

0	16/05/2016	A. B.	M. I. A.	BTESA	PRIMERA EMISIÓN	PE
Rev.	Fecha	Elaborado por nombre/firma	Revisado por nombre/firma	Aprobado por nombre/firma	Descripción	Estado
<div style="text-align: center;">  <p>RTVC Sistema de Medios Públicos</p> <p>TORRE 100 m LETICIA – AMAZONAS</p> </div>						
<div style="text-align: center;"> <p>EVALUACION ESTRUCTURAL</p>  <p>BTESA B R O A D T E L E C O M</p> </div>						
ESCALA SIN	FORMATO A4	REFERENCIA BTESA TAC100-LET-AMZ	REFERENCIA RTVC TORRE 100-LETICIA	HOJA 1/24	REV 0	

TABLA DE CONTENIDO

1.	DESCRIPCION.....	3
2.	ESPECIFICACIONES.....	3
3.	CARGAS.....	4
4.	MATERIALES.....	4
5.	ANALISIS Y DISEÑO.....	5
6.	ANEXOS – EVALUACION ESTRUCTURAL.....	5

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
2 / 24

REV.
0

TORRE 100 m

EVALUACION ESTRUCTURAL

1. DESCRIPCIÓN:

A continuación presentamos la verificación estructural de la torre auto-soportada de 100 metros, instalada en la estación Leticia (Amazonas), es tipo celosía de sección cuadrada, diseñada con perfiles angulares; El chequeo se hace con las cargas de antenas instaladas actualmente: Treinta y seis (36) antenas TV dipolo, cinco (5) antenas RF, dos (2) antenas MWØ1.20, ocho (8) antenas Panel y dos (2) antenas omni; Se proyecta la instalación de seis (6) antenas panel TV, según cuadro y luego se verifican los elementos que requieren refuerzo.

2. ESPECIFICACIONES:

Carga de diseño:

TIPO / DIAMETRO	ALTURA EN TORRE	CANTIDAD
ANTENAS EXISTENTES		
ANTENA TV-Dip	96,5 m	8 und
ANTENA TV-Dip	89,0 m	8 und
ANTENA OMNI	82,0 m	1 und
ANTENA TV-Dip	76,0 m	12 und
ANTENA RF	69,5 m	3 und
ANTENA RF	67,5 m	1 und
ANTENA TV-Dip	63,0 m	8 und
ANTENA PANEL	58,0 m	1 und
ANTENA PANEL	51,0 m	1 und
ANTENA RF	51,0 m	1 und
ANTENA PANEL	50,0 m	3 und
ANTENA MWØ1.2	49,0 m	1 und
ANTENA PANEL	49,0 m	3 und
ANTENA OMNI	40,0 m	1 und
ANTENA MWØ1.2	38,5 m	1 und
ANTENAS NUEVAS		
ANTENA PANEL	68,0 m	6 und

Carga viva: 3 Operarios de 80 kg. c/u.

Velocidad del viento: 120. Km / h

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
3 / 24

REV.
0

Materiales :- Ángulos, canales y platinas: ASTM A36 y ASTM A572

- Tornillos : ASTM A325 –G5

Galvanizado: Según norma ASTM A153 y ASTM A123

NOTA:

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

AZIMUT DE LA CARA A: 63°

AZIMUT DE LA CARA B: 193°

AZIMUT DE LA CARA C: 283°

AZIMUT DE LA CARA D: 13°

3. CARGAS:

Las cargas de diseño corresponden a acciones de gravedad y viento sobre la torre, antenas y demás accesorios, afectadas por un factor de seguridad.

3.1. Cargas de gravedad.

El peso propio de la estructura es evaluado por el programa de análisis estructural y es afectado por un factor de 1.2 para tener en cuenta los elementos redundantes, platinas, tornillos, uniones y galvanizado. El peso de las antenas y sus soportes se obtienen directamente del catálogo del fabricante.

3.2. Carga de viento:

V = Velocidad del viento: 120 Km. / hora.

Para el cálculo de las cargas viento se utiliza el NSR-10, con la siguiente expresión:

Fuerza debida al viento $F = q_z * C_f * A_f$

En donde:

q_z = Presion de viento en daN/m²

C_f = Coeficiente de fuerza según capitulo H

A_f = Area expuesta en m²

La presión del viento q_z , está dada por:

$$q_z = Q \times (Z_V \times V)^2 \times G$$

En donde,

Q Factor de densidad del aire = 0.0048

ZV Factor de terreno.

V Velocidad de viento básica = 120 km/h

G Factor de ráfaga de viento.

Presión de viento básica 76.2 kg/m²

3.3. Viento sobre la estructura.

Se aplican en los nudos que comprenden cada panel analizado.

Para $P(0) = 76.2 \text{ kg / m}^2$

$P(10) = 76.2$

$P(100) = 120.2$

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

**HOJA
4 / 24**

**REV.
0**

A = área del panel analizado. S / silueta.

Se plantean tres (3) hipótesis de carga de acuerdo con las especificaciones:

3.3.1. Viento Transversal: (Hipótesis C1)

Esta dada por la siguiente expresión: $F_t = C_f * P * A$

3.3.2. Viento a 45° : (Hipótesis C2)

Esta dada por la expresión: $F_{45^\circ} = 1.15 * F_t$

Se debe aplicar en cada dirección principal simultáneamente.

Adicionalmente para verificar deformaciones se tiene una hipótesis (C3) con viento de 60.Km/h

4. MATERIALES:

Acero: ASTM A36, A572

Tornillos: ASTM A394 To

Galvanización: ASTM A153 y ASTM A123

5. ANÁLISIS Y DISEÑO.

Se llevó a cabo según lo especificado en las normas EIA-222F, NSR-10 y se ejecutó mediante el programa tower.

6. ANEXOS-EVALUACION ESTRUCTURAL

TORRE 100m – LETICIA – AMAZONAS

EVALUACION ESTRUCTURAL TAC100



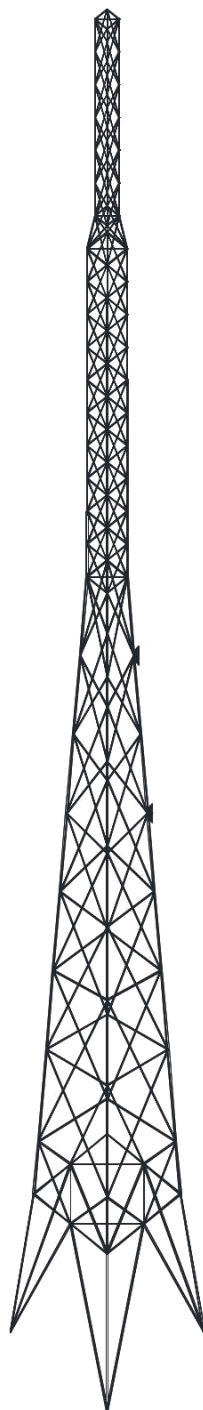
TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
5 / 24

REV.
0

SILUETA TAC100-ANTENAS



EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
6 / 24

REV.
0

LISTADO TOWER

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*****
*
* TOWER - Analysis and Design - Copyright Power Line Systems, Inc. 1986-2006 *
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Project Name : TORRE 100.m - LETICIA - AMAZONAS -ACT.
 Project Notes: BTESA - RTVC
 Project File : f:\arch 2016\eval btesa\tac100 leticia\tor100m let.tow
 Date run : 01:30:35 p.m. lunes, 16 de mayo de 2016
 by : Tower Version 10.20

Successfully performed linear analysis

The model has 0 warnings.



Member check option: TIA/EIA 222-F
 Connection rupture check: Not Checked
 Crossing diagonal check: Fixed

Joints Geometry:

Joint Label	Symmetry Code	X Coord. (m)	Y Coord. (m)	Z Coord. (m)	X Disp. Rest.	Y Disp. Rest.	Z Disp. Rest.	X Rot. Rest.	Y Rot. Rest.	Z Rot. Rest.
14F	XY-Symmetry	0.75	0.75	100	Free	Free	Free	Free	Free	Free
20F	XY-Symmetry	0.75	0.75	85	Free	Free	Free	Free	Free	Free
21F	XY-Symmetry	1.25	1.25	82.5	Free	Free	Free	Free	Free	Free
31F	XY-Symmetry	1.25	1.25	57.5	Free	Free	Free	Free	Free	Free
37F	XY-Symmetry	3.77	3.77	21.5	Free	Free	Free	Free	Free	Free
38F	XY-Symmetry	4.26	4.26	14.5	Free	Free	Free	Free	Free	Free
39F	XY-Symmetry	4.55	4.55	10.5	Free	Free	Free	Free	Free	Free
42F	XY-Symmetry	6	6	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
14X	X-GenXY	0.75	-0.75	100	Free	Free	Free	Free	Free	Free
14XY	XY-GenXY	-0.75	-0.75	100	Free	Free	Free	Free	Free	Free
14Y	Y-GenXY	-0.75	0.75	100	Free	Free	Free	Free	Free	Free
20X	X-GenXY	0.75	-0.75	85	Free	Free	Free	Free	Free	Free
20XY	XY-GenXY	-0.75	-0.75	85	Free	Free	Free	Free	Free	Free
20Y	Y-GenXY	-0.75	0.75	85	Free	Free	Free	Free	Free	Free
21X	X-GenXY	1.25	-1.25	82.5	Free	Free	Free	Free	Free	Free
21XY	XY-GenXY	-1.25	-1.25	82.5	Free	Free	Free	Free	Free	Free
21Y	Y-GenXY	-1.25	1.25	82.5	Free	Free	Free	Free	Free	Free
31X	X-GenXY	1.25	-1.25	57.5	Free	Free	Free	Free	Free	Free
31XY	XY-GenXY	-1.25	-1.25	57.5	Free	Free	Free	Free	Free	Free
31Y	Y-GenXY	-1.25	1.25	57.5	Free	Free	Free	Free	Free	Free
37X	X-GenXY	3.77	-3.77	21.5	Free	Free	Free	Free	Free	Free
37XY	XY-GenXY	-3.77	-3.77	21.5	Free	Free	Free	Free	Free	Free
37Y	Y-GenXY	-3.77	3.77	21.5	Free	Free	Free	Free	Free	Free
38X	X-GenXY	4.26	-4.26	14.5	Free	Free	Free	Free	Free	Free
38XY	XY-GenXY	-4.26	-4.26	14.5	Free	Free	Free	Free	Free	Free
38Y	Y-GenXY	-4.26	4.26	14.5	Free	Free	Free	Free	Free	Free
39X	X-GenXY	4.55	-4.55	10.5	Free	Free	Free	Free	Free	Free
39XY	XY-GenXY	-4.55	-4.55	10.5	Free	Free	Free	Free	Free	Free
39Y	Y-GenXY	-4.55	4.55	10.5	Free	Free	Free	Free	Free	Free
42X	X-GenXY	6	-6	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
7 / 24

REV.
0

42XY	XY-GenXY	-6	-6	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
42Y	Y-GenXY	-6	6	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

Secondary Joints:

