	2,54	cm
Material de los Pernos		SAE 1020 CALIBRADO	
Cantidad de Pernos		8	un
Area Total de Pernos	Atp	40,54	cm ²
Factor de Rosca		0,85	
Numero de Hilos por Pulgada	hp	8	
Area Efectiva de Pernos	Ap	31,27	cm ²
Cargas de Trabajo			
Fuerza de Arranque	T	69,74	ton
Fuerza de Cortante	Vux	6,48	ton
Fuerza de Cortante	Vuy	8,00	ton
Fuerza de Cortante	Vu	10,29	ton
Esfuerzo de Fluencia			
Resistencia a la Tension	Ft	3,36	ton/cm ²
Resistencia al Corte	Fv	2,24	ton/cm ²
Area Efectiva de cada Perno	Ae	3,91	cm ²
Area Total por Perno	Ap	5,07	cm ²
Area Requerida por Arranque	At	19,2	cm ²
Area Requerida Arranque Diseño	Atm	28,8	cm ²
Numero de Pernos Minimo	Np	8	un
Pernos a Colocar		8	un
Diametro del Perno		25	mm
Area Neta de Pernos	Anp	31,27	cm ²
AREA DE PERNOS > AREA REQUERIDA		OK CUMPLE	

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 1 of 54
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 100.000 m above the ground line.

The base of the tower is set at an elevation of 0.000 m above the ground line.

The face width of the tower is 0.550 m at the top and 11.950 m at the base.

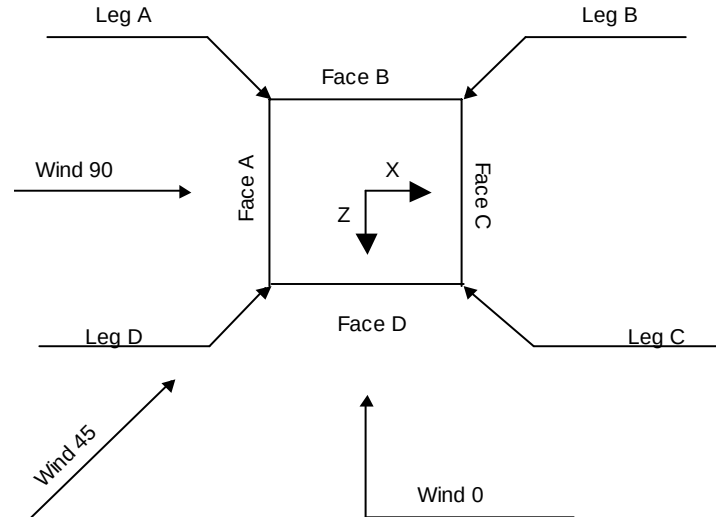
This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

1. Basic wind speed of 120 kph.
2. Deflections calculated using a wind speed of 60 kph.
3. Weld together tower sections have flange connections..
4. Connections use galvanized A394 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 AWS E60XX/E70XX electrodes..
7. All welded joints and connection flanges certified for integrity an quality per AWS D1:1.
8. RF antennas feeders shall be 1-5/8" and installed 48 feeders per side.
9. MW dishes feeders shall be 1/2" and installed 8 feeders per side.
10. A non-linear (P-delta) analysis was used.
11. Pressures are calculated at each section.
12. Stress ratio used in tower member design is 1.333.
13. 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		

**Square Tower****Tower Section Geometry**

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	m			m		m
T1	100.000-95.000			0.550	1	5.000
T2	95.000-92.000			0.550	1	3.000
T3	92.000-86.000			1.220	1	6.000
T4	86.000-82.000			1.220	1	4.000
T5	82.000-79.000			1.220	1	3.000
T6	79.000-74.000			2.800	1	5.000
T7	74.000-69.000			2.800	1	5.000
T8	69.000-61.500			2.800	1	7.500
T9	61.500-56.500			2.800	1	5.000
T10	56.500-52.700			2.800	1	3.800
T11	52.700-49.000			3.415	1	3.700
T12	49.000-45.000			4.015	1	4.000
T13	45.000-41.000			4.662	1	4.000
T14	41.000-37.000			5.310	1	4.000
T15	37.000-33.000			5.958	1	4.000
T16	33.000-25.000			6.606	1	8.000
T17	25.000-16.000			7.901	1	9.000
T18	16.000-8.000			9.359	1	8.000
T19	8.000-4.000			10.654	1	4.000
T20	4.000-0.000			11.302	1	4.000

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	100.000-95.000	0.500	Double K	No	Yes	0	0
T2	95.000-92.000	1.500	Double K	No	Yes	0	0
T3	92.000-86.000	1.000	Double K	No	Yes	0	0
T4	86.000-82.000	1.000	Double K	No	Yes	0	0
T5	82.000-79.000	1.500	Double K	No	Yes	0	0
T6	79.000-74.000	1.250	Double K	No	Yes	0	0
T7	74.000-69.000	1.250	Double K	No	Yes	0	0
T8	69.000-61.500	1.250	Double K	No	Yes	0	0
T9	61.500-56.500	1.250	Double K	No	Yes	0	0
T10	56.500-52.700	1.900	Double K1	No	Yes	0	0
T11	52.700-49.000	1.850	Double K1	No	Yes	0	0
T12	49.000-45.000	2.000	Double K1	No	Yes	0	0
T13	45.000-41.000	2.000	Double K1	No	Yes	0	0
T14	41.000-37.000	2.000	Double K1	No	Yes	0	0
T15	37.000-33.000	2.000	Double K1	No	Yes	0	0
T16	33.000-25.000	4.000	Double K1	No	Yes	0	0
T17	25.000-16.000	4.500	Double K1	No	Yes	0	0
T18	16.000-8.000	4.000	Double K1	No	Yes	0	0
T19	8.000-4.000	4.000	K1 Up	No	Yes	0	0
T20	4.000-0.000	4.000	K2 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 100.000-95.000	Equal Angle	L64x64x5	A572-50 (345 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T2 95.000-92.000	Equal Angle	L76x76x8	A572-50 (345 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T3 92.000-86.000	Equal Angle	L76x76x8	A572-50 (345 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T4 86.000-82.000	Equal Angle	L102x102x8	A572-50 (345 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T5 82.000-79.000	Equal Angle	L102x102x8	A572-50 (345 MPa)	Single Angle	L76x76x6.4	A572-50 (345 MPa)
T6 79.000-74.000	Equal Angle	L127x127x13	A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T7 74.000-69.000	Equal Angle	L152x152x13	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T8 69.000-61.500	Equal Angle	L152x152x13	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T9 61.500-56.500	Equal Angle	L152x152x13	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T10 56.500-52.700	Equal Angle	L152x152x16	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T11 52.700-49.000	Equal Angle	L152x152x16	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T12 49.000-45.000	Equal Angle	L152x152x16	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T13 45.000-41.000	Equal Angle	L152x152x16	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T14 41.000-37.000	Equal Angle	L152x152x16	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T15 37.000-33.000	Equal Angle	L152x152x16	A572-50 (345 MPa)	Single Angle	L64x64x4.8	A572-50 (345 MPa)
T16 33.000-	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50

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Tower Elevation m	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
25.000			(345 MPa)			(345 MPa)
T17 25.000-16.000	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
T18 16.000-8.000	Equal Angle	L152x152x16	(345 MPa) A572-50	Single Angle	L64x64x4.8	(345 MPa) A572-50
T19 8.000-4.000	Equal Angle	L152x152x16	(345 MPa) A572-50	Single Angle	L76x76x6.4	(345 MPa) A572-50
T20 4.000-0.000	Equal Angle	L152x152x16	(345 MPa) A572-50	Single Angle	L76x76x6.4	(345 MPa) A572-50

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 100.000-95.000	Single Angle	L51x51x6.4	A572-50 (345 MPa)	Single Angle		A570-50 (345 MPa)
T2 95.000-92.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T3 92.000-86.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T4 86.000-82.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T5 82.000-79.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T6 79.000-74.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A572-50 (345 MPa)
T10 56.500-52.700	Single Angle	L64x64x6.4	A572-50 (345 MPa)	Solid Round		A572-50 (345 MPa)
T20 4.000-0.000	Single Angle	L64x64x4.8	A572-50 (345 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
T1 100.000-95.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T2 95.000-92.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T3 92.000-86.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T4 86.000-82.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T5 82.000-79.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T6 79.000-74.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T7 74.000-69.000	None	Flat Bar		A36	Single Angle	L51x51x4.8	A572-50

Tower Elevation m	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T8 69.000-61.500	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T9 61.500-56.500	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T10 56.500-52.700	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T11 52.700-49.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T12 49.000-45.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T13 45.000-41.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T14 41.000-37.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T15 37.000-33.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T16 33.000-25.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T17 25.000-16.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T18 16.000-8.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T19 8.000-4.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50
T20 4.000-0.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50

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 100.000-95.000	Single Angle		A572-50 (345 MPa)	Single Angle	L38x38x5	A572-50 (345 MPa)
T6 79.000-74.000	Single Angle		A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T10 56.500-52.700	Single Angle		A572-50 (345 MPa)	Single Angle	L76x76x6.4	A572-50 (345 MPa)
T15 37.000-33.000	Single Angle		A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T16 33.000-25.000	Single Angle		A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T17 25.000-16.000	Single Angle		A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T18 16.000-8.000	Single Angle		A572-50 (345 MPa)	Single Angle	L64x64x6.4	A572-50 (345 MPa)
T19 8.000-4.000	Single Angle		A572-50 (345 MPa)	Single Angle	L64x64x6.4	A572-50 (345 MPa)
T20 4.000-0.000	Single Angle		A572-50 (345 MPa)	Single Angle	L64x64x6.4	A572-50 (345 MPa)

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 6 of 54
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Redundant Bracing Grade	Redundant Type	Redundant Size	K Factor
T10 56.500-52.700	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
T11 52.700-49.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
T12 49.000-45.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
T13 45.000-41.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
T14 41.000-37.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x4.8	1
T15 37.000-33.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x4.8	1
T16 33.000-25.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x4.8	1
T17 25.000-16.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x4.8	1
T18 16.000-8.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L64x64x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x4.8	1
T19 8.000-4.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L64x64x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L64x64x6.4	1
T20 4.000-0.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L64x64x4.8	1
		Horizontal (2)	Single Angle L64x64x4.8	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Diagonal (2)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L64x64x6.4	1
		Hip (2)	Single Angle L64x64x6.4	1

Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Gusset Area (per face) <i>m</i> ²	Gusset Thickness <i>mm</i>	Gusset Grade	Adjust. Factor <i>A_f</i>	Adjust. Factor <i>A_r</i>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals <i>mm</i>	Double Angle Stitch Bolt Spacing Horizontals <i>mm</i>
T1 100.000-95.000	0.018	6	A36 (248 MPa)	1	1	1.25	0	0
T2 95.000-92.000	0.018	6	A36 (248 MPa)	1	1	1.25	0	0
T3 92.000-86.000	0.018	8	A36 (248 MPa)	1	1	1.25	0	0
T4 86.000-82.000	0.018	10	A36 (248 MPa)	1	1	1.25	0	0
T5 82.000-79.000	0.018	10	A36 (248 MPa)	1	1	1.25	0	0
T6 79.000-	0.018	10	A36	1	1	1.25	0	0

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
m	m ²	mm						
74.000			(248 MPa)					
T7 74.000-69.000	0.021	10	A36	1	1	1.25	0	0
T8 69.000-61.500	0.021	10	A36	1	1	1.25	0	0
T9 61.500-56.500	0.024	10	A36	1	1	1.25	0	0
T10 56.500-52.700	0.024	10	A36	1	1	1.25	0	0
T11 52.700-49.000	0.024	10	A36	1	1	1.25	0	0
T12 49.000-45.000	0.024	10	A36	1	1	1.25	0	0
T13 45.000-41.000	0.024	10	A36	1	1	1.25	0	0
T14 41.000-37.000	0.024	10	A36	1	1	1.25	0	0
T15 37.000-33.000	0.024	10	A36	1	1	1.25	0	0
T16 33.000-25.000	0.024	10	A36	1	1	1.25	0	0
T17 25.000-16.000	0.024	10	A36	1	1	1.25	0	0
T18 16.000-8.000	0.024	10	A36	1	1	1.25	0	0
T19 8.000-4.000	0.024	10	A36	1	1	1.25	0	0
T20 4.000-0.000	0.024	10	A36	1	1	1.25	0	0

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				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 100.000-95.000	No	No	1	1	1	1	1	1	1	1
T2 95.000-92.000	No	No	1	1	1	1	1	1	1	1
T3 92.000-86.000	No	No	1	1	1	1	1	1	1	1
T4 86.000-82.000	No	No	1	1	1	1	0.5	1	1	1
T5 82.000-79.000	No	No	1	1	1	1	0.5	1	1	1
T6 79.000-74.000	No	No	1	1	1	1	0.5	1	1	1
T7 74.000-69.000	No	No	1	1	1	1	0.5	1	1	1
T8 69.000-61.500	No	No	1	1	1	1	0.5	1	1	1
T9 61.500-	No	No	1	1	1	1	0.5	1	1	1

Tower Elevation m	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
56.500				1	1	1	1	1	1	1
T10 56.500- 52.700	No	No	1	1	1	1	0.5	1	1	1
T11 52.700- 49.000	No	No	1	1	1	1	0.5	1	1	1
T12 49.000- 45.000	No	No	1	1	1	1	0.25	1	1	1
T13 45.000- 41.000	No	No	1	1	1	1	0.25	1	1	1
T14 41.000- 37.000	No	No	1	1	1	1	0.25	1	1	1
T15 37.000- 33.000	No	No	1	1	1	1	0.25	1	1	1
T16 33.000- 25.000	No	No	1	1	1	1	0.25	1	1	1
T17 25.000- 16.000	No	No	1	1	1	1	0.25	1	1	1
T18 16.000- 8.000	No	No	1	1	1	1	0.25	1	1	1
T19 8.000- 4.000	No	No	1	1	1	1	0.25	1	1	1
T20 4.000- 0.000	No	No	1	1	1	1	0.25	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation 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 100.000- 95.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T2 95.000- 92.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T3 92.000- 86.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T4 86.000- 82.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T5 82.000- 79.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T6 79.000- 74.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T7 74.000- 69.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T8 69.000- 61.500	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T9 61.500- 56.500	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75

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
T10 56.500-52.700	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T11 52.700-49.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T12 49.000-45.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T13 45.000-41.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T14 41.000-37.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T15 37.000-33.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T16 33.000-25.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T17 25.000-16.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T18 16.000-8.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T19 8.000-4.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T20 4.000-0.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75

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 100.000-95.000	Sleeve DS	19	6	16	2	16	2	16	2	16	0	16	1	16	1
T2 95.000-92.000	Sleeve DS	A325N	12	A325N	2	A325N	2	A307	2	A325N	0	A307	1	A307	1
T3 92.000-86.000	Sleeve DS	A325N	14	A325N	2	A325N	2	A307	2	A325N	0	A307	1	A307	1
T4 86.000-82.000	Sleeve DS	19	16	16	2	16	2	16	2	A325N	0	A325N	1	A307	2
T5 82.000-79.000	Sleeve DS	A325N	16	A325N	2	A325N	2	A307	2	A325N	0	A307	1	A307	2
T6 79.000-74.000	Sleeve DS	19	16	16	2	16	2	16	2	A325N	0	A307	1	A307	2
T7 74.000-69.000	Sleeve DS	A325N	24	A325N	2	A325N	2	A307	2	A325N	0	A307	1	A307	2
T8 69.000-61.500	Sleeve DS	19	32	16	2	16	2	16	2	A325N	0	A307	1	A307	2
T9 61.500-56.500	Sleeve DS	A325N	32	A325N	2	A325N	2	A307	2	A325N	0	A307	1	A307	2
T10 56.500-52.700	Sleeve DS	19	34	16	2	16	2	16	2	A325N	0	A307	2	A307	2
T11 52.700-49.000	Sleeve DS	A325N	36	A325N	2	A325N	2	A307	2	A325N	0	A307	2	A307	2

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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.
T12 49.000- 45.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T13 45.000- 41.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T14 41.000- 37.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T15 37.000- 33.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T16 33.000- 25.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T17 25.000- 16.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T18 16.000- 8.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T19 8.000- 4.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2
T20 4.000- 0.000	Sleeve DS	19 A325N	36	16 A325N	3	16 A325N	2	16 A307	2	16 A325N	0	16 A307	2	16 A307	2

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _A A _A Front m ²	C _A A _A Side m ²	Weight kg
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.074	0.074	68.00

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	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _A A _A Front m ²	C _A A _A Side m ²	Weight kg
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000 0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.074	0.074	68.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000 0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000 0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000 0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	D	From Face	0.000 0.000 0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000 0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000 0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000 0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	D	From Face	0.000 0.000 0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000 0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000 0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000 0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000 0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00

Dishes

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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 ²	Weight kg
8 FT DISH	D	Paraboloid w/o Radome	From Leg	0.000 0.000 0.000	0.0000		14.400	2.438	No Ice 4.673	113.85

Tower Pressures - No Ice

$$G_H = 1.082$$

Section Elevation m	z m	K _Z	q _z MPa	A _G m ²	F a c e	A _F m ²	A _R m ²	A _{leg} m ²	Leg %	C _A A _A In Face m ²	C _A A _A Out Face m ²
T1 100.000- 95.000	97.500	1.914	0.00	2.926	A	1.235	0.000	0.635	51.44	0.000	0.000
					B	1.235	0.000		51.44	0.000	0.000
					C	1.235	0.000		51.44	0.000	0.000
					D	1.235	0.000		51.44	0.000	0.000
T2 95.000- 92.000	93.500	1.891	0.00	2.788	A	0.800	0.000	0.463	57.82	0.000	0.000
					B	0.800	0.000		57.82	0.000	0.000
					C	0.800	0.000		57.82	0.000	0.000
					D	0.800	0.000		57.82	0.000	0.000
T3 92.000- 86.000	89.000	1.864	0.00	7.583	A	1.729	0.000	0.914	52.89	0.000	0.000
					B	1.729	0.000		52.89	0.000	0.000
					C	1.729	0.000		52.89	0.000	0.000
					D	1.729	0.000		52.89	0.000	0.000
T4 86.000- 82.000	84.000	1.834	0.00	5.108	A	1.372	0.000	0.813	59.23	0.000	0.000
					B	1.372	0.000		59.23	0.000	0.000
					C	1.372	0.000		59.23	0.000	0.000
					D	1.372	0.000		59.23	0.000	0.000
T5 82.000- 79.000	80.500	1.812	0.00	6.207	A	1.366	0.000	0.651	47.63	0.000	0.000
					B	1.366	0.000		47.63	0.000	0.000
					C	1.366	0.000		47.63	0.000	0.000
					D	1.366	0.000		47.63	0.000	0.000
T6 79.000- 74.000	76.500	1.785	0.00	14.362	A	2.427	0.000	1.270	52.34	0.000	0.000
					B	2.427	0.000		52.34	0.000	0.000
					C	2.427	0.000		52.34	0.000	0.000
					D	2.427	0.000		52.34	0.000	0.000
T7 74.000- 69.000	71.500	1.751	0.00	14.428	A	2.718	0.000	1.524	56.08	0.000	0.000
					B	2.718	0.000		56.08	0.000	0.000
					C	2.718	0.000		56.08	0.000	0.000
					D	2.718	0.000		56.08	0.000	0.000
T8 69.000- 61.500	65.250	1.706	0.00	21.641	A	4.063	0.000	2.286	56.27	0.000	0.000
					B	4.063	0.000		56.27	0.000	0.000
					C	4.063	0.000		56.27	0.000	0.000
					D	4.063	0.000		56.27	0.000	0.000
T9 61.500- 56.500	59.000	1.658	0.00	14.428	A	2.719	0.000	1.524	56.06	0.000	0.000
					B	2.719	0.000		56.06	0.000	0.000
					C	2.719	0.000		56.06	0.000	0.000
					D	2.719	0.000		56.06	0.000	0.000
T10 56.500- 52.700	54.600	1.621	0.00	12.143	A	2.328	0.000	1.166	50.07	0.000	0.000
					B	2.328	0.000		50.07	0.000	0.000
					C	2.328	0.000		50.07	0.000	0.000
					D	2.328	0.000		50.07	0.000	0.000
T11 52.700- 49.000	50.850	1.589	0.00	14.071	A	2.225	0.000	1.135	51.01	0.000	0.000
					B	2.225	0.000		51.01	0.000	0.000
					C	2.225	0.000		51.01	0.000	0.000

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F a c e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	$C_A A_A$ In Face m^2	$C_A A_A$ Out Face m^2
T12 49.000-45.000	47.000	1.553	0.00	17.706	D	2.225	0.000		51.01	0.000	0.000
					A	2.829	0.000	1.227	43.38	0.000	0.000
					B	2.829	0.000		43.38	0.000	0.000
					C	2.829	0.000		43.38	0.000	0.000
					D	2.829	0.000		43.38	0.000	0.000
T13 45.000-41.000	43.000	1.514	0.00	20.297	A	3.008	0.000	1.227	40.80	0.000	0.000
					B	3.008	0.000		40.80	0.000	0.000
					C	3.008	0.000		40.80	0.000	0.000
					D	3.008	0.000		40.80	0.000	0.000
T14 41.000-37.000	39.000	1.473	0.00	22.888	A	3.190	0.000	1.227	38.47	0.000	0.000
					B	3.190	0.000		38.47	0.000	0.000
					C	3.190	0.000		38.47	0.000	0.000
					D	3.190	0.000		38.47	0.000	0.000
T15 37.000-33.000	35.000	1.428	0.00	25.479	A	3.376	0.000	1.227	36.35	0.000	0.000
					B	3.376	0.000		36.35	0.000	0.000
					C	3.376	0.000		36.35	0.000	0.000
					D	3.376	0.000		36.35	0.000	0.000
T16 33.000-25.000	29.000	1.353	0.00	58.731	A	5.326	0.000	2.454	46.08	0.000	0.000
					B	5.326	0.000		46.08	0.000	0.000
					C	5.326	0.000		46.08	0.000	0.000
					D	5.326	0.000		46.08	0.000	0.000
T17 25.000-16.000	20.500	1.226	0.00	78.461	A	6.121	0.000	2.761	45.11	0.000	0.000
					B	6.121	0.000		45.11	0.000	0.000
					C	6.121	0.000		45.11	0.000	0.000
					D	6.121	0.000		45.11	0.000	0.000
T18 16.000-8.000	12.000	1.052	0.00	80.755	A	6.192	0.000	2.454	39.64	0.000	0.000
					B	6.192	0.000		39.64	0.000	0.000
					C	6.192	0.000		39.64	0.000	0.000
					D	6.192	0.000		39.64	0.000	0.000
T19 8.000-4.000	6.000	1	0.00	44.264	A	3.212	0.000	1.227	38.20	0.000	0.000
					B	3.212	0.000		38.20	0.000	0.000
					C	3.212	0.000		38.20	0.000	0.000
					D	3.212	0.000		38.20	0.000	0.000
T20 4.000-0.000	2.000	1	0.00	46.856	A	4.852	0.000	1.227	25.29	0.000	0.000
					B	4.852	0.000		25.29	0.000	0.000
					C	4.852	0.000		25.29	0.000	0.000
					D	4.852	0.000		25.29	0.000	0.000

Tower Pressure - Service

$$G_H = 1.082$$

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F a c e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	$C_A A_A$ In Face m^2	$C_A A_A$ Out Face m^2
T1 100.000-95.000	97.500	1.914	0.00	2.926	A	1.235	0.000	0.635	51.44	0.000	0.000
					B	1.235	0.000		51.44	0.000	0.000
					C	1.235	0.000		51.44	0.000	0.000
					D	1.235	0.000		51.44	0.000	0.000
T2 95.000-92.000	93.500	1.891	0.00	2.788	A	0.800	0.000	0.463	57.82	0.000	0.000
					B	0.800	0.000		57.82	0.000	0.000
					C	0.800	0.000		57.82	0.000	0.000
					D	0.800	0.000		57.82	0.000	0.000
T3 92.000-86.000	89.000	1.864	0.00	7.583	A	1.729	0.000	0.914	52.89	0.000	0.000
					B	1.729	0.000		52.89	0.000	0.000

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F_{ac} e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	C_{AA} In Face m^2	C_{AA} Out Face m^2
T4 86.000-82.000	84.000	1.834	0.00	5.108	C	1.729	0.000	0.813	52.89	0.000	0.000
					D	1.729	0.000		52.89	0.000	0.000
					A	1.372	0.000		59.23	0.000	0.000
					B	1.372	0.000		59.23	0.000	0.000
T5 82.000-79.000	80.500	1.812	0.00	6.207	C	1.372	0.000	0.651	59.23	0.000	0.000
					D	1.372	0.000		59.23	0.000	0.000
					A	1.366	0.000		47.63	0.000	0.000
					B	1.366	0.000		47.63	0.000	0.000
T6 79.000-74.000	76.500	1.785	0.00	14.362	C	1.366	0.000	1.270	47.63	0.000	0.000
					D	1.366	0.000		47.63	0.000	0.000
					A	2.427	0.000		52.34	0.000	0.000
					B	2.427	0.000		52.34	0.000	0.000
T7 74.000-69.000	71.500	1.751	0.00	14.428	C	2.427	0.000	1.524	52.34	0.000	0.000
					D	2.427	0.000		52.34	0.000	0.000
					A	2.718	0.000		56.08	0.000	0.000
					B	2.718	0.000		56.08	0.000	0.000
T8 69.000-61.500	65.250	1.706	0.00	21.641	C	2.718	0.000	2.286	56.08	0.000	0.000
					D	2.718	0.000		56.08	0.000	0.000
					A	4.063	0.000		56.27	0.000	0.000
					B	4.063	0.000		56.27	0.000	0.000
T9 61.500-56.500	59.000	1.658	0.00	14.428	C	4.063	0.000	1.524	56.27	0.000	0.000
					D	4.063	0.000		56.27	0.000	0.000
					A	2.719	0.000		56.06	0.000	0.000
					B	2.719	0.000		56.06	0.000	0.000
T10 56.500-52.700	54.600	1.621	0.00	12.143	C	2.719	0.000	1.166	56.06	0.000	0.000
					D	2.719	0.000		56.06	0.000	0.000
					A	2.328	0.000		50.07	0.000	0.000
					B	2.328	0.000		50.07	0.000	0.000
T11 52.700-49.000	50.850	1.589	0.00	14.071	C	2.328	0.000	1.135	50.07	0.000	0.000
					D	2.328	0.000		50.07	0.000	0.000
					A	2.225	0.000		51.01	0.000	0.000
					B	2.225	0.000		51.01	0.000	0.000
T12 49.000-45.000	47.000	1.553	0.00	17.706	C	2.225	0.000	1.227	51.01	0.000	0.000
					D	2.225	0.000		51.01	0.000	0.000
					A	2.829	0.000		43.38	0.000	0.000
					B	2.829	0.000		43.38	0.000	0.000
T13 45.000-41.000	43.000	1.514	0.00	20.297	C	2.829	0.000	1.227	43.38	0.000	0.000
					D	2.829	0.000		43.38	0.000	0.000
					A	3.008	0.000		40.80	0.000	0.000
					B	3.008	0.000		40.80	0.000	0.000
T14 41.000-37.000	39.000	1.473	0.00	22.888	C	3.008	0.000	1.227	40.80	0.000	0.000
					D	3.008	0.000		40.80	0.000	0.000
					A	3.190	0.000		38.47	0.000	0.000
					B	3.190	0.000		38.47	0.000	0.000
T15 37.000-33.000	35.000	1.428	0.00	25.479	C	3.190	0.000	1.227	38.47	0.000	0.000
					D	3.190	0.000		38.47	0.000	0.000
					A	3.376	0.000		36.35	0.000	0.000
					B	3.376	0.000		36.35	0.000	0.000
T16 33.000-25.000	29.000	1.353	0.00	58.731	C	3.376	0.000	2.454	36.35	0.000	0.000
					D	3.376	0.000		36.35	0.000	0.000
					A	5.326	0.000		46.08	0.000	0.000
					B	5.326	0.000		46.08	0.000	0.000
T17 25.000-16.000	20.500	1.226	0.00	78.461	C	5.326	0.000	2.761	46.08	0.000	0.000
					D	5.326	0.000		46.08	0.000	0.000
					A	6.121	0.000		45.11	0.000	0.000
					B	6.121	0.000		45.11	0.000	0.000
T18 16.000-8.000	12.000	1.052	0.00	80.755	C	6.121	0.000	2.454	45.11	0.000	0.000
					D	6.121	0.000		45.11	0.000	0.000
					A	6.192	0.000		39.64	0.000	0.000
					B	6.192	0.000		39.64	0.000	0.000

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	z m	K _Z	q _z MPa	A _G m ²	F a c e m ²	A _F m ²	A _R m ²	A _{leg} m ²	Leg % %	C _A A _A In Face m ²	C _A A _A Out Face m ²
T19 8.000- 4.000	6.000	1	0.00	44.264	C	6.192	0.000	1.227	39.64	0.000	0.000
					D	6.192	0.000		39.64	0.000	0.000
					A	3.212	0.000		38.20	0.000	0.000
					B	3.212	0.000		38.20	0.000	0.000
					C	3.212	0.000		38.20	0.000	0.000
T20 4.000- 0.000	2.000	1	0.00	46.856	D	3.212	0.000	1.227	38.20	0.000	0.000
					A	4.852	0.000		25.29	0.000	0.000
					B	4.852	0.000		25.29	0.000	0.000
					C	4.852	0.000		25.29	0.000	0.000
					D	4.852	0.000		25.29	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	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T1 100.000- 95.000	3.62	390.31	A	0.422	2.223	0.661	1	1	1.235	394.93	78.99	D
			B	0.422	2.223	0.661	1	1	1.235			
			C	0.422	2.223	0.661	1	1	1.235			
			D	0.422	2.223	0.661	1	1	1.235			
T2 95.000- 92.000	3.62	260.21	A	0.287	2.636	0.612	1	1	0.800	300.00	100.00	D
			B	0.287	2.636	0.612	1	1	0.800			
			C	0.287	2.636	0.612	1	1	0.800			
			D	0.287	2.636	0.612	1	1	0.800			
T3 92.000- 86.000	4.46	571.10	A	0.228	2.863	0.597	1	1	1.729	693.93	115.65	D
			B	0.228	2.863	0.597	1	1	1.729			
			C	0.228	2.863	0.597	1	1	1.729			
			D	0.228	2.863	0.597	1	1	1.729			
T4 86.000- 82.000	5.37	450.89	A	0.269	2.704	0.607	1	1	1.372	511.70	127.92	D
			B	0.269	2.704	0.607	1	1	1.372			
			C	0.269	2.704	0.607	1	1	1.372			
			D	0.269	2.704	0.607	1	1	1.372			
T5 82.000- 79.000	5.37	526.92	A	0.22	2.895	0.595	1	1	1.366	538.80	179.60	D
			B	0.22	2.895	0.595	1	1	1.366			
			C	0.22	2.895	0.595	1	1	1.366			
			D	0.22	2.895	0.595	1	1	1.366			
T6 79.000- 74.000	5.37	1158.10	A	0.169	3.117	0.585	1	1	2.427	1015.68	203.14	D
			B	0.169	3.117	0.585	1	1	2.427			
			C	0.169	3.117	0.585	1	1	2.427			
			D	0.169	3.117	0.585	1	1	2.427			
T7 74.000- 69.000	6.26	1172.23	A	0.188	3.031	0.588	1	1	2.718	1084.74	216.95	D
			B	0.188	3.031	0.588	1	1	2.718			
			C	0.188	3.031	0.588	1	1	2.718			
			D	0.188	3.031	0.588	1	1	2.718			
T8 69.000- 61.500	6.26	1758.34	A	0.188	3.033	0.588	1	1	4.063	1581.24	210.83	D
			B	0.188	3.033	0.588	1	1	4.063			
			C	0.188	3.033	0.588	1	1	4.063			
			D	0.188	3.033	0.588	1	1	4.063			
T9 61.500- 56.500	7.16	1172.23	A	0.188	3.03	0.588	1	1	2.719	1027.02	205.40	D
			B	0.188	3.03	0.588	1	1	2.719			
			C	0.188	3.03	0.588	1	1	2.719			
			D	0.188	3.03	0.588	1	1	2.719			
T10 56.500- 52.700	7.16	1323.89	A	0.192	3.016	0.589	1	1	2.328	856.23	225.32	D
			B	0.192	3.016	0.589	1	1	2.328			
			C	0.192	3.016	0.589	1	1	2.328			
			D	0.192	3.016	0.589	1	1	2.328			

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T11 52.700- 49.000	7.16	1072.92	A	0.158	3.167	0.583	1	1	2.225	842.07	227.59	D
			B	0.158	3.167	0.583	1	1	2.225			
			C	0.158	3.167	0.583	1	1	2.225			
			D	0.158	3.167	0.583	1	1	2.225			
T12 49.000- 45.000	7.16	1296.70	A	0.16	3.16	0.583	1	1	2.829	1044.09	261.02	D
			B	0.16	3.16	0.583	1	1	2.829			
			C	0.16	3.16	0.583	1	1	2.829			
			D	0.16	3.16	0.583	1	1	2.829			
T13 45.000- 41.000	7.16	1357.01	A	0.148	3.214	0.581	1	1	3.008	1100.79	275.20	D
			B	0.148	3.214	0.581	1	1	3.008			
			C	0.148	3.214	0.581	1	1	3.008			
			D	0.148	3.214	0.581	1	1	3.008			
T14 41.000- 37.000	7.16	1442.25	A	0.139	3.255	0.58	1	1	3.190	1150.32	287.58	D
			B	0.139	3.255	0.58	1	1	3.190			
			C	0.139	3.255	0.58	1	1	3.190			
			D	0.139	3.255	0.58	1	1	3.190			
T15 37.000- 33.000	7.16	1617.07	A	0.133	3.288	0.579	1	1	3.376	1192.30	298.07	D
			B	0.133	3.288	0.579	1	1	3.376			
			C	0.133	3.288	0.579	1	1	3.376			
			D	0.133	3.288	0.579	1	1	3.376			
T16 33.000- 25.000	7.16	2621.42	A	0.091	3.498	0.574	1	1	5.326	1895.96	237.00	D
			B	0.091	3.498	0.574	1	1	5.326			
			C	0.091	3.498	0.574	1	1	5.326			
			D	0.091	3.498	0.574	1	1	5.326			
T17 25.000- 16.000	7.16	3000.61	A	0.078	3.564	0.573	1	1	6.121	2010.74	223.42	D
			B	0.078	3.564	0.573	1	1	6.121			
			C	0.078	3.564	0.573	1	1	6.121			
			D	0.078	3.564	0.573	1	1	6.121			
T18 16.000- 8.000	7.16	3094.49	A	0.077	3.571	0.573	1	1	6.192	1748.85	218.61	D
			B	0.077	3.571	0.573	1	1	6.192			
			C	0.077	3.571	0.573	1	1	6.192			
			D	0.077	3.571	0.573	1	1	6.192			
T19 8.000- 4.000	7.16	1916.84	A	0.073	3.593	0.573	1	1	3.212	867.97	216.99	D
			B	0.073	3.593	0.573	1	1	3.212			
			C	0.073	3.593	0.573	1	1	3.212			
			D	0.073	3.593	0.573	1	1	3.212			
T20 4.000- 0.000	7.16	2228.26	A	0.104	3.432	0.575	1	1	4.852	1252.22	313.05	D
			B	0.104	3.432	0.575	1	1	4.852			
			C	0.104	3.432	0.575	1	1	4.852			
			D	0.104	3.432	0.575	1	1	4.852			
Sum Weight:	126.23	28558.01						OTM	931169 kg-m	21109.55		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T1 100.000- 95.000	3.62	390.31	A	0.422	2.223	0.661	1.2	1.2	1.481	473.91	94.78	D
			B	0.422	2.223	0.661	1.2	1.2	1.481			
			C	0.422	2.223	0.661	1.2	1.2	1.481			
			D	0.422	2.223	0.661	1.2	1.2	1.481			
T2 95.000- 92.000	3.62	260.21	A	0.287	2.636	0.612	1.2	1.2	0.961	359.99	120.00	D
			B	0.287	2.636	0.612	1.2	1.2	0.961			
			C	0.287	2.636	0.612	1.2	1.2	0.961			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 17 of 54
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T3 92.000-86.000	4.46	571.10	D	0.287	2.636	0.612	1.2	1.2	0.961			
			A	0.228	2.863	0.597	1.171	1.171	2.024	812.58	135.43	D
			B	0.228	2.863	0.597	1.171	1.171	2.024			
			C	0.228	2.863	0.597	1.171	1.171	2.024			
			D	0.228	2.863	0.597	1.171	1.171	2.024			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1.2	1.2	1.647	614.04	153.51	D
			B	0.269	2.704	0.607	1.2	1.2	1.647			
			C	0.269	2.704	0.607	1.2	1.2	1.647			
			D	0.269	2.704	0.607	1.2	1.2	1.647			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1.165	1.165	1.591	627.71	209.24	D
			B	0.22	2.895	0.595	1.165	1.165	1.591			
			C	0.22	2.895	0.595	1.165	1.165	1.591			
			D	0.22	2.895	0.595	1.165	1.165	1.591			
T6 79.000-74.000	5.37	1158.10	A	0.169	3.117	0.585	1.127	1.127	2.734	1144.39	228.88	D
			B	0.169	3.117	0.585	1.127	1.127	2.734			
			C	0.169	3.117	0.585	1.127	1.127	2.734			
			D	0.169	3.117	0.585	1.127	1.127	2.734			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1.141	1.141	3.102	1237.98	247.60	D
			B	0.188	3.031	0.588	1.141	1.141	3.102			
			C	0.188	3.031	0.588	1.141	1.141	3.102			
			D	0.188	3.031	0.588	1.141	1.141	3.102			
T8 69.000-61.500	6.26	1758.34	A	0.188	3.033	0.588	1.141	1.141	4.635	1803.88	240.52	D
			B	0.188	3.033	0.588	1.141	1.141	4.635			
			C	0.188	3.033	0.588	1.141	1.141	4.635			
			D	0.188	3.033	0.588	1.141	1.141	4.635			
T9 61.500-56.500	7.16	1172.23	A	0.188	3.03	0.588	1.141	1.141	3.103	1172.16	234.43	D
			B	0.188	3.03	0.588	1.141	1.141	3.103			
			C	0.188	3.03	0.588	1.141	1.141	3.103			
			D	0.188	3.03	0.588	1.141	1.141	3.103			
T10 56.500-52.700	7.16	1323.89	A	0.192	3.016	0.589	1.144	1.144	2.663	979.36	257.73	D
			B	0.192	3.016	0.589	1.144	1.144	2.663			
			C	0.192	3.016	0.589	1.144	1.144	2.663			
			D	0.192	3.016	0.589	1.144	1.144	2.663			
T11 52.700-49.000	7.16	1072.92	A	0.158	3.167	0.583	1.119	1.119	2.489	941.95	254.58	D
			B	0.158	3.167	0.583	1.119	1.119	2.489			
			C	0.158	3.167	0.583	1.119	1.119	2.489			
			D	0.158	3.167	0.583	1.119	1.119	2.489			
T12 49.000-45.000	7.16	1296.70	A	0.16	3.16	0.583	1.12	1.12	3.168	1169.19	292.30	D
			B	0.16	3.16	0.583	1.12	1.12	3.168			
			C	0.16	3.16	0.583	1.12	1.12	3.168			
			D	0.16	3.16	0.583	1.12	1.12	3.168			
T13 45.000-41.000	7.16	1357.01	A	0.148	3.214	0.581	1.111	1.111	3.342	1223.13	305.78	D
			B	0.148	3.214	0.581	1.111	1.111	3.342			
			C	0.148	3.214	0.581	1.111	1.111	3.342			
			D	0.148	3.214	0.581	1.111	1.111	3.342			
T14 41.000-37.000	7.16	1442.25	A	0.139	3.255	0.58	1.105	1.105	3.524	1270.57	317.64	D
			B	0.139	3.255	0.58	1.105	1.105	3.524			
			C	0.139	3.255	0.58	1.105	1.105	3.524			
			D	0.139	3.255	0.58	1.105	1.105	3.524			
T15 37.000-33.000	7.16	1617.07	A	0.133	3.288	0.579	1.099	1.099	3.712	1310.79	327.70	D
			B	0.133	3.288	0.579	1.099	1.099	3.712			
			C	0.133	3.288	0.579	1.099	1.099	3.712			
			D	0.133	3.288	0.579	1.099	1.099	3.712			
T16 33.000-25.000	7.16	2621.42	A	0.091	3.498	0.574	1.068	1.068	5.688	2024.91	253.11	D
			B	0.091	3.498	0.574	1.068	1.068	5.688			
			C	0.091	3.498	0.574	1.068	1.068	5.688			
			D	0.091	3.498	0.574	1.068	1.068	5.688			
T17 25.000-16.000	7.16	3000.61	A	0.078	3.564	0.573	1.059	1.059	6.479	2128.38	236.49	D
			B	0.078	3.564	0.573	1.059	1.059	6.479			
			C	0.078	3.564	0.573	1.059	1.059	6.479			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 18 of 54
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation <i>m</i>	Add Weight <i>kg</i>	Self Weight <i>kg</i>	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i> <i>m</i> ²	<i>F</i> <i>kg</i>	<i>w</i> <i>kglm</i>	<i>Ctrl.</i> <i>Face</i>
T18 16.000- 8.000	7.16	3094.49	D	0.078	3.564	0.573	1.059	1.059	6.479			
			A	0.077	3.571	0.573	1.058	1.058	6.548	1849.41	231.18	D
			B	0.077	3.571	0.573	1.058	1.058	6.548			
			C	0.077	3.571	0.573	1.058	1.058	6.548			
			D	0.077	3.571	0.573	1.058	1.058	6.548			
T19 8.000- 4.000	7.16	1916.84	A	0.073	3.593	0.573	1.054	1.054	3.387	915.21	228.80	D
			B	0.073	3.593	0.573	1.054	1.054	3.387			
			C	0.073	3.593	0.573	1.054	1.054	3.387			
			D	0.073	3.593	0.573	1.054	1.054	3.387			
T20 4.000- 0.000	7.16	2228.26	A	0.104	3.432	0.575	1.078	1.078	5.229	1349.46	337.37	D
			B	0.104	3.432	0.575	1.078	1.078	5.229			
			C	0.104	3.432	0.575	1.078	1.078	5.229			
			D	0.104	3.432	0.575	1.078	1.078	5.229			
Sum Weight:	126.23	28558.01						OTM	1054303 kg-m	23409.02		

Tower Forces - Service - Wind Normal To Face

Section Elevation <i>m</i>	Add Weight <i>kg</i>	Self Weight <i>kg</i>	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i> <i>m</i> ²	<i>F</i> <i>kg</i>	<i>w</i> <i>kglm</i>	<i>Ctrl.</i> <i>Face</i>
T1 100.000- 95.000	3.62	390.31	A	0.422	2.223	0.661	1	1	1.235	98.73	19.75	D
			B	0.422	2.223	0.661	1	1	1.235			
			C	0.422	2.223	0.661	1	1	1.235			
			D	0.422	2.223	0.661	1	1	1.235			
T2 95.000- 92.000	3.62	260.21	A	0.287	2.636	0.612	1	1	0.800	75.00	25.00	D
			B	0.287	2.636	0.612	1	1	0.800			
			C	0.287	2.636	0.612	1	1	0.800			
			D	0.287	2.636	0.612	1	1	0.800			
T3 92.000- 86.000	4.46	571.10	A	0.228	2.863	0.597	1	1	1.729	173.48	28.91	D
			B	0.228	2.863	0.597	1	1	1.729			
			C	0.228	2.863	0.597	1	1	1.729			
			D	0.228	2.863	0.597	1	1	1.729			
T4 86.000- 82.000	5.37	450.89	A	0.269	2.704	0.607	1	1	1.372	127.92	31.98	D
			B	0.269	2.704	0.607	1	1	1.372			
			C	0.269	2.704	0.607	1	1	1.372			
			D	0.269	2.704	0.607	1	1	1.372			
T5 82.000- 79.000	5.37	526.92	A	0.22	2.895	0.595	1	1	1.366	134.70	44.90	D
			B	0.22	2.895	0.595	1	1	1.366			
			C	0.22	2.895	0.595	1	1	1.366			
			D	0.22	2.895	0.595	1	1	1.366			
T6 79.000- 74.000	5.37	1158.10	A	0.169	3.117	0.585	1	1	2.427	253.92	50.78	D
			B	0.169	3.117	0.585	1	1	2.427			
			C	0.169	3.117	0.585	1	1	2.427			
			D	0.169	3.117	0.585	1	1	2.427			
T7 74.000- 69.000	6.26	1172.23	A	0.188	3.031	0.588	1	1	2.718	271.18	54.24	D
			B	0.188	3.031	0.588	1	1	2.718			
			C	0.188	3.031	0.588	1	1	2.718			
			D	0.188	3.031	0.588	1	1	2.718			
T8 69.000- 61.500	6.26	1758.34	A	0.188	3.033	0.588	1	1	4.063	395.31	52.71	D
			B	0.188	3.033	0.588	1	1	4.063			
			C	0.188	3.033	0.588	1	1	4.063			
			D	0.188	3.033	0.588	1	1	4.063			
T9 61.500- 56.500	7.16	1172.23	A	0.188	3.03	0.588	1	1	2.719	256.75	51.35	D
			B	0.188	3.03	0.588	1	1	2.719			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 19 of 54
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T10 56.500- 52.700	7.16	1323.89	C	0.188	3.03	0.588	1	1	2.719	214.06	56.33	D
			D	0.188	3.03	0.588	1	1	2.719			
			A	0.192	3.016	0.589	1	1	2.328			
			B	0.192	3.016	0.589	1	1	2.328			
T11 52.700- 49.000	7.16	1072.92	C	0.192	3.016	0.589	1	1	2.328	210.52	56.90	D
			D	0.192	3.016	0.589	1	1	2.328			
			A	0.158	3.167	0.583	1	1	2.225			
			B	0.158	3.167	0.583	1	1	2.225			
T12 49.000- 45.000	7.16	1296.70	C	0.158	3.167	0.583	1	1	2.225	261.02	65.26	D
			D	0.158	3.167	0.583	1	1	2.225			
			A	0.16	3.16	0.583	1	1	2.829			
			B	0.16	3.16	0.583	1	1	2.829			
T13 45.000- 41.000	7.16	1357.01	C	0.16	3.16	0.583	1	1	2.829	275.20	68.80	D
			D	0.16	3.16	0.583	1	1	2.829			
			A	0.148	3.214	0.581	1	1	3.008			
			B	0.148	3.214	0.581	1	1	3.008			
T14 41.000- 37.000	7.16	1442.25	C	0.148	3.214	0.581	1	1	3.008	287.58	71.89	D
			D	0.148	3.214	0.581	1	1	3.008			
			A	0.139	3.255	0.58	1	1	3.190			
			B	0.139	3.255	0.58	1	1	3.190			
T15 37.000- 33.000	7.16	1617.07	C	0.139	3.255	0.58	1	1	3.190	298.07	74.52	D
			D	0.139	3.255	0.58	1	1	3.190			
			A	0.133	3.288	0.579	1	1	3.376			
			B	0.133	3.288	0.579	1	1	3.376			
T16 33.000- 25.000	7.16	2621.42	C	0.133	3.288	0.579	1	1	3.376	473.99	59.25	D
			D	0.133	3.288	0.579	1	1	3.376			
			A	0.091	3.498	0.574	1	1	5.326			
			B	0.091	3.498	0.574	1	1	5.326			
T17 25.000- 16.000	7.16	3000.61	C	0.091	3.498	0.574	1	1	5.326	502.68	55.85	D
			D	0.091	3.498	0.574	1	1	5.326			
			A	0.078	3.564	0.573	1	1	6.121			
			B	0.078	3.564	0.573	1	1	6.121			
T18 16.000- 8.000	7.16	3094.49	C	0.078	3.564	0.573	1	1	6.121	437.21	54.65	D
			D	0.078	3.564	0.573	1	1	6.121			
			A	0.077	3.571	0.573	1	1	6.192			
			B	0.077	3.571	0.573	1	1	6.192			
T19 8.000- 4.000	7.16	1916.84	C	0.077	3.571	0.573	1	1	6.192	216.99	54.25	D
			D	0.077	3.571	0.573	1	1	6.192			
			A	0.073	3.593	0.573	1	1	3.212			
			B	0.073	3.593	0.573	1	1	3.212			
T20 4.000- 0.000	7.16	2228.26	C	0.073	3.593	0.573	1	1	3.212	313.05	78.26	D
			D	0.073	3.593	0.573	1	1	3.212			
			A	0.104	3.432	0.575	1	1	4.852			
			B	0.104	3.432	0.575	1	1	4.852			
Sum Weight:	126.23	28558.01	C	0.104	3.432	0.575	1	1	4.852	5277.39		
			D	0.104	3.432	0.575	1	1	4.852			
									OTM	232792 kg-m		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T1 100.000-	3.62	390.31	A	0.422	2.223	0.661	1.2	1.2	1.481	118.48	23.70	D

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
95.000			B	0.422	2.223	0.661	1.2	1.2	1.481			
			C	0.422	2.223	0.661	1.2	1.2	1.481			
			D	0.422	2.223	0.661	1.2	1.2	1.481			
T2 95.000- 92.000	3.62	260.21	A	0.287	2.636	0.612	1.2	1.2	0.961	90.00	30.00	D
			B	0.287	2.636	0.612	1.2	1.2	0.961			
			C	0.287	2.636	0.612	1.2	1.2	0.961			
			D	0.287	2.636	0.612	1.2	1.2	0.961			
T3 92.000- 86.000	4.46	571.10	A	0.228	2.863	0.597	1.171	1.171	2.024	203.14	33.86	D
			B	0.228	2.863	0.597	1.171	1.171	2.024			
			C	0.228	2.863	0.597	1.171	1.171	2.024			
			D	0.228	2.863	0.597	1.171	1.171	2.024			
T4 86.000- 82.000	5.37	450.89	A	0.269	2.704	0.607	1.2	1.2	1.647	153.51	38.38	D
			B	0.269	2.704	0.607	1.2	1.2	1.647			
			C	0.269	2.704	0.607	1.2	1.2	1.647			
			D	0.269	2.704	0.607	1.2	1.2	1.647			
T5 82.000- 79.000	5.37	526.92	A	0.22	2.895	0.595	1.165	1.165	1.591	156.93	52.31	D
			B	0.22	2.895	0.595	1.165	1.165	1.591			
			C	0.22	2.895	0.595	1.165	1.165	1.591			
			D	0.22	2.895	0.595	1.165	1.165	1.591			
T6 79.000- 74.000	5.37	1158.10	A	0.169	3.117	0.585	1.127	1.127	2.734	286.10	57.22	D
			B	0.169	3.117	0.585	1.127	1.127	2.734			
			C	0.169	3.117	0.585	1.127	1.127	2.734			
			D	0.169	3.117	0.585	1.127	1.127	2.734			
T7 74.000- 69.000	6.26	1172.23	A	0.188	3.031	0.588	1.141	1.141	3.102	309.50	61.90	D
			B	0.188	3.031	0.588	1.141	1.141	3.102			
			C	0.188	3.031	0.588	1.141	1.141	3.102			
			D	0.188	3.031	0.588	1.141	1.141	3.102			
T8 69.000- 61.500	6.26	1758.34	A	0.188	3.033	0.588	1.141	1.141	4.635	450.97	60.13	D
			B	0.188	3.033	0.588	1.141	1.141	4.635			
			C	0.188	3.033	0.588	1.141	1.141	4.635			
			D	0.188	3.033	0.588	1.141	1.141	4.635			
T9 61.500- 56.500	7.16	1172.23	A	0.188	3.03	0.588	1.141	1.141	3.103	293.04	58.61	D
			B	0.188	3.03	0.588	1.141	1.141	3.103			
			C	0.188	3.03	0.588	1.141	1.141	3.103			
			D	0.188	3.03	0.588	1.141	1.141	3.103			
T10 56.500- 52.700	7.16	1323.89	A	0.192	3.016	0.589	1.144	1.144	2.663	244.84	64.43	D
			B	0.192	3.016	0.589	1.144	1.144	2.663			
			C	0.192	3.016	0.589	1.144	1.144	2.663			
			D	0.192	3.016	0.589	1.144	1.144	2.663			
T11 52.700- 49.000	7.16	1072.92	A	0.158	3.167	0.583	1.119	1.119	2.489	235.49	63.65	D
			B	0.158	3.167	0.583	1.119	1.119	2.489			
			C	0.158	3.167	0.583	1.119	1.119	2.489			
			D	0.158	3.167	0.583	1.119	1.119	2.489			
T12 49.000- 45.000	7.16	1296.70	A	0.16	3.16	0.583	1.12	1.12	3.168	292.30	73.07	D
			B	0.16	3.16	0.583	1.12	1.12	3.168			
			C	0.16	3.16	0.583	1.12	1.12	3.168			
			D	0.16	3.16	0.583	1.12	1.12	3.168			
T13 45.000- 41.000	7.16	1357.01	A	0.148	3.214	0.581	1.111	1.111	3.342	305.78	76.45	D
			B	0.148	3.214	0.581	1.111	1.111	3.342			
			C	0.148	3.214	0.581	1.111	1.111	3.342			
			D	0.148	3.214	0.581	1.111	1.111	3.342			
T14 41.000- 37.000	7.16	1442.25	A	0.139	3.255	0.58	1.105	1.105	3.524	317.64	79.41	D
			B	0.139	3.255	0.58	1.105	1.105	3.524			
			C	0.139	3.255	0.58	1.105	1.105	3.524			
			D	0.139	3.255	0.58	1.105	1.105	3.524			
T15 37.000- 33.000	7.16	1617.07	A	0.133	3.288	0.579	1.099	1.099	3.712	327.70	81.92	D
			B	0.133	3.288	0.579	1.099	1.099	3.712			
			C	0.133	3.288	0.579	1.099	1.099	3.712			
			D	0.133	3.288	0.579	1.099	1.099	3.712			
T16 33.000-	7.16	2621.42	A	0.091	3.498	0.574	1.068	1.068	5.688	506.23	63.28	D

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 21 of 54
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation <i>m</i>	Add Weight <i>kg</i>	Self Weight <i>kg</i>	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i> <i>m</i> ²	<i>F</i> <i>kg</i>	<i>w</i> <i>kg/m</i>	<i>Ctrl.</i> <i>Face</i>
25.000			B	0.091	3.498	0.574	1.068	1.068	5.688			
			C	0.091	3.498	0.574	1.068	1.068	5.688			
			D	0.091	3.498	0.574	1.068	1.068	5.688			
T17 25.000- 16.000	7.16	3000.61	A	0.078	3.564	0.573	1.059	1.059	6.479	532.10	59.12	D
			B	0.078	3.564	0.573	1.059	1.059	6.479			
			C	0.078	3.564	0.573	1.059	1.059	6.479			
			D	0.078	3.564	0.573	1.059	1.059	6.479			
T18 16.000- 8.000	7.16	3094.49	A	0.077	3.571	0.573	1.058	1.058	6.548	462.35	57.79	D
			B	0.077	3.571	0.573	1.058	1.058	6.548			
			C	0.077	3.571	0.573	1.058	1.058	6.548			
			D	0.077	3.571	0.573	1.058	1.058	6.548			
T19 8.000- 4.000	7.16	1916.84	A	0.073	3.593	0.573	1.054	1.054	3.387	228.80	57.20	D
			B	0.073	3.593	0.573	1.054	1.054	3.387			
			C	0.073	3.593	0.573	1.054	1.054	3.387			
			D	0.073	3.593	0.573	1.054	1.054	3.387			
T20 4.000- 0.000	7.16	2228.26	A	0.104	3.432	0.575	1.078	1.078	5.229	337.37	84.34	D
			B	0.104	3.432	0.575	1.078	1.078	5.229			
			C	0.104	3.432	0.575	1.078	1.078	5.229			
			D	0.104	3.432	0.575	1.078	1.078	5.229			
Sum Weight:	126.23	28558.01						OTM	263576 kg-m	5852.26		

Force Totals

Load Case	Vertical Forces <i>kg</i>	Sum of Forces <i>X</i> <i>kg</i>	Sum of Forces <i>Z</i> <i>kg</i>	Sum of Overturning Moments, <i>M_x</i> <i>kg-m</i>	Sum of Overturning Moments, <i>M_z</i> <i>kg-m</i>	Sum of Torques <i>kg-m</i>
Leg Weight	14345.93					
Bracing Weight	14085.85					
Total Member Self-Weight	28431.77			466	466	
Gusset Weight	126.23					
Total Weight	30183.79			466	466	
Wind 0 deg - No Ice		435.03	-21803.96	-954795	-5798	-112
Wind 45 deg - No Ice		17144.04	-17144.04	-763519	-763519	0
Wind 90 deg - No Ice		21803.96	-435.03	-5798	-954795	112
Wind 180 deg - No Ice		-17.75	21611.45	952955	722	1209
Total Weight	30183.79			466	466	
Wind 0 deg - Service		108.76	-5450.99	-238349	-1100	-28
Wind 45 deg - Service		4286.01	-4286.01	-190530	-190530	0
Wind 90 deg - Service		5450.99	-108.76	-1100	-238349	28
Wind 180 deg - Service		-4.44	5402.86	238589	530	302

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

Comb. No.	Description
5	Dead+Wind 180 deg - No Ice
6	Dead+Wind 0 deg - Service
7	Dead+Wind 45 deg - Service
8	Dead+Wind 90 deg - Service
9	Dead+Wind 180 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	100 - 95	Leg	Max Tension	3	1134.55	-2	-2
			Max. Compression	3	-1276.42	-3	-3
			Max. Mx	3	-77.45	7	-6
			Max. My	3	-75.93	-6	7
			Max. Vy	3	-20.34	7	-6
		Diagonal	Max. Vx	3	-20.35	-6	7
			Max Tension	3	247.21	0	0
			Max. Compression	3	-266.44	0	0
			Max. Mx	2	59.49	0	0
			Max. My	5	16.25	0	0
		Horizontal	Max. Vy	2	0.55	0	0
			Max. Vx	5	-0.01	0	0
			Max Tension	3	23.35	-1	0
			Max. Compression	3	-19.85	1	0
			Max. Mx	4	18.90	1	0
		Top Girt	Max. My	3	12.95	1	0
			Max. Vy	4	-5.84	1	0
			Max. Vx	3	-0.12	1	0
			Max Tension	4	6.37	0	0
			Max. Compression	2	-6.57	0	0
		Inner Bracing	Max. Mx	1	-0.17	0	0
			Max. My	3	-5.80	0	0
			Max. Vy	1	1.63	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	2.04	0	0
T2	95 - 92	Leg	Max. Compression	3	-1.16	0	0
			Max. Mx	1	0.00	0	0
			Max. My	4	0.09	0	0
			Max. Vy	1	-1.30	0	0
			Max. Vx	4	0.01	0	0
		Diagonal	Max Tension	3	1311.75	0	0
			Max. Compression	3	-1485.86	0	0
			Max. Mx	3	-80.37	7	-7
			Max. My	3	-80.56	-7	7
			Max. Vy	2	-15.95	7	-1
		Horizontal	Max. Vx	2	-15.95	-1	7
			Max Tension	3	289.30	0	0
			Max. Compression	3	-350.24	0	0
			Max. Mx	2	88.90	0	0
			Max. My	2	213.28	0	0
			Max. Vy	2	1.22	0	0
			Max. Vx	2	-0.38	0	0
		Top Girt	Max Tension	4	27.09	0	0
			Max. Compression	2	-33.28	0	0
			Max. Mx	4	-1.00	0	0
			Max. My	3	25.10	0	0
			Max. Vy	4	-1.39	0	0
			Max. Vx	3	-1.15	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T3	92 - 86	Top Girt	Max Tension	5	0.21	0	0
			Max. Compression	4	-6.86	0	0
			Max. Mx	1	-3.12	0	0
			Max. My	1	-3.12	0	0
			Max. Vy	1	1.24	0	0
			Max. Vx	1	-0.14	0	0
		Leg	Max Tension	3	4966.03	-6	-6
			Max. Compression	3	-5686.17	6	6
			Max. Mx	3	-341.76	20	-18
			Max. My	3	-342.58	-18	20
			Max. Vy	3	-35.08	20	-18
			Max. Vx	3	-35.09	-18	20
		Diagonal	Max Tension	3	742.69	0	0
			Max. Compression	3	-783.29	0	0
			Max. Mx	2	360.88	0	0
			Max. My	5	-164.73	0	0
			Max. Vy	2	1.22	0	0
			Max. Vx	5	-0.02	0	0
		Horizontal	Max Tension	3	48.19	1	0
			Max. Compression	3	-47.97	-1	0
			Max. Mx	4	35.25	1	0
			Max. My	3	-20.23	1	0
			Max. Vy	4	3.60	1	0
			Max. Vx	3	0.27	0	0
T4	86 - 82	Top Girt	Max Tension	4	297.33	0	0
			Max. Compression	2	-234.39	0	0
			Max. Mx	1	31.32	-1	0
			Max. My	3	-206.28	0	0
			Max. Vy	1	2.76	0	0
			Max. Vx	3	-0.00	0	0
		Leg	Max Tension	3	9180.53	-23	-23
			Max. Compression	3	-10244.40	-5	-5
			Max. Mx	3	-528.23	68	-63
			Max. My	3	-530.05	-63	68
			Max. Vy	3	-95.06	68	-63
			Max. Vx	3	-95.08	-63	68
		Diagonal	Max Tension	3	1067.12	0	0
			Max. Compression	3	-1093.48	0	0
			Max. Mx	4	754.93	0	0
			Max. My	5	37.40	0	0
			Max. Vy	4	1.22	0	0
			Max. Vx	5	-0.02	0	0
		Horizontal	Max Tension	4	109.70	0	0
			Max. Compression	2	-98.82	0	0
			Max. Mx	4	85.82	2	0
			Max. My	4	-14.83	0	0
			Max. Vy	4	5.12	2	0
			Max. Vx	4	0.42	0	0
T5	82 - 79	Top Girt	Max Tension	2	54.86	0	0
			Max. Compression	4	-49.20	0	0
			Max. Mx	1	5.86	-1	0
			Max. My	3	-43.46	0	0
			Max. Vy	1	2.76	0	0
			Max. Vx	3	-0.00	0	0
		Leg	Max Tension	3	6703.78	6	6
			Max. Compression	3	-7601.92	15	15
			Max. Mx	4	3641.79	17	-1
			Max. My	4	3641.82	-1	17
			Max. Vy	4	32.38	17	-1
			Max. Vx	4	32.38	-1	17
		Diagonal	Max Tension	3	2572.95	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T6	79 - 74	Horizontal	Max. Compression	3	-2819.82	0	0
			Max. Mx	2	-1178.44	-3	0
			Max. My	5	1212.82	0	1
			Max. Vy	2	6.22	0	0
			Max. Vx	5	-2.47	0	0
			Max Tension	2	39.99	0	5
			Max. Compression	4	-68.47	0	5
			Max. Mx	2	-13.25	2	5
			Max. My	5	-11.18	-1	7
			Max. Vy	2	-3.70	2	5
			Max. Vx	5	7.38	0	0
			Max Tension	2	842.23	0	0
		Top Girt	Max. Compression	4	-1026.45	0	0
			Max. Mx	1	-88.87	-1	0
			Max. My	1	-88.87	0	0
			Max. Vy	1	2.67	0	0
			Max. Vx	1	-0.70	0	0
			Max Tension	3	9438.71	-3	-3
			Max. Compression	3	-11303.60	24	24
			Max. Mx	3	-1032.82	68	-61
			Max. My	3	-1035.79	-60	68
			Max. Vy	3	-72.30	68	-61
			Max. Vx	3	-72.01	-60	68
			Max Tension	2	1114.45	0	0
		Diagonal	Max. Compression	4	-1152.77	0	0
			Max. Mx	2	927.16	-1	0
			Max. My	5	111.86	0	0
			Max. Vy	2	-3.19	0	0
			Max. Vx	5	-0.02	0	0
			Max Tension	3	85.14	1	0
			Max. Compression	3	-72.69	1	0
			Max. Mx	4	34.43	2	0
			Max. My	2	34.27	2	0
			Max. Vy	4	-4.36	2	0
			Max. Vx	2	-0.06	2	0
			Max Tension	4	1821.25	0	0
		Top Girt	Max. Compression	2	-1507.58	0	0
			Max. Mx	1	155.30	-4	0
			Max. My	5	156.56	0	0
			Max. Vy	1	-6.34	0	0
			Max. Vx	5	0.00	0	0
			Max Tension	3	167.71	0	0
			Max. Compression	2	-31.98	0	0
			Max. Mx	1	155.80	9	0
			Max. My	4	0.77	0	0
			Max. Vy	1	-8.96	0	0
			Max. Vx	4	0.05	0	0
			Inner Bracing	Max Tension	3	14910.53	-17
		Max. Compression		3	-17421.59	45	46
		Max. Mx		3	-1281.48	88	-76
		Max. My		3	-1286.45	-76	88
		Max. Vy		3	-97.03	88	-76
		Max. Vx		3	-97.04	-76	88
		Max Tension		2	1490.51	0	0
		Max. Compression		4	-1526.43	0	0
		Max. Mx		4	1298.40	-2	0
		Max. My		5	-12.90	0	0
		Max. Vy		4	4.02	0	0
		Max. Vx		5	-0.02	0	0
Horizontal	Max Tension	3	157.31	1	0		
	Max. Compression	3	-139.08	1	0		

