

Guyed Master Tower Design : 61 m.

[TIA/EIA-222 STANDARD]

1

Location ต.ภูเก้าสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด

Owner นายวิระพงศ์ พลอาสา

Engineer นายเสริมพันธ์ เอี่ยมจะบก

Date 21 พฤษภาคม 2555

แรงลมที่กระทำต่อโครงสร้าง: คิครณิกระทำต่อ Tower				Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Unit	
พิจารณาความสูงของแต่ละช่วง				10.00	9.00	9.00	9.00	12.00	9.00	3.00	m.	
พิจารณาที่ความกว้าง/ด้าน				0.66	0.66	0.66	0.66	0.66	0.66	0.66	m.	
พื้นที่รับแรงลมทั้งหมด/ด้าน; A_G				0.66	0.66	0.66	0.66	0.66	0.66	0.66	m. ² /m.	
Tower Column	Pipe	∅ 60.50 x 4	mm.	60.50	60.50	60.50	60.50	60.50	60.50	60.50	mm.	
Column Bracing	∅	19	mm. @	0.40	19.00	19.00	19.00	19.00	19.00	19.00	mm.	
Diagonal	ความยาว	0.72	ม.	0.72	0.72	0.72	0.72	0.72	0.72	0.72	m.	
	จำนวน	7.00	ท่อน/3 ม.	24.00	21.00	21.00	21.00	28.00	21.00	7.00		
Horizontal	ความยาว	0.60	ม.	0.60	0.60	0.60	0.60	0.60	0.60	0.60	m.	
	จำนวน	8.00	ท่อน/3 ม.	27.00	24.00	24.00	24.00	32.00	24.00	8.00		
Projected area of flat structural component in one face; A_F				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	m. ²
Projected area of round structural component in one face; A_R				0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	m. ²
Gross area of one tower face; A_G				0.660	0.660	0.660	0.660	0.660	0.660	0.660	0.660	m. ²
Solidity ratio = $(A_R+A_F)/A_G$; e				0.278	0.278	0.278	0.278	0.278	0.278	0.278	0.278	-
The reduction factor for round structural component; $R_R \leq 1$				0.609	0.609	0.609	0.609	0.609	0.609	0.609	0.609	-
Structure force coefficient; C_F				2.357	2.357	2.357	2.357	2.357	2.357	2.357	2.357	-
Wind direction factor; D_F (normal=1, 45 degree=1+0.75e)				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
Wind direction factor for round structural; D_R				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
Effective projected area of structural component in one face; A_E				0.112	0.112	0.112	0.112	0.112	0.112	0.112	0.112	m. ²
Height of tower; h_{max} .				61.00	61.00	61.00	61.00	61.00	61.00	61.00	61.00	m.
Height above average ground level to midpoint of panel of the structure and appurtenances; z				5.00	14.50	23.50	32.50	43.00	53.50	59.50		m.
Exposure Coefficient; K_z ($1 \leq K_z \leq 2.58$)				1.000	1.112	1.276	1.400	1.517	1.615	1.665		-
Basic wind speed for the structure location; V				130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	km./hr.
Velocity pressure = $0.613K_zV^2$ for V in m./s.; q_z				799.36	888.89	1,020.38	1,119.42	1,212.64	1,290.75	1,330.55		Pa(N/m. ²)
Gust responses factor from ; G_H ($1 \leq G_H \leq 1.25$)				1.113	1.113	1.113	1.113	1.113	1.113	1.113	1.113	-
Horizontal force applied to a section of the structure; F				23.89	26.56	30.49	33.45	36.24	38.57	39.76		kg/m.

Guyed Master Tower Design : 61 m.

[TIA/EIA-222 STANDARD]

2

Location ต.ภูเก้าสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด

Owner นายวิระพงศ์ พลอาสา

Engineer นายเสริมพันธ์ เอี่ยมจะบก

Date 21 พฤษภาคม 2555

แรงลมที่กระทำต่อโครงสร้าง: คิครณึกระทำต่อสายอุปกรณึ	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Guyed-Stay	Unit
สายล่อฟ้า (Lightning Cable)	10.00	9.00	9.00	9.00	12.00	9.00	3.00	m.
∅	9.44	9.44	9.44	9.44	9.44	9.44	9.44	mm.
Quantity/Side	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
สายสัญญาณ (Feeder Line)								
∅ (1" + 5"/8); L = 63 m.	41.28	41.28	41.28	41.28	41.28	41.28	41.28	mm.
Quantity/Side	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
ระบบท่อร้อยสาย (IMC. Conduit)								
∅	33.40	33.40	33.40	33.40	33.40	33.40	33.40	mm.
Quantity/Side	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Projected area of flat structural component in one face; A _F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	m. ²
Projected area of round structural component in one face; A _R	0.167	0.167	0.167	0.167	0.167	0.167	0.167	m. ²
Gross area of one tower face; A _G	0.660	0.660	0.660	0.660	0.660	0.660	0.660	m. ²
Solidity ratio = (A _R +A _F)/A _G ; e	0.253	0.253	0.253	0.253	0.253	0.253	0.253	-
The reduction factor for round structural component; R _R ≤ 1	0.603	0.603	0.603	0.603	0.603	0.603	0.603	-
Structure force coefficient; C _F	2.430	2.430	2.430	2.430	2.430	2.430	2.430	-
Wind direction factor; D _F (normal=1, 45 degree=1+0.75e)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
Wind direction factor for round structural; D _R	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
Effective projected area of structural component in one face; A _E	0.100	0.100	0.100	0.100	0.100	0.100	0.100	m. ²
Height of tower; h _{max} .	61.00	61.00	61.00	61.00	61.00	61.00	61.00	m.
Height above average ground level to midpoint of panel of the structure and appurtenances; z	5.00	14.50	23.50	32.50	43.00	53.50	59.50	m.
Exposure Coefficient; K _z (1 ≤ K _z ≤ 2.58)	1.000	1.112	1.276	1.400	1.517	1.615	1.665	-
Basic wind speed for the structure location; V	130.00	130.00	130.00	130.00	130.00	130.00	130.00	km./hr.
Velocity pressure = 0.613K _z V ² for V in m./s.; q _z	799.36	888.89	1,020.38	1,119.42	1,212.64	1,290.75	1,330.55	Pa(N/m. ²)
Gust responses factor from ; G _H (1 ≤ G _H ≤ 1.25)	1.113	1.113	1.113	1.113	1.113	1.113	1.113	-
Horizontal force applied to a section of the structure; F	22.14	24.62	28.26	31.00	33.58	35.75	36.85	kg./m.
Total p1+p2	47.00	52.00	59.00	65.00	70.00	75.00	77.00	kg./m.
	23.50	26.00	29.50	32.50	35.00	37.50	38.50	kg./m./s.

Guyed Master Tower Design : 61 m. [TIA/EIA-222 STANDARD]

3

Location ต.กู่กาสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด Owner นายวีระพงศ์ พลอาสา
Engineer นายเสริมพันธ์ เอี่ยมจะบก Date 21 พฤษภาคม 2555

แรงลมที่กระทำต่อโครงสร้าง: คิครณิกระทำต่อ Antenna					Unit
มิติด้านกว้าง	=	0.25			m.
มิติด้านยาว	=	2.00			m.
จำนวนที่ติดตั้งบน Tower	=	6.00			unit
ความสูงของตำแหน่งติดตั้งนับจากยอด Tower ลงมา	=	1.00			m.
น้ำหนักของอุปกรณ์ประกอบ	=	50.00			kg.
Gross area of one Antenna face; A_G	=	0.50			$m.^2$
Height of tower; h_{max}	=	61.00			m.
Height above average ground level to midpoint of panel of the structure and appurtenances; z	=	60.00			m.
Exposure Coefficient; K_z ($1 \leq K_z \leq 2.58$)	=	1.67			-
Basic wind speed for the structure location; V_1	=	130.00			km./hr.
Basic wind speed for the structure location; V_2	=	36.11			m./sec.
Velocity pressure = $0.613K_zV^2$ for V in m./s.; q_z	=	1,333.74			$Pa(N/m.^2)$
	=	135.96			$kg./m.^2$
Gust responses factor from ; G_H ($1 \leq G_H \leq 1.25$)	=	1.113			-
Wind load coefficient; C_a (from table TIA page 62-67)	=	1.200			
Horizontal force applied to a section of the structure; F	=	90.83			kg./unit
	=	544.95			kg./6unit

Guyed Master Tower Design : 61 m.