Joint Label	Symmetry Code	Origin Joint	End Joint	Fraction	Elevation	X Disp. Rest.	Y Disp. Rest.	Z Disp. Rest.	X Rot. Rest.	Y Rot. Rest.	Z Rot. Rest.
(m)											
15S	XY-Symmetry	14P	20P	0.166	0	Free	Free	Free	Free	Free	Free
16S	XY-Symmetry	14P	20P	0.333	0	Free	Free	Free	Free	Free	Free
17S	XY-Symmetry	14P	20P	0.5	0	Free	Free	Free	Free	Free	Free
18S	XY-Symmetry	14P	20P	0.666	0	Free	Free	Free	Free	Free	Free
19S	XY-Symmetry	14P	20P	0.833	0	Free	Free	Free	Free	Free	Free
22S	XY-Symmetry	21P	31P	0.1	0	Free	Free	Free	Free	Free	Free
23S	XY-Symmetry	21P	31P	0.2	0	Free	Free	Free	Free	Free	Free
24S	XY-Symmetry	21P	31P	0.3	0	Free	Free	Free	Free	Free	Free
25S	XY-Symmetry	21P	31P	0.4	0	Free	Free	Free	Free	Free	Free
26S	XY-Symmetry	21P	31P	0.5	0	Free	Free	Free	Free	Free	Free
27S	XY-Symmetry	21P	31P	0.6	0	Free	Free	Free	Free	Free	Free
28S	XY-Symmetry	21P	31P	0.7	0	Free	Free	Free	Free	Free	Free
29S	XY-Symmetry	21P	31P	0.8	0	Free	Free	Free	Free	Free	Free
30S	XY-Symmetry	21P	31P	0.9	0	Free	Free	Free	Free	Free	Free
32S	XY-Symmetry	31P	37P	0.166	0	Free	Free	Free	Free	Free	Free
33S	XY-Symmetry	31P	37P	0.333	0	Free	Free	Free	Free	Free	Free
34S	XY-Symmetry	31P	37P	0.5	0	Free	Free	Free	Free	Free	Free
35S	XY-Symmetry	31P	37P	0.666	0	Free	Free	Free	Free	Free	Free
36S	XY-Symmetry	31P	37P	0.833	0	Free	Free	Free	Free	Free	Free
40S	Y-Symmetry	39P	39X	0.5	0	Free	Free	Free	Free	Free	Free
41S	X-Symmetry	39P	39Y	0.5	0	Free	Free	Free	Free	Free	Free
15X	X-GenXY	14P	20P	0.166	0	Free	Free	Free	Free	Free	Free
15XY	XY-GenXY	14P	20P	0.166	0	Free	Free	Free	Free	Free	Free
15Y	Y-GenXY	14P	20P	0.166	0	Free	Free	Free	Free	Free	Free
16X	X-GenXY	14P	20P	0.333	0	Free	Free	Free	Free	Free	Free
16XY	XY-GenXY	14P	20P	0.333	0	Free	Free	Free	Free	Free	Free
16Y	Y-GenXY	14P	20P	0.333	0	Free	Free	Free	Free	Free	Free
17X	X-GenXY	14P	20P	0.5	0	Free	Free	Free	Free	Free	Free
17XY	XY-GenXY	14P	20P	0.5	0	Free	Free	Free	Free	Free	Free
17Y	Y-GenXY	14P	20P	0.5	0	Free	Free	Free	Free	Free	Free
18X	X-GenXY	14P	20P	0.666	0	Free	Free	Free	Free	Free	Free
18XY	XY-GenXY	14P	20P	0.666	0	Free	Free	Free	Free	Free	Free
18Y	Y-GenXY	14P	20P	0.666	0	Free	Free	Free	Free	Free	Free
19X	X-GenXY	14P	20P	0.833	0	Free	Free	Free	Free	Free	Free
19XY	XY-GenXY	14P	20P	0.833	0	Free	Free	Free	Free	Free	Free
19Y	Y-GenXY	14P	20P	0.833	0	Free	Free	Free	Free	Free	Free
22X	X-GenXY	21P	31P	0.1	0	Free	Free	Free	Free	Free	Free
22XY	XY-GenXY	21P	31P	0.1	0	Free	Free	Free	Free	Free	Free
22Y	Y-GenXY	21P	31P	0.1	0	Free	Free	Free	Free	Free	Free
23X	X-GenXY	21P	31P	0.2	0	Free	Free	Free	Free	Free	Free
23XY	XY-GenXY	21P	31P	0.2	0	Free	Free	Free	Free	Free	Free
23Y	Y-GenXY	21P	31P	0.2	0	Free	Free	Free	Free	Free	Free
24X	X-GenXY	21P	31P	0.3	0	Free	Free	Free	Free	Free	Free
24XY	XY-GenXY	21P	31P	0.3	0	Free	Free	Free	Free	Free	Free
24Y	Y-GenXY	21P	31P	0.3	0	Free	Free	Free	Free	Free	Free
25X	X-GenXY	21P	31P	0.4	0	Free	Free	Free	Free	Free	Free
25XY	XY-GenXY	21P	31P	0.4	0	Free	Free	Free	Free	Free	Free
25Y	Y-GenXY	21P	31P	0.4	0	Free	Free	Free	Free	Free	Free
26X	X-GenXY	21P	31P	0.5	0	Free	Free	Free	Free	Free	Free
26XY	XY-GenXY	21P	31P	0.5	0	Free	Free	Free	Free	Free	Free
26Y	Y-GenXY	21P	31P	0.5	0	Free	Free	Free	Free	Free	Free
27X	X-GenXY	21P	31P	0.6	0	Free	Free	Free	Free	Free	Free
27XY	XY-GenXY	21P	31P	0.6	0	Free	Free	Free	Free	Free	Free
27Y	Y-GenXY	21P	31P	0.6	0	Free	Free	Free	Free	Free	Free
28X	X-GenXY	21P	31P	0.7	0	Free	Free	Free	Free	Free	Free
28XY	XY-GenXY	21P	31P	0.7	0	Free	Free	Free	Free	Free	Free
28Y	Y-GenXY	21P	31P	0.7	0	Free	Free	Free	Free	Free	Free
29X	X-GenXY	21P	31P	0.8	0	Free	Free	Free	Free	Free	Free
29XY	XY-GenXY	21P	31P	0.8	0	Free	Free	Free	Free	Free	Free
29Y	Y-GenXY	21P	31P	0.8	0	Free	Free	Free	Free	Free	Free
30X	X-GenXY	21P	31P	0.9	0	Free	Free	Free	Free	Free	Free
30XY	XY-GenXY	21P	31P	0.9	0	Free	Free	Free	Free	Free	Free
30Y	Y-GenXY	21P	31P	0.9	0	Free	Free	Free	Free	Free	Free
32X	X-GenXY	31P	37P	0.166	0	Free	Free	Free	Free	Free	Free
32XY	XY-GenXY	31P	37P	0.166	0	Free	Free	Free	Free	Free	Free
32Y	Y-GenXY	31P	37P	0.166	0	Free	Free	Free	Free	Free	Free
33X	X-GenXY	31P	37P	0.333	0	Free	Free	Free	Free	Free	Free
33XY	XY-GenXY	31P	37P	0.333	0	Free	Free	Free	Free	Free	Free
33Y	Y-GenXY	31P	37P	0.333	0	Free	Free	Free	Free	Free	Free
34X	X-GenXY	31P	37P	0.5	0	Free	Free	Free	Free	Free	Free
34XY	XY-GenXY	31P	37P	0.5	0	Free	Free	Free	Free	Free	Free
34Y	Y-GenXY	31P	37P	0.5	0	Free	Free	Free	Free	Free	Free
35X	X-GenXY	31P	37P	0.666	0	Free	Free	Free	Free	Free	Free
35XY	XY-GenXY	31P	37P	0.666	0	Free	Free	Free	Free	Free	Free
35Y	Y-GenXY	31P	37P	0.666	0	Free	Free	Free	Free	Free	Free

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
8 / 24

REV.
0

36X	X-GenXY	31P	37P	0.833	0	Free	Free	Free	Free	Free	Free
36XY	XY-GenXY	31P	37P	0.833	0	Free	Free	Free	Free	Free	Free
36Y	Y-GenXY	31P	37P	0.833	0	Free	Free	Free	Free	Free	Free
40Y	Y-Gen	39P	39X	0.5	0	Free	Free	Free	Free	Free	Free
41X	X-Gen	39P	39Y	0.5	0	Free	Free	Free	Free	Free	Free

Steel Material Properties:

Steel Material Label	Modulus of Elasticity (MPa)	Yield Stress Fy (MPa)	Ultimate Stress Fu (MPa)	Member Stress All. Hyp. 1 (MPa)	Member Stress All. Hyp. 2 (MPa)	Member Rupture Hyp. 1 (MPa)	Member Rupture Hyp. 2 (MPa)	Member Bearing Hyp. 1 (MPa)	Member Bearing Hyp. 2 (MPa)
A-36	2e+005	248.1	399.9	0	0	0	0	0	0
A-572	2e+005	344.7	482.5	0	0	0	0	0	0

Bolt Properties:

Bolt Label	Bolt Diameter (cm)	Hole Diameter (cm)	Ultimate Shear Capacity (kN)	Default End Distance (cm)	Default Bolt Spacing (cm)	Shear Capacity Hyp. 1 (kN)	Shear Capacity Hyp. 2 (kN)
5/8"	1.59	1.749	62.53	2.5	0	0	0
5/8" DC	1.59	1.749	125	2.5	0	0	0

Number Bolts Used By Type:

Bolt Type	Number Bolts
5/8" DC	816
5/8"	488

Angle Properties:

Angle Type	Angle Size	Long Leg (cm)	Short Leg (cm)	Thick. (cm)	Unit Weight (N/m)	Gross Area (cm^2)	w/t Ratio	Radius of Gyration Rx (cm)	Radius of Gyration Ry (cm)	Radius of Gyration Rz (cm)	Number of Angles	Wind Width (cm)	Short Edge Dist. (cm)	Long Edge Dist. (cm)	Optimize Cost Factor	Section Modulus (cm^3)
SAE	4X4X0.375	10.16	10.16	0.9525	143	18.52	8.67	3.132	3.132	2.004	1	10.16	0	0	1.0000	0
SAE	4X4X0.25	10.16	10.16	0.635	96.31	12.52	13.5	3.175	3.175	2.019	1	10.16	0	0	1.0000	0
SAE	3X3X0.25	7.62	7.62	0.635	71.79	9.355	9.75	2.375	2.375	1.514	1	7.62	0	0	1.0000	0
SAE	2.5X2.5X0.25	6.35	6.35	0.635	59.83	7.677	7.75	1.953	1.953	1.247	1	6.35	0	0	1.0000	0
SAE	2.5X2.5X0.1875	6.35	6.35	0.4763	44.8	5.935	10.67	1.976	1.976	1.257	1	6.35	0	0	1.0000	0
SAE	2X2X0.1875	5.08	5.08	0.4763	35.61	4.581	7	1.567	1.567	1.001	1	5.08	0	0	1.0000	0
SAE	5X5X0.5	12.7	12.7	1.27	236.4	30.65	8	3.912	3.912	2.497	1	12.7	0	0	1.0000	0
SAE	5X5X0.375	12.7	12.7	0.9525	179.5	23.29	11	3.962	3.962	2.515	1	12.7	0	0	1.0000	0
SAE	3X3X0.375	7.62	7.62	0.9525	105.1	13.61	6.17	2.319	2.319	1.491	1	7.62	0	0	1.0000	0
SAE	2.5X2.5X0.375	6.35	6.35	0.9525	86.09	11.16	4.83	1.913	1.913	1.237	1	6.35	0	0	1.0000	0
SAE	1.5X1.5X0.125	3.81	3.81	0.3175	17.95	2.323	8	1.181	1.181	0.7518	1	3.81	0	0	1.0000	0