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T8	69 - 61.5	Leg	Max. Mx	2	114.19	1	0
			Max. My	4	-116.97	1	0
			Max. Vy	2	-4.16	1	0
			Max. Vx	4	-0.14	0	0
			Max Tension	3	25758.88	-51	-50
			Max. Compression	3	-29264.33	43	44
			Max. Mx	3	-1598.07	132	-116
			Max. My	3	-1605.77	-116	132
			Max. Vy	3	-144.16	132	-116
			Max. Vx	3	-144.19	-116	132
		Diagonal	Max Tension	2	2077.19	0	0
			Max. Compression	4	-2143.13	0	0
			Max. Mx	4	1642.24	-2	0
			Max. My	5	-131.22	0	0
			Max. Vy	4	4.02	0	0
		Horizontal	Max. Vx	5	-0.02	0	0
			Max Tension	3	228.40	2	0
			Max. Compression	3	-216.70	1	0
			Max. Mx	2	207.87	2	0
			Max. My	3	-216.70	1	0
			Max. Vy	2	-4.33	2	0
			Max. Vx	3	0.27	1	0
			Max Tension	3	34750.34	-81	-81
			Max. Compression	3	-38916.76	4	-10
			Max. Mx	3	-2001.59	226	-205
T9	61.5 - 56.5	Leg	Max. My	3	-2012.96	-205	226
			Max. Vy	3	-237.65	226	-205
			Max. Vx	3	-237.68	-205	226
		Diagonal	Max Tension	3	2481.01	0	0
			Max. Compression	4	-2524.95	0	0
			Max. Mx	2	2171.82	-2	0
			Max. My	5	63.20	0	0
			Max. Vy	2	4.02	0	0
			Max. Vx	5	-0.02	0	0
		Horizontal	Max Tension	2	331.79	0	0
			Max. Compression	4	-301.04	0	0
			Max. Mx	2	233.25	2	0
			Max. My	2	-53.22	1	-1
			Max. Vy	2	4.95	2	0
			Max. Vx	2	0.82	1	-1
		Leg	Max Tension	3	37239.72	8	14
			Max. Compression	3	-41986.39	108	112
			Max. Mx	3	-2544.64	244	-218
			Max. My	3	-2567.06	-216	243
			Max. Vy	3	-161.77	244	-218
			Max. Vx	3	-160.86	-216	243
		Diagonal	Max Tension	4	566.47	0	0
			Max. Compression	2	-636.23	0	0
			Max. Mx	3	-492.47	6	-1
			Max. My	3	-509.20	-5	1
			Max. Vy	3	-7.46	6	-1
		Horizontal	Max. Vx	3	-1.05	0	0
			Max Tension	3	168.17	0	0
			Max. Compression	3	-214.50	2	0
			Max. Mx	4	-158.63	2	0
			Max. My	2	-158.16	2	0
			Max. Vy	4	-5.10	2	0
			Max. Vx	2	0.46	2	0
		Top Girt	Max Tension	4	1124.67	0	0
			Max. Compression	2	-1343.16	0	0
			Max. Mx	1	-82.68	-7	0
T10	56.5 - 52.7	Leg	Max. Mx	3	37239.72	8	14
			Max. Compression	3	-41986.39	108	112
			Max. Mx	3	-2544.64	244	-218
			Max. My	3	-2567.06	-216	243
			Max. Vy	3	-161.77	244	-218
			Max. Vx	3	-160.86	-216	243
		Diagonal	Max Tension	4	566.47	0	0
			Max. Compression	2	-636.23	0	0
			Max. Mx	3	-492.47	6	-1
			Max. My	3	-509.20	-5	1
			Max. Vy	3	-7.46	6	-1
		Horizontal	Max. Vx	3	-1.05	0	0
			Max Tension	3	168.17	0	0
			Max. Compression	3	-214.50	2	0
			Max. Mx	4	-158.63	2	0
			Max. My	2	-158.16	2	0
			Max. Vy	4	-5.10	2	0
			Max. Vx	2	0.46	2	0
		Top Girt	Max Tension	4	1124.67	0	0
			Max. Compression	2	-1343.16	0	0
			Max. Mx	1	-82.68	-7	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T11	52.7 - 49	Redund Diag 1 Bracing	Max. My	1	-82.68	0	1
			Max. Vy	1	10.51	0	0
			Max. Vx	1	-0.85	0	0
			Max Tension	3	520.34	0	0
		Inner Bracing	Max. Compression	3	-520.34	0	0
			Max. Mx	4	0.92	-1	0
			Max. My	5	0.15	0	0
			Max. Vy	4	1.94	0	0
			Max. Vx	5	-0.24	0	0
			Max Tension	3	65.57	0	0
			Max. Compression	3	-164.33	0	0
			Max. Mx	1	1.78	18	0
			Max. My	4	1.21	0	0
			Max. Vy	1	-18.05	0	0
			Max. Vx	4	-0.07	0	0
		Diagonal	Max Tension	3	37772.41	-83	-80
			Max. Compression	3	-43452.38	81	87
			Max. Mx	3	-2439.67	244	-218
			Max. My	3	-2445.14	-217	243
			Max. Vy	3	186.03	244	-218
			Max. Vx	3	185.60	-217	243
			Max Tension	5	357.85	0	0
			Max. Compression	5	-387.32	0	0
			Max. Mx	3	312.94	6	1
			Max. My	3	-260.95	-3	1
			Max. Vy	3	7.11	6	1
			Max. Vx	3	-1.11	0	0
		Horizontal	Max Tension	2	248.79	3	3
			Max. Compression	3	-276.68	1	2
			Max. Mx	2	248.79	3	3
			Max. My	3	157.72	3	5
			Max. Vy	2	5.75	3	3
			Max. Vx	3	2.98	0	0
		Redund Diag 1 Bracing	Max Tension	3	481.21	0	0
			Max. Compression	3	-481.21	0	0
			Max. Mx	2	-1.79	-1	0
			Max. My	5	-2.32	0	0
			Max. Vy	2	2.27	0	0
			Max. Vx	5	-0.26	0	0
T12	49 - 45	Leg	Max Tension	3	37647.38	-66	-74
			Max. Compression	3	-43933.11	-134	-134
			Max. Mx	4	-27735.83	249	20
			Max. My	4	-27716.89	19	249
		Diagonal	Max. Vy	3	-346.25	-126	-143
			Max. Vx	3	-386.38	-126	-143
			Max Tension	3	808.23	4	0
			Max. Compression	3	-974.66	0	0
		Horizontal	Max. Mx	3	1.80	5	-1
			Max. My	3	-224.34	1	-2
			Max. Vy	3	-6.36	5	-1
			Max. Vx	3	-1.52	2	2
		Redund Horz 1 Bracing	Max Tension	3	110.36	2	1
			Max. Compression	3	-157.92	3	-1
			Max. Mx	3	-73.50	3	-1
			Max. My	3	66.28	2	1
		Redund Horz 1 Bracing	Max. Vy	3	6.30	3	-1
			Max. Vx	3	1.04	0	0
			Max Tension	3	661.14	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T13	45 - 41	Redund Diag 1 Bracing	Max. Compression	3	-661.14	0	0
			Max. Mx	1	46.01	-1	0
			Max. My	3	661.14	0	0
			Max. Vy	1	2.45	0	0
			Max. Vx	3	-0.20	0	0
			Max Tension	3	468.72	0	0
		Redund Hip 1 Bracing	Max. Compression	3	-468.72	0	0
			Max. Mx	5	167.51	-1	0
			Max. My	5	129.40	0	0
			Max. Vy	5	2.64	0	0
			Max. Vx	5	-0.29	0	0
			Max Tension	1	0.00	0	0
		Leg	Max. Compression	3	-5.42	0	0
			Max. Mx	1	-3.21	-1	0
			Max. My	3	-2.26	0	0
			Max. Vy	1	2.35	0	0
			Max. Vx	3	0.00	0	0
			Max Tension	3	38542.37	-173	-162
		Diagonal	Max. Compression	3	-45877.01	-103	-102
			Max. Mx	4	-28966.43	249	20
			Max. My	4	-28950.25	19	249
			Max. Vy	3	369.51	-142	-144
			Max. Vx	3	379.16	-142	-144
			Max Tension	5	847.30	2	1
		Horizontal	Max. Compression	3	-972.55	0	0
			Max. Mx	3	504.76	5	-2
			Max. My	3	-512.73	2	-2
			Max. Vy	3	-6.29	5	-2
			Max. Vx	3	1.63	2	2
			Max Tension	2	139.53	4	1
		Redund Horz 1 Bracing	Max. Compression	3	-181.04	3	-1
			Max. Mx	3	127.62	4	1
			Max. My	3	69.12	4	1
			Max. Vy	3	-7.23	4	1
			Max. Vx	3	0.90	0	0
			Max Tension	3	690.39	0	0
		Redund Diag 1 Bracing	Max. Compression	3	-690.39	0	0
			Max. Mx	1	52.03	-1	0
			Max. My	3	690.39	0	0
			Max. Vy	1	2.81	0	0
			Max. Vx	3	-0.23	0	0
			Max Tension	3	460.79	0	0
		Redund Hip 1 Bracing	Max. Compression	3	-460.79	0	0
			Max. Mx	5	138.00	-1	0
			Max. My	5	201.14	0	0
			Max. Vy	5	-3.00	0	0
			Max. Vx	5	-0.31	0	0
			Max Tension	3	0.10	0	0
T14	41 - 37	Leg	Max. Compression	3	-6.78	0	0
			Max. Mx	1	-3.58	-1	0
			Max. My	3	-0.74	0	0
			Max. Vy	1	-2.70	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	39942.39	-86	-108
			Max. Compression	3	-47901.99	-111	-103
			Max. Mx	3	-3446.86	250	-203

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T15	37 - 33	Diagonal	Max. My	3	-3482.30	-183	239
			Max. Vy	3	-314.06	250	-203
			Max. Vx	3	-354.08	-92	-123
			Max Tension	5	960.13	2	1
			Max. Compression	4	-1122.74	0	0
			Max. Mx	3	734.57	5	-2
		Horizontal	Max. My	3	-595.34	2	-2
			Max. Vy	3	-6.59	5	-2
			Max. Vx	3	1.73	5	-2
			Max Tension	3	126.78	4	1
			Max. Compression	3	-160.08	5	-1
			Max. Mx	3	-84.31	5	-1
		Redund Horz 1 Bracing	Max. My	3	124.61	4	1
			Max. Vy	3	8.06	5	-1
			Max. Vx	3	0.88	0	0
			Max Tension	3	720.87	0	0
			Max. Compression	3	-720.87	0	0
			Max. Mx	1	57.03	-1	0
		Redund Diag 1 Bracing	Max. My	3	720.87	0	0
			Max. Vy	1	3.18	0	0
			Max. Vx	3	-0.26	0	0
			Max Tension	3	459.55	0	0
			Max. Compression	3	-459.55	0	0
			Max. Mx	5	152.10	-2	0
		Redund Hip 1 Bracing	Max. My	5	112.22	0	0
			Max. Vy	5	3.37	0	0
			Max. Vx	5	0.33	0	0
			Max Tension	3	0.23	0	0
			Max. Compression	3	-7.96	0	0
			Max. Mx	1	-4.15	-2	0
		Leg	Max. My	3	-0.60	0	0
			Max. Vy	1	4.51	0	0
			Max. Vx	3	0.00	0	0
			Max Tension	3	41062.46	-159	-129
			Max. Compression	3	-49880.12	98	118
			Max. Mx	3	-3477.73	250	-203
		Diagonal	Max. My	3	-3469.20	-184	239
			Max. Vy	3	328.17	-125	-127
			Max. Vx	3	343.02	-125	-127
			Max Tension	3	1279.43	3	1
			Max. Compression	3	-1401.19	0	0
			Max. Mx	3	381.37	4	1
		Horizontal	Max. My	3	-790.77	3	-1
			Max. Vy	3	-6.73	4	1
			Max. Vx	3	1.20	3	-1
			Max Tension	3	116.75	6	0
			Max. Compression	3	-168.61	5	0
			Max. Mx	3	116.75	6	0
		Redund Horz 1 Bracing	Max. My	3	116.75	6	0
			Max. Vy	3	-9.03	6	0
			Max. Vx	2	0.75	5	0
			Max Tension	3	750.63	0	0
			Max. Compression	3	-750.63	0	0
			Max. Mx	1	63.22	-1	0
			Max. My	3	750.63	0	0
			Max. Vy	1	3.54	0	0
			Max. Vx	3	-0.29	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T16	33 - 25	Redund Diag 1 Bracing	Max Tension	3	461.79	0	0
			Max. Compression	3	-461.79	0	0
			Max. Mx	4	125.55	-2	0
			Max. My	5	117.77	0	0
			Max. Vy	4	3.73	0	0
			Max. Vx	5	-0.36	0	0
		Redund Hip 1 Bracing	Max Tension	3	4.67	0	0
			Max. Compression	3	-4.42	0	0
			Max. Mx	1	-2.81	-3	0
			Max. My	3	4.12	0	0
			Max. Vy	1	5.03	0	0
			Max. Vx	3	0.00	0	0
		Inner Bracing	Max Tension	3	61.41	0	0
			Max. Compression	3	-66.48	0	0
			Max. Mx	1	0.05	-22	0
			Max. My	4	1.19	0	0
			Max. Vy	1	14.22	0	0
			Max. Vx	4	0.04	0	0
		Leg	Max Tension	3	44187.60	-73	-100
			Max. Compression	3	-53858.47	63	89
			Max. Mx	3	-4821.91	761	-731
			Max. My	3	-4725.06	-713	738
			Max. Vy	3	-431.06	-73	63
			Max. Vx	3	-481.65	-204	-269
		Diagonal	Max Tension	3	2310.93	5	-2
			Max. Compression	3	-2757.04	0	0
			Max. Mx	3	1666.00	7	-2
			Max. My	3	-1563.65	0	-3
			Max. Vy	3	7.51	5	2
			Max. Vx	3	1.70	0	-3
		Horizontal	Max Tension	3	236.93	8	-1
			Max. Compression	3	-285.80	7	0
			Max. Mx	3	-231.41	8	-1
			Max. My	3	234.97	8	-1
			Max. Vy	3	-10.39	8	-1
			Max. Vx	2	0.87	8	-1
		Redund Horz 1 Bracing	Max Tension	3	810.50	0	0
			Max. Compression	3	-810.50	0	0
			Max. Mx	6	-47.40	-2	0
			Max. My	5	-217.78	0	0
			Max. Vy	6	4.09	0	0
			Max. Vx	5	-0.33	0	0
		Redund Diag 1 Bracing	Max Tension	3	629.25	0	0
			Max. Compression	3	-629.25	0	0
			Max. Mx	5	154.08	-3	0
			Max. My	5	73.66	0	0
			Max. Vy	5	4.47	0	0
			Max. Vx	5	-0.52	0	0
		Redund Hip 1 Bracing	Max Tension	3	3.81	0	0
			Max. Compression	3	-5.72	0	0
			Max. Mx	1	-3.91	-4	0
			Max. My	3	0.36	0	0
			Max. Vy	1	5.80	0	0
			Max. Vx	3	0.00	0	0
		Inner Bracing	Max Tension	3	517.23	0	0
			Max. Compression	3	-530.90	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T17	25 - 16	Leg	Max. Mx	1	0.27	-30	0
			Max. My	4	2.10	0	0
			Max. Vy	1	16.41	0	0
			Max. Vx	4	0.04	0	0
		Diagonal	Max Tension	3	48553.87	-445	-435
			Max. Compression	3	-56854.88	-1242	-1474
			Max. Mx	3	-56854.88	-1242	-1474
			Max. My	3	-56854.88	-1242	-1474
			Max. Vy	3	-555.95	-420	-414
			Max. Vx	3	741.25	-1242	-1474
			Max Tension	3	71120.78	90	-162
			Max. Compression	3	-2354.93	0	0
			Max. Mx	3	63582.30	-142	-231
			Max. My	3	802.31	70	614
			Max. Vy	3	50.07	0	0
		Horizontal	Max. Vx	3	-189.99	78	613
			Max Tension	3	388.98	16	-4
			Max. Compression	3	-422.02	4	-1
			Max. Mx	3	-220.89	17	-2
			Max. My	3	388.98	16	-4
			Max. Vy	3	13.61	17	-2
			Max. Vx	3	2.34	16	-4
		Redund Horz 1 Bracing	Max Tension	3	111386.26	0	0
			Max. Compression	3	-855.60	0	0
			Max. Mx	3	-459.61	-3	0
			Max. My	3	2195.94	0	0
			Max. Vy	3	4.87	0	0
		Redund Diag 1 Bracing	Max. Vx	3	-0.40	0	0
			Max Tension	3	59512.04	0	0
			Max. Compression	3	-644.65	0	0
			Max. Mx	3	407.97	-4	0
			Max. My	3	1206.82	0	1
		Redund Hip 1 Bracing	Max. Vy	3	5.30	0	0
			Max. Vx	3	-1.26	0	0
			Max Tension	3	112377.12	0	0
			Max. Compression	4	-8.06	0	0
			Max. Mx	1	-4.63	-5	0
T18	16 - 8	Inner Bracing	Max. My	3	2662.90	0	0
			Max. Vy	1	-6.90	0	0
			Max. Vx	3	-0.01	0	0
			Max Tension	3	62.12	0	0
		Leg	Max. Compression	3	-85.38	0	0
			Max. Mx	1	0.34	-42	0
			Max. My	3	53.11	0	1
			Max. Vy	1	19.53	0	0
			Max. Vx	3	0.71	0	0
			Max Tension	3	55233.76	-69	41
			Max. Compression	3	-61756.06	946	980
			Max. Mx	3	-7497.67	1881	-1816
			Max. My	3	-7495.77	-1840	1908
			Max. Vy	3	-1160.88	1881	-1816
			Max. Vx	3	-1175.41	-1840	1908
		Diagonal	Max Tension	3	91745.23	-73	126
			Max. Compression	4	-2413.28	0	0
			Max. Mx	3	86137.30	-80	107
			Max. My	3	4001.72	-31	-597
			Max. Vy	3	-31.63	0	0
			Max. Vx	3	-194.76	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T19	8 - 4	Horizontal	Max Tension	3	139.81	0	0
			Max. Compression	3	-215.76	4	-1
			Max. Mx	3	-108.62	25	-1
			Max. My	3	-104.61	25	-2
			Max. Vy	3	-16.24	25	-1
			Max. Vx	3	-1.25	25	-2
		Redund Horz 1 Bracing	Max Tension	3	155808.63	0	0
			Max. Compression	3	-1221.11	0	0
			Max. Mx	3	8444.00	-4	0
			Max. My	3	154651.38	0	0
			Max. Vy	3	7.12	0	0
			Max. Vx	3	-0.58	0	0
		Redund Diag 1 Bracing	Max Tension	3	83972.31	0	0
			Max. Compression	3	-744.59	0	0
			Max. Mx	3	426.38	-5	0
			Max. My	3	4996.20	0	1
			Max. Vy	3	6.04	0	0
			Max. Vx	3	-1.17	0	0
		Redund Hip 1 Bracing	Max Tension	3	123606.58	0	0
			Max. Compression	4	-9.00	0	0
			Max. Mx	1	-5.16	-7	0
			Max. My	3	7304.23	0	0
			Max. Vy	1	8.01	0	0
		Inner Bracing	Max. Vx	3	-0.01	0	0
			Max Tension	3	669.05	0	0
			Max. Compression	3	-635.21	0	0
			Max. Mx	1	0.36	-94	0
			Max. My	3	669.05	0	-2
		Leg	Max. Vy	1	37.69	0	0
			Max. Vx	3	0.91	0	0
			Max Tension	3	55585.12	412	365
			Max. Compression	3	-66709.35	4	6
			Max. Mx	3	-7920.80	1875	-1820
		Diagonal	Max. My	3	-7750.02	-1844	1904
			Max. Vy	3	1091.39	1875	-1820
			Max. Vx	3	1108.30	-1844	1904
			Max Tension	3	3364.65	0	0
			Max. Compression	3	-3619.21	8	0
		Redund Horz 1 Bracing	Max. Mx	3	1939.60	16	2
			Max. My	2	-2492.93	7	-4
			Max. Vy	3	-16.92	16	2
			Max. Vx	3	-2.35	5	4
			Max Tension	3	1234.10	0	0
		Redund Diag 1 Bracing	Max. Compression	3	-1193.18	0	0
			Max. Mx	1	103.48	-6	0
			Max. My	3	122.43	0	0
			Max. Vy	1	8.04	0	0
			Max. Vx	3	-0.65	0	0
		Redund Hip 1 Bracing	Max Tension	3	705.38	0	0
			Max. Compression	3	-843.46	0	0
			Max. Mx	3	-108.71	-6	0
			Max. My	2	76.40	0	-1
			Max. Vy	3	6.74	0	0
		Redund Hip 1 Bracing	Max. Vx	2	0.66	0	0
			Max Tension	1	0.00	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T20	4 - 0	Inner Bracing	Max. Compression	3	-9.22	0	0
			Max. Mx	1	-7.69	-15	0
			Max. My	3	-6.77	0	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	92.53	0	0
			Max. Compression	3	-108.53	0	0
			Max. Mx	1	0.99	-120	0
			Max. My	4	2.09	0	0
			Max. Vy	1	42.57	0	0
		Leg	Max. Vx	4	0.01	0	0
			Max Tension	3	55080.75	14	15
			Max. Compression	3	-67037.39	0	0
			Max. Mx	2	-45861.92	-89	-6
			Max. My	4	-45864.23	-5	-89
			Max. Vy	3	90.20	78	-65
			Max. Vx	3	90.93	-64	78
		Diagonal	Max Tension	3	2364.09	7	1
			Max. Compression	3	-2824.57	0	0
			Max. Mx	3	2143.55	8	-4
			Max. My	3	-2783.73	3	-6
			Max. Vy	3	12.52	8	-4
			Max. Vx	3	-3.48	0	0
		Top Girt	Max Tension	3	301.84	23	-2
			Max. Compression	3	-430.51	0	0
			Max. Mx	4	-41.47	23	-2
			Max. My	3	301.84	23	-2
			Max. Vy	4	-20.23	23	-2
			Max. Vx	3	-1.64	23	-2
		Redund Horz 1 Bracing	Max Tension	3	1008.83	0	0
			Max. Compression	3	-1008.83	0	0
			Max. Mx	2	696.51	-3	0
			Max. My	4	691.14	0	0
			Max. Vy	2	5.36	0	0
			Max. Vx	4	-0.43	0	0
		Redund Horz 2 Bracing	Max Tension	3	1008.83	0	0
			Max. Compression	3	-1008.83	0	0
			Max. Mx	1	110.59	-10	0
			Max. My	3	1008.83	0	1
			Max. Vy	1	10.72	0	0
			Max. Vx	3	-0.87	0	0
		Redund Diag 1 Bracing	Max Tension	3	595.33	0	0
			Max. Compression	3	-595.33	0	0
			Max. Mx	4	411.00	-2	0
			Max. My	3	595.33	0	0
			Max. Vy	4	4.01	0	0
			Max. Vx	3	-0.41	0	0
		Redund Diag 2 Bracing	Max Tension	3	521.67	0	0
			Max. Compression	3	-521.67	0	0
			Max. Mx	3	521.67	-8	0
			Max. My	3	521.67	0	-1
			Max. Vy	3	8.26	0	0
			Max. Vx	3	0.71	0	0
		Redund Hip 1 Bracing	Max Tension	1	0.00	0	0
			Max. Compression	3	-7.50	0	0
			Max. Mx	1	-4.80	-7	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
			Max. My	3	-3.05	0	0
			Max. Vy	1	10.03	0	0
			Max. Vx	3	0.00	0	0
		Redund Hip 2 Bracing	Max Tension	1	0.00	0	0
			Max. Compression	3	-9.91	0	0
			Max. Mx	1	-7.32	-27	0
			Max. Vy	1	20.07	0	0
			Max. Vx	3	0.00	0	0

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical kg	Horizontal, X kg	Horizontal, Z kg
Leg D	Max. Vert	5	47548.44	4148.02	-6202.57
	Max. H _x	5	47548.44	4148.02	-6202.57
	Max. H _z	3	-56858.59	-6477.46	6595.96
	Min. Vert	3	-56858.59	-6477.46	6595.96
	Min. H _x	3	-56858.59	-6477.46	6595.96
	Min. H _z	5	47548.44	4148.02	-6202.57
Leg C	Max. Vert	5	47489.30	-4190.30	-6149.44
	Max. H _x	2	-32262.03	2563.99	4651.06
	Max. H _z	2	-32262.03	2563.99	4651.06
	Min. Vert	2	-32262.03	2563.99	4651.06
	Min. H _x	4	47355.14	-6218.47	-4053.24
	Min. H _z	5	47489.30	-4190.30	-6149.44
Leg B	Max. Vert	3	69741.53	-8021.41	7996.47
	Max. H _x	5	-32457.86	2692.09	-4605.59
	Max. H _z	3	69741.53	-8021.41	7996.47
	Min. Vert	5	-32457.86	2692.09	-4605.59
	Min. H _x	3	69741.53	-8021.41	7996.47
	Min. H _z	5	-32457.86	2692.09	-4605.59
Leg A	Max. Vert	2	47356.17	4068.24	6204.71
	Max. H _x	2	47356.17	4068.24	6204.71
	Max. H _z	2	47356.17	4068.24	6204.71
	Min. Vert	5	-32396.11	-2632.03	-4652.24
	Min. H _x	4	-32263.03	-4637.07	-2579.05
	Min. H _z	5	-32396.11	-2632.03	-4652.24

Tower Mast Reaction Summary

Load Combination	Vertical kg	Shear _x kg	Shear _z kg	Overturning Moment, M _x kg-m	Overturning Moment, M _z kg-m	Torque kg-m
Dead Only	30183.79	0.00	-0.00	466	466	0
Dead+Wind 0 deg - No Ice	30183.78	435.09	-21802.89	-957242	-5804	-112
Dead+Wind 45 deg - No Ice	30149.48	16763.63	-16802.71	-757132	-755739	255
Dead+Wind 90 deg - No Ice	30183.78	21802.89	-435.04	-5805	-957242	112
Dead+Wind 180 deg - No Ice	30183.77	-17.77	21609.84	955353	722	1208
Dead+Wind 0 deg - Service	30183.79	108.76	-5450.63	-238949	-1101	-28
Dead+Wind 45 deg - Service	30183.79	4285.72	-4285.72	-191020	-191019	0
Dead+Wind 90 deg - Service	30183.81	5450.65	-108.78	-1101	-238949	28

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Load Combination	Vertical kg	Shear _x kg	Shear _z kg	Overturning Moment, M _x kg-m	Overturning Moment, M _z kg-m	Torque kg-m
Dead+Wind 180 deg - Service	30183.79	-4.44	5402.50	239187	530	302

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	-30183.79	0.00	-0.00	30183.79	0.00	0.000%
2	435.03	-30183.79	-21803.96	-435.09	30183.78	21802.89	0.003%
3	17144.04	-30183.79	-17144.04	-16763.63	30149.48	16802.71	1.323%
4	21803.96	-30183.79	-435.03	-21802.89	30183.78	435.04	0.003%
5	-17.75	-30183.79	21611.45	17.77	30183.77	-21609.84	0.004%
6	108.76	-30183.79	-5450.99	-108.76	30183.79	5450.63	0.001%
7	4286.01	-30183.79	-4286.01	-4285.72	30183.79	4285.72	0.001%
8	5450.99	-30183.79	-108.76	-5450.65	30183.81	108.78	0.001%
9	-4.44	-30183.79	5402.86	4.44	30183.79	-5402.50	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	16	0.00013848	0.00008081
3	No	200	0.14077307	0.00000000
4	Yes	16	0.00013992	0.00008081
5	Yes	15	0.00014502	0.00012501
6	Yes	15	0.00000001	0.00010712
7	Yes	15	0.00000001	0.00011134
8	Yes	15	0.00000001	0.00010711
9	Yes	15	0.00000001	0.00010709

Maximum Tower Deflections - Service Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 95	149.27	7	0.1885	0.0001
T2	95 - 92	132.95	7	0.1810	0.0001
T3	92 - 86	123.52	7	0.1776	0.0001
T4	86 - 82	105.35	7	0.1619	0.0001
T5	82 - 79	94.36	7	0.1442	0.0001
T6	79 - 74	87.29	7	0.1326	0.0001
T7	74 - 69	75.62	7	0.1273	0.0001
T8	69 - 61.5	64.45	7	0.1205	0.0001
T9	61.5 - 56.5	49.00	7	0.1039	0.0001
T10	56.5 - 52.7	40.06	7	0.0876	0.0001
T11	52.7 - 49	34.62	7	0.0762	0.0002
T12	49 - 45	29.87	7	0.0682	0.0002
T13	45 - 41	25.29	7	0.0599	0.0002

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Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T14	41 - 37	21.19	7	0.0530	0.0002
T15	37 - 33	17.52	7	0.0464	0.0002
T16	33 - 25	14.24	7	0.0406	0.0002
T17	25 - 16	8.67	7	0.0288	0.0002
T18	16 - 8	4.01	7	0.0183	0.0002
T19	8 - 4	1.24	7	0.0086	0.0001
T20	4 - 0	0.32	7	0.0045	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
91.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	121.97	0.1768	0.0001	52327
90.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	117.65	0.1742	0.0001	39318
88.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	113.38	0.1708	0.0001	30436
88.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	112.78	0.1702	0.0001	29484
87.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	108.59	0.1659	0.0001	24115
85.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	104.47	0.1607	0.0001	16981
85.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	103.89	0.1599	0.0001	15782
84.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	99.92	0.1538	0.0001	9821
82.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	96.14	0.1474	0.0001	7229
66.200	ANTENA VHF BAND I - 2 DIPOLOS	7	58.48	0.1153	0.0001	34526
64.650	ANTENA VHF BAND I - 2 DIPOLOS	7	55.27	0.1120	0.0001	31695
63.100	ANTENA VHF BAND I - 2 DIPOLOS	7	52.14	0.1083	0.0001	29292
62.900	ANTENA VHF BAND I - 2 DIPOLOS	7	51.74	0.1078	0.0001	29007
61.350	ANTENA VHF BAND I - 2 DIPOLOS	7	48.71	0.1035	0.0001	24307
59.800	ANTENA VHF BAND I - 2 DIPOLOS	7	45.77	0.0986	0.0001	16588
59.600	ANTENA VHF BAND I - 2 DIPOLOS	7	45.40	0.0980	0.0001	15861
58.050	ANTENA VHF BAND I - 2 DIPOLOS	7	42.63	0.0928	0.0001	11841
56.500	ANTENA VHF BAND I - 2 DIPOLOS	7	40.06	0.0876	0.0001	10326
14.400	8 FT DISH	7	3.37	0.0164	0.0002	49997

Maximum Tower Deflections - Design Wind

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Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 95	551.02	3	0.6465	0.0048
T2	95 - 92	495.72	3	0.6215	0.0048
T3	92 - 86	463.86	3	0.6103	0.0048
T4	86 - 82	402.74	3	0.5575	0.0048
T5	82 - 79	366.28	3	0.4979	0.0048
T6	79 - 74	343.47	3	0.4586	0.0048
T7	74 - 69	305.84	3	0.4408	0.0048
T8	69 - 61.5	270.16	3	0.4174	0.0048
T9	61.5 - 56.5	221.73	3	0.3606	0.0048
T10	56.5 - 52.7	194.78	3	0.3043	0.0048
T11	52.7 - 49	179.59	3	0.2652	0.0048
T12	49 - 45	167.00	3	0.2375	0.0048
T13	45 - 41	155.51	3	0.2091	0.0048
T14	41 - 37	145.93	3	0.1853	0.0048
T15	37 - 33	138.02	3	0.1624	0.0047
T16	33 - 25	131.68	3	0.1420	0.0047
T17	25 - 16	122.44	3	0.1011	0.0047
T18	16 - 8	49.75	3	0.0647	0.0030
T19	8 - 4	5.31	3	0.0345	0.0003
T20	4 - 0	1.20	3	0.0188	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
91.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	458.63	0.6078	0.0048	13810
90.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	444.07	0.5990	0.0048	10372
88.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	429.71	0.5875	0.0048	8036
88.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	427.68	0.5857	0.0048	7785
87.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	413.59	0.5710	0.0048	6370
85.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	399.82	0.5535	0.0048	4462
85.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	397.88	0.5507	0.0048	4142
84.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	384.63	0.5304	0.0048	2558
82.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	372.14	0.5088	0.0048	1877
66.200	ANTENA VHF BAND I - 2 DIPOLOS	3	251.31	0.3995	0.0048	8836
64.650	ANTENA VHF BAND I - 2 DIPOLOS	3	241.24	0.3883	0.0048	8098
63.100	ANTENA VHF BAND I - 2 DIPOLOS	3	231.48	0.3756	0.0048	7474
62.900	ANTENA VHF BAND I - 2 DIPOLOS	3	230.24	0.3738	0.0048	7400
61.350	ANTENA VHF BAND I - 2 DIPOLOS	3	220.84	0.3590	0.0048	6198
59.800	ANTENA VHF BAND I - 2 DIPOLOS	3	211.82	0.3424	0.0048	4233
59.600	ANTENA VHF BAND I - 2	3	210.70	0.3401	0.0048	4048

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Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
58.050	DIPOLOS ANTENA VHF BAND I - 2	3	202.34	0.3223	0.0048	3023
56.500	DIPOLOS ANTENA VHF BAND I - 2	3	194.78	0.3043	0.0048	2637
14.400	DIPOLOS 8 FT DISH	3	37.04	0.0581	0.0024	1444

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	100	Leg	A325N	19	6	3.90	4975.37	0.001 ✓	1.333	Bearing
		Diagonal	A325N	16	2	133.22	2922.37	0.046 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	23.35	1391.60	0.017 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	3.28	2922.37	0.001 ✓	1.333	Bolt Shear
T2	95	Leg	A325N	19	12	244.65	8292.26	0.030 ✓	1.333	Bearing
		Diagonal	A325N	16	2	175.12	2922.37	0.060 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	33.28	1391.60	0.024 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	3.43	2922.37	0.001 ✓	1.333	Bolt Shear
T3	92	Leg	A325N	19	14	350.57	8292.26	0.042 ✓	1.333	Bearing
		Diagonal	A325N	16	2	391.64	2922.37	0.134 ✓	1.333	Bolt Shear
		Horizontal	A325N	16	1	48.19	2172.09	0.022 ✓	1.333	Member Block Shear
		Top Girt	A325N	16	2	148.67	2922.37	0.051 ✓	1.333	Bolt Shear
T4	86	Leg	A325N	19	16	1025.65	8292.26	0.124 ✓	1.333	Bearing
		Diagonal	A325N	16	2	546.74	2922.37	0.187 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	109.70	1391.60	0.079 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	27.43	2922.37	0.009 ✓	1.333	Bolt Shear
T5	82	Leg	A325N	19	16	947.11	8292.26	0.114 ✓	1.333	Bearing
		Diagonal	A325N	16	2	1409.91	2922.37	0.482 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	68.47	1391.60	0.049 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	513.23	2922.37	0.176 ✓	1.333	Bolt Shear
T6	79	Leg	A325N	19	16	1133.91	8416.41	0.135 ✓	1.333	Bolt DS
		Diagonal	A325N	16	2	576.38	2922.37	0.197 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	85.14	1391.60	0.061 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	910.62	2922.37	0.312 ✓	1.333	Bolt Shear
T7	74	Leg	A325N	19	24	1185.46	8416.41	0.141 ✓	1.333	Bolt DS
		Diagonal	A325N	16	2	763.21	2922.37	0.261 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	157.31	1391.60	0.113 ✓	1.333	Bolt Shear
T8	69	Leg	A325N	19	32	1308.79	8416.41	0.156 ✓	1.333	Bolt DS
		Diagonal	A325N	16	2	1071.57	2922.37	0.367 ✓	1.333	Bolt Shear

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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
T9	61.5	Horizontal	A307	16	1	228.40	1391.60	0.164 ✓	1.333	Bolt Shear
		Leg	A325N	19	32	2150.07	8416.41	0.255 ✓	1.333	Bolt DS
		Diagonal	A325N	16	2	1262.47	2922.37	0.432 ✓	1.333	Bolt Shear
T10	56.5	Horizontal	A307	16	1	331.79	1391.60	0.238 ✓	1.333	Bolt Shear
		Leg	A325N	19	34	2463.39	8416.41	0.293 ✓	1.333	Bolt DS
		Diagonal	A325N	16	2	318.12	2922.37	0.109 ✓	1.333	Bolt Shear
T11	52.7	Horizontal	A307	16	2	107.25	1391.60	0.077 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	671.58	2922.37	0.230 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	2408.59	8416.41	0.286 ✓	1.333	Bolt DS
T12	49	Diagonal	A325N	16	2	193.66	2922.37	0.066 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	138.34	1391.60	0.099 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	2440.61	8416.41	0.290 ✓	1.333	Bolt DS
T13	45	Diagonal	A325N	16	3	324.89	2922.37	0.111 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	78.96	1391.60	0.057 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	2532.93	8416.41	0.301 ✓	1.333	Bolt DS
T14	41	Diagonal	A325N	16	3	324.18	2922.37	0.111 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	90.52	1391.60	0.065 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	2655.50	8416.41	0.316 ✓	1.333	Bolt DS
T15	37	Diagonal	A325N	16	3	374.25	2922.37	0.128 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	80.04	1391.60	0.058 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	2755.22	8416.41	0.327 ✓	1.333	Bolt DS
T16	33	Diagonal	A325N	16	3	467.06	2922.37	0.160 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	84.31	1391.60	0.061 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	2988.75	8416.41	0.355 ✓	1.333	Bolt DS
T17	25	Diagonal	A325N	16	3	919.01	2922.37	0.314 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	142.90	1391.60	0.103 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	3112.57	8416.41	0.370 ✓	1.333	Bolt DS
T18	16	Diagonal	A325N	16	3	23706.92	2922.37	8.112 ✗	1.333	Bolt Shear
		Horizontal	A307	16	2	211.01	1391.60	0.152 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	3425.71	8416.41	0.407 ✓	1.333	Bolt DS
T19	8	Diagonal	A325N	16	3	30581.75	2922.37	10.465 ✗	1.333	Bolt Shear
		Horizontal	A307	16	2	107.88	1391.60	0.078 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	3698.51	8416.41	0.439 ✓	1.333	Bolt DS
T20	4	Diagonal	A325N	16	3	1206.40	2922.37	0.413 ✓	1.333	Bolt Shear
		Leg	A325N	19	36	3714.58	8416.41	0.441 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	941.53	2922.37	0.322 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	215.26	2922.37	0.074 ✓	1.333	Bolt Shear

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Compression Checks

Leg Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>F_a</i> <i>MPa</i>	<i>A</i> <i>mm²</i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P_a</i> <i>kg</i>	Ratio <i>P</i> <i>P_a</i>
T1	100 - 95	L64x64x5	5.000	0.500	39.8 K=1.00	178	582	-1276.42	10571.20	0.121
T2	95 - 92	L76x76x8	3.037	1.519	101.5 K=1.00	99	1148	-1485.86	11590.60	0.128
T3	92 - 86	L76x76x8	6.000	1.000	66.8 K=1.00	148	1148	-5686.19	17371.46	0.327
T4	86 - 82	L102x102x8	4.000	1.000	49.8 K=1.00	168	1548	-10244.39	26547.18	0.386
T5	82 - 79	L102x102x8	3.201	1.601	79.7 K=1.00	132	1548	-7601.94	20769.50	0.366
T6	79 - 74	L127x127x13	5.000	1.250	50.1 K=1.00	168	3065	-11303.62	52443.46	0.216
T7	74 - 69	L152x152x13	5.000	1.250	41.7 K=1.00	176	3710	-17421.58	66743.87	0.261
T8	69 - 61.5	L152x152x13	7.500	1.250	41.7 K=1.00	176	3710	-29264.34	66743.87	0.438
T9	61.5 - 56.5	L152x152x13	5.000	1.250	41.7 K=1.00	176	3710	-38916.74	66743.87	0.583
T10	56.5 - 52.7	L152x152x16	3.825	1.912	63.8 K=1.00	152	4587	-41986.38	71135.10	0.590
T11	52.7 - 49	L152x152x16	3.724	1.862	62.1 K=1.00	154	4587	-43452.39	72083.11	0.603
T12	49 - 45	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-43933.11	86105.01	0.510
T13	45 - 41	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-45876.80	86105.01	0.533
T14	41 - 37	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-47902.09	86105.01	0.556
T15	37 - 33	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-49880.21	86105.01	0.579
T16	33 - 25	L152x152x16	8.052	2.013	67.2 K=1.00	148	4587	-53858.67	69200.07	0.778
T17	25 - 16	L152x152x16	9.059	2.265	75.6 K=1.00	137	4587	-56855.10	64130.72	0.887
T18	16 - 8	L152x152x16	8.052	2.013	67.2 K=1.00	148	4587	-61756.17	69200.07	0.892
T19	8 - 4	L152x152x16	4.026	2.013	67.2 K=1.00	148	4587	-66709.40	69199.62	0.964
T20	4 - 0	L152x152x16	4.026	1.342	44.8 K=1.00	173	4587	-67037.34	81090.09	0.827

Diagonal Design Data (Compression)

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.571	0.505	57.9 K=1.00	159	401	-266.44	6501.98	0.041 ✓
T2	95 - 92	L44x44x5	1.628	1.530	175.4 K=1.00	33	401	-350.24	1367.89	0.256 ✓
T3	92 - 86	L44x44x5	1.171	1.098	125.9 K=1.00	65	401	-783.29	2654.60	0.295 ✓
T4	86 - 82	L44x44x5	1.171	1.074	123.1 K=1.00	68	401	-1093.48	2776.55	0.394 ✓
T5	82 - 79	L76x76x6.4	2.090	2.017	134.1 K=1.00	57	929	-2265.26	5423.51	0.418 ✓
T6	79 - 74	L51x51x4.8	1.877	1.792	179.0 K=1.00	32	461	-1152.77	1510.95	0.763 ✓
T7	74 - 69	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-1526.42	3066.63	0.498 ✓
T8	69 - 61.5	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-2143.13	3066.63	0.699 ✓
T9	61.5 - 56.5	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-2524.95	3066.63	0.823 ✓
T10	56.5 - 52.7	L64x64x4.8	2.559	2.446	123.8 K=1.00	67	582	-636.23	3989.33	0.159 ✓
T11	52.7 - 49	L64x64x4.8	2.734	2.630	133.1 K=1.00	58	582	-387.32	3448.31	0.112 ✓
T12	49 - 45	L64x64x4.8	3.076	1.538	122.3 K=1.00	69	582	-974.66	4083.54	0.239 ✓
T13	45 - 41	L64x64x4.8	3.328	1.664	132.3 K=1.00	59	582	-972.55	3488.09	0.279 ✓
T14	41 - 37	L64x64x4.8	3.592	1.796	142.8 K=1.00	50	582	-1122.74	2994.67	0.375 ✓
T15	37 - 33	L64x64x4.8	3.865	1.932	153.7 K=1.00	44	582	-1401.19	2586.69	0.542 ✓
T16	33 - 25	L64x64x4.8	5.631	2.816	223.9 K=1.00	21	582	-2757.04	1218.23	2.263 ✗
T17	25 - 16	KL/R > 200 (C) - 900 L64x64x4.8	6.502	3.251	258.6 K=1.00	15	582	-2354.93	913.76	2.577 ✗
T18	16 - 8	KL/R > 200 (C) - 949 L64x64x4.8	6.670	3.335	265.2 K=1.00	15	582	-2413.28	868.50	2.779 ✗
T19	8 - 4	KL/R > 200 (C) - 1018 L76x76x6.4	6.670	3.335	221.8 K=1.00	21	929	-3619.21	1983.16	1.825 ✗
T20	4 - 0	KL/R > 200 (C) - 1091 L76x76x6.4	7.198	2.399	159.6 K=1.00	40	929	-2824.57	3831.39	0.737 ✓

Horizontal Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.550	0.243	27.9 K=1.00	189	401	-19.85	7722.19	0.003 ✓
T2	95 - 92	L44x44x5	0.885	0.809	59.3 K=1.00	157	401	-33.28	6433.44	0.005 ✓
T3	92 - 86	L44x44x5	1.220	1.144	83.9 K=1.00	126	401	-47.97	5135.35	0.009 ✓
T4	86 - 82	L44x44x5	1.220	1.118	82.0 K=1.00	128	401	-98.82	5242.53	0.019 ✓
T5	82 - 79	L51x51x4.8	2.010	1.908	121.8 K=1.00	69	461	-68.47	3266.04	0.021 ✓
T6	79 - 74	L51x51x4.8	2.800	1.336	133.5 K=1.00	58	461	-72.69	2715.47	0.027 ✓
T7	74 - 69	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-139.08	1696.90	0.082 ✓
T8	69 - 61.5	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-216.70	1696.90	0.128 ✓
T9	61.5 - 56.5	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-301.04	1696.90	0.177 ✓
T10	56.5 - 52.7	L51x51x4.8	3.108	1.478	147.7 K=1.00	47	461	-214.50	2221.46	0.097 ✓
T11	52.7 - 49	L51x51x4.8	3.715	3.563	227.3 K=1.00	20	461	-276.68	937.19	0.295 ✓
T12	49 - 45	L51x51x4.8	4.338	4.186	267.1 K=1.00	14	461	-157.92	678.80	0.233 ✓
T13	45 - 41	KL/R > 250 (C) - 638 L51x51x4.8	4.986	4.834	308.4 K=1.00	11	461	-181.04	509.06	0.356 ✓
T14	41 - 37	KL/R > 250 (C) - 679 L51x51x4.8	5.634	5.482	349.8 K=1.00	8	461	-160.08	395.85	0.404 ✓
T15	37 - 33	KL/R > 250 (C) - 766 L51x51x4.8	6.282	3.065	306.2 K=1.00	11	461	-168.61	516.41	0.327 ✓
T16	33 - 25	KL/R > 250 (C) - 807 L51x51x4.8	7.254	3.551	354.8 K=1.00	8	461	-285.80	384.76	0.743 ✓
T17	25 - 16	KL/R > 250 (C) - 883 L51x51x4.8	8.630	4.239	423.6 K=1.00	6	461	-422.02	269.96	1.563 ✗
T18	16 - 8	KL/R > 250 (C) - 952 L51x51x4.8	10.007	4.927	492.3 K=1.00	4	461	-215.76	199.81	1.080 ✓
		KL/R > 250 (C) - 1021								

Top Girt Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L51x51x6.4	0.550	0.486	49.0 K=1.00	169	605	-6.57	10427.37	0.001 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T2	95 - 92	L51x51x4.8	0.550	0.486	48.6 K=1.00	169	461	-6.86	7966.99	0.001
T3	92 - 86	L51x51x4.8	1.220	1.144	114.3 K=1.00	79	461	-234.39	3707.52	0.063
T4	86 - 82	L51x51x4.8	1.220	1.144	73.0 K=1.00	141	461	-49.20	6609.11	0.007
T5	82 - 79	L51x51x4.8	1.220	1.118	71.4 K=1.00	143	461	-1026.45	6708.13	0.153
T6	79 - 74	L51x51x4.8	2.800	2.698	172.2 K=1.00	35	461	-1507.58	1633.61	0.923
T10	56.5 - 52.7	L64x64x6.4	2.800	2.648	135.5 K=1.00	56	768	-1343.16	4387.12	0.306
T20	4 - 0	L64x64x4.8	11.302	5.575	282.1 K=1.00	13	582	-430.51	767.67	0.561

KL/R > 200 (C) - 1083

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T12	49 - 45	L51x51x4.8	1.085	1.008	100.8 K=1.00	100	461	-661.14	4711.78	0.140
T13	45 - 41	L51x51x4.8	1.247	1.170	116.9 K=1.00	75	461	-690.40	3541.06	0.195
T14	41 - 37	L51x51x4.8	1.409	1.332	133.1 K=1.00	58	461	-720.87	2732.51	0.264
T15	37 - 33	L51x51x4.8	1.570	1.494	149.3 K=1.00	46	461	-750.64	2172.31	0.346
T16	33 - 25	L51x51x4.8	1.813	1.737	173.6 K=1.00	34	461	-810.50	1607.27	0.504
T17	25 - 16	L51x51x4.8	2.158	2.081	208.0 K=1.00	24	461	-855.60	1119.72	0.764
T18	16 - 8	L64x64x4.8	2.502	2.425	192.9 K=1.00	28	582	-1221.11	1641.82	0.744
T19	8 - 4	L64x64x4.8	2.826	2.749	218.7 K=1.00	22	582	-1193.18	1277.74	0.934
T20	4 - 0	L64x64x4.8	1.884	1.807	143.8 K=1.00	50	582	-1008.83	2956.28	0.341

Redundant Horizontal (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x4.8	3.767	3.691	293.6 K=1.00	12	582	-1008.83	708.87	1.423 X

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
KL/R > 250 (C) - 1141										

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T10	56.5 - 52.7	L51x51x4.8	1.280	1.152	115.1 K=1.00	78	461	-520.34	3656.94	0.142 ✓
T11	52.7 - 49	L51x51x4.8	1.367	1.255	125.4 K=1.00	65	461	-481.21	3080.41	0.156 ✓
T12	49 - 45	L51x51x4.8	1.538	1.431	142.9 K=1.00	50	461	-468.72	2370.25	0.198 ✓
T13	45 - 41	L51x51x4.8	1.664	1.564	156.3 K=1.00	42	461	-460.79	1983.66	0.232 ✓
T14	41 - 37	L51x51x4.8	1.796	1.701	169.9 K=1.00	36	461	-459.55	1677.29	0.274 ✓
T15	37 - 33	L51x51x4.8	1.932	1.841	183.9 K=1.00	30	461	-461.79	1431.77	0.323 ✓
T16	33 - 25	L51x51x4.8	2.816	2.696	269.4 K=1.00	14	461	-629.25	667.16	0.943 ✓
T17	25 - 16	KL/R > 250 (C) - 924 L51x51x4.8	3.251	3.136	313.4 K=1.00	10	461	-644.65	493.24	1.307 ✓
T18	16 - 8	KL/R > 250 (C) - 993 L51x51x4.8	3.082	2.982	298.0 K=1.00	12	461	-744.59	545.42	1.365 ✗
T19	8 - 4	KL/R > 250 (C) - 1024 L51x51x4.8	3.599	3.507	350.5 K=1.00	8	461	-843.46	394.33	2.139 ✗
T20	4 - 0	KL/R > 250 (C) - 1093 L51x51x4.8	2.223	2.128	212.6 K=1.00	23	461	-595.33	1071.14	0.556 ✓

Redundant Diagonal (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L51x51x4.8	3.896	3.815	381.2 K=1.00	7	461	-521.67	333.24	1.565 ✗
KL/R > 250 (C) - 1143										

Redundant Hip (1) Design Data (Compression)

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T12	49 - 45	L51x51x3.2	1.534	1.534	151.9 K=1.00	45	312	-5.42	1421.82	0.004
T13	45 - 41	L51x51x3.2	1.763	1.763	174.6 K=1.00	34	312	-6.78	1076.39	0.006
T14	41 - 37	L51x51x4.8	1.992	1.992	199.0 K=1.00	26	461	-7.96	1222.43	0.007
T15	37 - 33	L51x51x4.8	2.221	2.221	221.9 K=1.00	21	461	-4.42	983.31	0.004
T16	33 - 25	L51x51x4.8	2.565	2.565	256.3 K=1.00	16	461	-5.72	737.52	0.008
T17	25 - 16	KL/R > 250 (C) - 898 L51x51x4.8	3.051	3.051	304.9 K=1.00	11	461	-8.06	521.01	0.015
T18	16 - 8	KL/R > 250 (C) - 967 L51x51x4.8	3.538	3.538	353.5 K=1.00	8	461	-9.00	387.53	0.023
T19	8 - 4	KL/R > 250 (C) - 1036 L64x64x6.4	3.996	3.996	320.4 K=1.00	10	768	-7.69	785.16	0.010*
T20	4 - 0	KL/R > 250 (C) - 1105 L64x64x6.4	2.664	2.664	213.6 K=1.00	23	768	-7.50	1766.61	0.004

* DL controls

Redundant Hip (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x6.4	5.328	5.328	427.2 K=1.00	6	768	-9.91	441.65	0.022
		KL/R > 250 (C) - 1157								✓

Inner Bracing Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L38x38x5	0.389	0.325	43.7 K=1.00	174	340	-1.16	6053.19	0.000
T6	79 - 74	L51x51x4.8	3.960	3.858	385.5 K=1.00	7	461	-31.98	325.85	0.098
T10	56.5 - 52.7	KL/R > 250 (C) - 312 L76x76x6.4	3.960	3.807	253.2 K=1.00	16	929	-164.33	1521.37	0.108
T15	37 - 33	KL/R > 250 (C) - 524 L51x51x4.8	4.442	4.442	443.9	5	461	-66.48	245.83	0.270

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
					K=1.00					✓
T16	33 - 25	KL/R > 250 (C) - 840 L51x51x4.8	5.129	5.129	512.5 K=1.00	4	461	-530.90	184.38	2.879 ✗
T17	25 - 16	KL/R > 250 (C) - 909 L51x51x4.8	6.102	6.102	609.8 K=1.00	3	461	-85.38	130.25	0.656 ✓
T18	16 - 8	KL/R > 250 (C) - 977 L64x64x6.4	7.076	7.076	567.4 K=1.00	3	768	-635.21	250.41	2.537 ✗
T19	8 - 4	KL/R > 250 (C) - 1048 L64x64x6.4	7.992	7.992	640.8 K=1.00	3	768	-108.53	196.29	0.553 ✓
		KL/R > 250 (C) - 1116								✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L64x64x5	5.000	0.500	25.3	224	370	1134.55	8459.91	0.134 ✓
T2	95 - 92	L76x76x8	3.037	1.519	64.8	224	796	1311.74	18178.45	0.072 ✓
T3	92 - 86	L76x76x8	6.000	1.000	42.7	224	796	4966.02	18178.45	0.273 ✓
T4	86 - 82	L102x102x8	4.000	1.000	31.8	224	1196	9180.53	27318.33	0.336 ✓
T5	82 - 79	L102x102x8	3.201	1.601	50.8	224	1196	6703.78	27318.33	0.245 ✓
T6	79 - 74	L127x127x13	5.000	1.250	32.0	224	2500	9438.72	57124.53	0.165 ✓
T7	74 - 69	L152x152x13	5.000	1.250	26.5	224	3145	14910.54	71866.29	0.207 ✓
T8	69 - 61.5	L152x152x13	7.500	1.250	26.5	224	3145	25758.88	71866.29	0.358 ✓
T9	61.5 - 56.5	L152x152x13	5.000	1.250	26.5	224	3145	34750.36	71866.29	0.484 ✓
T10	56.5 - 52.7	L152x152x16	3.825	1.912	40.9	224	3881	37239.72	88690.03	0.420 ✓
T11	52.7 - 49	L152x152x16	3.724	1.862	39.8	224	3881	37772.42	88690.03	0.426 ✓
T12	49 - 45	L152x152x16	4.026	1.007	21.5	224	3881	37647.36	88690.03	0.424 ✓
T13	45 - 41	L152x152x16	4.026	1.007	21.5	224	3881	38542.39	88690.03	0.435 ✓
T14	41 - 37	L152x152x16	4.026	1.007	21.5	224	3881	39942.40	88690.03	0.450 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T15	37 - 33	L152x152x16	4.026	1.007	21.5	224	3881	41062.46	88690.03	0.463 ✓
T16	33 - 25	L152x152x16	8.052	2.013	43.1	224	3881	44187.62	88690.03	0.498 ✓
T17	25 - 16	L152x152x16	9.059	2.265	48.5	224	3881	48553.90	88690.03	0.547 ✓
T18	16 - 8	L152x152x16	8.052	2.013	43.1	224	3881	55233.96	88690.03	0.623 ✓
T19	8 - 4	L152x152x16	4.026	2.013	43.1	224	3881	55585.04	88690.03	0.627 ✓
T20	4 - 0	L152x152x16	4.026	1.342	28.7	224	3881	55080.64	88690.03	0.621 ✓

Diagonal Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.571	0.505	37.0	224	232	247.21	5312.20	0.047 ✓
T2	95 - 92	L44x44x5	1.628	1.530	112.2	224	232	289.30	5312.20	0.054 ✓
T3	92 - 86	L44x44x5	1.171	1.098	80.5	224	232	742.69	5312.20	0.140 ✓
T4	86 - 82	L44x44x5	1.171	1.074	78.7	224	232	1067.12	5312.20	0.201 ✓
T5	82 - 79	L76x76x6.4	1.667	1.594	67.5	224	606	2572.95	13848.04	0.186 ✓
T6	79 - 74	L51x51x4.8	1.877	1.792	114.3	224	278	1114.45	6350.48	0.175 ✓
T7	74 - 69	L64x64x4.8	1.877	1.775	89.8	224	368	1490.50	8418.00	0.177 ✓
T8	69 - 61.5	L64x64x4.8	1.877	1.775	89.8	224	368	2077.19	8418.00	0.247 ✓
T9	61.5 - 56.5	L64x64x4.8	1.877	1.775	89.8	224	368	2481.01	8418.00	0.295 ✓
T10	56.5 - 52.7	L64x64x4.8	2.559	2.446	123.8	224	368	566.46	8418.00	0.067 ✓
T11	52.7 - 49	L64x64x4.8	2.734	2.630	133.1	224	368	357.85	8418.00	0.043 ✓
T12	49 - 45	L64x64x4.8	3.076	1.538	77.8	224	368	808.23	8418.00	0.096 ✓
T13	45 - 41	L64x64x4.8	3.328	1.664	84.2	224	368	847.30	8418.00	0.101 ✓
T14	41 - 37	L64x64x4.8	3.592	1.796	90.9	224	368	960.13	8418.00	0.114 ✓
T15	37 - 33	L64x64x4.8	3.865	1.932	97.8	224	368	1279.43	8418.00	0.152 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T16	33 - 25	L64x64x4.8	5.631	2.816	142.5	224	368	2310.93	8418.00	0.275 ✓
T17	25 - 16	L64x64x4.8	5.999	3.000	151.8	224	368	71120.58	8418.00	8.449 ✗
T18	16 - 8	L64x64x4.8	6.670	3.335	168.8	224	368	91745.43	8418.00	10.899 ✗
T19	8 - 4	L76x76x6.4	6.670	3.335	141.2	224	606	3364.65	13848.04	0.243 ✓
T20	4 - 0	L76x76x6.4	7.198	2.399	101.6	224	606	2364.09	13848.04	0.171 ✓

Horizontal Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.550	0.243	17.8	224	232	23.35	5312.20	0.004 ✓
T2	95 - 92	L44x44x5	0.885	0.809	59.3	224	232	27.09	5312.20	0.005 ✓
T3	92 - 86	L44x44x5	1.220	1.144	83.9	224	232	48.19	5312.20	0.009 ✓
T4	86 - 82	L44x44x5	1.220	1.118	82.0	224	232	109.70	5312.20	0.021 ✓
T5	82 - 79	L51x51x4.8	2.010	1.908	121.8	224	278	39.99	6350.48	0.006 ✓
T6	79 - 74	L51x51x4.8	2.800	1.336	85.3	224	278	85.14	6350.48	0.013 ✓
T7	74 - 69	L51x51x4.8	2.800	2.648	168.9	224	278	157.31	6350.48	0.025 ✓
T8	69 - 61.5	L51x51x4.8	2.800	2.648	168.9	224	278	228.40	6350.48	0.036 ✓
T9	61.5 - 56.5	L51x51x4.8	2.800	2.648	168.9	224	278	331.79	6350.48	0.052 ✓
T10	56.5 - 52.7	L51x51x4.8	3.108	1.478	94.3	224	278	168.17	6350.48	0.026 ✓
T11	52.7 - 49	L51x51x4.8	3.715	3.563	227.3	224	278	248.80	6350.48	0.039 ✓
T12	49 - 45	L51x51x4.8	4.338	4.186	267.1	224	278	110.36	6350.48	0.017 ✓
T13	45 - 41	L51x51x4.8	4.986	4.834	308.4	224	278	139.53	6350.48	0.022 ✓
T14	41 - 37	L51x51x4.8	5.634	5.482	349.8	224	278	126.78	6350.48	0.020 ✓
T15	37 - 33	L51x51x4.8	6.282	3.065	195.6	224	278	116.75	6350.48	0.018 ✓
T16	33 - 25	L51x51x4.8	7.254	3.551	226.6	224	278	236.93	6350.48	0.037 ✓
T17	25 - 16	L51x51x4.8	8.630	4.239	270.5	224	278	388.98	6350.48	0.061 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T18	16 - 8	L51x51x4.8	10.007	4.927	314.4	224	278	139.81	6350.48	0.022 ✓

Top Girt Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L51x51x6.4	0.550	0.486	31.5	224	363	6.37	8297.75	0.001 ✓
T2	95 - 92	L51x51x4.8	0.550	0.486	31.0	224	278	0.21	6350.48	0.000 ✓
T3	92 - 86	L51x51x4.8	1.220	1.144	73.0	224	278	297.33	6350.48	0.047 ✓
T4	86 - 82	L51x51x4.8	1.220	1.144	73.0	224	278	54.86	6350.48	0.009 ✓
T5	82 - 79	L51x51x4.8	1.220	1.118	71.4	224	278	842.23	6350.48	0.133 ✓
T6	79 - 74	L51x51x4.8	2.800	2.698	172.2	224	278	1821.25	6350.48	0.287 ✓
T10	56.5 - 52.7	L64x64x6.4	2.800	2.648	135.5	224	485	1124.67	11083.94	0.101 ✓
T20	4 - 0	L64x64x4.8	11.302	5.575	282.1	224	368	301.84	8418.00	0.036 ✓

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T12	49 - 45	L51x51x4.8	1.085	1.008	64.3	207	461	661.14	9729.56	0.068 ✓
T13	45 - 41	L51x51x4.8	1.247	1.170	74.7	207	461	690.40	9729.56	0.071 ✓
T14	41 - 37	L51x51x4.8	1.409	1.332	85.0	207	461	720.87	9729.56	0.074 ✓
T15	37 - 33	L51x51x4.8	1.570	1.494	95.3	207	461	750.64	9729.56	0.077 ✓
T16	33 - 25	L51x51x4.8	1.813	1.737	110.8	207	461	810.50	9729.56	0.083 ✓
T17	25 - 16	L51x51x4.8	2.158	2.081	132.8	207	461	111386.44	9729.56	11.448 ✗
T18	16 - 8	H2-1 (11.45 CR) - 947 L64x64x4.8	2.502	2.425	122.7	207	582	155808.57	12274.21	12.694 ✗
T19	8 - 4	H2-1 (12.69 CR) - 1016 L64x64x4.8	2.826	2.749	139.1	207	582	1234.10	12274.21	0.101

