

ASMTower 2018.4

Job No. 40m Guyed Pole  
Client OG  
Project GSM Network

Rev. No. A  
Date 5/11/2017  
Designed by M.Joe  
Checked by A.S.M

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## Structure Design For 40m Guyed Pole

**Client: OG**  
**Project: GSM Network**

A	5/11/2017	First issue	M.Joe	A.S.M
<b>Rev.</b>	<b>Date</b>	<b>Description</b>	<b>Designed by</b>	<b>Reviewed by</b>

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## Design Basics

The design is according to ANSI/TIA-222-G-2, the following is the main design parameters:

- Basic wind speed is 36.11 m/s.
- Service wind speed is 25 m/s.
- Exposure category is C.
- Structure class is II.
- Topographic category is 1.
- Elevation at bottom of tower is 0 m.
- Wind directions applied on tower in the analysis are generated automatically.
- Wind directions applied on tower in the analysis are 0, 45, 90, 135, 180, 225, 270, 315 Deg.
- Wind load on each panel antenna are based on actual direction.
- Wind load on each microwave are based on actual direction.

## Executive Summary

*The structure is Safe with maximum members rating are as following:*

- Pole parts rating is 0.32
- Guy wires rating is 0.55
- Base connection rating is 0.86

## Antenna Loading Configuration

The tower is designed to carry the following:

ID	Antenna Name	Elev. m	Qty.	Type	Width mm	Thick. mm	Height mm	Mount Name
1	Quad Band Antenna	42	1	Flat	548	135	2555	Mount 76x3000
2	Quad Band Antenna	42	1	Flat	548	135	2555	Mount 76x3000
3	Quad Band Antenna	42	1	Flat	548	135	2555	Mount 76x3000

Microwave antennas

ID	MW Name	Elev. m	Qty.	Type	Diameter mm	Mount Name
1	HP 2.4m	40	1	HP	2400	Mount 114x1500
2	HP 1.2m	44	1	HP	1200	Mount 114x1500

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**Pole Parts Geometry**

Part No.	Bottom Elev. m	Top Elev. m	Length m	Bottom Diam. mm	Top Diam. mm	Thick. mm	No. Of Sides	Bottom Overlap m	Material Name	Weight kg
6	40	45	5	250	250	10	ROUND	0	A36	301.8
5	36	40	4	250	250	10	ROUND	0	A36	241.4
4	27	36	9	250	250	10	ROUND	0	A36	543.2
3	18	27	9	250	250	10	ROUND	0	A36	543.2
2	9	18	9	250	250	10	ROUND	0	A36	543.2
1	0	9	9	250	250	10	ROUND	0	A36	543.2
Total										2716

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 0**Gust effect factor  $G_h = 0.85$ Direction probability  $K_d = 0.85$ Important factor  $I = 1$ **Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	$D_{av}$ m	Area $m^2$	$t_{iz}$ mm	$R_a$	C	$C_f$	EPA $m^2$	$q_z$ $N/m^2$	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	1.07	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	1.07	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	1.07	10.27	1.2	1.35	878.8	1.01
4	2	29.25	4.5	0.25	1.125	0	1.07	10.11	1.2	1.35	852.7	0.98
	1	24.75	4.5	0.25	1.125	0	1.07	9.94	1.2	1.35	823.2	0.94
5	2	20.25	4.5	0.25	1.125	0	1.07	9.73	1.2	1.35	789.2	0.91
	1	15.75	4.5	0.25	1.125	0	1.07	9.48	1.2	1.35	748.5	0.86
6	2	11.25	4.5	0.25	1.125	0	1.07	9.15	1.2	1.35	697.3	0.8
	1	6.75	4.5	0.25	1.125	0	1.07	8.67	1.2	1.35	626.2	0.72
	2	2.25	4.5	0.25	1.125	0	1.07	8.32	1.2	1.35	577.5	0.66
	Total										13.05	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	$K_a$	EPA <sub>n</sub> $m^2$	EPA <sub>t</sub> $m^2$	EPA <sub>a</sub> $m^2$	$t_{iz}$ mm	$q_z$ $N/m^2$	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.804	0	915.5	0	0.63
2	36 To 40	38	1	1.608	0.456	1.608	0	901	0	1.23
3	31.5 To 36	33.75	1	1.809	0.513	1.809	0	878.8	0	1.35
4	27 To 31.5	29.25	1	1.809	0.513	1.809	0	852.7	0	1.31
5	22.5 To 27	24.75	1	1.809	0.513	1.809	0	823.2	0	1.27

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	1.809	0	789.2	0	1.21	
7	13.5 To 18	15.75	1	1.809	0.513	1.809	0	748.5	0	1.15	
8	9 To 13.5	11.25	1	1.809	0.513	1.809	0	697.3	0	1.07	
9	4.5 To 9	6.75	1	1.809	0.513	1.809	0	626.2	0	0.96	
10	0 To 4.5	2.25	1	1.809	0.513	1.809	0	577.5	0	0.89	
Total							16.884	---	---	---	11.07

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	-0.63	0	0	0	25.65	0
2	38	-1.23	0	0	0	46.8	0
3	33.75	-1.35	0	0	0	45.61	0
4	29.25	-1.31	0	0	0	38.35	0
5	24.75	-1.27	0	0	0	31.33	0
6	20.25	-1.21	0	0	0	24.57	0
7	15.75	-1.15	0	0	0	18.13	0
8	11.25	-1.07	0	0	0	12.06	0
9	6.75	-0.96	0	0	0	6.5	0
10	2.25	-0.89	0	0	0	2	0
Total		-11.07	0	0	0	251	0

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	1.516	0	920.2	30	1.19	
2	42	42	1	1.815	0.62	1.516	0	920.2	150	1.19	
3	42	42	1	1.815	0.62	0.62	0	920.2	90	0.48	
Total							3.652	---	---	---	2.86

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-1.19	0	0	0	49.8	-0.35
2	42	-1.19	0	0	0	49.8	-0.35
3	42	-0.48	0	0	0	20.37	0.29
Total		-2.86	0	0	0	119.98	-0.42

### Wind forces from mounts of panel antenna

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.115	0	920.2	30	0.09
2	42	42	1	0.034	0.358	0.115	0	920.2	150	0.09
3	42	42	1	0.034	0.358	0.358	0	920.2	90	0.28
Total						0.587	---	---	---	0.46

**Wind vector from mounts of panel antenna**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.09	0	0	0	3.77	-0.02
2	42	-0.09	0	0	0	3.77	-0.02
3	42	-0.28	0	0	0	11.74	0.11
Total		-0.46	0	0	0	19.28	0.07

**Wind forces from MW dishes**

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	330	1.21	-0.23	0.05	4.24	-0.82	0.44
2	44	44	1200	1.131	0	929.3	210	-0.96	-0.18	-0.06	-0.85	-0.16	-0.07

**Wind vectors from MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-4.08	0	-1.41	0	0.44	0	-56.38	163.33	0.01
2	44	-0.82	0	0.29	0	-0.07	0	12.82	36.03	-0.15
Total		-4.9	0	-1.12	---	---	---	-43.56	199.36	-0.14

**Wind forces from mounts Of MW dishes**

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.059	0	910.8	30	0.05
2	44	44	1	0.034	0.234	0.084	0	929.3	150	0.07
Total						0.143	---	---	---	0.11

**Wind vectors from mounts Of MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-0.05	0	0	0	1.82	-0.01

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	-0.07	0	0	0	2.92	-0.01
Total		-0.11	0	0	0	4.74	-0.02

## Wind forces from guy wires

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	145.92	577.5	0.03
2	9	4.5	8	1.2	17.493	77.18	577.5	0.08
3	9	4.5	8	1.2	17.493	34.08	577.5	0.03
4	9	4.5	8	1.2	17.493	102.82	577.5	0.08
5	18	9	8	1.2	23.431	128.2	665.3	0.08
6	18	9	8	1.2	23.431	80.46	665.3	0.12
7	18	9	8	1.2	23.431	51.8	665.3	0.08
8	18	9	8	1.2	23.431	99.54	665.3	0.12
9	27	13.5	8	1.2	30.887	117.98	724.6	0.14
10	27	13.5	8	1.2	30.887	82.78	724.6	0.18
11	27	13.5	8	1.2	30.887	62.02	724.6	0.14
12	27	13.5	8	1.2	30.887	97.22	724.6	0.18
13	36	18	16	1.2	39	111.81	769.9	0.42
14	36	18	16	1.2	39	84.29	769.9	0.49
15	36	18	16	1.2	39	68.19	769.9	0.42
16	36	18	16	1.2	39	95.71	769.9	0.49
17	40	20	20	1.2	42.72	109.83	787.1	0.61
18	40	20	20	1.2	42.72	84.79	787.1	0.68
19	40	20	20	1.2	42.72	70.17	787.1	0.61
20	40	20	20	1.2	42.72	95.21	787.1	0.68

## Wind vector from guy wires

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.01	-0.02	0.01	0.08	-0.08	-0.09
2	9	4.5	-0.08	0.01	-0.01	-0.13	0.33	-0.58
3	9	4.5	-0.01	0.02	0.01	0.08	-0.08	0.09
4	9	4.5	-0.08	-0.01	-0.01	-0.13	0.33	0.58
5	18	9	-0.06	-0.05	0.01	0.18	0.21	-0.19
6	18	9	-0.12	0.02	-0.01	-0.23	1.07	-0.91
7	18	9	-0.06	0.05	0.01	0.18	0.21	0.19
8	18	9	-0.12	-0.02	-0.01	-0.23	1.07	0.91
9	27	13.5	-0.13	-0.07	0.01	0.26	1.22	-0.31
10	27	13.5	-0.18	0.02	-0.01	-0.29	2.37	-1.31
11	27	13.5	-0.13	0.07	0.01	0.26	1.22	0.31

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.18	-0.02	-0.01	-0.29	2.37	1.31
13	36	18	-0.39	-0.16	0.02	0.61	5.93	-0.88
14	36	18	-0.48	0.04	-0.02	-0.65	8.6	-3.53
15	36	18	-0.39	0.16	0.02	0.61	5.93	0.88
16	36	18	-0.48	-0.04	-0.02	-0.65	8.6	3.53
17	40	20	-0.57	-0.2	0.02	0.8	9.94	-1.25
18	40	20	-0.68	0.06	-0.02	-0.84	13.44	-4.95
19	40	20	-0.57	0.2	0.02	0.8	9.94	1.25
20	40	20	-0.68	-0.06	-0.02	-0.84	13.44	4.95
Total			-5.4	0	-0.02	-0.45	86.04	0

### Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 45

Gust effect factor  $G_h = 0.85$ Direction probability  $K_d = 0.85$ Important factor  $I = 1$ 

### Wind forces on pole parts

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.97	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	0.97	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	0.97	10.27	1.2	1.35	878.8	1.01
3	2	29.25	4.5	0.25	1.125	0	0.97	10.11	1.2	1.35	852.7	0.98
	4	24.75	4.5	0.25	1.125	0	0.97	9.94	1.2	1.35	823.2	0.94
4	2	20.25	4.5	0.25	1.125	0	0.97	9.73	1.2	1.35	789.2	0.91
	5	15.75	4.5	0.25	1.125	0	0.97	9.48	1.2	1.35	748.5	0.86
5	2	11.25	4.5	0.25	1.125	0	0.97	9.15	1.2	1.35	697.3	0.8
	6	6.75	4.5	0.25	1.125	0	0.97	8.67	1.2	1.35	626.2	0.72
6	2	2.25	4.5	0.25	1.125	0	0.97	8.32	1.2	1.35	577.5	0.66
	Total										13.05	---

### Wind forces from transmission line clusters

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.516	0	915.5	45	0.4
2	36 To 40	38	1	1.608	0.456	1.032	0	901	45	0.79
3	31.5 To 36	33.75	1	1.809	0.513	1.161	0	878.8	45	0.87
4	27 To 31.5	29.25	1	1.809	0.513	1.161	0	852.7	45	0.84
5	22.5 To 27	24.75	1	1.809	0.513	1.161	0	823.2	45	0.81

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	1.161	0	789.2	45	0.78	
7	13.5 To 18	15.75	1	1.809	0.513	1.161	0	748.5	45	0.74	
8	9 To 13.5	11.25	1	1.809	0.513	1.161	0	697.3	45	0.69	
9	4.5 To 9	6.75	1	1.809	0.513	1.161	0	626.2	45	0.62	
10	0 To 4.5	2.25	1	1.809	0.513	1.161	0	577.5	45	0.57	
Total							10.836	---	---	---	7.11

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	-0.28	0	-0.28	-11.64	11.64	0.09
2	38	-0.56	0	-0.56	-21.24	21.24	0.17
3	33.75	-0.61	0	-0.61	-20.7	20.7	0.18
4	29.25	-0.6	0	-0.6	-17.4	17.4	0.18
5	24.75	-0.57	0	-0.57	-14.22	14.22	0.17
6	20.25	-0.55	0	-0.55	-11.15	11.15	0.17
7	15.75	-0.52	0	-0.52	-8.23	8.23	0.16
8	11.25	-0.49	0	-0.49	-5.47	5.47	0.15
9	6.75	-0.44	0	-0.44	-2.95	2.95	0.13
10	2.25	-0.4	0	-0.4	-0.91	0.91	0.12
Total		-5.03	0	-5.03	-113.91	113.91	1.51

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	1.735	0	920.2	15	1.36	
2	42	42	1	1.815	0.62	0.7	0	920.2	105	0.55	
3	42	42	1	1.815	0.62	1.217	0	920.2	135	0.95	
Total							3.652	---	---	---	2.86

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.96	0	-0.96	-40.3	40.3	0.21
2	42	-0.39	0	-0.39	-16.26	16.26	-0.31
3	42	-0.67	0	-0.67	-28.28	28.28	0.4
Total		-2.02	0	-2.02	-84.84	84.84	0.29

### Wind forces from mounts of panel antenna



## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.056	0	920.2	15	0.04
2	42	42	1	0.034	0.358	0.336	0	920.2	105	0.26
3	42	42	1	0.034	0.358	0.196	0	920.2	135	0.15
Total						0.587	---	---	---	0.46