Angle Groups:

Group Label	Group Description	Angle Type	Angle Size	Material Type	Element Type	Group Type	Optimize Group	Allow. Angle Width For Optimize (cm)
1	M01	SAE	5X5X0.5	A-572	Beam		Size + Type	30.480
2	M02	SAE	5X5X0.5	A-572	Beam		Size + Type	30.480
3	M03	SAE	5X5X0.5	A-572	Beam		Size + Type	30.480
4	M04	SAE	5X5X0.375	A-572	Beam		Size + Type	30.480
5	M05	SAE	5X5X0.375	A-572	Beam		Size + Type	30.480
6	M06	SAE	5X5X0.375	A-572	Beam		Size + Type	30.480
7	M07	SAE	4X4X0.375	A-572	Beam		Size + Type	30.480
8	M08	SAE	3X3X0.375	A-572	Beam		Size + Type	30.480
9	M09	SAE	2.5X2.5X0.375	A-572	Beam		Size + Type	30.480
10	M10	SAE	2.5X2.5X0.375	A-572	Beam		Size + Type	30.480
11	M11	SAE	2.5X2.5X0.25	A-572	Beam		Size + Type	30.480
12	M12	SAE	2.5X2.5X0.1875	A-572	Beam		Size + Type	30.480
13	D01	SAE	4X4X0.25	A-36	Truss		Size + Type	30.480
14	D02	SAE	3X3X0.25	A-36	Truss		Size + Type	30.480
15	D03	SAE	2.5X2.5X0.1875	A-36	Truss		Size + Type	30.480
16	D04	SAE	2.5X2.5X0.1875	A-36	Truss		Size + Type	30.480
17	D05	SAE	2.5X2.5X0.1875	A-36	Truss		Size + Type	30.480
18	D06	SAE	2X2X0.1875	A-36	Truss		Size + Type	30.480
19	D07	SAE	2X2X0.1875	A-36	Truss		Size + Type	30.480
20	D08	SAE	2X2X0.1875	A-36	Truss		Size + Type	30.480
21	D09	SAE	2X2X0.1875	A-36	Truss		Size + Type	30.480
22	D10	SAE	1.5X1.5X0.125	A-36	Truss		Size + Type	30.480
23	D11	SAE	1.5X1.5X0.125	A-36	Truss		Size + Type	30.480
24	D12	SAE	1.5X1.5X0.125	A-36	Truss		Size + Type	30.480
25	H01	SAE	2.5X2.5X0.1875	A-36	Beam		Size + Type	30.480

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
9 / 24

REV.
0

26	H02	SAE	2.5X2.5X0.1875	A-36	Beam	Size + Type	30.480
27	H03	SAE	2.5X2.5X0.1875	A-36	Beam	Size + Type	30.480
28	H04	SAE	2.5X2.5X0.1875	A-36	Beam	Size + Type	30.480
29	H05	SAE	2.5X2.5X0.1875	A-36	Beam	Size + Type	30.480
30	H06	SAE	2X2X0.1875	A-36	Beam	Size + Type	30.480
33	C01	SAE	2X2X0.1875	A-36	Truss	Size + Type	30.480
34	C02	SAE	2X2X0.1875	A-36	Truss	Size + Type	30.480
35	C03	SAE	2X2X0.1875	A-36	Truss	Size + Type	30.480
36	C04	SAE	2X2X0.1875	A-36	Truss	Size + Type	30.480

Aggregate Angle Information:

Note: Estimate of surface area reported for painting purposes, not wind loading.

Angle Type	Material Size	Total Type	Length (m)	Total Surface Area (m^2)	Total Weight (N)
SAE	5X5X0.5	A-572	135.35	68.76	31994.95
SAE	5X5X0.375	A-572	116.37	59.12	20887.17
SAE	4X4X0.375	A-572	40.00	16.26	5720.16
SAE	3X3X0.375	A-572	20.00	6.10	2101.30
SAE	2.5X2.5X0.375	A-572	30.39	7.72	2616.61
SAE	2.5X2.5X0.25	A-572	30.00	7.62	1794.85
SAE	2.5X2.5X0.1875	A-572	30.00	7.62	1343.95
SAE	4X4X0.25	A-36	97.44	39.60	9384.36
SAE	3X3X0.25	A-36	46.81	14.27	3360.42
SAE	2.5X2.5X0.1875	A-36	533.45	135.50	23897.76
SAE	2X2X0.1875	A-36	331.21	67.30	11792.76
SAE	1.5X1.5X0.125	A-36	165.87	25.28	2977.04

Sections:

The adjustment factors below only apply to dead load and wind areas that are calculated for members in the model. They do not apply to equipment or to manually input dead load and drag areas.

Section Label	Joint Defining	Dead Load Adjust.	Transverse Drag x Area Factor For Face	Longitudinal Drag x Area Factor For Face	Transverse Area Factor (CD From Code)	Longitudinal Area Factor (CD From Code)	Af Flat For Face	Ar Round For Face	Transverse Drag x Area Factor For All	Longitudinal Drag x Area Factor For All	SAPS Angle Factor	SAPS Round Factor	Force Solid Face
SECC1	20P	1.200	0.000	0.000	0.000	0.000	1.100	1.000	0.000	0.000	0.000	0.000	None
SECC2	21P	1.200	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000	0.000	0.000	None
SECC3	26S	1.200	0.000	0.000	0.000	0.000	1.100	1.000	0.000	0.000	0.000	0.000	None
SECC4	31P	1.200	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000	0.000	0.000	None
SECC5	33S	1.200	0.000	0.000	0.000	0.000	1.100	1.000	0.000	0.000	0.000	0.000	None
SECC6	35S	1.200	0.000	0.000	0.000	0.000	1.150	1.000	0.000	0.000	0.000	0.000	None
SECC7	37P	1.200	0.000	0.000	0.000	0.000	1.150	1.000	0.000	0.000	0.000	0.000	None
SECC8	39P	1.200	0.000	0.000	0.000	0.000	1.150	1.000	0.000	0.000	0.000	0.000	None
SECC9	42P	1.200	0.000	0.000	0.000	0.000	1.150	1.000	0.000	0.000	0.000	0.000	None

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*** Loads Data

Loads from file: f:\arch_2016\eval_btesa\tac100_leticia\tor100m_let.eia

Structure Height Summary (used for calculating wind/ice adjust with height):

Structure height above ground 100.00 (m)
Elevation of structure bottom for wind height adjustment: 0.00 (m)
Structure height for structure gust response factor: 100.00 (m)
Structure gust response factor, Gh: 1.0822
Guy installation temperature: 15.56 (deg C)
Tower Type: Rectangular Latticed

EIA Rev. F Load Cases:

Load Case Description	Dead Load Factor	Wind Load Factor	Ice Load Factor	Strength Factor	Allowable Stress Increase Factor	Basic Wind Speed (m/s)	Wind Dir. (Deg)	Ice Thick. (cm)	Ice Temperature Density (N/m^3)	Ice Temperature (deg C)	Point Loads	Joint Displ.
WIN 0 -120	1.2500	0.8500	1.0000	1.0000	1.0000	33.333	0	0.0000	0.0000	20.0	13 loads	
WIN 45-120	1.2500	0.8500	1.0000	1.0000	1.0000	33.333	45	0.0000	0.0000	20.0	13 loads	
WIN 45-60	1.2500	0.8500	1.0000	1.0000	1.0000	16.666	45	0.0000	0.0000	20.0	13 loads	

Concentrated Loads for Load Case "WIN 0 -120":

Joint Label	Force X-Dir (N)	Force Y-Dir (N)	Force Vertical (N)	Moment X-Axis (N-m)	Moment Y-Axis (N-m)	Moment Z-Axis (N-m)	Load Comment

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
10 / 24

REV.
0

14P	920	230	480	0	0	0
16S	920	230	480	0	0	0
18S	920	230	480	0	0	0
21P	350	120	300	0	0	0
22S	805	200	840	0	0	0
23S	805	200	840	0	0	0
24S	805	200	840	0	0	0
26S	620	180	400	0	0	0
27S	805	200	840	0	0	0
28S	865	215	530	0	0	0
29S	865	215	530	0	0	0
30S	865	215	530	0	0	0
31P	750	270	650	0	0	0

Equipment Load Case Information for "WIN 0 -120":

Equipment Label	Equipment Property Set	Elevation Above Ground (m)	qzGh (Pa)	Ice Thick. (cm)	Total Wind Area (m²)	Wind Incidence Angle (deg)	222-G CA	222-G CS	222-G CM	Antenna Load Axial FEM (N)	Antenna Load Side FEM (N)	Antenna Load Moment MM (N-m)	Long. Load (N)	Trans. Load (N)	Vert. Load (N)
ANT_MW1	Ant.MW01.2	51.52	999.15	0.00	0.00	225.00	-0.52150	-0.45705	-0.13905	-589.32	-516.49	-188.56	781.92	51.50	1500.00
ANT_MW2	Ant.MW01.2	39.50	926.10	0.00	0.00	225.00	-0.52150	-0.45705	-0.13905	-546.23	-478.72	-174.77	724.75	47.73	1500.00

EIA Section Load Case Information for "WIN 0 -120":

Section	Z of Ave.		Elev.	qzGh	Ioe	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face	Face</
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Concentrated Loads for Load Case "WIN 45-120":

Joint Label	Force X-Dir (N)	Force Y-Dir (N)	Force Vertical (N)	Moment X-Axis (N-m)	Moment Y-Axis (N-m)	Moment Z-Axis (N-m)	Load Comment
14P	815	815	480	0	0	0	
16S	815	815	480	0	0	0	
18S	815	815	480	0	0	0	
21P	350	350	300	0	0	0	
22S	710	710	840	0	0	0	
23S	710	710	840	0	0	0	
24S	710	710	840	0	0	0	
26S	570	570	400	0	0	0	
27S	710	710	840	0	0	0	
28S	760	760	530	0	0	0	
29S	760	760	530	0	0	0	
30S	760	760	530	0	0	0	
31P	720	720	650	0	0	0	

Equipment Load Case Information for "WIN 45-120":

Equipment Label	Equipment Property Set	Elevation Above Ground (m)	qzGh (Pa)	Ice Thick. (cm)	Total Wind Area (m²)	Wind Incidence Angle (deg)	222-G CA	222-G CS	222-G CM	Antenna Load Axial FEM (N)	Antenna Load Side FEM (N)	Antenna Load Moment MM (N-m)	Long. Load (N)	Trans. Load (N)	Vert. Load (N)
ANT_MW1	Ant.MW01.2	51.52	999.15	0.00	0.00	180.00	-1.05470	-0.00000	-0.00000	-1191.86	-0.00	-0.00	842.77	842.77	1500.00
ANT_MW2	Ant.MW01.2	39.50	926.10	0.00	0.00	180.00	-1.05470	-0.00000	-0.00000	-1104.71	-0.00	-0.00	781.15	781.15	1500.00

EIA Section Load Case Information for "WIN 45-120":