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x4.8	1.884	1.807	91.5	207	582	1008.83	12274.21	0.082 ✓ ✓

Redundant Horizontal (2) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x4.8	3.767	3.691	186.8	207	582	1008.83	12274.21	0.082 ✓

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T10	56.5 - 52.7	L51x51x4.8	1.280	1.152	73.5	207	461	520.34	9729.56	0.053
T11	52.7 - 49	L51x51x4.8	1.367	1.255	80.1	207	461	481.21	9729.56	0.049 ✓
T12	49 - 45	L51x51x4.8	1.538	1.431	91.3	207	461	468.72	9729.56	0.048 ✓
T13	45 - 41	L51x51x4.8	1.664	1.564	99.8	207	461	460.79	9729.56	0.047 ✓
T14	41 - 37	L51x51x4.8	1.796	1.701	108.5	207	461	459.55	9729.56	0.047 ✓
T15	37 - 33	L51x51x4.8	1.932	1.841	117.4	207	461	461.79	9729.56	0.047 ✓
T16	33 - 25	L51x51x4.8	2.816	2.696	172.1	207	461	629.25	9729.56	0.065 ✓
T17	25 - 16	L51x51x4.8	3.000	2.884	184.0	207	461	59512.24	9729.56	6.117 ✗
T18	16 - 8	L51x51x4.8	3.082	2.982	190.3	207	461	83972.22	9729.56	8.631 ✗
T19	8 - 4	L51x51x4.8	3.599	3.507	223.8	207	461	705.38	9729.56	0.072 ✗
T20	4 - 0	L51x51x4.8	2.223	2.128	135.8	207	461	595.33	9729.56	0.061 ✓ ✓

Redundant Diagonal (2) Design Data (Tension)

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Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>F_a</i> <i>MPa</i>	<i>A</i> <i>mm²</i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P_a</i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T20	4 - 0	L51x51x4.8	3.896	3.815	243.4	207	461	521.67	9729.56	0.054 ✓

Redundant Hip (1) Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>F_a</i> <i>MPa</i>	<i>A</i> <i>mm²</i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P_a</i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T13	45 - 41	L51x51x3.2	1.763	1.763	110.8	207	312	0.10	6591.29	0.000 ✓
T14	41 - 37	L51x51x4.8	1.992	1.992	127.1	207	461	0.23	9729.56	0.000 ✓
T15	37 - 33	L51x51x4.8	2.221	2.221	141.7	207	461	4.67	9729.56	0.000 ✓
T16	33 - 25	L51x51x4.8	2.565	2.565	163.6	207	461	3.81	9729.56	0.000 ✓
T17	25 - 16	L51x51x4.8	3.051	3.051	194.7	207	461	112377.09	9729.56	11.550 ✗
T18	16 - 8	L51x51x4.8	3.538	3.538	225.7	207	461	123606.68	9729.56	12.704 ✗

Inner Bracing Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>F_a</i> <i>MPa</i>	<i>A</i> <i>mm²</i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P_a</i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T1	100 - 95	L38x38x5	0.389	0.325	28.1	207	340	2.04	7175.97	0.000 ✓
T6	79 - 74	L51x51x4.8	3.960	3.858	246.2	207	461	155.80	9729.56	0.016* ✓
T10	56.5 - 52.7	L76x76x6.4	2.197	2.045	86.6	207	929	65.57	19595.20	0.003 ✓
T15	37 - 33	L51x51x4.8	4.442	4.442	283.4	207	461	61.41	9729.56	0.006 ✓
T16	33 - 25	L51x51x4.8	5.129	5.129	327.3	207	461	517.23	9729.56	0.053 ✓
T17	25 - 16	L51x51x4.8	6.102	6.102	389.4	207	461	62.12	9729.56	0.006 ✓
T18	16 - 8	L64x64x6.4	7.076	7.076	362.2	207	768	669.04	16193.25	0.041 ✓
T19	8 - 4	L64x64x6.4	7.992	7.992	409.2	207	768	92.53	16193.25	0.006 ✓

* DL controls

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Section Capacity Table

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T1	100 - 95	Leg	L64x64x5	1	1134.55	11277.06	10.1	Pass
		Diagonal	L44x44x5	22	247.21	7081.17	3.5	Pass
		Horizontal	L44x44x5	42	23.35	7081.17	0.3	Pass
		Top Girt	L51x51x6.4	8	6.37	11060.90	1.3 (b)	Pass
							0.1	
T2	95 - 92	Inner Bracing	L38x38x5	5	-0.14	4989.48	0.0	Pass
		Leg	L76x76x8	138	-1485.86	15450.27	9.6	Pass
		Diagonal	L44x44x5	151	-350.24	1823.40	19.2	Pass
		Horizontal	L44x44x5	147	-33.28	8575.77	0.4	Pass
		Top Girt	L51x51x4.8	143	-6.86	10620.00	1.8 (b)	Pass
0.1								
T3	92 - 86	Leg	L76x76x8	166	-5686.19	23156.15	24.6	Pass
		Diagonal	L44x44x5	179	-783.29	3538.58	22.1	Pass
		Horizontal	L44x44x5	181	-47.97	6845.42	0.7	Pass
T4	86 - 82	Top Girt	L51x51x4.8	168	-234.39	4942.12	1.7 (b)	Pass
							4.7	
		Leg	L102x102x8	234	-10244.39	35387.39	28.9	Pass
		Diagonal	L44x44x5	247	-1093.48	3701.14	29.5	Pass
		Horizontal	L44x44x5	263	109.70	7081.17	1.5	Pass
T5	82 - 79	Top Girt	L51x51x4.8	238	54.86	8465.18	5.9 (b)	Pass
							0.6	
		Leg	L102x102x8	282	-7601.94	27685.74	0.7 (b)	Pass
							27.5	
		Diagonal	L76x76x6.4	296	-2265.26	7229.54	31.3	Pass
T6	79 - 74	Horizontal	L51x51x4.8	288	-68.47	4353.64	36.2 (b)	Pass
							1.6	
		Top Girt	L51x51x4.8	285	-1026.45	8941.94	3.7 (b)	Pass
							11.5	
		Leg	L127x127x13	310	-11303.62	69907.13	13.2 (b)	Pass
T7	74 - 69	Diagonal	L51x51x4.8	320	-1152.77	2014.09	16.2	Pass
		Horizontal	L51x51x4.8	327	-72.69	3619.72	57.2	Pass
		Top Girt	L51x51x4.8	314	-1507.58	2177.60	2.0	Pass
							4.6 (b)	
		Inner Bracing	L51x51x4.8	312	-31.98	434.35	69.2	Pass
T8	69 - 61.5	Leg	L152x152x13	370	-17421.58	88969.57	7.4	Pass
		Diagonal	L64x64x4.8	374	-1526.42	4087.82	19.6	Pass
		Horizontal	L51x51x4.8	372	-139.08	2261.97	37.3	Pass
		Leg	L152x152x13	414	-29264.34	88969.57	6.1	Pass
							8.5 (b)	
Diagonal	L64x64x4.8	423	-2143.13	4087.82	32.9	Pass		
T9	61.5 - 56.5	Horizontal	L51x51x4.8	416	-216.70	2261.97	52.4	Pass
		Leg	L152x152x13	478	-38916.74	88969.57	9.6	Pass
							12.3 (b)	
		Diagonal	L64x64x4.8	487	-2524.95	4087.82	43.7	Pass
		Horizontal	L51x51x4.8	509	-301.04	2261.97	61.8	Pass
T10	56.5 - 52.7	Top Girt	L51x51x4.8	528	-1343.16	5848.03	13.3	Pass
							17.9 (b)	
		Redund Diag 1	L51x51x4.8	562	-520.34	4874.71	44.3	Pass
		Bracing	L76x76x6.4	524	-164.33	2027.98	12.0	Pass
		Inner Bracing	L76x76x6.4	524	-164.33	2027.98	7.2	Pass
T11	52.7 - 49	Leg	L152x152x16	573	-43452.39	96086.78	23.0	Pass
		Diagonal	L64x64x4.8	581	-387.32	4596.59	10.7	Pass
							8.1	Pass

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job	Page
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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:31:00 01/06/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T12	49 - 45	Horizontal	L51x51x4.8	575	-276.68	1249.27	22.1	Pass
		Redund Diag 1	L51x51x4.8	602	-481.21	4106.18	11.7	Pass
		Bracing						
		Leg	L152x152x16	613	-43933.11	114777.97	38.3	Pass
		Diagonal	L64x64x4.8	631	-974.66	5443.36	17.9	Pass
		Horizontal	L51x51x4.8	638	-157.92	904.84	17.5	Pass
		Redund Horz 1	L51x51x4.8	627	-661.14	6280.81	10.5	Pass
T13	45 - 41	Bracing						
		Redund Diag 1	L51x51x4.8	658	-468.72	3159.55	14.8	Pass
		Bracing						
		Redund Hip 1	L51x51x3.2	637	-5.42	1895.29	0.3	Pass
		Bracing						
		Leg	L152x152x16	677	-45876.80	114777.97	40.0	Pass
		Diagonal	L64x64x4.8	695	-972.55	4649.62	20.9	Pass
T14	41 - 37	Horizontal	L51x51x4.8	679	-181.04	678.57	26.7	Pass
		Redund Horz 1	L51x51x4.8	696	-690.40	4720.23	14.6	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	722	-460.79	2644.21	17.4	Pass
		Bracing						
		Redund Hip 1	L51x51x3.2	730	-6.78	1434.83	0.5	Pass
		Bracing						
T15	37 - 33	Leg	L152x152x16	741	-47902.09	114777.97	41.7	Pass
		Diagonal	L64x64x4.8	759	-1122.74	3991.90	28.1	Pass
		Horizontal	L51x51x4.8	766	-160.08	527.67	30.3	Pass
		Redund Horz 1	L51x51x4.8	755	-720.87	3642.44	19.8	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	786	-459.55	2235.83	20.6	Pass
		Bracing						
T16	33 - 25	Redund Hip 1	L51x51x4.8	765	-7.96	1629.50	0.5	Pass
		Bracing						
		Leg	L152x152x16	805	-49880.21	114777.97	43.5	Pass
		Diagonal	L64x64x4.8	823	-1401.19	3448.06	40.6	Pass
		Horizontal	L51x51x4.8	807	-168.61	688.37	24.5	Pass
		Redund Horz 1	L51x51x4.8	819	-750.64	2895.69	25.9	Pass
		Bracing						
T17	25 - 16	Redund Diag 1	L51x51x4.8	855	-461.79	1908.55	24.2	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	829	-4.42	1310.75	0.3	Pass
		Bracing						
		Inner Bracing	L51x51x4.8	840	-66.48	327.69	20.3	Pass
		Leg	L152x152x16	874	-53858.67	92243.69	58.4	Pass
		Diagonal	L64x64x4.8	900	-2757.04	1623.90	169.8	Fail ✗
T17	25 - 16	Horizontal	L51x51x4.8	883	-285.80	512.88	55.7	Pass
		Redund Horz 1	L51x51x4.8	888	-810.50	2142.50	37.8	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	924	-629.25	889.32	70.8	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	898	-5.72	983.11	0.6	Pass
		Bracing						
T17	25 - 16	Inner Bracing	L51x51x4.8	909	-530.90	245.78	216.0	Fail ✗
		Leg	L152x152x16	943	-56855.10	85486.25	66.5	Pass
		Diagonal	L64x64x4.8	991	71120.58	11221.19	633.8	Fail ✗
		Horizontal	L51x51x4.8	952	-422.02	359.85	117.3	Fail ✗
		Redund Horz 1	L51x51x4.8	947	111386.44	12969.50	858.8	Fail ✗
		Bracing						
		Redund Diag 1	L51x51x4.8	974	59512.24	12969.50	458.9	Fail ✗
T17	25 - 16	Bracing						
		Redund Hip 1	L51x51x4.8	976	112377.09	12969.50	866.5	Fail ✗
		Bracing						
T17	25 - 16	Inner Bracing	L51x51x4.8	977	-85.38	173.63	49.2	Pass

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T18	16 - 8	Leg	L152x152x16	1012	-61756.17	92243.69	66.9	Pass
		Diagonal	L64x64x4.8	1015	91745.43	11221.19	817.6	Fail X
		Horizontal	L51x51x4.8	1021	-215.76	266.34	81.0	Pass
		Redund Horz 1 Bracing	L64x64x4.8	1016	155808.57	16361.53	952.3	Fail X
		Redund Diag 1 Bracing	L51x51x4.8	1043	83972.22	12969.50	647.5	Fail X
		Redund Hip 1 Bracing	L51x51x4.8	1045	123606.68	12969.50	953.1	Fail X
		Inner Bracing	L64x64x6.4	1048	-635.21	333.80	190.3	Fail X
		Leg	L152x152x16	1081	-66709.40	92243.09	72.3	Pass
		Diagonal	L76x76x6.4	1091	-3619.21	2643.55	136.9	Fail X
		Redund Horz 1 Bracing	L64x64x4.8	1088	-1193.18	1703.23	70.1	Pass
T19	8 - 4	Redund Diag 1 Bracing	L51x51x4.8	1093	-843.46	525.65	160.5	Fail X
		Redund Hip 1 Bracing	L64x64x6.4	1105	-7.69	785.16	1.0	Pass
		Inner Bracing	L64x64x6.4	1116	-108.53	261.65	41.5	Pass
		Leg	L152x152x16	1122	-67037.34	108093.09	62.0	Pass
		Diagonal	L76x76x6.4	1146	-2824.57	5107.24	55.3	Pass
		Top Girt	L64x64x4.8	1083	-430.51	1023.31	42.1	Pass
		Redund Horz 1 Bracing	L64x64x4.8	1140	-1008.83	3940.72	25.6	Pass
		Redund Horz 2 Bracing	L64x64x4.8	1148	-1008.83	944.92	106.8	Fail X
		Redund Diag 1 Bracing	L51x51x4.8	1149	-595.33	1427.83	41.7	Pass
		Redund Diag 2 Bracing	L51x51x4.8	1143	-521.67	444.21	117.4	Fail X
T20	4 - 0	Redund Hip 1 Bracing	L64x64x6.4	1170	-7.50	2354.89	0.3	Pass
		Redund Hip 2 Bracing	L64x64x6.4	1157	-9.91	588.72	1.7	Pass
		Summary						
		Leg (T19)				72.3		Pass
		Diagonal (T18)				817.6		Fail X
		Horizontal (T17)				117.3		Fail X
		Top Girt (T6)				69.2		Pass
		Redund Horz 1 Bracing (T18)				952.3		Fail X
		Redund Horz 2 Bracing (T20)				106.8		Fail X
		Redund Diag 1 Bracing (T18)				647.5		Fail X
		Redund Diag 2 Bracing (T20)				117.4		Fail X
		Redund Hip 1 Bracing (T18)				953.1		Fail X

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL	Page 54 of 54
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	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
						Redund Hip 2 Bracing (T20)	1.7	Pass
						Inner Bracing (T16)	216.0	Fail X
						Bolt Checks	785.0	Fail X
						RATING =	953.1	Fail X



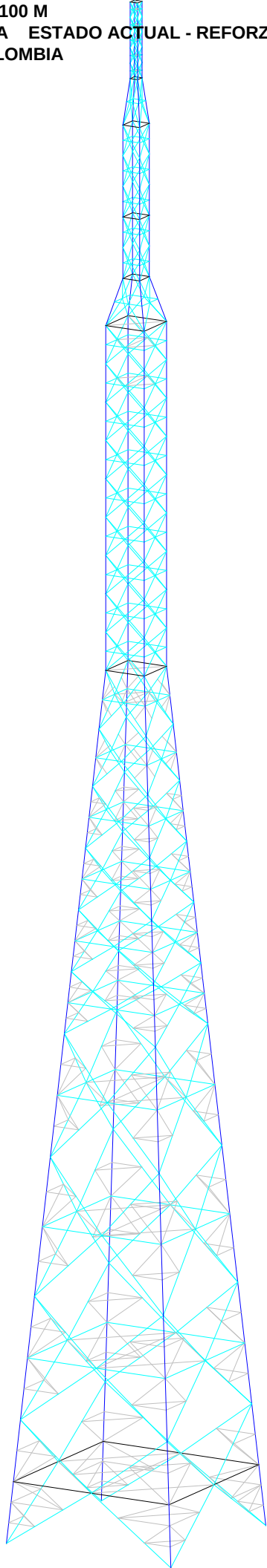
RESULTADOS

ESTADO ACTUAL REFORZADA

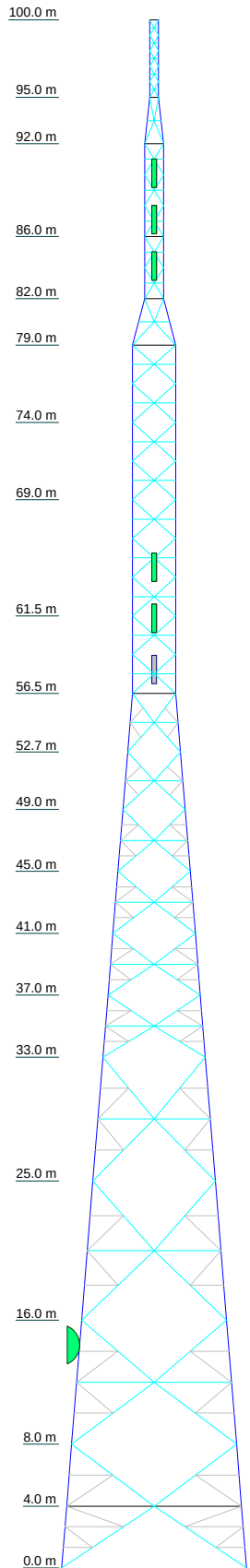
ESTACION : MONTERIA

Enero 22 de 2011

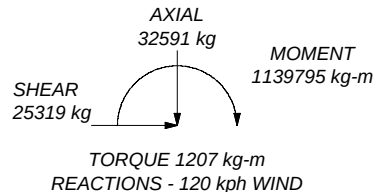
Project: TORRE CUADRADA SECCION VARIABLE DE 100 M
Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA



Section		T18	T19	T20	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs																					L64x64x5
Leg Grade																					
Diagonals																					L76x76x8
Diagonal Grade																					
Top Girts																					
Horizontals																					
Red. Horizontals																					
Red. Diagonals																					
Red. Hips																					
Inner Bracing																					
Face Width (m)	11.95	11.3022	10.6542	9.3588	7.9013	6.6058	5.958	5.3102	4.6824	4.0146	3.4154	2 @ 1.85	2 @ 1.9	18 @ 1.25	2 @ 1.5	2.8	2 @ 1.5	2 @ 1.5	2 @ 1.5	10 @ 0.5	0.55
# Panels @ (m)			4 @ 4																		
Weight (kg)	31002.0	2384.1	2384.9	3787.5	3784.9	3138.9	1515.4	1449.4	1384.2	1203.9	1080.1	1331.0	1179.4	1764.6	1178.5	1163.5	932.3	466.3	576.6	263.8	393.9



MAX. CORNER REACTIONS AT BASE:
DOWN: 75179 kg
UPLIFT: -59709 kg
SHEAR: 11148 kg



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7	8 FT DISH	14.4

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L127x127x13	D	L64x64x6.4
B	L76x76x6.4	E	L64x64x4.8
C	L102x102x6.4	F	L51x51x4.8

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	345 MPa	448 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 A394 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 AWS E60XX/E70XX electrodes.
7. All welded joints and connection flanges certified for integrity an quality per AWS D1:1
8. RF antennas feeders shall be 1-5/8" and installed 48 feeders per side
9. MW dishes feeders shall be 1/2" and installed 8 feeders per side
10. TOWER RATING: 96%

INSTATEL COLOMBIA

Carrera 124 No 17 - 98
Bogotá - Colombia
Phone: (57-1) 547 07 90
FAX: (57-1) 547 07 90

Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA

Estado ACTUAL - REFORZAD

Project: TORRE CUADRADA SECCION VARIABLE DE 100 M

Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA

Code: TIA/EIA-222-F

Path:

Drawn by: Ing Jaime Gutierrez C.

Date: 01/27/11

Scale: NTS

Dwg No: E-1



CONCLUSIONES Y RESULTADOS

ESTADO DE LA ESTRUCTURA

PINTURA

A la pintura es necesario e inmediato realizar un mantenimiento Inmediato de lavado y limpieza ya que estos químicos de las aves van deteriorando la pintura y queda expuesto el galvanizado que también entra a la corrosión

TORNILLERIA

Se debe reemplazar la tornillería de los elementos que se deben reforzar

ESCALERA DE ACCESO

Se encuentran bien, solo en mantenimiento solicitado a la pintura

PLATAFORMAS DE DESCANSO

Como estas también han sido atacadas por los excrementos de las aves se deben realizar los mantenimientos de lavado y limpieza

LUCES DE OBSTRUCCION

Se encuentran bien no tiene problema

ESTADO ACTUAL DE LA TORRE

Para cumplir con el requerimiento solicitados de la velocidad de viento de diseño de 120 kph entonces dentro del análisis de cálculo la torre se debe reforzar de la siguiente manera.

DIAGONALES

- La diagonal del nivel +4.00 m a +8.00 m se retira la existente y se reemplaza por un ángulo de 102x102x6.4
- La diagonal del nivel +8.00 m a +16.00 m se retira la existente y se reemplaza por un ángulo de 76x76x6.4
- La diagonal del nivel +16.00 m a +25.00 m se retira la existente y se reemplaza por un ángulo de 76x76x6.4
- La diagonal del nivel +25.00 m a +33.00 m se retira la existente y se reemplaza por un ángulo de 76x76x6.4

REDUNDANTES

- El redundante diagonal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- El redundante Horizontal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- Los dos redundantes Diagonales entre en nivel +4.00 m al nivel + 8.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- Los dos redundantes Diagonales entre en nivel +8.00 m al nivel + 16.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- Los dos redundantes Diagonales entre en nivel +16.00 m al nivel + 25.00 m se retira y se reemplaza por un ángulo de 64x64x6.4

PESO APROXIMADO DE REFUERZO

Materiales comprendidos en ángulos platina y tornillería - peso= 7470 Kg

DEFLEXION DE LA TORRE

Luego de análisis de la torre en el estado actual y teniendo en cuenta la velocidad de viento de operación de 60 kph la torre cumple con los desplazamientos mínimos requeridos

CIMENTACION

La cimentación según los cálculos realizados, están cumpliendo con los requerimientos al límite, cualquier carga adicional que se le imponga a la torre se debe realizar un nuevo análisis para verificar su estado ya que se puede exceder.

No necesita Reforzamiento

Se anexa las memorias y su plano de construcción

ANEXO SE PRESENTA:

ISOMETRICO TORRE REFORZADA

SILUETA ESTADO ACTUAL REFORZADA

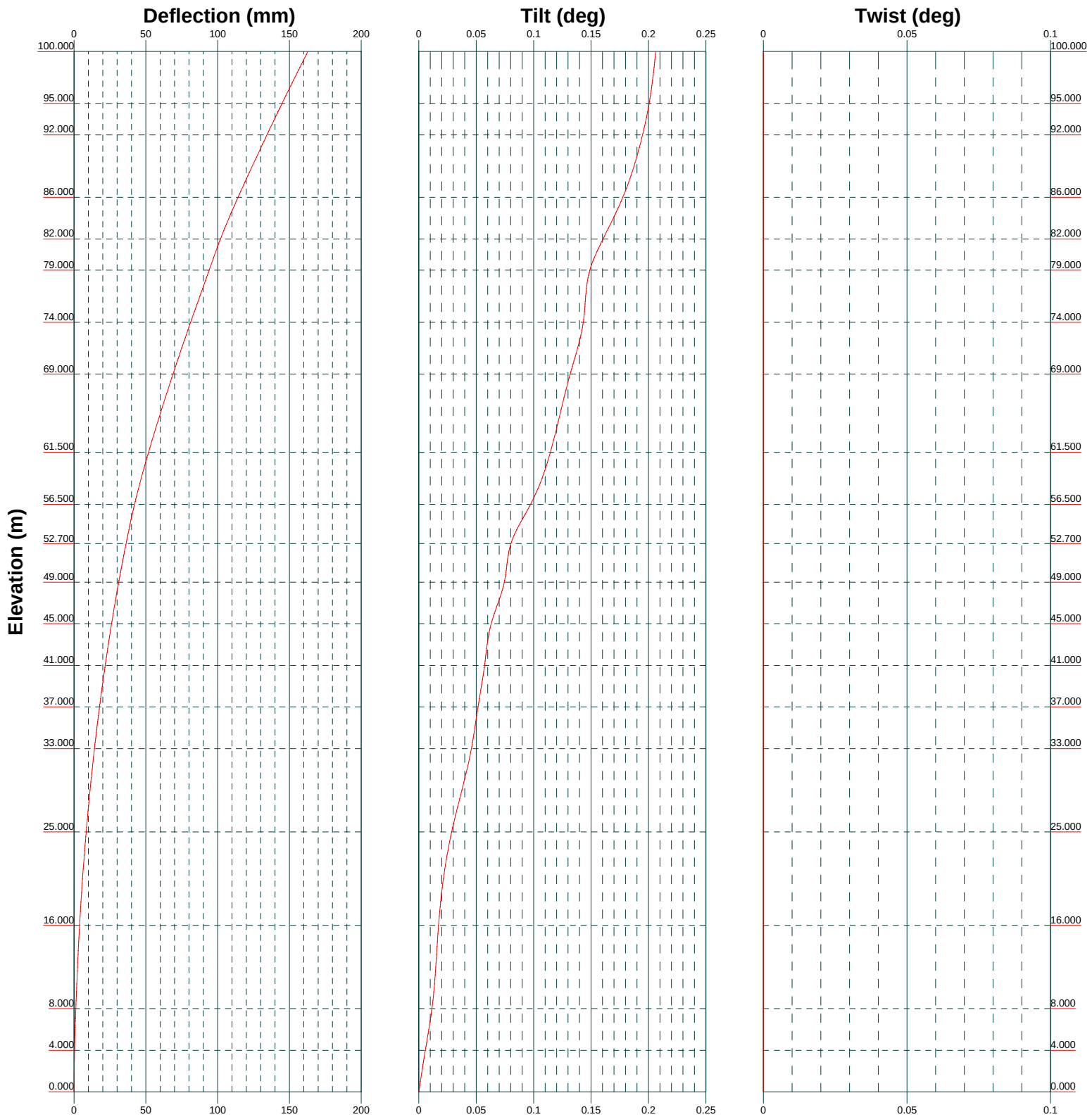
DEFORMADA TORRE REFORZADA

CALCULO PLACA BASE Y PERNOS REFROZADA

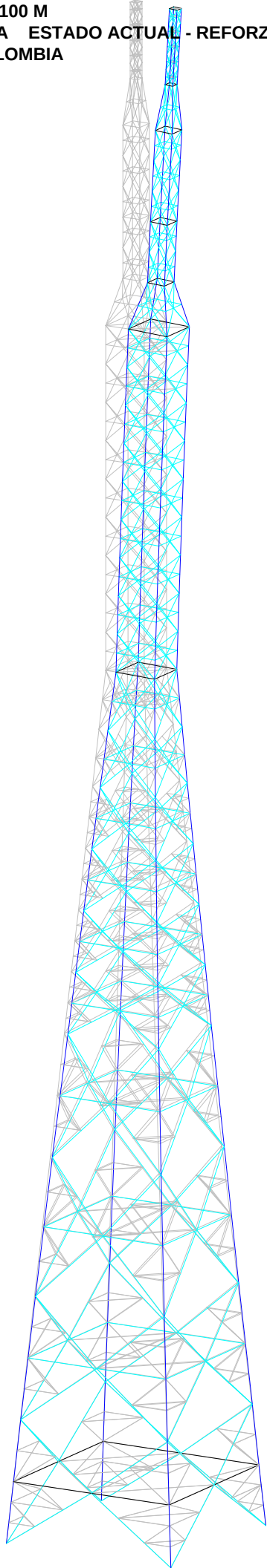
CALCULO ESTRUCTURAL ESTDO ACTUAL REFORZADA

CALCULO CIMENTACION

PLANO DE CIMENTACION



Project: TORRE CUADRADA SECCION VARIABLE DE 100 M
Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA
LC:8 Dead+Wind 90 deg - Service
Max. Disp.142.78 mm @ 100.000 m
Scaling 20



Calculo: Ing. Jaime Gutierrez C:

Fecha: Enero 6 de 2011

ESTACION: MONTERIA

ESTADO ACTUAL - REFORZADA

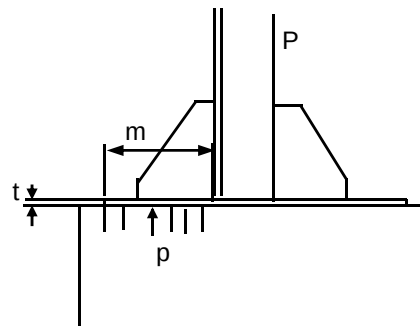
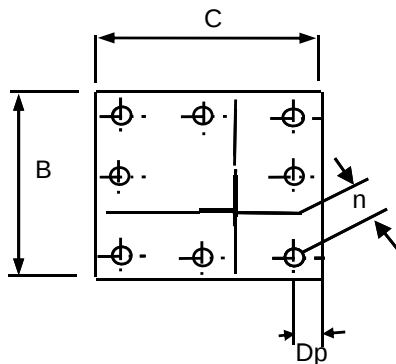
ESTRUCTURA: TORRE CUADRADA 100 m SECCION VARIABLE

CARGAS ACTUANTES

Tension Maxima	T	(ton)		72,275
Compresion Maxima	C	(ton)	-56,847	
Fuerza Longitudinal en X	Hx	(ton)	6,547	-7,657
Fuerza Transversal en Y	Hy	(ton)	6,597	7,626

CALCULO DE PLACA - BASE

PLACA BASE	B	C	t	Dp	m	Dimension pedestal (cm)		No pernos
	cm.	cm.	cm	cm	cm.	Bp	Cp	un
	120	120	3,8	8,0	40,0	125	125	8,0



Area Placa Colocada	Ac	14.400	cm ²				
Acero A-36	Fy=	2.530	Kg /cm ²	Concreto.	f'c=	210	Kg / cm ²
Distancia	n	8,0	cm				
Area Requerida placa base	Ar	742	cm ²				
Apoyo contacto pedestal	Fp	76,563	Kg / cm ²				
Presion de Apoyo	pp	3,948	kg / cm ²				
Esfuerzo de Flexion por Compresion	Fb						
Esfuerzo de Flexion	Fb	1.645	Kg / cm ²			Acero A-36	
Distancia al borde	m	40	cm				
Espesor Placa Base C	t	0,68	cm				
Esfuerzo de Flexion por Arranque	Fb''						
Distancia al perno	Dp	8	cm				
Fuerza en el Perno	Pt	9,03	Ton				
Momento de Flexion	Mf	72,3	Ton - cm				
Espesor de la Placa Base Arr	t	2,10	cm				
Espesor Minimo Placa Base	t	2,10	cm				
Lado de la placa Base	B	1.200	mm				
Espesor de la Placa Base	t	38	mm			OK CUMPLE	



Calculo: Ing. Jaime Gutierrez C:
Fecha: Enero 6 de 2011



ESTACION: MONTERIA

ESTADO ACTUAL - REFORZADA

ESTRUCTURA: TORRE CUADRADA 100 m SECCION VARIABLE

DISEÑO DE PERNOS DE ANCLAJE

Diametro de los Pernos	dp	1,00	plg
	dp	2,54	cm
Material de los Pernos		SAE 1020 CALIBRADO	
Cantidad de Pernos		8	un
Area Total de Pernos	Atp	40,54	cm ²
Factor de Rosca		0,85	
Numero de Hilos por Pulgada	hp	8	
Area Efectiva de Pernos	Ap	31,27	cm ²
Cargas de Trabajo			
Fuerza de Arranque	T	72,28	ton
Fuerza de Cortante	Vux	6,55	ton
Fuerza de Cortante	Vuy	7,63	ton
Fuerza de Cortante	Vu	10,05	ton
Propiedades de los Materiales			
Esfuerzo de Fluencia	Fy	4,20	ton/cm ²
Resistencia a la Tension	Ft	3,36	ton/cm ²
Resistencia al Corte	Fv	2,24	ton/cm ²
Area Efectiva de cada Perno	Ae	3,91	cm ²
Area Total por Perno	Ap	5,07	cm ²
Area Requerida por Arranque	At	19,8	cm ²
Area Requerida Arranque Diseño	Atm	29,7	cm ²
Numero de Pernos Minimo	Np	8	un
Pernos a Colocar		8	un
Diametro del Perno		25	mm
Area Neta de Pernos	Anp	31,27	cm ²
AREA DE PERNOS > AREA REQUERIDA		OK CUMPLE	

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA	Page 1 of 53
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 100.000 m above the ground line.

The base of the tower is set at an elevation of 0.000 m above the ground line.

The face width of the tower is 0.550 m at the top and 11.950 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 A394 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 AWS E60XX/E70XX electrodes..

All welded joints and connection flanges certified for integrity an quality per AWS D1:1.

RF antennas feeders shall be 1-5/8" and installed 48 feeders per side.

MW dishes feeders shall be 1/2" and installed 8 feeders per side.

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

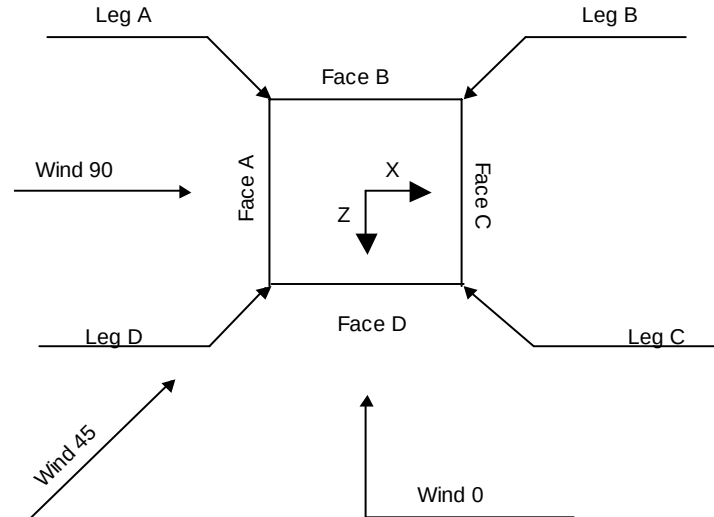
Pressures are calculated at each section.

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		



Square Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	m			m		m
T1	100.000-95.000			0.550	1	5.000
T2	95.000-92.000			0.550	1	3.000
T3	92.000-86.000			1.220	1	6.000
T4	86.000-82.000			1.220	1	4.000
T5	82.000-79.000			1.220	1	3.000
T6	79.000-74.000			2.800	1	5.000
T7	74.000-69.000			2.800	1	5.000
T8	69.000-61.500			2.800	1	7.500
T9	61.500-56.500			2.800	1	5.000
T10	56.500-52.700			2.800	1	3.800
T11	52.700-49.000			3.415	1	3.700
T12	49.000-45.000			4.015	1	4.000
T13	45.000-41.000			4.662	1	4.000
T14	41.000-37.000			5.310	1	4.000
T15	37.000-33.000			5.958	1	4.000
T16	33.000-25.000			6.606	1	8.000
T17	25.000-16.000			7.901	1	9.000
T18	16.000-8.000			9.359	1	8.000
T19	8.000-4.000			10.654	1	4.000
T20	4.000-0.000			11.302	1	4.000

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	100.000-95.000	0.500	Double K	No	Yes	0	0
T2	95.000-92.000	1.500	Double K	No	Yes	0	0
T3	92.000-86.000	1.000	Double K	No	Yes	0	0
T4	86.000-82.000	1.000	Double K	No	Yes	0	0
T5	82.000-79.000	1.500	Double K	No	Yes	0	0
T6	79.000-74.000	1.250	Double K	No	Yes	0	0
T7	74.000-69.000	1.250	Double K	No	Yes	0	0
T8	69.000-61.500	1.250	Double K	No	Yes	0	0
T9	61.500-56.500	1.250	Double K	No	Yes	0	0
T10	56.500-52.700	1.900	Double K1	No	Yes	0	0
T11	52.700-49.000	1.850	Double K1	No	Yes	0	0
T12	49.000-45.000	2.000	Double K1	No	Yes	0	0
T13	45.000-41.000	2.000	Double K1	No	Yes	0	0
T14	41.000-37.000	2.000	Double K1	No	Yes	0	0
T15	37.000-33.000	2.000	Double K1	No	Yes	0	0
T16	33.000-25.000	4.000	Double K1	No	Yes	0	0
T17	25.000-16.000	4.500	Double K1	No	Yes	0	0
T18	16.000-8.000	4.000	Double K1	No	Yes	0	0
T19	8.000-4.000	4.000	K1 Up	No	Yes	0	0
T20	4.000-0.000	4.000	K2 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	L64x64x5	A572-50	Single Angle	L44x44x5	A572-50
100.000-95.000			(345 MPa)			(345 MPa)
T2	Equal Angle	L76x76x8	A572-50	Single Angle	L44x44x5	A572-50
95.000-92.000			(345 MPa)			(345 MPa)
T3	Equal Angle	L76x76x8	A572-50	Single Angle	L44x44x5	A572-50
92.000-86.000			(345 MPa)			(345 MPa)
T4	Equal Angle	L102x102x8	A572-50	Single Angle	L44x44x5	A572-50
86.000-82.000			(345 MPa)			(345 MPa)
T5	Equal Angle	L102x102x8	A572-50	Single Angle	L76x76x6.4	A572-50
82.000-79.000			(345 MPa)			(345 MPa)
T6	Equal Angle	L127x127x13	A572-50	Single Angle	L51x51x4.8	A572-50
79.000-74.000			(345 MPa)			(345 MPa)
T7	Equal Angle	L152x152x13	A572-50	Single Angle	L64x64x4.8	A572-50
74.000-69.000			(345 MPa)			(345 MPa)
T8	Equal Angle	L152x152x13	A572-50	Single Angle	L64x64x4.8	A572-50
69.000-61.500			(345 MPa)			(345 MPa)
T9	Equal Angle	L152x152x13	A572-50	Single Angle	L64x64x4.8	A572-50
61.500-56.500			(345 MPa)			(345 MPa)
T10	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
56.500-52.700			(345 MPa)			(345 MPa)
T11	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
52.700-49.000			(345 MPa)			(345 MPa)
T12	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
49.000-45.000			(345 MPa)			(345 MPa)
T13	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
45.000-41.000			(345 MPa)			(345 MPa)
T14	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
41.000-37.000			(345 MPa)			(345 MPa)
T15	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
37.000-33.000			(345 MPa)			(345 MPa)
T16	Equal Angle	L152x152x16	A572-50	Single Angle	L76x76x6.4	A572-50

Tower Elevation m	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T8 69.000-61.500	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T9 61.500-56.500	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T10 56.500-52.700	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T11 52.700-49.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T12 49.000-45.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T13 45.000-41.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T14 41.000-37.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T15 37.000-33.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T16 33.000-25.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T17 25.000-16.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T18 16.000-8.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T19 8.000-4.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50
T20 4.000-0.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50

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 100.000-95.000	Single Angle		A572-50 (345 MPa)	Single Angle	L38x38x5	A572-50 (345 MPa)
T6 79.000-74.000	Single Angle		A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T10 56.500-52.700	Single Angle		A572-50 (345 MPa)	Single Angle	L76x76x6.4	A572-50 (345 MPa)
T16 33.000-25.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T17 25.000-16.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T18 16.000-8.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T19 8.000-4.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T20 4.000-0.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)

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 Horizontal mm
m	m^2	mm						
T1 100.000-95.000	0.018	6	A36 (248 MPa)	1	1	1.25	0	0
T2 95.000-92.000	0.018	6	A36 (248 MPa)	1	1	1.25	0	0
T3 92.000-86.000	0.018	8	A36 (248 MPa)	1	1	1.25	0	0
T4 86.000-82.000	0.018	10	A36 (248 MPa)	1	1	1.25	0	0
T5 82.000-79.000	0.018	10	A36 (248 MPa)	1	1	1.25	0	0
T6	0.018	10	A36	1	1	1.25	0	0

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
m	m ²	mm						
79.000-74.000			(248 MPa)					
T7	0.021	10	A36	1	1	1.25	0	0
74.000-69.000			(248 MPa)					
T8	0.021	10	A36	1	1	1.25	0	0
69.000-61.500			(248 MPa)					
T9	0.024	10	A36	1	1	1.25	0	0
61.500-56.500			(248 MPa)					
T10	0.024	10	A36	1	1	1.25	0	0
56.500-52.700			(248 MPa)					
T11	0.024	10	A36	1	1	1.25	0	0
52.700-49.000			(248 MPa)					
T12	0.024	10	A36	1	1	1.25	0	0
49.000-45.000			(248 MPa)					
T13	0.024	10	A36	1	1	1.25	0	0
45.000-41.000			(248 MPa)					
T14	0.024	10	A36	1	1	1.25	0	0
41.000-37.000			(248 MPa)					
T15	0.024	10	A36	1	1	1.25	0	0
37.000-33.000			(248 MPa)					
T16	0.024	10	A36	1	1	1.25	0	0
33.000-25.000			(248 MPa)					
T17	0.024	10	A36	1	1	1.25	0	0
25.000-16.000			(248 MPa)					
T18	0.024	10	A36	1	1	1.25	0	0
16.000-8.000			(248 MPa)					
T19	0.024	10	A36	1	1	1.25	0	0
8.000-4.000			(248 MPa)					
T20	0.024	10	A36	1	1	1.25	0	0
4.000-0.000			(248 MPa)					

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				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	1	1	1	1	1	1	1	1
100.000-95.000				1	1	1	1	1	1	1
T2	No	No	1	1	1	1	1	1	1	1
95.000-92.000				1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1
92.000-86.000				1	1	1	1	1	1	1
T4	No	No	1	1	1	1	0.5	1	1	1
86.000-82.000				1	1	1	1	1	1	1
T5	No	No	1	1	1	1	0.5	1	1	1
82.000-79.000				1	1	1	1	1	1	1
T6	No	No	1	1	1	1	0.5	1	1	1
79.000-74.000				1	1	1	1	1	1	1
T7	No	No	1	1	1	1	0.5	1	1	1
74.000-69.000				1	1	1	1	1	1	1
T8	No	No	1	1	1	1	0.5	1	1	1
69.000-61.500				1	1	1	1	1	1	1

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
T9	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
61.500-56.500														
T10	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
56.500-52.700														
T11	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
52.700-49.000														
T12	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
49.000-45.000														
T13	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
45.000-41.000														
T14	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
41.000-37.000														
T15	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
37.000-33.000														
T16	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
33.000-25.000														
T17	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
25.000-16.000														
T18	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
16.000-8.000														
T19	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
8.000-4.000														
T20	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
4.000-0.000														

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	Sleeve DS	19	6	16	2	16	2	16	2	16	0	16	1	16	1
100.000-95.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T2	Sleeve DS	19	12	16	2	16	2	16	2	16	0	16	1	16	1
95.000-92.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T3	Sleeve DS	19	14	16	2	16	2	16	2	16	0	16	1	16	1
92.000-86.000		A325N		A325N		A325N		A307		A325N		A325N		A307	
T4	Sleeve DS	19	16	16	2	16	2	16	2	16	0	16	1	16	2
86.000-82.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T5	Sleeve DS	19	16	16	2	16	2	16	2	16	0	16	1	16	2
82.000-79.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T6	Sleeve DS	19	16	16	2	16	2	16	2	16	0	16	1	16	2
79.000-74.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T7	Sleeve DS	19	24	16	2	16	2	16	2	16	0	16	1	16	2
74.000-69.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T8	Sleeve DS	19	32	16	2	16	2	16	2	16	0	16	1	16	2
69.000-61.500		A325N		A325N		A325N		A307		A325N		A307		A307	
T9	Sleeve DS	19	32	16	2	16	2	16	2	16	0	16	1	16	2
61.500-56.500		A325N		A325N		A325N		A307		A325N		A307		A307	

  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA	Page 10 of 53
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

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.
T10	Sleeve DS	19	34	16	2	16	2	16	2	16	0	16	2	16	2
56.500-52.700		A325N		A325N		A325N		A307		A325N		A307		A307	
T11	Sleeve DS	19	36	16	2	16	2	16	2	16	0	16	2	16	2
52.700-49.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T12	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
49.000-45.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T13	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
45.000-41.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T14	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
41.000-37.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T15	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
37.000-33.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T16	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
33.000-25.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T17	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
25.000-16.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T18	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
16.000-8.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T19	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
8.000-4.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T20	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
4.000-0.000		A325N		A325N		A325N		A307		A325N		A307		A307	

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _A A _A Front m ²	C _A A _A Side m ²	Weight kg
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4	D	From Face	0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _A A _A Front m ²	C _A A _A Side m ²	Weight kg
DIPO AT13-240			0.000 0.000						
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	D	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	D	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00

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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 ²	Weight kg
8 FT DISH	D	Paraboloid w/o Radome	From Leg	0.000 0.000 0.000	0.0000		14.400	2.438	No Ice 4.673	113.85

Tower Pressures - No Ice

$$G_H = 1.082$$

Section Elevation m	z m	K _Z	q _z MPa	A _G m ²	F a c e	A _F m ²	A _R m ²	A _{leg} m ²	Leg %	C _A A _A In Face m ²	C _A A _A Out Face m ²
T1 100.000-95.000	97.500	1.914	0.00	2.926	A	1.235	0.000	0.635	51.44	0.000	0.000
					B	1.235	0.000		51.44	0.000	0.000
					C	1.235	0.000		51.44	0.000	0.000
					D	1.235	0.000		51.44	0.000	0.000
T2 95.000-92.000	93.500	1.891	0.00	2.788	A	0.800	0.000	0.463	57.82	0.000	0.000
					B	0.800	0.000		57.82	0.000	0.000
					C	0.800	0.000		57.82	0.000	0.000
					D	0.800	0.000		57.82	0.000	0.000
T3 92.000-86.000	89.000	1.864	0.00	7.583	A	1.729	0.000	0.914	52.89	0.000	0.000
					B	1.729	0.000		52.89	0.000	0.000
					C	1.729	0.000		52.89	0.000	0.000
					D	1.729	0.000		52.89	0.000	0.000
T4 86.000-82.000	84.000	1.834	0.00	5.108	A	1.372	0.000	0.813	59.23	0.000	0.000
					B	1.372	0.000		59.23	0.000	0.000
					C	1.372	0.000		59.23	0.000	0.000
					D	1.372	0.000		59.23	0.000	0.000
T5 82.000-79.000	80.500	1.812	0.00	6.207	A	1.366	0.000	0.651	47.63	0.000	0.000
					B	1.366	0.000		47.63	0.000	0.000
					C	1.366	0.000		47.63	0.000	0.000
					D	1.366	0.000		47.63	0.000	0.000
T6 79.000-74.000	76.500	1.785	0.00	14.362	A	2.427	0.000	1.270	52.34	0.000	0.000
					B	2.427	0.000		52.34	0.000	0.000
					C	2.427	0.000		52.34	0.000	0.000
					D	2.427	0.000		52.34	0.000	0.000
T7 74.000-69.000	71.500	1.751	0.00	14.428	A	2.718	0.000	1.524	56.08	0.000	0.000
					B	2.718	0.000		56.08	0.000	0.000
					C	2.718	0.000		56.08	0.000	0.000
					D	2.718	0.000		56.08	0.000	0.000
T8 69.000-61.500	65.250	1.706	0.00	21.641	A	4.063	0.000	2.286	56.27	0.000	0.000
					B	4.063	0.000		56.27	0.000	0.000
					C	4.063	0.000		56.27	0.000	0.000
					D	4.063	0.000		56.27	0.000	0.000
T9 61.500-56.500	59.000	1.658	0.00	14.428	A	2.719	0.000	1.524	56.06	0.000	0.000
					B	2.719	0.000		56.06	0.000	0.000
					C	2.719	0.000		56.06	0.000	0.000
					D	2.719	0.000		56.06	0.000	0.000
T10 56.500-52.700	54.600	1.621	0.00	12.143	A	2.328	0.000	1.166	50.07	0.000	0.000
					B	2.328	0.000		50.07	0.000	0.000
					C	2.328	0.000		50.07	0.000	0.000
					D	2.328	0.000		50.07	0.000	0.000

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Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F a c e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	$C_A A_A$ In Face m^2	$C_A A_A$ Out Face m^2
T11 52.700-49.000	50.850	1.589	0.00	14.071	A	2.225	0.000	1.135	51.01	0.000	0.000
					B	2.225	0.000		51.01	0.000	0.000
					C	2.225	0.000		51.01	0.000	0.000
					D	2.225	0.000		51.01	0.000	0.000
T12 49.000-45.000	47.000	1.553	0.00	17.706	A	2.829	0.000	1.227	43.38	0.000	0.000
					B	2.829	0.000		43.38	0.000	0.000
					C	2.829	0.000		43.38	0.000	0.000
					D	2.829	0.000		43.38	0.000	0.000
T13 45.000-41.000	43.000	1.514	0.00	20.297	A	3.008	0.000	1.227	40.80	0.000	0.000
					B	3.008	0.000		40.80	0.000	0.000
					C	3.008	0.000		40.80	0.000	0.000
					D	3.008	0.000		40.80	0.000	0.000
T14 41.000-37.000	39.000	1.473	0.00	22.888	A	3.190	0.000	1.227	38.47	0.000	0.000
					B	3.190	0.000		38.47	0.000	0.000
					C	3.190	0.000		38.47	0.000	0.000
					D	3.190	0.000		38.47	0.000	0.000
T15 37.000-33.000	35.000	1.428	0.00	25.479	A	3.376	0.000	1.227	36.35	0.000	0.000
					B	3.376	0.000		36.35	0.000	0.000
					C	3.376	0.000		36.35	0.000	0.000
					D	3.376	0.000		36.35	0.000	0.000
T16 33.000-25.000	29.000	1.353	0.00	58.731	A	5.595	0.000	2.454	43.86	0.000	0.000
					B	5.595	0.000		43.86	0.000	0.000
					C	5.595	0.000		43.86	0.000	0.000
					D	5.595	0.000		43.86	0.000	0.000
T17 25.000-16.000	20.500	1.226	0.00	78.461	A	6.586	0.000	2.761	41.92	0.000	0.000
					B	6.586	0.000		41.92	0.000	0.000
					C	6.586	0.000		41.92	0.000	0.000
					D	6.586	0.000		41.92	0.000	0.000
T18 16.000-8.000	12.000	1.052	0.00	80.755	A	6.671	0.000	2.454	36.79	0.000	0.000
					B	6.671	0.000		36.79	0.000	0.000
					C	6.671	0.000		36.79	0.000	0.000
					D	6.671	0.000		36.79	0.000	0.000
T19 8.000-4.000	6.000	1	0.00	44.264	A	3.635	0.000	1.227	33.76	0.000	0.000
					B	3.635	0.000		33.76	0.000	0.000
					C	3.635	0.000		33.76	0.000	0.000
					D	3.635	0.000		33.76	0.000	0.000
T20 4.000-0.000	2.000	1	0.00	46.856	A	4.949	0.000	1.227	24.80	0.000	0.000
					B	4.949	0.000		24.80	0.000	0.000
					C	4.949	0.000		24.80	0.000	0.000
					D	4.949	0.000		24.80	0.000	0.000

Tower Pressure - Service

$$G_H = 1.082$$

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F a c e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	$C_A A_A$ In Face m^2	$C_A A_A$ Out Face m^2
T1 100.000-95.000	97.500	1.914	0.00	2.926	A	1.235	0.000	0.635	51.44	0.000	0.000
					B	1.235	0.000		51.44	0.000	0.000
					C	1.235	0.000		51.44	0.000	0.000
					D	1.235	0.000		51.44	0.000	0.000
T2 95.000-92.000	93.500	1.891	0.00	2.788	A	0.800	0.000	0.463	57.82	0.000	0.000
					B	0.800	0.000		57.82	0.000	0.000
					C	0.800	0.000		57.82	0.000	0.000

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F_{ac} e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	C_{AA} In Face m^2	C_{AA} Out Face m^2
T3 92.000-86.000	89.000	1.864	0.00	7.583	D A B C D	0.800 1.729 1.729 1.729 1.729	0.000 0.000 0.000 0.000 0.000	0.914	57.82 52.89 52.89 52.89 52.89	0.000 0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000 0.000
T4 86.000-82.000	84.000	1.834	0.00	5.108	A B C D	1.372 1.372 1.372 1.372	0.000 0.000 0.000 0.000	0.813	59.23 59.23 59.23 59.23	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T5 82.000-79.000	80.500	1.812	0.00	6.207	A B C D	1.366 1.366 1.366 1.366	0.000 0.000 0.000 0.000	0.651	47.63 47.63 47.63 47.63	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T6 79.000-74.000	76.500	1.785	0.00	14.362	A B C D	2.427 2.427 2.427 2.427	0.000 0.000 0.000 0.000	1.270	52.34 52.34 52.34 52.34	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T7 74.000-69.000	71.500	1.751	0.00	14.428	A B C D	2.718 2.718 2.718 2.718	0.000 0.000 0.000 0.000	1.524	56.08 56.08 56.08 56.08	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T8 69.000-61.500	65.250	1.706	0.00	21.641	A B C D	4.063 4.063 4.063 4.063	0.000 0.000 0.000 0.000	2.286	56.27 56.27 56.27 56.27	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T9 61.500-56.500	59.000	1.658	0.00	14.428	A B C D	2.719 2.719 2.719 2.719	0.000 0.000 0.000 0.000	1.524	56.06 56.06 56.06 56.06	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T10 56.500-52.700	54.600	1.621	0.00	12.143	A B C D	2.328 2.328 2.328 2.328	0.000 0.000 0.000 0.000	1.166	50.07 50.07 50.07 50.07	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T11 52.700-49.000	50.850	1.589	0.00	14.071	A B C D	2.225 2.225 2.225 2.225	0.000 0.000 0.000 0.000	1.135	51.01 51.01 51.01 51.01	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T12 49.000-45.000	47.000	1.553	0.00	17.706	A B C D	2.829 2.829 2.829 2.829	0.000 0.000 0.000 0.000	1.227	43.38 43.38 43.38 43.38	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T13 45.000-41.000	43.000	1.514	0.00	20.297	A B C D	3.008 3.008 3.008 3.008	0.000 0.000 0.000 0.000	1.227	40.80 40.80 40.80 40.80	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T14 41.000-37.000	39.000	1.473	0.00	22.888	A B C D	3.190 3.190 3.190 3.190	0.000 0.000 0.000 0.000	1.227	38.47 38.47 38.47 38.47	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T15 37.000-33.000	35.000	1.428	0.00	25.479	A B C D	3.376 3.376 3.376 3.376	0.000 0.000 0.000 0.000	1.227	36.35 36.35 36.35 36.35	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T16 33.000-25.000	29.000	1.353	0.00	58.731	A B C D	5.595 5.595 5.595 5.595	0.000 0.000 0.000 0.000	2.454	43.86 43.86 43.86 43.86	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T17 25.000-16.000	20.500	1.226	0.00	78.461	A B C	6.586 6.586 6.586	0.000 0.000 0.000	2.761	41.92 41.92 41.92	0.000 0.000 0.000	0.000 0.000 0.000

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	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	z m	K _Z	q _z MPa	A _G m ²	F a c e m ²	A _F m ²	A _R m ²	A _{leg} m ²	Leg % %	C _A A _A In Face m ²	C _A A _A Out Face m ²
T18 16.000-8.000	12.000	1.052	0.00	80.755	D A B C D	6.586 6.671 6.671 6.671 6.671	0.000 0.000 0.000 0.000 0.000	2.454	41.92 36.79 36.79 36.79 36.79	0.000 0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000 0.000
T19 8.000-4.000	6.000	1	0.00	44.264	A B C D	3.635 3.635 3.635 3.635	0.000 0.000 0.000 0.000	1.227	33.76 33.76 33.76 33.76	0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000
T20 4.000-0.000	2.000	1	0.00	46.856	A B C D	4.949 4.949 4.949 4.949	0.000 0.000 0.000 0.000	1.227	24.80 24.80 24.80 24.80	0.000 0.000 0.000 0.000	0.000 0.000 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	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T1 100.000-95.000	3.62	390.31	A B C D	0.422 0.422 0.422 0.422	2.223 2.223 2.223 2.223	0.661 0.661 0.661 0.661	1 1 1 1	1 1 1 1	1.235 1.235 1.235 1.235	394.93	78.99	D
T2 95.000-92.000	3.62	260.21	A B C D	0.287 0.287 0.287 0.287	2.636 2.636 2.636 2.636	0.612 0.612 0.612 0.612	1 1 1 1	1 1 1 1	0.800 0.800 0.800 0.800	300.00	100.00	D
T3 92.000-86.000	4.46	571.10	A B C D	0.228 0.228 0.228 0.228	2.863 2.863 2.863 2.863	0.597 0.597 0.597 0.597	1 1 1 1	1 1 1 1	1.729 1.729 1.729 1.729	693.93	115.65	D
T4 86.000-82.000	5.37	450.89	A B C D	0.269 0.269 0.269 0.269	2.704 2.704 2.704 2.704	0.607 0.607 0.607 0.607	1 1 1 1	1 1 1 1	1.372 1.372 1.372 1.372	511.70	127.92	D
T5 82.000-79.000	5.37	526.92	A B C D	0.22 0.22 0.22 0.22	2.895 2.895 2.895 2.895	0.595 0.595 0.595 0.595	1 1 1 1	1 1 1 1	1.366 1.366 1.366 1.366	538.80	179.60	D
T6 79.000-74.000	5.37	1158.10	A B C D	0.169 0.169 0.169 0.169	3.117 3.117 3.117 3.117	0.585 0.585 0.585 0.585	1 1 1 1	1 1 1 1	2.427 2.427 2.427 2.427	1015.68	203.14	D
T7 74.000-69.000	6.26	1172.23	A B C D	0.188 0.188 0.188 0.188	3.031 3.031 3.031 3.031	0.588 0.588 0.588 0.588	1 1 1 1	1 1 1 1	2.718 2.718 2.718 2.718	1084.74	216.95	D
T8 69.000-61.500	6.26	1758.34	A B C D	0.188 0.188 0.188 0.188	3.033 3.033 3.033 3.033	0.588 0.588 0.588 0.588	1 1 1 1	1 1 1 1	4.063 4.063 4.063 4.063	1581.24	210.83	D
T9 61.500-56.500	7.16	1172.23	A B C D	0.188 0.188 0.188 0.188	3.03 3.03 3.03 3.03	0.588 0.588 0.588 0.588	1 1 1 1	1 1 1 1	2.719 2.719 2.719 2.719	1027.02	205.40	D
T10	7.16	1323.89	A	0.192	3.016	0.589	1	1	2.328	856.23	225.32	D

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA	Page 16 of 53
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
56.500-52.700			B	0.192	3.016	0.589	1	1	2.328			
			C	0.192	3.016	0.589	1	1	2.328			
			D	0.192	3.016	0.589	1	1	2.328			
T11	7.16	1072.92	A	0.158	3.167	0.583	1	1	2.225	842.07	227.59	D
52.700-49.000			B	0.158	3.167	0.583	1	1	2.225			
			C	0.158	3.167	0.583	1	1	2.225			
			D	0.158	3.167	0.583	1	1	2.225			
T12	7.16	1296.70	A	0.16	3.16	0.583	1	1	2.829	1044.09	261.02	D
49.000-45.000			B	0.16	3.16	0.583	1	1	2.829			
			C	0.16	3.16	0.583	1	1	2.829			
			D	0.16	3.16	0.583	1	1	2.829			
T13	7.16	1357.01	A	0.148	3.214	0.581	1	1	3.008	1100.79	275.20	D
45.000-41.000			B	0.148	3.214	0.581	1	1	3.008			
			C	0.148	3.214	0.581	1	1	3.008			
			D	0.148	3.214	0.581	1	1	3.008			
T14	7.16	1442.25	A	0.139	3.255	0.58	1	1	3.190	1150.32	287.58	D
41.000-37.000			B	0.139	3.255	0.58	1	1	3.190			
			C	0.139	3.255	0.58	1	1	3.190			
			D	0.139	3.255	0.58	1	1	3.190			
T15	7.16	1508.23	A	0.133	3.288	0.579	1	1	3.376	1192.30	298.07	D
37.000-33.000			B	0.133	3.288	0.579	1	1	3.376			
			C	0.133	3.288	0.579	1	1	3.376			
			D	0.133	3.288	0.579	1	1	3.376			
T16	7.16	3131.77	A	0.095	3.474	0.575	1	1	5.595	1978.36	247.29	D
33.000-25.000			B	0.095	3.474	0.575	1	1	5.595			
			C	0.095	3.474	0.575	1	1	5.595			
			D	0.095	3.474	0.575	1	1	5.595			
T17	7.16	3747.74	A	0.084	3.533	0.574	1	1	6.586	2144.62	238.29	D
25.000-16.000			B	0.084	3.533	0.574	1	1	6.586			
			C	0.084	3.533	0.574	1	1	6.586			
			D	0.084	3.533	0.574	1	1	6.586			
T18	7.16	3780.36	A	0.083	3.54	0.573	1	1	6.671	1867.69	233.46	D
16.000-8.000			B	0.083	3.54	0.573	1	1	6.671			
			C	0.083	3.54	0.573	1	1	6.671			
			D	0.083	3.54	0.573	1	1	6.671			
T19	7.16	2377.69	A	0.082	3.542	0.573	1	1	3.635	968.47	242.12	D
8.000-4.000			B	0.082	3.542	0.573	1	1	3.635			
			C	0.082	3.542	0.573	1	1	3.635			
			D	0.082	3.542	0.573	1	1	3.635			
T20	7.16	2376.92	A	0.106	3.421	0.576	1	1	4.949	1273.33	318.33	D
4.000-0.000			B	0.106	3.421	0.576	1	1	4.949			
			C	0.106	3.421	0.576	1	1	4.949			
			D	0.106	3.421	0.576	1	1	4.949			
Sum Weight:	126.23	31002.03						OTM	938374 kg-m	21566.28		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T1	3.62	390.31	A	0.422	2.223	0.661	1.2	1.2	1.481	473.91	94.78	D
100.000-95.000			B	0.422	2.223	0.661	1.2	1.2	1.481			
			C	0.422	2.223	0.661	1.2	1.2	1.481			
			D	0.422	2.223	0.661	1.2	1.2	1.481			