[TIA/EIA-222 STANDARD]

4

Location ต.กู่กาสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด Owner นายวีระพงศ์ พลอาสา
 Engineer นายเสริมพันธ์ เอี่ยมจะบก Date 21 พฤษภาคม 2555

แรงลมที่กระทำต่อโครงสร้าง: คิครณีกระทำต่อ Solid Parabolic Antenna					Unit
เส้นผ่าศูนย์กลาง	=	1.20			m.
พื้นที่ภาพฉาย	=	1.13			m. ²
จำนวนที่ติดตั้งบน Tower	=	2.00			unit
ความสูงของตำแหน่งติดตั้งนับจากยอด Tower ลงมา	=	5.00			m.
น้ำหนักของอุปกรณ์ประกอบ		100.00			kg.
Gross area of one Solid Parabolic Antenna face; A _G	=	1.13			m. ²
Height of tower; h _{max.}	=	61.00			m.
Height above average ground level to midpoint of panel of the structure and appurtenances; z	=	56.00			m.
Exposure Coefficient; K _z (1 ≤ K _z ≤ 2.58)	=	1.64			-
Basic wind speed for the structure location; V ₁	=	130.00			km./hr.
Basic wind speed for the structure location; V ₂	=	36.11			m./sec.
Velocity pressure = 0.613K _z V ² for V in m./s.; q _z	=	1,307.71			Pa(N/m. ²)
	=	133.30			kg./m. ²
Gust responses factor from ; G _H (1 ≤ G _H ≤ 1.25)	=	1.113			-
Wind load coefficient; C _a (from table TIA page 62-67)	=	1.200			
Horizontal force applied to a section of the structure; F	=	201.51			kg./unit
	=	403.03			kg./2unit

Guyed Master Tower Design : 61 m.

[TIA/EIA-222 STANDARD]

5

Location ต.กู่กาสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด Owner นายวีระพงศ์ พลอาสา
 Engineer นายเสริมพันธ์ เอี่ยมจะบก Date 21 พฤษภาคม 2555

แรงลมที่กระทำต่อโครงสร้าง: ลิดกรณีกระทำต่อ Booster						Unit
มิติด้านกว้าง	=	0.40				m.
มิติด้านยาว	=	0.40				m. ²
จำนวนที่ติดตั้งบน Tower	=	3.00				unit
ความสูงของตำแหน่งติดตั้งนับจากยอด Tower ลงมา	=	3.00				m.
น้ำหนักของอุปกรณ์ประกอบ	=	100.00				kg.
Gross area of one Solid Parabolic Antenna face; A _G	=	0.16				m. ²
Height of tower; h _{max.}	=	61.00				m.
Height above average ground level to midpoint of panel of the structure and appurtenances; z	=	58.00				m.
Exposure Coefficient; K _z (1 ≤ K _z ≤ 2.58)	=	1.65				-
Basic wind speed for the structure location; V ₁	=	130.00				km./hr.
Basic wind speed for the structure location; V ₂	=	36.11				m./sec.
Velocity pressure = 0.613K _z V ² for V in m./s.; q _z	=	1,320.88				Pa(N/m. ²)
	=	134.65				kg./m. ²
Gust responses factor from ; G _H (1 ≤ G _H ≤ 1.25)	=	1.113				-
Wind load coefficient; C _a (from table TIA page 62-67)	=	1.200				
Horizontal force applied to a section of the structure; F	=	28.78				kg./unit
	=	86.35				kg./3unit



Software licensed to A.SERPUN

Job No	Sheet No 1	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet	Date/Time 28-May-2012 08:42

Job Information

	Engineer	Checked	Approved
Name:			
Date:	19-May-12		

Structure Type | SPACE FRAME

Number of Nodes	565	Highest Node	584
Number of Elements	1512	Highest Beam	1551

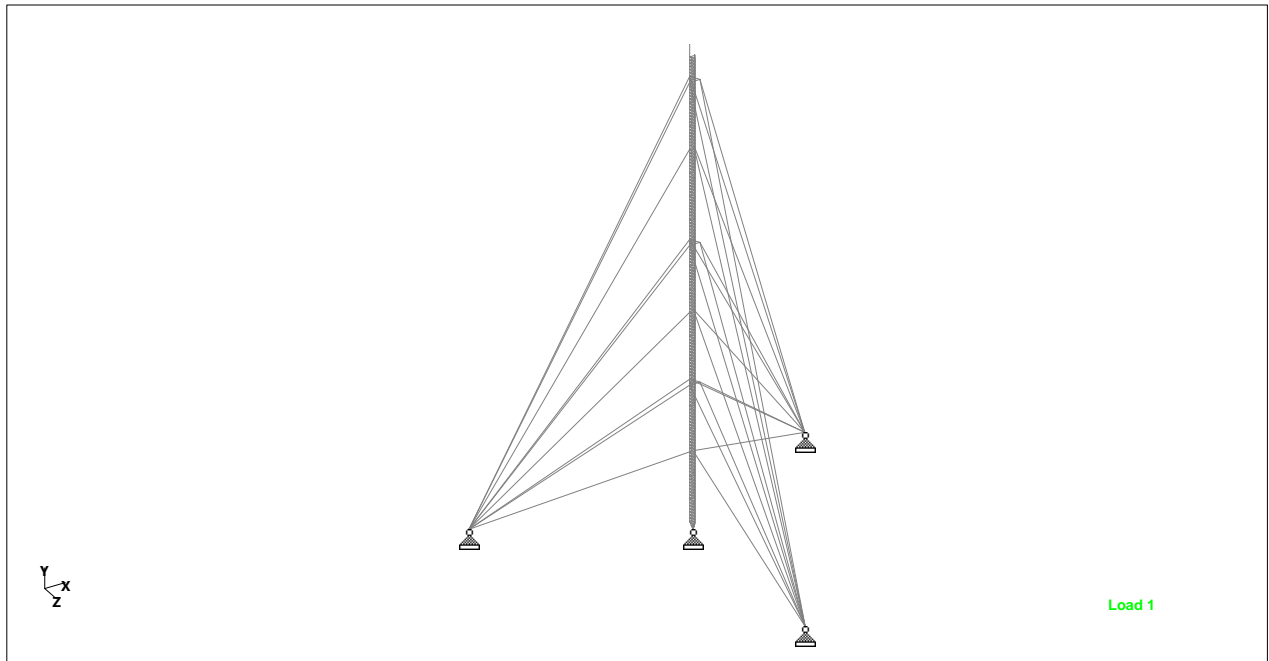
Number of Basic Load Cases	3
Number of Combination Load Cases	1

Included in this printout are data for:

Nodes	10,527,536,551,560,561,562
Beams	34,35,107,112,846,876,882,888,1

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	LOAD CASE 1: DL
Primary	2	LOAD CASE 2: WL
Primary	3	LOAD CASE 3: Temp.
Combination	4	COMBINATION LOAD CASE 4: DL+WL+T



Whole Structure



Software licensed to A.SERPUN

Job No

Sheet No

2

Rev

Part

Job Title

Ref

By

Date 19-May-12

Chd

Client

File Antenna Towers 61-Roiet.