Section Label	Z of Top (m)	Z of Bottom (m)	Ave. Above Gnd. (m)	Elev. (m)	qzGh (Pa)	Ice Thick. (cm)	Face AF (m ²)	Face AR (m ²)	Face RR*AR (m ²)	Face AG (m ²)	e	Face DF	Face DR	Face RR	Face CF	Face AE (m ²)	Face WF (N)	NotF AAF (m ²)	NotF CAF	NotF AAR (m ²)	NotF CAR	NotF AAR*CAR (m ²)	NotF WA (N)	Total Wind (N)	Total Weight (N)
SECC1	100.00	85.00		92.50	1180.98	0.00	3.77	6.18	4.14	22.5	0.44	1.20	1.20	0.67	2.17	9.5	24360	0.00	2.00	0.00	1.20	0.00	0	24360	14235
SECC2	85.00	82.50		83.75	1147.92	0.00	0.74	1.03	0.65	5.0	0.35	1.20	1.20	0.63	2.42	1.7	4619	0.00	2.00	0.00	1.20	0.00	0	4619	3840
SECC3	82.50	70.00		76.25	1117.56	0.00	4.07	5.15	3.16	31.3	0.30	1.20	1.20	0.61	2.61	8.7	25299	0.00	2.00	0.00	1.20	0.00	0	25299	19183
SECC4	70.00	57.50		63.75	1061.82	0.00	4.75	5.15	3.20	31.3	0.32	1.20	1.20	0.62	2.53	9.5	25646	0.00	2.00	0.00	1.20	0.00	0	25646	24172
SECC5	57.50	45.51		51.51	999.06	0.00	5.29	4.94	2.98	40.0	0.26	1.19	1.19	0.60	2.75	9.9	27106	0.00	2.00	0.00	1.20	0.00	0	27106	23970
SECC6	45.51	33.52		39.52	926.22	0.00	5.81	4.94	2.90	60.1	0.18	1.13	1.13	0.59	3.07	9.9	28097	0.00	2.00	0.00	1.20	0.00	0	28097	24994
SECC7	33.52	21.50		27.51	835.18	0.00	6.16	4.95	2.87	80.5	0.14	1.10	1.10	0.58	3.26	10.0	27160	0.00	2.00	0.00	1.20	0.00	0	27160	30437
SECC8	21.50	10.50		16.00	715.35	0.00	6.48	4.53	2.62	91.5	0.12	1.09	1.09	0.58	3.35	9.9	23745	0.00	2.00	0.00	1.20	0.00	0	23745	33574
SECC9	10.50	0.00		5.25	626.50	0.00	5.97	4.33	2.48	110.8	0.09	1.07	1.07	0.57	3.49	9.0	19756	0.00	2.00	0.00	1.20	0.00	0	19756	32401

Concentrated Loads for Load Case "WIN 45-60":

Joint Label	Force X-Dir (N)	Force Y-Dir (N)	Force Vertical (N)	Moment X-Axis (N-m)	Moment Y-Axis (N-m)	Moment Z-Axis (N-m)	Load Comment
14P	420	420	480	0	0	0	
16S	420	420	480	0	0	0	
18S	420	420	480	0	0	0	
21P	180	180	300	0	0	0	

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
11 / 24

REV.
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22S	360	360	840	0	0	0
23S	360	360	840	0	0	0
24S	360	360	840	0	0	0
26S	290	290	400	0	0	0
27S	360	360	840	0	0	0
28S	380	380	530	0	0	0
29S	380	380	530	0	0	0
30S	380	380	530	0	0	0
31P	360	360	650	0	0	0

Equipment Load Case Information for "WIN 45-60":

Equipment Label	Equipment Property	Elevation Above Ground (m)	qzGh (Pa)	Ice Thick. (cm)	Total Wind Area (m²)	Wind Incidence Angle (deg)	222-G CA	222-G CS	222-G CM	Antenna Axial Load (N)	Antenna Side Load (N)	Antenna Moment (N-m)	Long. Load (N)	Trans. Load (N)	Vert. Load (N)
ANT_MW1	Ant.MW01.2	51.52	249.77	0.00	0.00	180.00	-1.05470	-0.00000	-0.00000	-297.95	-0.00	-0.00	210.66	210.68	1500.00
ANT_MW2	Ant.MW01.2	39.50	231.51	0.00	0.00	180.00	-1.05470	-0.00000	-0.00000	-276.16	-0.00	-0.00	195.28	195.28	1500.00

EIA Section Load Case Information for "WIN 45-60":

Section Label	Z of Top (m)	Z of Bottom (m)	Elev. Above Gnd. (m)	qzGh (Pa)	Ice Thick. (cm)	Face AF (m²)	Face AR (m²)	Face RR (m²)	Face AG (m²)	Face e	Face DF	Face DR	Face RR	Face CF	Face AE (m²)	Face WF (N)	NotF AAF (m²)	NotF CAF (m²)	NotF AAR (m²)	NotF CAR (m²)	NotF AAR*CAR (m²)	NotF WA (N)	Total Wind (N)	Total Weight (N)
SECC1	100.00	85.00	92.50	295.23	0.00	3.77	6.18	4.14	22.5	0.44	1.20	1.20	0.67	2.17	9.5	6090	0.00	2.00	0.00	1.20	0.00	0	6090	14235
SECC2	85.00	82.50	83.75	286.96	0.00	0.74	1.03	0.65	5.0	0.35	1.20	1.20	0.63	2.42	1.7	1155	0.00	2.00	0.00	1.20	0.00	0	1155	3840
SECC3	82.50	70.00	76.25	279.37	0.00	4.07	5.15	3.16	31.3	0.30	1.20	1.20	0.61	2.61	8.7	6324	0.00	2.00	0.00	1.20	0.00	0	6324	19183
SECC4	70.00	57.50	63.75	265.44	0.00	4.75	5.15	3.20	31.3	0.32	1.20	1.20	0.62	2.53	9.5	6411	0.00	2.00	0.00	1.20	0.00	0	6411	24172
SECC5	57.50	45.51	51.51	249.75	0.00	5.29	4.94	2.98	40.0	0.26	1.15	1.15	0.60	2.75	9.9	6776	0.00	2.00	0.00	1.20	0.00	0	6776	23970
SECC6	45.51	33.52	39.52	231.54	0.00	5.81	4.94	2.90	60.1	0.18	1.13	1.13	0.55	3.07	9.9	7024	0.00	2.00	0.00	1.20	0.00	0	7024	24994
SECC7	33.52	21.50	27.51	208.78	0.00	6.16	4.95	2.87	80.5	0.14	1.10	1.10	0.58	3.26	10.0	6790	0.00	2.00	0.00	1.20	0.00	0	6790	30437
SECC8	21.50	10.50	16.00	178.83	0.00	6.48	4.53	2.62	91.5	0.12	1.05	1.09	0.56	3.35	9.9	5936	0.00	2.00	0.00	1.20	0.00	0	5936	33574
SECC9	10.50	0.00	5.25	156.62	0.00	5.97	4.33	2.48	110.8	0.09	1.07	1.07	0.57	3.49	9.0	4939	0.00	2.00	0.00	1.20	0.00	0	4939	32401

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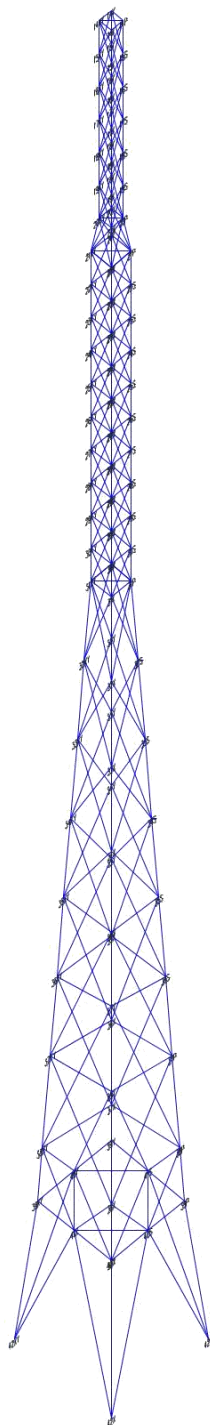
TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
12 / 24

REV.
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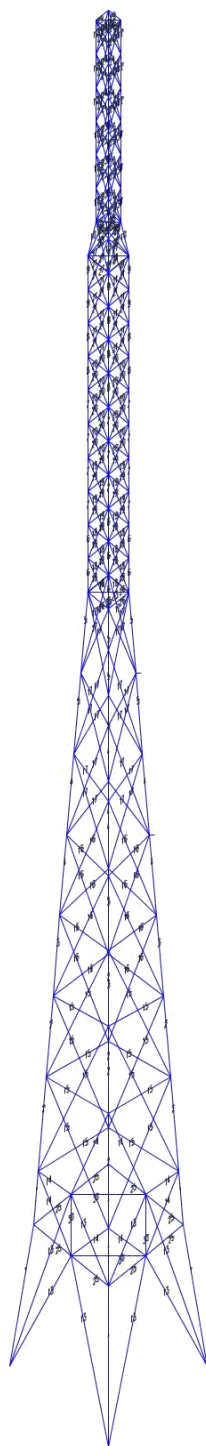
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TAC100-LET-AMZ

HOJA
13 / 24

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SILUETA TAC100-ELEMENTOS



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TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
14 / 24

REV.
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RESUMEN

Project Name : TORRE 100m - LETICIA - AMAZONAS -ACT.
 Project Notes: BTESA - RTVC
 Project File : f:\arch_2016\eval_btesa\tac100_leticia\tori00m_let.tow
 Date run : 01:30:35 p.m. lunes, 16 de mayo de 2016
 by : Tower Version 10.20

Successfully performed linear analysis

The model has 0 warnings.

Member check option: TIA/EIA 222-F
 Connection rupture check: Not Checked
 Crossing diagonal check: Fixed
 Loads from file: f:\arch_2016\eval_btesa\tac100_leticia\tori00m_let.eia

*** Analysis Results:

Maximum element usage is 185.38% for Angle "67P" in load case "WIN 45-120" NG

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kN)	Trans. Force (kN)	Vert. Force (kN)	Shear Force (kN)	Trans. Moment (kN-m)	Long. Moment (kN-m)	Vert. Moment (kN-m)	Bending Moment (kN-m)	Found. Usage %
WIN 0 -120	42P	-57.50	-63.40	451.15	85.59	-0.62	0.56	0.06	0.83	0.00
WIN 0 -120	42X	-54.48	62.51	432.67	82.92	0.57	0.55	-0.00	0.79	0.00
WIN 0 -120	42XY	-40.42	-47.27	-342.53	62.20	-0.41	0.39	0.02	0.57	0.00
WIN 0 -120	42Y	-38.33	45.36	-323.74	59.38	0.38	0.36	-0.01	0.52	0.00
WIN 45-120	42P	-93.25	-93.25	705.51	131.88	-0.92	0.92	0.00	1.30	0.00
WIN 45-120	42X	-1.49	15.02	54.10	15.10	0.11	0.08	0.01	0.13	0.00
WIN 45-120	42XY	-76.58	-76.58	-596.17	108.30	-0.73	0.73	0.00	1.03	0.00
WIN 45-120	42Y	15.02	-1.49	54.10	15.10	-0.08	-0.11	-0.01	0.13	0.00
WIN 45-60	42P	-31.24	-31.24	232.84	44.18	-0.33	0.33	0.00	0.46	0.00
WIN 45-60	42X	-6.13	10.58	54.60	12.23	0.09	0.10	0.00	0.13	0.00
WIN 45-60	42XY	-14.65	-14.65	-124.50	20.72	-0.14	0.14	0.00	0.19	0.00
WIN 45-60	42Y	10.58	-6.13	54.60	12.23	-0.10	-0.09	-0.00	0.13	0.00

Note: Summary of Joint Support Reactions For All Load Cases in Direction of Leg not printed because none of the angle members attached to foundation joints have a group type of 'Leg'.