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T2 95.000-92.000	3.62	260.21	A	0.287	2.636	0.612	1.2	1.2	0.961	359.99	120.00	D
			B	0.287	2.636	0.612	1.2	1.2	0.961			
			C	0.287	2.636	0.612	1.2	1.2	0.961			
			D	0.287	2.636	0.612	1.2	1.2	0.961			
T3 92.000-86.000	4.46	571.10	A	0.228	2.863	0.597	1.171	1.171	2.024	812.58	135.43	D
			B	0.228	2.863	0.597	1.171	1.171	2.024			
			C	0.228	2.863	0.597	1.171	1.171	2.024			
			D	0.228	2.863	0.597	1.171	1.171	2.024			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1.2	1.2	1.647	614.04	153.51	D
			B	0.269	2.704	0.607	1.2	1.2	1.647			
			C	0.269	2.704	0.607	1.2	1.2	1.647			
			D	0.269	2.704	0.607	1.2	1.2	1.647			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1.165	1.165	1.591	627.71	209.24	D
			B	0.22	2.895	0.595	1.165	1.165	1.591			
			C	0.22	2.895	0.595	1.165	1.165	1.591			
			D	0.22	2.895	0.595	1.165	1.165	1.591			
T6 79.000-74.000	5.37	1158.10	A	0.169	3.117	0.585	1.127	1.127	2.734	1144.39	228.88	D
			B	0.169	3.117	0.585	1.127	1.127	2.734			
			C	0.169	3.117	0.585	1.127	1.127	2.734			
			D	0.169	3.117	0.585	1.127	1.127	2.734			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1.141	1.141	3.102	1237.98	247.60	D
			B	0.188	3.031	0.588	1.141	1.141	3.102			
			C	0.188	3.031	0.588	1.141	1.141	3.102			
			D	0.188	3.031	0.588	1.141	1.141	3.102			
T8 69.000-61.500	6.26	1758.34	A	0.188	3.033	0.588	1.141	1.141	4.635	1803.88	240.52	D
			B	0.188	3.033	0.588	1.141	1.141	4.635			
			C	0.188	3.033	0.588	1.141	1.141	4.635			
			D	0.188	3.033	0.588	1.141	1.141	4.635			
T9 61.500-56.500	7.16	1172.23	A	0.188	3.03	0.588	1.141	1.141	3.103	1172.16	234.43	D
			B	0.188	3.03	0.588	1.141	1.141	3.103			
			C	0.188	3.03	0.588	1.141	1.141	3.103			
			D	0.188	3.03	0.588	1.141	1.141	3.103			
T10 56.500-52.700	7.16	1323.89	A	0.192	3.016	0.589	1.144	1.144	2.663	979.36	257.73	D
			B	0.192	3.016	0.589	1.144	1.144	2.663			
			C	0.192	3.016	0.589	1.144	1.144	2.663			
			D	0.192	3.016	0.589	1.144	1.144	2.663			
T11 52.700-49.000	7.16	1072.92	A	0.158	3.167	0.583	1.119	1.119	2.489	941.95	254.58	D
			B	0.158	3.167	0.583	1.119	1.119	2.489			
			C	0.158	3.167	0.583	1.119	1.119	2.489			
			D	0.158	3.167	0.583	1.119	1.119	2.489			
T12 49.000-45.000	7.16	1296.70	A	0.16	3.16	0.583	1.12	1.12	3.168	1169.19	292.30	D
			B	0.16	3.16	0.583	1.12	1.12	3.168			
			C	0.16	3.16	0.583	1.12	1.12	3.168			
			D	0.16	3.16	0.583	1.12	1.12	3.168			
T13 45.000-41.000	7.16	1357.01	A	0.148	3.214	0.581	1.111	1.111	3.342	1223.13	305.78	D
			B	0.148	3.214	0.581	1.111	1.111	3.342			
			C	0.148	3.214	0.581	1.111	1.111	3.342			
			D	0.148	3.214	0.581	1.111	1.111	3.342			
T14 41.000-37.000	7.16	1442.25	A	0.139	3.255	0.58	1.105	1.105	3.524	1270.57	317.64	D
			B	0.139	3.255	0.58	1.105	1.105	3.524			
			C	0.139	3.255	0.58	1.105	1.105	3.524			
			D	0.139	3.255	0.58	1.105	1.105	3.524			
T15 37.000-33.000	7.16	1508.23	A	0.133	3.288	0.579	1.099	1.099	3.712	1310.79	327.70	D
			B	0.133	3.288	0.579	1.099	1.099	3.712			
			C	0.133	3.288	0.579	1.099	1.099	3.712			
			D	0.133	3.288	0.579	1.099	1.099	3.712			
T16 33.000-25.000	7.16	3131.77	A	0.095	3.474	0.575	1.071	1.071	5.995	2119.71	264.96	D
			B	0.095	3.474	0.575	1.071	1.071	5.995			
			C	0.095	3.474	0.575	1.071	1.071	5.995			
			D	0.095	3.474	0.575	1.071	1.071	5.995			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA	Page 18 of 53
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T17 25.000-16.000	7.16	3747.74	A	0.084	3.533	0.574	1.063	1.063	7.001	2279.63	253.29	D
			B	0.084	3.533	0.574	1.063	1.063	7.001			
			C	0.084	3.533	0.574	1.063	1.063	7.001			
			D	0.084	3.533	0.574	1.063	1.063	7.001			
T18 16.000-8.000	7.16	3780.36	A	0.083	3.54	0.573	1.062	1.062	7.084	1983.40	247.92	D
			B	0.083	3.54	0.573	1.062	1.062	7.084			
			C	0.083	3.54	0.573	1.062	1.062	7.084			
			D	0.083	3.54	0.573	1.062	1.062	7.084			
T19 8.000-4.000	7.16	2377.69	A	0.082	3.542	0.573	1.062	1.062	3.859	1028.13	257.03	D
			B	0.082	3.542	0.573	1.062	1.062	3.859			
			C	0.082	3.542	0.573	1.062	1.062	3.859			
			D	0.082	3.542	0.573	1.062	1.062	3.859			
T20 4.000-0.000	7.16	2376.92	A	0.106	3.421	0.576	1.079	1.079	5.341	1374.19	343.55	D
			B	0.106	3.421	0.576	1.079	1.079	5.341			
			C	0.106	3.421	0.576	1.079	1.079	5.341			
			D	0.106	3.421	0.576	1.079	1.079	5.341			
Sum Weight:	126.23	31002.03						OTM	1062487 kg-m	23926.70		

Tower Forces - Service - Wind Normal To Face

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T1 100.000-95.000	3.62	390.31	A	0.422	2.223	0.661	1	1	1.235	98.73	19.75	D
			B	0.422	2.223	0.661	1	1	1.235			
			C	0.422	2.223	0.661	1	1	1.235			
			D	0.422	2.223	0.661	1	1	1.235			
T2 95.000-92.000	3.62	260.21	A	0.287	2.636	0.612	1	1	0.800	75.00	25.00	D
			B	0.287	2.636	0.612	1	1	0.800			
			C	0.287	2.636	0.612	1	1	0.800			
			D	0.287	2.636	0.612	1	1	0.800			
T3 92.000-86.000	4.46	571.10	A	0.228	2.863	0.597	1	1	1.729	173.48	28.91	D
			B	0.228	2.863	0.597	1	1	1.729			
			C	0.228	2.863	0.597	1	1	1.729			
			D	0.228	2.863	0.597	1	1	1.729			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1	1	1.372	127.92	31.98	D
			B	0.269	2.704	0.607	1	1	1.372			
			C	0.269	2.704	0.607	1	1	1.372			
			D	0.269	2.704	0.607	1	1	1.372			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1	1	1.366	134.70	44.90	D
			B	0.22	2.895	0.595	1	1	1.366			
			C	0.22	2.895	0.595	1	1	1.366			
			D	0.22	2.895	0.595	1	1	1.366			
T6 79.000-74.000	5.37	1158.10	A	0.169	3.117	0.585	1	1	2.427	253.92	50.78	D
			B	0.169	3.117	0.585	1	1	2.427			
			C	0.169	3.117	0.585	1	1	2.427			
			D	0.169	3.117	0.585	1	1	2.427			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1	1	2.718	271.18	54.24	D
			B	0.188	3.031	0.588	1	1	2.718			
			C	0.188	3.031	0.588	1	1	2.718			
			D	0.188	3.031	0.588	1	1	2.718			
T8 69.000-61.500	6.26	1758.34	A	0.188	3.033	0.588	1	1	4.063	395.31	52.71	D
			B	0.188	3.033	0.588	1	1	4.063			
			C	0.188	3.033	0.588	1	1	4.063			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA	Page 19 of 53
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T9 61.500-56.500	7.16	1172.23	D	0.188	3.033	0.588	1	1	4.063			
			A	0.188	3.03	0.588	1	1	2.719	256.75	51.35	D
			B	0.188	3.03	0.588	1	1	2.719			
			C	0.188	3.03	0.588	1	1	2.719			
			D	0.188	3.03	0.588	1	1	2.719			
T10 56.500-52.700	7.16	1323.89	A	0.192	3.016	0.589	1	1	2.328	214.06	56.33	D
			B	0.192	3.016	0.589	1	1	2.328			
			C	0.192	3.016	0.589	1	1	2.328			
			D	0.192	3.016	0.589	1	1	2.328			
T11 52.700-49.000	7.16	1072.92	A	0.158	3.167	0.583	1	1	2.225	210.52	56.90	D
			B	0.158	3.167	0.583	1	1	2.225			
			C	0.158	3.167	0.583	1	1	2.225			
			D	0.158	3.167	0.583	1	1	2.225			
T12 49.000-45.000	7.16	1296.70	A	0.16	3.16	0.583	1	1	2.829	261.02	65.26	D
			B	0.16	3.16	0.583	1	1	2.829			
			C	0.16	3.16	0.583	1	1	2.829			
			D	0.16	3.16	0.583	1	1	2.829			
T13 45.000-41.000	7.16	1357.01	A	0.148	3.214	0.581	1	1	3.008	275.20	68.80	D
			B	0.148	3.214	0.581	1	1	3.008			
			C	0.148	3.214	0.581	1	1	3.008			
			D	0.148	3.214	0.581	1	1	3.008			
T14 41.000-37.000	7.16	1442.25	A	0.139	3.255	0.58	1	1	3.190	287.58	71.89	D
			B	0.139	3.255	0.58	1	1	3.190			
			C	0.139	3.255	0.58	1	1	3.190			
			D	0.139	3.255	0.58	1	1	3.190			
T15 37.000-33.000	7.16	1508.23	A	0.133	3.288	0.579	1	1	3.376	298.07	74.52	D
			B	0.133	3.288	0.579	1	1	3.376			
			C	0.133	3.288	0.579	1	1	3.376			
			D	0.133	3.288	0.579	1	1	3.376			
T16 33.000-25.000	7.16	3131.77	A	0.095	3.474	0.575	1	1	5.595	494.59	61.82	D
			B	0.095	3.474	0.575	1	1	5.595			
			C	0.095	3.474	0.575	1	1	5.595			
			D	0.095	3.474	0.575	1	1	5.595			
T17 25.000-16.000	7.16	3747.74	A	0.084	3.533	0.574	1	1	6.586	536.15	59.57	D
			B	0.084	3.533	0.574	1	1	6.586			
			C	0.084	3.533	0.574	1	1	6.586			
			D	0.084	3.533	0.574	1	1	6.586			
T18 16.000-8.000	7.16	3780.36	A	0.083	3.54	0.573	1	1	6.671	466.92	58.37	D
			B	0.083	3.54	0.573	1	1	6.671			
			C	0.083	3.54	0.573	1	1	6.671			
			D	0.083	3.54	0.573	1	1	6.671			
T19 8.000-4.000	7.16	2377.69	A	0.082	3.542	0.573	1	1	3.635	242.12	60.53	D
			B	0.082	3.542	0.573	1	1	3.635			
			C	0.082	3.542	0.573	1	1	3.635			
			D	0.082	3.542	0.573	1	1	3.635			
T20 4.000-0.000	7.16	2376.92	A	0.106	3.421	0.576	1	1	4.949	318.33	79.58	D
			B	0.106	3.421	0.576	1	1	4.949			
			C	0.106	3.421	0.576	1	1	4.949			
			D	0.106	3.421	0.576	1	1	4.949			
Sum Weight:	126.23	31002.03						OTM	234593 kg-m	5391.57		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T1 100.000-95.000	3.62	390.31	A	0.422	2.223	0.661	1.2	1.2	1.481	118.48	23.70	D
			B	0.422	2.223	0.661	1.2	1.2	1.481			
			C	0.422	2.223	0.661	1.2	1.2	1.481			
			D	0.422	2.223	0.661	1.2	1.2	1.481			
T2 95.000-92.000	3.62	260.21	A	0.287	2.636	0.612	1.2	1.2	0.961	90.00	30.00	D
			B	0.287	2.636	0.612	1.2	1.2	0.961			
			C	0.287	2.636	0.612	1.2	1.2	0.961			
			D	0.287	2.636	0.612	1.2	1.2	0.961			
T3 92.000-86.000	4.46	571.10	A	0.228	2.863	0.597	1.171	1.171	2.024	203.14	33.86	D
			B	0.228	2.863	0.597	1.171	1.171	2.024			
			C	0.228	2.863	0.597	1.171	1.171	2.024			
			D	0.228	2.863	0.597	1.171	1.171	2.024			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1.2	1.2	1.647	153.51	38.38	D
			B	0.269	2.704	0.607	1.2	1.2	1.647			
			C	0.269	2.704	0.607	1.2	1.2	1.647			
			D	0.269	2.704	0.607	1.2	1.2	1.647			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1.165	1.165	1.591	156.93	52.31	D
			B	0.22	2.895	0.595	1.165	1.165	1.591			
			C	0.22	2.895	0.595	1.165	1.165	1.591			
			D	0.22	2.895	0.595	1.165	1.165	1.591			
T6 79.000-74.000	5.37	1158.10	A	0.169	3.117	0.585	1.127	1.127	2.734	286.10	57.22	D
			B	0.169	3.117	0.585	1.127	1.127	2.734			
			C	0.169	3.117	0.585	1.127	1.127	2.734			
			D	0.169	3.117	0.585	1.127	1.127	2.734			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1.141	1.141	3.102	309.50	61.90	D
			B	0.188	3.031	0.588	1.141	1.141	3.102			
			C	0.188	3.031	0.588	1.141	1.141	3.102			
			D	0.188	3.031	0.588	1.141	1.141	3.102			
T8 69.000-61.500	6.26	1758.34	A	0.188	3.033	0.588	1.141	1.141	4.635	450.97	60.13	D
			B	0.188	3.033	0.588	1.141	1.141	4.635			
			C	0.188	3.033	0.588	1.141	1.141	4.635			
			D	0.188	3.033	0.588	1.141	1.141	4.635			
T9 61.500-56.500	7.16	1172.23	A	0.188	3.03	0.588	1.141	1.141	3.103	293.04	58.61	D
			B	0.188	3.03	0.588	1.141	1.141	3.103			
			C	0.188	3.03	0.588	1.141	1.141	3.103			
			D	0.188	3.03	0.588	1.141	1.141	3.103			
T10 56.500-52.700	7.16	1323.89	A	0.192	3.016	0.589	1.144	1.144	2.663	244.84	64.43	D
			B	0.192	3.016	0.589	1.144	1.144	2.663			
			C	0.192	3.016	0.589	1.144	1.144	2.663			
			D	0.192	3.016	0.589	1.144	1.144	2.663			
T11 52.700-49.000	7.16	1072.92	A	0.158	3.167	0.583	1.119	1.119	2.489	235.49	63.65	D
			B	0.158	3.167	0.583	1.119	1.119	2.489			
			C	0.158	3.167	0.583	1.119	1.119	2.489			
			D	0.158	3.167	0.583	1.119	1.119	2.489			
T12 49.000-45.000	7.16	1296.70	A	0.16	3.16	0.583	1.12	1.12	3.168	292.30	73.07	D
			B	0.16	3.16	0.583	1.12	1.12	3.168			
			C	0.16	3.16	0.583	1.12	1.12	3.168			
			D	0.16	3.16	0.583	1.12	1.12	3.168			
T13 45.000-41.000	7.16	1357.01	A	0.148	3.214	0.581	1.111	1.111	3.342	305.78	76.45	D
			B	0.148	3.214	0.581	1.111	1.111	3.342			
			C	0.148	3.214	0.581	1.111	1.111	3.342			
			D	0.148	3.214	0.581	1.111	1.111	3.342			
T14 41.000-37.000	7.16	1442.25	A	0.139	3.255	0.58	1.105	1.105	3.524	317.64	79.41	D
			B	0.139	3.255	0.58	1.105	1.105	3.524			
			C	0.139	3.255	0.58	1.105	1.105	3.524			
			D	0.139	3.255	0.58	1.105	1.105	3.524			
T15 37.000-33.000	7.16	1508.23	A	0.133	3.288	0.579	1.099	1.099	3.712	327.70	81.92	D
			B	0.133	3.288	0.579	1.099	1.099	3.712			
			C	0.133	3.288	0.579	1.099	1.099	3.712			
			D	0.133	3.288	0.579	1.099	1.099	3.712			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA ESTADO ACTUAL - REFORZADA	Page 21 of 53
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 13:10:06 01/27/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T16 33.000-25.000	7.16	3131.77	A	0.095	3.474	0.575	1.071	1.071	5.995	529.93	66.24	D
			B	0.095	3.474	0.575	1.071	1.071	5.995			
			C	0.095	3.474	0.575	1.071	1.071	5.995			
			D	0.095	3.474	0.575	1.071	1.071	5.995			
T17 25.000-16.000	7.16	3747.74	A	0.084	3.533	0.574	1.063	1.063	7.001	569.91	63.32	D
			B	0.084	3.533	0.574	1.063	1.063	7.001			
			C	0.084	3.533	0.574	1.063	1.063	7.001			
			D	0.084	3.533	0.574	1.063	1.063	7.001			
T18 16.000-8.000	7.16	3780.36	A	0.083	3.54	0.573	1.062	1.062	7.084	495.85	61.98	D
			B	0.083	3.54	0.573	1.062	1.062	7.084			
			C	0.083	3.54	0.573	1.062	1.062	7.084			
			D	0.083	3.54	0.573	1.062	1.062	7.084			
T19 8.000-4.000	7.16	2377.69	A	0.082	3.542	0.573	1.062	1.062	3.859	257.03	64.26	D
			B	0.082	3.542	0.573	1.062	1.062	3.859			
			C	0.082	3.542	0.573	1.062	1.062	3.859			
			D	0.082	3.542	0.573	1.062	1.062	3.859			
T20 4.000-0.000	7.16	2376.92	A	0.106	3.421	0.576	1.079	1.079	5.341	343.55	85.89	D
			B	0.106	3.421	0.576	1.079	1.079	5.341			
			C	0.106	3.421	0.576	1.079	1.079	5.341			
			D	0.106	3.421	0.576	1.079	1.079	5.341			
Sum Weight:	126.23	31002.03						OTM	265622 kg-m	5981.68		

Force Totals

Load Case	Vertical Forces kg	Sum of Forces X kg	Sum of Forces Z kg	Sum of Overturning Moments, M _x kg-m	Sum of Overturning Moments, M _z kg-m	Sum of Torques kg-m
Leg Weight	14345.93					
Bracing Weight	16529.88					
Total Member Self-Weight	30875.80			466	466	
Gusset Weight	126.23					
Total Weight	32591.24			466	466	
Wind 0 deg - No Ice		435.03	-22817.35	-1010496	-5798	-112
Wind 45 deg - No Ice		17903.71	-17903.71	-803598	-803598	0
Wind 90 deg - No Ice		22817.35	-435.03	-5798	-1010496	112
Wind 180 deg - No Ice		-17.75	22624.84	1008656	722	1209
Total Weight	32591.24			466	466	
Wind 0 deg - Service		108.76	-5704.34	-252274	-1100	-28
Wind 45 deg - Service		4475.93	-4475.93	-200550	-200550	0
Wind 90 deg - Service		5704.34	-108.76	-1100	-252274	28
Wind 180 deg - Service		-4.44	5656.21	252514	530	302

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 45 deg - No Ice

Comb. No.	Description
4	Dead+Wind 90 deg - No Ice
5	Dead+Wind 180 deg - No Ice
6	Dead+Wind 0 deg - Service
7	Dead+Wind 45 deg - Service
8	Dead+Wind 90 deg - Service
9	Dead+Wind 180 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	100 - 95	Leg	Max Tension	3	1059.83	-2	-2
			Max. Compression	3	-1200.76	-3	-3
			Max. Mx	3	-76.05	7	-6
			Max. My	3	-76.01	-6	7
			Max. Vy	3	-19.25	7	-6
			Max. Vx	3	-19.26	-6	7
		Diagonal	Max Tension	3	231.01	0	0
			Max. Compression	3	-250.30	0	0
			Max. Mx	2	59.53	0	0
			Max. My	2	16.26	0	0
			Max. Vy	2	0.55	0	0
			Max. Vx	2	-0.01	0	0
		Horizontal	Max Tension	4	22.95	-1	0
			Max. Compression	5	-19.26	0	0
			Max. Mx	4	18.93	1	0
			Max. My	3	20.22	1	0
			Max. Vy	4	-5.84	1	0
			Max. Vx	3	-0.09	1	0
		Top Girt	Max Tension	4	6.37	0	0
			Max. Compression	2	-6.57	0	0
			Max. Mx	1	-0.17	0	0
			Max. My	3	-5.47	0	0
			Max. Vy	1	1.63	0	0
			Max. Vx	3	-0.00	0	0
		Inner Bracing	Max Tension	3	1.67	0	0
			Max. Compression	3	-1.31	0	0
			Max. Mx	1	0.00	0	0
			Max. My	4	0.09	0	0
			Max. Vy	1	-1.30	0	0
			Max. Vx	4	0.01	0	0
T2	95 - 92	Leg	Max Tension	3	1232.98	0	0
			Max. Compression	3	-1407.51	0	0
			Max. Mx	3	-82.75	7	-6
			Max. My	3	-82.74	-6	7
			Max. Vy	2	-15.93	7	-1
			Max. Vx	2	-15.93	-1	7
		Diagonal	Max Tension	3	274.55	0	0
			Max. Compression	3	-336.00	0	0
			Max. Mx	2	88.81	0	0
			Max. My	2	213.29	0	0
			Max. Vy	2	1.23	0	0
			Max. Vx	2	-0.39	0	0
		Horizontal	Max Tension	4	27.02	0	0
			Max. Compression	2	-33.19	0	0
			Max. Mx	4	-0.95	0	0
			Max. My	4	-0.95	0	0
			Max. Vy	4	-1.39	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T3	92 - 86	Top Girt	Max. Vx	4	-1.01	0	0
			Max Tension	5	0.17	0	0
			Max. Compression	4	-6.83	0	0
			Max. Mx	1	-3.12	0	0
			Max. My	1	-3.12	0	0
			Max. Vy	1	1.24	0	0
		Leg	Max. Vx	1	-0.14	0	0
			Max Tension	3	5115.08	-6	-6
			Max. Compression	3	-5827.07	5	5
			Max. Mx	3	-337.05	22	-20
			Max. My	3	-337.05	-20	22
			Max. Vy	3	-40.73	22	-20
		Diagonal	Max. Vx	3	-40.73	-20	22
			Max Tension	3	841.63	0	0
			Max. Compression	3	-881.55	0	0
			Max. Mx	2	363.37	0	0
			Max. My	5	-175.18	0	0
			Max. Vy	2	1.22	0	0
		Horizontal	Max. Vx	5	-0.02	0	0
			Max Tension	3	60.44	1	0
			Max. Compression	3	-61.30	-1	0
			Max. Mx	4	38.38	2	0
			Max. My	4	-39.02	0	0
			Max. Vy	4	3.76	2	0
T4	86 - 82	Top Girt	Max. Vx	4	0.21	0	0
			Max Tension	4	302.99	0	0
			Max. Compression	2	-240.06	0	0
			Max. Mx	1	31.25	-1	0
			Max. My	3	-198.17	0	0
			Max. Vy	1	2.76	0	0
		Leg	Max. Vx	3	-0.00	0	0
			Max Tension	3	10125.02	-24	-24
			Max. Compression	3	-11169.36	-5	-5
			Max. Mx	3	-521.14	75	-69
			Max. My	3	-521.15	-69	75
			Max. Vy	3	-108.77	75	-69
		Diagonal	Max. Vx	3	-108.77	-69	75
			Max Tension	3	1276.17	0	0
			Max. Compression	3	-1297.53	0	0
			Max. Mx	2	937.71	0	0
			Max. My	5	56.37	0	0
			Max. Vy	2	1.22	0	0
		Horizontal	Max. Vx	5	-0.02	0	0
			Max Tension	4	125.00	0	0
			Max. Compression	3	-115.94	2	0
			Max. Mx	4	97.05	3	0
			Max. My	4	-28.07	0	0
			Max. Vy	4	5.61	3	0
T5	82 - 79	Top Girt	Max. Vx	4	0.61	0	0
			Max Tension	2	48.19	0	0
			Max. Compression	4	-44.19	0	0
			Max. Mx	1	5.84	-1	0
			Max. My	3	-37.39	0	0
			Max. Vy	1	2.76	0	0
		Leg	Max. Vx	3	-0.00	0	0
			Max Tension	3	7610.68	7	7
			Max. Compression	3	-8483.46	17	17
			Max. Mx	4	4432.21	19	-2
			Max. My	4	4432.25	-2	19
			Max. Vy	4	34.81	19	-2
			Max. Vx	4	34.81	-2	19

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T6	79 - 74	Diagonal	Max Tension	3	2822.68	0	0
			Max. Compression	3	-3069.81	0	0
			Max. Mx	2	-1325.41	-3	0
			Max. My	5	1473.50	0	1
			Max. Vy	2	6.23	0	0
		Horizontal	Max. Vx	5	-2.47	0	0
			Max Tension	5	42.21	0	5
			Max. Compression	4	-72.72	0	5
			Max. Mx	2	-14.08	2	5
			Max. My	5	-10.68	-1	7
		Top Girt	Max. Vy	2	-3.90	2	5
			Max. Vx	5	7.95	0	0
			Max Tension	2	997.71	0	0
			Max. Compression	4	-1181.68	0	0
			Max. Mx	1	-87.70	-1	0
		Leg	Max. My	1	-87.70	0	0
			Max. Vy	1	2.67	0	0
			Max. Vx	1	-0.70	0	0
			Max Tension	3	10851.34	-4	-4
			Max. Compression	3	-12690.10	27	27
		Diagonal	Max. Mx	3	-1036.81	77	-69
			Max. My	3	-1036.83	-68	76
			Max. Vy	3	-79.28	77	-69
			Max. Vx	3	-78.96	-68	76
			Max Tension	2	1299.63	0	0
		Horizontal	Max. Compression	4	-1337.18	0	0
			Max. Mx	2	1111.03	-1	0
			Max. My	5	129.87	0	0
			Max. Vy	2	-3.19	0	0
			Max. Vx	5	-0.02	0	0
		Top Girt	Max Tension	3	91.02	1	0
			Max. Compression	3	-81.19	1	0
			Max. Mx	4	40.13	2	0
			Max. My	2	39.97	2	0
			Max. Vy	4	-4.43	2	0
		Inner Bracing	Max. Vx	2	-0.06	2	0
			Max Tension	4	2138.40	0	0
			Max. Compression	2	-1828.06	0	0
			Max. Mx	1	153.29	-4	0
			Max. My	5	154.67	0	0
T7	74 - 69	Leg	Max. Vy	1	-6.34	0	0
			Max. Vx	5	0.00	0	0
			Max Tension	3	169.69	0	0
			Max. Compression	2	-38.78	0	0
			Max. Mx	1	153.79	9	0
		Diagonal	Max. My	4	0.84	0	0
			Max. Vy	1	-8.96	0	0
			Max. Vx	4	0.06	0	0
			Max Tension	3	16955.77	-20	-20
			Max. Compression	3	-19463.26	51	51
		Horizontal	Max. Mx	3	-1278.23	98	-86
			Max. My	3	-1278.26	-86	98
			Max. Vy	2	-106.16	-42	-28
			Max. Vx	2	-106.15	-28	-42
			Max Tension	5	1678.21	0	0
		Top Girt	Max. Compression	4	-1713.41	0	0
			Max. Mx	4	1487.87	-2	0
			Max. My	5	-15.78	0	0
			Max. Vy	4	4.03	0	0
			Max. Vx	5	-0.02	0	0
		Inner Bracing	Max Tension	3	170.52	1	0
			Max. Compression	2	-38.78	0	0
			Max. Mx	1	153.79	9	0
			Max. My	4	0.84	0	0
			Max. Vy	1	-8.96	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T8	69 - 61.5	Leg	Max. Compression	3	-156.18	1	0
			Max. Mx	2	133.09	1	0
			Max. My	3	-156.18	1	0
			Max. Vy	2	-4.20	1	0
			Max. Vx	3	-0.23	0	0
			Max Tension	3	28769.39	-57	-57
			Max. Compression	3	-32270.98	48	48
			Max. Mx	3	-1594.04	145	-129
			Max. My	3	-1594.09	-129	145
			Max. Vy	2	-161.57	-67	-35
		Diagonal	Max. Vx	2	-161.54	-35	-67
			Max Tension	2	2271.66	0	0
			Max. Compression	4	-2337.66	0	0
			Max. Mx	4	1829.99	-2	0
			Max. My	5	-150.84	0	0
		Horizontal	Max. Vy	4	4.03	0	0
			Max. Vx	5	-0.02	0	0
			Max Tension	4	252.37	0	0
			Max. Compression	3	-242.34	1	0
			Max. Mx	2	235.84	2	0
T9	61.5 - 56.5	Leg	Max. My	4	-70.21	1	0
			Max. Vy	2	4.38	2	0
			Max. Vx	4	0.29	1	0
			Max Tension	3	38426.51	-90	-90
			Max. Compression	3	-42557.47	-4	-4
			Max. Mx	3	-2009.44	247	-226
			Max. My	3	-2009.50	-226	246
			Max. Vy	2	-260.68	-103	-41
			Max. Vx	2	-260.79	-74	223
		Diagonal	Max Tension	3	2665.34	0	0
			Max. Compression	4	-2718.42	0	0
			Max. Mx	2	2354.77	-2	0
			Max. My	5	67.54	0	0
			Max. Vy	2	4.02	0	0
		Horizontal	Max. Vx	5	-0.02	0	0
			Max Tension	2	372.88	0	0
			Max. Compression	4	-345.56	0	0
			Max. Mx	2	262.29	3	0
			Max. My	2	-59.67	1	-1
T10	56.5 - 52.7	Leg	Max. Vy	2	5.07	3	0
			Max. Vx	2	1.01	1	-1
			Max Tension	3	40907.67	12	12
			Max. Compression	3	-45588.97	117	118
			Max. Mx	3	-2599.89	255	-230
			Max. My	3	-2599.09	-229	255
			Max. Vy	3	-165.00	255	-230
			Max. Vx	3	-164.40	-229	255
		Diagonal	Max Tension	3	720.57	0	0
			Max. Compression	3	-691.62	0	0
			Max. Mx	3	-678.10	7	0
			Max. My	2	-670.95	-3	-1
			Max. Vy	3	-7.77	7	0
		Horizontal	Max. Vx	3	0.71	0	0
			Max Tension	2	183.11	0	0
			Max. Compression	3	-232.05	2	0
			Max. Mx	4	-178.05	3	0
			Max. My	2	-177.27	3	0
		Top Girt	Max. Vy	4	-5.19	3	0
			Max. Vx	2	0.48	3	0
			Max Tension	4	1275.63	0	0
			Max. Compression	2	-1518.07	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T11	52.7 - 49	Redund Diag 1 Bracing	Max. Mx	1	-87.14	-7	0
			Max. My	1	-87.14	0	1
			Max. Vy	1	10.51	0	0
			Max. Vx	1	-0.85	0	0
			Max Tension	3	564.99	0	0
			Max. Compression	3	-564.99	0	0
			Max. Mx	4	1.50	-1	0
			Max. My	5	0.84	0	0
			Max. Vy	4	1.94	0	0
			Max. Vx	5	-0.24	0	0
		Inner Bracing	Max Tension	3	41.88	0	0
			Max. Compression	3	-171.52	0	0
			Max. Mx	1	1.88	18	0
			Max. My	4	1.29	0	0
			Max. Vy	1	-18.05	0	0
			Max. Vx	4	0.08	0	0
			Max Tension	3	41550.55	-88	-88
			Max. Compression	3	-46977.17	97	96
			Max. Mx	3	-2580.74	256	-229
			Max. My	3	-2581.61	-229	255
		Diagonal	Max. Vy	3	198.90	256	-229
			Max. Vx	3	198.53	-229	255
			Max Tension	3	304.91	0	0
			Max. Compression	3	-314.45	0	0
			Max. Mx	3	285.55	6	0
			Max. My	3	-306.82	1	-1
			Max. Vy	3	-7.40	6	0
			Max. Vx	3	-0.81	0	0
		Horizontal	Max Tension	4	271.82	3	3
			Max. Compression	3	-311.55	1	4
			Max. Mx	2	271.80	3	2
			Max. My	4	-287.33	1	5
			Max. Vy	2	5.84	3	2
			Max. Vx	4	-2.80	0	0
		Redund Diag 1 Bracing	Max Tension	3	520.25	0	0
			Max. Compression	3	-520.25	0	0
			Max. Mx	2	-1.37	-1	0
			Max. My	5	-1.84	0	0
			Max. Vy	2	2.27	0	0
			Max. Vx	5	-0.26	0	0
T12	49 - 45	Leg	Max Tension	3	41146.40	-82	-83
			Max. Compression	3	-47063.41	-142	-142
			Max. Mx	2	-30282.17	282	22
			Max. My	2	-30301.11	22	282
			Max. Vy	5	-380.91	282	22
			Max. Vx	2	-381.02	22	282
		Diagonal	Max Tension	3	904.41	4	-1
			Max. Compression	3	-1027.59	0	0
			Max. Mx	3	-158.64	5	0
			Max. My	5	-415.10	-1	-1
			Max. Vy	3	-6.48	5	0
			Max. Vx	2	-1.29	-1	1
		Horizontal	Max Tension	2	117.96	0	0
			Max. Compression	3	-174.92	3	-1
			Max. Mx	4	-139.42	3	-1
			Max. My	4	117.72	2	1
			Max. Vy	4	6.28	3	-1
			Max. Vx	4	1.00	0	0
		Redund Horz 1	Max Tension	3	708.25	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T13	45 - 41	Bracing	Max. Compression	3	-708.25	0	0
			Max. Mx	1	46.09	-1	0
			Max. My	5	-219.93	0	0
			Max. Vy	1	2.45	0	0
			Max. Vx	5	-0.20	0	0
		Redund Diag 1 Bracing	Max Tension	3	502.12	0	0
			Max. Compression	3	-502.12	0	0
			Max. Mx	4	180.36	-1	0
			Max. My	5	149.77	0	0
			Max. Vy	4	2.64	0	0
			Max. Vx	5	-0.29	0	0
		Redund Hip 1 Bracing	Max Tension	1	0.00	0	0
			Max. Compression	3	-4.75	0	0
			Max. Mx	1	-3.21	-1	0
			Max. My	3	-3.76	0	0
			Max. Vy	1	2.35	0	0
			Max. Vx	3	0.00	0	0
		Leg	Max Tension	3	42265.04	-170	-169
			Max. Compression	3	-49069.54	-117	-117
			Max. Mx	2	-31382.52	282	22
			Max. My	2	-31398.50	22	282
			Max. Vy	3	383.67	-151	-151
		Diagonal	Max. Vx	3	385.11	-151	-151
			Max Tension	3	797.86	4	1
			Max. Compression	5	-909.91	0	0
			Max. Mx	3	547.97	5	0
			Max. My	4	-544.18	-1	-1
		Horizontal	Max. Vy	3	-6.46	5	0
			Max. Vx	2	-1.27	-1	1
			Max Tension	4	149.76	4	1
			Max. Compression	3	-201.77	3	0
			Max. Mx	2	149.41	4	1
		Redund Horz 1 Bracing	Max. My	2	149.30	4	1
			Max. Vy	2	-7.23	4	1
			Max. Vx	2	0.78	0	0
			Max Tension	3	738.44	0	0
			Max. Compression	3	-738.44	0	0
		Redund Diag 1 Bracing	Max. Mx	1	51.65	-1	0
			Max. My	5	476.34	0	0
			Max. Vy	1	2.81	0	0
			Max. Vx	5	-0.23	0	0
			Max Tension	3	492.86	0	0
		Redund Hip 1 Bracing	Max. Compression	3	-492.86	0	0
			Max. Mx	5	143.69	-1	0
			Max. My	5	227.63	0	0
			Max. Vy	5	-3.00	0	0
			Max. Vx	5	-0.31	0	0
T14	41 - 37	Leg	Max Tension	1	0.00	0	0
			Max. Compression	3	-4.47	0	0
			Max. Mx	1	-3.58	-1	0
			Max. My	3	-3.78	0	0
			Max. Vy	1	-2.70	0	0
		Redund Hip 1 Bracing	Max. Vx	3	-0.00	0	0
			Max Tension	3	43407.88	-125	-126
			Max. Compression	3	-50812.95	-106	-106

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T15	37 - 33	Leg	Max. Mx	2	-32965.27	234	22
			Max. My	2	-32980.31	22	234
			Max. Vy	5	-329.26	234	22
			Max. Vx	2	-329.16	22	234
		Diagonal	Max Tension	3	1028.85	3	-1
			Max. Compression	3	-1122.20	0	0
			Max. Mx	3	342.05	5	1
			Max. My	5	-861.54	0	-2
		Horizontal	Max. Vy	3	-6.62	5	1
			Max. Vx	2	-1.45	0	2
			Max Tension	5	124.78	0	0
			Max. Compression	3	-179.31	5	0
		Redund Horz 1 Bracing	Max. Mx	4	-144.52	5	0
			Max. My	3	57.34	4	1
			Max. Vy	4	7.98	5	0
			Max. Vx	5	0.72	5	-1
		Redund Diag 1 Bracing	Max Tension	3	764.67	0	0
			Max. Compression	3	-764.67	0	0
			Max. Mx	1	57.17	-1	0
			Max. My	5	-226.00	0	0
		Redund Hip 1 Bracing	Max. Vy	1	3.18	0	0
			Max. Vx	5	-0.26	0	0
			Max Tension	3	487.48	0	0
			Max. Compression	3	-487.48	0	0
		Leg	Max. Mx	4	167.18	-2	0
			Max. My	5	130.03	0	0
			Max. Vy	4	3.37	0	0
			Max. Vx	5	0.33	0	0
		Diagonal	Max Tension	1	0.00	0	0
			Max. Compression	3	-5.08	0	0
			Max. Mx	1	-4.15	-2	0
			Max. My	3	-4.49	0	0
		Horizontal	Max. Vy	1	4.51	0	0
			Max. Vx	3	0.00	0	0
			Max Tension	3	44953.44	-128	-126
			Max. Compression	3	-53062.16	134	130
		Diagonal	Max. Mx	2	-34218.04	234	22
			Max. My	2	-34230.08	22	234
			Max. Vy	3	316.89	-131	-130
			Max. Vx	3	320.09	-131	-130
		Horizontal	Max Tension	5	1133.05	3	1
			Max. Compression	4	-1314.70	0	0
			Max. Mx	3	804.78	5	-1
			Max. My	4	-1132.32	0	-2
		Redund Horz 1 Bracing	Max. Vy	3	-6.89	5	-1
			Max. Vx	4	-1.53	0	2
			Max Tension	3	119.81	6	0
			Max. Compression	3	-171.81	6	0
		Redund Horz 1 Bracing	Max. Mx	5	117.00	6	1
			Max. My	5	117.00	6	1
			Max. Vy	5	-8.97	6	1
			Max. Vx	5	0.76	0	0
		Redund Horz 1 Bracing	Max Tension	3	798.52	0	0
			Max. Compression	3	-798.52	0	0
			Max. Mx	1	62.68	-1	0
			Max. My	5	519.19	0	0
		Redund Horz 1 Bracing	Max. Vy	1	3.54	0	0
			Max. Vx	1	3.54	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T16	33 - 25	Redund Diag 1 Bracing	Max. Vx	5	-0.29	0	0
			Max Tension	3	491.25	0	0
			Max. Compression	3	-491.25	0	0
			Max. Mx	5	125.78	-2	0
			Max. My	5	132.87	0	0
		Redund Hip 1 Bracing	Max. Vy	5	3.73	0	0
			Max. Vx	5	-0.36	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	3	-5.20	0	0
			Max. Mx	1	-4.93	-3	0
		Leg	Max. My	3	-4.60	0	0
			Max. Vy	1	5.03	0	0
			Max. Vx	3	0.00	0	0
			Max Tension	3	47578.11	-104	-106
			Max. Compression	3	-56718.31	219	220
		Diagonal	Max. Mx	5	-37239.34	318	-17
			Max. My	2	-37252.17	-17	318
			Max. Vy	5	-234.77	318	-17
			Max. Vx	2	-234.73	-17	318
			Max Tension	4	1795.82	11	-3
		Horizontal	Max. Compression	4	-1900.05	0	0
			Max. Mx	3	1363.26	13	-6
			Max. My	3	-1138.32	-2	-6
			Max. Vy	3	-12.96	11	-4
			Max. Vx	3	-3.16	-2	6
		Redund Horz 1 Bracing	Max Tension	2	54.64	7	-1
			Max. Compression	3	-213.15	8	-1
			Max. Mx	4	-117.06	8	-1
			Max. My	2	-117.52	8	-1
			Max. Vy	4	10.36	8	-1
		Redund Diag 1 Bracing	Max. Vx	2	0.87	8	-1
			Max Tension	3	853.54	0	0
			Max. Compression	3	-853.54	0	0
			Max. Mx	6	-50.71	-2	0
			Max. My	5	560.41	0	0
		Redund Hip 1 Bracing	Max. Vy	6	4.09	0	0
			Max. Vx	5	-0.33	0	0
			Max Tension	3	662.66	0	0
			Max. Compression	3	-662.66	0	0
			Max. Mx	4	134.98	-3	0
		Inner Bracing	Max. My	5	95.71	0	0
			Max. Vy	4	4.47	0	0
			Max. Vx	5	-0.52	0	0
			Max Tension	3	3.39	0	0
			Max. Compression	3	-10.70	0	0
T17	25 - 16	Leg	Max. Mx	1	-5.02	-4	0
			Max. My	5	-7.93	0	0
			Max. Vy	1	5.80	0	0
			Max. Vx	5	-0.00	0	0
			Max Tension	3	51.98	0	0
		Inner Bracing	Max. Compression	3	-63.94	0	0
			Max. Mx	1	0.31	-81	0
			Max. My	4	2.12	0	0
			Max. Vy	1	44.54	0	0
			Max. Vx	4	0.10	0	0
		Leg	Max Tension	3	50965.67	-157	-156

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T18	16 - 8	Leg	Max. Compression	3	-62123.37	137	134
			Max. Mx	5	-40249.50	318	-17
			Max. My	2	-40258.12	-17	318
			Max. Vy	2	194.35	318	-17
			Max. Vx	2	194.27	-17	318
		Diagonal	Max Tension	4	2186.42	12	2
			Max. Compression	4	-2351.54	0	0
			Max. Mx	3	1663.39	15	-5
			Max. My	3	-1471.13	0	-5
			Max. Vy	3	-14.60	13	-4
		Horizontal	Max. Vx	3	-2.87	0	5
			Max Tension	5	48.81	11	-1
			Max. Compression	3	-214.98	10	-1
			Max. Mx	4	8.76	11	-1
			Max. My	2	8.71	11	-1
		Redund Horz 1 Bracing	Max. Vy	4	-12.29	11	-1
			Max. Vx	2	1.01	10	-1
			Max Tension	3	934.88	0	0
			Max. Compression	3	-934.88	0	0
			Max. Mx	1	86.60	-3	0
		Redund Diag 1 Bracing	Max. My	5	-127.02	0	0
			Max. Vy	1	4.87	0	0
			Max. Vx	5	-0.39	0	0
			Max Tension	3	704.38	0	0
			Max. Compression	3	-704.38	0	0
		Redund Hip 1 Bracing	Max. Mx	5	71.25	-7	0
			Max. My	5	145.06	0	1
			Max. Vy	5	8.80	0	0
			Max. Vx	5	-1.00	0	0
			Max Tension	3	0.99	0	0
		Inner Bracing	Max. Compression	3	-11.41	0	0
			Max. Mx	1	-6.50	-5	0
			Max. My	5	-8.20	0	0
			Max. Vy	1	-6.90	0	0
			Max. Vx	5	0.00	0	0
		Leg	Max Tension	3	17.46	0	0
			Max. Compression	3	-29.97	0	0
			Max. Mx	1	0.40	-114	0
			Max. My	4	2.26	0	0
			Max. Vy	1	52.99	0	0
		Diagonal	Max. Vx	4	0.09	0	0
			Max Tension	3	54910.23	-92	-93
			Max. Compression	3	-67751.17	180	182
			Max. Mx	2	-44982.52	296	-37
			Max. My	4	-44982.44	-38	297
		Horizontal	Max. Vy	3	240.91	-149	-149
			Max. Vx	3	239.57	-149	-149
			Max Tension	4	2351.58	13	-1
			Max. Compression	4	-2537.74	0	0
			Max. Mx	3	1861.46	15	-3
		Horizontal	Max. My	3	-1825.84	3	-4
			Max. Vy	3	-16.06	13	-3
			Max. Vx	3	-2.42	3	4
			Max Tension	2	62.32	14	-1
			Max. Compression	3	-228.95	14	-1
		Horizontal	Max. Mx	4	-81.05	14	-1
			Max. My	2	-81.54	14	-1
			Max. Vy	4	14.15	14	-1

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T19	8 - 4	Redund Horz 1 Bracing	Max. Vx	2	1.17	14	-1
			Max Tension	3	1019.57	0	0
			Max. Compression	3	-1019.57	0	0
			Max. Mx	6	-48.58	-4	0
			Max. My	5	-206.65	0	0
			Max. Vy	6	7.12	0	0
			Max. Vx	5	-0.58	0	0
			Max Tension	3	679.57	0	0
			Max. Compression	3	-679.57	0	0
			Max. Mx	4	144.18	-8	0
		Redund Diag 1 Bracing	Max. My	5	72.96	0	1
			Max. Vy	4	10.01	0	0
			Max. Vx	5	-1.02	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	3	-10.30	0	0
			Max. Mx	1	-7.14	-7	0
			Max. My	4	-7.10	0	0
			Max. Vy	1	8.01	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	21.56	0	0
		Inner Bracing	Max. Compression	3	-43.79	0	0
			Max. Mx	1	0.43	-154	0
			Max. My	4	2.41	0	0
			Max. Vy	1	61.44	0	0
			Max. Vx	4	0.06	0	0
			Max Tension	3	58217.83	-127	-128
			Max. Compression	3	-72695.62	46	46
			Max. Mx	2	-48039.88	296	-38
			Max. My	4	-48039.36	-38	297
			Max. Vy	2	197.50	296	-38
		Diagonal	Max. Vx	4	197.71	-38	297
			Max Tension	4	2671.68	0	0
			Max. Compression	2	-2560.74	0	0
			Max. Mx	3	1902.70	28	6
			Max. My	3	-1751.59	2	-7
			Max. Vy	3	-24.74	28	6
			Max. Vx	3	-4.16	2	-7
			Max Tension	3	1093.98	0	0
			Max. Compression	3	-1093.98	0	0
			Max. Mx	1	111.15	-6	0
		Redund Horz 1 Bracing	Max. My	2	-88.72	0	0
			Max. Vy	1	8.04	0	0
			Max. Vx	2	-0.65	0	0
			Max Tension	3	702.83	0	0
			Max. Compression	3	-702.83	0	0
			Max. Mx	3	119.20	-10	0
			Max. My	3	119.20	0	1
			Max. Vy	3	11.22	0	0
			Max. Vx	3	-1.10	0	0
			Max Tension	1	0.00	0	0
		Redund Diag 1 Bracing	Max. Compression	3	-14.09	0	0
			Max. Mx	1	-9.40	-15	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	244.31	0	0
		Inner Bracing	Max. Compression	3	-14.09	0	0
			Max. Mx	1	-9.40	-15	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	244.31	0	0
			Max. Compression	3	-14.09	0	0
			Max. Mx	1	-9.40	-15	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	244.31	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T20	4 - 0	Leg	Max. Compression	3	-268.71	0	0
			Max. Mx	1	0.98	-196	0
			Max. My	3	244.31	0	2
			Max. Vy	1	69.40	0	0
			Max. Vx	3	-1.09	0	0
			Max Tension	3	57930.18	-24	-23
		Diagonal	Max. Compression	3	-73337.10	0	1
			Max. Mx	2	-48741.47	-93	-9
			Max. My	4	-48744.03	-8	-94
			Max. Vy	2	-71.63	0	0
			Max. Vx	3	-72.73	-77	-87
			Max Tension	2	2394.50	0	0
			Max. Compression	4	-2850.01	0	0
			Max. Mx	3	-1902.57	34	-72
			Max. My	3	-1984.18	30	-79
			Max. Vy	3	-23.31	34	-72
		Top Girt	Max. Vx	3	-33.62	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	3	-198.03	22	-2
			Max. Mx	4	-39.87	24	-2
			Max. My	3	-73.32	23	-3
			Max. Vy	4	-20.24	24	-2
			Max. Vx	3	2.09	23	-3
		Redund Horz 1 Bracing	Max Tension	3	1103.63	0	0
			Max. Compression	3	-1103.63	0	0
			Max. Mx	3	1103.63	-3	0
			Max. My	4	734.47	0	0
			Max. Vy	3	5.36	0	0
			Max. Vx	4	-0.43	0	0
		Redund Horz 2 Bracing	Max Tension	3	1103.63	0	0
			Max. Compression	3	-1103.63	0	0
			Max. Mx	3	1103.63	-13	0
			Max. My	2	739.87	0	1
			Max. Vy	3	14.14	0	0
			Max. Vx	2	-1.15	0	0
		Redund Diag 1 Bracing	Max Tension	3	651.27	0	0
			Max. Compression	3	-651.27	0	0
			Max. Mx	3	651.27	-2	0
			Max. My	3	651.27	0	0
			Max. Vy	3	4.01	0	0
			Max. Vx	3	0.46	0	0
		Redund Diag 2 Bracing	Max Tension	3	570.69	0	0
			Max. Compression	3	-570.69	0	0
			Max. Mx	3	570.69	-13	0
			Max. My	3	570.69	0	-1
			Max. Vy	3	13.74	0	0
			Max. Vx	3	1.23	0	0
		Redund Hip 1 Bracing	Max Tension	3	0.08	0	0
			Max. Compression	3	-9.06	0	0
			Max. Mx	1	-4.76	-7	0
			Max. My	3	0.08	0	0
			Max. Vy	1	10.03	0	0
			Max. Vx	3	0.00	0	0
		Redund Hip 2 Bracing	Max Tension	1	0.00	0	0
			Max. Compression	4	-11.01	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
			Max. Mx	1	-8.43	-27	0
			Max. My	3	-10.09	0	0
			Max. Vy	1	20.07	0	0
			Max. Vx	3	0.00	0	0

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical kg	Horizontal, X kg	Horizontal, Z kg
Leg D	Max. Vert	5	50497.72	4430.58	-6523.00
	Max. H _x	5	50497.72	4430.58	-6523.00
	Max. H _z	3	-59708.88	-6777.35	6800.57
	Min. Vert	3	-59708.88	-6777.35	6800.57
	Min. H _x	3	-59708.88	-6777.35	6800.57
Leg C	Min. H _z	5	50497.72	4430.58	-6523.00
	Max. Vert	5	50438.82	-4473.09	-6470.42
	Max. H _x	2	-34006.24	2704.98	4837.32
	Max. H _z	2	-34006.24	2704.98	4837.32
	Min. Vert	2	-34006.24	2704.98	4837.32
Leg B	Min. H _x	4	50301.52	-6546.72	-4327.21
	Min. H _z	5	50438.82	-4473.09	-6470.42
	Max. Vert	3	75179.30	-7897.99	7867.55
	Max. H _x	5	-34203.66	2833.32	-4791.54
	Max. H _z	3	75179.30	-7897.99	7867.55
Leg A	Min. Vert	5	-34203.66	2833.32	-4791.54
	Min. H _x	3	75179.30	-7897.99	7867.55
	Min. H _z	5	-34203.66	2833.32	-4791.54
	Max. Vert	2	50303.21	4350.60	6525.22
	Max. H _x	2	50303.21	4350.60	6525.22
	Max. H _z	2	50303.21	4350.60	6525.22
	Min. Vert	5	-34141.66	-2773.02	-4838.25
	Min. H _x	4	-34007.89	-4815.40	-2728.66
	Min. H _z	5	-34141.66	-2773.02	-4838.25

Tower Mast Reaction Summary

Load Combination	Vertical kg	Shear _x kg	Shear _z kg	Overturning Moment, M _x kg-m	Overturning Moment, M _z kg-m	Torque kg-m
Dead Only	32591.24	0.00	-0.00	466	466	0
Dead+Wind 0 deg - No Ice	32591.21	435.10	-22815.70	-1013302	-5804	-112
Dead+Wind 45 deg - No Ice	32590.79	17903.62	-17902.49	-805962	-805952	-6
Dead+Wind 90 deg - No Ice	32591.22	22815.72	-435.00	-5804	-1013302	112
Dead+Wind 180 deg - No Ice	32591.22	-17.79	22623.21	1011459	722	1207
Dead+Wind 0 deg - Service	32591.24	108.76	-5703.94	-252977	-1102	-28
Dead+Wind 45 deg - Service	32591.24	4475.61	-4475.61	-201112	-201111	0
Dead+Wind 90 deg - Service	32591.24	5703.94	-108.76	-1101	-252975	28
Dead+Wind 180 deg - Service	32591.24	-4.44	5655.81	253213	530	302

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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	-32591.24	0.00	-0.00	32591.24	0.00	0.000%
2	435.03	-32591.24	-22817.35	-435.10	32591.21	22815.70	0.004%
3	17903.71	-32591.24	-17903.71	-17903.62	32590.79	17902.49	0.003%
4	22817.35	-32591.24	-435.03	-22815.72	32591.22	435.00	0.004%
5	-17.75	-32591.24	22624.84	17.79	32591.22	-22623.21	0.004%
6	108.76	-32591.24	-5704.34	-108.76	32591.24	5703.94	0.001%
7	4475.93	-32591.24	-4475.93	-4475.61	32591.24	4475.61	0.001%
8	5704.34	-32591.24	-108.76	-5703.94	32591.24	108.76	0.001%
9	-4.44	-32591.24	5656.21	4.44	32591.24	-5655.81	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	15	0.00009422	0.00012684
3	Yes	36	0.00012997	0.00010701
4	Yes	15	0.00009318	0.00012681
5	Yes	15	0.00009328	0.00012685
6	Yes	15	0.00000001	0.00011018
7	Yes	15	0.00000001	0.00011375
8	Yes	15	0.00000001	0.00011017
9	Yes	15	0.00000001	0.00011015

Maximum Tower Deflections - Service Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 95	162.71	7	0.2072	0.0001
T2	95 - 92	144.75	7	0.1997	0.0001
T3	92 - 86	134.34	7	0.1963	0.0001
T4	86 - 82	114.19	7	0.1799	0.0001
T5	82 - 79	101.95	7	0.1601	0.0001
T6	79 - 74	94.12	7	0.1467	0.0001
T7	74 - 69	81.20	7	0.1406	0.0001
T8	69 - 61.5	68.88	7	0.1327	0.0001
T9	61.5 - 56.5	51.91	7	0.1139	0.0001
T10	56.5 - 52.7	42.14	7	0.0957	0.0001
T11	52.7 - 49	36.23	7	0.0830	0.0001
T12	49 - 45	31.09	7	0.0742	0.0001
T13	45 - 41	26.13	7	0.0651	0.0001
T14	41 - 37	21.70	7	0.0576	0.0001
T15	37 - 33	17.74	7	0.0505	0.0001
T16	33 - 25	14.20	7	0.0441	0.0001
T17	25 - 16	8.47	7	0.0312	0.0001
T18	16 - 8	3.83	7	0.0198	0.0001
T19	8 - 4	1.22	7	0.0091	0.0001
T20	4 - 0	0.33	7	0.0048	0.0000

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Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Service Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
91.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	132.63	0.1956	0.0001	54150
90.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	127.85	0.1929	0.0001	40236
88.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	123.12	0.1894	0.0001	30896
88.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	122.45	0.1888	0.0001	29904
87.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	117.79	0.1842	0.0001	24320
85.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	113.22	0.1786	0.0001	16272
85.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	112.57	0.1777	0.0001	14947
84.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	108.14	0.1710	0.0001	8755
82.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	103.93	0.1637	0.0001	6273
66.200	ANTENA VHF BAND I - 2 DIPOLOS	7	62.32	0.1267	0.0001	29995
64.650	ANTENA VHF BAND I - 2 DIPOLOS	7	58.79	0.1230	0.0001	27664
63.100	ANTENA VHF BAND I - 2 DIPOLOS	7	55.36	0.1188	0.0001	25669
62.900	ANTENA VHF BAND I - 2 DIPOLOS	7	54.92	0.1182	0.0001	25431
61.350	ANTENA VHF BAND I - 2 DIPOLOS	7	51.59	0.1134	0.0001	21432
59.800	ANTENA VHF BAND I - 2 DIPOLOS	7	48.38	0.1080	0.0001	14738
59.600	ANTENA VHF BAND I - 2 DIPOLOS	7	47.97	0.1073	0.0001	14103
58.050	ANTENA VHF BAND I - 2 DIPOLOS	7	44.94	0.1015	0.0001	10570
56.500	ANTENA VHF BAND I - 2 DIPOLOS	7	42.14	0.0957	0.0001	9240
14.400	8 FT DISH	7	3.21	0.0176	0.0001	44602

Maximum Tower Deflections - Design Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 95	650.72	3	0.8285	0.0004
T2	95 - 92	578.93	3	0.7985	0.0004
T3	92 - 86	537.30	3	0.7850	0.0004

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Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T4	86 - 82	456.74	3	0.7192	0.0004
T5	82 - 79	407.78	3	0.6399	0.0004
T6	79 - 74	376.49	3	0.5863	0.0004
T7	74 - 69	324.85	3	0.5619	0.0004
T8	69 - 61.5	275.60	3	0.5303	0.0004
T9	61.5 - 56.5	207.78	3	0.4552	0.0004
T10	56.5 - 52.7	168.74	3	0.3823	0.0004
T11	52.7 - 49	145.10	3	0.3318	0.0004
T12	49 - 45	124.55	3	0.2965	0.0005
T13	45 - 41	104.73	3	0.2604	0.0005
T14	41 - 37	87.00	3	0.2304	0.0005
T15	37 - 33	71.18	3	0.2018	0.0005
T16	33 - 25	57.03	3	0.1764	0.0005
T17	25 - 16	34.10	3	0.1248	0.0005
T18	16 - 8	15.54	3	0.0788	0.0005
T19	8 - 4	5.14	3	0.0366	0.0003
T20	4 - 0	1.56	3	0.0190	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
91.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	530.45	0.7820	0.0004	13533
90.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	511.34	0.7714	0.0004	10056
88.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	492.44	0.7574	0.0004	7721
88.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	489.75	0.7551	0.0004	7474
87.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	471.14	0.7366	0.0004	6078
85.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	452.85	0.7140	0.0004	4067
85.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	450.27	0.7104	0.0004	3736
84.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	432.55	0.6835	0.0004	2188
82.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	415.73	0.6545	0.0004	1568
66.200	ANTENA VHF BAND I - 2 DIPOLOS	3	249.37	0.5064	0.0004	7497
64.650	ANTENA VHF BAND I - 2 DIPOLOS	3	235.29	0.4915	0.0004	6912
63.100	ANTENA VHF BAND I - 2 DIPOLOS	3	221.56	0.4748	0.0004	6412
62.900	ANTENA VHF BAND I - 2 DIPOLOS	3	219.82	0.4725	0.0004	6352
61.350	ANTENA VHF BAND I - 2 DIPOLOS	3	206.51	0.4532	0.0004	5355
59.800	ANTENA VHF BAND I - 2 DIPOLOS	3	193.65	0.4316	0.0004	3688
59.600	ANTENA VHF BAND I - 2 DIPOLOS	3	192.04	0.4286	0.0004	3529
58.050	ANTENA VHF BAND I - 2 DIPOLOS	3	179.93	0.4055	0.0004	2647

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
56.500	ANTENA VHF BAND I - 2 DIPOLOS	3	168.74	0.3823	0.0004	2315
14.400	8 FT DISH	3	13.07	0.0703	0.0005	11143

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	100	Leg	A325N	19	6	3.89	4975.37	0.001	✓	Bearing
		Diagonal	A325N	16	2	125.15	2922.37	0.043	✓	Bolt Shear
		Horizontal	A307	16	1	22.95	1391.60	0.016	✓	Bolt Shear
		Top Girt	A325N	16	2	3.29	2922.37	0.001	✓	Bolt Shear
T2	95	Leg	A325N	19	12	231.57	8292.26	0.028	✓	Bearing
		Diagonal	A325N	16	2	168.00	2922.37	0.057	✓	Bolt Shear
		Horizontal	A307	16	1	33.19	1391.60	0.024	✓	Bolt Shear
		Top Girt	A325N	16	2	3.42	2922.37	0.001	✓	Bolt Shear
T3	92	Leg	A325N	19	14	332.68	8292.26	0.040	✓	Bearing
		Diagonal	A325N	16	2	440.77	2922.37	0.151	✓	Bolt Shear
		Horizontal	A325N	16	1	60.44	2172.09	0.028	✓	Member Block Shear
		Top Girt	A325N	16	2	151.50	2922.37	0.052	✓	Bolt Shear
T4	86	Leg	A325N	19	16	1091.09	8292.26	0.132	✓	Bearing
		Diagonal	A325N	16	2	648.76	2922.37	0.222	✓	Bolt Shear
		Horizontal	A307	16	1	125.00	1391.60	0.090	✓	Bolt Shear
		Top Girt	A325N	16	2	24.10	2922.37	0.008	✓	Bolt Shear
T5	82	Leg	A325N	19	16	1057.28	8292.26	0.128	✓	Bearing
		Diagonal	A325N	16	2	1534.91	2922.37	0.525	✓	Bolt Shear
		Horizontal	A307	16	1	72.72	1391.60	0.052	✓	Bolt Shear
		Top Girt	A325N	16	2	590.84	2922.37	0.202	✓	Bolt Shear
T6	79	Leg	A325N	19	16	1271.20	8416.41	0.151	✓	Bolt DS
		Diagonal	A325N	16	2	668.59	2922.37	0.229	✓	Bolt Shear
		Horizontal	A307	16	1	91.02	1391.60	0.065	✓	Bolt Shear
		Top Girt	A325N	16	2	1069.20	2922.37	0.366	✓	Bolt Shear
T7	74	Leg	A325N	19	24	1329.40	8416.41	0.158	✓	Bolt DS
		Diagonal	A325N	16	2	856.70	2922.37	0.293	✓	Bolt Shear
		Horizontal	A307	16	1	170.52	1391.60	0.123	✓	Bolt Shear
T8	69	Leg	A325N	19	32	1456.60	8416.41	0.173	✓	Bolt DS
		Diagonal	A325N	16	2	1168.83	2922.37	0.400	✓	Bolt Shear
		Horizontal	A307	16	1	252.37	1391.60	0.181	✓	Bolt Shear
T9	61.5	Leg	A325N	19	32	2360.63	8416.41	0.280	✓	Bolt DS

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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
T10	56.5	Diagonal	A325N	16	2	1359.21	2922.37	0.465 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	372.88	1391.60	0.268 ✓	1.333	Bolt Shear
		Leg	A325N	19	34	2675.31	8416.41	0.318 ✓	1.333	Bolt DS
T11	52.7	Diagonal	A325N	16	2	360.29	2922.37	0.123 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	116.02	1391.60	0.083 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	759.04	2922.37	0.260 ✓	1.333	Bolt Shear
T12	49	Leg	A325N	19	36	2604.56	8416.41	0.309 ✓	1.333	Bolt DS
		Diagonal	A325N	16	2	157.23	2922.37	0.054 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	155.78	1391.60	0.112 ✓	1.333	Bolt Shear
T13	45	Leg	A325N	19	36	2613.84	8416.41	0.311 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	342.53	2922.37	0.117 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	87.46	1391.60	0.063 ✓	1.333	Bolt Shear
T14	41	Leg	A325N	19	36	2712.22	8416.41	0.322 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	303.30	2922.37	0.104 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	100.89	1391.60	0.072 ✓	1.333	Bolt Shear
T15	37	Leg	A325N	19	36	2814.12	8416.41	0.334 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	374.07	2922.37	0.128 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	89.65	1391.60	0.064 ✓	1.333	Bolt Shear
T16	33	Leg	A325N	19	36	2934.76	8416.41	0.349 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	438.23	2922.37	0.150 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	85.91	1391.60	0.062 ✓	1.333	Bolt Shear
T17	25	Leg	A325N	19	36	3132.42	8416.41	0.372 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	633.35	2922.37	0.217 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	106.57	1391.60	0.077 ✓	1.333	Bolt Shear
T18	16	Leg	A325N	19	36	3420.33	8416.41	0.406 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	783.85	2922.37	0.268 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	107.49	1391.60	0.077 ✓	1.333	Bolt Shear
T19	8	Leg	A325N	19	36	3734.87	8416.41	0.444 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	845.91	2922.37	0.289 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	114.48	1391.60	0.082 ✓	1.333	Bolt Shear
T20	4	Leg	A325N	19	36	4034.14	8416.41	0.479 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	890.56	2922.37	0.305 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	4064.51	8416.41	0.483 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	950.00	2922.37	0.325 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	99.01	2922.37	0.034 ✓	1.333	Bolt Shear