Date/Time 28-May-2012 08:42

Nodes

Node	X (cm)	Y (cm)	Z (cm)
10	33.00	0.00	19.17
527	0.00	5710.00	0.00
536	0.00	6090.00	0.00
551	0.00	5970.00	0.00
560	-2128.96	0.00	-1236.52
561	2194.96	0.00	-1236.52
562	33.00	0.00	2519.50

Beams

Beam	Node A	Node B	Length (cm)	Property	β (degrees)
34	17	18	66.00	2	0
35	18	19	66.30	2	0
107	41	46	44.38	2	0
112	43	45	44.37	2	0
846	322	319	10.00	5	0
876	337	340	40.00	6	0
882	340	343	40.00	6	0
888	343	322	40.00	6	0
915	319	352	10.00	6	0
1429	539	540	66.00	3	0
1548	584	561	6301.45	1	0
1549	582	561	6301.31	1	0
1550	582	560	6301.31	1	0
1551	583	560	6301.45	1	0

Section Properties

Prop	Section	Area (cm ²)	I _{yy} (cm ⁴)	I _{zz} (cm ⁴)	J (cm ⁴)	Material
1	Cir 0.01	0.71	0.04	0.04	0.08	STEEL
2	Cir 0.02	2.84	0.64	0.64	1.28	STEEL
3	Cir 0.02	2.84	0.64	0.64	1.28	STEEL
4	C125X65X6	17.11	61.80	424.00	3.06	STEEL
5	PIP60.5X4.0	7.10	28.50	28.50	56.95	STEEL
6	PIP60.5X4.0	7.10	28.50	28.50	56.95	STEEL

Materials

Mat	Name	E (kg/cm ²)	ν	Density (kg/m ³)	α (1/°C)
1	STEEL	2.09E+6	0.300	7833.41	12E -6
2	STAINLESSSTEEL	2.02E+6	0.300	7833.41	18E -6
3	ALUMINUM	703E+3	0.330	2712.63	23E -6
4	CONCRETE	221E+3	0.170	2402.62	10E -6



Software licensed to A.SERMPUN

Job No	Sheet No 3	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet.	Date/Time 28-May-2012 08:42

Supports

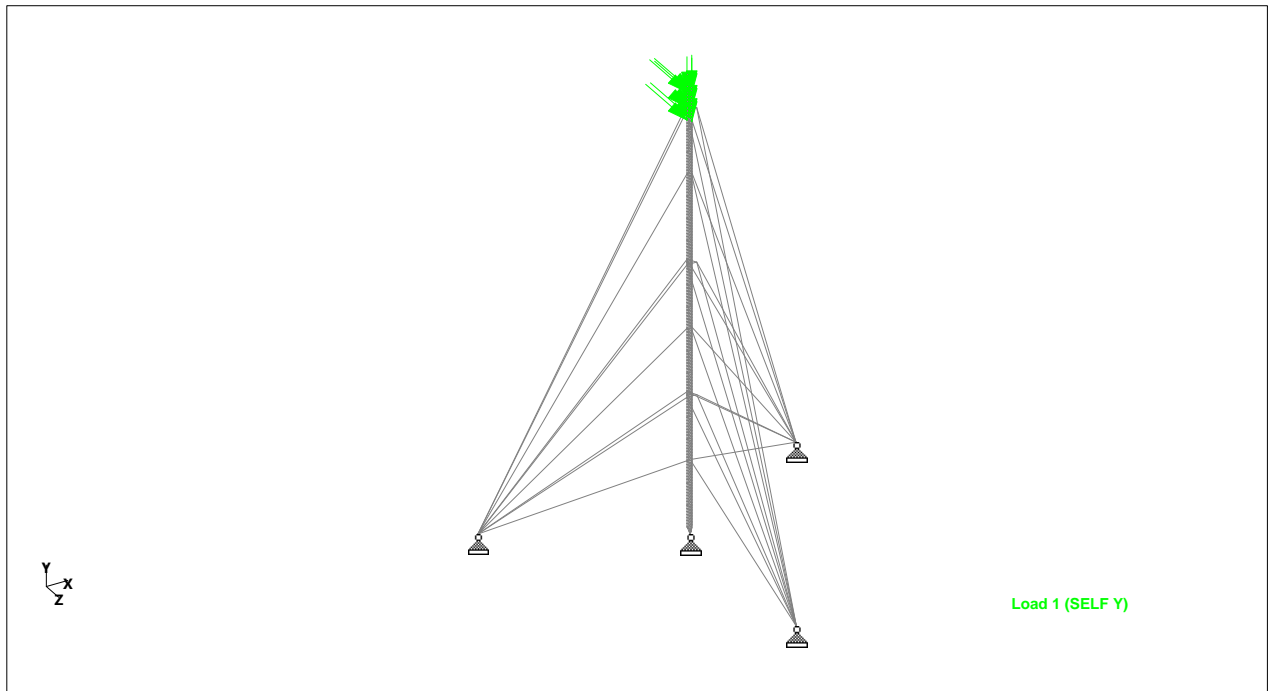
Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN·m/deg)	rY (kN·m/deg)	rZ (kN·m/deg)
10	Fixed	Fixed	Fixed	-	-	-
560	Fixed	Fixed	Fixed	-	-	-
561	Fixed	Fixed	Fixed	-	-	-
562	Fixed	Fixed	Fixed	-	-	-

Basic Load Cases

Number	Name
1	LOAD CASE 1: DL
2	LOAD CASE 2: WL
3	LOAD CASE 3: Temp.

Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
4	COMBINATION LOAD CASE 4: DL+WL+T	1	LOAD CASE 1: DL	1.00
		2	LOAD CASE 2: WL	1.00
		3	LOAD CASE 3: Temp.	1.00