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.03	0	-0.03	-1.29	1.29	0
2	42	-0.19	0	-0.19	-7.8	7.8	-0.1
3	42	-0.11	0	-0.11	-4.55	4.55	0.04
Total		-0.32	0	-0.32	-13.64	13.64	-0.05

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	15	1.26	0.14	-0.04	4.4	0.48	-0.31
2	44	44	1200	1.131	0	929.3	255	-0.44	-0.57	-0.11	-0.39	-0.51	-0.12

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-3.57	0	-2.61	0	-0.31	0	-104.56	142.79	-0.06
2	44	-0.59	0	-0.24	0	-0.12	0	-10.61	26.16	-0.39
Total		-4.16	0	-2.86	---	---	---	-115.16	168.94	-0.44

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.016	0	910.8	15	0.01
2	44	44	1	0.034	0.234	0.22	0	929.3	105	0.17
Total						0.236	---	---	---	0.19

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-0.01	0	-0.01	-0.34	0.34	0

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Rev. No. A

Client OG

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	-0.12	0	-0.12	-5.41	5.41	-0.06
Total		-0.13	0	-0.13	-5.76	5.76	-0.06

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	137.95	577.5	0.04
2	9	4.5	8	1.2	17.493	115.39	577.5	0.07
3	9	4.5	8	1.2	17.493	42.05	577.5	0.04
4	9	4.5	8	1.2	17.493	64.61	577.5	0.07
5	18	9	8	1.2	23.431	123.67	665.3	0.09
6	18	9	8	1.2	23.431	108.67	665.3	0.11
7	18	9	8	1.2	23.431	56.33	665.3	0.09
8	18	9	8	1.2	23.431	71.33	665.3	0.11
9	27	13.5	8	1.2	30.887	114.87	724.6	0.15
10	27	13.5	8	1.2	30.887	104.05	724.6	0.17
11	27	13.5	8	1.2	30.887	65.13	724.6	0.15
12	27	13.5	8	1.2	30.887	75.95	724.6	0.17
13	36	18	16	1.2	39	109.46	769.9	0.44
14	36	18	16	1.2	39	101.09	769.9	0.47
15	36	18	16	1.2	39	70.54	769.9	0.44
16	36	18	16	1.2	39	78.91	769.9	0.47
17	40	20	20	1.2	42.72	107.7	787.1	0.62
18	40	20	20	1.2	42.72	100.11	787.1	0.66
19	40	20	20	1.2	42.72	72.3	787.1	0.62
20	40	20	20	1.2	42.72	79.89	787.1	0.66

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.01	-0.02	-0.03	-0.09	-0.13	0.21
2	9	4.5	-0.06	-0.02	-0.03	0	0.3	-0.48
3	9	4.5	-0.01	0.02	-0.03	-0.09	-0.13	-0.21
4	9	4.5	-0.06	0.02	-0.03	0	0.3	0.48
5	18	9	-0.04	-0.05	-0.07	-0.5	0.02	0.4
6	18	9	-0.09	-0.03	-0.06	-0.34	0.88	-0.78
7	18	9	-0.04	0.05	-0.07	-0.5	0.02	-0.4
8	18	9	-0.09	0.03	-0.06	-0.34	0.88	0.78
9	27	13.5	-0.08	-0.06	-0.11	-1.35	0.7	0.62
10	27	13.5	-0.13	-0.04	-0.11	-1.15	1.84	-1.15
11	27	13.5	-0.08	0.06	-0.11	-1.35	0.7	-0.62

## ASMTower 2018.4

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.13	0.04	-0.11	-1.15	1.84	1.15
13	36	18	-0.27	-0.14	-0.31	-5.33	3.82	1.73
14	36	18	-0.35	-0.09	-0.31	-4.88	6.45	-3.12
15	36	18	-0.27	0.14	-0.31	-5.33	3.82	-1.73
16	36	18	-0.35	0.09	-0.31	-4.88	6.45	3.12
17	40	20	-0.39	-0.19	-0.44	-8.52	6.55	2.45
18	40	20	-0.49	-0.11	-0.44	-7.94	9.98	-4.39
19	40	20	-0.39	0.19	-0.44	-8.52	6.55	-2.45
20	40	20	-0.49	0.11	-0.44	-7.94	9.98	4.39
Total			-3.82	0	-3.79	-60.19	60.82	0

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 90**

Gust effect factor	G <sub>n</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.3	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	0.3	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	0.3	10.27	1.2	1.35	878.8	1.01
4	2	29.25	4.5	0.25	1.125	0	0.3	10.11	1.2	1.35	852.7	0.98
	1	24.75	4.5	0.25	1.125	0	0.3	9.94	1.2	1.35	823.2	0.94
5	2	20.25	4.5	0.25	1.125	0	0.3	9.73	1.2	1.35	789.2	0.91
	1	15.75	4.5	0.25	1.125	0	0.3	9.48	1.2	1.35	748.5	0.86
6	2	11.25	4.5	0.25	1.125	0	0.3	9.15	1.2	1.35	697.3	0.8
	1	6.75	4.5	0.25	1.125	0	0.3	8.67	1.2	1.35	626.2	0.72
	2	2.25	4.5	0.25	1.125	0	0.3	8.32	1.2	1.35	577.5	0.66
Total										13.05	---	8.62

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.228	0	915.5	90	0.18
2	36 To 40	38	1	1.608	0.456	0.456	0	901	90	0.35
3	31.5 To 36	33.75	1	1.809	0.513	0.513	0	878.8	90	0.38
4	27 To 31.5	29.25	1	1.809	0.513	0.513	0	852.7	90	0.37
5	22.5 To 27	24.75	1	1.809	0.513	0.513	0	823.2	90	0.36

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.513	0	789.2	90	0.34	
7	13.5 To 18	15.75	1	1.809	0.513	0.513	0	748.5	90	0.33	
8	9 To 13.5	11.25	1	1.809	0.513	0.513	0	697.3	90	0.3	
9	4.5 To 9	6.75	1	1.809	0.513	0.513	0	626.2	90	0.27	
10	0 To 4.5	2.25	1	1.809	0.513	0.513	0	577.5	90	0.25	
Total								4.788	---	---	3.14

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0	0	-0.18	-7.27	0	0.05
2	38	0	0	-0.35	-13.27	0	0.1
3	33.75	0	0	-0.38	-12.93	0	0.11
4	29.25	0	0	-0.37	-10.88	0	0.11
5	24.75	0	0	-0.36	-8.88	0	0.11
6	20.25	0	0	-0.34	-6.97	0	0.1
7	15.75	0	0	-0.33	-5.14	0	0.1
8	11.25	0	0	-0.3	-3.42	0	0.09
9	6.75	0	0	-0.27	-1.84	0	0.08
10	2.25	0	0	-0.25	-0.57	0	0.08
Total		0	0	-3.14	-71.18	0	0.94

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	0.919	0	920.2	60	0.72	
2	42	42	1	1.815	0.62	0.919	0	920.2	60	0.72	
3	42	42	1	1.815	0.62	1.815	0	920.2	180	1.42	
Total								3.652	---	---	2.86

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	-0.72	-30.18	0	0.37
2	42	0	0	-0.72	-30.18	0	-0.37
3	42	0	0	-1.42	-59.62	0	0
Total		0	0	-2.86	-119.98	0	0

### Wind forces from mounts of panel antenna

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.277	0	920.2	60	0.22
2	42	42	1	0.034	0.358	0.277	0	920.2	60	0.22
3	42	42	1	0.034	0.358	0.034	0	920.2	180	0.03
Total						0.587	---	---	---	0.46

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	-0.22	-9.09	0	0.07
2	42	0	0	-0.22	-9.09	0	-0.07
3	42	0	0	-0.03	-1.11	0	0
Total		0	0	-0.46	-19.28	0	0

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	60	0.95	0.37	-0.01	3.31	1.29	-0.07
2	44	44	1200	1.131	0	929.3	300	0.95	-0.37	0.01	0.84	-0.33	0.01

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-2.22	0	-2.77	0	-0.07	0	-110.76	88.97	0.6
2	44	0.57	0	-0.71	0	0.01	0	-31.08	-24.96	-0.16
Total		-1.66	0	-3.48	---	---	---	-141.84	64	0.44

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.176	0	910.8	60	0.14
2	44	44	1	0.034	0.234	0.184	0	929.3	60	0.15
Total						0.36	---	---	---	0.28

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0	0	-0.14	-5.45	0	0.04

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

ASMTower 2018.4

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0	0	-0.15	-6.39	0	-0.05
Total		0	0	-0.28	-11.84	0	0

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	102.82	577.5	0.08
2	9	4.5	8	1.2	17.493	145.92	577.5	0.03
3	9	4.5	8	1.2	17.493	77.18	577.5	0.08
4	9	4.5	8	1.2	17.493	34.08	577.5	0.03
5	18	9	8	1.2	23.431	99.54	665.3	0.12
6	18	9	8	1.2	23.431	128.2	665.3	0.08
7	18	9	8	1.2	23.431	80.46	665.3	0.12
8	18	9	8	1.2	23.431	51.8	665.3	0.08
9	27	13.5	8	1.2	30.887	97.22	724.6	0.18
10	27	13.5	8	1.2	30.887	117.98	724.6	0.14
11	27	13.5	8	1.2	30.887	82.78	724.6	0.18
12	27	13.5	8	1.2	30.887	62.02	724.6	0.14
13	36	18	16	1.2	39	95.71	769.9	0.49
14	36	18	16	1.2	39	111.81	769.9	0.42
15	36	18	16	1.2	39	84.29	769.9	0.49
16	36	18	16	1.2	39	68.19	769.9	0.42
17	40	20	20	1.2	42.72	95.21	787.1	0.68
18	40	20	20	1.2	42.72	109.83	787.1	0.61
19	40	20	20	1.2	42.72	84.79	787.1	0.68
20	40	20	20	1.2	42.72	70.17	787.1	0.61

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.01	-0.01	-0.08	-0.33	-0.13	0.58
2	9	4.5	-0.01	-0.02	-0.01	0.08	0.08	-0.09
3	9	4.5	0.01	0.01	-0.08	-0.33	-0.13	-0.58
4	9	4.5	-0.01	0.02	-0.01	0.08	0.08	0.09
5	18	9	0.01	-0.02	-0.12	-1.07	-0.23	0.91
6	18	9	-0.01	-0.05	-0.06	-0.21	0.18	-0.19
7	18	9	0.01	0.02	-0.12	-1.07	-0.23	-0.91
8	18	9	-0.01	0.05	-0.06	-0.21	0.18	0.19
9	27	13.5	0.01	-0.02	-0.18	-2.37	-0.29	1.31
10	27	13.5	-0.01	-0.07	-0.13	-1.22	0.26	-0.31
11	27	13.5	0.01	0.02	-0.18	-2.37	-0.29	-1.31

## ASMTower 2018.4

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.01	0.07	-0.13	-1.22	0.26	0.31
13	36	18	0.02	-0.04	-0.48	-8.6	-0.65	3.53
14	36	18	-0.02	-0.16	-0.39	-5.93	0.61	-0.88
15	36	18	0.02	0.04	-0.48	-8.6	-0.65	-3.53
16	36	18	-0.02	0.16	-0.39	-5.93	0.61	0.88
17	40	20	0.02	-0.06	-0.68	-13.44	-0.84	4.95
18	40	20	-0.02	-0.2	-0.57	-9.94	0.8	-1.25
19	40	20	0.02	0.06	-0.68	-13.44	-0.84	-4.95
20	40	20	-0.02	0.2	-0.57	-9.94	0.8	1.25
Total			0.02	0	-5.4	-86.04	-0.45	0

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 135**

Gust effect factor	G <sub>n</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.84	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	0.84	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	0.84	10.27	1.2	1.35	878.8	1.01
4	2	29.25	4.5	0.25	1.125	0	0.84	10.11	1.2	1.35	852.7	0.98
	1	24.75	4.5	0.25	1.125	0	0.84	9.94	1.2	1.35	823.2	0.94
5	2	20.25	4.5	0.25	1.125	0	0.84	9.73	1.2	1.35	789.2	0.91
	1	15.75	4.5	0.25	1.125	0	0.84	9.48	1.2	1.35	748.5	0.86
6	2	11.25	4.5	0.25	1.125	0	0.84	9.15	1.2	1.35	697.3	0.8
	1	6.75	4.5	0.25	1.125	0	0.84	8.67	1.2	1.35	626.2	0.72
	2	2.25	4.5	0.25	1.125	0	0.84	8.32	1.2	1.35	577.5	0.66
Total										13.05	---	8.62

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.443	0	915.5	135	0.34
2	36 To 40	38	1	1.608	0.456	0.886	0	901	135	0.68
3	31.5 To 36	33.75	1	1.809	0.513	0.996	0	878.8	135	0.74
4	27 To 31.5	29.25	1	1.809	0.513	0.996	0	852.7	135	0.72
5	22.5 To 27	24.75	1	1.809	0.513	0.996	0	823.2	135	0.7

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.996	0	789.2	135	0.67	
7	13.5 To 18	15.75	1	1.809	0.513	0.996	0	748.5	135	0.63	
8	9 To 13.5	11.25	1	1.809	0.513	0.996	0	697.3	135	0.59	
9	4.5 To 9	6.75	1	1.809	0.513	0.996	0	626.2	135	0.53	
10	0 To 4.5	2.25	1	1.809	0.513	0.996	0	577.5	135	0.49	
Total							9.3	---	---	---	6.1

## Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0.24	0	-0.24	-9.99	-9.99	0.07
2	38	0.48	0	-0.48	-18.23	-18.23	0.14
3	33.75	0.53	0	-0.53	-17.76	-17.76	0.16
4	29.25	0.51	0	-0.51	-14.94	-14.94	0.15
5	24.75	0.49	0	-0.49	-12.2	-12.2	0.15
6	20.25	0.47	0	-0.47	-9.57	-9.57	0.14
7	15.75	0.45	0	-0.45	-7.06	-7.06	0.13
8	11.25	0.42	0	-0.42	-4.7	-4.7	0.13
9	6.75	0.38	0	-0.38	-2.53	-2.53	0.11
10	2.25	0.35	0	-0.35	-0.78	-0.78	0.1
Total		4.31	0	-4.31	-97.76	-97.76	1.29

## Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	0.7	0	920.2	105	0.55
2	42	42	1	1.815	0.62	1.735	0	920.2	15	1.36
3	42	42	1	1.815	0.62	1.217	0	920.2	135	0.95
Total							3.652	---	---	2.86

## Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.39	0	-0.39	-16.26	-16.26	0.31
2	42	0.96	0	-0.96	-40.3	-40.3	-0.21
3	42	0.67	0	-0.67	-28.28	-28.28	-0.4
Total		2.02	0	-2.02	-84.84	-84.84	-0.29

## Wind forces from mounts of panel antenna



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Client OG

Date 5/11/2017

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.336	0	920.2	105	0.26
2	42	42	1	0.034	0.358	0.056	0	920.2	15	0.04
3	42	42	1	0.034	0.358	0.196	0	920.2	135	0.15
Total						0.587	---	---	---	0.46

**Wind vector from mounts of panel antenna**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.19	0	-0.19	-7.8	-7.8	0.1
2	42	0.03	0	-0.03	-1.29	-1.29	0
3	42	0.11	0	-0.11	-4.55	-4.55	-0.04
Total		0.32	0	-0.32	-13.64	-13.64	0.05

**Wind forces from MW dishes**

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	105	-0.44	0.57	0.11	-1.55	1.98	0.95
2	44	44	1200	1.131	0	929.3	345	1.26	-0.14	0.04	1.12	-0.12	0.04

**Wind vectors from MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	2.33	0	-0.95	0	0.95	0	-37.8	-93.24	1.99
2	44	0.91	0	-0.67	0	0.04	0	-29.34	-40.06	-0.02
Total		3.24	0	-1.61	---	---	---	-67.14	-133.3	1.97

**Wind forces from mounts Of MW dishes**

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.219	0	910.8	105	0.17
2	44	44	1	0.034	0.234	0.048	0	929.3	15	0.04
Total						0.266	---	---	---	0.21

**Wind vectors from mounts Of MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0.12	0	-0.12	-4.79	-4.79	0.06

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0.03	0	-0.03	-1.17	-1.17	0
Total		0.15	0	-0.15	-5.96	-5.96	0.06

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	64.61	577.5	0.07
2	9	4.5	8	1.2	17.493	137.95	577.5	0.04
3	9	4.5	8	1.2	17.493	115.39	577.5	0.07
4	9	4.5	8	1.2	17.493	42.05	577.5	0.04
5	18	9	8	1.2	23.431	71.33	665.3	0.11
6	18	9	8	1.2	23.431	123.67	665.3	0.09
7	18	9	8	1.2	23.431	108.67	665.3	0.11
8	18	9	8	1.2	23.431	56.33	665.3	0.09
9	27	13.5	8	1.2	30.887	75.95	724.6	0.17
10	27	13.5	8	1.2	30.887	114.87	724.6	0.15
11	27	13.5	8	1.2	30.887	104.05	724.6	0.17
12	27	13.5	8	1.2	30.887	65.13	724.6	0.15
13	36	18	16	1.2	39	78.91	769.9	0.47
14	36	18	16	1.2	39	109.46	769.9	0.44
15	36	18	16	1.2	39	101.09	769.9	0.47
16	36	18	16	1.2	39	70.54	769.9	0.44
17	40	20	20	1.2	42.72	79.89	787.1	0.66
18	40	20	20	1.2	42.72	107.7	787.1	0.62
19	40	20	20	1.2	42.72	100.11	787.1	0.66
20	40	20	20	1.2	42.72	72.3	787.1	0.62

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.03	0.02	-0.06	-0.3	0	0.48
2	9	4.5	0.03	-0.02	-0.01	0.13	-0.09	0.21
3	9	4.5	0.03	-0.02	-0.06	-0.3	0	-0.48
4	9	4.5	0.03	0.02	-0.01	0.13	-0.09	-0.21
5	18	9	0.06	0.03	-0.09	-0.88	-0.34	0.78
6	18	9	0.07	-0.05	-0.04	-0.02	-0.5	0.4
7	18	9	0.06	-0.03	-0.09	-0.88	-0.34	-0.78
8	18	9	0.07	0.05	-0.04	-0.02	-0.5	-0.4
9	27	13.5	0.11	0.04	-0.13	-1.84	-1.15	1.15
10	27	13.5	0.11	-0.06	-0.08	-0.7	-1.35	0.62
11	27	13.5	0.11	-0.04	-0.13	-1.84	-1.15	-1.15

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.11	0.06	-0.08	-0.7	-1.35	-0.62
13	36	18	0.31	0.09	-0.35	-6.45	-4.88	3.12
14	36	18	0.31	-0.14	-0.27	-3.82	-5.33	1.73
15	36	18	0.31	-0.09	-0.35	-6.45	-4.88	-3.12
16	36	18	0.31	0.14	-0.27	-3.82	-5.33	-1.73
17	40	20	0.44	0.11	-0.49	-9.98	-7.94	4.39
18	40	20	0.44	-0.19	-0.39	-6.55	-8.52	2.45
19	40	20	0.44	-0.11	-0.49	-9.98	-7.94	-4.39
20	40	20	0.44	0.19	-0.39	-6.55	-8.52	-2.45
Total			3.79	0	-3.82	-60.82	-60.19	0

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 180**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.07	10.48	0.6	0.3	915.5	0.23
2	1	38	4	0.25	1	0	0.07	10.4	0.6	0.6	901	0.46
	3	33.75	4.5	0.25	1.125	0	0.07	10.27	0.6	0.675	878.8	0.5
3	2	29.25	4.5	0.25	1.125	0	0.07	10.11	0.6	0.675	852.7	0.49
	4	24.75	4.5	0.25	1.125	0	0.07	9.94	0.6	0.675	823.2	0.47
4	2	20.25	4.5	0.25	1.125	0	0.07	9.73	0.6	0.675	789.2	0.45
	5	15.75	4.5	0.25	1.125	0	0.07	9.48	0.6	0.675	748.5	0.43
5	2	11.25	4.5	0.25	1.125	0	0.07	9.15	0.6	0.675	697.3	0.4
	6	6.75	4.5	0.25	1.125	0	0.07	8.67	0.6	0.679	626.2	0.36
6	2	2.25	4.5	0.25	1.125	0	0.07	8.32	0.63	0.707	577.5	0.35
	Total										6.786	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0	0	915.5	180	0
2	36 To 40	38	1	1.608	0.456	0	0	901	180	0
3	31.5 To 36	33.75	1	1.809	0.513	0	0	878.8	180	0
4	27 To 31.5	29.25	1	1.809	0.513	0	0	852.7	180	0
5	22.5 To 27	24.75	1	1.809	0.513	0	0	823.2	180	0

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0	0	789.2	180	0	
7	13.5 To 18	15.75	1	1.809	0.513	0	0	748.5	180	0	
8	9 To 13.5	11.25	1	1.809	0.513	0	0	697.3	180	0	
9	4.5 To 9	6.75	1	1.809	0.513	0	0	626.2	180	0	
10	0 To 4.5	2.25	1	1.809	0.513	0	0	577.5	180	0	
Total							0	---	---	---	0

## Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0	0	0	0	0	0
2	38	0	0	0	0	0	0
3	33.75	0	0	0	0	0	0
4	29.25	0	0	0	0	0	0
5	24.75	0	0	0	0	0	0
6	20.25	0	0	0	0	0	0
7	15.75	0	0	0	0	0	0
8	11.25	0	0	0	0	0	0
9	6.75	0	0	0	0	0	0
10	2.25	0	0	0	0	0	0
Total		0	0	0	0	0	0

## Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	1.516	0	920.2	150	1.19
2	42	42	1	1.815	0.62	1.516	0	920.2	30	1.19
3	42	42	1	1.815	0.62	0.62	0	920.2	90	0.48
Total						3.652	---	---	---	2.86

## Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	1.19	0	0	0	-49.8	0.35
2	42	1.19	0	0	0	-49.8	0.35
3	42	0.48	0	0	0	-20.37	-0.29
Total		2.86	0	0	0	-119.98	0.42

## Wind forces from mounts of panel antenna

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.115	0	920.2	150	0.09
2	42	42	1	0.034	0.358	0.115	0	920.2	30	0.09
3	42	42	1	0.034	0.358	0.358	0	920.2	90	0.28
Total						0.587	---	---	---	0.46

**Wind vector from mounts of panel antenna**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.09	0	0	0	-3.77	0.02
2	42	0.09	0	0	0	-3.77	0.02
3	42	0.28	0	0	0	-11.74	-0.11
Total		0.46	0	0	0	-19.28	-0.07

**Wind forces from MW dishes**

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	150	-0.96	0.18	0.06	-3.35	0.62	0.52
2	44	44	1200	1.131	0	929.3	30	1.21	0.23	-0.05	1.08	0.21	-0.06

**Wind vectors from MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	3.21	0	1.14	0	0.52	0	45.71	-128.42	0.84
2	44	1.04	0	-0.36	0	-0.06	0	-15.82	-45.83	0.05
Total		4.25	0	0.78	---	---	---	29.89	-174.25	0.9

**Wind forces from mounts Of MW dishes**

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.059	0	910.8	150	0.05
2	44	44	1	0.034	0.234	0.084	0	929.3	30	0.07
Total						0.143	---	---	---	0.11

**Wind vectors from mounts Of MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0.05	0	0	0	-1.82	0.01

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0.07	0	0	0	-2.92	0.01
Total		0.11	0	0	0	-4.74	0.02

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	34.08	577.5	0.03
2	9	4.5	8	1.2	17.493	102.82	577.5	0.08
3	9	4.5	8	1.2	17.493	145.92	577.5	0.03
4	9	4.5	8	1.2	17.493	77.18	577.5	0.08
5	18	9	8	1.2	23.431	51.8	665.3	0.08
6	18	9	8	1.2	23.431	99.54	665.3	0.12
7	18	9	8	1.2	23.431	128.2	665.3	0.08
8	18	9	8	1.2	23.431	80.46	665.3	0.12
9	27	13.5	8	1.2	30.887	62.02	724.6	0.14
10	27	13.5	8	1.2	30.887	97.22	724.6	0.18
11	27	13.5	8	1.2	30.887	117.98	724.6	0.14
12	27	13.5	8	1.2	30.887	82.78	724.6	0.18
13	36	18	16	1.2	39	68.19	769.9	0.42
14	36	18	16	1.2	39	95.71	769.9	0.49
15	36	18	16	1.2	39	111.81	769.9	0.42
16	36	18	16	1.2	39	84.29	769.9	0.49
17	40	20	20	1.2	42.72	70.17	787.1	0.61
18	40	20	20	1.2	42.72	95.21	787.1	0.68
19	40	20	20	1.2	42.72	109.83	787.1	0.61
20	40	20	20	1.2	42.72	84.79	787.1	0.68

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.01	0.02	-0.01	-0.08	0.08	0.09
2	9	4.5	0.08	-0.01	0.01	0.13	-0.33	0.58
3	9	4.5	0.01	-0.02	-0.01	-0.08	0.08	-0.09
4	9	4.5	0.08	0.01	0.01	0.13	-0.33	-0.58
5	18	9	0.06	0.05	-0.01	-0.18	-0.21	0.19
6	18	9	0.12	-0.02	0.01	0.23	-1.07	0.91
7	18	9	0.06	-0.05	-0.01	-0.18	-0.21	-0.19
8	18	9	0.12	0.02	0.01	0.23	-1.07	-0.91
9	27	13.5	0.13	0.07	-0.01	-0.26	-1.22	0.31
10	27	13.5	0.18	-0.02	0.01	0.29	-2.37	1.31
11	27	13.5	0.13	-0.07	-0.01	-0.26	-1.22	-0.31

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.18	0.02	0.01	0.29	-2.37	-1.31
13	36	18	0.39	0.16	-0.02	-0.61	-5.93	0.88
14	36	18	0.48	-0.04	0.02	0.65	-8.6	3.53
15	36	18	0.39	-0.16	-0.02	-0.61	-5.93	-0.88
16	36	18	0.48	0.04	0.02	0.65	-8.6	-3.53
17	40	20	0.57	0.2	-0.02	-0.8	-9.94	1.25
18	40	20	0.68	-0.06	0.02	0.84	-13.44	4.95
19	40	20	0.57	-0.2	-0.02	-0.8	-9.94	-1.25
20	40	20	0.68	0.06	0.02	0.84	-13.44	-4.95
Total			5.4	0	0.02	0.45	-86.04	0

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 225**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.84	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	0.84	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	0.84	10.27	1.2	1.35	878.8	1.01
3	2	29.25	4.5	0.25	1.125	0	0.84	10.11	1.2	1.35	852.7	0.98
	4	24.75	4.5	0.25	1.125	0	0.84	9.94	1.2	1.35	823.2	0.94
4	2	20.25	4.5	0.25	1.125	0	0.84	9.73	1.2	1.35	789.2	0.91
	5	15.75	4.5	0.25	1.125	0	0.84	9.48	1.2	1.35	748.5	0.86
5	2	11.25	4.5	0.25	1.125	0	0.84	9.15	1.2	1.35	697.3	0.8
	6	6.75	4.5	0.25	1.125	0	0.84	8.67	1.2	1.35	626.2	0.72
6	2	2.25	4.5	0.25	1.125	0	0.84	8.32	1.2	1.35	577.5	0.66
	Total										13.05	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.443	0	915.5	135	0.34
2	36 To 40	38	1	1.608	0.456	0.886	0	901	135	0.68
3	31.5 To 36	33.75	1	1.809	0.513	0.996	0	878.8	135	0.74
4	27 To 31.5	29.25	1	1.809	0.513	0.996	0	852.7	135	0.72
5	22.5 To 27	24.75	1	1.809	0.513	0.996	0	823.2	135	0.7

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Job No. 40m Guyed Pole  
 Client OG  
 Project GSM Network