Compression Checks

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Leg Design Data (Compression)

Section No.	Elevation m	Size	L m	L_u m	Kl/r	F_a MPa	A mm ²	Actual P kg	Allow. P_a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L64x64x5	5.000	0.500	39.8 K=1.00	178	582	-1200.76	10571.20	0.114
T2	95 - 92	L76x76x8	3.037	1.519	101.5 K=1.00	99	1148	-1407.51	11590.60	0.121
T3	92 - 86	L76x76x8	6.000	1.000	66.8 K=1.00	148	1148	-5827.08	17371.46	0.335
T4	86 - 82	L102x102x8	4.000	1.000	49.8 K=1.00	168	1548	-11169.35	26547.18	0.421
T5	82 - 79	L102x102x8	3.201	1.601	79.7 K=1.00	132	1548	-8483.45	20769.50	0.408
T6	79 - 74	L127x127x13	5.000	1.250	50.1 K=1.00	168	3065	-12690.11	52443.46	0.242
T7	74 - 69	L152x152x13	5.000	1.250	41.7 K=1.00	176	3710	-19463.25	66743.87	0.292
T8	69 - 61.5	L152x152x13	7.500	1.250	41.7 K=1.00	176	3710	-32270.97	66743.87	0.484
T9	61.5 - 56.5	L152x152x13	5.000	1.250	41.7 K=1.00	176	3710	-42557.46	66743.87	0.638
T10	56.5 - 52.7	L152x152x16	3.825	1.912	63.8 K=1.00	152	4587	-45588.77	71135.10	0.641
T11	52.7 - 49	L152x152x16	3.724	1.862	62.1 K=1.00	154	4587	-46977.21	72083.11	0.652
T12	49 - 45	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-47063.40	86105.01	0.547
T13	45 - 41	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-49069.64	86105.01	0.570
T14	41 - 37	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-50812.79	86105.01	0.590
T15	37 - 33	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-53062.16	86105.01	0.616
T16	33 - 25	L152x152x16	8.052	2.013	67.2 K=1.00	148	4587	-56718.11	69200.07	0.820
T17	25 - 16	L152x152x16	9.059	2.265	75.6 K=1.00	137	4587	-62123.57	64130.72	0.969
T18	16 - 8	L152x152x16	8.052	2.013	67.2 K=1.00	148	4587	-67751.30	69200.07	0.979
T19	8 - 4	L152x152x16	4.026	2.013	67.2 K=1.00	148	4587	-72695.46	69199.62	1.051
T20	4 - 0	L152x152x16	4.026	1.342	44.8 K=1.00	173	4587	-73337.29	81090.09	0.904

Diagonal Design Data (Compression)

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.571	0.505	57.9 K=1.00	159	401	-250.30	6501.98	0.038
T2	95 - 92	L44x44x5	1.628	1.530	175.4 K=1.00	33	401	-336.00	1367.89	0.246
T3	92 - 86	L44x44x5	1.171	1.098	125.9 K=1.00	65	401	-881.54	2654.60	0.332
T4	86 - 82	L44x44x5	1.171	1.074	123.1 K=1.00	68	401	-1297.53	2776.55	0.467
T5	82 - 79	L76x76x6.4	2.090	2.017	134.1 K=1.00	57	929	-2480.62	5423.51	0.457
T6	79 - 74	L51x51x4.8	1.877	1.792	179.0 K=1.00	32	461	-1337.18	1510.95	0.885
T7	74 - 69	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-1713.41	3066.63	0.559
T8	69 - 61.5	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-2337.67	3066.63	0.762
T9	61.5 - 56.5	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-2718.42	3066.63	0.886
T10	56.5 - 52.7	L64x64x4.8	2.559	2.446	123.8 K=1.00	67	582	-677.72	3989.33	0.170
T11	52.7 - 49	L64x64x4.8	2.734	2.630	133.1 K=1.00	58	582	-314.45	3448.31	0.091
T12	49 - 45	L64x64x4.8	3.076	1.538	122.3 K=1.00	69	582	-1027.59	4083.54	0.252
T13	45 - 41	L64x64x4.8	3.328	1.664	132.3 K=1.00	59	582	-909.91	3488.09	0.261
T14	41 - 37	L64x64x4.8	3.592	1.796	142.8 K=1.00	50	582	-1122.20	2994.67	0.375
T15	37 - 33	L64x64x4.8	3.865	1.932	153.7 K=1.00	44	582	-1314.70	2586.69	0.508
T16	33 - 25	L76x76x6.4	5.631	2.816	187.3 K=1.00	29	929	-1900.05	2781.76	0.683
T17	25 - 16	L76x76x6.4	6.502	3.251	216.2 K=1.00	22	929	-2351.55	2086.51	1.127
T18	16 - 8	KL/R > 200 (C) - 956 L76x76x6.4	6.670	3.335	221.8 K=1.00	21	929	-2537.74	1983.16	1.280
T19	8 - 4	KL/R > 200 (C) - 1013 L102x102x6.4	6.670	3.335	165.1 K=1.00	38	1252	-2560.73	4818.24	0.531
T20	4 - 0	L76x76x6.4	7.198	2.399	159.6 K=1.00	40	929	-2850.01	3831.39	0.744

Horizontal Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.550	0.243	27.9 K=1.00	189	401	-19.26	7722.19	0.002

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T2	95 - 92	L44x44x5	0.885	0.809	59.3 K=1.00	157	401	-33.19	6433.44	0.005
T3	92 - 86	L44x44x5	1.220	1.144	83.9 K=1.00	126	401	-61.30	5135.35	0.012
T4	86 - 82	L44x44x5	1.220	1.118	82.0 K=1.00	128	401	-115.94	5242.53	0.022
T5	82 - 79	L51x51x4.8	2.010	1.908	121.8 K=1.00	69	461	-72.72	3266.04	0.022
T6	79 - 74	L51x51x4.8	2.800	1.336	133.5 K=1.00	58	461	-81.19	2715.47	0.030
T7	74 - 69	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-156.18	1696.90	0.092
T8	69 - 61.5	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-242.34	1696.90	0.143
T9	61.5 - 56.5	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-345.56	1696.90	0.204
T10	56.5 - 52.7	L51x51x4.8	3.108	1.478	147.7 K=1.00	47	461	-232.05	2221.46	0.104
T11	52.7 - 49	L51x51x4.8	3.715	3.563	227.3 K=1.00	20	461	-311.55	937.19	0.332
T12	49 - 45	L51x51x4.8	4.338	4.186	267.1 K=1.00	14	461	-174.92	678.80	0.258
T13	45 - 41	KL/R > 250 (C) - 638 L51x51x4.8	4.986	4.834	308.4 K=1.00	11	461	-201.77	509.06	0.396
T14	41 - 37	KL/R > 250 (C) - 679 L51x51x4.8	5.634	5.482	349.8 K=1.00	8	461	-179.31	395.85	0.453
T15	37 - 33	KL/R > 250 (C) - 766 L51x51x4.8	6.282	6.130	391.1 K=1.00	7	461	-171.81	316.60	0.543
T16	33 - 25	KL/R > 250 (C) - 807 L51x51x4.8	7.254	3.551	354.8 K=1.00	8	461	-213.15	384.76	0.554
T17	25 - 16	KL/R > 250 (C) - 871 L51x51x4.8	8.630	4.239	423.6 K=1.00	6	461	-214.98	269.96	0.796
T18	16 - 8	KL/R > 250 (C) - 940 L51x51x4.8	10.007	4.927	492.3 K=1.00	4	461	-228.95	199.81	1.146
		KL/R > 250 (C) - 1009								

Top Girt Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L51x51x6.4	0.550	0.486	49.0 K=1.00	169	605	-6.57	10427.37	0.001
T2	95 - 92	L51x51x4.8	0.550	0.486	48.6 K=1.00	169	461	-6.83	7966.99	0.001

KL/R > 250 (C) - 1136

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Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L_u m	Kl/r	F_a MPa	A mm ²	Actual P kg	Allow. P_a kg	Ratio $\frac{P}{P_a}$
T10	56.5 - 52.7	L51x51x4.8	1.280	1.152	115.1 K=1.00	78	461	-564.99	3656.94	0.154
T11	52.7 - 49	L51x51x4.8	1.367	1.255	125.4 K=1.00	65	461	-520.25	3080.41	0.169
T12	49 - 45	L51x51x4.8	1.538	1.431	142.9 K=1.00	50	461	-502.12	2370.25	0.212
T13	45 - 41	L51x51x4.8	1.664	1.564	156.3 K=1.00	42	461	-492.86	1983.66	0.248
T14	41 - 37	L51x51x4.8	1.796	1.701	169.9 K=1.00	36	461	-487.48	1677.29	0.291
T15	37 - 33	L51x51x4.8	1.932	1.841	183.9 K=1.00	30	461	-491.25	1431.77	0.343
T16	33 - 25	L51x51x4.8	2.816	2.696	269.4 K=1.00	14	461	-662.66	667.16	0.993
T17	25 - 16	KL/R > 250 (C) - 919 L64x64x6.4	3.251	3.136	251.4 K=1.00	16	768	-704.38	1274.87	0.553
T18	16 - 8	KL/R > 250 (C) - 988 L64x64x6.4	3.335	3.235	259.4 K=1.00	15	768	-679.57	1198.25	0.567
T19	8 - 4	KL/R > 250 (C) - 1057 L64x64x6.4	3.599	3.507	281.2 K=1.00	13	768	-702.83	1019.24	0.690
T20	4 - 0	KL/R > 250 (C) - 1091 L51x51x4.8	2.223	2.128	212.6 K=1.00	23	461	-651.27	1071.14	0.608

Redundant Diagonal (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L_u m	Kl/r	F_a MPa	A mm ²	Actual P kg	Allow. P_a kg	Ratio $\frac{P}{P_a}$
T20	4 - 0	L64x64x6.4	3.896	3.815	305.9 K=1.00	11	768	-570.69	861.32	0.663
		KL/R > 250 (C) - 1138								

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L_u m	Kl/r	F_a MPa	A mm ²	Actual P kg	Allow. P_a kg	Ratio $\frac{P}{P_a}$
T12	49 - 45	L51x51x3.2	1.534	1.534	151.9 K=1.00	45	312	-4.75	1421.82	0.003

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T13	45 - 41	L51x51x3.2	1.763	1.763	174.6 K=1.00	34	312	-3.91	1076.39	0.004*
T14	41 - 37	L51x51x4.8	1.992	1.992	199.0 K=1.00	26	461	-4.47	1222.43	0.004*
T15	37 - 33	L51x51x4.8	2.221	2.221	221.9 K=1.00	21	461	-4.93	983.31	0.005*
T16	33 - 25	L51x51x4.8	2.565	2.565	256.3 K=1.00	16	461	-10.70	737.52	0.015
T17	25 - 16	KL/R > 250 (C) - 902 L51x51x4.8	3.051	3.051	304.9 K=1.00	11	461	-11.41	521.01	0.022
T18	16 - 8	KL/R > 250 (C) - 971 L51x51x4.8	3.538	3.538	353.5 K=1.00	8	461	-10.30	387.53	0.027
T19	8 - 4	KL/R > 250 (C) - 1040 L64x64x6.4	3.996	3.996	320.4 K=1.00	10	768	-14.09	785.16	0.018
T20	4 - 0	KL/R > 250 (C) - 1109 L64x64x6.4	2.664	2.664	213.6 K=1.00	23	768	-9.06	1766.61	0.005

* DL controls

Redundant Hip (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x6.4	5.328	5.328	427.2 K=1.00	6	768	-8.44	441.65	0.019*
		KL/R > 250 (C) - 1166								✓

* DL controls

Inner Bracing Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L38x38x5	0.389	0.325	43.7 K=1.00	174	340	-1.31	6053.19	0.000
T6	79 - 74	L51x51x4.8	3.960	3.858	385.5 K=1.00	7	461	-38.78	325.85	0.119
T10	56.5 - 52.7	KL/R > 250 (C) - 312 L76x76x6.4	3.960	3.807	253.2 K=1.00	16	929	-171.52	1521.37	0.113
T16	33 - 25	KL/R > 250 (C) - 524 L102x102x6.4	5.129	5.129	254.0	16	1252	-63.94	2036.80	0.031

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
					K=1.00					✓
T17	25 - 16	KL/R > 250 (C) - 905 L102x102x6.4	6.102	6.102	302.2 K=1.00	11	1252	-29.97	1438.88	0.021 ✓
T18	16 - 8	KL/R > 250 (C) - 974 L102x102x6.4	7.076	7.076	350.4 K=1.00	8	1252	-43.79	1070.25	0.041 ✓
T19	8 - 4	KL/R > 250 (C) - 1042 L102x102x6.4	7.992	7.992	395.8 K=1.00	7	1252	-268.71	838.93	0.320 ✓
		KL/R > 250 (C) - 1111								✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L64x64x5	5.000	0.500	25.3	224	370	1059.83	8459.91	0.125 ✓
T2	95 - 92	L76x76x8	3.037	1.519	64.8	224	796	1232.98	18178.45	0.068 ✓
T3	92 - 86	L76x76x8	6.000	1.000	42.7	224	796	5115.07	18178.45	0.281 ✓
T4	86 - 82	L102x102x8	4.000	1.000	31.8	224	1196	10125.00	27318.33	0.371 ✓
T5	82 - 79	L102x102x8	3.201	1.601	50.8	224	1196	7610.69	27318.33	0.279 ✓
T6	79 - 74	L127x127x13	5.000	1.250	32.0	224	2500	10851.34	57124.53	0.190 ✓
T7	74 - 69	L152x152x13	5.000	1.250	26.5	224	3145	16955.79	71866.29	0.236 ✓
T8	69 - 61.5	L152x152x13	7.500	1.250	26.5	224	3145	28769.38	71866.29	0.400 ✓
T9	61.5 - 56.5	L152x152x13	5.000	1.250	26.5	224	3145	38426.50	71866.29	0.535 ✓
T10	56.5 - 52.7	L152x152x16	3.825	1.912	40.9	224	3881	40907.65	88690.03	0.461 ✓
T11	52.7 - 49	L152x152x16	3.724	1.862	39.8	224	3881	41550.57	88690.03	0.468 ✓
T12	49 - 45	L152x152x16	4.026	1.007	21.5	224	3881	41146.42	88690.03	0.464 ✓
T13	45 - 41	L152x152x16	4.026	1.007	21.5	224	3881	42265.02	88690.03	0.477 ✓
T14	41 - 37	L152x152x16	4.026	1.007	21.5	224	3881	43407.89	88690.03	0.489 ✓
T15	37 - 33	L152x152x16	4.026	1.007	21.5	224	3881	44953.42	88690.03	0.507 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T16	33 - 25	L152x152x16	8.052	2.013	43.1	224	3881	47578.22	88690.03	0.536 ✓
T17	25 - 16	L152x152x16	9.059	2.265	48.5	224	3881	50965.65	88690.03	0.575 ✓
T18	16 - 8	L152x152x16	8.052	2.013	43.1	224	3881	54910.09	88690.03	0.619 ✓
T19	8 - 4	L152x152x16	4.026	2.013	43.1	224	3881	58217.69	88690.03	0.656 ✓
T20	4 - 0	L152x152x16	4.026	1.342	28.7	224	3881	57930.11	88690.03	0.653 ✓

Diagonal Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.571	0.505	37.0	224	232	231.01	5312.20	0.043 ✓
T2	95 - 92	L44x44x5	1.628	1.530	112.2	224	232	274.55	5312.20	0.052 ✓
T3	92 - 86	L44x44x5	1.171	1.098	80.5	224	232	841.63	5312.20	0.158 ✓
T4	86 - 82	L44x44x5	1.171	1.074	78.7	224	232	1276.17	5312.20	0.240 ✓
T5	82 - 79	L76x76x6.4	1.667	1.594	67.5	224	606	2822.68	13848.04	0.204 ✓
T6	79 - 74	L51x51x4.8	1.877	1.792	114.3	224	278	1299.63	6350.48	0.205 ✓
T7	74 - 69	L64x64x4.8	1.877	1.775	89.8	224	368	1678.21	8418.00	0.199 ✓
T8	69 - 61.5	L64x64x4.8	1.877	1.775	89.8	224	368	2271.66	8418.00	0.270 ✓
T9	61.5 - 56.5	L64x64x4.8	1.877	1.775	89.8	224	368	2665.34	8418.00	0.317 ✓
T10	56.5 - 52.7	L64x64x4.8	2.365	2.251	113.9	224	368	720.57	8418.00	0.086 ✓
T11	52.7 - 49	L64x64x4.8	2.734	2.630	133.1	224	368	304.91	8418.00	0.036 ✓
T12	49 - 45	L64x64x4.8	3.076	1.538	77.8	224	368	904.41	8418.00	0.107 ✓
T13	45 - 41	L64x64x4.8	3.328	1.664	84.2	224	368	797.86	8418.00	0.095 ✓
T14	41 - 37	L64x64x4.8	3.592	1.796	90.9	224	368	1028.85	8418.00	0.122 ✓
T15	37 - 33	L64x64x4.8	3.865	1.932	97.8	224	368	1133.05	8418.00	0.135 ✓
T16	33 - 25	L76x76x6.4	5.198	2.599	110.0	224	606	1795.82	13848.04	0.130 ✓
T17	25 - 16	L76x76x6.4	5.999	3.000	127.0	224	606	2186.42	13848.04	0.158 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T18	16 - 8	L76x76x6.4	6.165	3.082	130.5	224	606	2351.58	13848.04	0.170 ✓
T19	8 - 4	L102x102x6.4	6.670	3.335	105.0	224	848	2671.68	19376.20	0.138 ✓
T20	4 - 0	L76x76x6.4	7.198	2.399	101.6	224	606	2394.50	13848.04	0.173 ✓

Horizontal Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.550	0.243	17.8	224	232	22.95	5312.20	0.004 ✓
T2	95 - 92	L44x44x5	0.885	0.809	59.3	224	232	27.02	5312.20	0.005 ✓
T3	92 - 86	L44x44x5	1.220	1.144	83.9	224	232	60.44	5312.20	0.011 ✓
T4	86 - 82	L44x44x5	1.220	1.118	82.0	224	232	125.00	5312.20	0.024 ✓
T5	82 - 79	L51x51x4.8	2.010	1.908	121.8	224	278	42.21	6350.48	0.007 ✓
T6	79 - 74	L51x51x4.8	2.800	1.336	85.3	224	278	91.02	6350.48	0.014 ✓
T7	74 - 69	L51x51x4.8	2.800	2.648	168.9	224	278	170.52	6350.48	0.027 ✓
T8	69 - 61.5	L51x51x4.8	2.800	2.648	168.9	224	278	252.37	6350.48	0.040 ✓
T9	61.5 - 56.5	L51x51x4.8	2.800	2.648	168.9	224	278	372.88	6350.48	0.059 ✓
T10	56.5 - 52.7	L51x51x4.8	3.108	1.478	94.3	224	278	183.11	6350.48	0.029 ✓
T11	52.7 - 49	L51x51x4.8	3.715	3.563	227.3	224	278	271.82	6350.48	0.043 ✓
T12	49 - 45	L51x51x4.8	4.338	4.186	267.1	224	278	117.96	6350.48	0.019 ✓
T13	45 - 41	L51x51x4.8	4.986	4.834	308.4	224	278	149.76	6350.48	0.024 ✓
T14	41 - 37	L51x51x4.8	5.634	5.482	349.8	224	278	124.78	6350.48	0.020 ✓
T15	37 - 33	L51x51x4.8	6.282	6.130	391.1	224	278	119.81	6350.48	0.019 ✓
T16	33 - 25	L51x51x4.8	7.254	3.551	226.6	224	278	54.64	6350.48	0.009 ✓
T17	25 - 16	L51x51x4.8	8.630	4.239	270.5	224	278	48.81	6350.48	0.008 ✓
T18	16 - 8	L51x51x4.8	10.007	4.927	314.4	224	278	62.32	6350.48	0.010 ✓

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Top Girt Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>F_a</i> <i>MPa</i>	<i>A</i> <i>mm²</i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P_a</i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T1	100 - 95	L51x51x6.4	0.550	0.486	31.5	224	363	6.37	8297.75	0.001
T2	95 - 92	L51x51x4.8	0.550	0.486	31.0	224	278	0.17	6350.48	0.000
T3	92 - 86	L51x51x4.8	1.220	1.144	73.0	224	278	302.99	6350.48	0.048
T4	86 - 82	L51x51x4.8	1.220	1.144	73.0	224	278	48.19	6350.48	0.008
T5	82 - 79	L51x51x4.8	1.220	1.118	71.4	224	278	997.70	6350.48	0.157
T6	79 - 74	L51x51x4.8	2.800	2.698	172.2	224	278	2138.40	6350.48	0.337
T10	56.5 - 52.7	L64x64x6.4	2.800	2.648	135.5	224	485	1275.63	11083.94	0.115

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>F_a</i> <i>MPa</i>	<i>A</i> <i>mm²</i>	Actual <i>P</i> <i>kg</i>	Allow. <i>P_a</i> <i>kg</i>	Ratio $\frac{P}{P_a}$
T12	49 - 45	L51x51x4.8	1.085	1.008	64.3	207	461	708.25	9729.56	0.073
T13	45 - 41	L51x51x4.8	1.247	1.170	74.7	207	461	738.43	9729.56	0.076
T14	41 - 37	L51x51x4.8	1.409	1.332	85.0	207	461	764.67	9729.56	0.079
T15	37 - 33	L51x51x4.8	1.570	1.494	95.3	207	461	798.52	9729.56	0.082
T16	33 - 25	L51x51x4.8	1.813	1.737	110.8	207	461	853.54	9729.56	0.088
T17	25 - 16	L51x51x4.8	2.158	2.081	132.8	207	461	934.88	9729.56	0.096
T18	16 - 8	L64x64x4.8	2.502	2.425	122.7	207	582	1019.57	12274.21	0.083
T19	8 - 4	L64x64x4.8	2.826	2.749	139.1	207	582	1093.98	12274.21	0.089
T20	4 - 0	L64x64x4.8	1.884	1.807	91.5	207	582	1103.63	12274.21	0.090

Redundant Horizontal (2) Design Data (Tension)

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x6.4	3.767	3.691	189.0	207	768	1103.63	16193.25	0.068 ✓

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T10	56.5 - 52.7	L51x51x4.8	1.280	1.152	73.5	207	461	564.99	9729.56	0.058 ✓
T11	52.7 - 49	L51x51x4.8	1.367	1.255	80.1	207	461	520.25	9729.56	0.053 ✓
T12	49 - 45	L51x51x4.8	1.538	1.431	91.3	207	461	502.12	9729.56	0.052 ✓
T13	45 - 41	L51x51x4.8	1.664	1.564	99.8	207	461	492.86	9729.56	0.051 ✓
T14	41 - 37	L51x51x4.8	1.796	1.701	108.5	207	461	487.48	9729.56	0.050 ✓
T15	37 - 33	L51x51x4.8	1.932	1.841	117.4	207	461	491.25	9729.56	0.050 ✓
T16	33 - 25	L51x51x4.8	2.816	2.696	172.1	207	461	662.66	9729.56	0.068 ✓
T17	25 - 16	L64x64x6.4	3.251	3.136	160.5	207	768	704.38	16193.25	0.043 ✓
T18	16 - 8	L64x64x6.4	3.335	3.235	165.6	207	768	679.57	16193.25	0.042 ✓
T19	8 - 4	L64x64x6.4	3.599	3.507	179.6	207	768	702.83	16193.25	0.043 ✓
T20	4 - 0	L51x51x4.8	2.223	2.128	135.8	207	461	651.27	9729.56	0.067 ✓

Redundant Diagonal (2) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x6.4	3.896	3.815	195.3	207	768	570.69	16193.25	0.035 ✓

Redundant Hip (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T16	33 - 25	L51x51x4.8	2.565	2.565	163.6	207	461	3.39	9729.56	0.000
T17	25 - 16	L51x51x4.8	3.051	3.051	194.7	207	461	0.99	9729.56	0.000
T20	4 - 0	L64x64x6.4	2.664	2.664	136.4	207	768	0.08	16193.25	0.000

Inner Bracing Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L38x38x5	0.389	0.325	28.1	207	340	1.67	7175.97	0.000
T6	79 - 74	L51x51x4.8	3.960	3.858	246.2	207	461	153.79	9729.56	0.016*
T10	56.5 - 52.7	L76x76x6.4	2.197	2.045	86.6	207	929	41.88	19595.20	0.002
T16	33 - 25	L102x102x6.4	5.129	5.129	161.5	207	1252	51.98	26399.08	0.002
T17	25 - 16	L102x102x6.4	6.102	6.102	192.2	207	1252	17.46	26399.08	0.001
T18	16 - 8	L102x102x6.4	7.076	7.076	222.9	207	1252	21.56	26399.08	0.001
T19	8 - 4	L102x102x6.4	7.992	7.992	251.7	207	1252	244.31	26399.08	0.009

* DL controls

Section Capacity Table

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T1	100 - 95	Leg	L64x64x5	1	1059.83	11277.06	9.4	Pass
		Diagonal	L44x44x5	22	231.01	7081.17	3.3	Pass
		Horizontal	L44x44x5	39	22.95	7081.17	0.3	Pass
							1.2 (b)	
		Top Girt	L51x51x6.4	8	6.37	11060.90	0.1	Pass
T2	95 - 92						0.1 (b)	
		Inner Bracing	L38x38x5	5	-0.14	4989.48	0.0	Pass
		Leg	L76x76x8	138	-1407.51	15450.27	9.1	Pass
		Diagonal	L44x44x5	149	-336.00	1823.40	18.4	Pass
		Horizontal	L44x44x5	147	-33.19	8575.77	0.4	Pass
T3	92 - 86						1.8 (b)	
		Top Girt	L51x51x4.8	143	-6.83	10620.00	0.1	Pass
							0.1 (b)	
		Leg	L76x76x8	166	-5827.08	23156.15	25.2	Pass
		Diagonal	L44x44x5	177	-881.54	3538.58	24.9	Pass
		Horizontal	L44x44x5	172	-61.30	6845.42	0.9	Pass

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Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T4	86 - 82	Top Girt	L51x51x4.8	168	-240.06	4942.12	2.1 (b)	
		Leg	L102x102x8	234	-11169.35	35387.39	4.9	Pass
		Diagonal	L44x44x5	245	-1297.53	3701.14	31.6	Pass
		Horizontal	L44x44x5	263	125.00	7081.17	35.1	Pass
T5	82 - 79	Horizontal	L44x44x5	263	125.00	7081.17	1.8	Pass
		Top Girt	L51x51x4.8	236	48.19	8465.18	6.7 (b)	
		Leg	L102x102x8	282	-8483.45	27685.74	0.6	Pass
		Diagonal	L76x76x6.4	296	-2480.62	7229.54	0.6 (b)	
T6	79 - 74	Horizontal	L51x51x4.8	288	-72.72	4353.64	30.6	Pass
		Top Girt	L51x51x4.8	285	-1181.68	8941.94	34.3	Pass
		Leg	L127x127x13	310	-12690.11	69907.13	39.4 (b)	
		Diagonal	L51x51x4.8	320	-1337.18	2014.09	1.7	Pass
T7	74 - 69	Horizontal	L51x51x4.8	327	-81.19	3619.72	3.9 (b)	
		Top Girt	L51x51x4.8	314	-1828.06	2177.60	13.2	Pass
		Inner Bracing	L51x51x4.8	312	-38.78	434.35	15.2 (b)	
		Leg	L152x152x13	370	-19463.25	88969.57	18.2	Pass
T8	69 - 61.5	Diagonal	L64x64x4.8	374	-1713.41	4087.82	66.4	Pass
		Horizontal	L51x51x4.8	372	-156.18	2261.97	2.2	Pass
		Top Girt	L51x51x4.8	314	-1828.06	2177.60	4.9 (b)	
		Inner Bracing	L51x51x4.8	312	-38.78	434.35	83.9	Pass
T9	61.5 - 56.5	Leg	L152x152x13	414	-32270.97	88969.57	8.9	Pass
		Diagonal	L64x64x4.8	423	-2337.67	4087.82	21.9	Pass
		Horizontal	L51x51x4.8	416	-242.34	2261.97	41.9	Pass
		Top Girt	L51x51x4.8	314	-1828.06	2177.60	6.9	Pass
T10	56.5 - 52.7	Inner Bracing	L51x51x4.8	312	-38.78	434.35	9.2 (b)	
		Leg	L152x152x13	478	-42557.46	88969.57	36.3	Pass
		Diagonal	L64x64x4.8	487	-2718.42	4087.82	57.2	Pass
		Horizontal	L51x51x4.8	509	-345.56	2261.97	10.7	Pass
T11	52.7 - 49	Top Girt	L51x51x4.8	314	-1828.06	2177.60	13.6 (b)	
		Inner Bracing	L51x51x4.8	312	-38.78	434.35	47.8	Pass
		Leg	L152x152x13	478	-42557.46	88969.57	66.5	Pass
		Diagonal	L64x64x4.8	487	-2718.42	4087.82	15.3	Pass
T12	49 - 45	Horizontal	L51x51x4.8	509	-345.56	2261.97	20.1 (b)	
		Top Girt	L51x51x4.8	314	-1828.06	2177.60	48.1	Pass
		Inner Bracing	L51x51x4.8	312	-38.78	434.35	12.7	Pass
		Leg	L152x152x13	478	-42557.46	88969.57	7.8	Pass
T13	45 - 41	Diagonal	L64x64x4.8	487	-2718.42	4087.82	26.0	Pass
		Horizontal	L51x51x4.8	509	-345.56	2261.97	11.6	Pass
		Top Girt	L51x51x4.8	314	-1828.06	2177.60	48.1	Pass
		Inner Bracing	L51x51x4.8	312	-38.78	434.35	12.7	Pass

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Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T14	41 - 37	Redund Hip 1	L51x51x3.2	730	-3.91	1076.39	0.4	Pass
		Bracing						
		Leg	L152x152x16	741	-50812.79	114777.97	44.3	Pass
		Diagonal	L64x64x4.8	754	-1122.20	3991.90	28.1	Pass
		Horizontal	L51x51x4.8	766	-179.31	527.67	34.0	Pass
T15	37 - 33	Redund Horz 1	L51x51x4.8	760	-764.67	3642.44	21.0	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	786	-487.48	2235.83	21.8	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	794	-4.47	1222.43	0.4	Pass
T16	33 - 25	Bracing						
		Leg	L152x152x16	805	-53062.16	114777.97	46.2	Pass
		Diagonal	L64x64x4.8	823	-1314.70	3448.06	38.1	Pass
		Horizontal	L51x51x4.8	807	-171.81	422.03	40.7	Pass
		Redund Horz 1	L51x51x4.8	849	-798.52	2895.69	27.6	Pass
T17	25 - 16	Bracing						
		Redund Diag 1	L51x51x4.8	850	-491.25	1908.55	25.7	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	866	-4.93	983.31	0.5	Pass
		Bracing						
T18	16 - 8	Leg	L152x152x16	869	-56718.11	92243.69	61.5	Pass
		Diagonal	L76x76x6.4	875	-1900.05	3708.09	51.2	Pass
		Horizontal	L51x51x4.8	871	-213.15	512.88	41.6	Pass
		Redund Horz 1	L51x51x4.8	888	-853.54	2142.50	39.8	Pass
		Bracing						
T19	8 - 4	Redund Diag 1	L51x51x4.8	923	-662.66	889.32	74.5	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	902	-10.70	983.11	1.1	Pass
		Bracing						
		Inner Bracing	L102x102x6.4	905	-63.94	2715.06	2.4	Pass
T20	4 - 0	Leg	L152x152x16	938	-62123.57	85486.25	72.7	Pass
		Diagonal	L76x76x6.4	956	-2351.55	2781.31	84.5	Pass
		Horizontal	L51x51x4.8	940	-214.98	359.85	59.7	Pass
		Redund Horz 1	L51x51x4.8	952	-934.88	1492.58	62.6	Pass
		Bracing						
T21		Redund Diag 1	L64x64x6.4	988	-704.38	1699.40	41.4	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	971	-11.41	694.51	1.6	Pass
		Bracing						
		Inner Bracing	L102x102x6.4	974	-29.97	1918.02	1.6	Pass
T22		Leg	L152x152x16	1007	-67751.30	92243.69	73.4	Pass
		Diagonal	L76x76x6.4	1013	-2537.74	2643.55	96.0	Pass
		Horizontal	L51x51x4.8	1009	-228.95	266.34	86.0	Pass
		Redund Horz 1	L64x64x4.8	1021	-1019.57	2188.54	46.6	Pass
		Bracing						
T23		Redund Diag 1	L64x64x6.4	1057	-679.57	1597.26	42.5	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	1040	-10.30	516.58	2.0	Pass
		Bracing						
		Inner Bracing	L102x102x6.4	1042	-43.79	1426.65	3.1	Pass
T24		Leg	L152x152x16	1076	-72695.46	92243.09	78.8	Pass
		Diagonal	L102x102x6.4	1086	-2560.73	6422.72	39.9	Pass
		Horizontal	L64x64x4.8	1090	-1093.98	1703.23	64.2	Pass
		Redund Horz 1	L64x64x4.8	1091	-702.83	1358.65	51.7	Pass
		Bracing						
T25		Redund Diag 1	L64x64x6.4	1091	-702.83	1358.65	51.7	Pass
		Bracing						
		Redund Hip 1	L64x64x6.4	1109	-14.09	1046.62	1.3	Pass
		Bracing						
		Inner Bracing	L102x102x6.4	1111	-268.71	1118.29	24.0	Pass
T26		Leg	L152x152x16	1117	-73337.29	108093.09	67.8	Pass
		Diagonal	L76x76x6.4	1141	-2850.01	5107.24	55.8	Pass

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
		Top Girt	L64x64x4.8	1078	-198.03	1023.31	19.4	Pass
		Redund Horz 1 Bracing	L64x64x4.8	1135	-1103.63	3940.72	28.0	Pass
		Redund Horz 2 Bracing	L64x64x6.4	1136	-1103.63	1226.56	90.0	Pass
		Redund Diag 1 Bracing	L51x51x4.8	1137	-651.27	1427.83	45.6	Pass
		Redund Diag 2 Bracing	L64x64x6.4	1138	-570.69	1148.14	49.7	Pass
		Redund Hip 1 Bracing	L64x64x6.4	1165	-9.06	2354.89	0.4	Pass
		Redund Hip 2 Bracing	L64x64x6.4	1166	-8.44	441.65	1.9	Pass
							Summary	
							Leg (T19)	78.8 Pass
							Diagonal (T18)	96.0 Pass
							Horizontal (T18)	86.0 Pass
							Top Girt (T6)	83.9 Pass
							Redund Horz 1 Bracing (T19)	64.2 Pass
							Redund Horz 2 Bracing (T20)	90.0 Pass
							Redund Diag 1 Bracing (T16)	74.5 Pass
							Redund Diag 2 Bracing (T20)	49.7 Pass
							Redund Hip 1 Bracing (T18)	2.0 Pass
							Redund Hip 2 Bracing (T20)	1.9 Pass
							Inner Bracing (T19)	24.0 Pass
							Bolt Checks	39.4 Pass
							RATING =	96.0 Pass



CIMENTACION

ESTACION: MONTERIA

**TORRE CUADRADA DE 100 M
SECCION VARIABLE**

Enero 5 de 2011



MEMORIA EVALUACION ESTRUCTURAL CIMENTACION

ESTACION: MONTERIA

MINICIPIO: CIENAGA DE ORO - CORDOBA
SITIO: CERRO ZONA RURAL

TORRE CUADRADA DE 100 M
SECCION VARIABLE

CALCULO: ING. JAIME GUTIERREZ C.
MATRICULA 25202-45957 CND

Enero 5 de 2011

1.0 INTRODUCCION

1.1 OBJETO

El objeto de este documento es la realización de la evaluación estructural de la cimentación de la torre metálica cuadrada autosoportada sección variable de 100 metros de altura. Que funciona de soporte de antenas panel VHF y antena parabólica, según los cálculos realizados para la torre cuadrada, y las reacciones en los nudos de los soportes de la torre, que son las cargas vivas con las cuales se evalúa la cimentación, y son anexos a este documento.

La torre se localiza en el municipio de CIENAGA DE ORO - CORDOBA. Y esta construida y en zona de ladera, y dadas las condiciones de cargas y de suelo de fundación, una cimentación tipo PILA única de soporte de las cuatro patas de la torre, en concreto reforzado y se chequea que cumpla adecuadamente tanto los requisitos de capacidad portante, como de estabilidad al vuelco y arrancamiento, generado por las cargas horizontales impuestas.

Para efectos del adecuado dimensionamiento y verificación de la cimentación se han tenido en cuenta las cargas provenientes de la superestructura; y las recomendaciones y parámetros incluidos en el estudio de suelos realizado para la obra por: SUELOS & CIMIENTOS, que es anexo complementario en este documento.

2.0 CODIGOS Y NORMAS APLICABLES

NSR-98

EIA/TIA 222 F

ANDREWS, Bulletin 1015F

ACI 318 última edición

3.0 MATERIALES ESTRUCTURALES

Para la construcción de la cimentación se ha tenido en consideración que se utilizó los siguientes materiales:

- 1- Concreto la pila y vigas de amarre, con una resistencia a la compresión a 28 días, $f'c = 210 \text{ kg/cm}^2$, 3000 psi.
- 2- Acero de refuerzo Grado 60, con punto de fluencia $f_y = 4200 \text{ kg/cm}^2$, 60.000 psi, para varillas con diámetros 1/2" y superiores.
- 3- Acero de refuerzo A-37, con punto de fluencia $f_y = 2400 \text{ kg/cm}^2$, 34.200 psi, para varillas con diámetros 1/4" y 3/8"
- 4- Materiales granulares para relleno de cimentación. En general, debe obtenerse una compactación mayor o igual al 90% del Proctor Modificado.

4.0 CONCLUSIONES Y RECOMENDACIONES

De los análisis y diseños anteriores pueden extraerse las siguientes conclusiones y recomendaciones:

4.1 PILA

1 – La cimentación tipo Pila, con dado superior en concreto se comportará adecuadamente. Para tal efecto, sus dimensiones en planta deberán cubrir un área para el dado de 1.30 x 1.30 metros en cada dirección principal, y el fuste con un diámetro de 1.30 m y su profundidad deberá ser por lo menos 5.25 metros bajo la cota +0.00 de la superficie de nivelación del terreno.

2 – La altura del dado de base soporte de la torre, deberá tener como mínimo de 1.90 m., (sobresale 2.20 m. del terreno)

El concreto deberá tener una resistencia mínima de 210 kg/cm^2 (3000 psi) a 28 días.

4.2 VIGA DE AMARRE (ENLACE)

1 – La cimentación zapata viga de amarre en concreto se comportará adecuadamente. Para tal efecto, sus dimensiones ancho por alto deberán cubrir unas dimensiones de 40 cm. x 120 cm. y va amarrada entre

pedestales de la cimentación y su nivel superior de la viga debe estar a nivel terreno N+ 0.00.

El concreto deberá tener una resistencia mínima de 210 kg/cm² (3000 psi) a 28 días.

4.3 – Cualquier modificación que se realice, bien sea a los elementos de concreto, o a la configuración de la cimentación (profundidad, área, peso de rellenos, etc.), debe ser notificada al ingeniero calculista, con el objeto de realizar las verificaciones de rigor, y aprobarlas o recomendar.

ANEXOS:

- Memorias de Calculo
- Plano Cimentación



TOWER

FOUNDATIONS



DISEÑO CIMENTACION PILA

Cliente: **RTVC - TELEFONICA TELECOM**

Estructura: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

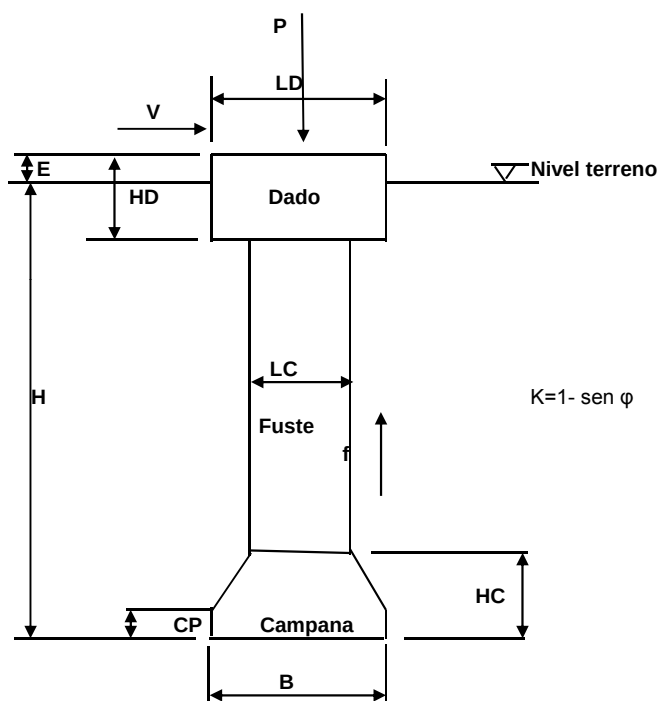
ESTACION BASE: **MONTERIA**

Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 5 de 2011



PARAMETROS DEL CAISSON

PROFUNDIDAD

SUELO

ANGULO DE FRICCION INTERNA DEL SUELO

K

FRICCION

CL

5°

0,91284

PUNTA

CL

5°

0,91284

O



TOWER

FOUNDATIONS



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PARAMETROS DE DISEÑO

ESFUERZO ADMISIBLE DEL TERRENO	Qadm	18,80	kPa
COHESION	Cu	9,8	kPa
PESO UNITARIO DEL CONCRETO	γ_c	24	kN/m ³
PESO UNITARIO DEL SUELO	γ_s	16	kN/m ³
ESFUERZO DE FLUENCIA DEL ACERO	Fy	420	Mpa
RESISTENCIA DEL CONCRETO	f'c	21	Mpa
MODULO DE ELASTICIDAD DEL CONCRETO	Ec	18500	Mpa

CARGAS DE TRABAJO

HIPOTESIS	1	2	
ARRANQUE	0,00	722,75	kN
COMPRESION	568,47	0,00	kN
CARGA LONGITUDINAL	65,74	76,57	kN
CARGA TRANSVERSAL	65,97	76,26	kN
MOMENTO LONGITUDINAL	0,00	0,00	kN.m
MOMENTO TRANSVERSAL	0,00	0,00	kN.m
VIGAS DE ENLACE	si		
MOMENTO FINAL LONGITUDINAL Y TRANSVERSAL	0,00	5484,60	kN.m

CARGAS DE DISEÑO

HIPOTESIS	1	2	
ARRANQUE	0,00	1011,850	kN
COMPRESION	795,86	0,000	kN
CARGA LONGITUDINAL	98,61	107,198	kN
CARGA TRANSVERSAL	92,36	114,390	kN
MOMENTO LONGITUDINAL	0,00	0,000	kN.m
MOMENTO TRANSVERSAL	0,00	0,000	kN.m
MOMENTO FINAL LONGITUDINAL Y TRANSVERSAL	0,00	0,00	kN.m



TOWER

FOUNDATIONS



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ANALISIS DE ESTABILIDAD

ALTURA DEL CIMIENTO SOBRE EL SUELO	E	2,15	m
LADO MAYOR DE LA CAMPANA	B	2,60	m
LADO DEL FUSTE	b	1,30	m
PROFUNDIDAD DE LA CIMENTACION	H	5,25	m
LADO DEL DADO	LD	1,30	m
PROFUNDIDAD DEL DADO	HD	0,05	m
PROFUNDIDAD DE CAMPANA	HC	1,00	m
PEDESTAL DE CAMPANA	CP	0,50	m
RECUBRIMIENTO DEL ACERO	REC	0,10	m
INERCIAS DE LA SECCION	I	1,904	m ⁴

ANALISIS DE CIMENTACION

VOLUMEN DADO	Vd	0,08	
VOLUMEN DEL FUSTE	Vf	8,49	
VOLUMEN PEDESTAL CAMPANA	Vpc	2,65	
VOLUMEN CONO	Vvc	1,66	
VOLUMEN DE CONCRETO	Vc	12,9	m ³
VOLUMEN DE EXCAVACION	Vexc	9,19	m ³
PESO DE LA CIMENTACION	Wp	1082,1	kN

CARGAS AXIALES

RELACION PROFUNDIDAD DIAMETRO	D/B	2,02	
FACTOR DE CAPACIDAD A COMPRESION	Nc	5,74	
AREA DE LA BASE	Ab	6,76	m ²
RESISTENCIA ULTIMA POR PUNTA	Qb	380,26	kN
FACTOR DE ADHESION	a	0,30	
AREA PERIMETRAL	Ap	13,65	m ²
RESISTENCIA ULTIMA POR FRICCION	Qs	40,13	kN
RESISTENCIA ULTIMA TOTAL A COMPRESION	Qp	420,39	kN
FACTOR DE SEGURIDAD A COMPRESION	FS	2,15	
RESISTENCIA ULTIMA TOTAL A ARRANCAMIENTO	Qu	1082,10	kN
FACTOR DE SEGURIDAD A ARRANCAMIENTO	FS	1,50	
MOMENTO DE VUELCO	Mv	346,34	kN
MOMENTO RESISTENTE	Mr	2576,03	kN
FACTOR DE SEGURIDAD A VOLCAMIENTO	FS	1,86	



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CARGAS HORIZONTALES

CARGA LONGITUDINAL	SL	65,74	kN
CARGA TRANSVERSAL	ST	65,97	kN
CARGA HORIZONTAL RESULTANTE	SR	93,13	kN
CARGA HORIZONTAL RESULTANTE ULTIMA	SRU	162,98	kN
MODULO DE REACCION	Ks	240,00	kN/m³
FACTOR DE RIGIDEZ	R	4,50	m
RELACION PROFUNDIDAD - RIGIDEZ	D/R	1,17	
PILAstra		RIGIDA	
PROFUNDIDAD SIN REACCION DEL SUELO	H	2,00	m
MOMENTO MAXIMO	Mmax	3618,22	kN.m
	G	3,70	m
PROFUNDIDAD MINIMA DE LA PILAstra	Dmin	4,50	m
CIMENTACION RIGIDA			
MAXIMA CARGA HORIZONTAL	SRMAX	572,29	kN
FACTOR DE SEGURIDAD	FS	1,87	

DESPLAZAMIENTO LATERAL

CRITERIO DE RIGIDEZ $b = 0.707/R$	b	0,16	m-1
PILAstra RIGIDA			
DESPLAZAMIENTO LATERAL	d	0,001	m

DISEÑO CONCRETO REFORZADO

CARGA LONGITUDINAL	SL	92,36	kN
CARGA TRANSVERSAL	ST	107,20	kN
CARGA HORIZONTAL RESULTANTE	SR	141,50	kN
CARGA MAXIMA DE ARRANQUE	Qu	1011,85	kN
PROFUNDIDAD SIN REACCION DEL SUELO	H	2,80	m
LOCALIZACION PUNTO MAXIMO DE MOMENTO	F	0,12	m
MOMENTO MAXIMO	Mmax	20965,53	kN.m



TOWER

FOUNDATIONS



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ESTACION BASE: MONTERIA

Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 5 de 2011

REFUERZO LONGITUDINAL FUSTE

DIAMETRO DE LAS VARILLAS	No	8,00	
	Φ	2,54	cm
AREA	Asi	5,07	cm ²
CANTIDAD		28,00	
AREA DE LA SECCION	As	141,88	cm ²
CUANTIA	ρ	0,0084	
RADIO DEL REFUERZO	r	0,751	m
INERCIA DE LA SECCION	Ixx	23800833	cm ⁴
MODULO DE LA SECCION	Sxx	1464667	cm ³
ESFUERZO MAXIMO SOBRE EL REFUERZO/FLEXION	Ff	1324,20	Mpa
ESFUERZO MAXIMO SOBRE EL REFUERZO/TENSION	Ft	39,73	Mpa
ESFUERZO MAXIMO SOBRE EL REFUERZO/TOTAL	F	1363,92	Mpa
ESFUERZO ULTIMO < 0.9 Fy		si	

REFUERZO LONGITUDINAL DEL DADO

DIAMETRO DE LAS VARILLAS	No	8,00	
	Φ	2,54	cm
AREA	Asi	5,07	cm ²
CANTIDAD		48,00	
AREA DE LA SECCION	As	243,22	cm ²
CUANTIA	ρ	0,0144	



TOWER

FOUNDATIONS



DISEÑO CIMENTACION PILA

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Estructura: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

ESTACION BASE: **MONTERIA**

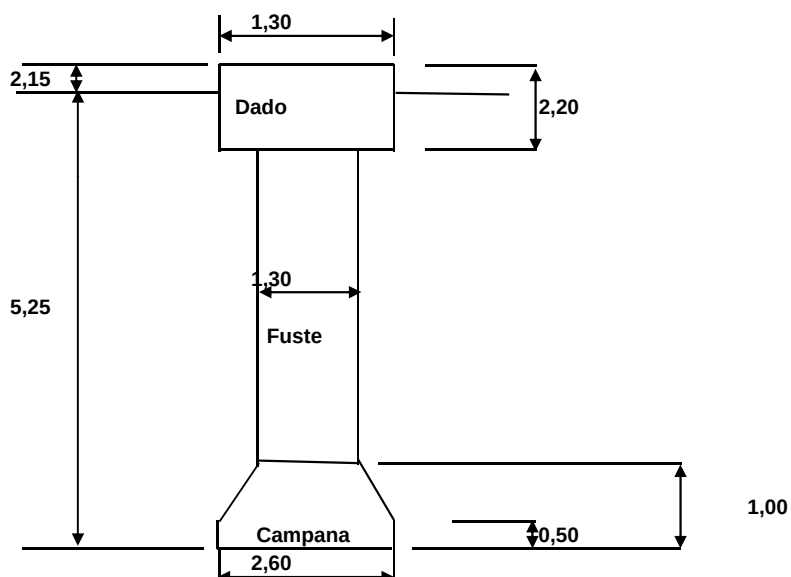
Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 5 de 2011

GEOMETRIA DE LA PILA





TOWER

FOUNDATIONS



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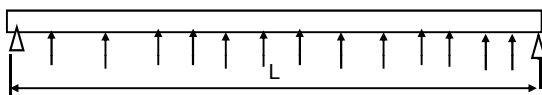
Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

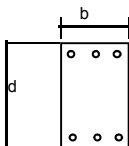
Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 5 de 2011

CALCULO DE VIGA DE AMARRE



FLEXION



A=	1,69	m ²
Pter	4,81	
W=	24,06	t/m
L=	7,96	m
Mu=	24362,55	t-cm
b=	40	cm
d=	120	cm
K=	0,04230	
ro=	0,00330	
As=	15,84	cm ²

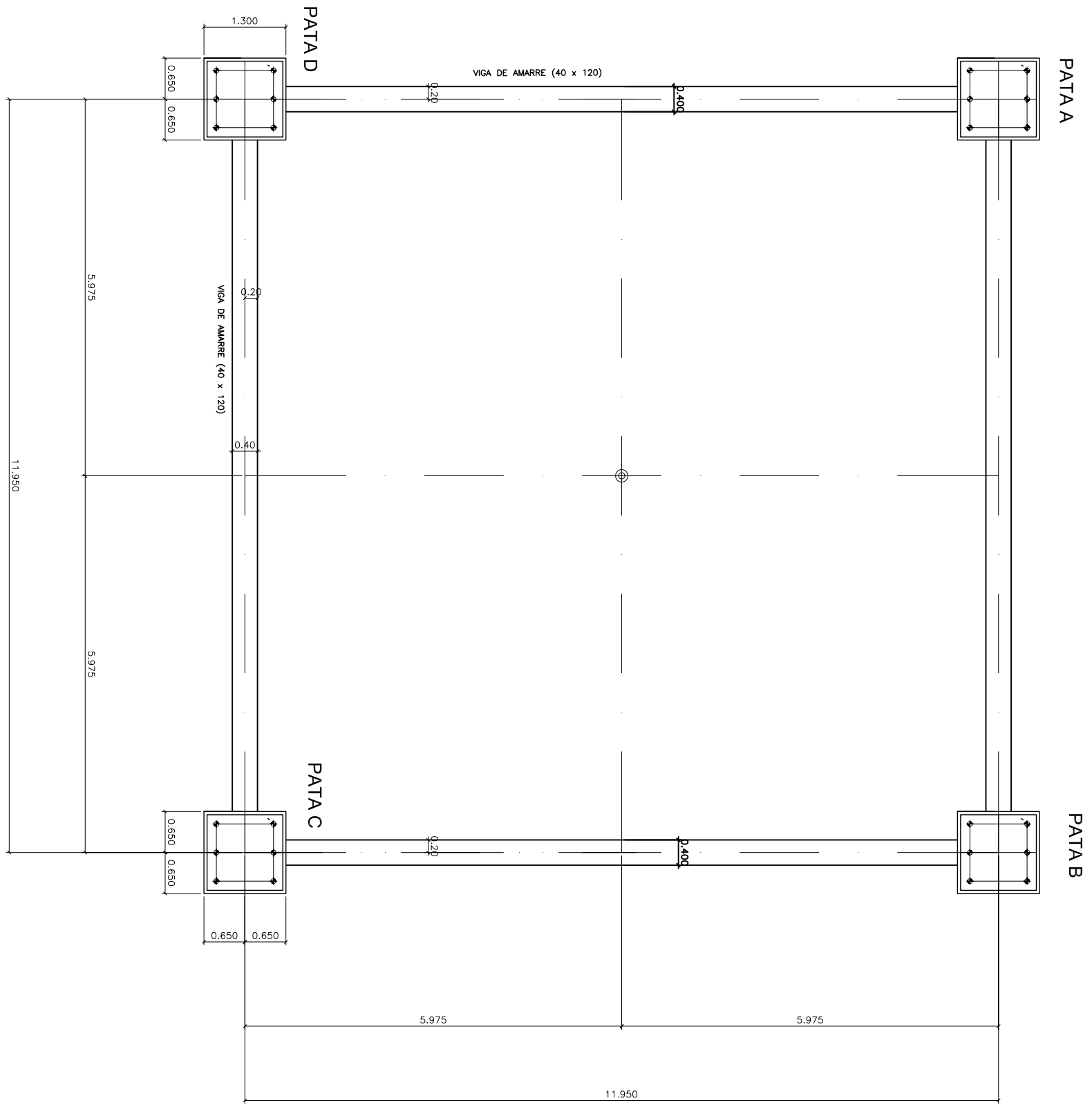
colocar 8 var No 6

CORTANTE

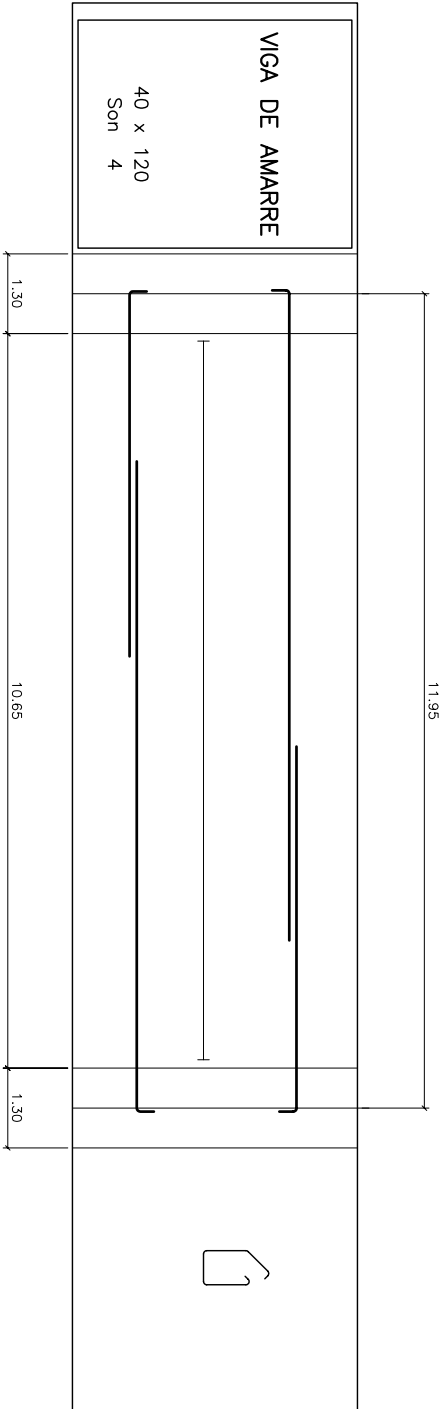
V=	95,693	t
vu=	31,898	kg/cm ²
Ø vc=	6,350	kg/cm ²

No requiere Refuerzo a cortante

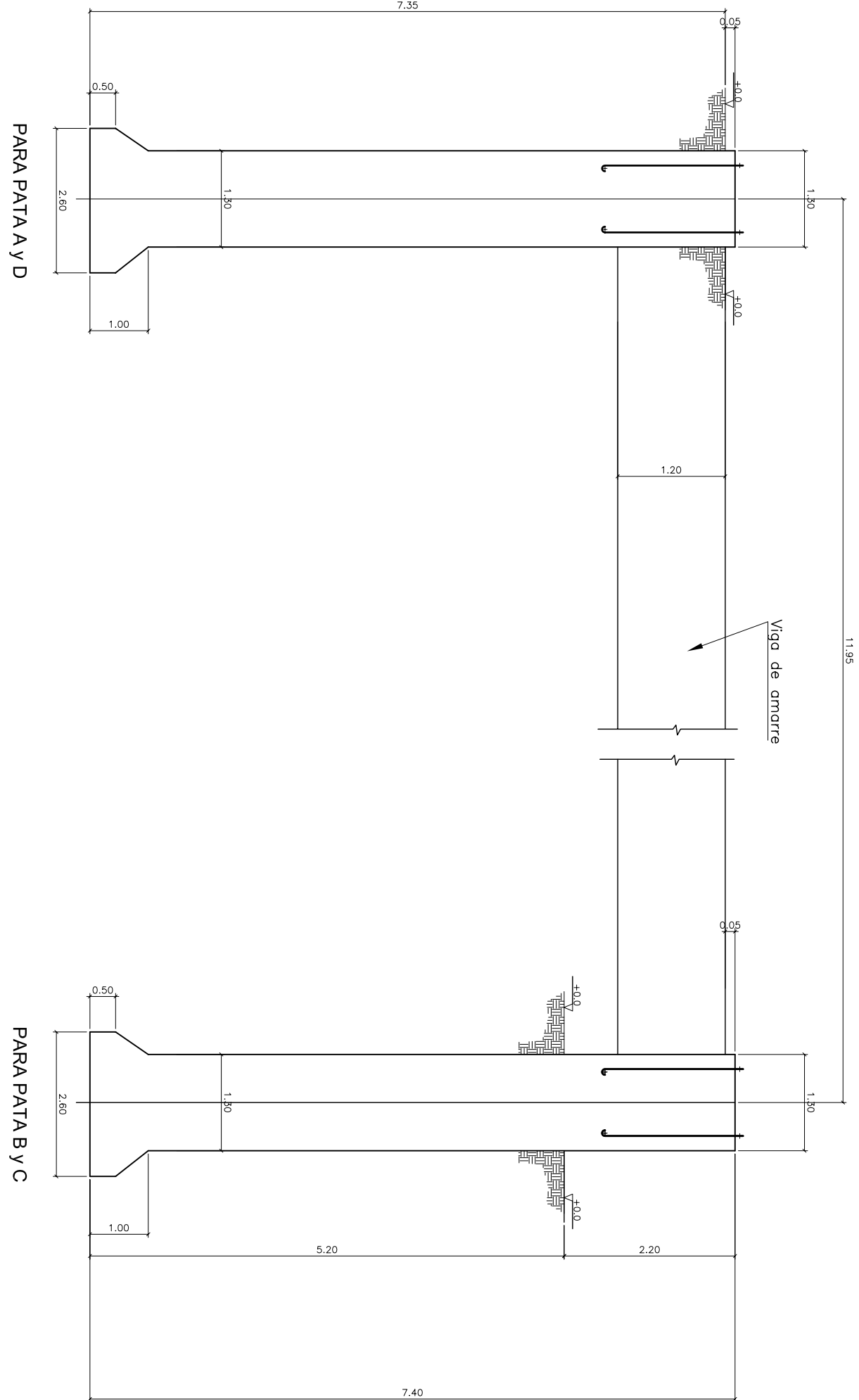
colocar E Ø 3/8" cada 16 cm



PLANTA DE CIMENTACION



VIGA DE AMARRE



NOTAS GENERALES:

1. DIMENSIONES EN MILIMETROS. ESPESORES EN PULGADAS
2. ACERO DE REFUERZO:
 - Ø16 > 1/2" F_y = 4200 kg/cm²
 - Ø16 < 1/2" F_y = 2400 kg/cm²
3. CONCRETO:
 - PLACA VIGAS DE AMARRE, PEDESTALES f_c = 211 kg/cm² (3000 P.S.I.)
 - CONCRETO DE LIMPIEZA f_c = 141 kg/cm² (2000 P.S.I.)
4. MATERIAL DE RELLENO:
 - G₁ = 1.6 t/m³
5. REQUERIMIENTO DEL ACERO 75 mm
6. NO SE PERMITE EL TRASLAPO DE VARILLAS VERTICALES

Estudio de suelos realizado por:
SUELOS & CIMENTOS

Municipio: CIENAGA DE ORO – CORDOBA
Sitio: CERRO EN ZONA RURAL

ESTACION:

MONTERIA

DISEÑO Y CÁLCULO:

ING. Jaime Gutierrez C.
T.P. 25202-45957 CND

DIBUJÓ:

VERONICA GUEVARA

REVISÓ:

Ing. J. M. G.