Overturning Moment Summary For All Load Cases:

Load Case	Transverse Moment (kN-m)	Longitudinal Moment (kN-m)	Resultant Moment (kN-m)
WIN 0 -120	223.586	9300.569	9303.256
WIN 45-120	7810.116	7810.116	11045.172
WIN 45-60	2144.086	2144.086	3032.195

EIA Sections Information:

Section Label	Top Z (m)	Bottom Z (m)	Joint Count	Member Count	Top Width (m)	Bottom Width (m)	Gross Area (m²)	Face Adjust Factor	Face Ar Adjust Factor	Dead Load Factor
SECC1	100.000	85.000	28	84	1.50	1.50	22.50	1.1000	1.0000	1.200
SECC2	85.000	82.500	8	24	1.50	2.50	5.00	1.0000	1.0000	1.200
SECC3	82.500	70.000	24	60	2.50	2.50	31.25	1.1000	1.0000	1.200
SECC4	70.000	57.500	24	66	2.50	2.50	31.25	1.0000	1.0000	1.200
SECC5	57.500	45.512	12	24	2.50	4.18	40.03	1.1000	1.0000	1.200
SECC6	45.512	33.524	12	24	4.18	5.86	60.15	1.1500	1.0000	1.200
SECC7	33.524	21.500	12	24	5.86	7.54	80.54	1.1500	1.0000	1.200
SECC8	21.500	10.500	16	36	7.54	9.10	91.52	1.1500	1.0000	1.200
SECC9	10.500	0.000	12	12	9.10	12.00	110.78	1.1500	1.0000	1.200

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress
 Printed capacities do not include EIA allowable stress increase for wind load cases.
 Printed capacities do not include the strength factor entered for each loadcase.

Group Summary (Compression Portion):

Group Label	Group Desc.	Angle Type	Steel Size	Strength (MPa)	Max Usage %	Max Use In Comp. %	Comp. Force (kN)	Comp. Control Load Case	L/R Capacity (kN)	Comp. Conn. Shear Capacity (kN)	Comp. Conn. Bearing Capacity (kN)	RI ₃	RI _{1Y}	RI ₂	L/R Length (m)	Curve No.	No. Of Bolts	Comp.	
1	M01	SAE	5X5X0.5	344.7	164.80164.80	2P	-738.262WIN	45-120	447.988	1050.042	1402.972	0.166	0.160	0.160	68.58	10.698	1	12 NG	
2	M02	SAE	5X5X0.5	344.7	140.94140.94	4P	-694.762WIN	45-120	492.939	1050.042	1402.972	0.206	0.200	0.200	56.38	7.034	1	12 NG	
3	M03	SAE	5X5X0.5	344.7	130.73130.73	6P	-625.125WIN	45-120	478.195	1050.042	1402.972	0.250	0.250	0.250	60.45	6.041	1	12 NG	
4	M04	SAE	5X5X0.375	344.7	164.13164.13	7P	-600.036WIN	45-120	365.588	1050.042	1052.229	0.250	0.250	0.250	59.76	6.005	1	12 NG	
5	M05	SAE	5X5X0.375	344.7	154.76154.76	9P	-564.255WIN	45-120	364.603	1050.042	1052.229	0.250	0.250	0.250	60.06	6.041	1	12 NG	
6	M06	SAE	5X5X0.375	344.7	128.98128.98	11P	-505.246WIN	45-120	391.721	875.035	876.857	0.500	0.500	0.500	49.71	2.500	1	10 NG	
7	M07	SAE	4X4X0.375	344.7	135.56135.56	13P	-386.046WIN	45-120	284.779	700.028	701.486	0.500	0.500	0.500	62.37	2.500	1	8 NG	
8	M08	SAE	3X3X0.375	344.7	115.73115.73	17P	-198.056WIN	45-120	171.138	525.021	526.114	0.500	0.500	0.500	83.84	2.500	1	6 NG	
9	M09	SAE	2.5X2.5X0.375	344.7	117.42117.42	19P	-130.682WIN	45-120	111.290	525.021	526.114	0.500	0.500	0.500	101.05	2.500	1	6 NG	
10	M10	SAE	2.5X2.5X0.375	344.7	88.30	88.30	21P	-91.894WIN	45-120	104.070	350.014	350.743	0.500	0.500	0.500	105.02	2.598	1	4
11	M11	SAE	2.5X2.5X0.25	344.7	117.13117.13	22P	-90.564WIN	45-120	77.319	350.014	233.829	0.500	0.500	0.500	100.43	2.505	1	4 NG	
12	M12	SAE	2.5X2.5X0.1875	344.7	40.31	40.31	25P	-24.404WIN	45-120	60.545	350.014	175.371	0.500	0.500	0.500	99.62	2.505	1	4
13	D01	SAE	4X4X0.25	248.1	27.91	27.91	33Y	-24.433WIN	45-120	102.386	87.538	96.906	0.250	0.160	0.160	96.51	12.180	3	2
14	D02	SAE	3X3X0.25	248.1	25.49	25.49	35Y	-15.796WIN	0 -120	61.973	87.538	96.906	0.500	0.330	0.330	127.54	5.851	6	2
15	D03	SAE	2.5X2.5X0.1875	248.1	124.02124.02	37Y	-16.843WIN	0 -120	13.580	87.538	72.679	0.500	0.250	0.250	269.82	10.664	6	2 NG	
16	D04	SAE	2.5X2.5X0.1875	248.1	76.11	76.11	41Y	-14.102WIN	0 -120	18.529	87.538	72.679	0.500	0.250	0.250	220.18	8.702	6	2
17	D05	SAE	2.5X2.5X0.1875	248.1	120.88120.88	46P	-16.843WIN	0 -120	13.968	87.538	72.679	0.750	0.500	0.500	265.00	6.664	6	2 NG	
18	D06	SAE	2X2X0.1875	248.1	141.97141.97	48X	-27.936WIN	45-120	19.673	87.538	72.679	0.750	0.500	0.500	176.64	3.536	6	2 NG	
19	D07	SAE	2X2X0.1875	248.1	120.33120.33	53Y	-23.673WIN	0 -120	19.673	87.538	72.679	0.750	0.500	0.500	176.64	3.536	6	2 NG	

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
15 / 24

REV.
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20	D08	SAE	2X2X0.1875	248.1	100.11	100.11	57Y	-19.695WIN	0	-120	19.673	87.538	72.679	0.750	0.500	0.500	176.64	3.536	6	2	NG
21	D09	SAE	2X2X0.1875	248.1	71.01	71.01	63XY	-13.970WIN	0	-120	19.673	87.538	72.679	0.750	0.500	0.500	176.64	3.536	6	2	
22	D10	SAE	1.5X1.5X0.125	248.1	185.38	185.38	67P	-13.878WIN	45	-120	7.486	87.538	48.453	0.750	0.500	0.500	215.50	3.240	6	2	NG
23	D11	SAE	1.5X1.5X0.125	248.1	132.56	132.56	69Y	-11.557WIN	0	-120	8.719	87.538	48.453	0.750	0.500	0.500	194.17	2.920	6	2	NG
24	D12	SAE	1.5X1.5X0.125	248.1	62.48	62.48	75Y	-5.448WIN	0	-120	8.719	87.538	48.453	0.750	0.500	0.500	194.17	2.920	6	2	
25	H01	SAE	2.5X2.5X0.1875	248.1	180.83	180.83	80P	-44.562WIN	45	-120	24.643	87.538	72.679	0.500	0.500	0.500	180.94	4.550	6	2	NG
26	H02	SAE	2.5X2.5X0.1875	248.1	36.32	36.32	96P	-7.81WIN	0	-120	21.529	87.538	72.679	1.000	1.000	1.000	198.84	2.500	6	2	
27	H03	SAE	2.5X2.5X0.1875	248.1	40.42	40.42	100R	-8.701WIN	0	-120	21.529	87.538	72.679	1.000	1.000	1.000	198.84	2.500	6	2	
28	H04	SAE	2.5X2.5X0.1875	248.1	12.43	8.45	101P	-3.573WIN	0	-120	42.282	87.538	72.679	1.000	1.000	1.000	119.30	1.500	3	2	
29	H05	SAE	2.5X2.5X0.1875	248.1	4.05	0.00	102YR	0.000			42.282	87.538	72.679	1.000	1.000	1.000	119.30	1.500	3	2	
30	H06	SAE	2X2X0.1875	248.1	20.05	20.05	103XY	-3.180WIN	45	-120	15.858	87.538	72.679	0.500	0.250	0.250	205.29	6.435	6	2	
33	C01	SAE	2X2X0.1875	248.1	33.71	33.71	104P	-4.648WIN	45	-120	13.789	87.538	72.679	1.000	0.500	0.500	225.60	3.536	6	2	
34	C02	SAE	2X2X0.1875	248.1	30.04	30.04	105P	-4.143WIN	45	-120	13.789	87.538	72.679	1.000	0.500	0.500	225.60	3.536	6	2	
35	C03	SAE	2X2X0.1875	248.1	11.02	11.02	106X	-3.101WIN	45	-120	28.148	87.538	72.679	1.000	0.500	0.500	135.36	2.121	6	2	
36	C04	SAE	2X2X0.1875	248.1	11.98	11.98	107P	-3.373WIN	45	-120	28.148	87.538	72.679	1.000	0.500	0.500	135.36	2.121	6	2	

Group Summary (Tension Portion):