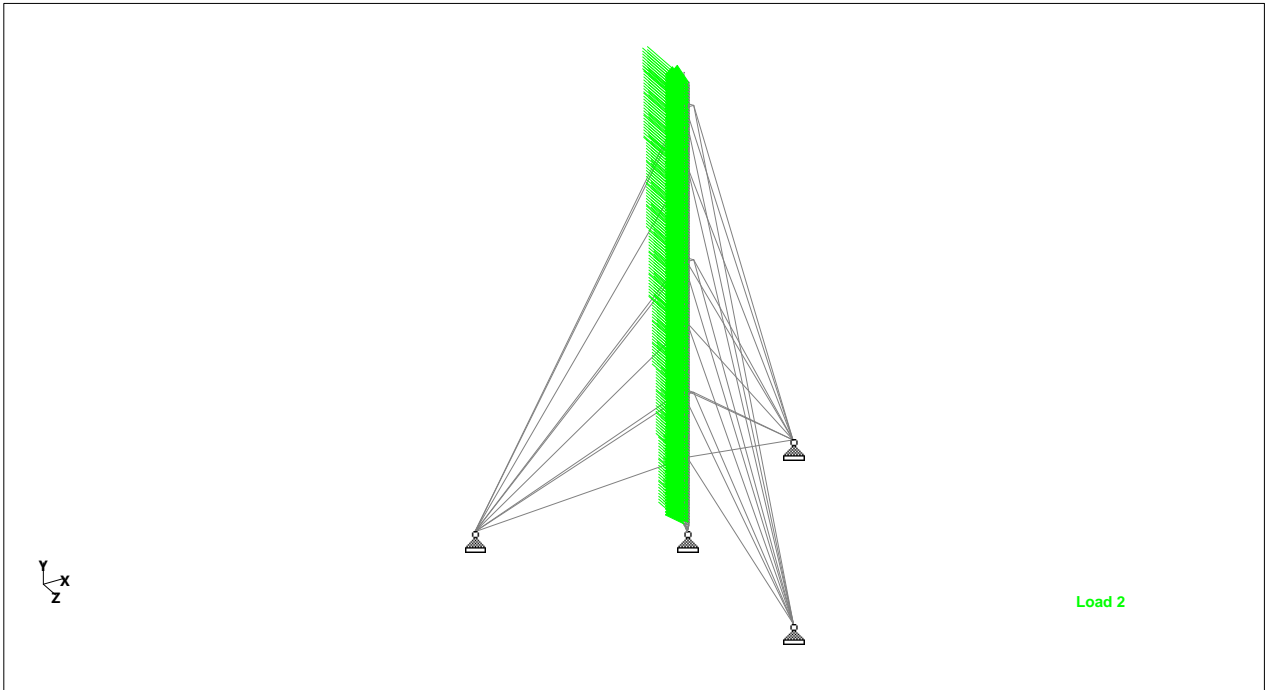


Whole Structure Loads 0.207327kg:1cm 1 LOAD CASE 1: DL

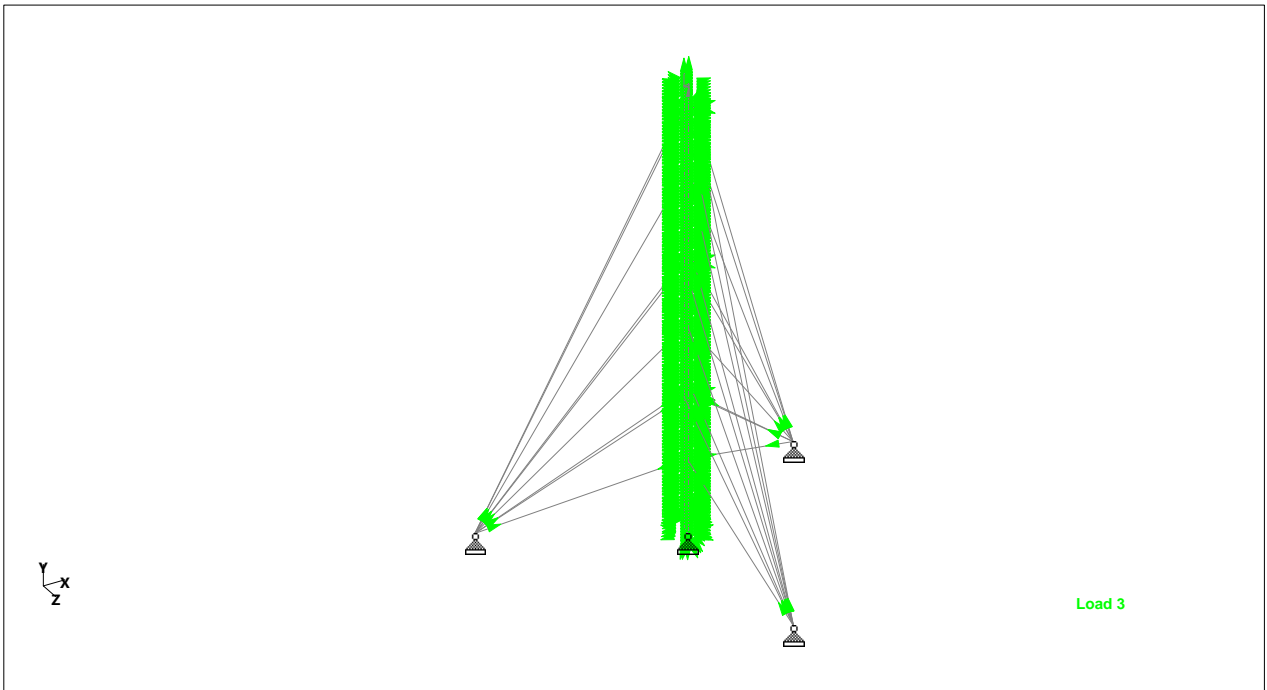


Software licensed to A.SERPUN

Job No	Sheet No 4	Rev
Part		
Job Title	Ref	
	By	Date 19-May-12 Chd
Client	File Antenna Towers 61-Roiet	Date/Time 28-May-2012 08:42



Whole Structure Loads 0.0158061kg:1cm 2 LOAD CASE 2: WL



Whole Structure Loads 0.0158061kg:1cm 3 LOAD CASE 3: Temp.

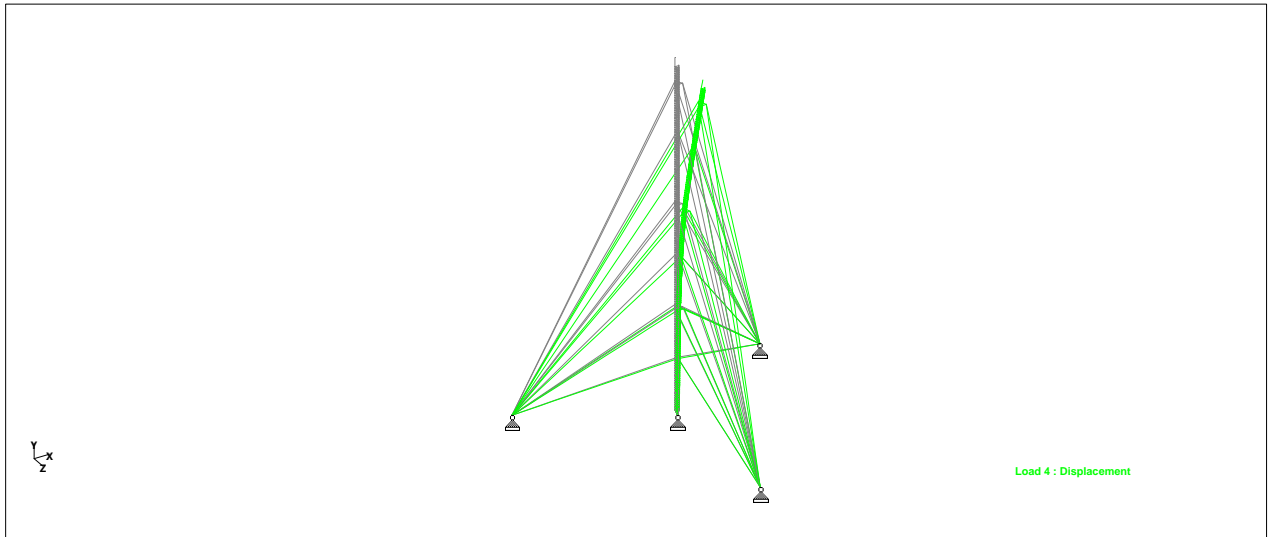


Software licensed to A.SERPUN

Job No	Sheet No 5	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet	Date/Time 28-May-2012 08:42

Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (deg)	rY (deg)	rZ (deg)
Max X	536	3:LOAD CASE	8.40	10.95	-7.62	15.76	-0.148	1.161	-0.110
Min X	527	2:LOAD CASE	-0.47	-9.92	247.92	248.12	0.145	0.115	0.001
Max Y	536	3:LOAD CASE	8.40	10.95	-7.62	15.76	-0.148	1.161	-0.110
Min Y	551	2:LOAD CASE	-0.46	-9.99	254.72	254.92	0.160	0.119	-0.002
Max Z	536	4:COMBINATIC	7.81	-5.72	539.36	539.45	0.842	1.318	-0.111
Min Z	536	3:LOAD CASE	8.40	10.95	-7.62	15.76	-0.148	1.161	-0.110
Max rX	551	4:COMBINATIC	6.77	-5.95	519.90	519.98	0.944	1.122	-0.040
Min rX	536	3:LOAD CASE	8.40	10.95	-7.62	15.76	-0.148	1.161	-0.110
Max rY	527	4:COMBINATIC	5.05	-6.34	478.78	478.84	0.890	2.070	-0.027
Min rY	10	4:COMBINATIC	0.00	0.00	0.00	0.00	0.228	-0.530	-0.064
Max rZ	527	1:LOAD CASE	-0.14	-6.66	234.13	234.23	0.802	0.037	0.002
Min rZ	536	4:COMBINATIC	7.81	-5.72	539.36	539.45	0.842	1.318	-0.111
Max Rst	536	4:COMBINATIC	7.81	-5.72	539.36	539.45	0.842	1.318	-0.111