APROBÓ:

RTVC - TELEFONICA TELECOM

CONTIENE

EVALUACION CIMENTACION
TORRE CUADRADA DE 100 M
SECCION VARIABLE

rtvc

RADIO TELEVISION NACIONAL DE COLOMBIA



05-Ene.-2011

PLANO Nº INS-ECM-01



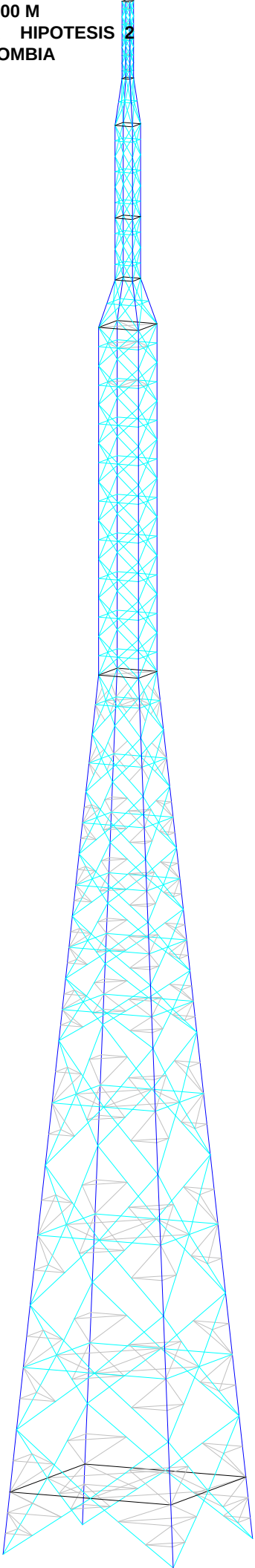
RESULTADOS

ESTADO HIPOTESIS 2 REFORZADA

ESTACION : MONTERIA

Enero 23 de 2011

Project: TORRE CUADRADA SECCION VARIABLE DE 100 M
Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA





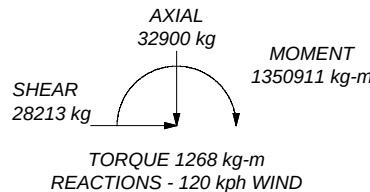
TYPE	ELEVATION	TYPE	ELEVATION
RYMSA UHF/AT15-250 PANEL	100 - 99	ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7
RYMSA UHF/AT15-250 PANEL	100 - 99		
RYMSA UHF/AT15-250 PANEL	100 - 99	ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7
RYMSA UHF/AT15-250 PANEL	100 - 99		
RYMSA UHF/AT15-250 PANEL	99 - 98	ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7
RYMSA UHF/AT15-250 PANEL	99 - 98		
RYMSA UHF/AT15-250 PANEL	99 - 98	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
RYMSA UHF/AT15-250 PANEL	99 - 98		
RYMSA UHF/AT15-250 PANEL	98 - 97	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
RYMSA UHF/AT15-250 PANEL	98 - 97		
RYMSA UHF/AT15-250 PANEL	98 - 97	ANTENA VHF BAND III 4 DIPO AT13-240	85.5 - 82.7
RYMSA UHF/AT15-250 PANEL	98 - 97		
RYMSA UHF/AT15-250 PANEL	97 - 96	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
RYMSA UHF/AT15-250 PANEL	97 - 96	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
RYMSA UHF/AT15-250 PANEL	97 - 96	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
RYMSA UHF/AT15-250 PANEL	97 - 96	ANTENA VHF BAND I - 2 DIPOLOS	66.2 - 63.1
RYMSA UHF/AT15-250 PANEL	96 - 95	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
RYMSA UHF/AT15-250 PANEL	96 - 95	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
RYMSA UHF/AT15-250 PANEL	96 - 95	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
RYMSA UHF/AT15-250 PANEL	96 - 95	ANTENA VHF BAND I - 2 DIPOLOS	62.9 - 59.8
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	ANTENA VHF BAND I - 2 DIPOLOS	59.6 - 56.5
ANTENA VHF BAND III 4 DIPO AT13-240	91.5 - 88.7	8 FT DISH	14.4
ANTENA VHF BAND III 4 DIPO AT13-240	88.5 - 85.7		

MARK	SIZE	MARK	SIZE
A	L127x127x13	D	L64x64x6.4
B	L76x76x6.4	E	L64x64x4.8
C	L102x102x6.4	F	L51x51x4.8

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	345 MPa	448 MPa			

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 A394 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 AWS E60XX/E70XX electrodes.
7. All welded joints and connection flanges certified for integrity an quality per AWS D1:1
8. RF antennas feeders shall be 1-5/8" and installed 48 feeders per side
9. MW dishes feeders shall be 1/2" and installed 8 feeders per side
10. TOWER RATING: 96.8%

DOWN: 87776 kg
UPLIFT: -72096 kg
SHEAR: 12641 kg



INSTATEL COLOMBIA		Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2	
Carrera 124 No 17 - 98		Project: TORRE CUADRADA SECCION VARIABLE DE 100 M	
Bogotá - Colombia		Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Drawn by: Ing Jaime Gutierrez C
Phone: (57-1) 547 07 90		Code: TIA/EIA-222-F	Date: 01/24/11
FAX: (57-1) 547 07 90		Path:	Scale: NTS
www.instatel.com.co Ingeniería y Servicio al Cliente en Colombia Professional Engineering Services in Colombia		DWG No. E-1	



CONCLUSIONES Y RESULTADOS

HIPOTESIS 2

En esta hipótesis se analizara la torre considerando todas las antenas y equipos existentes e instalados en ella, pero adicionalmente se considera el montaje de 20 antenas con una distribución (5-5-5-5) (cinco antenas en cada cara) banda UHF digital. (Futuro) a una altura entre 95 y 100 m.

ESTADO DE LA ESTRUCTURA

Para realizar la utilización de la estructura tenemos que tener en cuenta todas las recomendaciones de mantenimiento como de reforzamiento

PINTURA

A la pintura es necesario e inmediato realizar un mantenimiento Inmediato de lavado y limpieza ya que estos químicos de las aves van deteriorando la pintura y queda expuesto el galvanizado que también entra a la corrosión

TORNILLERIA

Se debe reemplazar la tornillería de los elementos que se deben reforzar

ESCALERA DE ACCESO

Se encuentran bien, solo en mantenimiento solicitado a la pintura

PLATAFORMAS DE DESCANSO

Como estas también han sido atacadas por los excrementos de las aves se deben realizar los mantenimientos de lavado y limpieza

LUCES DE OBSTRUCCION

Se encuentran bien no tiene problema

HIPOTESIS 2 DE LA TORRE

Para cumplir con el requerimiento solicitados de la velocidad de viento de diseño de 120 kph entonces dentro del análisis de cálculo la torre se debe reforzar de la siguiente manera.

DIAGONALES

- La diagonal del nivel +4.00 m a +8.00 m se retira la existente y se reemplaza por un ángulo de 102x102x6.4
- La diagonal del nivel +8.00 m a +16.00 m se retira la existente y se reemplaza por un ángulo de 76x76x6.4
- La diagonal del nivel +16.00 m a +25.00 m se retira la existente y se reemplaza por un ángulo de 76x76x6.4
- La diagonal del nivel +25.00 m a +33.00 m se retira la existente y se reemplaza por un ángulo de 76x76x6.4

HORIZONTALES

- La Horizontal del nivel + 79.00 m se retira la existente y se reemplaza por un ángulo de 64x64x4.8
- La Horizontal que se encuentra en la mitad entre el nivel + 8.00 m al nivel + 16.00 m se retira la existente y se reemplaza por un ángulo de 64x64x4.8

REDUNDANTES

- El redundante diagonal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- El redundante Horizontal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m a una altura 1.35 m se retira y se reemplaza por un ángulo de 64x64x6.4
- El redundante Horizontal que se encuentra en el segundo nivel de la pata hacia arriba entre en nivel +0.00 m al nivel + 4.00 m a una altura 2.70 m se retira y se reemplaza por un ángulo de 76x76x6.4
- Los dos redundantes Diagonales entre en nivel +4.00 m al nivel + 8.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- Los dos redundantes Diagonales entre en nivel +8.00 m al nivel + 16.00 m se retira y se reemplaza por un ángulo de 64x64x6.4
- Los dos redundantes Diagonales entre en nivel +16.00 m al nivel + 25.00 m se retira y se reemplaza por un ángulo de 64x64x6.4

PESO APROXIMADO DE REFUERZO

Materiales comprendidos en ángulos platina y tornillería - peso= 7470 Kg

DEFLEXION DE LA TORRE

Luego de análisis de la torre en el estado actual y teniendo en cuenta la velocidad de viento de operación de 60 kph la torre cumple con los desplazamientos mínimos requeridos

CIMENTACION

Luego de los cálculos realizados, y con las reacciones de la estructura en la Hipótesis 2, la cimentación está cumpliendo con los parámetros solicitados en la norma.

Cualquier carga adicional a las descritas, para esta hipótesis 2 se le debe realizar un nuevo análisis ya que la cimentación queda trabajando al límite de su capacidad.

No necesita Reforzamiento

ANEXO SE PRESENTA:

ISOMETRICO TORRE HIPOTESIS 2

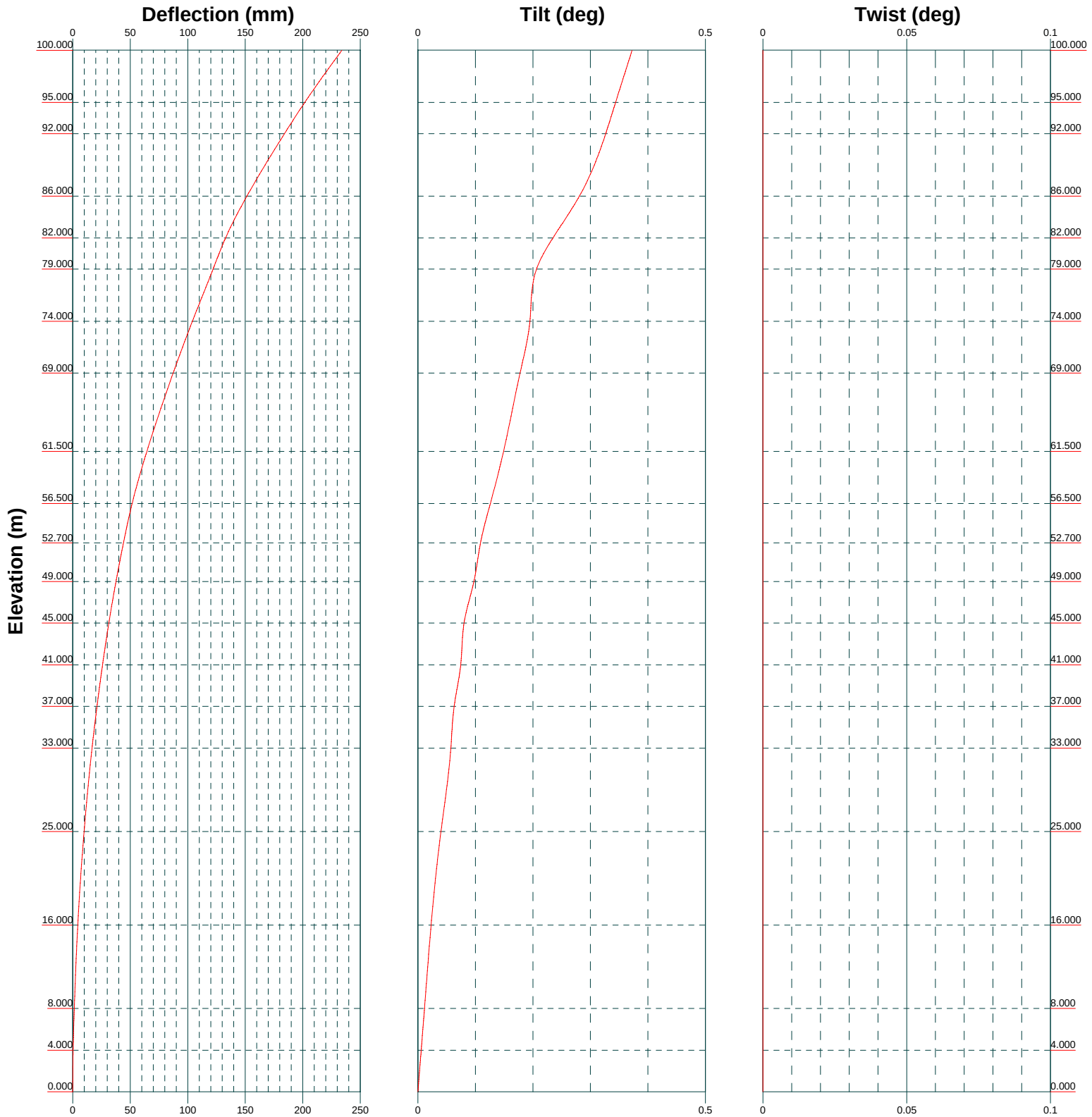
SILUETA ESTADO HIPOTESIS 2

DEFORMADA TORRE HIPOTESIS 2

CALCULO PLACA BASE Y PERNOS HIPOTESIS 2

CALCULO ESTRUCTURAL ESTADO HIPOTESIS 2

CALCULO CIMENTACION

**INSTATEL COLOMBIA**

Carrera 124 No 17 - 98

Bogotá - Colombia

Phone: (57-1) 547 07 90

FAX: (57-1) 547 07 90

Job: **ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2**Project: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA

Code: TIA/EIA-222-F

Path:

Drawn by: Ing Jaime Gutierrez C.

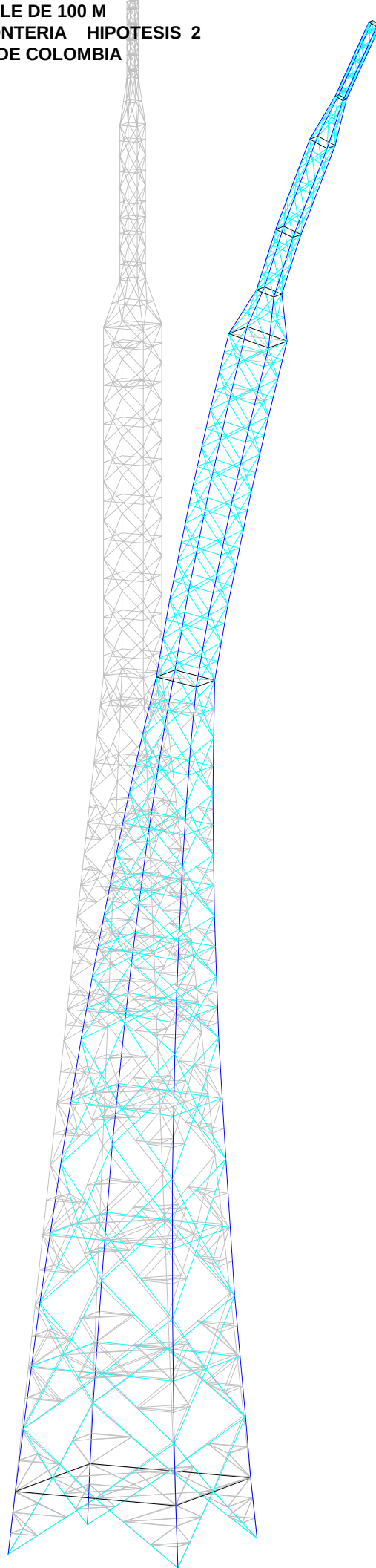
Date: 01/24/11

App'd:

Scale: NTS

Dwg No. E-5

Project: TORRE CUADRADA SECCION VARIABLE DE 100 M
Job: ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2
Client: RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA
LC:4 Dead+Wind 90 deg - No Ice
Max. Disp.851.64 mm @ 100.000 m
Scaling 20



Calculo: Ing. Jaime Gutierrez C:

Fecha: Enero 23 de 2011

ESTACION: MONTERIA

ESTADO HIPOTESIS 2

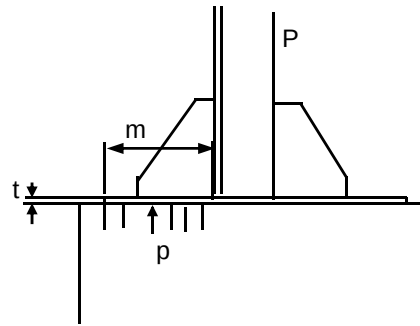
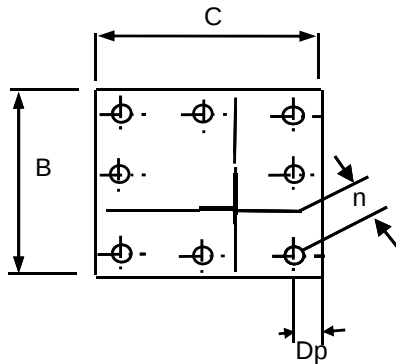
ESTRUCTURA: TORRE CUADRADA 100 m SECCION VARIABLE

CARGAS ACTUANTES

Tension Maxima	T	(ton)	87,776
Compresion Maxima	C	(ton)	-72,096
Fuerza Longitudinal en X	Hx	(ton)	-8,955
Fuerza Transversal en Y	Hy	(ton)	8,923

CALCULO DE PLACA - BASE

PLACA BASE	B	C	t	Dp	m	Dimension pedestal (cm)		No pernos
	cm.	cm.	cm	cm	cm.	Bp	Cp	un
	120	120	3,8	8,0	40,0	125	125	8,0



Area Placa Colocada	Ac	14.400	cm ²				
Acero A-36	Fy=	2.530	Kg / cm ²	Concreto.	f'c=	210	Kg / cm ²
Distancia	n	8,0	cm				
Area Requerida placa base	Ar	942	cm ²				
Apoyo contacto pedestal	Fp	76,563	Kg / cm ²				
Presion de Apoyo	pp	5,007	kg / cm ²				
Esfuerzo de Flexion por Compresion	Fb						
Esfuerzo de Flexion	Fb	1.645	Kg / cm ²			Acero A-36	
Distancia al borde	m	40	cm				
Espesor Placa Base C	t	0,76	cm				
Esfuerzo de Flexion por Arranque	Fb''						
Distancia al perno	Dp	8	cm				
Fuerza en el Perno	Pt	10,97	Ton				
Momento de Flexion	Mf	87,8	Ton - cm				
Espesor de la Placa Base Arr	t	2,31	cm				
Espesor Minimo Placa Base	t	2,31	cm				
Lado de la placa Base	B	1.200	mm				
Espesor de la Placa Base	t	38	mm			OK CUMPLE	



Calculo: Ing. Jaime Gutierrez C:
Fecha: Enero 23 de 2011



ESTACION: MONTERIA

ESTADO HIPOTESIS 2

ESTRUCTURA: TORRE CUADRADA 100 m SECCION VARIABLE

DISEÑO DE PERNOS DE ANCLAJE

Diametro de los Pernos	dp	1,00	plg
	dp	2,54	cm
Material de los Pernos		SAE 1020 CALIBRADO	
Cantidad de Pernos		8	un
Area Total de Pernos	Atp	40,54	cm ²
Factor de Rosca		0,85	
Numero de Hilos por Pulgada	hp	8	
Area Efectiva de Pernos	Ap	31,27	cm ²
Cargas de Trabajo			
Fuerza de Arranque	T	87,78	ton
Fuerza de Cortante	Vux	-7,80	ton
Fuerza de Cortante	Vuy	8,92	ton
Fuerza de Cortante	Vu	11,85	ton
Esfuerzo de Fluencia			
Resistencia a la Tension	Ft	3,36	ton/cm ²
Resistencia al Corte	Fv	2,24	ton/cm ²
Area Efectiva de cada Perno	Ae	3,91	cm ²
Area Total por Perno	Ap	5,07	cm ²
Area Requerida por Arranque	At	17,8	cm ²
Area Requerida Arranque Diseño	Atm	26,7	cm ²
Numero de Pernos Minimo	Np	7	un
Pernos a Colocar		8	un
Diametro del Perno		25	mm
Area Neta de Pernos	Anp	31,27	cm ²
AREA DE PERNOS > AREA REQUERIDA		OK CUMPLE	

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2	Page 1 of 55
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 100.000 m above the ground line.

The base of the tower is set at an elevation of 0.000 m above the ground line.

The face width of the tower is 0.550 m at the top and 11.950 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 A394 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 AWS E60XX/E70XX electrodes..

All welded joints and connection flanges certified for integrity an quality per AWS D1:1.

RF antennas feeders shall be 1-5/8" and installed 48 feeders per side.

MW dishes feeders shall be 1/2" and installed 8 feeders per side.

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

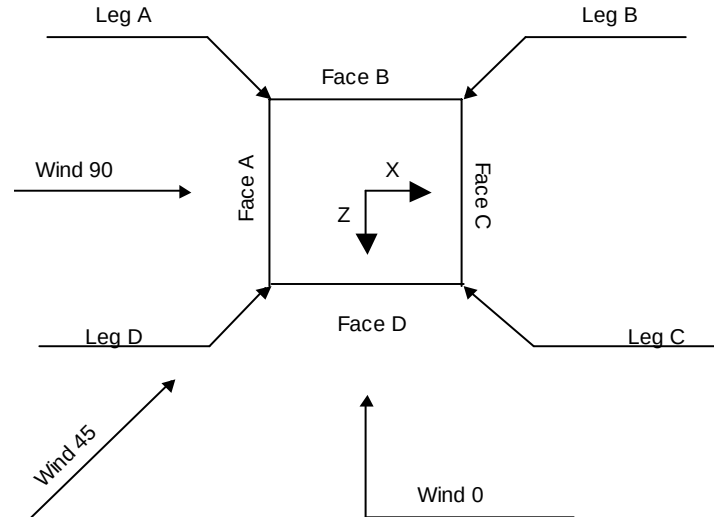
Pressures are calculated at each section.

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		



Square Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	m			m		m
T1	100.000-95.000			0.550	1	5.000
T2	95.000-92.000			0.550	1	3.000
T3	92.000-86.000			1.220	1	6.000
T4	86.000-82.000			1.220	1	4.000
T5	82.000-79.000			1.220	1	3.000
T6	79.000-74.000			2.800	1	5.000
T7	74.000-69.000			2.800	1	5.000
T8	69.000-61.500			2.800	1	7.500
T9	61.500-56.500			2.800	1	5.000
T10	56.500-52.700			2.800	1	3.800
T11	52.700-49.000			3.415	1	3.700
T12	49.000-45.000			4.015	1	4.000
T13	45.000-41.000			4.662	1	4.000
T14	41.000-37.000			5.310	1	4.000
T15	37.000-33.000			5.958	1	4.000
T16	33.000-25.000			6.606	1	8.000
T17	25.000-16.000			7.901	1	9.000
T18	16.000-8.000			9.359	1	8.000
T19	8.000-4.000			10.654	1	4.000
T20	4.000-0.000			11.302	1	4.000

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	100.000-95.000	0.500	Double K	No	Yes	0	0
T2	95.000-92.000	1.500	Double K	No	Yes	0	0
T3	92.000-86.000	1.000	Double K	No	Yes	0	0
T4	86.000-82.000	1.000	Double K	No	Yes	0	0
T5	82.000-79.000	1.500	Double K	No	Yes	0	0
T6	79.000-74.000	1.250	Double K	No	Yes	0	0
T7	74.000-69.000	1.250	Double K	No	Yes	0	0
T8	69.000-61.500	1.250	Double K	No	Yes	0	0
T9	61.500-56.500	1.250	Double K	No	Yes	0	0
T10	56.500-52.700	1.900	Double K1	No	Yes	0	0
T11	52.700-49.000	1.850	Double K1	No	Yes	0	0
T12	49.000-45.000	2.000	Double K1	No	Yes	0	0
T13	45.000-41.000	2.000	Double K1	No	Yes	0	0
T14	41.000-37.000	2.000	Double K1	No	Yes	0	0
T15	37.000-33.000	2.000	Double K1	No	Yes	0	0
T16	33.000-25.000	4.000	Double K1	No	Yes	0	0
T17	25.000-16.000	4.500	Double K1	No	Yes	0	0
T18	16.000-8.000	4.000	Double K1	No	Yes	0	0
T19	8.000-4.000	4.000	K1 Up	No	Yes	0	0
T20	4.000-0.000	4.000	K2 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	L64x64x5	A572-50	Single Angle	L44x44x5	A572-50
100.000-95.000			(345 MPa)			(345 MPa)
T2	Equal Angle	L76x76x8	A572-50	Single Angle	L44x44x5	A572-50
95.000-92.000			(345 MPa)			(345 MPa)
T3	Equal Angle	L76x76x8	A572-50	Single Angle	L44x44x5	A572-50
92.000-86.000			(345 MPa)			(345 MPa)
T4	Equal Angle	L102x102x8	A572-50	Single Angle	L44x44x5	A572-50
86.000-82.000			(345 MPa)			(345 MPa)
T5	Equal Angle	L102x102x8	A572-50	Single Angle	L76x76x6.4	A572-50
82.000-79.000			(345 MPa)			(345 MPa)
T6	Equal Angle	L127x127x13	A572-50	Single Angle	L51x51x4.8	A572-50
79.000-74.000			(345 MPa)			(345 MPa)
T7	Equal Angle	L152x152x13	A572-50	Single Angle	L64x64x4.8	A572-50
74.000-69.000			(345 MPa)			(345 MPa)
T8	Equal Angle	L152x152x13	A572-50	Single Angle	L64x64x4.8	A572-50
69.000-61.500			(345 MPa)			(345 MPa)
T9	Equal Angle	L152x152x13	A572-50	Single Angle	L64x64x4.8	A572-50
61.500-56.500			(345 MPa)			(345 MPa)
T10	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
56.500-52.700			(345 MPa)			(345 MPa)
T11	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
52.700-49.000			(345 MPa)			(345 MPa)
T12	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
49.000-45.000			(345 MPa)			(345 MPa)
T13	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
45.000-41.000			(345 MPa)			(345 MPa)
T14	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
41.000-37.000			(345 MPa)			(345 MPa)
T15	Equal Angle	L152x152x16	A572-50	Single Angle	L64x64x4.8	A572-50
37.000-33.000			(345 MPa)			(345 MPa)
T16	Equal Angle	L152x152x16	A572-50	Single Angle	L76x76x6.4	A572-50

<i>Tower Elevation m</i>	<i>Leg Type</i>	<i>Leg Size</i>	<i>Leg Grade</i>	<i>Diagonal Type</i>	<i>Diagonal Size</i>	<i>Diagonal Grade</i>
33.000-25.000 T17	Equal Angle	L152x152x16	(345 MPa) A572-50	Single Angle	L76x76x6.4	(345 MPa) A572-50
25.000-16.000 T18 16.000-8.000	Equal Angle	L152x152x16	(345 MPa) A572-50	Single Angle	L76x76x6.4	(345 MPa) A572-50
T19 8.000-4.000	Equal Angle	L152x152x16	(345 MPa) A572-50	Single Angle	L102x102x6.4	(345 MPa) A572-50
T20 4.000-0.000	Equal Angle	L152x152x16	(345 MPa) A572-50 (345 MPa)	Single Angle	L76x76x6.4	(345 MPa) A572-50 (345 MPa)

Tower Section Geometry (cont'd)

<i>Tower Elevation m</i>	<i>Top Girt Type</i>	<i>Top Girt Size</i>	<i>Top Girt Grade</i>	<i>Bottom Girt Type</i>	<i>Bottom Girt Size</i>	<i>Bottom Girt Grade</i>
T1 100.000-95.000	Single Angle	L51x51x6.4	A572-50 (345 MPa)	Single Angle		A570-50 (345 MPa)
T2 95.000-92.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T3 92.000-86.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T4 86.000-82.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T5 82.000-79.000	Single Angle	L51x51x4.8	A572-50 (345 MPa)	Solid Round		A570-50 (345 MPa)
T6 79.000-74.000	Single Angle	L64x64x4.8	A572-50 (345 MPa)	Solid Round		A572-50 (345 MPa)
T10 56.500-52.700	Single Angle	L64x64x6.4	A572-50 (345 MPa)	Solid Round		A572-50 (345 MPa)
T20 4.000-0.000	Single Angle	L64x64x4.8	A572-50 (345 MPa)	Solid Round		A572-50 (345 MPa)

Tower Section Geometry (cont'd)

<i>Tower Elevation</i> <i>m</i>	<i>No. of Mid Girts</i>	<i>Mid Girt Type</i>	<i>Mid Girt Size</i>	<i>Mid Girt Grade</i>	<i>Horizontal Type</i>	<i>Horizontal Size</i>	<i>Horizontal Grade</i>
T1 100.000-95.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T2 95.000-92.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T3 92.000-86.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T4 86.000-82.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L44x44x5	A572-50 (345 MPa)
T5 82.000-79.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T6 79.000-74.000	None	Flat Bar		A36 (248 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T7 74.000-69.000	None	Flat Bar		A36	Single Angle	L51x51x4.8	A572-50

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Tower Elevation m	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T8 69.000-61.500	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T9 61.500-56.500	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T10 56.500-52.700	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T11 52.700-49.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T12 49.000-45.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T13 45.000-41.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T14 41.000-37.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T15 37.000-33.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T16 33.000-25.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T17 25.000-16.000	None	Flat Bar		(248 MPa) A36	Single Angle	L51x51x4.8	(345 MPa) A572-50
T18 16.000-8.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50
T19 8.000-4.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50
T20 4.000-0.000	None	Flat Bar		(248 MPa) A36	Single Angle	L64x64x4.8	(345 MPa) A572-50

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 100.000-95.000	Single Angle		A572-50 (345 MPa)	Single Angle	L38x38x5	A572-50 (345 MPa)
T6 79.000-74.000	Single Angle		A572-50 (345 MPa)	Single Angle	L51x51x4.8	A572-50 (345 MPa)
T10 56.500-52.700	Single Angle		A572-50 (345 MPa)	Single Angle	L76x76x6.4	A572-50 (345 MPa)
T16 33.000-25.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T17 25.000-16.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T18 16.000-8.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T19 8.000-4.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)
T20 4.000-0.000	Single Angle		A572-50 (345 MPa)	Single Angle	L102x102x6.4	A572-50 (345 MPa)

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Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Redundant Bracing Grade	Redundant Type	Redundant Size	K Factor
T10 56.500-52.700	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
T11 52.700-49.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
T12 49.000-45.000	A572-50 (345 MPa)	Horizontal (1)	Single Angle L51x51x4.8	1
T13 45.000-41.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
		Horizontal (1)	Single Angle L51x51x4.8	1
T14 41.000-37.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
		Horizontal (1)	Single Angle L51x51x4.8	1
T15 37.000-33.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
		Horizontal (1)	Single Angle L51x51x4.8	1
T16 33.000-25.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
		Horizontal (1)	Single Angle L51x51x4.8	1
T17 25.000-16.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L51x51x4.8	1
		Hip (1)	Single Angle L51x51x3.2	1
		Horizontal (1)	Single Angle L51x51x4.8	1
T18 16.000-8.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L64x64x6.4	1
		Hip (1)	Single Angle L51x51x4.8	1
		Horizontal (1)	Single Angle L64x64x4.8	1
T19 8.000-4.000	A572-50 (345 MPa)	Diagonal (1)	Single Angle L64x64x6.4	1
		Hip (1)	Single Angle L64x64x6.4	1
		Horizontal (1)	Single Angle L64x64x4.8	1
T20 4.000-0.000	A572-50 (345 MPa)	Horizontal (2)	Single Angle L76x76x6.4	1
		Diagonal (1)	Single Angle L51x51x4.8	1
		Diagonal (2)	Single Angle L64x64x6.4	1
		Hip (1)	Single Angle L64x64x6.4	1
		Hip (2)	Single Angle L64x64x6.4	

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_f</i>	Adjust. Factor <i>A_r</i>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals <i>mm</i>	Double Angle Stitch Bolt Spacing Horizontals <i>mm</i>
T1 100.000-95.000	0.018	6	A36 (248 MPa)	1	1	1.25	0	0
T2 95.000-92.000	0.018	6	A36 (248 MPa)	1	1	1.25	0	0
T3 92.000-86.000	0.018	8	A36 (248 MPa)	1	1	1.25	0	0
T4 86.000-82.000	0.018	10	A36 (248 MPa)	1	1	1.25	0	0
T5 82.000-79.000	0.018	10	A36 (248 MPa)	1	1	1.25	0	0
T6	0.018	10	A36	1	1	1.25	0	0

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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
m	m ²	mm						
79.000-74.000			(248 MPa)					
T7	0.021	10	A36	1	1	1.25	0	0
74.000-69.000			(248 MPa)					
T8	0.021	10	A36	1	1	1.25	0	0
69.000-61.500			(248 MPa)					
T9	0.024	10	A36	1	1	1.25	0	0
61.500-56.500			(248 MPa)					
T10	0.024	10	A36	1	1	1.25	0	0
56.500-52.700			(248 MPa)					
T11	0.024	10	A36	1	1	1.25	0	0
52.700-49.000			(248 MPa)					
T12	0.024	10	A36	1	1	1.25	0	0
49.000-45.000			(248 MPa)					
T13	0.024	10	A36	1	1	1.25	0	0
45.000-41.000			(248 MPa)					
T14	0.024	10	A36	1	1	1.25	0	0
41.000-37.000			(248 MPa)					
T15	0.024	10	A36	1	1	1.25	0	0
37.000-33.000			(248 MPa)					
T16	0.024	10	A36	1	1	1.25	0	0
33.000-25.000			(248 MPa)					
T17	0.024	10	A36	1	1	1.25	0	0
25.000-16.000			(248 MPa)					
T18	0.024	10	A36	1	1	1.25	0	0
16.000-8.000			(248 MPa)					
T19	0.024	10	A36	1	1	1.25	0	0
8.000-4.000			(248 MPa)					
T20	0.024	10	A36	1	1	1.25	0	0
4.000-0.000			(248 MPa)					

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				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	1	1	1	1	1	1	1	1
100.000-95.000				1	1	1	1	1	1	1
T2	No	No	1	1	1	1	1	1	1	1
95.000-92.000				1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1
92.000-86.000				1	1	1	1	1	1	1
T4	No	No	1	1	1	1	0.5	1	1	1
86.000-82.000				1	1	1	1	1	1	1
T5	No	No	1	1	1	1	0.5	1	1	1
82.000-79.000				1	1	1	1	1	1	1
T6	No	No	1	1	1	1	0.5	1	1	1
79.000-74.000				1	1	1	1	1	1	1
T7	No	No	1	1	1	1	0.5	1	1	1
74.000-69.000				1	1	1	1	1	1	1
T8	No	No	1	1	1	1	0.5	1	1	1
69.000-61.500				1	1	1	1	1	1	1

Tower Elevation <i>m</i>	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T9 61.500-56.500	No	No	1	1	1	1	0.5	1	1	1
T10 56.500-52.700	No	No	1	1	1	1	0.5	1	1	1
T11 52.700-49.000	No	No	1	1	1	1	0.5	1	1	1
T12 49.000-45.000	No	No	1	1	1	1	0.25	1	1	1
T13 45.000-41.000	No	No	1	1	1	1	0.25	1	1	1
T14 41.000-37.000	No	No	1	1	1	1	0.25	1	1	1
T15 37.000-33.000	No	No	1	1	1	1	0.25	1	1	1
T16 33.000-25.000	No	No	1	1	1	1	0.25	1	1	1
T17 25.000-16.000	No	No	1	1	1	1	0.25	1	1	1
T18 16.000-8.000	No	No	1	1	1	1	0.25	1	1	1
T19 8.000-4.000	No	No	1	1	1	1	0.25	1	1	1
T20 4.000-0.000	No	No	1	1	1	1	0.25	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	<i>Leg</i>		<i>Diagonal</i>		<i>Top Girt</i>		<i>Bottom Girt</i>		<i>Mid Girt</i>		<i>Long Horizontal</i>		<i>Short Horizontal</i>	
	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>	<i>Net Width</i> <i>Deduct</i> mm	<i>U</i>
T1 100.000-95.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T2 95.000-92.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T3 92.000-86.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T4 86.000-82.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T5 82.000-79.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T6 79.000-74.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T7 74.000-69.000	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
T8 69.000-61.500	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75

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
T9	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
61.500-56.500														
T10	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
56.500-52.700														
T11	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
52.700-49.000														
T12	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
49.000-45.000														
T13	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
45.000-41.000														
T14	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
41.000-37.000														
T15	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
37.000-33.000														
T16	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
33.000-25.000														
T17	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
25.000-16.000														
T18	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
16.000-8.000														
T19	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
8.000-4.000														
T20	0	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
4.000-0.000														

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	Sleeve DS	19	6	16	2	16	2	16	2	16	0	16	1	16	1
100.000-95.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T2	Sleeve DS	19	12	16	2	16	2	16	2	16	0	16	1	16	1
95.000-92.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T3	Sleeve DS	19	14	16	2	16	2	16	2	16	0	16	1	16	1
92.000-86.000		A325N		A325N		A325N		A307		A325N		A325N		A307	
T4	Sleeve DS	19	16	16	2	16	2	16	2	16	0	16	1	16	2
86.000-82.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T5	Sleeve DS	19	16	16	2	16	2	16	2	16	0	16	1	16	2
82.000-79.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T6	Sleeve DS	19	16	16	2	16	2	16	2	16	0	16	1	16	2
79.000-74.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T7	Sleeve DS	19	24	16	2	16	2	16	2	16	0	16	1	16	2
74.000-69.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T8	Sleeve DS	19	32	16	2	16	2	16	2	16	0	16	1	16	2
69.000-61.500		A325N		A325N		A325N		A307		A325N		A307		A307	
T9	Sleeve DS	19	32	16	2	16	2	16	2	16	0	16	1	16	2
61.500-56.500		A325N		A325N		A325N		A307		A325N		A307		A307	

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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.
T10	Sleeve DS	19	34	16	2	16	2	16	2	16	0	16	2	16	2
56.500-52.700		A325N		A325N		A325N		A307		A325N		A307		A307	
T11	Sleeve DS	19	36	16	2	16	2	16	2	16	0	16	2	16	2
52.700-49.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T12	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
49.000-45.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T13	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
45.000-41.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T14	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
41.000-37.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T15	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
37.000-33.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T16	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
33.000-25.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T17	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
25.000-16.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T18	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
16.000-8.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T19	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
8.000-4.000		A325N		A325N		A325N		A307		A325N		A307		A307	
T20	Sleeve DS	19	36	16	3	16	2	16	2	16	0	16	2	16	2
4.000-0.000		A325N		A325N		A325N		A307		A325N		A307		A307	

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _A A _A Front m ²	C _A A _A Side m ²	Weight kg
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000 0.000	0.0000	91.500 - 88.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000 0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4	D	From Face	0.000	0.0000	88.500 - 85.700	No Ice	0.546	0.267	64.95

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _{AA} Front m ²	C _{AA} Side m ²	Weight kg
DIPO AT13-240			0.000 0.000						
ANTENA VHF BAND III 4 DIPO AT13-240	A	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	B	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	C	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND III 4 DIPO AT13-240	D	From Face	0.000 0.000	0.0000	85.500 - 82.700	No Ice	0.546	0.267	64.95
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	D	From Face	0.000 0.000	0.0000	66.200 - 63.100	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	D	From Face	0.000 0.000	0.0000	62.900 - 59.800	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	A	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	B	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
ANTENA VHF BAND I - 2 DIPOLOS	C	From Face	0.000 0.000	0.0000	59.600 - 56.500	No Ice	0.072	0.072	58.00
RYMSA UHF/AT15-250 PANEL	A	From Face	0.000 0.000	0.0000	100.000 - 99.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	B	From Face	0.000 0.000	0.0000	100.000 - 99.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250	C	From Face	0.000	0.0000	100.000 -	No Ice	0.665	0.363	10.00

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert m m m	Azimuth Adjustment °	Placement m		C _A A _A Front m ²	C _A A _A Side m ²	Weight kg
PANEL			0.000 0.000		99.000				
RYMSA UHF/AT15-250 PANEL	D	From Face	0.000 0.000 0.000	0.0000	100.000 - 99.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	A	From Face	0.000 0.000 0.000	0.0000	99.000 - 98.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	B	From Face	0.000 0.000 0.000	0.0000	99.000 - 98.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	C	From Face	0.000 0.000 0.000	0.0000	99.000 - 98.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	D	From Face	0.000 0.000 0.000	0.0000	99.000 - 98.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	A	From Face	0.000 0.000 0.000	0.0000	98.000 - 97.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	B	From Face	0.000 0.000 0.000	0.0000	98.000 - 97.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	C	From Face	0.000 0.000 0.000	0.0000	98.000 - 97.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	D	From Face	0.000 0.000 0.000	0.0000	98.000 - 97.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	A	From Face	0.000 0.000 0.000	0.0000	97.000 - 96.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	B	From Face	0.000 0.000 0.000	0.0000	97.000 - 96.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	C	From Face	0.000 0.000 0.000	0.0000	97.000 - 96.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	D	From Face	0.000 0.000 0.000	0.0000	97.000 - 96.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	A	From Face	0.000 0.000 0.000	0.0000	96.000 - 95.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	B	From Face	0.000 0.000 0.000	0.0000	96.000 - 95.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	C	From Face	0.000 0.000 0.000	0.0000	96.000 - 95.000	No Ice	0.665	0.363	10.00
RYMSA UHF/AT15-250 PANEL	D	From Face	0.000 0.000 0.000	0.0000	96.000 - 95.000	No Ice	0.665	0.363	10.00

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

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 ²	Weight kg
8 FT DISH	D	Paraboloid w/o Radome	From Leg	0.000 0.000 0.000	0.0000		14.400	2.438	No Ice 4.673	113.85

Tower Pressures - No Ice

$$G_H = 1.082$$

Section Elevation m	z m	K _Z	q _z MPa	A _G m ²	F a c e	A _F m ²	A _R m ²	A _{leg} m ²	Leg %	C _A A _A In Face m ²	C _A A _A Out Face m ²
T1 100.000-95.000	97.500	1.914	0.00	2.926	A	1.235	0.000	0.635	51.44	0.000	0.000
					B	1.235	0.000		51.44	0.000	0.000
					C	1.235	0.000		51.44	0.000	0.000
					D	1.235	0.000		51.44	0.000	0.000
T2 95.000-92.000	93.500	1.891	0.00	2.788	A	0.800	0.000	0.463	57.82	0.000	0.000
					B	0.800	0.000		57.82	0.000	0.000
					C	0.800	0.000		57.82	0.000	0.000
					D	0.800	0.000		57.82	0.000	0.000
T3 92.000-86.000	89.000	1.864	0.00	7.583	A	1.729	0.000	0.914	52.89	0.000	0.000
					B	1.729	0.000		52.89	0.000	0.000
					C	1.729	0.000		52.89	0.000	0.000
					D	1.729	0.000		52.89	0.000	0.000
T4 86.000-82.000	84.000	1.834	0.00	5.108	A	1.372	0.000	0.813	59.23	0.000	0.000
					B	1.372	0.000		59.23	0.000	0.000
					C	1.372	0.000		59.23	0.000	0.000
					D	1.372	0.000		59.23	0.000	0.000
T5 82.000-79.000	80.500	1.812	0.00	6.207	A	1.366	0.000	0.651	47.63	0.000	0.000
					B	1.366	0.000		47.63	0.000	0.000
					C	1.366	0.000		47.63	0.000	0.000
					D	1.366	0.000		47.63	0.000	0.000
T6 79.000-74.000	76.500	1.785	0.00	14.362	A	2.461	0.000	1.270	51.61	0.000	0.000
					B	2.461	0.000		51.61	0.000	0.000
					C	2.461	0.000		51.61	0.000	0.000
					D	2.461	0.000		51.61	0.000	0.000
T7 74.000-69.000	71.500	1.751	0.00	14.428	A	2.718	0.000	1.524	56.08	0.000	0.000
					B	2.718	0.000		56.08	0.000	0.000
					C	2.718	0.000		56.08	0.000	0.000
					D	2.718	0.000		56.08	0.000	0.000
T8 69.000-61.500	65.250	1.706	0.00	21.641	A	4.063	0.000	2.286	56.27	0.000	0.000
					B	4.063	0.000		56.27	0.000	0.000
					C	4.063	0.000		56.27	0.000	0.000
					D	4.063	0.000		56.27	0.000	0.000
T9 61.500-56.500	59.000	1.658	0.00	14.428	A	2.719	0.000	1.524	56.06	0.000	0.000
					B	2.719	0.000		56.06	0.000	0.000
					C	2.719	0.000		56.06	0.000	0.000
					D	2.719	0.000		56.06	0.000	0.000
T10 56.500-52.700	54.600	1.621	0.00	12.143	A	2.328	0.000	1.166	50.07	0.000	0.000
					B	2.328	0.000		50.07	0.000	0.000

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	$F_{ac e}$	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	C_{AA} In Face m^2	C_{AA} Out Face m^2
T11 52.700-49.000	50.850	1.589	0.00	14.071	C	2.328	0.000	1.135	50.07	0.000	0.000
					D	2.328	0.000		50.07	0.000	0.000
					A	2.225	0.000		51.01	0.000	0.000
					B	2.225	0.000		51.01	0.000	0.000
					C	2.225	0.000		51.01	0.000	0.000
T12 49.000-45.000	47.000	1.553	0.00	17.706	D	2.225	0.000	1.227	51.01	0.000	0.000
					A	2.829	0.000		43.38	0.000	0.000
					B	2.829	0.000		43.38	0.000	0.000
					C	2.829	0.000		43.38	0.000	0.000
					D	2.829	0.000		43.38	0.000	0.000
T13 45.000-41.000	43.000	1.514	0.00	20.297	A	3.008	0.000	1.227	40.80	0.000	0.000
					B	3.008	0.000		40.80	0.000	0.000
					C	3.008	0.000		40.80	0.000	0.000
					D	3.008	0.000		40.80	0.000	0.000
					A	3.190	0.000	1.227	38.47	0.000	0.000
T14 41.000-37.000	39.000	1.473	0.00	22.888	B	3.190	0.000		38.47	0.000	0.000
					C	3.190	0.000		38.47	0.000	0.000
					D	3.190	0.000		38.47	0.000	0.000
					A	3.376	0.000	1.227	36.35	0.000	0.000
					B	3.376	0.000		36.35	0.000	0.000
T15 37.000-33.000	35.000	1.428	0.00	25.479	C	3.376	0.000		36.35	0.000	0.000
					D	3.376	0.000		36.35	0.000	0.000
					A	5.595	0.000	2.454	43.86	0.000	0.000
					B	5.595	0.000		43.86	0.000	0.000
					C	5.595	0.000		43.86	0.000	0.000
T16 33.000-25.000	29.000	1.353	0.00	58.731	D	5.595	0.000		43.86	0.000	0.000
					A	6.586	0.000	2.761	41.92	0.000	0.000
					B	6.586	0.000		41.92	0.000	0.000
					C	6.586	0.000		41.92	0.000	0.000
					D	6.586	0.000		41.92	0.000	0.000
T17 25.000-16.000	20.500	1.226	0.00	78.461	A	6.796	0.000	2.454	36.12	0.000	0.000
					B	6.796	0.000		36.12	0.000	0.000
					C	6.796	0.000		36.12	0.000	0.000
					D	6.796	0.000		36.12	0.000	0.000
					A	3.635	0.000	1.227	33.76	0.000	0.000
T18 16.000-8.000	12.000	1.052	0.00	80.755	B	3.635	0.000		33.76	0.000	0.000
					C	3.635	0.000		33.76	0.000	0.000
					D	3.635	0.000		33.76	0.000	0.000
					A	5.042	0.000	1.227	24.34	0.000	0.000
					B	5.042	0.000		24.34	0.000	0.000
T19 8.000-4.000	6.000	1	0.00	44.264	C	5.042	0.000		24.34	0.000	0.000
					D	5.042	0.000		24.34	0.000	0.000
					A	5.042	0.000		24.34	0.000	0.000
					B	5.042	0.000		24.34	0.000	0.000
					C	5.042	0.000		24.34	0.000	0.000
T20 4.000-0.000	2.000	1	0.00	46.856	D	5.042	0.000		24.34	0.000	0.000

Tower Pressure - Service

$$G_H = 1.082$$

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	$F_{ac e}$	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	C_{AA} In Face m^2	C_{AA} Out Face m^2
T1 100.000-95.000	97.500	1.914	0.00	2.926	A	1.235	0.000	0.635	51.44	0.000	0.000
					B	1.235	0.000		51.44	0.000	0.000
					C	1.235	0.000		51.44	0.000	0.000
					D	1.235	0.000		51.44	0.000	0.000
T2	93.500	1.891	0.00	2.788	A	0.800	0.000	0.463	57.82	0.000	0.000

Section Elevation m	z m	K_z	q_z MPa	A_G m^2	F a c e	A_F m^2	A_R m^2	A_{leg} m^2	Leg %	C_{AA} In Face m^2	C_{AA} Out Face m^2
95.000-92.000					B	0.800	0.000		57.82	0.000	0.000
					C	0.800	0.000		57.82	0.000	0.000
					D	0.800	0.000		57.82	0.000	0.000
T3	89.000	1.864	0.00	7.583	A	1.729	0.000	0.914	52.89	0.000	0.000
92.000-86.000					B	1.729	0.000		52.89	0.000	0.000
					C	1.729	0.000		52.89	0.000	0.000
					D	1.729	0.000		52.89	0.000	0.000
T4	84.000	1.834	0.00	5.108	A	1.372	0.000	0.813	59.23	0.000	0.000
86.000-82.000					B	1.372	0.000		59.23	0.000	0.000
					C	1.372	0.000		59.23	0.000	0.000
					D	1.372	0.000		59.23	0.000	0.000
T5	80.500	1.812	0.00	6.207	A	1.366	0.000	0.651	47.63	0.000	0.000
82.000-79.000					B	1.366	0.000		47.63	0.000	0.000
					C	1.366	0.000		47.63	0.000	0.000
					D	1.366	0.000		47.63	0.000	0.000
T6	76.500	1.785	0.00	14.362	A	2.461	0.000	1.270	51.61	0.000	0.000
79.000-74.000					B	2.461	0.000		51.61	0.000	0.000
					C	2.461	0.000		51.61	0.000	0.000
					D	2.461	0.000		51.61	0.000	0.000
T7	71.500	1.751	0.00	14.428	A	2.718	0.000	1.524	56.08	0.000	0.000
74.000-69.000					B	2.718	0.000		56.08	0.000	0.000
					C	2.718	0.000		56.08	0.000	0.000
					D	2.718	0.000		56.08	0.000	0.000
T8	65.250	1.706	0.00	21.641	A	4.063	0.000	2.286	56.27	0.000	0.000
69.000-61.500					B	4.063	0.000		56.27	0.000	0.000
					C	4.063	0.000		56.27	0.000	0.000
					D	4.063	0.000		56.27	0.000	0.000
T9	59.000	1.658	0.00	14.428	A	2.719	0.000	1.524	56.06	0.000	0.000
61.500-56.500					B	2.719	0.000		56.06	0.000	0.000
					C	2.719	0.000		56.06	0.000	0.000
					D	2.719	0.000		56.06	0.000	0.000
T10	54.600	1.621	0.00	12.143	A	2.328	0.000	1.166	50.07	0.000	0.000
56.500-52.700					B	2.328	0.000		50.07	0.000	0.000
					C	2.328	0.000		50.07	0.000	0.000
					D	2.328	0.000		50.07	0.000	0.000
T11	50.850	1.589	0.00	14.071	A	2.225	0.000	1.135	51.01	0.000	0.000
52.700-49.000					B	2.225	0.000		51.01	0.000	0.000
					C	2.225	0.000		51.01	0.000	0.000
					D	2.225	0.000		51.01	0.000	0.000
T12	47.000	1.553	0.00	17.706	A	2.829	0.000	1.227	43.38	0.000	0.000
49.000-45.000					B	2.829	0.000		43.38	0.000	0.000
					C	2.829	0.000		43.38	0.000	0.000
					D	2.829	0.000		43.38	0.000	0.000
T13	43.000	1.514	0.00	20.297	A	3.008	0.000	1.227	40.80	0.000	0.000
45.000-41.000					B	3.008	0.000		40.80	0.000	0.000
					C	3.008	0.000		40.80	0.000	0.000
					D	3.008	0.000		40.80	0.000	0.000
T14	39.000	1.473	0.00	22.888	A	3.190	0.000	1.227	38.47	0.000	0.000
41.000-37.000					B	3.190	0.000		38.47	0.000	0.000
					C	3.190	0.000		38.47	0.000	0.000
					D	3.190	0.000		38.47	0.000	0.000
T15	35.000	1.428	0.00	25.479	A	3.376	0.000	1.227	36.35	0.000	0.000
37.000-33.000					B	3.376	0.000		36.35	0.000	0.000
					C	3.376	0.000		36.35	0.000	0.000
					D	3.376	0.000		36.35	0.000	0.000
T16	29.000	1.353	0.00	58.731	A	5.595	0.000	2.454	43.86	0.000	0.000
33.000-25.000					B	5.595	0.000		43.86	0.000	0.000
					C	5.595	0.000		43.86	0.000	0.000
					D	5.595	0.000		43.86	0.000	0.000
T17	20.500	1.226	0.00	78.461	A	6.586	0.000	2.761	41.92	0.000	0.000

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	z m	K _Z	q _z MPa	A _G m ²	F a c e	A _F m ²	A _R m ²	A _{leg} m ²	Leg %	C _A A _A In Face m ²	C _A A _A Out Face m ²
25.000-16.000					B	6.586	0.000		41.92	0.000	0.000
					C	6.586	0.000		41.92	0.000	0.000
					D	6.586	0.000		41.92	0.000	0.000
T18 16.000-8.000	12.000	1.052	0.00	80.755	A	6.796	0.000	2.454	36.12	0.000	0.000
					B	6.796	0.000		36.12	0.000	0.000
					C	6.796	0.000		36.12	0.000	0.000
					D	6.796	0.000		36.12	0.000	0.000
T19 8.000-4.000	6.000	1	0.00	44.264	A	3.635	0.000	1.227	33.76	0.000	0.000
					B	3.635	0.000		33.76	0.000	0.000
					C	3.635	0.000		33.76	0.000	0.000
					D	3.635	0.000		33.76	0.000	0.000
T20 4.000-0.000	2.000	1	0.00	46.856	A	5.042	0.000	1.227	24.34	0.000	0.000
					B	5.042	0.000		24.34	0.000	0.000
					C	5.042	0.000		24.34	0.000	0.000
					D	5.042	0.000		24.34	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 _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T1 100.000-95.000	3.62	390.31	A	0.422	2.223	0.661	1	1	1.235	414.67	82.93	D
			B	0.422	2.223	0.661	1	1	1.235			
			C	0.422	2.223	0.661	1	1	1.235			
			D	0.422	2.223	0.661	1	1	1.235			
T2 95.000-92.000	3.62	260.21	A	0.287	2.636	0.612	1	1	0.800	315.00	105.00	D
			B	0.287	2.636	0.612	1	1	0.800			
			C	0.287	2.636	0.612	1	1	0.800			
			D	0.287	2.636	0.612	1	1	0.800			
T3 92.000-86.000	4.46	571.10	A	0.228	2.863	0.597	1	1	1.729	728.62	121.44	D
			B	0.228	2.863	0.597	1	1	1.729			
			C	0.228	2.863	0.597	1	1	1.729			
			D	0.228	2.863	0.597	1	1	1.729			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1	1	1.372	537.28	134.32	D
			B	0.269	2.704	0.607	1	1	1.372			
			C	0.269	2.704	0.607	1	1	1.372			
			D	0.269	2.704	0.607	1	1	1.372			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1	1	1.366	565.74	188.58	D
			B	0.22	2.895	0.595	1	1	1.366			
			C	0.22	2.895	0.595	1	1	1.366			
			D	0.22	2.895	0.595	1	1	1.366			
T6 79.000-74.000	5.37	1171.36	A	0.171	3.107	0.585	1	1	2.461	1077.77	215.55	D
			B	0.171	3.107	0.585	1	1	2.461			
			C	0.171	3.107	0.585	1	1	2.461			
			D	0.171	3.107	0.585	1	1	2.461			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1	1	2.718	1138.97	227.79	D
			B	0.188	3.031	0.588	1	1	2.718			
			C	0.188	3.031	0.588	1	1	2.718			
			D	0.188	3.031	0.588	1	1	2.718			
T8 69.000-61.500	6.26	1758.34	A	0.188	3.033	0.588	1	1	4.063	1660.31	221.37	D
			B	0.188	3.033	0.588	1	1	4.063			
			C	0.188	3.033	0.588	1	1	4.063			
			D	0.188	3.033	0.588	1	1	4.063			
T9 61.500-56.500	7.16	1172.23	A	0.188	3.03	0.588	1	1	2.719	1078.37	215.67	D
			B	0.188	3.03	0.588	1	1	2.719			
			C	0.188	3.03	0.588	1	1	2.719			

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T10 56.500-52.700	7.16	1323.89	D	0.188	3.03	0.588	1	1	2.719	899.04	236.59	D
			A	0.192	3.016	0.589	1	1	2.328			
			B	0.192	3.016	0.589	1	1	2.328			
			C	0.192	3.016	0.589	1	1	2.328			
T11 52.700-49.000	7.16	1072.92	D	0.192	3.016	0.589	1	1	2.328	884.17	238.97	D
			A	0.158	3.167	0.583	1	1	2.225			
			B	0.158	3.167	0.583	1	1	2.225			
			C	0.158	3.167	0.583	1	1	2.225			
T12 49.000-45.000	7.16	1296.70	D	0.158	3.167	0.583	1	1	2.225	1096.29	274.07	D
			A	0.16	3.16	0.583	1	1	2.829			
			B	0.16	3.16	0.583	1	1	2.829			
			C	0.16	3.16	0.583	1	1	2.829			
T13 45.000-41.000	7.16	1357.01	D	0.16	3.16	0.583	1	1	2.829	1155.83	288.96	D
			A	0.148	3.214	0.581	1	1	3.008			
			B	0.148	3.214	0.581	1	1	3.008			
			C	0.148	3.214	0.581	1	1	3.008			
T14 41.000-37.000	7.16	1442.25	D	0.148	3.214	0.581	1	1	3.008	1207.83	301.96	D
			A	0.139	3.255	0.58	1	1	3.190			
			B	0.139	3.255	0.58	1	1	3.190			
			C	0.139	3.255	0.58	1	1	3.190			
T15 37.000-33.000	7.16	1508.23	D	0.139	3.255	0.58	1	1	3.190	1251.91	312.98	D
			A	0.133	3.288	0.579	1	1	3.376			
			B	0.133	3.288	0.579	1	1	3.376			
			C	0.133	3.288	0.579	1	1	3.376			
T16 33.000-25.000	7.16	3131.77	D	0.133	3.288	0.579	1	1	3.376	2077.27	259.66	D
			A	0.095	3.474	0.575	1	1	5.595			
			B	0.095	3.474	0.575	1	1	5.595			
			C	0.095	3.474	0.575	1	1	5.595			
T17 25.000-16.000	7.16	3747.74	D	0.095	3.474	0.575	1	1	5.595	2251.85	250.21	D
			A	0.084	3.533	0.574	1	1	6.586			
			B	0.084	3.533	0.574	1	1	6.586			
			C	0.084	3.533	0.574	1	1	6.586			
T18 16.000-8.000	7.16	3827.74	D	0.084	3.533	0.574	1	1	6.586	1993.29	249.16	D
			A	0.084	3.532	0.574	1	1	6.796			
			B	0.084	3.532	0.574	1	1	6.796			
			C	0.084	3.532	0.574	1	1	6.796			
T19 8.000-4.000	7.16	2377.69	D	0.084	3.532	0.574	1	1	6.796	1016.90	254.22	D
			A	0.082	3.542	0.573	1	1	3.635			
			B	0.082	3.542	0.573	1	1	3.635			
			C	0.082	3.542	0.573	1	1	3.635			
T20 4.000-0.000	7.16	2424.61	D	0.082	3.542	0.573	1	1	3.635	1358.31	339.58	D
			A	0.108	3.411	0.576	1	1	5.042			
			B	0.108	3.411	0.576	1	1	5.042			
			C	0.108	3.411	0.576	1	1	5.042			
Sum Weight:	126.23	31110.36	D	0.108	3.411	0.576	1	1	5.042	22709.43		
								OTM	986587 kg-m			

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T1 100.000-95.00	3.62	390.31	A	0.422	2.223	0.661	1.2	1.2	1.481	497.61	99.52	D
			B	0.422	2.223	0.661	1.2	1.2	1.481			

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
0			C	0.422	2.223	0.661	1.2	1.2	1.481			
T2	3.62	260.21	D	0.422	2.223	0.661	1.2	1.2	1.481			
95.000-92.000			A	0.287	2.636	0.612	1.2	1.2	0.961	377.99	126.00	D
			B	0.287	2.636	0.612	1.2	1.2	0.961			
			C	0.287	2.636	0.612	1.2	1.2	0.961			
			D	0.287	2.636	0.612	1.2	1.2	0.961			
T3	4.46	571.10	A	0.228	2.863	0.597	1.171	1.171	2.024	853.20	142.20	D
92.000-86.000			B	0.228	2.863	0.597	1.171	1.171	2.024			
			C	0.228	2.863	0.597	1.171	1.171	2.024			
			D	0.228	2.863	0.597	1.171	1.171	2.024			
T4	5.37	450.89	A	0.269	2.704	0.607	1.2	1.2	1.647	644.74	161.18	D
86.000-82.000			B	0.269	2.704	0.607	1.2	1.2	1.647			
			C	0.269	2.704	0.607	1.2	1.2	1.647			
			D	0.269	2.704	0.607	1.2	1.2	1.647			
T5	5.37	526.92	A	0.22	2.895	0.595	1.165	1.165	1.591	659.10	219.70	D
82.000-79.000			B	0.22	2.895	0.595	1.165	1.165	1.591			
			C	0.22	2.895	0.595	1.165	1.165	1.591			
			D	0.22	2.895	0.595	1.165	1.165	1.591			
T6	5.37	1171.36	A	0.171	3.107	0.585	1.129	1.129	2.777	1216.27	243.25	D
79.000-74.000			B	0.171	3.107	0.585	1.129	1.129	2.777			
			C	0.171	3.107	0.585	1.129	1.129	2.777			
			D	0.171	3.107	0.585	1.129	1.129	2.777			
T7	6.26	1172.23	A	0.188	3.031	0.588	1.141	1.141	3.102	1299.88	259.98	D
74.000-69.000			B	0.188	3.031	0.588	1.141	1.141	3.102			
			C	0.188	3.031	0.588	1.141	1.141	3.102			
			D	0.188	3.031	0.588	1.141	1.141	3.102			
T8	6.26	1758.34	A	0.188	3.033	0.588	1.141	1.141	4.635	1894.08	252.54	D
69.000-61.500			B	0.188	3.033	0.588	1.141	1.141	4.635			
			C	0.188	3.033	0.588	1.141	1.141	4.635			
			D	0.188	3.033	0.588	1.141	1.141	4.635			
T9	7.16	1172.23	A	0.188	3.03	0.588	1.141	1.141	3.103	1230.76	246.15	D
61.500-56.500			B	0.188	3.03	0.588	1.141	1.141	3.103			
			C	0.188	3.03	0.588	1.141	1.141	3.103			
			D	0.188	3.03	0.588	1.141	1.141	3.103			
T10	7.16	1323.89	A	0.192	3.016	0.589	1.144	1.144	2.663	1028.33	270.61	D
56.500-52.700			B	0.192	3.016	0.589	1.144	1.144	2.663			
			C	0.192	3.016	0.589	1.144	1.144	2.663			
			D	0.192	3.016	0.589	1.144	1.144	2.663			
T11	7.16	1072.92	A	0.158	3.167	0.583	1.119	1.119	2.489	989.05	267.31	D
52.700-49.000			B	0.158	3.167	0.583	1.119	1.119	2.489			
			C	0.158	3.167	0.583	1.119	1.119	2.489			
			D	0.158	3.167	0.583	1.119	1.119	2.489			
T12	7.16	1296.70	A	0.16	3.16	0.583	1.12	1.12	3.168	1227.65	306.91	D
49.000-45.000			B	0.16	3.16	0.583	1.12	1.12	3.168			
			C	0.16	3.16	0.583	1.12	1.12	3.168			
			D	0.16	3.16	0.583	1.12	1.12	3.168			
T13	7.16	1357.01	A	0.148	3.214	0.581	1.111	1.111	3.342	1284.28	321.07	D
45.000-41.000			B	0.148	3.214	0.581	1.111	1.111	3.342			
			C	0.148	3.214	0.581	1.111	1.111	3.342			
			D	0.148	3.214	0.581	1.111	1.111	3.342			
T14	7.16	1442.25	A	0.139	3.255	0.58	1.105	1.105	3.524	1334.10	333.53	D
41.000-37.000			B	0.139	3.255	0.58	1.105	1.105	3.524			
			C	0.139	3.255	0.58	1.105	1.105	3.524			
			D	0.139	3.255	0.58	1.105	1.105	3.524			
T15	7.16	1508.23	A	0.133	3.288	0.579	1.099	1.099	3.712	1376.33	344.08	D
37.000-33.000			B	0.133	3.288	0.579	1.099	1.099	3.712			
			C	0.133	3.288	0.579	1.099	1.099	3.712			
			D	0.133	3.288	0.579	1.099	1.099	3.712			
T16	7.16	3131.77	A	0.095	3.474	0.575	1.071	1.071	5.995	2225.70	278.21	D
33.000-25.000			B	0.095	3.474	0.575	1.071	1.071	5.995			