Group Label	Group Desc.	Angle Type	Angle Size	Steel Strength (MPa)	Max Usage %	Max Tension Tens. %	Tension Control Member	Tension Force (kN)	Tension Control Load Case	Section Capacity (kN)	Net Tens. Capacity (kN)	Conn. Shear Capacity (kN)	Tens. Rupture Capacity (kN)	Conn. Tens. Capacity (kN)	Length Member (m)	No. Of Bolts	No. Of Holes	Hole Diameter (cm)
1	M01	SAE	5X5X0.5	344.7	164.80	101.80	2XY	643.526WIN	45-120	632.122	1050.042	1402.972	0.000	10.698	12	2.000	1.749	NG
2	M02	SAE	5X5X0.5	344.7	140.94	97.20	4XY	614.393WIN	45-120	632.122	1050.042	1402.972	0.000	7.034	12	2.000	1.749	NG
3	M03	SAE	5X5X0.5	344.7	130.73	88.68	6XY	560.594WIN	45-120	632.122	1050.042	1402.972	0.000	6.041	12	2.000	1.749	NG
4	M04	SAE	5X5X0.375	344.7	164.13	112.70	7XY	542.641WIN	45-120	481.485	1050.042	1052.229	0.000	6.005	12	2.000	1.749	NG
5	M05	SAE	5X5X0.375	344.7	154.76	107.45	9XY	517.373WIN	45-120	481.485	1050.042	1052.229	0.000	6.041	12	2.000	1.749	NG
6	M06	SAE	5X5X0.375	344.7	128.98	97.44	11XY	469.176WIN	45-120	481.485	875.035	876.857	0.000	2.500	10	2.000	1.749	NG
7	M07	SAE	4X4X0.375	344.7	135.56	98.91	13XY	362.312WIN	45-120	366.310	700.028	701.486	0.000	2.500	8	2.000	1.749	NG
8	M08	SAE	3X3X0.375	344.7	115.73	74.78	17XY	185.462WIN	45-120	248.024	525.021	526.114	0.000	2.500	6	2.000	1.749	NG
9	M09	SAE	2.5X2.5X0.375	344.7	117.42	62.12	19XY	117.338WIN	45-120	188.881	525.021	526.114	0.000	2.500	6	2.000	1.749	NG
10	M10	SAE	2.5X2.5X0.375	344.7	88.30	44.31	21XY	83.701WIN	45-120	188.881	350.014	350.743	0.000	2.598	4	2.000	1.749	
11	M11	SAE	2.5X2.5X0.25	344.7	117.13	62.21	22XY	81.889WIN	45-120	131.627	350.014	233.829	0.000	2.505	4	2.000	1.749	NG
12	M12	SAE	2.5X2.5X0.1875	344.7	40.31	23.15	25XY	23.843WIN	45-120	103.000	350.014	175.371	0.000	2.505	4	2.000	1.749	
13	D01	SAE	4X4X0.25	248.1	27.91	20.67	32Y	18.097WIN	45-120	171.046	87.538	96.906	0.000	12.180	2	1.000	1.749	
14	D02	SAE	3X3X0.25	248.1	25.49	16.88	35P	14.776WIN	0-120	123.637	87.538	96.906	0.000	5.851	2	1.000	1.749	
15	D03	SAE	2.5X2.5X0.1875	248.1	124.02	22.63	37P	16.445WIN	0-120	76.521	87.538	72.679	0.000	10.664	2	1.000	1.749	NG
16	D04	SAE	2.5X2.5X0.1875	248.1	76.11	17.52	41P	12.731WIN	0-120	76.521	87.538	72.679	0.000	8.702	2	1.000	1.749	
17	D05	SAE	2.5X2.5X0.1875	248.1	120.88	18.38	46Y	13.360WIN	0-120	76.521	87.538	72.679	0.000	6.664	2	1.000	1.749	NG
18	D06	SAE	2X2X0.1875	248.1	141.97	47.45	49P	26.667WIN	0-120	56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	NG
19	D07	SAE	2X2X0.1875	248.1	120.33	42.15	53P	23.688WIN	0-120	56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	NG
20	D08	SAE	2X2X0.1875	248.1	100.11	36.18	57P	20.336WIN	0-120	56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	NG
21	D09	SAE	2X2X0.1875	248.1	71.01	25.60	63P	14.387WIN	0-120	56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	
22	D10	SAE	1.5X1.5X0.125	248.1	185.38	37.38	67XY	9.908WIN	45-120	26.503	87.538	48.453	0.000	3.240	2	1.000	1.749	NG
23	D11	SAE	1.5X1.5X0.125	248.1	132.56	38.47	71P	10.196WIN	0-120	26.503	87.538	48.453	0.000	2.920	2	1.000	1.749	NG
24	D12	SAE	1.5X1.5X0.125	248.1	62.48	21.13	75P	5.600WIN	0-120	26.503	87.538	48.453	0.000	2.920	2	1.000	1.749	
25	H01	SAE	2.5X2.5X0.1875	248.1	180.83	52.40	83X	38.081WIN	45-120	76.521	87.538	72.679	0.000	4.550	2	1.000	1.749	NG
26	H02	SAE	2.5X2.5X0.1875	248.1	36.32	17.16	96Y	12.470WIN	0-120	76.521	87.538	72.679	0.000	2.500	2	1.000	1.749	
27	H03	SAE	2.5X2.5X0.1875	248.1	40.42	21.60	100P	15.698WIN	0-120	76.521	87.538	72.679	0.000	2.500	2	1.000	1.749	
28	H04	SAE	2.5X2.5X0.1875	248.1	12.43	12.43	101R	9.034WIN	0-120	76.521	87.538	72.679	0.000	1.500	2	1.000	1.749	
29	H05	SAE	2.5X2.5X0.1875	248.1	4.05	4.05	102YR	2.945WIN	0-120	76.521	87.538	72.679	0.000	1.500	2	1.000	1.749	
30	H06	SAE	2X2X0.1875	248.1	20.05	3.86	103P	2.170WIN	45-120	56.203	87.538	72.679	0.000	6.435	2	1.000	1.749	
33	C01	SAE	2X2X0.1875	248.1	33.71	0.00	104X	0.000		56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	
34	C02	SAE	2X2X0.1875	248.1	30.04	0.00	105X	0.000		56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	
35	C03	SAE	2X2X0.1875	248.1	11.02	0.00	106X	0.000		56.203	87.538	72.679	0.000	2.121	2	1.000	1.749	
36	C04	SAE	2X2X0.1875	248.1	11.98	0.00	107X	0.000		56.203	87.538	72.679	0.000	2.121	2	1.000	1.749	

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
WIN 0 -120	141.80	49Y	Angle NG
WIN 45-120	185.38	67P	Angle NG
WIN 45-60	76.05	67P	Angle

*** Weight of structure (N):

Weight of Angles*Section DLF: 141445.6
Weight of Equipment: 2400.0
Total: 143845.6

*** End of Report

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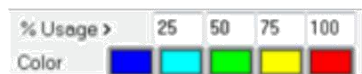
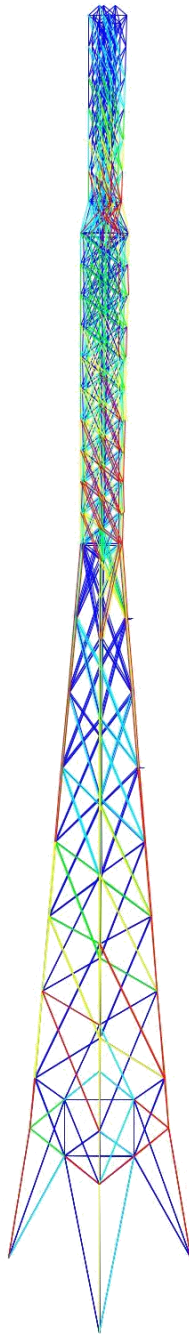
TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
16 / 24

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SILUETA ESFUERZOS-DEF.



EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
17 / 24

REV.
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TORRE 100 m – LETICIA - AMAZONAS
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EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
18 / 24

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RESUMEN DE DISEÑO

Project Name : TORRE 100m - LETICIA - AMAZONAS -REF.
Project Notes: BTESA - RTVC
Project File : f:\arch_2016\eval_btesa\tac100_leticia\tor100m_let_r.tow
Date run : 10:45:03 a.m. martes, 17 de mayo de 2016
by : Tower Version 10.20

Successfully performed linear analysis

The model has 0 warnings.

Member check option: TIA/EIA 222-F
Connection rupture check: Not Checked
Crossing diagonal check: Fixed
Loads from file: f:\arch_2016\eval_btesa\tac100_leticia\tor100m_let.eia

*** Analysis Results:

Maximum element usage is 92.60% for Angle "41Y" in load case "WIN 0 -120"

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kN)	Tran. Force (kN)	Vert. Force (kN)	Shear Force (kN)	Tran. Moment (kN-m)	Long. Moment (kN-m)	Vert. Moment (kN-m)	Bending Moment (kN-m)	Found. Usage %
WIN 0 -120	42P	-72.45	-78.41	548.54	106.76	-1.30	1.37	0.08	1.89	0.00
WIN 0 -120	42X	-69.38	77.52	530.09	104.04	1.19	1.35	-0.03	1.80	0.00
WIN 0 -120	42XY	-45.75	-52.67	-379.47	69.77	-0.75	0.88	0.01	1.16	0.00
WIN 0 -120	42Y	-43.59	50.75	-360.63	66.90	0.68	0.82	0.00	1.07	0.00
WIN 45-120	42P	-115.68	-115.68	852.35	163.59	-2.06	2.06	0.00	2.91	0.00
WIN 45-120	42X	-6.21	19.95	84.39	20.89	0.12	0.40	-0.03	0.42	0.00
WIN 45-120	42XY	-89.39	-89.39	-682.60	126.41	-1.54	1.54	-0.00	2.17	0.00
WIN 45-120	42Y	19.95	-6.21	84.39	20.89	-0.40	-0.12	0.03	0.42	0.00
WIN 45-60	42P	-40.46	-40.46	292.25	57.22	-0.76	0.76	0.00	1.08	0.00
WIN 45-60	42X	-10.90	15.43	84.86	18.89	0.21	0.31	-0.01	0.37	0.00
WIN 45-60	42XY	-14.27	-14.27	-123.44	20.18	-0.25	0.25	-0.00	0.35	0.00
WIN 45-60	42Y	15.43	-10.90	84.86	18.89	-0.31	-0.21	0.01	0.37	0.00

Note: Summary of Joint Support Reactions For All Load Cases in Direction of Leg not printed because none of the angle members attached to foundation joints have a group type of 'Leg'.

Overturning Moment Summary For All Load Cases:

Load Case	Transverse Moment (kN-m)	Longitudinal Moment (kN-m)	Resultant Moment (kN-m)
WIN 0 -120	223.745	10912.377	10914.671
WIN 45-120	9209.719	9209.718	13024.509
WIN 45-60	2494.102	2494.102	3527.192

EIA Sections Information:

Section Label	Top Z (m)	Bottom Z (m)	Joint Count	Member Count	Top Width (m)	Bottom Width (m)	Gross Area (m²)	Face Adj Factor	Face Ar Adj Factor	Dead Load Factor
SECC1	100.000	85.000	28	84	1.50	1.50	22.50	1.1000	1.0000	1.200
SECC2	85.000	82.500	8	18	1.50	2.50	5.00	1.0000	1.0000	1.200
SECC3	82.500	70.000	24	60	2.50	2.50	31.25	1.1000	1.0000	1.200
SECC4	70.000	57.500	24	66	2.50	2.50	31.25	1.0000	1.0000	1.200
SECC5	57.500	45.512	12	24	2.50	4.18	40.03	1.1000	1.0000	1.200
SECC6	45.512	33.524	12	24	4.18	5.86	60.15	1.1500	1.0000	1.200
SECC7	33.524	21.500	12	24	5.86	7.54	80.54	1.1500	1.0000	1.200
SECC8	21.500	10.500	16	36	7.54	9.10	91.52	1.1500	1.0000	1.200
SECC9	10.500	0.000	12	12	9.10	12.00	110.78	1.1500	1.0000	1.200

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress
Printed capacities do not include EIA allowable stress increase for wind load cases.
Printed capacities do not include the strength factor entered for each loadcase.