Rev. No. A  
 Date 5/11/2017  
 Designed by M.Joe  
 Checked by A.S.M

ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.996	0	789.2	135	0.67	
7	13.5 To 18	15.75	1	1.809	0.513	0.996	0	748.5	135	0.63	
8	9 To 13.5	11.25	1	1.809	0.513	0.996	0	697.3	135	0.59	
9	4.5 To 9	6.75	1	1.809	0.513	0.996	0	626.2	135	0.53	
10	0 To 4.5	2.25	1	1.809	0.513	0.996	0	577.5	135	0.49	
Total							9.3	---	---	---	6.1

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0.24	0	0.24	9.99	-9.99	-0.07
2	38	0.48	0	0.48	18.23	-18.23	-0.14
3	33.75	0.53	0	0.53	17.76	-17.76	-0.16
4	29.25	0.51	0	0.51	14.94	-14.94	-0.15
5	24.75	0.49	0	0.49	12.2	-12.2	-0.15
6	20.25	0.47	0	0.47	9.57	-9.57	-0.14
7	15.75	0.45	0	0.45	7.06	-7.06	-0.13
8	11.25	0.42	0	0.42	4.7	-4.7	-0.13
9	6.75	0.38	0	0.38	2.53	-2.53	-0.11
10	2.25	0.35	0	0.35	0.78	-0.78	-0.1
Total		4.31	0	4.31	97.76	-97.76	-1.29

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	1.735	0	920.2	165	1.36	
2	42	42	1	1.815	0.62	0.7	0	920.2	75	0.55	
3	42	42	1	1.815	0.62	1.217	0	920.2	45	0.95	
Total							3.652	---	---	---	2.86

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.96	0	0.96	40.3	-40.3	-0.21
2	42	0.39	0	0.39	16.26	-16.26	0.31
3	42	0.67	0	0.67	28.28	-28.28	-0.4
Total		2.02	0	2.02	84.84	-84.84	-0.29

### Wind forces from mounts of panel antenna



## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.056	0	920.2	165	0.04
2	42	42	1	0.034	0.358	0.336	0	920.2	75	0.26
3	42	42	1	0.034	0.358	0.196	0	920.2	45	0.15
Total						0.587	---	---	---	0.46

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.03	0	0.03	1.29	-1.29	0
2	42	0.19	0	0.19	7.8	-7.8	0.1
3	42	0.11	0	0.11	4.55	-4.55	-0.04
Total		0.32	0	0.32	13.64	-13.64	0.05

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	195	-0.98	-0.12	-0.03	-3.45	-0.43	-0.28
2	44	44	1200	1.131	0	929.3	75	0.47	0.53	0.05	0.42	0.47	0.05

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	2.77	0	2.1	0	-0.28	0	83.88	-110.81	-0.51
2	44	0.6	0	0.2	0	0.05	0	8.73	-26.49	0.3
Total		3.37	0	2.3	---	---	---	92.61	-137.3	-0.21

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.016	0	910.8	165	0.01
2	44	44	1	0.034	0.234	0.22	0	929.3	75	0.17
Total						0.236	---	---	---	0.19

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0.01	0	0.01	0.34	-0.34	0

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0.12	0	0.12	5.41	-5.41	0.06
Total		0.13	0	0.13	5.76	-5.76	0.06

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	42.05	577.5	0.04
2	9	4.5	8	1.2	17.493	64.61	577.5	0.07
3	9	4.5	8	1.2	17.493	137.95	577.5	0.04
4	9	4.5	8	1.2	17.493	115.39	577.5	0.07
5	18	9	8	1.2	23.431	56.33	665.3	0.09
6	18	9	8	1.2	23.431	71.33	665.3	0.11
7	18	9	8	1.2	23.431	123.67	665.3	0.09
8	18	9	8	1.2	23.431	108.67	665.3	0.11
9	27	13.5	8	1.2	30.887	65.13	724.6	0.15
10	27	13.5	8	1.2	30.887	75.95	724.6	0.17
11	27	13.5	8	1.2	30.887	114.87	724.6	0.15
12	27	13.5	8	1.2	30.887	104.05	724.6	0.17
13	36	18	16	1.2	39	70.54	769.9	0.44
14	36	18	16	1.2	39	78.91	769.9	0.47
15	36	18	16	1.2	39	109.46	769.9	0.44
16	36	18	16	1.2	39	101.09	769.9	0.47
17	40	20	20	1.2	42.72	72.3	787.1	0.62
18	40	20	20	1.2	42.72	79.89	787.1	0.66
19	40	20	20	1.2	42.72	107.7	787.1	0.62
20	40	20	20	1.2	42.72	100.11	787.1	0.66

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.01	0.02	0.03	0.09	0.13	-0.21
2	9	4.5	0.06	0.02	0.03	0	-0.3	0.48
3	9	4.5	0.01	-0.02	0.03	0.09	0.13	0.21
4	9	4.5	0.06	-0.02	0.03	0	-0.3	-0.48
5	18	9	0.04	0.05	0.07	0.5	-0.02	-0.4
6	18	9	0.09	0.03	0.06	0.34	-0.88	0.78
7	18	9	0.04	-0.05	0.07	0.5	-0.02	0.4
8	18	9	0.09	-0.03	0.06	0.34	-0.88	-0.78
9	27	13.5	0.08	0.06	0.11	1.35	-0.7	-0.62
10	27	13.5	0.13	0.04	0.11	1.15	-1.84	1.15
11	27	13.5	0.08	-0.06	0.11	1.35	-0.7	0.62

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.13	-0.04	0.11	1.15	-1.84	-1.15
13	36	18	0.27	0.14	0.31	5.33	-3.82	-1.73
14	36	18	0.35	0.09	0.31	4.88	-6.45	3.12
15	36	18	0.27	-0.14	0.31	5.33	-3.82	1.73
16	36	18	0.35	-0.09	0.31	4.88	-6.45	-3.12
17	40	20	0.39	0.19	0.44	8.52	-6.55	-2.45
18	40	20	0.49	0.11	0.44	7.94	-9.98	4.39
19	40	20	0.39	-0.19	0.44	8.52	-6.55	2.45
20	40	20	0.49	-0.11	0.44	7.94	-9.98	-4.39
Total			3.82	0	3.79	60.19	-60.82	0

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 270**Gust effect factor  $G_h = 0.85$ Direction probability  $K_d = 0.85$ Important factor  $I = 1$ **Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.3	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	0.3	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	0.3	10.27	1.2	1.35	878.8	1.01
3	2	29.25	4.5	0.25	1.125	0	0.3	10.11	1.2	1.35	852.7	0.98
	4	24.75	4.5	0.25	1.125	0	0.3	9.94	1.2	1.35	823.2	0.94
4	2	20.25	4.5	0.25	1.125	0	0.3	9.73	1.2	1.35	789.2	0.91
	5	15.75	4.5	0.25	1.125	0	0.3	9.48	1.2	1.35	748.5	0.86
5	2	11.25	4.5	0.25	1.125	0	0.3	9.15	1.2	1.35	697.3	0.8
	6	6.75	4.5	0.25	1.125	0	0.3	8.67	1.2	1.35	626.2	0.72
6	2	2.25	4.5	0.25	1.125	0	0.3	8.32	1.2	1.35	577.5	0.66
	Total										13.05	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.228	0	915.5	90	0.18
2	36 To 40	38	1	1.608	0.456	0.456	0	901	90	0.35
3	31.5 To 36	33.75	1	1.809	0.513	0.513	0	878.8	90	0.38
4	27 To 31.5	29.25	1	1.809	0.513	0.513	0	852.7	90	0.37
5	22.5 To 27	24.75	1	1.809	0.513	0.513	0	823.2	90	0.36

ASMTower 2018.4

Job No. 40m Guyed Pole

Rev. No. A

Client OG

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.513	0	789.2	90	0.34	
7	13.5 To 18	15.75	1	1.809	0.513	0.513	0	748.5	90	0.33	
8	9 To 13.5	11.25	1	1.809	0.513	0.513	0	697.3	90	0.3	
9	4.5 To 9	6.75	1	1.809	0.513	0.513	0	626.2	90	0.27	
10	0 To 4.5	2.25	1	1.809	0.513	0.513	0	577.5	90	0.25	
Total								4.788	---	---	3.14

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0	0	0.18	7.27	0	-0.05
2	38	0	0	0.35	13.27	0	-0.1
3	33.75	0	0	0.38	12.93	0	-0.11
4	29.25	0	0	0.37	10.88	0	-0.11
5	24.75	0	0	0.36	8.88	0	-0.11
6	20.25	0	0	0.34	6.97	0	-0.1
7	15.75	0	0	0.33	5.14	0	-0.1
8	11.25	0	0	0.3	3.42	0	-0.09
9	6.75	0	0	0.27	1.84	0	-0.08
10	2.25	0	0	0.25	0.57	0	-0.08
Total		0	0	3.14	71.18	0	-0.94

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	0.919	0	920.2	120	0.72	
2	42	42	1	1.815	0.62	0.919	0	920.2	120	0.72	
3	42	42	1	1.815	0.62	1.815	0	920.2	0	1.42	
Total								3.652	---	---	2.86

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	0.72	30.18	0	-0.37
2	42	0	0	0.72	30.18	0	0.37
3	42	0	0	1.42	59.62	0	0
Total		0	0	2.86	119.98	0	0

### Wind forces from mounts of panel antenna

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.277	0	920.2	120	0.22
2	42	42	1	0.034	0.358	0.277	0	920.2	120	0.22
3	42	42	1	0.034	0.358	0.034	0	920.2	0	0.03
Total						0.587	---	---	---	0.46

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	0.22	9.09	0	-0.07
2	42	0	0	0.22	9.09	0	0.07
3	42	0	0	0.03	1.11	0	0
Total		0	0	0.46	19.28	0	0

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	240	-0.71	-0.44	-0.1	-2.49	-1.53	-0.87
2	44	44	1200	1.131	0	929.3	120	-0.71	0.44	0.1	-0.64	0.39	0.11

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	1.39	0	2.57	0	-0.87	0	102.87	-55.6	-1.68
2	44	-0.35	0	0.66	0	0.11	0	28.86	15.6	0.32
Total		1.04	0	3.23	---	---	---	131.74	-40	-1.36

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.176	0	910.8	120	0.14
2	44	44	1	0.034	0.234	0.184	0	929.3	120	0.15
Total						0.36	---	---	---	0.28

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0	0	0.14	5.45	0	-0.04

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0	0	0.15	6.39	0	0.05
Total		0	0	0.28	11.84	0	0

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	77.18	577.5	0.08
2	9	4.5	8	1.2	17.493	34.08	577.5	0.03
3	9	4.5	8	1.2	17.493	102.82	577.5	0.08
4	9	4.5	8	1.2	17.493	145.92	577.5	0.03
5	18	9	8	1.2	23.431	80.46	665.3	0.12
6	18	9	8	1.2	23.431	51.8	665.3	0.08
7	18	9	8	1.2	23.431	99.54	665.3	0.12
8	18	9	8	1.2	23.431	128.2	665.3	0.08
9	27	13.5	8	1.2	30.887	82.78	724.6	0.18
10	27	13.5	8	1.2	30.887	62.02	724.6	0.14
11	27	13.5	8	1.2	30.887	97.22	724.6	0.18
12	27	13.5	8	1.2	30.887	117.98	724.6	0.14
13	36	18	16	1.2	39	84.29	769.9	0.49
14	36	18	16	1.2	39	68.19	769.9	0.42
15	36	18	16	1.2	39	95.71	769.9	0.49
16	36	18	16	1.2	39	111.81	769.9	0.42
17	40	20	20	1.2	42.72	84.79	787.1	0.68
18	40	20	20	1.2	42.72	70.17	787.1	0.61
19	40	20	20	1.2	42.72	95.21	787.1	0.68
20	40	20	20	1.2	42.72	109.83	787.1	0.61

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.01	0.01	0.08	0.33	0.13	-0.58
2	9	4.5	0.01	0.02	0.01	-0.08	-0.08	0.09
3	9	4.5	-0.01	-0.01	0.08	0.33	0.13	0.58
4	9	4.5	0.01	-0.02	0.01	-0.08	-0.08	-0.09
5	18	9	-0.01	0.02	0.12	1.07	0.23	-0.91
6	18	9	0.01	0.05	0.06	0.21	-0.18	0.19
7	18	9	-0.01	-0.02	0.12	1.07	0.23	0.91
8	18	9	0.01	-0.05	0.06	0.21	-0.18	-0.19
9	27	13.5	-0.01	0.02	0.18	2.37	0.29	-1.31
10	27	13.5	0.01	0.07	0.13	1.22	-0.26	0.31
11	27	13.5	-0.01	-0.02	0.18	2.37	0.29	1.31

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.01	-0.07	0.13	1.22	-0.26	-0.31
13	36	18	-0.02	0.04	0.48	8.6	0.65	-3.53
14	36	18	0.02	0.16	0.39	5.93	-0.61	0.88
15	36	18	-0.02	-0.04	0.48	8.6	0.65	3.53
16	36	18	0.02	-0.16	0.39	5.93	-0.61	-0.88
17	40	20	-0.02	0.06	0.68	13.44	0.84	-4.95
18	40	20	0.02	0.2	0.57	9.94	-0.8	1.25
19	40	20	-0.02	-0.06	0.68	13.44	0.84	4.95
20	40	20	0.02	-0.2	0.57	9.94	-0.8	-1.25
Total			-0.02	0	5.4	86.04	0.45	0

**Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 315**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	10.54	0.6	0.45	927	0.35
	2	41	2	0.25	0.5	0	0.97	10.48	1.2	0.6	915.5	0.47
2	1	38	4	0.25	1	0	0.97	10.4	1.2	1.2	901	0.92
	3	33.75	4.5	0.25	1.125	0	0.97	10.27	1.2	1.35	878.8	1.01
4	2	29.25	4.5	0.25	1.125	0	0.97	10.11	1.2	1.35	852.7	0.98
	1	24.75	4.5	0.25	1.125	0	0.97	9.94	1.2	1.35	823.2	0.94
5	2	20.25	4.5	0.25	1.125	0	0.97	9.73	1.2	1.35	789.2	0.91
	1	15.75	4.5	0.25	1.125	0	0.97	9.48	1.2	1.35	748.5	0.86
6	2	11.25	4.5	0.25	1.125	0	0.97	9.15	1.2	1.35	697.3	0.8
	1	6.75	4.5	0.25	1.125	0	0.97	8.67	1.2	1.35	626.2	0.72
	2	2.25	4.5	0.25	1.125	0	0.97	8.32	1.2	1.35	577.5	0.66
Total										13.05	---	8.62