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation <i>m</i>	Add Weight <i>kg</i>	Self Weight <i>kg</i>	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i> <i>m</i> ²	<i>F</i> <i>kg</i>	<i>w</i> <i>kg/m</i>	Ctrl. Face
T17 25.000-16.000	7.16	3747.74	C	0.095	3.474	0.575	1.071	1.071	5.995			
			D	0.095	3.474	0.575	1.071	1.071	5.995			
			A	0.084	3.533	0.574	1.063	1.063	7.001	2393.62	265.96	D
			B	0.084	3.533	0.574	1.063	1.063	7.001			
			C	0.084	3.533	0.574	1.063	1.063	7.001			
			D	0.084	3.533	0.574	1.063	1.063	7.001			
T18 16.000-8.000	7.16	3827.74	A	0.084	3.532	0.574	1.063	1.063	7.225	2119.09	264.89	D
			B	0.084	3.532	0.574	1.063	1.063	7.225			
			C	0.084	3.532	0.574	1.063	1.063	7.225			
			D	0.084	3.532	0.574	1.063	1.063	7.225			
T19 8.000-4.000	7.16	2377.69	A	0.082	3.542	0.573	1.062	1.062	3.859	1079.54	269.88	D
			B	0.082	3.542	0.573	1.062	1.062	3.859			
			C	0.082	3.542	0.573	1.062	1.062	3.859			
			D	0.082	3.542	0.573	1.062	1.062	3.859			
T20 4.000-0.000	7.16	2424.61	A	0.108	3.411	0.576	1.081	1.081	5.449	1467.94	366.98	D
			B	0.108	3.411	0.576	1.081	1.081	5.449			
			C	0.108	3.411	0.576	1.081	1.081	5.449			
			D	0.108	3.411	0.576	1.081	1.081	5.449			
Sum Weight:	126.23	31110.36						OTM	1117222 kg-m	25199.27		

Tower Forces - Service - Wind Normal To Face

Section Elevation <i>m</i>	Add Weight <i>kg</i>	Self Weight <i>kg</i>	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i> <i>m</i> ²	<i>F</i> <i>kg</i>	<i>w</i> <i>kg/m</i>	Ctrl. Face
T1 100.000-95.000	3.62	390.31	A	0.422	2.223	0.661	1	1	1.235	103.67	20.73	D
			B	0.422	2.223	0.661	1	1	1.235			
			C	0.422	2.223	0.661	1	1	1.235			
			D	0.422	2.223	0.661	1	1	1.235			
T2 95.000-92.000	3.62	260.21	A	0.287	2.636	0.612	1	1	0.800	78.75	26.25	D
			B	0.287	2.636	0.612	1	1	0.800			
			C	0.287	2.636	0.612	1	1	0.800			
			D	0.287	2.636	0.612	1	1	0.800			
T3 92.000-86.000	4.46	571.10	A	0.228	2.863	0.597	1	1	1.729	182.16	30.36	D
			B	0.228	2.863	0.597	1	1	1.729			
			C	0.228	2.863	0.597	1	1	1.729			
			D	0.228	2.863	0.597	1	1	1.729			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1	1	1.372	134.32	33.58	D
			B	0.269	2.704	0.607	1	1	1.372			
			C	0.269	2.704	0.607	1	1	1.372			
			D	0.269	2.704	0.607	1	1	1.372			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1	1	1.366	141.43	47.14	D
			B	0.22	2.895	0.595	1	1	1.366			
			C	0.22	2.895	0.595	1	1	1.366			
			D	0.22	2.895	0.595	1	1	1.366			
T6 79.000-74.000	5.37	1171.36	A	0.171	3.107	0.585	1	1	2.461	269.44	53.89	D
			B	0.171	3.107	0.585	1	1	2.461			
			C	0.171	3.107	0.585	1	1	2.461			
			D	0.171	3.107	0.585	1	1	2.461			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1	1	2.718	284.74	56.95	D
			B	0.188	3.031	0.588	1	1	2.718			
			C	0.188	3.031	0.588	1	1	2.718			
			D	0.188	3.031	0.588	1	1	2.718			
T8	6.26	1758.34	A	0.188	3.033	0.588	1	1	4.063	415.08	55.34	D

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2	Page 20 of 55
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
69.000-61.500			B	0.188	3.033	0.588	1	1	4.063			
			C	0.188	3.033	0.588	1	1	4.063			
			D	0.188	3.033	0.588	1	1	4.063			
T9	7.16	1172.23	A	0.188	3.03	0.588	1	1	2.719	269.59	53.92	D
61.500-56.500			B	0.188	3.03	0.588	1	1	2.719			
			C	0.188	3.03	0.588	1	1	2.719			
			D	0.188	3.03	0.588	1	1	2.719			
T10	7.16	1323.89	A	0.192	3.016	0.589	1	1	2.328	224.76	59.15	D
56.500-52.700			B	0.192	3.016	0.589	1	1	2.328			
			C	0.192	3.016	0.589	1	1	2.328			
			D	0.192	3.016	0.589	1	1	2.328			
T11	7.16	1072.92	A	0.158	3.167	0.583	1	1	2.225	221.04	59.74	D
52.700-49.000			B	0.158	3.167	0.583	1	1	2.225			
			C	0.158	3.167	0.583	1	1	2.225			
			D	0.158	3.167	0.583	1	1	2.225			
T12	7.16	1296.70	A	0.16	3.16	0.583	1	1	2.829	274.07	68.52	D
49.000-45.000			B	0.16	3.16	0.583	1	1	2.829			
			C	0.16	3.16	0.583	1	1	2.829			
			D	0.16	3.16	0.583	1	1	2.829			
T13	7.16	1357.01	A	0.148	3.214	0.581	1	1	3.008	288.96	72.24	D
45.000-41.000			B	0.148	3.214	0.581	1	1	3.008			
			C	0.148	3.214	0.581	1	1	3.008			
			D	0.148	3.214	0.581	1	1	3.008			
T14	7.16	1442.25	A	0.139	3.255	0.58	1	1	3.190	301.96	75.49	D
41.000-37.000			B	0.139	3.255	0.58	1	1	3.190			
			C	0.139	3.255	0.58	1	1	3.190			
			D	0.139	3.255	0.58	1	1	3.190			
T15	7.16	1508.23	A	0.133	3.288	0.579	1	1	3.376	312.98	78.24	D
37.000-33.000			B	0.133	3.288	0.579	1	1	3.376			
			C	0.133	3.288	0.579	1	1	3.376			
			D	0.133	3.288	0.579	1	1	3.376			
T16	7.16	3131.77	A	0.095	3.474	0.575	1	1	5.595	519.32	64.91	D
33.000-25.000			B	0.095	3.474	0.575	1	1	5.595			
			C	0.095	3.474	0.575	1	1	5.595			
			D	0.095	3.474	0.575	1	1	5.595			
T17	7.16	3747.74	A	0.084	3.533	0.574	1	1	6.586	562.96	62.55	D
25.000-16.000			B	0.084	3.533	0.574	1	1	6.586			
			C	0.084	3.533	0.574	1	1	6.586			
			D	0.084	3.533	0.574	1	1	6.586			
T18	7.16	3827.74	A	0.084	3.532	0.574	1	1	6.796	498.32	62.29	D
16.000-8.000			B	0.084	3.532	0.574	1	1	6.796			
			C	0.084	3.532	0.574	1	1	6.796			
			D	0.084	3.532	0.574	1	1	6.796			
T19	7.16	2377.69	A	0.082	3.542	0.573	1	1	3.635	254.22	63.56	D
8.000-4.000			B	0.082	3.542	0.573	1	1	3.635			
			C	0.082	3.542	0.573	1	1	3.635			
			D	0.082	3.542	0.573	1	1	3.635			
T20	7.16	2424.61	A	0.108	3.411	0.576	1	1	5.042	339.58	84.89	D
4.000-0.000			B	0.108	3.411	0.576	1	1	5.042			
			C	0.108	3.411	0.576	1	1	5.042			
			D	0.108	3.411	0.576	1	1	5.042			
Sum Weight:	126.23	31110.36						OTM	246647 kg-m	5677.36		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
m	kg	kg							m ²	kg	kglm	
T1 100.000-95.000	3.62	390.31	A	0.422	2.223	0.661	1.2	1.2	1.481	124.40	24.88	D
			B	0.422	2.223	0.661	1.2	1.2	1.481			
			C	0.422	2.223	0.661	1.2	1.2	1.481			
			D	0.422	2.223	0.661	1.2	1.2	1.481			
T2 95.000-92.000	3.62	260.21	A	0.287	2.636	0.612	1.2	1.2	0.961	94.50	31.50	D
			B	0.287	2.636	0.612	1.2	1.2	0.961			
			C	0.287	2.636	0.612	1.2	1.2	0.961			
			D	0.287	2.636	0.612	1.2	1.2	0.961			
T3 92.000-86.000	4.46	571.10	A	0.228	2.863	0.597	1.171	1.171	2.024	213.30	35.55	D
			B	0.228	2.863	0.597	1.171	1.171	2.024			
			C	0.228	2.863	0.597	1.171	1.171	2.024			
			D	0.228	2.863	0.597	1.171	1.171	2.024			
T4 86.000-82.000	5.37	450.89	A	0.269	2.704	0.607	1.2	1.2	1.647	161.18	40.30	D
			B	0.269	2.704	0.607	1.2	1.2	1.647			
			C	0.269	2.704	0.607	1.2	1.2	1.647			
			D	0.269	2.704	0.607	1.2	1.2	1.647			
T5 82.000-79.000	5.37	526.92	A	0.22	2.895	0.595	1.165	1.165	1.591	164.78	54.93	D
			B	0.22	2.895	0.595	1.165	1.165	1.591			
			C	0.22	2.895	0.595	1.165	1.165	1.591			
			D	0.22	2.895	0.595	1.165	1.165	1.591			
T6 79.000-74.000	5.37	1171.36	A	0.171	3.107	0.585	1.129	1.129	2.777	304.07	60.81	D
			B	0.171	3.107	0.585	1.129	1.129	2.777			
			C	0.171	3.107	0.585	1.129	1.129	2.777			
			D	0.171	3.107	0.585	1.129	1.129	2.777			
T7 74.000-69.000	6.26	1172.23	A	0.188	3.031	0.588	1.141	1.141	3.102	324.97	64.99	D
			B	0.188	3.031	0.588	1.141	1.141	3.102			
			C	0.188	3.031	0.588	1.141	1.141	3.102			
			D	0.188	3.031	0.588	1.141	1.141	3.102			
T8 69.000-61.500	6.26	1758.34	A	0.188	3.033	0.588	1.141	1.141	4.635	473.52	63.14	D
			B	0.188	3.033	0.588	1.141	1.141	4.635			
			C	0.188	3.033	0.588	1.141	1.141	4.635			
			D	0.188	3.033	0.588	1.141	1.141	4.635			
T9 61.500-56.500	7.16	1172.23	A	0.188	3.03	0.588	1.141	1.141	3.103	307.69	61.54	D
			B	0.188	3.03	0.588	1.141	1.141	3.103			
			C	0.188	3.03	0.588	1.141	1.141	3.103			
			D	0.188	3.03	0.588	1.141	1.141	3.103			
T10 56.500-52.700	7.16	1323.89	A	0.192	3.016	0.589	1.144	1.144	2.663	257.08	67.65	D
			B	0.192	3.016	0.589	1.144	1.144	2.663			
			C	0.192	3.016	0.589	1.144	1.144	2.663			
			D	0.192	3.016	0.589	1.144	1.144	2.663			
T11 52.700-49.000	7.16	1072.92	A	0.158	3.167	0.583	1.119	1.119	2.489	247.26	66.83	D
			B	0.158	3.167	0.583	1.119	1.119	2.489			
			C	0.158	3.167	0.583	1.119	1.119	2.489			
			D	0.158	3.167	0.583	1.119	1.119	2.489			
T12 49.000-45.000	7.16	1296.70	A	0.16	3.16	0.583	1.12	1.12	3.168	306.91	76.73	D
			B	0.16	3.16	0.583	1.12	1.12	3.168			
			C	0.16	3.16	0.583	1.12	1.12	3.168			
			D	0.16	3.16	0.583	1.12	1.12	3.168			
T13 45.000-41.000	7.16	1357.01	A	0.148	3.214	0.581	1.111	1.111	3.342	321.07	80.27	D
			B	0.148	3.214	0.581	1.111	1.111	3.342			
			C	0.148	3.214	0.581	1.111	1.111	3.342			
			D	0.148	3.214	0.581	1.111	1.111	3.342			
T14 41.000-37.000	7.16	1442.25	A	0.139	3.255	0.58	1.105	1.105	3.524	333.53	83.38	D
			B	0.139	3.255	0.58	1.105	1.105	3.524			
			C	0.139	3.255	0.58	1.105	1.105	3.524			
			D	0.139	3.255	0.58	1.105	1.105	3.524			
T15 37.000-33.000	7.16	1508.23	A	0.133	3.288	0.579	1.099	1.099	3.712	344.08	86.02	D
			B	0.133	3.288	0.579	1.099	1.099	3.712			
			C	0.133	3.288	0.579	1.099	1.099	3.712			
			D	0.133	3.288	0.579	1.099	1.099	3.712			

RISATower  Carrera 124 No 17 - 98 Bogotá - Colombia Phone: (57-1) 547 07 90 FAX: (57-1) 547 07 90	Job ESTUDIO ESTRUCTURAL - ESTACION MONTERIA HIPOTESIS 2	Page 22 of 55
	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section Elevation m	Add Weight kg	Self Weight kg	F a c e	e	C _F	R _R	D _F	D _R	A _E m ²	F kg	w kg/m	Ctrl. Face
T16 33.000-25.000	7.16	3131.77	A	0.095	3.474	0.575	1.071	1.071	5.995	556.42	69.55	D
			B	0.095	3.474	0.575	1.071	1.071	5.995			
			C	0.095	3.474	0.575	1.071	1.071	5.995			
			D	0.095	3.474	0.575	1.071	1.071	5.995			
T17 25.000-16.000	7.16	3747.74	A	0.084	3.533	0.574	1.063	1.063	7.001	598.40	66.49	D
			B	0.084	3.533	0.574	1.063	1.063	7.001			
			C	0.084	3.533	0.574	1.063	1.063	7.001			
			D	0.084	3.533	0.574	1.063	1.063	7.001			
T18 16.000-8.000	7.16	3827.74	A	0.084	3.532	0.574	1.063	1.063	7.225	529.77	66.22	D
			B	0.084	3.532	0.574	1.063	1.063	7.225			
			C	0.084	3.532	0.574	1.063	1.063	7.225			
			D	0.084	3.532	0.574	1.063	1.063	7.225			
T19 8.000-4.000	7.16	2377.69	A	0.082	3.542	0.573	1.062	1.062	3.859	269.88	67.47	D
			B	0.082	3.542	0.573	1.062	1.062	3.859			
			C	0.082	3.542	0.573	1.062	1.062	3.859			
			D	0.082	3.542	0.573	1.062	1.062	3.859			
T20 4.000-0.000	7.16	2424.61	A	0.108	3.411	0.576	1.081	1.081	5.449	366.98	91.75	D
			B	0.108	3.411	0.576	1.081	1.081	5.449			
			C	0.108	3.411	0.576	1.081	1.081	5.449			
			D	0.108	3.411	0.576	1.081	1.081	5.449			
Sum Weight:	126.23	31110.36						OTM	279306 kg-m	6299.82		

Force Totals

Load Case	Vertical Forces kg	Sum of Forces X kg	Sum of Forces Z kg	Sum of Overturning Moments, M _x kg-m	Sum of Overturning Moments, M _z kg-m	Sum of Torques kg-m
Leg Weight	14345.93					
Bracing Weight	16638.21					
Total Member Self-Weight	30984.13			466	466	
Gusset Weight	126.23					
Total Weight	32899.57			466	466	
Wind 0 deg - No Ice		456.78	-25576.39	-1213798	-6111	-117
Wind 45 deg - No Ice		19951.18	-19951.18	-952039	-952039	0
Wind 90 deg - No Ice		25576.39	-456.78	-6111	-1213798	117
Wind 180 deg - No Ice		-18.63	25374.26	1211820	735	1269
Total Weight	32899.57			466	466	
Wind 0 deg - Service		114.20	-6394.10	-303100	-1178	-29
Wind 45 deg - Service		4987.80	-4987.80	-237660	-237660	0
Wind 90 deg - Service		6394.10	-114.20	-1178	-303100	29
Wind 180 deg - Service		-4.66	6343.56	303305	533	317

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 45 deg - No Ice

Comb. No.	Description
4	Dead+Wind 90 deg - No Ice
5	Dead+Wind 180 deg - No Ice
6	Dead+Wind 0 deg - Service
7	Dead+Wind 45 deg - Service
8	Dead+Wind 90 deg - Service
9	Dead+Wind 180 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	100 - 95	Leg	Max Tension	3	4776.19	-10	-10
			Max. Compression	3	-4911.48	-12	-12
			Max. Mx	3	-118.25	29	-28
			Max. My	3	-118.05	-28	29
			Max. Vy	3	-87.22	29	-28
			Max. Vx	3	-87.25	-28	29
		Diagonal	Max Tension	3	1036.70	0	0
			Max. Compression	3	-1076.21	0	0
			Max. Mx	2	264.40	0	0
			Max. My	5	63.95	0	0
			Max. Vy	2	0.56	0	0
			Max. Vx	5	-0.02	0	0
		Horizontal	Max Tension	4	106.91	0	0
			Max. Compression	3	-105.52	-4	0
			Max. Mx	2	106.89	-7	0
			Max. My	2	90.94	7	0
			Max. Vy	2	24.38	0	0
			Max. Vx	2	-0.92	7	0
		Top Girt	Max Tension	4	31.56	0	0
			Max. Compression	2	-30.49	0	0
			Max. Mx	1	0.10	0	0
			Max. My	3	-22.39	0	0
			Max. Vy	1	1.63	0	0
			Max. Vx	3	-0.00	0	0
		Inner Bracing	Max Tension	3	17.91	0	0
			Max. Compression	3	-15.77	0	0
			Max. Mx	1	0.09	0	0
			Max. My	4	0.78	0	0
			Max. Vy	1	-1.30	0	0
			Max. Vx	4	0.02	0	0
T2	95 - 92	Leg	Max Tension	3	5130.74	-1	-1
			Max. Compression	3	-5404.63	4	4
			Max. Mx	3	-80.80	18	-17
			Max. My	3	-80.87	-17	18
			Max. Vy	4	25.44	18	-6
			Max. Vx	2	25.44	-6	18
		Diagonal	Max Tension	2	1084.81	0	0
			Max. Compression	4	-1160.63	0	0
			Max. Mx	2	106.69	-1	0
			Max. My	2	1084.81	0	0
			Max. Vy	2	1.25	0	0
			Max. Vx	2	-0.41	0	0
		Horizontal	Max Tension	4	41.34	0	0
			Max. Compression	2	-55.72	0	0
			Max. Mx	2	2.26	1	1
			Max. My	2	2.26	1	1
			Max. Vy	2	-2.63	1	1

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T3	92 - 86	Top Girt	Max. Vx	2	2.01	0	0
			Max Tension	2	1.76	0	0
			Max. Compression	4	-17.07	0	0
			Max. Mx	1	-4.57	0	0
			Max. My	1	-4.57	0	0
			Max. Vy	1	1.24	0	0
		Leg	Max. Vx	1	-0.14	0	0
			Max Tension	3	14255.83	-20	-20
			Max. Compression	3	-15195.04	16	16
			Max. Mx	3	-315.03	54	-52
			Max. My	3	-315.04	-52	54
			Max. Vy	3	-88.70	54	-52
			Max. Vx	3	-88.70	-52	54
			Max Tension	3	1761.15	0	0
			Max. Compression	3	-1761.92	0	0
			Max. Mx	2	1112.39	0	0
			Max. My	5	-550.27	0	0
			Max. Vy	2	1.24	0	0
			Max. Vx	5	-0.04	0	0
		Horizontal	Max Tension	5	125.95	0	0
			Max. Compression	5	-139.25	0	0
			Max. Mx	4	102.81	4	0
			Max. My	4	-60.87	0	-1
			Max. Vy	4	7.78	4	0
			Max. Vx	4	1.29	0	-1
		Top Girt	Max Tension	4	1138.32	0	0
			Max. Compression	2	-1053.06	0	0
			Max. Mx	1	40.96	-1	0
			Max. My	3	-773.25	0	0
			Max. Vy	1	2.76	0	0
			Max. Vx	3	-0.00	0	0
T4	86 - 82	Leg	Max Tension	3	23305.06	-61	-61
			Max. Compression	3	-24297.71	-9	-9
			Max. Mx	3	-566.39	167	-161
			Max. My	3	-566.42	-161	167
			Max. Vy	4	-227.29	157	-63
			Max. Vx	4	-227.29	-63	157
		Diagonal	Max Tension	3	2250.25	0	0
			Max. Compression	3	-2144.38	0	0
			Max. Mx	2	1715.25	0	0
			Max. My	5	30.20	0	0
			Max. Vy	2	1.23	0	0
			Max. Vx	5	-0.03	0	0
		Horizontal	Max Tension	5	293.23	0	0
			Max. Compression	5	-303.81	0	0
			Max. Mx	4	234.65	6	1
			Max. My	4	-45.61	0	-2
			Max. Vy	4	11.30	6	1
			Max. Vx	4	2.64	0	-2
		Top Girt	Max Tension	2	212.15	0	0
			Max. Compression	4	-250.60	0	0
			Max. Mx	1	7.33	-1	0
			Max. My	3	-181.73	0	0
			Max. Vy	1	2.76	0	0
			Max. Vx	3	-0.00	0	0
T5	82 - 79	Leg	Max Tension	3	15774.12	10	10
			Max. Compression	3	-16349.62	31	31
			Max. Mx	4	10047.46	35	-6
			Max. My	4	10047.53	-6	35
			Max. Vy	4	51.90	35	-6
			Max. Vx	4	51.91	-6	35

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T6	79 - 74	Diagonal	Max Tension	3	6811.95	0	0
			Max. Compression	3	-7074.98	0	0
			Max. Mx	2	-3396.77	-3	0
			Max. My	5	3703.93	0	1
			Max. Vy	2	6.25	0	0
		Horizontal	Max. Vx	5	-2.49	0	0
			Max Tension	3	50.67	2	4
			Max. Compression	4	-108.80	0	3
			Max. Mx	2	-14.29	3	5
			Max. My	5	-10.60	-2	19
		Top Girt	Max. Vy	2	-5.18	3	5
			Max. Vx	5	19.11	0	0
			Max Tension	2	2407.06	0	0
			Max. Compression	4	-2648.50	0	0
			Max. Mx	1	-92.15	-1	0
		Leg	Max. My	1	-92.15	0	0
			Max. Vy	1	2.67	0	0
			Max. Vx	1	-0.70	0	0
			Max Tension	3	20200.57	-13	-13
			Max. Compression	3	-21912.12	46	47
		Diagonal	Max. Mx	3	-1197.08	121	-112
			Max. My	3	-1197.12	-112	121
			Max. Vy	3	-119.57	121	-112
			Max. Vx	3	-119.25	-112	121
			Max Tension	2	1886.96	0	0
		Horizontal	Max. Compression	4	-1920.81	0	0
			Max. Mx	2	1670.81	-2	0
			Max. My	5	187.11	0	0
			Max. Vy	2	-3.20	0	0
			Max. Vx	5	-0.03	0	0
		Top Girt	Max Tension	2	147.56	0	0
			Max. Compression	3	-138.06	2	0
			Max. Mx	4	77.41	2	0
			Max. My	2	77.24	2	0
			Max. Vy	4	-4.73	2	0
		Inner Bracing	Max. Vx	2	-0.10	2	0
			Max Tension	4	4602.01	0	0
			Max. Compression	2	-4229.66	0	0
			Max. Mx	1	182.14	-6	0
			Max. My	5	189.56	0	0
T7	74 - 69	Leg	Max. Vy	1	7.99	0	0
			Max. Vx	5	-0.00	0	0
			Max Tension	3	233.08	0	0
			Max. Compression	2	-89.72	0	0
			Max. Mx	1	144.80	9	0
		Diagonal	Max. My	4	1.24	0	0
			Max. Vy	1	-8.96	0	0
			Max. Vx	4	0.08	0	0
			Max Tension	3	28544.59	-38	-38
			Max. Compression	3	-31118.93	80	80
		Horizontal	Max. Mx	3	-1338.53	151	-138
			Max. My	3	-1338.61	-138	151
			Max. Vy	2	-174.24	150	-41
			Max. Vx	2	-174.24	-41	149
			Max Tension	2	2293.48	0	0
		Top Girt	Max. Compression	4	-2326.07	0	0
			Max. Mx	4	2094.48	-2	0
			Max. My	5	-39.84	0	0
			Max. Vy	4	4.04	0	0
			Max. Vx	5	-0.03	0	0
		Inner Bracing	Max Tension	4	266.18	0	0
			Max. Compression	4	-266.18	0	0
			Max. Mx	4	-266.18	0	0
			Max. My	4	-266.18	0	0
			Max. Vy	4	-266.18	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T8	69 - 61.5	Leg	Max. Compression	3	-250.85	1	1
			Max. Mx	2	227.97	2	0
			Max. My	3	-250.85	1	1
			Max. Vy	2	-4.35	2	0
			Max. Vx	3	-0.40	0	0
			Max Tension	3	43863.01	-89	-89
			Max. Compression	3	-47526.87	72	72
			Max. Mx	3	-1602.91	212	-195
			Max. My	3	-1603.00	-195	212
			Max. Vy	2	-249.91	-104	-53
		Diagonal	Max. Vx	2	-249.89	-53	-104
			Max Tension	2	2941.67	0	0
			Max. Compression	4	-3008.97	0	0
			Max. Mx	4	2449.95	-2	0
			Max. My	5	-241.19	0	0
		Horizontal	Max. Vy	4	4.04	0	0
			Max. Vx	5	-0.03	0	0
			Max Tension	4	388.93	0	0
			Max. Compression	2	-370.53	0	0
			Max. Mx	2	358.95	2	0
T9	61.5 - 56.5	Leg	Max. My	4	-103.72	1	-1
			Max. Vy	2	4.59	2	0
			Max. Vx	4	0.58	1	-1
			Max Tension	3	55958.77	-133	-133
			Max. Compression	3	-60129.04	-5	-5
			Max. Mx	3	-2039.04	350	-328
			Max. My	3	-2039.15	-328	350
			Max. Vy	2	-386.69	-153	-59
			Max. Vx	2	-386.80	-115	331
		Diagonal	Max Tension	3	3426.55	0	0
			Max. Compression	4	-3401.06	0	0
			Max. Mx	2	2981.39	-2	0
			Max. My	5	-35.35	0	0
			Max. Vy	2	4.03	0	0
		Horizontal	Max. Vx	5	-0.02	0	0
			Max Tension	2	547.01	0	0
			Max. Compression	4	-537.36	0	0
			Max. Mx	2	383.94	3	1
			Max. My	4	-93.58	1	-3
T10	56.5 - 52.7	Leg	Max. Vy	2	5.59	3	1
			Max. Vx	4	1.90	1	-3
			Max Tension	3	58227.85	16	16
			Max. Compression	3	-62943.35	164	165
			Max. Mx	3	-2760.41	350	-321
			Max. My	3	-2759.39	-320	349
			Max. Vy	2	-232.17	334	-113
			Max. Vx	2	-232.16	-113	334
		Diagonal	Max Tension	3	1551.87	0	0
			Max. Compression	3	-1458.30	0	0
			Max. Mx	3	-1444.58	9	0
			Max. My	3	-1333.08	2	-1
			Max. Vy	3	-9.42	9	0
		Horizontal	Max. Vx	2	-0.76	0	0
			Max Tension	2	257.70	0	0
			Max. Compression	3	-329.87	3	0
			Max. Mx	4	-258.90	3	0
			Max. My	2	-258.09	3	0
T10	56.5 - 52.7	Top Girt	Max. Vy	4	-5.59	3	0
			Max. Vx	2	0.53	3	0
			Max Tension	4	1903.26	0	0
			Max. Compression	2	-2223.81	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T11	52.7 - 49	Redund Diag 1 Bracing	Max. Mx	1	-89.01	-7	0
			Max. My	1	-89.01	0	1
			Max. Vy	1	10.51	0	0
			Max. Vx	1	-0.85	0	0
			Max Tension	3	780.06	0	0
			Max. Compression	3	-780.06	0	0
			Max. Mx	4	3.99	-1	0
			Max. My	5	3.80	0	0
			Max. Vy	4	1.94	0	0
			Max. Vx	5	-0.25	0	0
		Inner Bracing	Max Tension	3	80.38	0	0
			Max. Compression	3	-250.80	0	0
			Max. Mx	1	1.92	18	0
			Max. My	4	1.80	0	0
			Max. Vy	1	-18.05	0	0
			Max. Vx	4	0.10	0	0
			Max Tension	3	57858.85	-128	-128
			Max. Compression	3	-63368.74	124	123
			Max. Mx	3	-2609.09	350	-321
			Max. My	3	-2610.25	-320	349
		Diagonal	Max. Vy	2	271.96	334	-113
			Max. Vx	2	271.98	-112	334
			Max Tension	4	393.74	0	0
			Max. Compression	3	-491.89	0	0
			Max. Mx	3	-44.41	8	0
			Max. My	3	-375.03	7	1
			Max. Vy	3	-8.67	8	0
			Max. Vx	3	0.82	0	0
		Horizontal	Max Tension	4	374.70	4	2
			Max. Compression	3	-432.95	1	5
			Max. Mx	2	374.66	4	2
			Max. My	4	-417.07	1	5
			Max. Vy	2	6.12	4	2
			Max. Vx	4	-3.19	0	0
		Redund Diag 1 Bracing	Max Tension	3	701.78	0	0
			Max. Compression	3	-701.78	0	0
			Max. Mx	2	0.31	-1	0
			Max. My	5	0.07	0	0
			Max. Vy	2	-2.28	0	0
			Max. Vx	5	-0.26	0	0
T12	49 - 45	Leg	Max Tension	3	56119.15	-111	-111
			Max. Compression	3	-62249.70	-170	-170
			Max. Mx	2	-40725.61	386	25
			Max. My	2	-40744.65	26	386
			Max. Vy	3	-508.27	-197	-198
			Max. Vx	3	-510.20	-197	-198
		Diagonal	Max Tension	3	845.72	5	-1
			Max. Compression	3	-929.52	0	0
			Max. Mx	3	-310.32	6	0
			Max. My	2	173.46	4	-1
			Max. Vy	3	-7.23	6	0
			Max. Vx	3	1.32	1	1
		Horizontal	Max Tension	2	157.54	0	0
			Max. Compression	3	-231.91	3	-1
			Max. Mx	4	-192.49	3	-1
			Max. My	4	157.29	2	2
			Max. Vy	4	6.36	3	-1
			Max. Vx	4	1.37	0	0
		Redund Horz 1	Max Tension	3	936.78	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T13	45 - 41	Bracing	Max. Compression	3	-936.78	0	0
			Max. Mx	2	613.35	-1	0
			Max. My	5	-335.80	0	0
			Max. Vy	2	2.45	0	0
			Max. Vx	5	-0.20	0	0
		Redund Diag 1 Bracing	Max Tension	3	664.14	0	0
			Max. Compression	3	-664.14	0	0
			Max. Mx	4	221.24	-1	0
			Max. My	5	233.15	0	0
			Max. Vy	4	2.64	0	0
			Max. Vx	5	-0.29	0	0
		Redund Hip 1 Bracing	Max Tension	1	0.00	0	0
			Max. Compression	3	-5.01	0	0
			Max. Mx	1	-3.21	-1	0
			Max. My	3	-4.52	0	0
			Max. Vy	1	2.35	0	0
			Max. Vx	3	0.00	0	0
		Leg	Max Tension	3	56653.83	-232	-232
			Max. Compression	3	-63654.25	-161	-161
			Max. Mx	2	-41451.78	386	26
			Max. My	2	-41467.85	26	386
			Max. Vy	3	501.35	-191	-190
		Diagonal	Max. Vx	3	502.94	-191	-190
			Max Tension	3	660.21	5	1
			Max. Compression	3	-689.82	0	0
			Max. Mx	3	312.27	6	0
			Max. My	3	-428.66	1	-1
		Horizontal	Max. Vy	3	-6.99	6	0
			Max. Vx	3	1.24	1	-1
			Max Tension	4	199.07	4	1
			Max. Compression	3	-268.11	3	-1
			Max. Mx	2	198.71	4	1
		Redund Horz 1 Bracing	Max. My	5	198.58	4	1
			Max. Vy	2	-7.31	4	1
			Max. Vx	5	0.84	0	0
			Max Tension	3	957.92	0	0
			Max. Compression	3	-957.92	0	0
		Redund Diag 1 Bracing	Max. Mx	1	52.45	-1	0
			Max. My	5	629.13	0	0
			Max. Vy	1	2.81	0	0
			Max. Vx	5	-0.23	0	0
			Max Tension	3	639.35	0	0
		Redund Hip 1 Bracing	Max. Compression	3	-639.35	0	0
			Max. Mx	5	178.98	-1	0
			Max. My	5	338.29	0	0
			Max. Vy	5	3.01	0	0
			Max. Vx	5	-0.31	0	0
T14	41 - 37	Leg	Max Tension	1	0.00	0	0
			Max. Compression	3	-4.59	0	0
			Max. Mx	1	-3.58	-1	0
			Max. My	3	-3.97	0	0
			Max. Vy	1	2.70	0	0
		Redund Hip 1 Bracing	Max. Vx	3	0.00	0	0
			Max Tension	3	57237.32	-169	-170
			Max. Compression	3	-64795.98	-145	-146

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T15	37 - 33	Leg	Max. Mx	2	-42613.26	305	27
			Max. My	2	-42628.38	27	304
			Max. Vy	5	-415.18	305	27
			Max. Vx	2	-415.11	27	304
		Diagonal	Max Tension	3	982.40	4	-1
			Max. Compression	3	-1024.22	0	0
			Max. Mx	3	40.08	5	1
			Max. My	3	-587.46	1	2
		Horizontal	Max. Vy	3	-7.00	5	1
			Max. Vx	3	1.43	1	2
			Max Tension	5	158.40	0	0
			Max. Compression	3	-230.61	5	0
		Redund Horiz 1 Bracing	Max. Mx	4	-188.85	5	-1
			Max. My	4	157.78	4	1
			Max. Vy	4	7.99	5	-1
			Max. Vx	2	0.76	5	-1
		Redund Diag 1 Bracing	Max Tension	3	975.10	0	0
			Max. Compression	3	-975.10	0	0
			Max. Mx	1	57.98	-1	0
			Max. My	5	-330.92	0	0
		Redund Hip 1 Bracing	Max. Vy	1	3.18	0	0
			Max. Vx	5	-0.26	0	0
			Max Tension	3	621.63	0	0
			Max. Compression	3	-621.63	0	0
		Leg	Max. Mx	4	206.17	-2	0
			Max. My	5	197.56	0	0
			Max. Vy	4	3.37	0	0
			Max. Vx	5	-0.33	0	0
		Diagonal	Max Tension	1	0.00	0	0
			Max. Compression	5	-5.12	0	0
			Max. Mx	1	-4.46	-2	0
			Max. My	3	-4.66	0	0
		Horizontal	Max. Vy	1	4.51	0	0
			Max. Vx	3	0.00	0	0
			Max Tension	3	58482.82	-167	-166
			Max. Compression	3	-66670.29	-119	-118
		Diagonal	Max. Mx	2	-43631.39	305	27
			Max. My	2	-43643.46	27	304
			Max. Vy	3	399.85	-159	-158
			Max. Vx	3	403.39	-159	-158
		Horizontal	Max Tension	3	1040.57	4	1
			Max. Compression	4	-1149.76	0	0
			Max. Mx	3	623.38	5	-1
			Max. My	4	-900.04	0	-2
		Redund Horiz 1 Bracing	Max. Vy	3	-7.18	5	-1
			Max. Vx	4	-1.49	0	2
			Max Tension	4	150.47	6	1
			Max. Compression	3	-220.16	6	0
		Redund Horiz 1 Bracing	Max. Mx	2	150.18	6	1
			Max. My	5	150.03	6	1
			Max. Vy	5	-9.01	6	1
			Max. Vx	5	0.80	0	0
		Redund Horiz 1 Bracing	Max Tension	3	1003.31	0	0
			Max. Compression	3	-1003.31	0	0
			Max. Mx	1	63.47	-1	0
			Max. My	5	660.75	0	0
		Redund Horiz 1 Bracing	Max. Vy	1	3.54	0	0
			Max. Vx	1	3.54	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T16	33 - 25	Redund Diag 1 Bracing	Max. Vx	5	-0.29	0	0
			Max Tension	3	617.24	0	0
			Max. Compression	3	-617.24	0	0
			Max. Mx	5	150.93	-2	0
			Max. My	5	197.90	0	0
			Max. Vy	5	3.73	0	0
			Max. Vx	5	-0.36	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	3	-5.23	0	0
			Max. Mx	1	-4.56	-3	0
		Redund Hip 1 Bracing	Max. My	3	-4.67	0	0
			Max. Vy	1	5.03	0	0
			Max. Vx	3	0.00	0	0
			Max Tension	3	60673.98	-140	-142
			Max. Compression	3	-69896.42	271	273
			Max. Mx	5	-46357.27	396	-23
			Max. My	2	-46370.20	-23	396
			Max. Vy	5	-288.05	396	-23
			Max. Vx	2	-288.03	-23	396
		Diagonal	Max Tension	4	1548.42	12	-4
			Max. Compression	4	-1691.16	0	0
			Max. Mx	3	1179.76	15	-7
			Max. My	3	1163.94	15	7
			Max. Vy	3	-13.56	13	6
			Max. Vx	3	-3.60	-4	7
		Horizontal	Max Tension	2	43.73	7	-1
			Max. Compression	3	-264.83	8	-1
			Max. Mx	4	-150.74	8	-1
			Max. My	2	-151.18	8	-1
			Max. Vy	4	10.40	8	-1
			Max. Vx	2	0.89	8	-1
		Redund Horz 1 Bracing	Max Tension	3	1051.86	0	0
			Max. Compression	3	-1051.86	0	0
			Max. Mx	6	-68.16	-2	0
			Max. My	5	697.62	0	0
			Max. Vy	6	4.09	0	0
			Max. Vx	5	-0.33	0	0
		Redund Diag 1 Bracing	Max Tension	3	816.62	0	0
			Max. Compression	3	-816.62	0	0
			Max. Mx	4	172.87	-3	0
			Max. My	5	141.07	0	0
			Max. Vy	4	4.47	0	0
			Max. Vx	5	-0.52	0	0
		Redund Hip 1 Bracing	Max Tension	3	4.86	0	0
			Max. Compression	3	-12.40	0	0
			Max. Mx	1	-5.02	-4	0
			Max. My	5	-8.85	0	0
			Max. Vy	1	5.80	0	0
			Max. Vx	5	-0.00	0	0
		Inner Bracing	Max Tension	3	87.14	0	0
			Max. Compression	3	-98.12	0	0
			Max. Mx	1	0.31	-81	0
			Max. My	4	2.42	0	0
			Max. Vy	1	44.54	0	0
			Max. Vx	4	0.13	0	0
T17	25 - 16	Leg	Max Tension	3	63692.51	-200	-200

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T18	16 - 8	Leg	Max. Compression	3	-74963.94	165	161
			Max. Mx	5	-49118.34	396	-23
			Max. My	2	-49127.19	-23	396
			Max. Vy	5	242.34	396	-23
			Max. Vx	2	242.30	-23	396
		Diagonal	Max Tension	4	2035.21	13	2
			Max. Compression	4	-2223.56	0	0
			Max. Mx	3	1568.44	16	-6
			Max. My	3	-1033.97	-1	-6
			Max. Vy	3	-15.01	14	-5
		Horizontal	Max. Vx	3	-3.18	-1	6
			Max Tension	5	37.05	11	-1
			Max. Compression	3	-262.05	10	-1
			Max. Mx	4	9.16	11	-1
			Max. My	2	9.11	11	-1
		Redund Horz 1 Bracing	Max. Vy	4	-12.33	11	-1
			Max. Vx	2	1.01	10	-1
			Max Tension	3	1128.12	0	0
			Max. Compression	3	-1128.12	0	0
			Max. Mx	1	87.37	-3	0
		Redund Diag 1 Bracing	Max. My	5	-153.94	0	0
			Max. Vy	1	4.87	0	0
			Max. Vx	5	-0.39	0	0
			Max Tension	3	849.97	0	0
			Max. Compression	3	-849.97	0	0
		Redund Hip 1 Bracing	Max. Mx	5	92.24	-7	0
			Max. My	5	198.90	0	1
			Max. Vy	5	8.80	0	0
			Max. Vx	5	-1.00	0	0
			Max Tension	3	2.23	0	0
		Inner Bracing	Max. Compression	3	-12.81	0	0
			Max. Mx	1	-6.50	-5	0
			Max. My	5	-8.76	0	0
			Max. Vy	1	6.90	0	0
			Max. Vx	5	-0.00	0	0
		Leg	Max Tension	3	32.04	0	0
			Max. Compression	3	-43.47	0	0
			Max. Mx	1	0.40	-114	0
			Max. My	4	2.54	0	0
			Max. Vy	1	52.99	0	0
		Diagonal	Max. Vx	4	0.11	0	0
			Max Tension	3	67509.60	-119	-120
			Max. Compression	3	-80421.12	218	221
			Max. Mx	2	-53698.29	352	-42
			Max. My	4	-53698.20	-43	353
		Horizontal	Max. Vy	3	271.65	-173	-172
			Max. Vx	3	270.04	-173	-172
			Max Tension	4	2264.76	14	-1
			Max. Compression	4	-2475.85	0	0
			Max. Mx	3	1819.16	16	-4
		Horizontal	Max. My	3	-1781.88	2	-5
			Max. Vy	3	-16.38	14	-4
			Max. Vx	3	-2.63	2	5
			Max Tension	4	62.34	0	0
			Max. Compression	3	-272.52	18	-2
		Horizontal	Max. Mx	4	-105.66	18	-2
			Max. My	2	-106.16	18	-2
			Max. Vy	4	17.91	18	-2

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T19	8 - 4	Redund Horz 1 Bracing	Max. Vx	2	1.48	18	-2
			Max Tension	3	1210.24	0	0
			Max. Compression	3	-1210.24	0	0
			Max. Mx	6	-61.45	-4	0
			Max. My	4	808.09	0	0
			Max. Vy	6	7.12	0	0
			Max. Vx	4	-0.58	0	0
			Max Tension	3	806.65	0	0
			Max. Compression	3	-806.65	0	0
			Max. Mx	4	171.69	-8	0
		Redund Diag 1 Bracing	Max. My	5	103.13	0	1
			Max. Vy	4	10.01	0	0
			Max. Vx	5	-1.02	0	0
			Max Tension	1	0.00	0	0
			Max. Compression	3	-11.23	0	0
			Max. Mx	1	-7.15	-7	0
			Max. My	4	-6.95	0	0
			Max. Vy	1	8.01	0	0
			Max. Vx	4	-0.00	0	0
			Max Tension	3	5.78	0	0
		Inner Bracing	Max. Compression	3	-28.53	0	0
			Max. Mx	1	0.43	-154	0
			Max. My	4	2.68	0	0
			Max. Vy	1	61.44	0	0
			Max. Vx	4	0.07	0	0
			Max Tension	3	70654.00	-159	-160
			Max. Compression	3	-85319.16	52	52
			Max. Mx	2	-56719.81	352	-42
			Max. My	4	-56719.06	-43	353
			Max. Vy	2	235.92	352	-42
		Diagonal	Max. Vx	4	236.15	-43	353
			Max Tension	4	2652.65	0	0
			Max. Compression	2	-2522.09	0	0
			Max. Mx	3	1903.46	30	7
			Max. My	3	-1675.97	0	-8
			Max. Vy	3	-25.43	30	7
			Max. Vx	3	-4.42	0	-8
			Max Tension	3	1283.95	0	0
			Max. Compression	3	-1283.95	0	0
			Max. Mx	1	112.21	-6	0
		Redund Horz 1 Bracing	Max. My	2	-109.16	0	0
			Max. Vy	1	8.04	0	0
			Max. Vx	2	-0.65	0	0
			Max Tension	3	824.13	0	0
			Max. Compression	3	-824.13	0	0
			Max. Mx	3	161.05	-10	0
			Max. My	3	161.05	0	1
			Max. Vy	3	11.22	0	0
			Max. Vx	3	-1.10	0	0
			Max Tension	1	0.00	0	0
		Redund Diag 1 Bracing	Max. Compression	3	-14.88	0	0
			Max. Mx	1	-9.39	-15	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	205.48	0	0
		Inner Bracing	Max. Compression	3	-14.88	0	0
			Max. Mx	1	-9.39	-15	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	205.48	0	0
			Max. Compression	3	-14.88	0	0
			Max. Mx	1	-9.39	-15	0
			Max. Vy	1	15.05	0	0
			Max. Vx	3	-0.00	0	0
			Max Tension	3	205.48	0	0

Section No.	Elevation m	Component Type	Condition	Gov. Load Comb.	Force kg	Major Axis Moment kg-m	Minor Axis Moment kg-m
T20	4 - 0	Leg	Max. Compression	3	-229.99	0	0
			Max. Mx	1	1.03	-196	0
			Max. My	3	205.48	0	2
			Max. Vy	1	69.40	0	0
			Max. Vx	3	-0.96	0	0
			Max Tension	3	70392.77	-30	-30
			Max. Compression	3	-85994.35	0	1
			Max. Mx	2	-57441.27	-105	-21
			Max. My	4	-57444.45	-20	-106
			Max. Vy	2	-80.67	0	0
		Diagonal	Max. Vx	3	-86.79	-94	-105
			Max Tension	2	2374.41	0	0
			Max. Compression	4	-2819.03	0	0
			Max. Mx	3	-1924.92	33	-67
			Max. My	3	-2005.68	28	-75
			Max. Vy	3	-22.63	33	-67
			Max. Vx	3	-31.98	0	0
		Top Girt	Max Tension	1	0.00	0	0
			Max. Compression	3	-232.19	22	-2
			Max. Mx	4	-44.92	24	-2
			Max. My	3	-69.09	23	-3
			Max. Vy	4	-20.27	24	-2
			Max. Vx	3	2.04	23	-3
		Redund Horz 1 Bracing	Max Tension	3	1294.11	0	0
			Max. Compression	3	-1294.11	0	0
			Max. Mx	3	1294.11	-3	0
			Max. My	4	865.41	0	0
			Max. Vy	3	5.36	0	0
			Max. Vx	4	-0.43	0	0
		Redund Horz 2 Bracing	Max Tension	3	1294.11	0	0
			Max. Compression	3	-1294.11	0	0
			Max. Mx	3	1294.11	-16	0
			Max. My	2	871.11	0	1
			Max. Vy	3	17.11	0	0
			Max. Vx	2	-1.39	0	0
		Redund Diag 1 Bracing	Max Tension	3	763.68	0	0
			Max. Compression	3	-763.68	0	0
			Max. Mx	3	763.68	-2	0
			Max. My	3	763.68	0	0
			Max. Vy	3	4.01	0	0
			Max. Vx	3	0.45	0	0
		Redund Diag 2 Bracing	Max Tension	3	669.19	0	0
			Max. Compression	3	-669.19	0	0
			Max. Mx	3	669.19	-13	0
			Max. My	3	669.19	0	-1
			Max. Vy	3	13.74	0	0
			Max. Vx	3	1.23	0	0
		Redund Hip 1 Bracing	Max Tension	3	1.18	0	0
			Max. Compression	3	-10.31	0	0
			Max. Mx	1	-4.77	-7	0
			Max. My	3	1.18	0	0
			Max. Vy	1	10.03	0	0
			Max. Vx	3	0.00	0	0
		Redund Hip 2 Bracing	Max Tension	1	0.00	0	0
			Max. Compression	4	-11.97	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
			Max. Mx	1	-8.76	-27	0
			Max. My	3	-10.72	0	0
			Max. Vy	1	20.07	0	0
			Max. Vx	3	0.00	0	0

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical kg	Horizontal, X kg	Horizontal, Z kg
Leg D	Max. Vert	5	59121.37	5119.98	-7211.20
	Max. H _x	5	59121.37	5119.98	-7211.20
	Max. H _z	3	-72096.45	-7801.70	7825.07
	Min. Vert	3	-72096.45	-7801.70	7825.07
	Min. H _x	3	-72096.45	-7801.70	7825.07
	Min. H _z	5	59121.37	5119.98	-7211.20
Leg C	Max. Vert	5	59062.43	-5165.23	-7156.83
	Max. H _x	2	-42467.98	3439.57	5525.07
	Max. H _z	2	-42467.98	3439.57	5525.07
	Min. Vert	2	-42467.98	3439.57	5525.07
	Min. H _x	4	58917.25	-7235.04	-5012.73
	Min. H _z	5	59062.43	-5165.23	-7156.83
Leg B	Max. Vert	3	87776.13	-8954.54	8922.56
	Max. H _x	5	-42674.21	3575.07	-5477.56
	Max. H _z	3	87776.13	-8954.54	8922.56
	Min. Vert	5	-42674.21	3575.07	-5477.56
	Min. H _x	3	87776.13	-8954.54	8922.56
	Min. H _z	5	-42674.21	3575.07	-5477.56
Leg A	Max. Vert	2	58920.11	5036.76	7214.41
	Max. H _x	2	58920.11	5036.76	7214.41
	Max. H _z	2	58920.11	5036.76	7214.41
	Min. Vert	5	-42610.06	-3511.14	-5526.21
	Min. H _x	4	-42470.64	-5503.72	-3464.08
	Min. H _z	5	-42610.06	-3511.14	-5526.21

Tower Mast Reaction Summary

Load Combination	Vertical kg	Shear _x kg	Shear _z kg	Overturning Moment, M _x kg-m	Overturning Moment, M _z kg-m	Torque kg-m
Dead Only	32899.57	0.00	-0.00	466	466	0
Dead+Wind 0 deg - No Ice	32899.33	456.94	-25573.79	-1217704	-6116	-118
Dead+Wind 45 deg - No Ice	32898.42	19950.74	-19948.95	-955243	-955234	-9
Dead+Wind 90 deg - No Ice	32899.53	25573.93	-456.75	-6118	-1217703	117
Dead+Wind 180 deg - No Ice	32899.53	-18.68	25371.79	1215722	735	1268
Dead+Wind 0 deg - Service	32899.57	114.20	-6393.50	-304084	-1180	-29
Dead+Wind 45 deg - Service	32899.57	4987.33	-4987.33	-238426	-238426	0
Dead+Wind 90 deg - Service	32899.57	6393.50	-114.20	-1180	-304083	29
Dead+Wind 180 deg - Service	32899.57	-4.66	6342.96	304287	533	317

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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	-32899.57	0.00	-0.00	32899.57	0.00	0.000%
2	456.78	-32899.57	-25576.39	-456.94	32899.33	25573.79	0.006%
3	19951.18	-32899.57	-19951.18	-19950.74	32898.42	19948.95	0.006%
4	25576.39	-32899.57	-456.78	-25573.93	32899.53	456.75	0.006%
5	-18.63	-32899.57	25374.26	18.68	32899.53	-25371.79	0.006%
6	114.20	-32899.57	-6394.10	-114.20	32899.57	6393.50	0.002%
7	4987.80	-32899.57	-4987.80	-4987.33	32899.57	4987.33	0.002%
8	6394.10	-32899.57	-114.20	-6393.50	32899.57	114.20	0.002%
9	-4.66	-32899.57	6343.56	4.66	32899.57	-6342.96	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00010106	0.00014508
3	Yes	32	0.00014852	0.00011698
4	Yes	15	0.00010016	0.00014503
5	Yes	15	0.00010024	0.00014507
6	Yes	15	0.00000001	0.00013226
7	Yes	15	0.00000001	0.00013387
8	Yes	15	0.00000001	0.00013226
9	Yes	15	0.00000001	0.00013226

Maximum Tower Deflections - Service Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 95	233.90	7	0.3751	0.0001
T2	95 - 92	201.70	7	0.3431	0.0001
T3	92 - 86	184.10	7	0.3276	0.0001
T4	86 - 82	151.40	7	0.2786	0.0001
T5	82 - 79	132.93	7	0.2326	0.0001
T6	79 - 74	122.00	7	0.2046	0.0001
T7	74 - 69	104.08	7	0.1934	0.0001
T8	69 - 61.5	87.25	7	0.1802	0.0001
T9	61.5 - 56.5	64.48	7	0.1514	0.0001
T10	56.5 - 52.7	51.65	7	0.1250	0.0001
T11	52.7 - 49	44.10	7	0.1069	0.0001
T12	49 - 45	37.60	7	0.0946	0.0001
T13	45 - 41	31.40	7	0.0822	0.0001
T14	41 - 37	25.92	7	0.0722	0.0001
T15	37 - 33	21.07	7	0.0627	0.0001
T16	33 - 25	16.78	7	0.0545	0.0001
T17	25 - 16	9.87	7	0.0381	0.0001
T18	16 - 8	4.37	7	0.0239	0.0001
T19	8 - 4	1.35	7	0.0110	0.0001
T20	4 - 0	0.32	7	0.0058	0.0000

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Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
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Critical Deflections and Radius of Curvature - Service Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
100.000	RYMSA UHF/AT15-250 PANEL	7	233.90	0.3751	0.0001	15949
99.500	RYMSA UHF/AT15-250 PANEL	7	230.60	0.3717	0.0001	15949
99.000	RYMSA UHF/AT15-250 PANEL	7	227.30	0.3682	0.0001	15949
98.500	RYMSA UHF/AT15-250 PANEL	7	224.01	0.3648	0.0001	15949
98.000	RYMSA UHF/AT15-250 PANEL	7	220.73	0.3615	0.0001	12153
97.500	RYMSA UHF/AT15-250 PANEL	7	217.48	0.3582	0.0001	9722
97.000	RYMSA UHF/AT15-250 PANEL	7	214.25	0.3549	0.0001	8102
96.500	RYMSA UHF/AT15-250 PANEL	7	211.05	0.3518	0.0001	6944
96.000	RYMSA UHF/AT15-250 PANEL	7	207.89	0.3488	0.0001	6112
95.500	RYMSA UHF/AT15-250 PANEL	7	204.77	0.3459	0.0001	5617
95.000	RYMSA UHF/AT15-250 PANEL	7	201.70	0.3431	0.0001	5486
91.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	181.25	0.3247	0.0001	15061
90.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	173.36	0.3154	0.0001	11733
88.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	165.64	0.3044	0.0001	9148
88.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	164.56	0.3027	0.0001	8869
87.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	157.09	0.2898	0.0001	7295
85.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	149.88	0.2753	0.0001	5596
85.500	ANTENA VHF BAND III 4 DIPO AT13-240	7	148.88	0.2731	0.0001	5315
84.100	ANTENA VHF BAND III 4 DIPO AT13-240	7	142.09	0.2571	0.0001	3750
82.700	ANTENA VHF BAND III 4 DIPO AT13-240	7	135.82	0.2406	0.0001	2942
66.200	ANTENA VHF BAND I - 2 DIPOLOS	7	78.39	0.1706	0.0001	18872
64.650	ANTENA VHF BAND I - 2 DIPOLOS	7	73.66	0.1649	0.0001	17628
63.100	ANTENA VHF BAND I - 2 DIPOLOS	7	69.07	0.1586	0.0001	16539
62.900	ANTENA VHF BAND I - 2 DIPOLOS	7	68.49	0.1577	0.0001	16407
61.350	ANTENA VHF BAND I - 2 DIPOLOS	7	64.06	0.1507	0.0001	14070
59.800	ANTENA VHF BAND I - 2 DIPOLOS	7	59.81	0.1428	0.0001	9925
59.600	ANTENA VHF BAND I - 2 DIPOLOS	7	59.27	0.1417	0.0001	9520
58.050	ANTENA VHF BAND I - 2 DIPOLOS	7	55.30	0.1333	0.0001	7233
56.500	ANTENA VHF BAND I - 2 DIPOLOS	7	51.65	0.1250	0.0001	6376
14.400	8 FT DISH	7	3.65	0.0213	0.0001	36563

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Maximum Tower Deflections - Design Wind

Section No.	Elevation m	Horz. Deflection mm	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 95	935.57	3	1.5004	0.0004
T2	95 - 92	806.77	3	1.3725	0.0004
T3	92 - 86	736.39	3	1.3104	0.0004
T4	86 - 82	605.62	3	1.1141	0.0004
T5	82 - 79	531.74	3	0.9302	0.0004
T6	79 - 74	488.04	3	0.8181	0.0004
T7	74 - 69	416.41	3	0.7733	0.0004
T8	69 - 61.5	349.09	3	0.7205	0.0004
T9	61.5 - 56.5	258.08	3	0.6052	0.0004
T10	56.5 - 52.7	206.78	3	0.4996	0.0004
T11	52.7 - 49	176.58	3	0.4275	0.0004
T12	49 - 45	150.60	3	0.3783	0.0005
T13	45 - 41	125.82	3	0.3288	0.0005
T14	41 - 37	103.87	3	0.2887	0.0005
T15	37 - 33	84.50	3	0.2509	0.0005
T16	33 - 25	67.32	3	0.2179	0.0005
T17	25 - 16	39.69	3	0.1525	0.0005
T18	16 - 8	17.70	3	0.0955	0.0006
T19	8 - 4	5.64	3	0.0440	0.0003
T20	4 - 0	1.53	3	0.0230	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation m	Appurtenance	Gov. Load Comb.	Deflection mm	Tilt °	Twist °	Radius of Curvature m
100.000	RYMSA UHF/AT15-250 PANEL	3	935.57	1.5004	0.0004	3992
99.500	RYMSA UHF/AT15-250 PANEL	3	922.35	1.4866	0.0004	3992
99.000	RYMSA UHF/AT15-250 PANEL	3	909.15	1.4729	0.0004	3992
98.500	RYMSA UHF/AT15-250 PANEL	3	895.99	1.4592	0.0004	3992
98.000	RYMSA UHF/AT15-250 PANEL	3	882.90	1.4458	0.0004	3042
97.500	RYMSA UHF/AT15-250 PANEL	3	869.88	1.4326	0.0004	2434
97.000	RYMSA UHF/AT15-250 PANEL	3	856.97	1.4197	0.0004	2028
96.500	RYMSA UHF/AT15-250 PANEL	3	844.19	1.4072	0.0004	1738
96.000	RYMSA UHF/AT15-250 PANEL	3	831.54	1.3951	0.0004	1530
95.500	RYMSA UHF/AT15-250 PANEL	3	819.06	1.3835	0.0004	1406
95.000	RYMSA UHF/AT15-250 PANEL	3	806.77	1.3725	0.0004	1373
91.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	725.00	1.2987	0.0004	3767
90.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	693.45	1.2613	0.0004	2934
88.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	662.58	1.2174	0.0004	2288
88.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	658.23	1.2106	0.0004	2218
87.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	628.35	1.1592	0.0004	1824
85.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	599.54	1.1011	0.0004	1399
85.500	ANTENA VHF BAND III 4 DIPO AT13-240	3	595.53	1.0922	0.0004	1329
84.100	ANTENA VHF BAND III 4 DIPO AT13-240	3	568.36	1.0280	0.0004	938

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
m			mm	°	°	m
82.700	ANTENA VHF BAND III 4 DIPO AT13-240	3	543.29	0.9623	0.0004	736
66.200	ANTENA VHF BAND I - 2 DIPOLOS	3	313.68	0.6821	0.0004	4718
64.650	ANTENA VHF BAND I - 2 DIPOLOS	3	294.77	0.6592	0.0004	4406
63.100	ANTENA VHF BAND I - 2 DIPOLOS	3	276.42	0.6341	0.0004	4133
62.900	ANTENA VHF BAND I - 2 DIPOLOS	3	274.09	0.6307	0.0004	4100
61.350	ANTENA VHF BAND I - 2 DIPOLOS	3	256.39	0.6023	0.0004	3517
59.800	ANTENA VHF BAND I - 2 DIPOLOS	3	239.38	0.5707	0.0004	2483
59.600	ANTENA VHF BAND I - 2 DIPOLOS	3	237.25	0.5665	0.0004	2382
58.050	ANTENA VHF BAND I - 2 DIPOLOS	3	221.35	0.5330	0.0004	1810
56.500	ANTENA VHF BAND I - 2 DIPOLOS	3	206.78	0.4996	0.0004	1596
14.400	8 FT DISH	3	14.82	0.0850	0.0005	9133

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	100	Leg	A325N	19	6	10.03	4975.37	0.002 ✓	1.333	Bearing
		Diagonal	A325N	16	2	538.11	2922.37	0.184 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	106.91	1391.60	0.077 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	15.78	2922.37	0.005 ✓	1.333	Bolt Shear
T2	95	Leg	A325N	19	12	897.71	8292.26	0.108 ✓	1.333	Bearing
		Diagonal	A325N	16	2	580.32	2922.37	0.199 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	55.72	1391.60	0.040 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	8.54	2922.37	0.003 ✓	1.333	Bolt Shear
T3	92	Leg	A325N	19	14	1137.32	8292.26	0.137 ✓	1.333	Bearing
		Diagonal	A325N	16	2	880.96	2922.37	0.301 ✓	1.333	Bolt Shear
		Horizontal	A325N	16	1	125.95	2172.09	0.058 ✓	1.333	Member Block Shear
		Top Girt	A325N	16	2	569.16	2922.37	0.195 ✓	1.333	Bolt Shear
T4	86	Leg	A325N	19	16	2560.09	8292.26	0.309 ✓	1.333	Bearing
		Diagonal	A325N	16	2	1125.13	2922.37	0.385 ✓	1.333	Bolt Shear
		Horizontal	A307	16	1	303.81	1391.60	0.218 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	125.30	2922.37	0.043 ✓	1.333	Bolt Shear
T5	82	Leg	A325N	19	16	2040.52	8292.26	0.246 ✓	1.333	Bearing
		Diagonal	A325N	16	2	3537.49	2922.37	1.210 ✓	1.333	Bolt Shear

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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
T6	79	Horizontal	A307	16	1	108.80	1391.60	0.078	✓	Bolt Shear
		Top Girt	A325N	16	2	1324.25	2922.37	0.453	✓	Bolt Shear
		Leg	A325N	19	16	2296.46	8416.41	0.273	✓	Bolt DS
		Diagonal	A325N	16	2	960.41	2922.37	0.329	✓	Bolt Shear
T7	74	Horizontal	A307	16	1	147.56	1391.60	0.106	✓	Bolt Shear
		Top Girt	A325N	16	2	2301.01	2922.37	0.787	✓	Bolt Shear
		Leg	A325N	19	24	2204.06	8416.41	0.262	✓	Bolt DS
		Diagonal	A325N	16	2	1163.03	2922.37	0.398	✓	Bolt Shear
T8	69	Horizontal	A307	16	1	266.18	1391.60	0.191	✓	Bolt Shear
		Leg	A325N	19	32	2260.91	8416.41	0.269	✓	Bolt DS
		Diagonal	A325N	16	2	1504.48	2922.37	0.515	✓	Bolt Shear
		Horizontal	A307	16	1	388.93	1391.60	0.279	✓	Bolt Shear
T9	61.5	Leg	A325N	19	32	3401.64	8416.41	0.404	✓	Bolt DS
		Diagonal	A325N	16	2	1713.28	2922.37	0.586	✓	Bolt Shear
		Horizontal	A307	16	1	547.01	1391.60	0.393	✓	Bolt Shear
		Leg	A325N	19	34	3696.61	8416.41	0.439	✓	Bolt DS
T10	56.5	Diagonal	A325N	16	2	775.94	2922.37	0.266	✓	Bolt Shear
		Horizontal	A307	16	2	164.94	1391.60	0.119	✓	Bolt Shear
		Top Girt	A325N	16	2	1111.90	2922.37	0.380	✓	Bolt Shear
		Leg	A325N	19	36	3515.79	8416.41	0.418	✓	Bolt DS
T11	52.7	Diagonal	A325N	16	2	245.95	2922.37	0.084	✓	Bolt Shear
		Horizontal	A307	16	2	216.48	1391.60	0.156	✓	Bolt Shear
		Leg	A325N	19	36	3458.32	8416.41	0.411	✓	Bolt DS
		Diagonal	A325N	16	3	309.84	2922.37	0.106	✓	Bolt Shear
T12	49	Horizontal	A307	16	2	115.96	1391.60	0.083	✓	Bolt Shear
		Leg	A325N	19	36	3521.29	8416.41	0.418	✓	Bolt DS
		Diagonal	A325N	16	3	229.94	2922.37	0.079	✓	Bolt Shear
		Horizontal	A307	16	2	134.05	1391.60	0.096	✓	Bolt Shear
T13	45	Leg	A325N	19	36	3592.39	8416.41	0.427	✓	Bolt DS
		Diagonal	A325N	16	3	341.41	2922.37	0.117	✓	Bolt Shear
		Horizontal	A307	16	2	115.30	1391.60	0.083	✓	Bolt Shear
		Leg	A325N	19	36	3690.48	8416.41	0.438	✓	Bolt DS
T14	41	Diagonal	A325N	16	3	383.25	2922.37	0.131	✓	Bolt Shear
		Horizontal	A307	16	2	110.08	1391.60	0.079	✓	Bolt Shear
		Leg	A325N	19	36	3865.60	8416.41	0.459	✓	Bolt DS
		Diagonal	A325N	16	3	563.72	2922.37	0.193	✓	Bolt Shear
T15	37	Horizontal	A307	16	2	132.41	1391.60	0.095	✓	Bolt Shear
		Leg	A325N	19	36	4132.70	8416.41	0.491	✓	Bolt DS
		Diagonal	A325N	16	3	741.19	2922.37	0.254	✓	Bolt Shear
		Horizontal	A307	16	2	131.02	1391.60	0.094	✓	Bolt Shear