Whole Structure Displacements 0.7mm:1cm 4 COMBINATION LOAD CASE 4: DL+WL+Temp



Software licensed to A.SERMPUN

Job No	Sheet No 6	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet.	Date/Time 28-May-2012 08:42

Beam Maximum Axial Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (cm)	L/C		d (cm)	Max Fx (kg)
34	17	66.00	1:LOAD CASE	Max -ve		
				Max +ve	0.00	-321.76
			2:LOAD CASE	Max -ve		
				Max +ve	0.00	-416.35
			3:LOAD CASE	Max -ve		
				Max +ve	0.00	-398.66
			4:COMBINATIC	Max -ve		
				Max +ve	0.00	-1136.77
35	18	66.30	1:LOAD CASE	Max -ve		
				Max +ve	0.00	-326.08
			2:LOAD CASE	Max -ve		
				Max +ve	0.00	-454.36
			3:LOAD CASE	Max -ve		
				Max +ve	0.00	-371.59
			4:COMBINATIC	Max -ve		
				Max +ve	0.00	-1152.03
107	41	44.38	1:LOAD CASE	Max -ve	44.38	352.10
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	459.78
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	219.96
				Max +ve		
			4:COMBINATIC	Max -ve	44.38	1031.84
				Max +ve		
112	43	44.37	1:LOAD CASE	Max -ve	44.37	366.02
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	489.38
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	212.54
				Max +ve		
			4:COMBINATIC	Max -ve	44.37	1067.94
				Max +ve		
846	322	10.00	1:LOAD CASE	Max -ve	0.00	5279.06
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	5145.68
				Max +ve		
			3:LOAD CASE	Max -ve		
				Max +ve	0.00	-42.00
			4:COMBINATIC	Max -ve	0.00	10.4E+3
				Max +ve		
876	337	40.00	1:LOAD CASE	Max -ve	0.00	5156.94
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	4660.54
				Max +ve		
			3:LOAD CASE	Max -ve		
				Max +ve	0.00	-146.36
			4:COMBINATIC	Max -ve	0.00	9671.12
				Max +ve		



Software licensed to A.SERPUN

Job No	Sheet No 7	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet.	Date/Time 28-May-2012 08:42

Beam Maximum Axial Forces Cont...

Beam	Node A	Length (cm)	L/C		d (cm)	Max Fx (kg)
882	340	40.00	1:LOAD CASE	Max -ve	0.00	5205.93
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	4842.83
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	-167.05
				Max +ve		
4:COMBINATIC	Max -ve	0.00	9881.71			
	Max +ve					
888	343	40.00	1:LOAD CASE	Max -ve	0.00	5282.76
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	5145.68
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	-42.00
				Max +ve		
4:COMBINATIC	Max -ve	0.00	10.4E+3			
	Max +ve					
915	319	10.00	1:LOAD CASE	Max -ve	0.00	5409.16
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	5006.83
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	-265.12
				Max +ve		
4:COMBINATIC	Max -ve	0.00	10.2E+3			
	Max +ve					
1429	539	66.00	1:LOAD CASE	Max -ve	0.00	488.93
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	303.71
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	178.08
				Max +ve		
4:COMBINATIC	Max -ve	0.00	970.72			
	Max +ve					
1548	584	6301.45	1:LOAD CASE	Max -ve	0.00	-885.85
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	-943.78
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	0.00
				Max +ve		
4:COMBINATIC	Max -ve	0.00	-1829.63			
	Max +ve					
1549	582	6301.31	1:LOAD CASE	Max -ve	0.00	-1094.69
				Max +ve		
			2:LOAD CASE	Max -ve	0.00	-898.26
				Max +ve		
			3:LOAD CASE	Max -ve	0.00	0.00
				Max +ve		
4:COMBINATIC	Max -ve	0.00	-1992.95			
	Max +ve					
1550	582	6301.31	1:LOAD CASE	Max -ve		

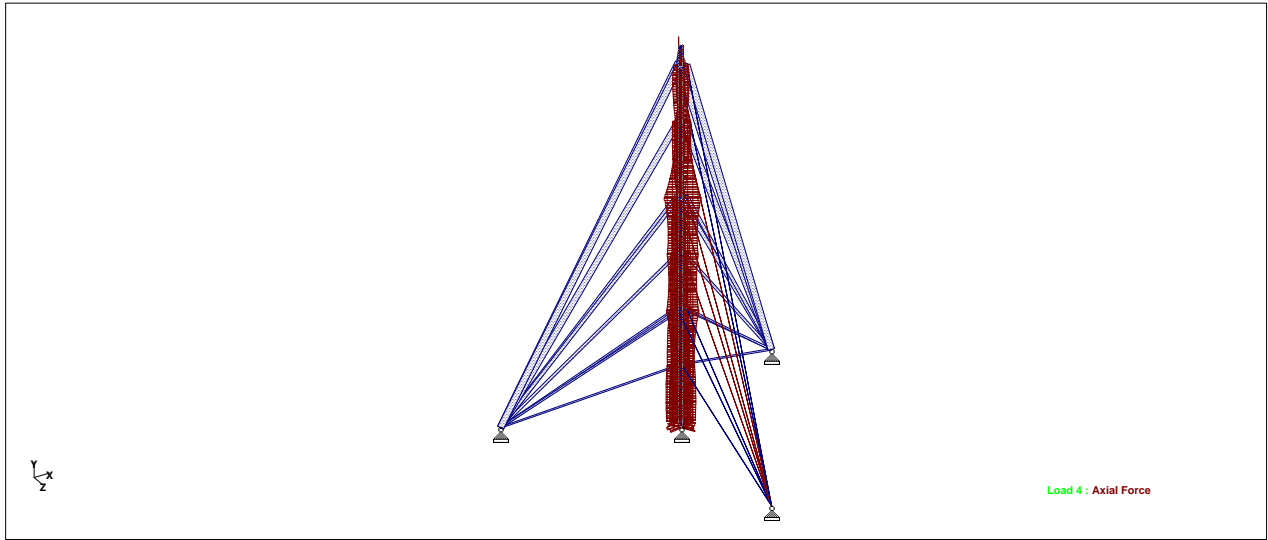


Software licensed to A.SERPUN

Job No	Sheet No 8	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet	Date/Time 28-May-2012 08:42

Beam Maximum Axial Forces Cont...

Beam	Node A	Length (cm)	L/C		d (cm)	Max Fx (kg)
				Max +ve	0.00	-1085.98
			2:LOAD CASE	Max -ve		
				Max +ve	0.00	-871.40
			3:LOAD CASE	Max -ve	0.00	0.00
				Max +ve	0.00	0.00
			4:COMBINATIC	Max -ve		
				Max +ve	0.00	-1957.38
1551	583	6301.45	1:LOAD CASE	Max -ve		
				Max +ve	0.00	-892.72
			2:LOAD CASE	Max -ve		
				Max +ve	0.00	-967.40
			3:LOAD CASE	Max -ve		
				Max +ve	0.00	-15.13
			4:COMBINATIC	Max -ve		
				Max +ve	0.00	-1875.25