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.516	0	915.5	45	0.4
2	36 To 40	38	1	1.608	0.456	1.032	0	901	45	0.79
3	31.5 To 36	33.75	1	1.809	0.513	1.161	0	878.8	45	0.87
4	27 To 31.5	29.25	1	1.809	0.513	1.161	0	852.7	45	0.84
5	22.5 To 27	24.75	1	1.809	0.513	1.161	0	823.2	45	0.81

ASMTower 2018.4

Job No. 40m Guyed Pole

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	1.161	0	789.2	45	0.78	
7	13.5 To 18	15.75	1	1.809	0.513	1.161	0	748.5	45	0.74	
8	9 To 13.5	11.25	1	1.809	0.513	1.161	0	697.3	45	0.69	
9	4.5 To 9	6.75	1	1.809	0.513	1.161	0	626.2	45	0.62	
10	0 To 4.5	2.25	1	1.809	0.513	1.161	0	577.5	45	0.57	
Total								10.836	---	---	7.11

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	-0.28	0	0.28	11.64	11.64	-0.09
2	38	-0.56	0	0.56	21.24	21.24	-0.17
3	33.75	-0.61	0	0.61	20.7	20.7	-0.18
4	29.25	-0.6	0	0.6	17.4	17.4	-0.18
5	24.75	-0.57	0	0.57	14.22	14.22	-0.17
6	20.25	-0.55	0	0.55	11.15	11.15	-0.17
7	15.75	-0.52	0	0.52	8.23	8.23	-0.16
8	11.25	-0.49	0	0.49	5.47	5.47	-0.15
9	6.75	-0.44	0	0.44	2.95	2.95	-0.13
10	2.25	-0.4	0	0.4	0.91	0.91	-0.12
Total		-5.03	0	5.03	113.91	113.91	-1.51

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	0.7	0	920.2	75	0.55	
2	42	42	1	1.815	0.62	1.735	0	920.2	165	1.36	
3	42	42	1	1.815	0.62	1.217	0	920.2	45	0.95	
Total								3.652	---	---	2.86

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.39	0	0.39	16.26	16.26	-0.31
2	42	-0.96	0	0.96	40.3	40.3	0.21
3	42	-0.67	0	0.67	28.28	28.28	0.4
Total		-2.02	0	2.02	84.84	84.84	0.29

### Wind forces from mounts of panel antenna



## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.336	0	920.2	75	0.26
2	42	42	1	0.034	0.358	0.056	0	920.2	165	0.04
3	42	42	1	0.034	0.358	0.196	0	920.2	45	0.15
Total						0.587	---	---	---	0.46

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.19	0	0.19	7.8	7.8	-0.1
2	42	-0.03	0	0.03	1.29	1.29	0
3	42	-0.11	0	0.11	4.55	4.55	0.04
Total		-0.32	0	0.32	13.64	13.64	-0.05

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	910.8	285	0.47	-0.53	-0.05	1.66	-1.85	-0.39
2	44	44	1200	1.131	0	929.3	165	-0.98	0.12	0.03	-0.88	0.11	0.04

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-2.36	0	0.78	0	-0.39	0	31.11	94.42	-1.36
2	44	-0.71	0	0.53	0	0.04	0	23.54	31.09	0.09
Total		-3.07	0	1.31	---	---	---	54.64	125.51	-1.27

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.235	0.219	0	910.8	75	0.17
2	44	44	1	0.034	0.234	0.048	0	929.3	165	0.04
Total						0.266	---	---	---	0.21

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-0.12	0	0.12	4.79	4.79	-0.06

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	-0.03	0	0.03	1.17	1.17	0
Total		-0.15	0	0.15	5.96	5.96	-0.06

### Wind forces from guy wires

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	115.39	577.5	0.07
2	9	4.5	8	1.2	17.493	42.05	577.5	0.04
3	9	4.5	8	1.2	17.493	64.61	577.5	0.07
4	9	4.5	8	1.2	17.493	137.95	577.5	0.04
5	18	9	8	1.2	23.431	108.67	665.3	0.11
6	18	9	8	1.2	23.431	56.33	665.3	0.09
7	18	9	8	1.2	23.431	71.33	665.3	0.11
8	18	9	8	1.2	23.431	123.67	665.3	0.09
9	27	13.5	8	1.2	30.887	104.05	724.6	0.17
10	27	13.5	8	1.2	30.887	65.13	724.6	0.15
11	27	13.5	8	1.2	30.887	75.95	724.6	0.17
12	27	13.5	8	1.2	30.887	114.87	724.6	0.15
13	36	18	16	1.2	39	101.09	769.9	0.47
14	36	18	16	1.2	39	70.54	769.9	0.44
15	36	18	16	1.2	39	78.91	769.9	0.47
16	36	18	16	1.2	39	109.46	769.9	0.44
17	40	20	20	1.2	42.72	100.11	787.1	0.66
18	40	20	20	1.2	42.72	72.3	787.1	0.62
19	40	20	20	1.2	42.72	79.89	787.1	0.66
20	40	20	20	1.2	42.72	107.7	787.1	0.62

### Wind vector from guy wires

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.03	-0.02	0.06	0.3	0	-0.48
2	9	4.5	-0.03	0.02	0.01	-0.13	0.09	-0.21
3	9	4.5	-0.03	0.02	0.06	0.3	0	0.48
4	9	4.5	-0.03	-0.02	0.01	-0.13	0.09	0.21
5	18	9	-0.06	-0.03	0.09	0.88	0.34	-0.78
6	18	9	-0.07	0.05	0.04	0.02	0.5	-0.4
7	18	9	-0.06	0.03	0.09	0.88	0.34	0.78
8	18	9	-0.07	-0.05	0.04	0.02	0.5	0.4
9	27	13.5	-0.11	-0.04	0.13	1.84	1.15	-1.15
10	27	13.5	-0.11	0.06	0.08	0.7	1.35	-0.62
11	27	13.5	-0.11	0.04	0.13	1.84	1.15	1.15

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.11	-0.06	0.08	0.7	1.35	0.62
13	36	18	-0.31	-0.09	0.35	6.45	4.88	-3.12
14	36	18	-0.31	0.14	0.27	3.82	5.33	-1.73
15	36	18	-0.31	0.09	0.35	6.45	4.88	3.12
16	36	18	-0.31	-0.14	0.27	3.82	5.33	1.73
17	40	20	-0.44	-0.11	0.49	9.98	7.94	-4.39
18	40	20	-0.44	0.19	0.39	6.55	8.52	-2.45
19	40	20	-0.44	0.11	0.49	9.98	7.94	4.39
20	40	20	-0.44	-0.19	0.39	6.55	8.52	2.45
Total			-3.79	0	3.82	60.82	60.19	0

### Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 0

Gust effect factor  $G_h = 0.85$ Direction probability  $K_d = 0.85$ Important factor  $I = 1$ 

### Wind forces on pole parts

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	1.07	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	1.07	7.2	1.2	1.2	431.8	0.44
	3	33.75	4.5	0.25	1.125	0	1.07	7.11	1.2	1.35	421.2	0.48
3	2	29.25	4.5	0.25	1.125	0	1.07	7	1.2	1.35	408.7	0.47
	4	24.75	4.5	0.25	1.125	0	1.07	6.88	1.2	1.35	394.6	0.45
4	2	20.25	4.5	0.25	1.125	0	1.07	6.74	1.2	1.35	378.3	0.43
	5	15.75	4.5	0.25	1.125	0	1.07	6.56	1.2	1.35	358.8	0.41
5	2	11.25	4.5	0.25	1.125	0	1.07	6.33	1.2	1.35	334.2	0.38
	6	6.75	4.5	0.25	1.125	0	1.07	6	1.2	1.35	300.1	0.34
6	2	2.25	4.5	0.25	1.125	0	1.07	5.76	1.2	1.35	276.8	0.32
	Total										13.137	---

### Wind forces from transmission line clusters

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.804	0	438.8	0	0.3
2	36 To 40	38	1	1.608	0.456	1.608	0	431.8	0	0.59
3	31.5 To 36	33.75	1	1.809	0.513	1.809	0	421.2	0	0.65
4	27 To 31.5	29.25	1	1.809	0.513	1.809	0	408.7	0	0.63
5	22.5 To 27	24.75	1	1.809	0.513	1.809	0	394.6	0	0.61

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Job No. 40m Guyed Pole  
 Client OG  
 Project GSM Network

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 Date 5/11/2017  
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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	1.809	0	378.3	0	0.58	
7	13.5 To 18	15.75	1	1.809	0.513	1.809	0	358.8	0	0.55	
8	9 To 13.5	11.25	1	1.809	0.513	1.809	0	334.2	0	0.51	
9	4.5 To 9	6.75	1	1.809	0.513	1.809	0	300.1	0	0.46	
10	0 To 4.5	2.25	1	1.809	0.513	1.809	0	276.8	0	0.43	
Total							16.884	---	---	---	5.31

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	-0.3	0	0	0	12.3	0
2	38	-0.59	0	0	0	22.43	0
3	33.75	-0.65	0	0	0	21.86	0
4	29.25	-0.63	0	0	0	18.38	0
5	24.75	-0.61	0	0	0	15.02	0
6	20.25	-0.58	0	0	0	11.78	0
7	15.75	-0.55	0	0	0	8.69	0
8	11.25	-0.51	0	0	0	5.78	0
9	6.75	-0.46	0	0	0	3.12	0
10	2.25	-0.43	0	0	0	0.96	0
Total		-5.31	0	0	0	120.3	0

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	1.516	0	441	30	0.57	
2	42	42	1	1.815	0.62	1.516	0	441	150	0.57	
3	42	42	1	1.815	0.62	0.62	0	441	90	0.23	
Total							3.652	---	---	---	1.37

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.57	0	0	0	23.87	-0.17
2	42	-0.57	0	0	0	23.87	-0.17
3	42	-0.23	0	0	0	9.76	0.14
Total		-1.37	0	0	0	57.5	-0.2

### Wind forces from mounts of panel antenna

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.115	0	441	30	0.04
2	42	42	1	0.034	0.358	0.115	0	441	150	0.04
3	42	42	1	0.034	0.358	0.358	0	441	90	0.13
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.04	0	0	0	1.81	-0.01
2	42	-0.04	0	0	0	1.81	-0.01
3	42	-0.13	0	0	0	5.63	0.05
Total		-0.22	0	0	0	9.24	0.04

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	330	1.21	-0.23	0.05	2.03	-0.39	0.21
2	44	44	1200	1.131	0	445.4	210	-0.96	-0.18	-0.06	-0.41	-0.08	-0.03

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-1.96	0	-0.68	0	0.21	0	-27.02	78.28	0
2	44	-0.39	0	0.14	0	-0.03	0	6.15	17.27	-0.07
Total		-2.35	0	-0.54	---	---	---	-20.88	95.55	-0.07

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.061	0	436.5	30	0.02
2	44	44	1	0.034	0.244	0.087	0	445.4	150	0.03
Total						0.148	---	---	---	0.06

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-0.02	0	0	0	0.91	0

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	-0.03	0	0	0	1.44	-0.01
Total		-0.06	0	0	0	2.35	-0.01

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	145.92	276.8	0.01
2	9	4.5	8	1.2	17.493	77.18	276.8	0.04
3	9	4.5	8	1.2	17.493	34.08	276.8	0.01
4	9	4.5	8	1.2	17.493	102.82	276.8	0.04
5	18	9	8	1.2	23.431	128.2	318.9	0.04
6	18	9	8	1.2	23.431	80.46	318.9	0.06
7	18	9	8	1.2	23.431	51.8	318.9	0.04
8	18	9	8	1.2	23.431	99.54	318.9	0.06
9	27	13.5	8	1.2	30.887	117.98	347.3	0.07
10	27	13.5	8	1.2	30.887	82.78	347.3	0.09
11	27	13.5	8	1.2	30.887	62.02	347.3	0.07
12	27	13.5	8	1.2	30.887	97.22	347.3	0.09
13	36	18	16	1.2	39	111.81	369	0.2
14	36	18	16	1.2	39	84.29	369	0.23
15	36	18	16	1.2	39	68.19	369	0.2
16	36	18	16	1.2	39	95.71	369	0.23
17	40	20	20	1.2	42.72	109.83	377.3	0.29
18	40	20	20	1.2	42.72	84.79	377.3	0.33
19	40	20	20	1.2	42.72	70.17	377.3	0.29
20	40	20	20	1.2	42.72	95.21	377.3	0.33

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.01	-0.01	0	0.04	-0.04	-0.04
2	9	4.5	-0.04	0	-0.01	-0.06	0.16	-0.28
3	9	4.5	-0.01	0.01	0	0.04	-0.04	0.04
4	9	4.5	-0.04	0	-0.01	-0.06	0.16	0.28
5	18	9	-0.03	-0.02	0	0.09	0.1	-0.09
6	18	9	-0.06	0.01	-0.01	-0.11	0.51	-0.44
7	18	9	-0.03	0.02	0	0.09	0.1	0.09
8	18	9	-0.06	-0.01	-0.01	-0.11	0.51	0.44
9	27	13.5	-0.06	-0.03	0	0.12	0.58	-0.15
10	27	13.5	-0.09	0.01	-0.01	-0.14	1.14	-0.63
11	27	13.5	-0.06	0.03	0	0.12	0.58	0.15

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.09	-0.01	-0.01	-0.14	1.14	0.63
13	36	18	-0.19	-0.07	0.01	0.29	2.84	-0.42
14	36	18	-0.23	0.02	-0.01	-0.31	4.12	-1.69
15	36	18	-0.19	0.07	0.01	0.29	2.84	0.42
16	36	18	-0.23	-0.02	-0.01	-0.31	4.12	1.69
17	40	20	-0.27	-0.1	0.01	0.38	4.76	-0.6
18	40	20	-0.32	0.03	-0.01	-0.4	6.44	-2.37
19	40	20	-0.27	0.1	0.01	0.38	4.76	0.6
20	40	20	-0.32	-0.03	-0.01	-0.4	6.44	2.37
Total			-2.59	0	-0.01	-0.22	41.24	0

### Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 45

Gust effect factor  $G_h = 0.85$   
 Direction probability  $K_d = 0.85$   
 Important factor  $I = 1$

### Wind forces on pole parts

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.97	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	0.97	7.2	1.2	1.2	431.8	0.44
	2	29.25	4.5	0.25	1.125	0	0.97	7.11	1.2	1.35	421.2	0.48
3	1	33.75	4.5	0.25	1.125	0	0.97	7	1.2	1.35	408.7	0.47
	2	24.75	4.5	0.25	1.125	0	0.97	6.88	1.2	1.35	394.6	0.45
4	1	24.75	4.5	0.25	1.125	0	0.97	6.74	1.2	1.35	378.3	0.43
	2	20.25	4.5	0.25	1.125	0	0.97	6.56	1.2	1.35	358.8	0.41
5	1	15.75	4.5	0.25	1.125	0	0.97	6.33	1.2	1.35	334.2	0.38
	2	11.25	4.5	0.25	1.125	0	0.97	6	1.2	1.35	300.1	0.34
6	1	6.75	4.5	0.25	1.125	0	0.97	5.76	1.2	1.35	276.8	0.32
	2	2.25	4.5	0.25	1.125	0	0.97					
Total										13.137	---	4.16

### Wind forces from transmission line clusters

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.516	0	438.8	45	0.19
2	36 To 40	38	1	1.608	0.456	1.032	0	431.8	45	0.38
3	31.5 To 36	33.75	1	1.809	0.513	1.161	0	421.2	45	0.42
4	27 To 31.5	29.25	1	1.809	0.513	1.161	0	408.7	45	0.4
5	22.5 To 27	24.75	1	1.809	0.513	1.161	0	394.6	45	0.39

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	1.161	0	378.3	45	0.37	
7	13.5 To 18	15.75	1	1.809	0.513	1.161	0	358.8	45	0.35	
8	9 To 13.5	11.25	1	1.809	0.513	1.161	0	334.2	45	0.33	
9	4.5 To 9	6.75	1	1.809	0.513	1.161	0	300.1	45	0.3	
10	0 To 4.5	2.25	1	1.809	0.513	1.161	0	276.8	45	0.27	
Total							10.836	---	---	---	3.41

## Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	-0.14	0	-0.14	-5.58	5.58	0.04
2	38	-0.27	0	-0.27	-10.18	10.18	0.08
3	33.75	-0.29	0	-0.29	-9.92	9.92	0.09
4	29.25	-0.29	0	-0.29	-8.34	8.34	0.09
5	24.75	-0.28	0	-0.28	-6.81	6.81	0.08
6	20.25	-0.26	0	-0.26	-5.34	5.34	0.08
7	15.75	-0.25	0	-0.25	-3.94	3.94	0.08
8	11.25	-0.23	0	-0.23	-2.62	2.62	0.07
9	6.75	-0.21	0	-0.21	-1.41	1.41	0.06
10	2.25	-0.19	0	-0.19	-0.43	0.43	0.06
Total		-2.41	0	-2.41	-54.59	54.59	0.72

## Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	1.735	0	441	15	0.65
2	42	42	1	1.815	0.62	0.7	0	441	105	0.26
3	42	42	1	1.815	0.62	1.217	0	441	135	0.46
Total							3.652	---	---	1.37

## Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.46	0	-0.46	-19.31	19.31	0.1
2	42	-0.19	0	-0.19	-7.79	7.79	-0.15
3	42	-0.32	0	-0.32	-13.55	13.55	0.19
Total		-0.97	0	-0.97	-40.66	40.66	0.14

## Wind forces from mounts of panel antenna



## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.056	0	441	15	0.02
2	42	42	1	0.034	0.358	0.336	0	441	105	0.13
3	42	42	1	0.034	0.358	0.196	0	441	135	0.07
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.01	0	-0.01	-0.62	0.62	0
2	42	-0.09	0	-0.09	-3.74	3.74	-0.05
3	42	-0.05	0	-0.05	-2.18	2.18	0.02
Total		-0.16	0	-0.16	-6.54	6.54	-0.02

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	15	1.26	0.14	-0.04	2.11	0.23	-0.15
2	44	44	1200	1.131	0	445.4	255	-0.44	-0.57	-0.11	-0.19	-0.24	-0.06

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-1.71	0	-1.25	0	-0.15	0	-50.11	68.44	-0.03
2	44	-0.28	0	-0.12	0	-0.06	0	-5.08	12.54	-0.19
Total		-2	0	-1.37	---	---	---	-55.2	80.97	-0.21

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.016	0	436.5	15	0.01
2	44	44	1	0.034	0.244	0.23	0	445.4	105	0.09
Total						0.246	---	---	---	0.09

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0	0	0	-0.17	0.17	0

ASMTower 2018.4

Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

ASMTower 2018.4

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	-0.06	0	-0.06	-2.71	2.71	-0.03
Total		-0.07	0	-0.07	-2.88	2.88	-0.03

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	137.95	276.8	0.02
2	9	4.5	8	1.2	17.493	115.39	276.8	0.03
3	9	4.5	8	1.2	17.493	42.05	276.8	0.02
4	9	4.5	8	1.2	17.493	64.61	276.8	0.03
5	18	9	8	1.2	23.431	123.67	318.9	0.04
6	18	9	8	1.2	23.431	108.67	318.9	0.05
7	18	9	8	1.2	23.431	56.33	318.9	0.04
8	18	9	8	1.2	23.431	71.33	318.9	0.05
9	27	13.5	8	1.2	30.887	114.87	347.3	0.07
10	27	13.5	8	1.2	30.887	104.05	347.3	0.08
11	27	13.5	8	1.2	30.887	65.13	347.3	0.07
12	27	13.5	8	1.2	30.887	75.95	347.3	0.08
13	36	18	16	1.2	39	109.46	369	0.21
14	36	18	16	1.2	39	101.09	369	0.23
15	36	18	16	1.2	39	70.54	369	0.21
16	36	18	16	1.2	39	78.91	369	0.23
17	40	20	20	1.2	42.72	107.7	377.3	0.3
18	40	20	20	1.2	42.72	100.11	377.3	0.32
19	40	20	20	1.2	42.72	72.3	377.3	0.3
20	40	20	20	1.2	42.72	79.89	377.3	0.32

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0	-0.01	-0.01	-0.04	-0.06	0.1
2	9	4.5	-0.03	-0.01	-0.01	0	0.14	-0.23
3	9	4.5	0	0.01	-0.01	-0.04	-0.06	-0.1
4	9	4.5	-0.03	0.01	-0.01	0	0.14	0.23
5	18	9	-0.02	-0.02	-0.03	-0.24	0.01	0.19
6	18	9	-0.04	-0.01	-0.03	-0.16	0.42	-0.38
7	18	9	-0.02	0.02	-0.03	-0.24	0.01	-0.19
8	18	9	-0.04	0.01	-0.03	-0.16	0.42	0.38
9	27	13.5	-0.04	-0.03	-0.05	-0.64	0.34	0.3
10	27	13.5	-0.06	-0.02	-0.05	-0.55	0.88	-0.55
11	27	13.5	-0.04	0.03	-0.05	-0.64	0.34	-0.3

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.06	0.02	-0.05	-0.55	0.88	0.55
13	36	18	-0.13	-0.07	-0.15	-2.55	1.83	0.83
14	36	18	-0.17	-0.04	-0.15	-2.34	3.09	-1.5
15	36	18	-0.13	0.07	-0.15	-2.55	1.83	-0.83
16	36	18	-0.17	0.04	-0.15	-2.34	3.09	1.5
17	40	20	-0.19	-0.09	-0.21	-4.08	3.14	1.17
18	40	20	-0.23	-0.05	-0.21	-3.81	4.78	-2.1
19	40	20	-0.19	0.09	-0.21	-4.08	3.14	-1.17
20	40	20	-0.23	0.05	-0.21	-3.81	4.78	2.1
Total			-1.83	0	-1.82	-28.85	29.15	0

**Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 90**Gust effect factor  $G_h = 0.85$ Direction probability  $K_d = 0.85$ Important factor  $I = 1$ **Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.3	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	0.3	7.2	1.2	1.2	431.8	0.44
	3	33.75	4.5	0.25	1.125	0	0.3	7.11	1.2	1.35	421.2	0.48
3	2	29.25	4.5	0.25	1.125	0	0.3	7	1.2	1.35	408.7	0.47
	4	24.75	4.5	0.25	1.125	0	0.3	6.88	1.2	1.35	394.6	0.45
4	2	20.25	4.5	0.25	1.125	0	0.3	6.74	1.2	1.35	378.3	0.43
	5	15.75	4.5	0.25	1.125	0	0.3	6.56	1.2	1.35	358.8	0.41
5	2	11.25	4.5	0.25	1.125	0	0.3	6.33	1.2	1.35	334.2	0.38
	6	6.75	4.5	0.25	1.125	0	0.3	6	1.2	1.35	300.1	0.34
6	2	2.25	4.5	0.25	1.125	0	0.3	5.76	1.2	1.35	276.8	0.32
	Total										13.137	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.228	0	438.8	90	0.09
2	36 To 40	38	1	1.608	0.456	0.456	0	431.8	90	0.17
3	31.5 To 36	33.75	1	1.809	0.513	0.513	0	421.2	90	0.18
4	27 To 31.5	29.25	1	1.809	0.513	0.513	0	408.7	90	0.18
5	22.5 To 27	24.75	1	1.809	0.513	0.513	0	394.6	90	0.17

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.513	0	378.3	90	0.16	
7	13.5 To 18	15.75	1	1.809	0.513	0.513	0	358.8	90	0.16	
8	9 To 13.5	11.25	1	1.809	0.513	0.513	0	334.2	90	0.15	
9	4.5 To 9	6.75	1	1.809	0.513	0.513	0	300.1	90	0.13	
10	0 To 4.5	2.25	1	1.809	0.513	0.513	0	276.8	90	0.12	
Total							4.788	---	---	---	1.51

## Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0	0	-0.09	-3.49	0	0.03
2	38	0	0	-0.17	-6.36	0	0.05
3	33.75	0	0	-0.18	-6.2	0	0.06
4	29.25	0	0	-0.18	-5.21	0	0.05
5	24.75	0	0	-0.17	-4.26	0	0.05
6	20.25	0	0	-0.16	-3.34	0	0.05
7	15.75	0	0	-0.16	-2.46	0	0.05
8	11.25	0	0	-0.15	-1.64	0	0.04
9	6.75	0	0	-0.13	-0.88	0	0.04
10	2.25	0	0	-0.12	-0.27	0	0.04
Total		0	0	-1.51	-34.12	0	0.45

## Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	0.919	0	441	60	0.34
2	42	42	1	1.815	0.62	0.919	0	441	60	0.34
3	42	42	1	1.815	0.62	1.815	0	441	180	0.68
Total							3.652	---	---	1.37

## Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	-0.34	-14.47	0	0.18
2	42	0	0	-0.34	-14.47	0	-0.18
3	42	0	0	-0.68	-28.57	0	0
Total		0	0	-1.37	-57.5	0	0

## Wind forces from mounts of panel antenna

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.277	0	441	60	0.1
2	42	42	1	0.034	0.358	0.277	0	441	60	0.1
3	42	42	1	0.034	0.358	0.034	0	441	180	0.01
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	-0.1	-4.35	0	0.03
2	42	0	0	-0.1	-4.35	0	-0.03
3	42	0	0	-0.01	-0.53	0	0
Total		0	0	-0.22	-9.24	0	0

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	60	0.95	0.37	-0.01	1.59	0.62	-0.03
2	44	44	1200	1.131	0	445.4	300	0.95	-0.37	0.01	0.4	-0.16	0

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-1.07	0	-1.33	0	-0.03	0	-53.09	42.64	0.29
2	44	0.27	0	-0.34	0	0	0	-14.9	-11.96	-0.08
Total		-0.79	0	-1.67	---	---	---	-67.98	30.68	0.21

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.183	0	436.5	60	0.07
2	44	44	1	0.034	0.244	0.192	0	445.4	60	0.07
Total						0.375	---	---	---	0.14

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0	0	-0.07	-2.72	0	0.02

ASMTower 2018.4

Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

ASMTower 2018.4

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0	0	-0.07	-3.19	0	-0.02
Total		0	0	-0.14	-5.91	0	0

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	102.82	276.8	0.04
2	9	4.5	8	1.2	17.493	145.92	276.8	0.01
3	9	4.5	8	1.2	17.493	77.18	276.8	0.04
4	9	4.5	8	1.2	17.493	34.08	276.8	0.01
5	18	9	8	1.2	23.431	99.54	318.9	0.06
6	18	9	8	1.2	23.431	128.2	318.9	0.04
7	18	9	8	1.2	23.431	80.46	318.9	0.06
8	18	9	8	1.2	23.431	51.8	318.9	0.04
9	27	13.5	8	1.2	30.887	97.22	347.3	0.09
10	27	13.5	8	1.2	30.887	117.98	347.3	0.07
11	27	13.5	8	1.2	30.887	82.78	347.3	0.09
12	27	13.5	8	1.2	30.887	62.02	347.3	0.07
13	36	18	16	1.2	39	95.71	369	0.23
14	36	18	16	1.2	39	111.81	369	0.2
15	36	18	16	1.2	39	84.29	369	0.23
16	36	18	16	1.2	39	68.19	369	0.2
17	40	20	20	1.2	42.72	95.21	377.3	0.33
18	40	20	20	1.2	42.72	109.83	377.3	0.29
19	40	20	20	1.2	42.72	84.79	377.3	0.33
20	40	20	20	1.2	42.72	70.17	377.3	0.29