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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
T18	16	Leg	A325N	19	36	4438.78	8416.41	0.527 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	825.28	2922.37	0.282 ✓	1.333	Bolt Shear
		Horizontal	A307	16	2	136.26	1391.60	0.098 ✓	1.333	Bolt Shear
T19	8	Leg	A325N	19	36	4735.55	8416.41	0.563 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	884.22	2922.37	0.303 ✓	1.333	Bolt Shear
T20	4	Leg	A325N	19	36	4767.21	8416.41	0.566 ✓	1.333	Bolt DS
		Diagonal	A325N	16	3	939.68	2922.37	0.322 ✓	1.333	Bolt Shear
		Top Girt	A325N	16	2	116.10	2922.37	0.040 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L64x64x5	5.000	0.500	39.8 K=1.00	178	582	-4911.45	10571.20	0.465 ✓
T2	95 - 92	L76x76x8	3.037	1.519	101.5 K=1.00	99	1148	-5404.65	11590.60	0.466 ✓
T3	92 - 86	L76x76x8	6.000	1.000	66.8 K=1.00	148	1148	-15195.03	17371.46	0.875 ✓
T4	86 - 82	L102x102x8	4.000	1.000	49.8 K=1.00	168	1548	-24297.73	26547.18	0.915 ✓
T5	82 - 79	L102x102x8	3.201	1.601	79.7 K=1.00	132	1548	-16349.61	20769.50	0.787 ✓
T6	79 - 74	L127x127x13	5.000	1.250	50.1 K=1.00	168	3065	-21912.10	52443.46	0.418 ✓
T7	74 - 69	L152x152x13	5.000	1.250	41.7 K=1.00	176	3710	-31118.94	66743.87	0.466 ✓
T8	69 - 61.5	L152x152x13	7.500	1.250	41.7 K=1.00	176	3710	-47526.97	66743.87	0.712 ✓
T9	61.5 - 56.5	L152x152x13	5.000	1.250	41.7 K=1.00	176	3710	-60129.13	66743.87	0.901 ✓
T10	56.5 - 52.7	L152x152x16	3.825	1.912	63.8 K=1.00	152	4587	-62943.22	71135.10	0.885 ✓
T11	52.7 - 49	L152x152x16	3.724	1.862	62.1 K=1.00	154	4587	-63368.69	72083.11	0.879 ✓
T12	49 - 45	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-62249.67	86105.01	0.723 ✓
T13	45 - 41	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-63654.45	86105.01	0.739 ✓
T14	41 - 37	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-64796.14	86105.01	0.753 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T15	37 - 33	L152x152x16	4.026	1.007	33.6 K=1.00	184	4587	-66670.39	86105.01	0.774
T16	33 - 25	L152x152x16	8.052	2.013	67.2 K=1.00	148	4587	-69896.34	69200.07	1.010
T17	25 - 16	L152x152x16	9.059	2.265	75.6 K=1.00	137	4587	-74963.87	64130.72	1.169
T18	16 - 8	L152x152x16	8.052	2.013	67.2 K=1.00	148	4587	-80421.04	69200.07	1.162
T19	8 - 4	L152x152x16	4.026	2.013	67.2 K=1.00	148	4587	-85319.39	69199.62	1.233
T20	4 - 0	L152x152x16	4.026	1.342	44.8 K=1.00	173	4587	-85994.33	81090.09	1.060

Diagonal Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.571	0.505	57.9 K=1.00	159	401	-1076.21	6501.98	0.166
T2	95 - 92	L44x44x5	1.628	1.530	175.4 K=1.00	33	401	-1160.63	1367.89	0.848
T3	92 - 86	L44x44x5	1.171	1.098	125.9 K=1.00	65	401	-1761.93	2654.60	0.664
T4	86 - 82	L44x44x5	1.171	1.074	123.1 K=1.00	68	401	-2144.38	2776.55	0.772
T5	82 - 79	L76x76x6.4	2.090	2.017	134.1 K=1.00	57	929	-5567.44	5423.51	1.027
T6	79 - 74	L51x51x4.8	1.877	1.792	179.0 K=1.00	32	461	-1920.81	1510.95	1.271
T7	74 - 69	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-2326.06	3066.63	0.759
T8	69 - 61.5	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-3008.97	3066.63	0.981
T9	61.5 - 56.5	L64x64x4.8	1.877	1.775	141.1 K=1.00	52	582	-3401.06	3066.63	1.109
T10	56.5 - 52.7	L64x64x4.8	2.559	2.446	123.8 K=1.00	67	582	-1338.48	3989.33	0.336
T11	52.7 - 49	L64x64x4.8	2.522	2.419	122.4 K=1.00	69	582	-491.89	4078.56	0.121
T12	49 - 45	L64x64x4.8	3.076	1.538	122.3 K=1.00	69	582	-929.52	4083.54	0.228
T13	45 - 41	L64x64x4.8	3.328	1.664	132.3 K=1.00	59	582	-689.82	3488.09	0.198
T14	41 - 37	L64x64x4.8	3.592	1.796	142.8 K=1.00	50	582	-1024.22	2994.67	0.342
T15	37 - 33	L64x64x4.8	3.865	1.932	153.7 K=1.00	44	582	-1149.76	2586.69	0.444
T16	33 - 25	L76x76x6.4	5.631	2.816	187.3 K=1.00	29	929	-1691.16	2781.76	0.608

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T17	25 - 16	L76x76x6.4	6.502	3.251	216.2 K=1.00	22	929	-2223.56	2086.51	1.066 ✓
T18	16 - 8	KL/R > 200 (C) - 956 L76x76x6.4	6.670	3.335	221.8 K=1.00	21	929	-2475.84	1983.16	1.248 ✓
T19	8 - 4	KL/R > 200 (C) - 1013 L102x102x6.4	6.670	3.335	165.1 K=1.00	38	1252	-2522.09	4818.24	0.523 ✓
T20	4 - 0	L76x76x6.4	7.198	2.399	159.6 K=1.00	40	929	-2819.03	3831.39	0.736 ✓

Horizontal Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L44x44x5	0.550	0.243	27.9 K=1.00	189	401	-105.52	7722.19	0.014 ✓
T2	95 - 92	L44x44x5	0.885	0.809	59.3 K=1.00	157	401	-55.72	6433.44	0.009 ✓
T3	92 - 86	L44x44x5	1.220	1.144	83.9 K=1.00	126	401	-139.25	5135.35	0.027 ✓
T4	86 - 82	L44x44x5	1.220	1.118	82.0 K=1.00	128	401	-303.81	5242.53	0.058 ✓
T5	82 - 79	L51x51x4.8	2.010	1.908	121.8 K=1.00	69	461	-108.80	3266.04	0.033 ✓
T6	79 - 74	L51x51x4.8	2.800	1.336	133.5 K=1.00	58	461	-138.06	2715.47	0.051 ✓
T7	74 - 69	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-250.85	1696.90	0.148 ✓
T8	69 - 61.5	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-370.53	1696.90	0.218 ✓
T9	61.5 - 56.5	L51x51x4.8	2.800	2.648	168.9 K=1.00	36	461	-537.36	1696.90	0.317 ✓
T10	56.5 - 52.7	L51x51x4.8	3.108	1.478	147.7 K=1.00	47	461	-329.87	2221.46	0.148 ✓
T11	52.7 - 49	L51x51x4.8	3.715	3.563	227.3 K=1.00	20	461	-432.95	937.19	0.462 ✓
T12	49 - 45	L51x51x4.8	4.338	4.186	267.1 K=1.00	14	461	-231.91	678.80	0.342 ✓
T13	45 - 41	KL/R > 250 (C) - 638 L51x51x4.8	4.986	4.834	308.4 K=1.00	11	461	-268.11	509.06	0.527 ✓
T14	41 - 37	KL/R > 250 (C) - 679 L51x51x4.8	5.634	5.482	349.8 K=1.00	8	461	-230.61	395.85	0.583 ✓
T15	37 - 33	KL/R > 250 (C) - 766 L51x51x4.8	6.282	6.130	391.1 K=1.00	7	461	-220.16	316.60	0.695 ✓
T16	33 - 25	KL/R > 250 (C) - 807 L51x51x4.8	7.254	3.551	354.8	8	461	-264.83	384.76	0.688 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
					K=1.00					✓
T17	25 - 16	KL/R > 250 (C) - 871 L51x51x4.8	8.630	4.239	423.6 K=1.00	6	461	-262.05	269.96	0.971 ✓
T18	16 - 8	KL/R > 250 (C) - 940 L64x64x4.8	10.007	4.927	391.9 K=1.00	7	582	-272.52	397.86	0.685 ✓
		KL/R > 250 (C) - 1009								✓

Top Girt Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L51x51x6.4	0.550	0.486	49.0 K=1.00	169	605	-30.49	10427.37	0.003 ✓
T2	95 - 92	L51x51x4.8	0.550	0.486	48.6 K=1.00	169	461	-17.07	7966.99	0.002 ✓
T3	92 - 86	L51x51x4.8	1.220	1.144	114.3 K=1.00	79	461	-1053.06	3707.52	0.284 ✓
T4	86 - 82	L51x51x4.8	1.220	1.144	73.0 K=1.00	141	461	-250.60	6609.11	0.038 ✓
T5	82 - 79	L51x51x4.8	1.220	1.118	71.4 K=1.00	143	461	-2648.49	6708.13	0.395 ✓
T6	79 - 74	L64x64x4.8	2.800	2.698	136.6 K=1.00	55	582	-4229.66	3276.71	1.291 ✓
T10	56.5 - 52.7	L64x64x6.4	2.800	2.648	135.5 K=1.00	56	768	-2223.81	4387.12	0.507 ✓
T20	4 - 0	L64x64x4.8	11.302	5.575	282.1 K=1.00	13	582	-232.19	767.67	0.302 ✓
		KL/R > 200 (C) - 1078								✓

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T12	49 - 45	L51x51x4.8	1.085	1.008	100.8 K=1.00	100	461	-936.78	4711.78	0.199 ✓
T13	45 - 41	L51x51x4.8	1.247	1.170	116.9 K=1.00	75	461	-957.92	3541.06	0.271 ✓
T14	41 - 37	L51x51x4.8	1.409	1.332	133.1 K=1.00	58	461	-975.10	2732.51	0.357 ✓
T15	37 - 33	L51x51x4.8	1.570	1.494	149.3 K=1.00	46	461	-1003.31	2172.31	0.462 ✓
T16	33 - 25	L51x51x4.8	1.813	1.737	173.6 K=1.00	34	461	-1051.85	1607.27	0.654 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T17	25 - 16	L51x51x4.8	2.158	2.081	208.0 K=1.00	24	461	-1128.12	1119.72	1.008 ✓
T18	16 - 8	L64x64x4.8	2.502	2.425	192.9 K=1.00	28	582	-1210.24	1641.82	0.737 ✓
T19	8 - 4	L64x64x4.8	2.826	2.749	218.7 K=1.00	22	582	-1283.95	1277.74	1.005 ✓
T20	4 - 0	L64x64x4.8	1.884	1.807	143.8 K=1.00	50	582	-1294.11	2956.28	0.438 ✓

Redundant Horizontal (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L76x76x6.4	3.767	3.691	245.5 K=1.00	17	929	-1294.11	1618.66	0.799 ✓

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T10	56.5 - 52.7	L51x51x4.8	1.280	1.152	115.1 K=1.00	78	461	-780.06	3656.94	0.213 ✓
T11	52.7 - 49	L51x51x4.8	1.367	1.255	125.4 K=1.00	65	461	-701.78	3080.41	0.228 ✓
T12	49 - 45	L51x51x4.8	1.538	1.431	142.9 K=1.00	50	461	-664.14	2370.25	0.280 ✓
T13	45 - 41	L51x51x4.8	1.664	1.564	156.3 K=1.00	42	461	-639.35	1983.66	0.322 ✓
T14	41 - 37	L51x51x4.8	1.796	1.701	169.9 K=1.00	36	461	-621.63	1677.29	0.371 ✓
T15	37 - 33	L51x51x4.8	1.932	1.841	183.9 K=1.00	30	461	-617.24	1431.77	0.431 ✓
T16	33 - 25	L51x51x4.8	2.816	2.696	269.4 K=1.00	14	461	-816.62	667.16	1.224 ✓
T17	25 - 16	KL/R > 250 (C) - 919 L64x64x6.4	3.251	3.136	251.4 K=1.00	16	768	-849.97	1274.87	0.667 ✓
T18	16 - 8	KL/R > 250 (C) - 988 L64x64x6.4	3.335	3.235	259.4 K=1.00	15	768	-806.65	1198.25	0.673 ✓
T19	8 - 4	KL/R > 250 (C) - 1057 L64x64x6.4	3.599	3.507	281.2 K=1.00	13	768	-824.13	1019.24	0.809 ✓
T20	4 - 0	KL/R > 250 (C) - 1091 L51x51x4.8	2.223	2.128	212.6 K=1.00	23	461	-763.68	1071.14	0.713 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
										✓

Redundant Diagonal (2) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x6.4	3.896	3.815	305.9 K=1.00	11	768	-669.19	861.32	0.777 ✓
		KL/R > 250 (C) - 1138								

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T12	49 - 45	L51x51x3.2	1.534	1.534	151.9 K=1.00	45	312	-5.01	1421.82	0.004 ✓
T13	45 - 41	L51x51x3.2	1.763	1.763	174.6 K=1.00	34	312	-3.91	1076.39	0.004* ✓
T14	41 - 37	L51x51x4.8	1.992	1.992	199.0 K=1.00	26	461	-4.47	1222.43	0.004* ✓
T15	37 - 33	L51x51x4.8	2.221	2.221	221.9 K=1.00	21	461	-4.93	983.31	0.005* ✓
T16	33 - 25	L51x51x4.8	2.565	2.565	256.3 K=1.00	16	461	-12.40	737.52	0.017 ✓
T17	25 - 16	KL/R > 250 (C) - 902 L51x51x4.8	3.051	3.051	304.9 K=1.00	11	461	-12.81	521.01	0.025 ✓
T18	16 - 8	KL/R > 250 (C) - 971 L51x51x4.8	3.538	3.538	353.5 K=1.00	8	461	-11.23	387.53	0.029 ✓
T19	8 - 4	KL/R > 250 (C) - 1040 L64x64x6.4	3.996	3.996	320.4 K=1.00	10	768	-14.88	785.16	0.019 ✓
T20	4 - 0	KL/R > 250 (C) - 1109 L64x64x6.4	2.664	2.664	213.6 K=1.00	23	768	-10.31	1766.61	0.006 ✓

* DL controls

Redundant Hip (2) Design Data (Compression)

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L64x64x6.4	5.328	5.328	427.2 K=1.00	6	768	-11.97	441.65	0.027 ✓
KL/R > 250 (C) - 1140										

Inner Bracing Design Data (Compression)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L38x38x5	0.389	0.325	43.7 K=1.00	174	340	-15.77	6053.19	0.003 ✓
T6	79 - 74	L51x51x4.8	3.960	3.858	385.5 K=1.00	7	461	-89.72	325.85	0.275 ✓
T10	56.5 - 52.7	KL/R > 250 (C) - 312 L76x76x6.4	3.960	3.807	253.2 K=1.00	16	929	-250.80	1521.37	0.165 ✓
T16	33 - 25	KL/R > 250 (C) - 524 L102x102x6.4	5.129	5.129	254.0 K=1.00	16	1252	-98.13	2036.80	0.048 ✓
T17	25 - 16	KL/R > 250 (C) - 905 L102x102x6.4	6.102	6.102	302.2 K=1.00	11	1252	-43.47	1438.88	0.030 ✓
T18	16 - 8	KL/R > 250 (C) - 974 L102x102x6.4	7.076	7.076	350.4 K=1.00	8	1252	-28.53	1070.25	0.027 ✓
T19	8 - 4	KL/R > 250 (C) - 1042 L102x102x6.4	7.992	7.992	395.8 K=1.00	7	1252	-229.99	838.93	0.274 ✓
KL/R > 250 (C) - 1111										

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T1	100 - 95	L64x64x5	5.000	0.500	25.3	224	370	4776.19	8459.91	0.565 ✓
T2	95 - 92	L76x76x8	3.037	1.519	64.8	224	796	5130.72	18178.45	0.282 ✓
T3	92 - 86	L76x76x8	6.000	1.000	42.7	224	796	14255.82	18178.45	0.784 ✓
T4	86 - 82	L102x102x8	4.000	1.000	31.8	224	1196	23305.08	27318.33	0.853 ✓
T5	82 - 79	L102x102x8	3.201	1.601	50.8	224	1196	15774.13	27318.33	0.577 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T6	79 - 74	L127x127x13	5.000	1.250	32.0	224	2500	20200.56	57124.53	0.354 ✓
T7	74 - 69	L152x152x13	5.000	1.250	26.5	224	3145	28544.58	71866.29	0.397 ✓
T8	69 - 61.5	L152x152x13	7.500	1.250	26.5	224	3145	43863.03	71866.29	0.610 ✓
T9	61.5 - 56.5	L152x152x13	5.000	1.250	26.5	224	3145	55958.80	71866.29	0.779 ✓
T10	56.5 - 52.7	L152x152x16	3.825	1.912	40.9	224	3881	58227.67	88690.03	0.657 ✓
T11	52.7 - 49	L152x152x16	3.724	1.862	39.8	224	3881	57858.90	88690.03	0.652 ✓
T12	49 - 45	L152x152x16	4.026	1.007	21.5	224	3881	56119.37	88690.03	0.633 ✓
T13	45 - 41	L152x152x16	4.026	1.007	21.5	224	3881	56653.70	88690.03	0.639 ✓
T14	41 - 37	L152x152x16	4.026	1.007	21.5	224	3881	57237.48	88690.03	0.645 ✓
T15	37 - 33	L152x152x16	4.026	1.007	21.5	224	3881	58483.04	88690.03	0.659 ✓
T16	33 - 25	L152x152x16	8.052	2.013	43.1	224	3881	60673.89	88690.03	0.684 ✓
T17	25 - 16	L152x152x16	9.059	2.265	48.5	224	3881	63692.55	88690.03	0.718 ✓
T18	16 - 8	L152x152x16	8.052	2.013	43.1	224	3881	67509.53	88690.03	0.761 ✓
T19	8 - 4	L152x152x16	4.026	2.013	43.1	224	3881	70653.84	88690.03	0.797 ✓
T20	4 - 0	L152x152x16	4.026	1.342	28.7	224	3881	70392.57	88690.03	0.794 ✓

Diagonal Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L44x44x5	0.571	0.505	37.0	224	232	1036.70	5312.20	0.195 ✓
T2	95 - 92	L44x44x5	1.628	1.530	112.2	224	232	1084.81	5312.20	0.204 ✓
T3	92 - 86	L44x44x5	1.171	1.098	80.5	224	232	1761.15	5312.20	0.332 ✓
T4	86 - 82	L44x44x5	1.171	1.074	78.7	224	232	2250.25	5312.20	0.424 ✓
T5	82 - 79	L76x76x6.4	1.667	1.594	67.5	224	606	6811.96	13848.04	0.492 ✓
T6	79 - 74	L51x51x4.8	1.877	1.792	114.3	224	278	1886.96	6350.48	0.297 ✓
T7	74 - 69	L64x64x4.8	1.877	1.775	89.8	224	368	2293.48	8418.00	0.272 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T8	69 - 61.5	L64x64x4.8	1.877	1.775	89.8	224	368	2941.67	8418.00	0.349 ✓
T9	61.5 - 56.5	L64x64x4.8	1.877	1.775	89.8	224	368	3426.56	8418.00	0.407 ✓
T10	56.5 - 52.7	L64x64x4.8	2.365	2.251	113.9	224	368	1551.88	8418.00	0.184 ✓
T11	52.7 - 49	L64x64x4.8	2.522	2.419	122.4	224	368	393.74	8418.00	0.047 ✓
T12	49 - 45	L64x64x4.8	3.076	1.538	77.8	224	368	845.72	8418.00	0.100 ✓
T13	45 - 41	L64x64x4.8	3.328	1.664	84.2	224	368	660.21	8418.00	0.078 ✓
T14	41 - 37	L64x64x4.8	3.592	1.796	90.9	224	368	982.40	8418.00	0.117 ✓
T15	37 - 33	L64x64x4.8	3.865	1.932	97.8	224	368	1040.57	8418.00	0.124 ✓
T16	33 - 25	L76x76x6.4	5.198	2.599	110.0	224	606	1548.42	13848.04	0.112 ✓
T17	25 - 16	L76x76x6.4	5.999	3.000	127.0	224	606	2035.21	13848.04	0.147 ✓
T18	16 - 8	L76x76x6.4	6.165	3.082	130.5	224	606	2264.76	13848.04	0.164 ✓
T19	8 - 4	L102x102x6.4	6.670	3.335	105.0	224	848	2652.65	19376.20	0.137 ✓
T20	4 - 0	L76x76x6.4	7.198	2.399	101.6	224	606	2374.41	13848.04	0.171 ✓

Horizontal Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L44x44x5	0.550	0.243	17.8	224	232	106.91	5312.20	0.020 ✓
T2	95 - 92	L44x44x5	0.885	0.809	59.3	224	232	41.34	5312.20	0.008 ✓
T3	92 - 86	L44x44x5	1.220	1.144	83.9	224	232	125.95	5312.20	0.024 ✓
T4	86 - 82	L44x44x5	1.220	1.118	82.0	224	232	293.23	5312.20	0.055 ✓
T5	82 - 79	L51x51x4.8	2.010	1.908	121.8	224	278	50.67	6350.48	0.008 ✓
T6	79 - 74	L51x51x4.8	2.800	1.336	85.3	224	278	147.56	6350.48	0.023 ✓
T7	74 - 69	L51x51x4.8	2.800	2.648	168.9	224	278	266.18	6350.48	0.042 ✓
T8	69 - 61.5	L51x51x4.8	2.800	2.648	168.9	224	278	388.93	6350.48	0.061 ✓
T9	61.5 - 56.5	L51x51x4.8	2.800	2.648	168.9	224	278	547.01	6350.48	0.086 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T10	56.5 - 52.7	L51x51x4.8	3.108	1.478	94.3	224	278	257.70	6350.48	0.041 ✓
T11	52.7 - 49	L51x51x4.8	3.715	3.563	227.3	224	278	374.70	6350.48	0.059 ✓
T12	49 - 45	L51x51x4.8	4.338	4.186	267.1	224	278	157.54	6350.48	0.025 ✓
T13	45 - 41	L51x51x4.8	4.986	4.834	308.4	224	278	199.07	6350.48	0.031 ✓
T14	41 - 37	L51x51x4.8	5.634	5.482	349.8	224	278	158.40	6350.48	0.025 ✓
T15	37 - 33	L51x51x4.8	6.282	6.130	391.1	224	278	150.47	6350.48	0.024 ✓
T16	33 - 25	L51x51x4.8	7.254	3.551	226.6	224	278	43.73	6350.48	0.007 ✓
T17	25 - 16	L51x51x4.8	8.630	4.239	270.5	224	278	37.05	6350.48	0.006 ✓
T18	16 - 8	L64x64x4.8	10.007	4.927	249.3	224	368	62.34	8418.00	0.007 ✓

Top Girt Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L51x51x6.4	0.550	0.486	31.5	224	363	31.56	8297.75	0.004 ✓
T2	95 - 92	L51x51x4.8	0.550	0.486	31.0	224	278	1.76	6350.48	0.000 ✓
T3	92 - 86	L51x51x4.8	1.220	1.144	73.0	224	278	1138.32	6350.48	0.179 ✓
T4	86 - 82	L51x51x4.8	1.220	1.144	73.0	224	278	212.15	6350.48	0.033 ✓
T5	82 - 79	L51x51x4.8	1.220	1.118	71.4	224	278	2407.06	6350.48	0.379 ✓
T6	79 - 74	L64x64x4.8	2.800	2.698	136.6	224	368	4602.01	8418.00	0.547 ✓
T10	56.5 - 52.7	L64x64x6.4	2.800	2.648	135.5	224	485	1903.26	11083.94	0.172 ✓

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T12	49 - 45	L51x51x4.8	1.085	1.008	64.3	207	461	936.78	9729.56	0.096 ✓

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Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T13	45 - 41	L51x51x4.8	1.247	1.170	74.7	207	461	957.92	9729.56	0.098
T14	41 - 37	L51x51x4.8	1.409	1.332	85.0	207	461	975.10	9729.56	0.100
T15	37 - 33	L51x51x4.8	1.570	1.494	95.3	207	461	1003.31	9729.56	0.103
T16	33 - 25	L51x51x4.8	1.813	1.737	110.8	207	461	1051.85	9729.56	0.108
T17	25 - 16	L51x51x4.8	2.158	2.081	132.8	207	461	1128.12	9729.56	0.116
T18	16 - 8	L64x64x4.8	2.502	2.425	122.7	207	582	1210.24	12274.21	0.099
T19	8 - 4	L64x64x4.8	2.826	2.749	139.1	207	582	1283.95	12274.21	0.105
T20	4 - 0	L64x64x4.8	1.884	1.807	91.5	207	582	1294.11	12274.21	0.105

Redundant Horizontal (2) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T20	4 - 0	L76x76x6.4	3.767	3.691	156.3	207	929	1294.11	19595.20	0.066

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio P P _a
T10	56.5 - 52.7	L51x51x4.8	1.280	1.152	73.5	207	461	780.06	9729.56	0.080
T11	52.7 - 49	L51x51x4.8	1.367	1.255	80.1	207	461	701.78	9729.56	0.072
T12	49 - 45	L51x51x4.8	1.538	1.431	91.3	207	461	664.14	9729.56	0.068
T13	45 - 41	L51x51x4.8	1.664	1.564	99.8	207	461	639.35	9729.56	0.066
T14	41 - 37	L51x51x4.8	1.796	1.701	108.5	207	461	621.63	9729.56	0.064
T15	37 - 33	L51x51x4.8	1.932	1.841	117.4	207	461	617.24	9729.56	0.063
T16	33 - 25	L51x51x4.8	2.816	2.696	172.1	207	461	816.62	9729.56	0.084
T17	25 - 16	L64x64x6.4	3.251	3.136	160.5	207	768	849.97	16193.25	0.052
T18	16 - 8	L64x64x6.4	3.335	3.235	165.6	207	768	806.65	16193.25	0.050

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	Project TORRE CUADRADA SECCION VARIABLE DE 100 M	Date 12:38:40 01/24/11
	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T19	8 - 4	L64x64x6.4	3.599	3.507	179.6	207	768	824.13	16193.25	0.051 ✓
T20	4 - 0	L51x51x4.8	2.223	2.128	135.8	207	461	763.68	9729.56	0.078 ✓

Redundant Diagonal (2) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T20	4 - 0	L64x64x6.4	3.896	3.815	195.3	207	768	669.19	16193.25	0.041 ✓

Redundant Hip (1) Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T16	33 - 25	L51x51x4.8	2.565	2.565	163.6	207	461	4.86	9729.56	0.000 ✓
T17	25 - 16	L51x51x4.8	3.051	3.051	194.7	207	461	2.23	9729.56	0.000 ✓
T20	4 - 0	L64x64x6.4	2.664	2.664	136.4	207	768	1.18	16193.25	0.000 ✓

Inner Bracing Design Data (Tension)

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
T1	100 - 95	L38x38x5	0.389	0.325	28.1	207	340	17.91	7175.97	0.002 ✓
T6	79 - 74	L51x51x4.8	3.960	3.858	246.2	207	461	233.08	9729.56	0.024 ✓
T10	56.5 - 52.7	L76x76x6.4	2.197	2.045	86.6	207	929	80.38	19595.20	0.004 ✓
T16	33 - 25	L102x102x6.4	5.129	5.129	161.5	207	1252	87.14	26399.08	0.003 ✓
T17	25 - 16	L102x102x6.4	6.102	6.102	192.2	207	1252	32.04	26399.08	0.001 ✓
T18	16 - 8	L102x102x6.4	7.076	7.076	222.9	207	1252	5.78	26399.08	0.000 ✓
T19	8 - 4	L102x102x6.4	7.992	7.992	251.7	207	1252	205.48	26399.08	0.008 ✓

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	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section No.	Elevation m	Size	L m	L _u m	Kl/r	F _a MPa	A mm ²	Actual P kg	Allow. P _a kg	Ratio $\frac{P}{P_a}$
										✓

Section Capacity Table

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T1	100 - 95	Leg	L64x64x5	1	4776.19	11277.06	42.4	Pass
		Diagonal	L44x44x5	22	1036.70	7081.17	14.6	Pass
		Horizontal	L44x44x5	39	106.91	7081.17	1.5	Pass
		Top Girt	L51x51x6.4	8	31.56	11060.90	5.8 (b)	Pass
							0.3	
T2	95 - 92	Inner Bracing	L38x38x5	23	-15.77	8068.90	0.2	Pass
		Leg	L76x76x8	138	-5404.65	15450.27	35.0	Pass
		Diagonal	L44x44x5	149	-1160.63	1823.40	63.7	Pass
		Horizontal	L44x44x5	147	-55.72	8575.77	0.6	Pass
		Top Girt	L51x51x4.8	141	-17.07	10620.00	3.0 (b)	Pass
T3	92 - 86	Leg	L76x76x8	166	-15195.03	23156.15	0.2 (b)	Pass
		Diagonal	L44x44x5	177	-1761.93	3538.58	65.6	Pass
		Horizontal	L44x44x5	198	-139.25	6845.42	49.8	Pass
		Top Girt	L51x51x4.8	171	-1053.06	4942.12	2.0	Pass
							4.4 (b)	
T4	86 - 82	Leg	L102x102x8	234	-24297.73	35387.39	21.3	Pass
		Diagonal	L44x44x5	245	-2144.38	3701.14	68.7	Pass
		Horizontal	L44x44x5	266	-303.81	6988.29	57.9	Pass
		Top Girt	L51x51x4.8	239	-250.60	8809.95	4.3	Pass
							16.4 (b)	
T5	82 - 79	Leg	L102x102x8	282	-16349.61	27685.74	2.8	Pass
		Diagonal	L76x76x6.4	296	-5567.44	7229.54	3.2 (b)	Pass
		Horizontal	L51x51x4.8	294	-108.80	4353.64	59.1	Pass
							77.0	
		Top Girt	L51x51x4.8	285	-2648.49	8941.94	90.8 (b)	Pass
T6	79 - 74	Leg	L127x127x13	310	-21912.10	69907.13	5.9 (b)	Pass
		Diagonal	L51x51x4.8	320	-1920.81	2014.09	29.6	Pass
		Horizontal	L51x51x4.8	327	-138.06	3619.72	34.0 (b)	Pass
		Top Girt	L64x64x4.8	314	-4229.66	4367.85	31.3	Pass
							8.0 (b)	
T7	74 - 69	Inner Bracing	L51x51x4.8	312	-89.72	434.35	96.8	Pass
		Leg	L152x152x13	370	-31118.94	88969.57	20.7	Pass
		Diagonal	L64x64x4.8	374	-2326.06	4087.82	35.0	Pass
		Horizontal	L51x51x4.8	372	-250.85	2261.97	56.9	Pass
		Top Girt	L51x51x4.8	414	-47526.97	88969.57	11.1	Pass
T8	69 - 61.5	Leg	L152x152x13	414	-47526.97	88969.57	14.3 (b)	Pass
		Diagonal	L64x64x4.8	423	-3008.97	4087.82	53.4	Pass
		Horizontal	L51x51x4.8	436	-370.53	2261.97	73.6	Pass
		Top Girt	L51x51x4.8	478	-60129.13	88969.57	16.4	Pass
							21.0 (b)	
T9	61.5 - 56.5	Leg	L152x152x13	478	-60129.13	88969.57	67.6	Pass
		Diagonal	L64x64x4.8	487	-3401.06	4087.82	83.2	Pass
		Horizontal	L51x51x4.8	509	-537.36	2261.97	23.8	Pass
		Top Girt	L51x51x4.8	522	-62943.22	94823.08	29.5 (b)	Pass
							66.4	
T10	56.5 - 52.7	Leg	L152x152x16	522	-62943.22	94823.08	66.4	Pass

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Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
T11	52.7 - 49	Diagonal	L64x64x4.8	543	-1338.48	5317.78	25.2	Pass
		Horizontal	L51x51x4.8	545	-329.87	2961.21	11.1	Pass
		Top Girt	L64x64x6.4	528	-2223.81	5848.03	38.0	Pass
		Redund Diag 1	L51x51x4.8	562	-780.06	4874.71	16.0	Pass
		Bracing						
		Inner Bracing	L76x76x6.4	524	-250.80	2027.98	12.4	Pass
		Leg	L152x152x16	573	-63368.69	96086.78	65.9	Pass
		Diagonal	L64x64x4.8	607	-491.89	5436.72	9.0	Pass
		Horizontal	L51x51x4.8	590	-432.95	1249.27	34.7	Pass
		Redund Diag 1	L51x51x4.8	602	-701.78	4106.18	17.1	Pass
T12	49 - 45	Bracing						
		Leg	L152x152x16	613	-62249.67	114777.97	54.2	Pass
		Diagonal	L64x64x4.8	626	-929.52	5443.36	17.1	Pass
		Horizontal	L51x51x4.8	638	-231.91	904.84	25.6	Pass
		Redund Horz 1	L51x51x4.8	632	-936.78	6280.81	14.9	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	658	-664.14	3159.55	21.0	Pass
		Bracing						
		Redund Hip 1	L51x51x3.2	646	-5.01	1895.29	0.3	Pass
		Bracing						
T13	45 - 41	Leg	L152x152x16	677	-63654.45	114777.97	55.5	Pass
		Diagonal	L64x64x4.8	695	-689.82	4649.62	14.8	Pass
		Horizontal	L51x51x4.8	679	-268.11	678.57	39.5	Pass
		Redund Horz 1	L51x51x4.8	691	-957.92	4720.23	20.3	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	722	-639.35	2644.21	24.2	Pass
		Bracing						
		Redund Hip 1	L51x51x3.2	730	-3.91	1076.39	0.4	Pass
		Bracing						
		Leg	L152x152x16	741	-64796.14	114777.97	56.5	Pass
T14	41 - 37	Diagonal	L64x64x4.8	754	-1024.22	3991.90	25.7	Pass
		Horizontal	L51x51x4.8	766	-230.61	527.67	43.7	Pass
		Redund Horz 1	L51x51x4.8	755	-975.10	3642.44	26.8	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	786	-621.63	2235.83	27.8	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	794	-4.47	1222.43	0.4	Pass
		Bracing						
		Leg	L152x152x16	805	-66670.39	114777.97	58.1	Pass
		Diagonal	L64x64x4.8	823	-1149.76	3448.06	33.3	Pass
T15	37 - 33	Horizontal	L51x51x4.8	807	-220.16	422.03	52.2	Pass
		Redund Horz 1	L51x51x4.8	849	-1003.31	2895.69	34.6	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	850	-617.24	1908.55	32.3	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	866	-4.93	983.31	0.5	Pass
		Bracing						
		Leg	L152x152x16	869	-69896.34	92243.69	75.8	Pass
		Diagonal	L76x76x6.4	875	-1691.16	3708.09	45.6	Pass
		Horizontal	L51x51x4.8	871	-264.83	512.88	51.6	Pass
T16	33 - 25	Redund Horz 1	L51x51x4.8	883	-1051.85	2142.50	49.1	Pass
		Bracing						
		Redund Diag 1	L51x51x4.8	919	-816.62	889.32	91.8	Pass
		Bracing						
		Redund Hip 1	L51x51x4.8	902	-12.40	983.11	1.3	Pass
		Bracing						
		Inner Bracing	L102x102x6.4	905	-98.13	2715.06	3.6	Pass
		Leg	L152x152x16	938	-74963.87	85486.25	87.7	Pass
		Diagonal	L76x76x6.4	956	-2223.56	2781.31	79.9	Pass
		Horizontal	L51x51x4.8	940	-262.05	359.85	72.8	Pass
T17	25 - 16	Redund Horz 1	L51x51x4.8	987	-1128.12	1492.58	75.6	Pass

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	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail	
T18	16 - 8	Bracing							
		Redund Diag 1	L64x64x6.4	992	-849.97	1699.40	50.0	Pass	
		Bracing							
		Redund Hip 1	L51x51x4.8	971	-12.81	694.51	1.8	Pass	
		Bracing							
		Inner Bracing	L102x102x6.4	974	-43.47	1918.02	2.3	Pass	
		Leg	L152x152x16	1007	-80421.04	92243.69	87.2	Pass	
		Diagonal	L76x76x6.4	1013	-2475.84	2643.55	93.7	Pass	
		Horizontal	L64x64x4.8	1009	-272.52	530.34	51.4	Pass	
		Redund Horz 1	L64x64x4.8	1021	-1210.24	2188.54	55.3	Pass	
T19	8 - 4	Bracing							
		Redund Diag 1	L64x64x6.4	1061	-806.65	1597.26	50.5	Pass	
		Bracing							
		Redund Hip 1	L51x51x4.8	1040	-11.23	516.58	2.2	Pass	
		Bracing							
		Inner Bracing	L102x102x6.4	1042	-28.53	1426.65	2.0	Pass	
		Leg	L152x152x16	1076	-85319.39	92243.09	92.5	Pass	
		Diagonal	L102x102x6.4	1105	-2522.09	6422.72	39.3	Pass	
		Redund Horz 1	L64x64x4.8	1095	-1283.95	1703.23	75.4	Pass	
		Bracing							
T20	4 - 0	Redund Diag 1	L64x64x6.4	1091	-824.13	1358.65	60.7	Pass	
		Bracing							
		Redund Hip 1	L64x64x6.4	1109	-14.88	1046.62	1.4	Pass	
		Bracing							
		Inner Bracing	L102x102x6.4	1111	-229.99	1118.29	20.6	Pass	
		Leg	L152x152x16	1117	-85994.33	108093.09	79.6	Pass	
		Diagonal	L76x76x6.4	1141	-2819.03	5107.24	55.2	Pass	
		Top Girt	L64x64x4.8	1078	-232.19	1023.31	22.7	Pass	
		Redund Horz 1	L64x64x4.8	1135	-1294.11	3940.72	32.8	Pass	
		Bracing							
		Redund Horz 2	L76x76x6.4	1143	-1294.11	2157.67	60.0	Pass	
		Bracing							
		Redund Diag 1	L51x51x4.8	1137	-763.68	1427.83	53.5	Pass	
		Bracing							
		Redund Diag 2	L64x64x6.4	1138	-669.19	1148.14	58.3	Pass	
		Bracing							
		Redund Hip 1	L64x64x6.4	1165	-10.31	2354.89	0.4	Pass	
		Bracing							
		Redund Hip 2	L64x64x6.4	1140	-11.97	588.72	2.0	Pass	
		Bracing							
Summary									
Leg (T19)							92.5	Pass	
Diagonal (T6)							95.4	Pass	
Horizontal (T17)							72.8	Pass	
Top Girt (T6)							96.8	Pass	
Redund Horz 1							75.6	Pass	
Bracing (T17)									
Redund Horz 2							60.0	Pass	
Bracing (T20)									
Redund Diag 1							91.8	Pass	
Bracing (T16)									
Redund							58.3	Pass	

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	Client RTVC - RADIO TELEVISION NACIONAL DE COLOMBIA	Designed by Ing Jaime Gutierrez C.

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	SF*P _{allow} kg	% Capacity	Pass Fail
						Diag 2 Bracing (T20)		
						Redund Hip 1 Bracing (T18)	2.2	Pass
						Redund Hip 2 Bracing (T20)	2.0	Pass
						Inner Bracing (T6)	20.7	Pass
						Bolt Checks	90.8	Pass
						RATING =	96.8	Pass



TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

Cliente: **RTVC - TELEFONICA TELECOM**

Estructura: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

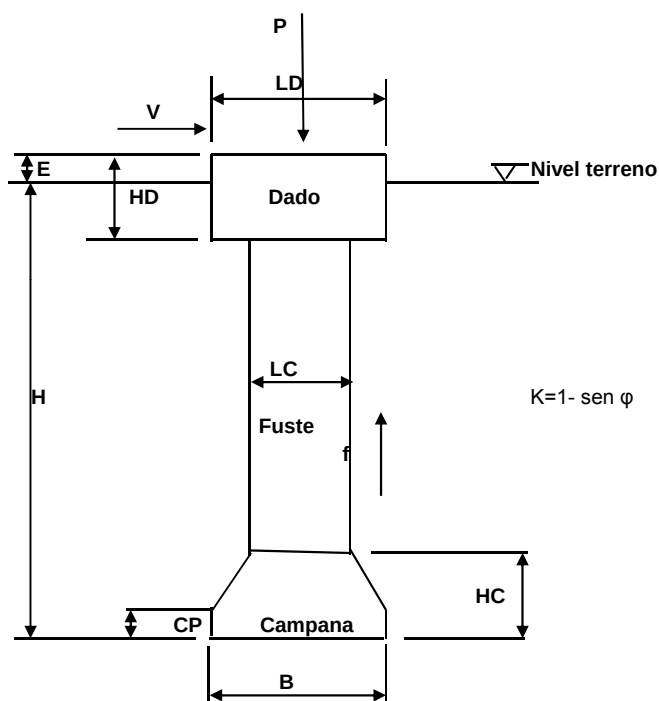
ESTACION BASE: **MONTERIA**

Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 23 de 2011



PARAMETROS DEL CAISSON

PROFUNDIDAD

SUELO

ANGULO DE FRICCION INTERNA DEL SUELO

K

FRICCION

CL

5°

0,91284

PUNTA

CL

5°

0,91284

O



TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

Cliente: RTVC - TELEFONICA TELECOM

Estructura: TORRE CUADRADA SECCION VARIABLE DE 100 M

ESTACION BASE: MONTERIA

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PARAMETROS DE DISEÑO

ESFUERZO ADMISIBLE DEL TERRENO	Qadm	18,80	kPa
COHESION	Cu	9,8	kPa
PESO UNITARIO DEL CONCRETO	γ_c	24	kN/m ³
PESO UNITARIO DEL SUELO	γ_s	16	kN/m ³
ESFUERZO DE FLUENCIA DEL ACERO	Fy	420	Mpa
RESISTENCIA DEL CONCRETO	f'c	21	Mpa
MODULO DE ELASTICIDAD DEL CONCRETO	Ec	18500	Mpa

CARGAS DE TRABAJO

HIPOTESIS	1	2	
ARRANQUE	0,00	877,76	kN
COMPRESION	720,96	0,00	kN
CARGA LONGITUDINAL	78,02	89,55	kN
CARGA TRANSVERSAL	78,25	89,23	kN
MOMENTO LONGITUDINAL	0,00	0,00	kN.m
MOMENTO TRANSVERSAL	0,00	0,00	kN.m
VIGAS DE ENLACE	si		
MOMENTO FINAL LONGITUDINAL Y TRANSVERSAL	0,00	5484,60	kN.m

CARGAS DE DISEÑO

HIPOTESIS	1	2	
ARRANQUE	0,00	1228,864	kN
COMPRESION	1009,34	0,000	kN
CARGA LONGITUDINAL	117,03	125,370	kN
CARGA TRANSVERSAL	109,55	133,845	kN
MOMENTO LONGITUDINAL	0,00	0,000	kN.m
MOMENTO TRANSVERSAL	0,00	0,000	kN.m
MOMENTO FINAL LONGITUDINAL Y TRANSVERSAL	0,00	0,00	kN.m



TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

Cliente: RTVC - TELEFONICA TELECOM

Estructura: TORRE CUADRADA SECCION VARIABLE DE 100 M

ESTACION BASE: MONTERIA

Municipio: CIENAGA DE ORO - MONTERIA

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ANALISIS DE ESTABILIDAD

ALTURA DEL CIMIENTO SOBRE EL SUELO	E	2,15	m
LADO MAYOR DE LA CAMPANA	B	2,60	m
LADO DEL FUSTE	b	1,30	m
PROFUNDIDAD DE LA CIMENTACION	H	5,25	m
LADO DEL DADO	LD	1,30	m
PROFUNDIDAD DEL DADO	HD	0,05	m
PROFUNDIDAD DE CAMPANA	HC	1,00	m
PEDESTAL DE CAMPANA	CP	0,50	m
RECUBRIMIENTO DEL ACERO	REC	0,10	m
INERCIA DE LA SECCION	I	1,904	m ⁴

ANALISIS DE CIMENTACION

VOLUMEN DADO	Vd	0,08	
VOLUMEN DEL FUSTE	Vf	8,49	
VOLUMEN PEDESTAL CAMPANA	Vpc	2,65	
VOLUMEN CONO	Vvc	1,66	
VOLUMEN DE CONCRETO	Vc	12,9	m ³
VOLUMEN DE EXCAVACION	Vexc	9,19	m ³
PESO DE LA CIMENTACION	Wp	1327,9	kN

CARGAS AXIALES

RELACION PROFUNDIDAD DIAMETRO	D/B	2,02	
FACTOR DE CAPACIDAD A COMPRESION	Nc	5,74	
AREA DE LA BASE	Ab	6,76	m ²
RESISTENCIA ULTIMA POR PUNTA	Qb	380,26	kN
FACTOR DE ADHESION	a	0,30	
AREA PERIMETRAL	Ap	13,65	m ²
RESISTENCIA ULTIMA POR FRICCION	Qs	40,13	kN
RESISTENCIA ULTIMA TOTAL A COMPRESION	Qp	420,39	kN
FACTOR DE SEGURIDAD A COMPRESION	FS	1,72	
RESISTENCIA ULTIMA TOTAL A ARRANCAMIENTO	Qu	1327,95	kN
FACTOR DE SEGURIDAD A ARRANCAMIENTO	FS	1,51	
MOMENTO DE VUELCO	Mv	410,81	kN
MOMENTO RESISTENTE	Mr	3093,87	kN
FACTOR DE SEGURIDAD A VOLCAMIENTO	FS	1,88	



TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

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CARGAS HORIZONTALES

CARGA LONGITUDINAL	SL	78,02	kN
CARGA TRANSVERSAL	ST	78,25	kN
CARGA HORIZONTAL RESULTANTE	SR	110,50	kN
CARGA HORIZONTAL RESULTANTE ULTIMA	SRU	193,37	kN
MODULO DE REACCION	Ks	240,00	kN/m³
FACTOR DE RIGIDEZ	R	4,50	m
RELACION PROFUNDIDAD - RIGIDEZ	D/R	1,17	
PILAstra		RIGIDA	
PROFUNDIDAD SIN REACCION DEL SUELO	H	2,00	m
MOMENTO MAXIMO	Mmax	4292,91	kN.m
	G	3,70	m
PROFUNDIDAD MINIMA DE LA PILASTRA	Dmin	4,50	m
CIMENTACION RIGIDA			
MAXIMA CARGA HORIZONTAL	SRMAX	725,19	kN
FACTOR DE SEGURIDAD	FS	1,62	

DESPLAZAMIENTO LATERAL

CRITERIO DE RIGIDEZ $b = 0.707/R$	b	0,16	m-1
PILAstra RIGIDA			
DESPLAZAMIENTO LATERAL	d	0,001	m

DISEÑO CONCRETO REFORZADO

CARGA LONGITUDINAL	SL	109,55	kN
CARGA TRANSVERSAL	ST	125,37	kN
CARGA HORIZONTAL RESULTANTE	SR	166,49	kN
CARGA MAXIMA DE ARRANQUE	Qu	1228,86	kN
PROFUNDIDAD SIN REACCION DEL SUELO	H	2,80	m
LOCALIZACION PUNTO MAXIMO DE MOMENTO	F	0,12	m
MOMENTO MAXIMO	Mmax	25462,06	kN.m



TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

Cliente: **RTVC - TELEFONICA TELECOM**

Estructura: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

ESTACION BASE: MONTERIA

Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 23 de 2011

REFUERZO LONGITUDINAL FUSTE

DIAMETRO DE LAS VARILLAS	No	8,00	
	Φ	2,54	cm
AREA	Asi	5,07	cm ²
CANTIDAD		28,00	
AREA DE LA SECCION	As	141,88	cm ²
CUANTIA	ρ	0,0084	
RADIO DEL REFUERZO	r	0,751	m
INERCIA DE LA SECCION	Ixx	23800833	cm ⁴
MODULO DE LA SECCION	Sxx	1464667	cm ³
ESFUERZO MAXIMO SOBRE EL REFUERZO/FLEXION	Ff	1324,20	Mpa
ESFUERZO MAXIMO SOBRE EL REFUERZO/TENSION	Ft	39,73	Mpa
ESFUERZO MAXIMO SOBRE EL REFUERZO/TOTAL	F	1363,92	Mpa
ESFUERZO ULTIMO < 0.9 Fy		si	

REFUERZO LONGITUDINAL DEL DADO

DIAMETRO DE LAS VARILLAS	No	8,00	
	Φ	2,54	cm
AREA	Asi	5,07	cm ²
CANTIDAD		48,00	
AREA DE LA SECCION	As	243,22	cm ²
CUANTIA	ρ	0,0144	



TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

Cliente: **RTVC - TELEFONICA TELECOM**

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ESTACION BASE: **MONTERIA**

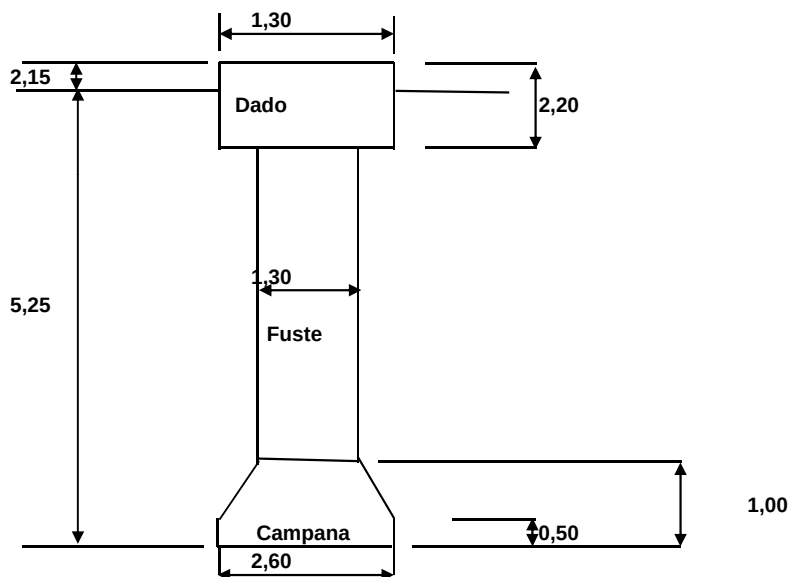
Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 23 de 2011

GEOMETRIA DE LA PILA





TOWER

FOUNDATIONS



HIPOTESIS 2

DISEÑO CIMENTACION PILA

Cliente: **RTVC - TELEFONICA TELECOM**

Estructura: **TORRE CUADRADA SECCION VARIABLE DE 100 M**

ESTACION BASE: **MONTERIA**

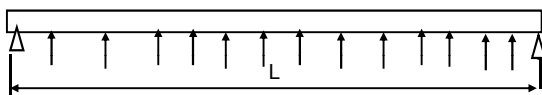
Municipio: **CIENAGA DE ORO - MONTERIA**

Sitio: **PREDIO RURAL EN EL CERRO**

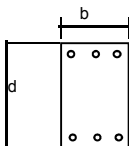
Diseño: Ing. Jaime Gutierrez C

Fecha: Enero 23 de 2011

CALCULO DE VIGA DE AMARRE



FLEXION



A=	1,69	m ²
Pter	5,73	
W=	28,64	t/m
L=	7,96	m
Mu=	29007,20	t-cm
b=	40	cm
d=	120	cm
K=	0,05036	
ro=	0,00330	
As=	15,84	cm ²

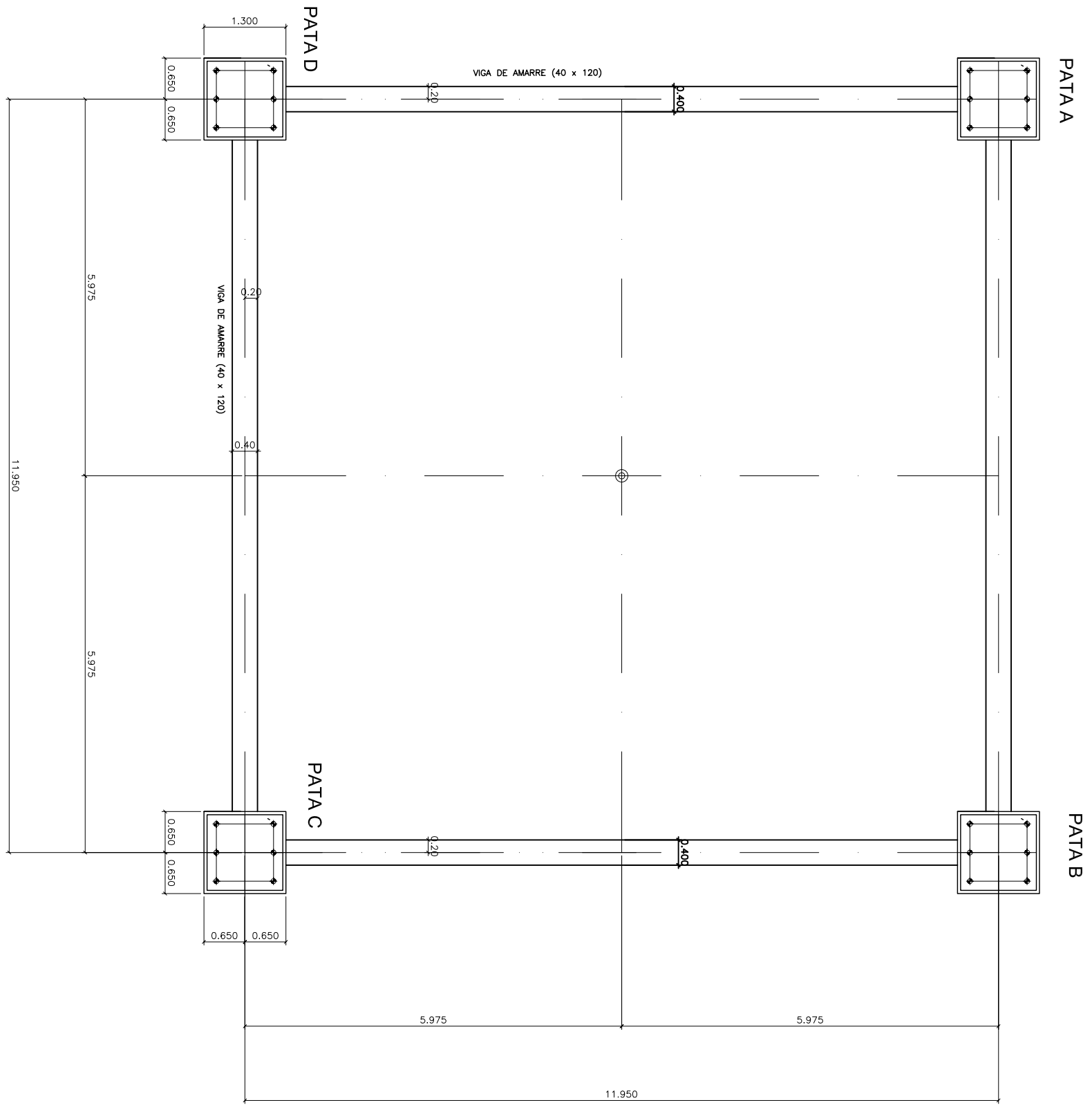
colocar 8 var No 6

CORTANTE

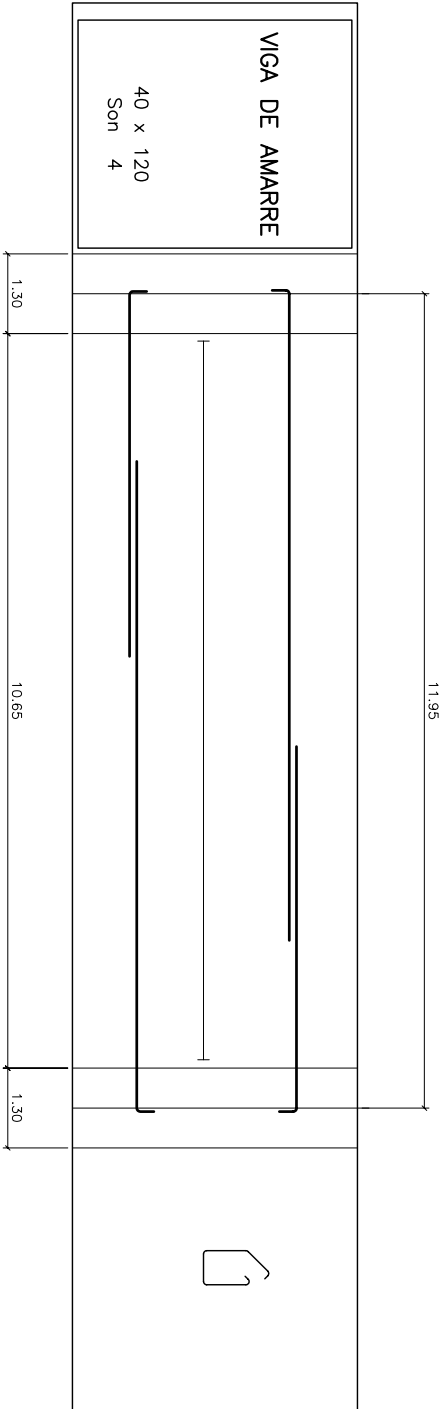
V=	113,936	t
vu=	37,979	kg/cm ²
Ø vc=	6,350	kg/cm ²

No requiere Refuerzo a cortante

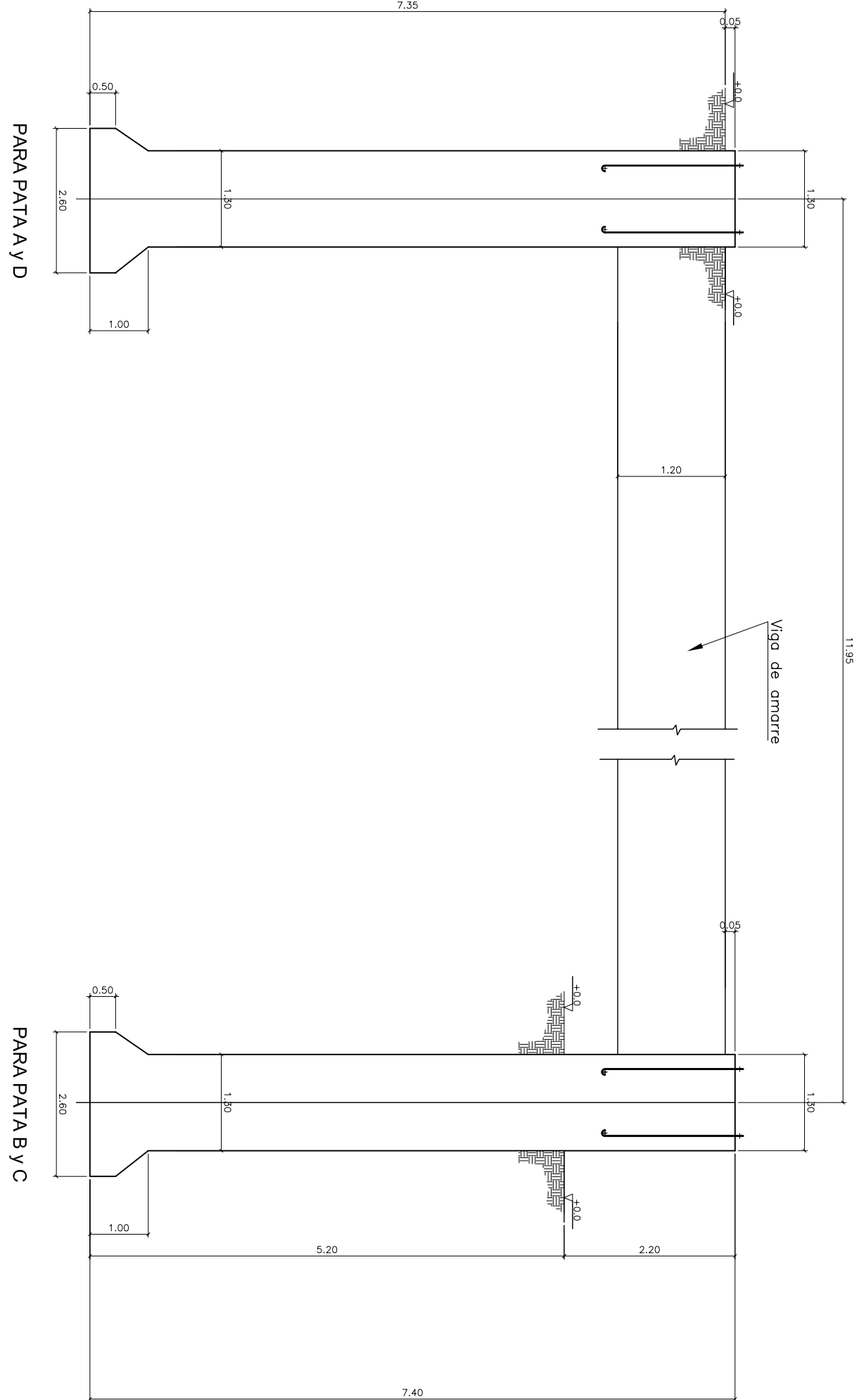
colocar E Ø 3/8" cada 16 cm



PLANTA DE CIMENTACION



VIGA DE AMARRE



NOTAS GENERALES:

1. DIMENSIONES EN MILIMETROS. ESPESORES EN PULGADAS
2. ACERO DE REFUERZO:
 - Ø16 > 1/2" F_y = 4200 kg/cm²
 - Ø16 < 1/2" F_y = 2400 kg/cm²
3. CONCRETO:
 - PLACA VIGAS DE AMARRE, PEDESTALES f_c = 211 kg/cm² (3000 P.S.I.)
 - CONCRETO DE LIMPIEZA f_c = 141 kg/cm² (2000 P.S.I.)
4. MATERIAL DE RELLENO:
 - G₁ = 1.6 t/m³
5. REQUERIMIENTO DEL ACERO 75 mm
6. NO SE PERMITE EL TRASLAPADO DE VARILLAS VERTICALES

Estudio de suelos realizado por:
SUELOS & CIMENTOS

Municipio: CIENAGA DE ORO – CORDOBA
Sitio: CERRO EN ZONA RURAL

ESTACION:

MONTERIA

DISEÑO Y CÁLCULO:

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T.P. 25202-45957 CND

DIBUJÓ:

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REVISÓ:

Ing. J. M. G.

APROBÓ:

RTVC - TELEFONICA TELECOM

CONTIENE

EVALUACION CIMENTACION
TORRE CUADRADA DE 100 M
SECCION VARIABLE

rtvc

RADIO TELEVISION NACIONAL DE COLOMBIA



05-Ene.-2011

PLANO Nº
INS-ECM-01