Whole Structure Fx 40.7886kg:1cm 4 COMBINATION LOAD CASE 4: DL+WL+Temp

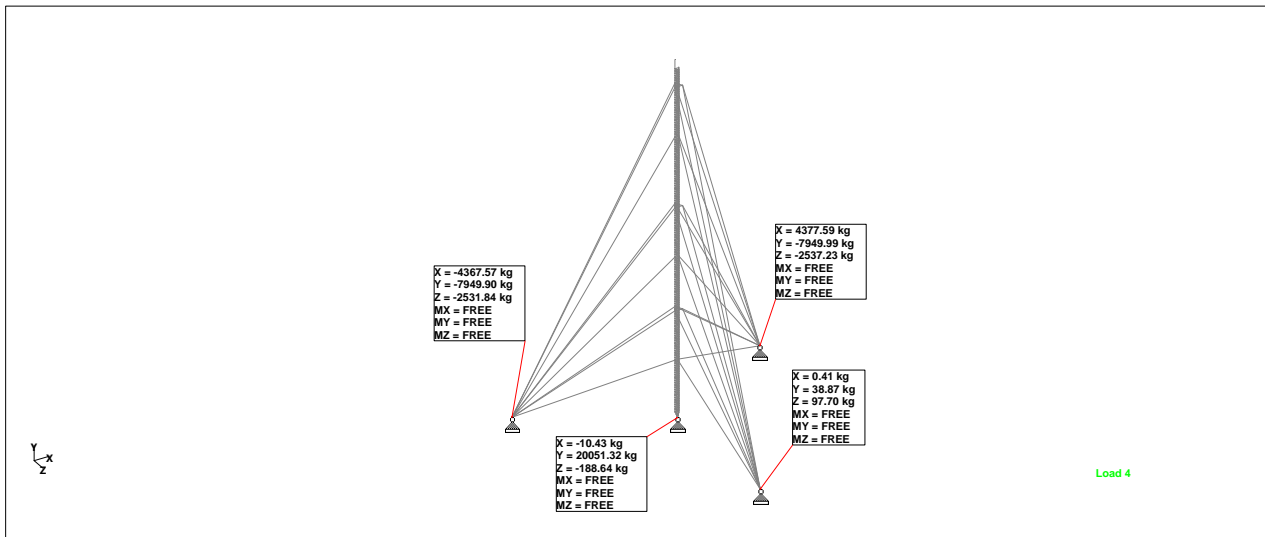


Software licensed to A.SERMPUN

Job No	Sheet No 9	Rev
Part		
Ref		
By	Date 19-May-12	Chd
Client	File Antenna Towers 61-Roiet.	Date/Time 28-May-2012 08:42

Reaction Summary

	Node	L/C	Horizontal	Vertical	Horizontal	Moment		
			FX (kg)	FY (kg)	FZ (kg)	MX (kg·m)	MY (kg·m)	MZ (kg·m)
Max FX	561	4:COMBINATIC	4377.59	-7949.99	-2537.23	0.00	0.00	0.00
Min FX	560	4:COMBINATIC	-4367.57	-7949.90	-2531.84	0.00	0.00	0.00
Max FY	10	4:COMBINATIC	-10.43	20.1E+3	-188.64	0.00	0.00	0.00
Min FY	561	4:COMBINATIC	4377.59	-7949.99	-2537.23	0.00	0.00	0.00
Max FZ	562	4:COMBINATIC	0.41	38.87	97.70	0.00	0.00	0.00
Min FZ	561	4:COMBINATIC	4377.59	-7949.99	-2537.23	0.00	0.00	0.00
Max MX	10	1:LOAD CASE	-0.52	8858.59	-7.60	0.00	0.00	0.00
Min MX	10	1:LOAD CASE	-0.52	8858.59	-7.60	0.00	0.00	0.00
Max MY	10	1:LOAD CASE	-0.52	8858.59	-7.60	0.00	0.00	0.00
Min MY	10	1:LOAD CASE	-0.52	8858.59	-7.60	0.00	0.00	0.00
Max MZ	10	1:LOAD CASE	-0.52	8858.59	-7.60	0.00	0.00	0.00
Min MZ	10	1:LOAD CASE	-0.52	8858.59	-7.60	0.00	0.00	0.00



Whole Structure



NeoSteelDesign v.5

Project : Antenna Tower 61 m.

Engineer : นายเสริมพันธ์ เอี่ยมจระ1

Location : ต.คูกาสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด

Date : 21-พ.ค.-2555

Owner : นายวีระพงษ์ พลอาสา

Time : 9:55:05 AM

Design For Axially Tension Members : Bracing (Diagonal&Horizontal)

[I.Data For Design]

1.1.Type Of Joints	1	Welding
1.2.Use Strength Of Welding $0.4 \cdot f_y$		
1.3.Size Of Welding	4.00	mm.
1.4.Length Of Member	0.72	m.
1.5.Design Load	1,152	kg.
1.6.Use Value Of k	1	(Normal = 1)

[II.Properties Of Steel For Design]

2.1.Use Steel Grade	Fe-24
2.2.Modulus Of Elastic.	2,040,000 ksc.
2.3.Yield Strength	2,400 ksc.
2.4.Ultimate Strength	4,100 ksc.
2.5.All. Tensile Stress	1,200 ksc.
2.6.Use Allowable KL/r	240 For Main.

[III.Result Of Calculate]

3.1.Req. Min. Area(A_g)	0.96	cm. ²
3.2.Req. Min. Area(A_n)	0.56	cm. ²
3.3.Req. Min. Area(A_e)	1*[0.56]	cm. ²
3.4.Required r_{min} .	0.24	cm.

[IV.Select Type & Section Of Steel]

4.1.Type Of Section	1	RB
4.2.Trial Section No.	4	O
4.3.Size Of Diameter	19.00	mm.
4.4.Thick. Web(t, t_w)		mm.
4.5.Thick. Flange(t_f)		mm.
4.6.Section Area(A_s)	2.84	cm. ²
4.7.Weight Of Section	2.22	kg./m.
4.8.Sect. Modulus(S_{x-x})	1.70	cm. ³
4.9.Moment Of In.(I_{x-x})	0.64	cm. ⁴
4.10.Rad. Of Gyr.(r_{min})	0.48	cm.

[V.Recheck Design Section]

5.1.Net Area To Req.		cm. ²
5.2.Status Of Sect. Area	This Section OK.!	
5.3.Load Resist By Sect.	3,408	kg. OK.!
5.4.Safty Load	2.96	times
5.5.Actual Stress	405.63	ksc. OK.!
5.6.Selenderness Ratio	150.00	< 240 OK.!

RB 19 mm.

Select To Use Section : RB 19 mm.



Project : Antenna Tower 61 m. **Engineer** : นายเสริมพันธ์ เอี่ยมจะป
Location : ต.กู่กาสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด **Date** : 21-พ.ค.-2555
Owner : นายวีระพงศ์ พลอาสา **Time** : 9:28:25 AM

Design For Axially Compression Members : Column of Tower

[I.Datas For Design]			[II.Properties Of Steel For Design]		
1.1.Design Load(P)	10,386	kg.	2.1.Use Steel Grade	Fe-30	
1.2.Length(L _{x-x})	0.40	m.	2.2.Modulus Of Elastic.	2,040,000	ksc.
1.3.Length(L _{y-y})	0.40	m.	2.3.Yield Strength	3,000	ksc.
1.4.Max. Length	0.40	m.	2.4.Ultimate Strength	5,000	ksc.
1.5.Min. Value Of k	0.65	[fixed-fixed]	2.5.All. Comp. Stress	1,800	ksc.
1.6.Use Value Of k	1.00		2.6.Use Allowable KL/r	200	For Main.
[III.Result Of Calculate]			[IV.Select Type & Section Of Steel]		
3.1.Req. Min. Area	5.77	cm. ²	4.1.Type Of Section	1	Pipe
3.2.Value Of (λ) _c	115.86	****	4.2.Trial Section No.	12	O
3.3.Value Of (λ) _(KL/r)	20.00	OK.!	4.3.Size Of Diameter	60.50	mm.
3.5.Allowable Compressive Stress : F _a			4.4.Thick. Web(t, tw)	4.00	mm.
1.)Inelastic Range : λ _(kl / r) < λ _c			4.5.Thick. Flange(tf)	4.00	mm.
F _{ai} = 1,707.52	ksc.		4.6.Section Area(As)	7.10	cm.2
2.)Elastic Range : λ _(kl / r) > λ _c			4.7.Weight Of Section	5.57	kg./m.
F _{ae} = 0.00	ksc.		4.8.Sect. Modulus(Sx-x)	9.41	cm.3
<<--- Member Will To Fail By Yield --->>			4.9.Moment Of In.(Ix-x)	28.50	cm.4
<u>O - 60.5*4 mm.(น้ำหนัก = 5.57 kg./m.)</u>			4.10.Rad. Of Gyr.(rmin.)	2.00	cm.
[V.Recheck Design Section]					
5.1.Status Of Sect. Area	: This Section OK.!		5.4.Actual Stress	1,462.88	ksc. OK.!
5.2.Load Resist By Sect.	12,123	kg. OK.!	5.5.Slenderness Ratio	20.00	< 200 OK.!
5.3.Safy Load	1.17	times	<u>O - 60.5*4 mm.(น้ำหนัก = 5.57 kg./m.)</u>		
Select To Use Section : O - 60.5*4 mm.(น้ำหนัก = 5.57 kg./m.)					