Group Summary (Compression Portion):

Group Label	Group Desc.	Angle Type	Angle Size	Steel Strength (MPa)	Max Usage %	Max Use In Comp.	Comp. Member	Comp. Force (kN)	Comp. Control Load Case	L/R Capacity (kN)	Conn. Shear Capacity (kN)	Conn. Bearing Capacity (kN)	R1X	R1Y	R1Z	L/R Length (m)	Curve No.	No. Bolts	Of Comp.
1	M01	DAI	5X1/2+5X3/8	344.7	89.13	89.13	2P	-876.538WIN	45-120	983.478	1050.042	2104.458	0.166	0.160	0.160	35.51	10.698	1	12
2	M02	DAI	5X1/2+5X3/8	344.7	81.57	81.57	4P	-826.675WIN	45-120	1013.491	1050.042	2104.458	0.200	0.200	0.200	29.18	7.034	1	12
3	M03	DAI	5X1/2+5X3/8	344.7	73.07	73.07	6P	-733.288WIN	45-120	1003.587	1050.042	2104.458	0.250	0.250	0.250	31.33	6.041	1	12
4	M04	DAI	5X3/8+4X3/8	344.7	91.26	91.26	7P	-698.472WIN	45-120	765.379	1050.042	2104.458	0.250	0.250	0.250	34.50	6.005	1	12
5	M05	DAI	5X3/8+4X3/8	344.7	85.56	85.56	9P	-654.192WIN	45-120	764.592	1050.042	2104.458	0.250	0.250	0.250	34.71	6.041	1	12
6	M06	DAI	5X3/8+4X3/8	344.7	75.23	75.23	12P	-526.660WIN	45-120	786.399	700.028	1402.972	0.500	0.500	0.500	28.73	2.500	1	8
7	M07	DAI	4X3/8+4X5/16	344.7	70.83	70.83	13P	-445.509WIN	45-120	628.945	700.028	1402.972	0.500	0.500	0.500	32.38	2.500	1	8
8	M08	DAI	3X3/8+3X1/4	344.7	57.32	57.32	17P	-229.699WIN	45-120	400.703	525.021	1052.229	0.500	0.500	0.500	43.17	2.500	1	6
9	M09	DAI	3X3/8+3X1/4	344.7	37.87	37.87	19P	-151.733WIN	45-120	400.703	525.021	1052.229	0.500	0.500	0.500	43.17	2.500	1	6
10	M10	DAI	3X3/8+3X1/4	344.7	29.70	29.70	21P	-103.970WIN	45-120	396.782	350.014	701.486	0.500	0.500	0.500	44.86	2.598	1	4
11	M11	DAI	3X3/8+3X1/4	344.7	29.63	29.63	22P	-103.709WIN	45-120	400.504	350.014	701.486	0.500	0.500	0.500	43.26	2.505	1	4
12	M12	SAE	2.5X2.5X0.1875	344.7	45.10	45.10	25P	-27.307WIN	45-120	60.545	350.014	175.371	0.500	0.500	0.500	99.62	2.505	1	4
13	D01	SAE	4X4X0.25	248.1	31.87	31.87	33Y	-27.896WIN	45-120	102.386	87.538	96.906	0.250	0.160	0.160	96.51	12.180	3	2
14	D02	SAE	3X3X0.25	248.1	37.50	37.50	35Y	-23.239WIN	45-120	61.973	87.538	96.906	0.500	0.330	0.330	127.54	5.851	6	2
15	D03	DAE	2.5X2.5X0.1875	248.1	77.80	77.80	37Y	-20.671WIN	0 -120	26.570	87.538	145.359	0.500	0.250	0.250	269.82	10.664	6	2
16	D04	SAE	2.5X2.5X0.1875	248.1	92.60	92.60	41Y	-17.158WIN	0 -120	18.529	87.538	72.679	0.500	0.250	0.250	220.18	8.702	6	2
17	D05	DAE	2.5X2.5X0.1875	248.1	78.36	78.36	46P	-23.023WIN	0 -120	29.381	87.538	145.359	0.750	0.500	0.500	252.91	6.664	6	2

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TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
19 / 24

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18	D06	DAE	2X2X0.1875	248.1	81.06	81.06	49Y	-34.107WIN	45-120	42.075	87.538	145.359	0.75C	0.500	0.500	169.20	3.536	6	2
19	D07	DAE	2X2X0.1875	248.1	64.43	64.43	53Y	-27.111WIN	0 -120	42.075	87.538	145.359	0.75C	0.500	0.500	169.20	3.536	6	2
20	D08	DAE	2X2X0.1875	248.1	53.79	53.79	57Y	-22.632WIN	0 -120	42.075	87.538	145.359	0.75C	0.500	0.500	169.20	3.536	6	2
21	D09	SAE	2X2X0.1875	248.1	81.79	81.79	63XY	-16.091WIN	0 -120	19.673	87.538	72.679	0.75C	0.500	0.500	176.64	3.536	6	2
22	D10	SAE	2X2X0.1875	248.1	74.40	74.40	66P	-16.516WIN	45-120	22.198	87.538	72.679	0.75C	0.500	0.500	161.90	3.240	6	2
23	D11	SAE	2X2X0.1875	248.1	50.86	50.86	69Y	-12.985WIN	0 -120	25.532	87.538	72.679	0.75C	0.500	0.500	145.88	2.920	6	2
24	D12	SAE	1.5X1.5X0.125	248.1	69.35	69.35	75Y	-6.046WIN	0 -120	8.719	87.538	48.453	0.75C	0.500	0.500	194.17	2.920	6	2
25	H01	DAE	2.5X2.5X0.1875	248.1	60.63	60.63	82P	-51.593WIN	45-120	85.101	87.538	145.359	0.50C	0.500	0.500	115.12	4.550	3	2
26	H02	SAE	2.5X2.5X0.1875	248.1	24.65	24.65	96P	-5.308WIN	0 -120	21.529	87.538	72.679	1.00C	1.000	1.000	198.84	2.500	6	2
27	H03	SAE	2.5X2.5X0.1875	248.1	43.06	43.06	100P	-9.271WIN	0 -120	21.529	87.538	72.679	1.00C	1.000	1.000	198.84	2.500	6	2
28	H04	SAE	2.5X2.5X0.1875	248.1	15.06	9.75	101P	-4.124WIN	0 -120	42.282	87.538	72.679	1.00C	1.000	1.000	119.30	1.500	3	2
29	H05	SAE	2.5X2.5X0.1875	248.1	3.99	0.00	102YR	0.00C		42.282	87.538	72.679	1.00C	1.000	1.000	119.30	1.500	3	2
30	H06	SAE	2X2X0.1875	248.1	25.79	25.79	103XY	-4.089WIN	45-120	15.858	87.538	72.679	0.50C	0.250	0.250	205.29	6.435	6	2
33	C01	SAE	2X2X0.1875	248.1	30.35	30.35	104P	-4.186WIN	45-120	13.789	87.538	72.679	1.00C	0.500	0.500	225.60	3.536	6	2
34	C02	SAE	2X2X0.1875	248.1	23.30	23.30	105P	-2.457WIN	45-120	13.789	87.538	72.679	1.00C	0.500	0.500	225.60	3.536	6	2
35	C03	SAE	2X2X0.1875	248.1	8.73	8.73	106X	-2.457WIN	45-120	28.148	87.538	72.679	1.00C	0.500	0.500	135.36	2.121	6	2
36	C04	SAE	2X2X0.1875	248.1	11.88	11.88	107P	-3.345WIN	45-120	28.148	87.538	72.679	1.00C	0.500	0.500	135.36	2.121	6	2

Group Summary (Tension Portion):

Group Label	Group Desc.	Angle Type	Angle Size	Steel	Max Tension	Tension	Tension	Net Tens.	Conn. Shear	Tens.	Conn.	Tens.	Conn.	Length	No. Of	No. Of	Hole
				Strength	Use	In Control	Force	Control	Section	Bearing	Rupture	Member	Tens.	cm			
				(MPa)	%	%	(kN)	Load Case	Capacity (kN)	Capacity (kN)	Capacity (kN)	Capacity (kN)	Capacity (kN)	(m)			(cm)
1	M01	DAI	5X1/2+5X3/8	344.7	89.13	69.53	2XY 730.042WIN	45-120	1115.621	1050.042	2104.458	0.000	10.698	12	2.000	1.749	
2	M02	DAI	5X1/2+5X3/8	344.7	81.57	66.49	4XY 698.141WIN	45-120	1115.621	1050.042	2104.458	0.000	7.034	12	2.000	1.749	
3	M03	DAI	5X1/2+5X3/8	344.7	73.07	60.07	6XY 630.728WIN	45-120	1115.621	1050.042	2104.458	0.000	6.041	12	2.000	1.749	
4	M04	DAI	5X3/8+4X3/8	344.7	91.26	70.40	7XY 608.186WIN	45-120	863.897	1050.042	2104.458	0.000	6.005	12	2.000	1.749	
5	M05	DAI	5X3/8+4X3/8	344.7	85.56	67.18	9XY 580.334WIN	45-120	863.897	1050.042	2104.458	0.000	6.041	12	2.000	1.749	
6	M06	DAI	5X3/8+4X3/8	344.7	75.23	68.18	12XY 477.276WIN	45-120	863.897	700.028	1402.972	0.000	2.500	8	2.000	1.749	
7	M07	DAI	4X3/8+4x5/16	344.7	70.83	58.34	13XY 408.394WIN	45-120	702.617	700.028	1402.972	0.000	2.500	8	2.000	1.749	
8	M08	DAI	3X3/8+3X1/4	344.7	57.32	44.27	17XY 208.983WIN	45-120	472.093	525.021	1052.229	0.000	2.500	6	2.000	1.749	
9	M09	DAI	3X3/8+3X1/4	344.7	37.87	28.80	20XY 100.818WIN	45-120	472.093	350.014	701.486	0.000	2.500	4	2.000	1.749	
10	M10	DAI	3X3/8+3X1/4	344.7	29.70	27.48	21XY 96.168WIN	45-120	472.093	350.014	701.486	0.000	2.598	4	2.000	1.749	
11	M11	DAI	3X3/8+3X1/4	344.7	29.63	26.17	22XY 91.588WIN	45-120	472.093	350.014	701.486	0.000	2.505	4	2.000	1.749	
12	M12	SAE	2.5X2.5X0.1875	344.7	45.10	23.92	25XY 24.636WIN	45-120	103.000	350.014	175.371	0.000	2.505	4	2.000	1.749	
13	D01	SAE	4X4X0.25	248.1	31.87	19.60	33X 17.157WIN	45-120	171.046	87.538	96.906	0.000	12.180	2	1.000	1.749	
14	D02	SAE	3X3X0.25	248.1	37.50	22.87	35X 20.016WIN	45-120	123.637	87.538	96.906	0.000	5.851	2	1.000	1.749	
15	D03	DAE	2.5X2.5X0.1875	248.1	77.80	24.42	37P 21.375WIN	0 -120	161.665	87.538	145.359	0.000	10.664	2	1.000	1.749	
16	D04	SAE	2.5X2.5X0.1875	248.1	92.60	21.69	41P 15.762WIN	0 -120	76.521	87.538	72.679	0.000	8.702	2	1.000	1.749	
17	D05	DAE	2.5X2.5X0.1875	248.1	78.36	18.56	46Y 16.247WIN	0 -120	161.665	87.538	145.359	0.000	6.664	2	1.000	1.749	
18	D06	DAE	2X2X0.1875	248.1	81.06	34.59	51P 30.283WIN	0 -120	125.866	87.538	145.359	0.000	3.536	2	1.000	1.749	
19	D07	DAE	2X2X0.1875	248.1	64.43	30.14	53P 26.382WIN	0 -120	125.866	87.538	145.359	0.000	3.536	2	1.000	1.749	
20	D08	DAE	2X2X0.1875	248.1	53.79	26.41	57P 23.122WIN	0 -120	125.866	87.538	145.359	0.000	3.536	2	1.000	1.749	
21	D09	SAE	2X2X0.1875	248.1	81.79	28.97	63P 16.283WIN	0 -120	56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	
22	D10	SAE	2X2X0.1875	248.1	74.40	15.52	66XY 8.723WIN	45-120	56.203	87.538	72.679	0.000	3.240	2	1.000	1.749	
23	D11	SAE	2X2X0.1875	248.1	50.86	20.47	71P 11.505WIN	0 -120	56.203	87.538	72.679	0.000	2.920	2	1.000	1.749	
24	D12	SAE	1.5X1.5X0.125	248.1	69.35	23.97	75P 6.353WIN	0 -120	26.503	87.538	48.453	0.000	2.920	2	1.000	1.749	
25	H01	DAE	2.5X2.5X0.1875	248.1	60.63	47.95	83X 41.978WIN	45-120	161.665	87.538	145.359	0.000	4.550	2	1.000	1.749	
26	H02	SAE	2.5X2.5X0.1875	248.1	24.65	15.37	96Y 11.174WIN	0 -120	76.521	87.538	72.679	0.000	2.500	2	1.000	1.749	
27	H03	SAE	2.5X2.5X0.1875	248.1	43.06	24.76	100P 17.999WIN	0 -120	76.521	87.538	72.679	0.000	2.500	2	1.000	1.749	
28	H04	SAE	2.5X2.5X0.1875	248.1	15.06	15.06	101R 10.948WIN	0 -120	76.521	87.538	72.679	0.000	1.500	2	1.000	1.749	
29	H05	SAE	2.5X2.5X0.1875	248.1	3.99	3.99	102YR 2.903WIN	45-120	76.521	87.538	72.679	0.000	1.500	2	1.000	1.749	
30	H06	SAE	2X2X0.1875	248.1	25.79	4.43	103P 2.492WIN	45-120	56.203	87.538	72.679	0.000	6.435	2	1.000	1.749	
33	C01	SAE	2X2X0.1875	248.1	30.35	0.00	104X 0.000		56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	
34	C02	SAE	2X2X0.1875	248.1	23.30	0.73	105X 0.412WIN	45-120	56.203	87.538	72.679	0.000	3.536	2	1.000	1.749	
35	C03	SAE	2X2X0.1875	248.1	8.73	0.00	106X 0.000		56.203	87.538	72.679	0.000	2.121	2	1.000	1.749	
36	C04	SAE	2X2X0.1875	248.1	11.88	0.00	107X 0.000		56.203	87.538	72.679	0.000	2.121	2	1.000	1.749	