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.01	0	-0.04	-0.16	-0.06	0.28
2	9	4.5	0	-0.01	-0.01	0.04	0.04	-0.04
3	9	4.5	0.01	0	-0.04	-0.16	-0.06	-0.28
4	9	4.5	0	0.01	-0.01	0.04	0.04	0.04
5	18	9	0.01	-0.01	-0.06	-0.51	-0.11	0.44
6	18	9	0	-0.02	-0.03	-0.1	0.09	-0.09
7	18	9	0.01	0.01	-0.06	-0.51	-0.11	-0.44
8	18	9	0	0.02	-0.03	-0.1	0.09	0.09
9	27	13.5	0.01	-0.01	-0.09	-1.14	-0.14	0.63
10	27	13.5	0	-0.03	-0.06	-0.58	0.12	-0.15
11	27	13.5	0.01	0.01	-0.09	-1.14	-0.14	-0.63

## ASMTower 2018.4

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0	0.03	-0.06	-0.58	0.12	0.15
13	36	18	0.01	-0.02	-0.23	-4.12	-0.31	1.69
14	36	18	-0.01	-0.07	-0.19	-2.84	0.29	-0.42
15	36	18	0.01	0.02	-0.23	-4.12	-0.31	-1.69
16	36	18	-0.01	0.07	-0.19	-2.84	0.29	0.42
17	40	20	0.01	-0.03	-0.32	-6.44	-0.4	2.37
18	40	20	-0.01	-0.1	-0.27	-4.76	0.38	-0.6
19	40	20	0.01	0.03	-0.32	-6.44	-0.4	-2.37
20	40	20	-0.01	0.1	-0.27	-4.76	0.38	0.6
Total			0.01	0	-2.59	-41.24	-0.22	0

**Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 135**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.84	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	0.84	7.2	1.2	1.2	431.8	0.44
	3	33.75	4.5	0.25	1.125	0	0.84	7.11	1.2	1.35	421.2	0.48
4	2	29.25	4.5	0.25	1.125	0	0.84	7	1.2	1.35	408.7	0.47
	1	24.75	4.5	0.25	1.125	0	0.84	6.88	1.2	1.35	394.6	0.45
5	2	20.25	4.5	0.25	1.125	0	0.84	6.74	1.2	1.35	378.3	0.43
	1	15.75	4.5	0.25	1.125	0	0.84	6.56	1.2	1.35	358.8	0.41
6	2	11.25	4.5	0.25	1.125	0	0.84	6.33	1.2	1.35	334.2	0.38
	1	6.75	4.5	0.25	1.125	0	0.84	6	1.2	1.35	300.1	0.34
6	2	2.25	4.5	0.25	1.125	0	0.84	5.76	1.2	1.35	276.8	0.32
	Total										13.137	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.443	0	438.8	135	0.17
2	36 To 40	38	1	1.608	0.456	0.886	0	431.8	135	0.33
3	31.5 To 36	33.75	1	1.809	0.513	0.996	0	421.2	135	0.36
4	27 To 31.5	29.25	1	1.809	0.513	0.996	0	408.7	135	0.35
5	22.5 To 27	24.75	1	1.809	0.513	0.996	0	394.6	135	0.33

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.996	0	378.3	135	0.32	
7	13.5 To 18	15.75	1	1.809	0.513	0.996	0	358.8	135	0.3	
8	9 To 13.5	11.25	1	1.809	0.513	0.996	0	334.2	135	0.28	
9	4.5 To 9	6.75	1	1.809	0.513	0.996	0	300.1	135	0.25	
10	0 To 4.5	2.25	1	1.809	0.513	0.996	0	276.8	135	0.23	
Total							9.3	---	---	---	2.92

## Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0.12	0	-0.12	-4.79	-4.79	0.04
2	38	0.23	0	-0.23	-8.74	-8.74	0.07
3	33.75	0.25	0	-0.25	-8.51	-8.51	0.08
4	29.25	0.24	0	-0.24	-7.16	-7.16	0.07
5	24.75	0.24	0	-0.24	-5.85	-5.85	0.07
6	20.25	0.23	0	-0.23	-4.59	-4.59	0.07
7	15.75	0.21	0	-0.21	-3.38	-3.38	0.06
8	11.25	0.2	0	-0.2	-2.25	-2.25	0.06
9	6.75	0.18	0	-0.18	-1.21	-1.21	0.05
10	2.25	0.17	0	-0.17	-0.37	-0.37	0.05
Total		2.07	0	-2.07	-46.85	-46.85	0.62

## Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	0.7	0	441	105	0.26
2	42	42	1	1.815	0.62	1.735	0	441	15	0.65
3	42	42	1	1.815	0.62	1.217	0	441	135	0.46
Total							3.652	---	---	1.37

## Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.19	0	-0.19	-7.79	-7.79	0.15
2	42	0.46	0	-0.46	-19.31	-19.31	-0.1
3	42	0.32	0	-0.32	-13.55	-13.55	-0.19
Total		0.97	0	-0.97	-40.66	-40.66	-0.14

## Wind forces from mounts of panel antenna



## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.336	0	441	105	0.13
2	42	42	1	0.034	0.358	0.056	0	441	15	0.02
3	42	42	1	0.034	0.358	0.196	0	441	135	0.07
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.09	0	-0.09	-3.74	-3.74	0.05
2	42	0.01	0	-0.01	-0.62	-0.62	0
3	42	0.05	0	-0.05	-2.18	-2.18	-0.02
Total		0.16	0	-0.16	-6.54	-6.54	0.02

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	105	-0.44	0.57	0.11	-0.74	0.95	0.46
2	44	44	1200	1.131	0	445.4	345	1.26	-0.14	0.04	0.54	-0.06	0.02

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	1.12	0	-0.45	0	0.46	0	-18.12	-44.69	0.96
2	44	0.44	0	-0.32	0	0.02	0	-14.06	-19.2	-0.01
Total		1.55	0	-0.77	---	---	---	-32.18	-63.89	0.94

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.228	0	436.5	105	0.08
2	44	44	1	0.034	0.244	0.048	0	445.4	15	0.02
Total						0.276	---	---	---	0.1

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0.06	0	-0.06	-2.39	-2.39	0.03

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0.01	0	-0.01	-0.57	-0.57	0
Total		0.07	0	-0.07	-2.96	-2.96	0.03

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	64.61	276.8	0.03
2	9	4.5	8	1.2	17.493	137.95	276.8	0.02
3	9	4.5	8	1.2	17.493	115.39	276.8	0.03
4	9	4.5	8	1.2	17.493	42.05	276.8	0.02
5	18	9	8	1.2	23.431	71.33	318.9	0.05
6	18	9	8	1.2	23.431	123.67	318.9	0.04
7	18	9	8	1.2	23.431	108.67	318.9	0.05
8	18	9	8	1.2	23.431	56.33	318.9	0.04
9	27	13.5	8	1.2	30.887	75.95	347.3	0.08
10	27	13.5	8	1.2	30.887	114.87	347.3	0.07
11	27	13.5	8	1.2	30.887	104.05	347.3	0.08
12	27	13.5	8	1.2	30.887	65.13	347.3	0.07
13	36	18	16	1.2	39	78.91	369	0.23
14	36	18	16	1.2	39	109.46	369	0.21
15	36	18	16	1.2	39	101.09	369	0.23
16	36	18	16	1.2	39	70.54	369	0.21
17	40	20	20	1.2	42.72	79.89	377.3	0.32
18	40	20	20	1.2	42.72	107.7	377.3	0.3
19	40	20	20	1.2	42.72	100.11	377.3	0.32
20	40	20	20	1.2	42.72	72.3	377.3	0.3

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.01	0.01	-0.03	-0.14	0	0.23
2	9	4.5	0.01	-0.01	0	0.06	-0.04	0.1
3	9	4.5	0.01	-0.01	-0.03	-0.14	0	-0.23
4	9	4.5	0.01	0.01	0	0.06	-0.04	-0.1
5	18	9	0.03	0.01	-0.04	-0.42	-0.16	0.38
6	18	9	0.03	-0.02	-0.02	-0.01	-0.24	0.19
7	18	9	0.03	-0.01	-0.04	-0.42	-0.16	-0.38
8	18	9	0.03	0.02	-0.02	-0.01	-0.24	-0.19
9	27	13.5	0.05	0.02	-0.06	-0.88	-0.55	0.55
10	27	13.5	0.05	-0.03	-0.04	-0.34	-0.64	0.3
11	27	13.5	0.05	-0.02	-0.06	-0.88	-0.55	-0.55

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.05	0.03	-0.04	-0.34	-0.64	-0.3
13	36	18	0.15	0.04	-0.17	-3.09	-2.34	1.5
14	36	18	0.15	-0.07	-0.13	-1.83	-2.55	0.83
15	36	18	0.15	-0.04	-0.17	-3.09	-2.34	-1.5
16	36	18	0.15	0.07	-0.13	-1.83	-2.55	-0.83
17	40	20	0.21	0.05	-0.23	-4.78	-3.81	2.1
18	40	20	0.21	-0.09	-0.19	-3.14	-4.08	1.17
19	40	20	0.21	-0.05	-0.23	-4.78	-3.81	-2.1
20	40	20	0.21	0.09	-0.19	-3.14	-4.08	-1.17
Total			1.82	0	-1.83	-29.15	-28.85	0

**Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 180**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.07	7.26	0.72	0.36	438.8	0.13
2	1	38	4	0.25	1	0	0.07	7.2	0.73	0.727	431.8	0.27
	2	29.25	4.5	0.25	1.125	0	0.07	7.11	0.74	0.828	421.2	0.3
3	1	33.75	4.5	0.25	1.125	0	0.07	7	0.75	0.84	408.7	0.29
	2	29.25	4.5	0.25	1.125	0	0.07	6.88	0.76	0.855	394.6	0.29
4	1	24.75	4.5	0.25	1.125	0	0.07	6.74	0.78	0.874	378.3	0.28
	2	20.25	4.5	0.25	1.125	0	0.07	6.56	0.8	0.897	358.8	0.27
5	1	15.75	4.5	0.25	1.125	0	0.07	6.33	0.83	0.929	334.2	0.26
	2	11.25	4.5	0.25	1.125	0	0.07	6	0.87	0.981	300.1	0.25
6	1	6.75	4.5	0.25	1.125	0	0.07	5.76	0.91	1.021	276.8	0.24
	2	2.25	4.5	0.25	1.125	0	0.07					
Total										8.849	---	2.79

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0	0	438.8	180	0
2	36 To 40	38	1	1.608	0.456	0	0	431.8	180	0
3	31.5 To 36	33.75	1	1.809	0.513	0	0	421.2	180	0
4	27 To 31.5	29.25	1	1.809	0.513	0	0	408.7	180	0
5	22.5 To 27	24.75	1	1.809	0.513	0	0	394.6	180	0

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
6	18 To 22.5	20.25	1	1.809	0.513	0	0	378.3	180	0
7	13.5 To 18	15.75	1	1.809	0.513	0	0	358.8	180	0
8	9 To 13.5	11.25	1	1.809	0.513	0	0	334.2	180	0
9	4.5 To 9	6.75	1	1.809	0.513	0	0	300.1	180	0
10	0 To 4.5	2.25	1	1.809	0.513	0	0	276.8	180	0
Total							0	---	---	0

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0	0	0	0	0	0
2	38	0	0	0	0	0	0
3	33.75	0	0	0	0	0	0
4	29.25	0	0	0	0	0	0
5	24.75	0	0	0	0	0	0
6	20.25	0	0	0	0	0	0
7	15.75	0	0	0	0	0	0
8	11.25	0	0	0	0	0	0
9	6.75	0	0	0	0	0	0
10	2.25	0	0	0	0	0	0
Total		0	0	0	0	0	0

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	1.516	0	441	150	0.57
2	42	42	1	1.815	0.62	1.516	0	441	30	0.57
3	42	42	1	1.815	0.62	0.62	0	441	90	0.23
Total						3.652	---	---	---	1.37

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.57	0	0	0	-23.87	0.17
2	42	0.57	0	0	0	-23.87	0.17
3	42	0.23	0	0	0	-9.76	-0.14
Total		1.37	0	0	0	-57.5	0.2

### Wind forces from mounts of panel antenna

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.115	0	441	150	0.04
2	42	42	1	0.034	0.358	0.115	0	441	30	0.04
3	42	42	1	0.034	0.358	0.358	0	441	90	0.13
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.04	0	0	0	-1.81	0.01
2	42	0.04	0	0	0	-1.81	0.01
3	42	0.13	0	0	0	-5.63	-0.05
Total		0.22	0	0	0	-9.24	-0.04

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	150	-0.96	0.18	0.06	-1.61	0.3	0.25
2	44	44	1200	1.131	0	445.4	30	1.21	0.23	-0.05	0.52	0.1	-0.03

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	1.54	0	0.55	0	0.25	0	21.91	-61.55	0.4
2	44	0.5	0	-0.17	0	-0.03	0	-7.58	-21.96	0.03
Total		2.04	0	0.38	---	---	---	14.32	-83.51	0.43

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.061	0	436.5	150	0.02
2	44	44	1	0.034	0.244	0.087	0	445.4	30	0.03
Total						0.148	---	---	---	0.06

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0.02	0	0	0	-0.91	0

ASMTower 2018.4

Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

ASMTower 2018.4

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0.03	0	0	0	-1.44	0.01
Total		0.06	0	0	0	-2.35	0.01

### Wind forces from guy wires

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	34.08	276.8	0.01
2	9	4.5	8	1.2	17.493	102.82	276.8	0.04
3	9	4.5	8	1.2	17.493	145.92	276.8	0.01
4	9	4.5	8	1.2	17.493	77.18	276.8	0.04
5	18	9	8	1.2	23.431	51.8	318.9	0.04
6	18	9	8	1.2	23.431	99.54	318.9	0.06
7	18	9	8	1.2	23.431	128.2	318.9	0.04
8	18	9	8	1.2	23.431	80.46	318.9	0.06
9	27	13.5	8	1.2	30.887	62.02	347.3	0.07
10	27	13.5	8	1.2	30.887	97.22	347.3	0.09
11	27	13.5	8	1.2	30.887	117.98	347.3	0.07
12	27	13.5	8	1.2	30.887	82.78	347.3	0.09
13	36	18	16	1.2	39	68.19	369	0.2
14	36	18	16	1.2	39	95.71	369	0.23
15	36	18	16	1.2	39	111.81	369	0.2
16	36	18	16	1.2	39	84.29	369	0.23
17	40	20	20	1.2	42.72	70.17	377.3	0.29
18	40	20	20	1.2	42.72	95.21	377.3	0.33
19	40	20	20	1.2	42.72	109.83	377.3	0.29
20	40	20	20	1.2	42.72	84.79	377.3	0.33