Guyed Master Tower Design : 61 m.

[TIA/EIA-222 STANDARD]

Location	ต.ภูเก้าสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด	Owner	นายวีระพงศ์ พลอาสา
Engineer	นายเสริมพันธ์ เอี่ยมจะบก	Date	21 พฤษภาคม 2555

6

Bracing Member

Yield Strength (Es = 2040,000 ksc.)	=	2,400.00	ksc.
Allowable Stress	=	1,200.00	ksc.
Design Force	=	1,152.00	kg.
Length	=	0.72	m.
Use		RB 19	mm.
Area	=	2.84	cm. ²
r	=	0.48	cm.
L/r	=	151.58	
Cc	=	129.58	
fa	=	457.57	ksc.
Ft	=	3,403.71	kg.
Fc	=	1,297.86	kg.
FS. Ft	=	2.95	
FS. Fc	=	1.13	

Guy Wire

Size		∅	3/8	inch.
Breaking Strength	=		6,000.00	kg.
Tension Force	=		1,993.00	kg.
FS.	=		3.01	

Anchor Bolt

Yield Strength	=	2,400.00	ksc.	
Allowable Tension Stress	=	1,200.00	ksc.	
Allowable Shear Stress	=	960.00	ksc.	
Design Tension Force	=	7,949.99	kg.	
Design Shear Force	=	4,377.59	kg.	
Use Bolt				
Size		∅	20.00	cm.
Area/Bolt	=		3.14	cm. ²
Tension Force/Bolt	=		3,771.43	kg.
Shear Force/Bolt	=		3,017.14	kg.
Number	=		3	Bolts
Use	=		6-Dia. 20 mm. (L = 1 m.)	

[Project] Antenna Tower 61 m.

[Building] เสาส่งสัญญาณ

[Engineer] นายเสริมพันธ์ เอี่ยมจวบก

[Location] ต.ภูเก้าสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด

[Date] 21-May-2555

DESIGN RC. COLUMN

[I.Data For Design]

[II.Results of Design Section&Reinf.]

Type of Column	Short Column		2.1.Value of m		10.08
1.1.Reduction Factor	1.000	kh/r =16.7	2.2.Value of I_{x-x}		1,447,592 cm. ⁴
1.2.Shape of Column	1	จตุรัส	2.3.Value of I_{y-y}		1,447,592 cm. ⁴
1.3.High of Column	3.00	m.	2.4.Value of cx		30.00 cm.
1.4.Req. bx ≥	20.00	cm.	2.5.Value of cy		30.00 cm.
1.5.Req. ty ≥	20.00	cm.	2.6.Value of fa		5.57 kg./cm. ²
1.6.Design Wide(bx)	60.00	cm.	2.7.Value of fbx		kg./cm. ²
1.7.Design Depth(ty)	60.00	cm.	2.8.Value of fby		kg./cm. ²
1.8.Dia. of drain Pipe		cm. OK.!	2.9.Value of Fa		131.07 kg./cm. ²
1.9.Vertical Load(P_z)	20,051	kg.	2.10.Value of Fb		157.50 kg./cm. ²
1.10.Horiz. Load(P_y)	188.64	kg.	2.11.Value of Pa		304,680 kg.
1.11.Moment(M_{x-x})		kg.-m.	2.12.Value of Pbx		174,827 kg.
1.12.Moment(M_{y-y})		kg.-m.	2.13.Value of Pby		174,827 kg.
1.13.Design Ratio(p_g)	1.01	% OK.!	2.14.Value of Po		471,847 kg.
	18 - DB	16 mm.	2.15.Value of $M_{b_{x-x}}$		23,920 kg.-m.
1.14.Design Stirrup Dia	9	mm.	2.16.Value of $M_{b_{y-y}}$		23,920 kg.-m.
	3 - RB 9 mm. @	26 cm.	2.17.Value of $M_{o_{x-x}}$		7,169 kg.-m.
	---[e<ea:Compression zone 1]---		2.18.Value of $M_{o_{y-y}}$		7,169 kg.-m.

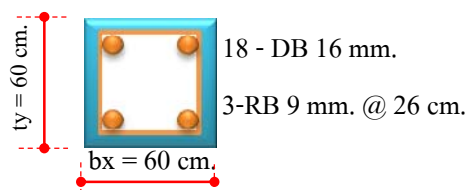
Status of Design Section & Reinforcement

$$(f_a/F_a)+(f_{bx}/F_b)+(f_{by}/F_b) = 0.04 \leq 1.00 \text{ OK.!$$

$$(M_x/M_{ox})+(M_y/M_{oy}) = \leq 1.00 \text{ OK.!$$

This Design Section Is Safty

Pillar



[Project] Antenna Tower 61 m.

[Building] เสาส่งสัญญาณ

[Engineer] นายเสริมพันธ์ เอี่ยมจะบก

[Location] ต.ภูเกาสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด

[Date] 21-May-2555

DESIGN SPREAD FOOTING

[I.Data For Design]

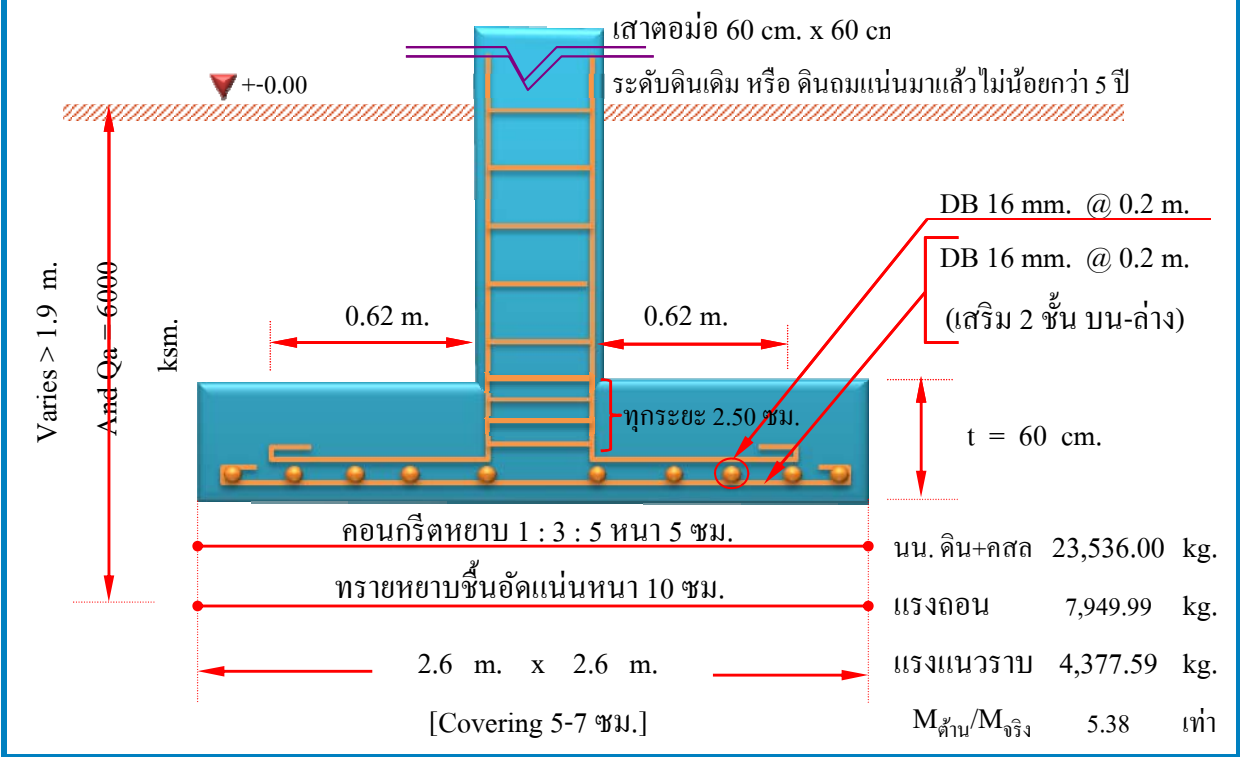
[II.Results of Design]