*** Maximum Stress Summary for Each Load Case



Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
WIN 0 -120	92.60	41Y	Angle
WIN 45-120	91.26	7P	Angle
WIN 45-60	34.37	66P	Angle

*** Weight of structure (N):
Weight of Angles*Section DLF: 238230.9
Weight of Equipment: 2400.0
Total: 240630.9

*** End of Report

EVALUACION ESTRUCTURAL TAC100

		TORRE 100m - LETICIA		
		TAC100-LET-AMZ	HOJA 20 / 24	REV. 0

TORRE 100 m – LETICIA - AMAZONAS
CIMENTACION

EVALUACION ESTRUCTURAL TAC100



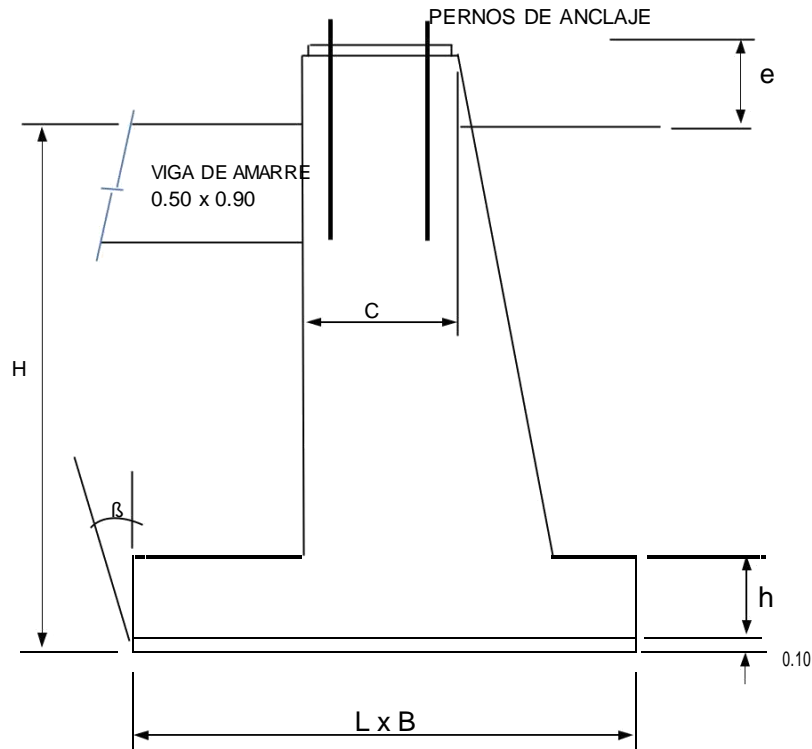
TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
21 / 24

REV.
0

TORRE 100,m - LETICIA
CIMENTACION EN CONCRETO



MATERIALES: Acero $f_y = 4,200$ Kg / cm²
 Concr. $f'_c = 210$ Kg / cm²
 Angulo $\beta = 20$ grados. $T_g = 0.364$
 Suelo $q_u = 1.00$ Kg / cm²
 Suelo $C = 0.10$ Kg / cm²

PREDIMENSIONAMIENT. CHEQUEO ESTABLD.

Dimensiones (m.)	H = 1.95	h = 0.75	C = 0.65	L = 3.85	e = 0.30
Volumen de Concreto (m3)	V1 = 0.613	V2 = 11.117	V3 = 0.741	Vc = 12.47	Cortante Vu=
Volumen de Suelo (m3)	V4 = 28.904	V5 = 10.117	V6 = 0.952	Vs = 27.502	16,359
Peso Específico (Ton / m3)	Suelo 1.70	Concreto 2.40	R. Cohesión 15.015	P. Suelo 46.754	P. Concreto 29.930
Peso total Fundación (Ton.)	91,698		Arrancamiento Fu = 68,260	Factor de seguridad al arranque K= 1.14	
Compresión C =	85,235	Area m2 14.82	0.47	Kg / cm2	Presión sobre el terreno

EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
22 / 24



REV.
0

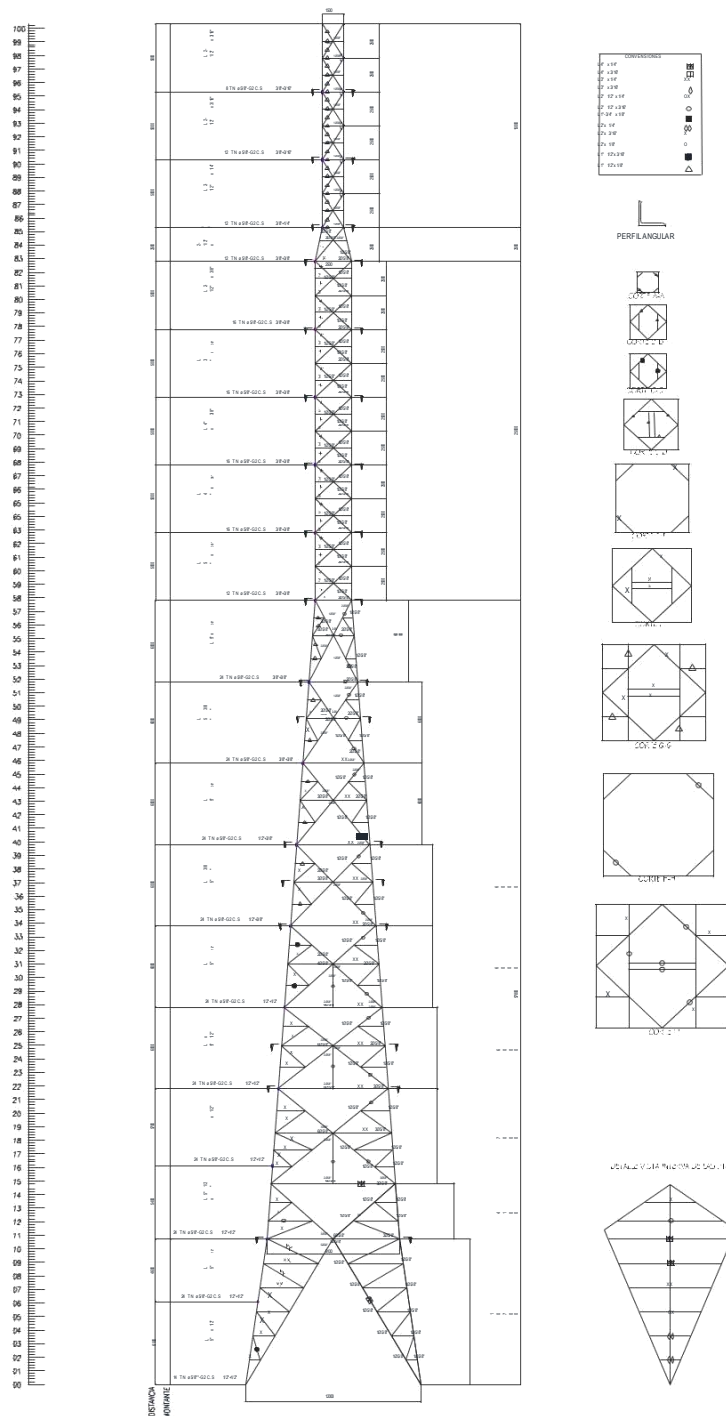
CONCLUSIONES:

La torre de 100 metros instalada en sitio Leticia-Amazonas, en el estado actual y después del análisis con las antenas instaladas:

1. La estructura metálica en las condiciones de trabajo con las cargas actuales mas las antenas nuevas, no cumple por esfuerzos y deformaciones; El elemento más esforzado está trabajando al 185.38 %, referido al límite fluencia, fallan los elementos M01, M02, M03 de L5"x3/8", M04, M05, M06 de L5"x3/8", M07 de L4"x3/8", M08 de L3"x3/8", M09 L2-1/2"x3/8" y M11 de L2-1/2"x1/4", marcados en rojo en la silueta.
2. El análisis estructural se hace considerando que los elementos que conforman la estructura están en buen estado.
3. La deflexión máxima en el extremo superior de la torre, para cargas de trabajo, con viento de 60.km/h es 0.42 m, es decir 0.24 ° menor a 0.5°.
4. Se propone un refuerzo para los elementos M01, M02, M03, con L5"x3/8", M04, M05, M06 con L4"x3/8", M07 con L4"x5/16", M08, M09, M11 con L3"x1/4", además de hacer cierre interno entre estas diagonales para mejorar la esbeltez; El peso aprox. del reforzamiento es 11.500 kg.
5. La cimentación, según el informe de campo, está compuesta por zapatas cuadradas de 3.85m, con pedestales de 0.65x0.65 (piramidales) a una profundidad de 1.95 metros, unidos mediante vigas de amarre de 0.50x0.90m, con suelo $q_a=1.0 \text{ kg/cm}^2$ y según la verificación, la cimentación no cumple por esfuerzos para las cargas de la torre con las antenas nuevas; Se propone hacer un reforzamineto mediante la construcción de placas supeficiales en cada pata, de 5.0x5.0m, con espesor de 0.40m, con lo cual las cantidades de obra son 40.0m³ de concreto de 210 kg/cm² y 3500kg de acero de refuerzo.

EVALUACION ESTRUCTURAL TAC100

		TORRE 100m - LETICIA		
		TAC100-LET-AMZ	HOJA 23 / 24	REV. 0



EVALUACION ESTRUCTURAL TAC100



TORRE 100m - LETICIA

TAC100-LET-AMZ

HOJA
24 / 24

REV.
0