Design For Footing No. :	Anchor Base	2.1.Factor of Shape	1.00	[]
1.1.Shape of Found.	1 จตุรัส	2.2.Contact Factor	18.78	(A _F /A _P)
1.2.Shape of Pillar	1 เสาเหลี่ยม	2.3.All.Contact Stress	416.50	kg./cm. ²
1.3.Pillar Wide(bz)	60.00 cm.	2.4.Col.Contact Stress	2.21	kg./cm. ²
1.4.Pillar Long(tx)	60.00 cm.	2.5.Kern Limit(e _x)	e <= Lx/6	OK.!
1.5.Depth of Found.	1.90 m.	2.6.Kern Limit(e _z)	e <= Bz/6	OK.!
1.6.Vertical Load(Py)	7,950 kg.	2.7.Recheck A _{req.}	----	[OK. !]----
1.7.Horiz. Load(Px)	4,377.59 kg.	2.8.Weight of Found.	9,734.40	kg./A _F
1.8.Horiz. Load(Pz)	2,537.23 kg.	2.9.Recheck q _a	2,616.03	kg./m. ²
1.9.Moment(M _{x-x})	kg.-m.	2.10.P _{min.} Long Direct.	2,616.03	kg./m. ²
1.10.Moment(M _{z-z})	kg.-m.	2.11.P _{max.} Long Direct.	2,616.03	kg./m. ²
1.11.All. Soil Bearing	6,000 kg./m. ²	2.12.P _{max} At $\frac{(Ly + ty)}{2}$	2,616.03	kg./m. ²
1.12 Req. Min. Area	1.46 m. ²	2.13.P _{max} At $\frac{d}{2}$	2,616.03	kg./m. ²
1.13.Design Long(Lx)	2.60 m. OK.!	2.14.P _{max} At d	2,616.03	kg./m. ²
1.14.Design Short(Bz)	2.60 m. OK.!	2.15.M _{max} At $\frac{(Ly + ty)}{2}$	3,400.84	kg.-m.
1.15 Req. Min. Thick.	20.00 cm.	2.16.V _{max} At $\frac{(Ly + ty)}{2}$	6,801.69	kg.
1.16.Design Thickness	60.00 cm.	2.17.v _a At $\frac{d}{2}$	0.52	kg./cm. ²
1.17.Ratio of [Bz/Lx] ≥	0.75 Is: 1 OK.!	2.18.v _a At d	0.20	kg./cm. ²

[III.Design Reinforcement]

3.1.Required Min. A _{sa} of Dowels For Anchor to Column	18.00	cm. ² (Min=0.005*A _p)	
3.2.Required Min. Embedment Length L _d For Compression Bars	62.00	cm.	
3.3.Design Dowel Bars(Min. 4 - DB 12 mm.)	18 - DB	16 mm. OK.!	
3.4 Req. Main Steel	2.48 cm. ² /B _x	3.5 Req. Second Steel	2.48 cm. ² /L _y
3.6.Design Main Steel(Bott. Steel)	DB 16 mm @	0.20	m. OK.!
3.7.Design Main Steel(Top Steel)	DB 16 mm @	0.20	m. OK.!

Anchor Base



[Project] Antenna Tower 61 m.

[Building] เสาส่งสัญญาณ

[Engineer] นายเสริมพันธ์ เอี่ยมจะบก

[Location] ต.ภูเก้าสิงห์ อ.เกษตรวิสัย จ.ร้อยเอ็ด

[Date] 21-May-2555

DESIGN SPREAD FOOTING

[I.Data For Design]

[II.Results of Design]

Design For Footing No. :	Tower Base	2.1.Factor of Shape	1.00	[]
1.1.Shape of Found.	1 จตุรัส	2.2.Contact Factor	18.78	(A _F /A _P)
1.2.Shape of Pillar	1 เสาเหลี่ยม	2.3.All.Contact Stress	416.50	kg./cm. ²
1.3.Pillar Wide(bz)	60.00 cm.	2.4.Col.Contact Stress	5.57	kg./cm. ²
1.4.Pillar Long(tx)	60.00 cm.	2.5.Kern Limit(e _x)	e <= Lx/6	OK.!
1.5.Depth of Found.	1.50 m.	2.6.Kern Limit(e _z)	e <= Bz/6	OK.!
1.6.Vertical Load(Py)	20,051 kg.	2.7.Recheck A _{req.}	----[OK.!]----	
1.7.Horiz. Load(Px)	10.43 kg.	2.8.Weight of Found.	9,734.40	kg./A _F
1.8.Horiz. Load(Pz)	188.64 kg.	2.9.Recheck q _a	4,406.17	kg./m. ²
1.9.Moment(M _{x-x})	kg.-m.	2.10.P _{min.} Long Direct.	4,406.17	kg./m. ²
1.10.Moment(M _{z-z})	kg.-m.	2.11.P _{max.} Long Direct.	4,406.17	kg./m. ²
1.11.All. Soil Bearing	6,000 kg./m. ²	2.12.P _{max} At $\frac{(Ly + ty)}{2}$	4,406.17	kg./m. ²
1.12 Req. Min. Area	3.68 m. ²	2.13.P _{max} At $\frac{d}{2}$	4,406.17	kg./m. ²
1.13.Design Long(Lx)	2.60 m. OK.!	2.14.P _{max} At d	4,406.17	kg./m. ²
1.14.Design Short(Bz)	2.60 m. OK.!	2.15.M _{max} At $\frac{(Ly + ty)}{2}$	5,728.02	kg.-m.
1.15 Req. Min. Thick.	22.58 cm.	2.16.V _{max} At $\frac{(Ly + ty)}{2}$	11,456.05	kg.
1.16.Design Thickness	60.00 cm.	2.17.v _a At $\frac{d}{2}$	0.87	kg./cm. ²
1.17.Ratio of [Bz/Lx] ≥	0.75 Is: 1 OK.!	2.18.v _a At d	0.33	kg./cm. ²

[III.Design Reinforcement]

3.1.Required Min. A _{sa} of Dowels For Anchor to Column	18.00	cm. ² (Min=0.005*A _p)	
3.2.Required Min. Embedment Length L _d For Compression Bars	62.00	cm.	
3.3.Design Dowel Bars(Min. 4 - DB 12 mm.)	18 - DB	16 mm. OK.!	
3.4 Req. Main Steel	4.18 cm. ² /B _x	3.5 Req. Second Steel	4.18 cm. ² /L _y
3.6.Design Main Steel(Bott. Steel)	DB 16 mm @	0.20	m. OK.!
3.7.Design Main Steel(Top Steel)	DB 16 mm @	0.20	m. OK.!

Tower Base