### Wind vector from guy wires

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0.01	0.01	0	-0.04	0.04	0.04
2	9	4.5	0.04	0	0.01	0.06	-0.16	0.28
3	9	4.5	0.01	-0.01	0	-0.04	0.04	-0.04
4	9	4.5	0.04	0	0.01	0.06	-0.16	-0.28
5	18	9	0.03	0.02	0	-0.09	-0.1	0.09
6	18	9	0.06	-0.01	0.01	0.11	-0.51	0.44
7	18	9	0.03	-0.02	0	-0.09	-0.1	-0.09
8	18	9	0.06	0.01	0.01	0.11	-0.51	-0.44
9	27	13.5	0.06	0.03	0	-0.12	-0.58	0.15
10	27	13.5	0.09	-0.01	0.01	0.14	-1.14	0.63
11	27	13.5	0.06	-0.03	0	-0.12	-0.58	-0.15

## ASMTower 2018.4

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.09	0.01	0.01	0.14	-1.14	-0.63
13	36	18	0.19	0.07	-0.01	-0.29	-2.84	0.42
14	36	18	0.23	-0.02	0.01	0.31	-4.12	1.69
15	36	18	0.19	-0.07	-0.01	-0.29	-2.84	-0.42
16	36	18	0.23	0.02	0.01	0.31	-4.12	-1.69
17	40	20	0.27	0.1	-0.01	-0.38	-4.76	0.6
18	40	20	0.32	-0.03	0.01	0.4	-6.44	2.37
19	40	20	0.27	-0.1	-0.01	-0.38	-4.76	-0.6
20	40	20	0.32	0.03	0.01	0.4	-6.44	-2.37
Total			2.59	0	0.01	0.22	-41.24	0

**Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 225**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.84	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	0.84	7.2	1.2	1.2	431.8	0.44
	3	33.75	4.5	0.25	1.125	0	0.84	7.11	1.2	1.35	421.2	0.48
3	2	29.25	4.5	0.25	1.125	0	0.84	7	1.2	1.35	408.7	0.47
	4	24.75	4.5	0.25	1.125	0	0.84	6.88	1.2	1.35	394.6	0.45
4	2	20.25	4.5	0.25	1.125	0	0.84	6.74	1.2	1.35	378.3	0.43
	5	15.75	4.5	0.25	1.125	0	0.84	6.56	1.2	1.35	358.8	0.41
5	2	11.25	4.5	0.25	1.125	0	0.84	6.33	1.2	1.35	334.2	0.38
	6	6.75	4.5	0.25	1.125	0	0.84	6	1.2	1.35	300.1	0.34
6	2	2.25	4.5	0.25	1.125	0	0.84	5.76	1.2	1.35	276.8	0.32
	Total										13.137	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.443	0	438.8	135	0.17
2	36 To 40	38	1	1.608	0.456	0.886	0	431.8	135	0.33
3	31.5 To 36	33.75	1	1.809	0.513	0.996	0	421.2	135	0.36
4	27 To 31.5	29.25	1	1.809	0.513	0.996	0	408.7	135	0.35
5	22.5 To 27	24.75	1	1.809	0.513	0.996	0	394.6	135	0.33

ASMTower 2018.4

Job No. 40m Guyed Pole

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Client OG

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Project GSM Network

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.996	0	378.3	135	0.32	
7	13.5 To 18	15.75	1	1.809	0.513	0.996	0	358.8	135	0.3	
8	9 To 13.5	11.25	1	1.809	0.513	0.996	0	334.2	135	0.28	
9	4.5 To 9	6.75	1	1.809	0.513	0.996	0	300.1	135	0.25	
10	0 To 4.5	2.25	1	1.809	0.513	0.996	0	276.8	135	0.23	
Total							9.3	---	---	---	2.92

**Wind vector from transmission line clusters**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0.12	0	0.12	4.79	-4.79	-0.04
2	38	0.23	0	0.23	8.74	-8.74	-0.07
3	33.75	0.25	0	0.25	8.51	-8.51	-0.08
4	29.25	0.24	0	0.24	7.16	-7.16	-0.07
5	24.75	0.24	0	0.24	5.85	-5.85	-0.07
6	20.25	0.23	0	0.23	4.59	-4.59	-0.07
7	15.75	0.21	0	0.21	3.38	-3.38	-0.06
8	11.25	0.2	0	0.2	2.25	-2.25	-0.06
9	6.75	0.18	0	0.18	1.21	-1.21	-0.05
10	2.25	0.17	0	0.17	0.37	-0.37	-0.05
Total		2.07	0	2.07	46.85	-46.85	-0.62

**Wind forces from panel antenna**

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	1.735	0	441	165	0.65	
2	42	42	1	1.815	0.62	0.7	0	441	75	0.26	
3	42	42	1	1.815	0.62	1.217	0	441	45	0.46	
Total							3.652	---	---	---	1.37

**Wind vector from panel antenna**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.46	0	0.46	19.31	-19.31	-0.1
2	42	0.19	0	0.19	7.79	-7.79	0.15
3	42	0.32	0	0.32	13.55	-13.55	-0.19
Total		0.97	0	0.97	40.66	-40.66	-0.14

**Wind forces from mounts of panel antenna**



## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.056	0	441	165	0.02
2	42	42	1	0.034	0.358	0.336	0	441	75	0.13
3	42	42	1	0.034	0.358	0.196	0	441	45	0.07
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0.01	0	0.01	0.62	-0.62	0
2	42	0.09	0	0.09	3.74	-3.74	0.05
3	42	0.05	0	0.05	2.18	-2.18	-0.02
Total		0.16	0	0.16	6.54	-6.54	0.02

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	195	-0.98	-0.12	-0.03	-1.65	-0.21	-0.13
2	44	44	1200	1.131	0	445.4	75	0.47	0.53	0.05	0.2	0.23	0.02

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	1.33	0	1.01	0	-0.13	0	40.2	-53.11	-0.24
2	44	0.29	0	0.1	0	0.02	0	4.18	-12.7	0.14
Total		1.62	0	1.1	---	---	---	44.39	-65.81	-0.1

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.016	0	436.5	165	0.01
2	44	44	1	0.034	0.244	0.23	0	445.4	75	0.09
Total						0.246	---	---	---	0.09

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0	0	0	0.17	-0.17	0

ASMTower 2018.4

Job No. 40m Guyed Pole

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Project GSM Network

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Checked by A.S.M

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0.06	0	0.06	2.71	-2.71	0.03
Total		0.07	0	0.07	2.88	-2.88	0.03

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	42.05	276.8	0.02
2	9	4.5	8	1.2	17.493	64.61	276.8	0.03
3	9	4.5	8	1.2	17.493	137.95	276.8	0.02
4	9	4.5	8	1.2	17.493	115.39	276.8	0.03
5	18	9	8	1.2	23.431	56.33	318.9	0.04
6	18	9	8	1.2	23.431	71.33	318.9	0.05
7	18	9	8	1.2	23.431	123.67	318.9	0.04
8	18	9	8	1.2	23.431	108.67	318.9	0.05
9	27	13.5	8	1.2	30.887	65.13	347.3	0.07
10	27	13.5	8	1.2	30.887	75.95	347.3	0.08
11	27	13.5	8	1.2	30.887	114.87	347.3	0.07
12	27	13.5	8	1.2	30.887	104.05	347.3	0.08
13	36	18	16	1.2	39	70.54	369	0.21
14	36	18	16	1.2	39	78.91	369	0.23
15	36	18	16	1.2	39	109.46	369	0.21
16	36	18	16	1.2	39	101.09	369	0.23
17	40	20	20	1.2	42.72	72.3	377.3	0.3
18	40	20	20	1.2	42.72	79.89	377.3	0.32
19	40	20	20	1.2	42.72	107.7	377.3	0.3
20	40	20	20	1.2	42.72	100.11	377.3	0.32

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	0	0.01	0.01	0.04	0.06	-0.1
2	9	4.5	0.03	0.01	0.01	0	-0.14	0.23
3	9	4.5	0	-0.01	0.01	0.04	0.06	0.1
4	9	4.5	0.03	-0.01	0.01	0	-0.14	-0.23
5	18	9	0.02	0.02	0.03	0.24	-0.01	-0.19
6	18	9	0.04	0.01	0.03	0.16	-0.42	0.38
7	18	9	0.02	-0.02	0.03	0.24	-0.01	0.19
8	18	9	0.04	-0.01	0.03	0.16	-0.42	-0.38
9	27	13.5	0.04	0.03	0.05	0.64	-0.34	-0.3
10	27	13.5	0.06	0.02	0.05	0.55	-0.88	0.55
11	27	13.5	0.04	-0.03	0.05	0.64	-0.34	0.3

## ASMTower 2018.4

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0.06	-0.02	0.05	0.55	-0.88	-0.55
13	36	18	0.13	0.07	0.15	2.55	-1.83	-0.83
14	36	18	0.17	0.04	0.15	2.34	-3.09	1.5
15	36	18	0.13	-0.07	0.15	2.55	-1.83	0.83
16	36	18	0.17	-0.04	0.15	2.34	-3.09	-1.5
17	40	20	0.19	0.09	0.21	4.08	-3.14	-1.17
18	40	20	0.23	0.05	0.21	3.81	-4.78	2.1
19	40	20	0.19	-0.09	0.21	4.08	-3.14	1.17
20	40	20	0.23	-0.05	0.21	3.81	-4.78	-2.1
Total			1.83	0	1.82	28.85	-29.15	0

**Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 270**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.3	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	0.3	7.2	1.2	1.2	431.8	0.44
	3	33.75	4.5	0.25	1.125	0	0.3	7.11	1.2	1.35	421.2	0.48
4	2	29.25	4.5	0.25	1.125	0	0.3	7	1.2	1.35	408.7	0.47
	1	24.75	4.5	0.25	1.125	0	0.3	6.88	1.2	1.35	394.6	0.45
5	2	20.25	4.5	0.25	1.125	0	0.3	6.74	1.2	1.35	378.3	0.43
	1	15.75	4.5	0.25	1.125	0	0.3	6.56	1.2	1.35	358.8	0.41
6	2	11.25	4.5	0.25	1.125	0	0.3	6.33	1.2	1.35	334.2	0.38
	1	6.75	4.5	0.25	1.125	0	0.3	6	1.2	1.35	300.1	0.34
6	2	2.25	4.5	0.25	1.125	0	0.3	5.76	1.2	1.35	276.8	0.32
	Total										13.137	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.228	0	438.8	90	0.09
2	36 To 40	38	1	1.608	0.456	0.456	0	431.8	90	0.17
3	31.5 To 36	33.75	1	1.809	0.513	0.513	0	421.2	90	0.18
4	27 To 31.5	29.25	1	1.809	0.513	0.513	0	408.7	90	0.18
5	22.5 To 27	24.75	1	1.809	0.513	0.513	0	394.6	90	0.17

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	0.513	0	378.3	90	0.16	
7	13.5 To 18	15.75	1	1.809	0.513	0.513	0	358.8	90	0.16	
8	9 To 13.5	11.25	1	1.809	0.513	0.513	0	334.2	90	0.15	
9	4.5 To 9	6.75	1	1.809	0.513	0.513	0	300.1	90	0.13	
10	0 To 4.5	2.25	1	1.809	0.513	0.513	0	276.8	90	0.12	
Total							4.788	---	---	---	1.51

### Wind vector from transmission line clusters

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	0	0	0.09	3.49	0	-0.03
2	38	0	0	0.17	6.36	0	-0.05
3	33.75	0	0	0.18	6.2	0	-0.06
4	29.25	0	0	0.18	5.21	0	-0.05
5	24.75	0	0	0.17	4.26	0	-0.05
6	20.25	0	0	0.16	3.34	0	-0.05
7	15.75	0	0	0.16	2.46	0	-0.05
8	11.25	0	0	0.15	1.64	0	-0.04
9	6.75	0	0	0.13	0.88	0	-0.04
10	2.25	0	0	0.12	0.27	0	-0.04
Total		0	0	1.51	34.12	0	-0.45

### Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
1	42	42	1	1.815	0.62	0.919	0	441	120	0.34	
2	42	42	1	1.815	0.62	0.919	0	441	120	0.34	
3	42	42	1	1.815	0.62	1.815	0	441	0	0.68	
Total							3.652	---	---	---	1.37

### Wind vector from panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	0.34	14.47	0	-0.18
2	42	0	0	0.34	14.47	0	0.18
3	42	0	0	0.68	28.57	0	0
Total		0	0	1.37	57.5	0	0

### Wind forces from mounts of panel antenna

## ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.277	0	441	120	0.1
2	42	42	1	0.034	0.358	0.277	0	441	120	0.1
3	42	42	1	0.034	0.358	0.034	0	441	0	0.01
Total						0.587	---	---	---	0.22

## Wind vector from mounts of panel antenna

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	0	0	0.1	4.35	0	-0.03
2	42	0	0	0.1	4.35	0	0.03
3	42	0	0	0.01	0.53	0	0
Total		0	0	0.22	9.24	0	0

## Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	240	-0.71	-0.44	-0.1	-1.19	-0.73	-0.42
2	44	44	1200	1.131	0	445.4	120	-0.71	0.44	0.1	-0.3	0.19	0.05

## Wind vectors from MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0.67	0	1.23	0	-0.42	0	49.31	-26.65	-0.8
2	44	-0.17	0	0.31	0	0.05	0	13.83	7.48	0.15
Total		0.5	0	1.55	---	---	---	63.14	-19.17	-0.65

## Wind forces from mounts Of MW dishes

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.183	0	436.5	120	0.07
2	44	44	1	0.034	0.244	0.192	0	445.4	120	0.07
Total						0.375	---	---	---	0.14

## Wind vectors from mounts Of MW dishes

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	0	0	0.07	2.72	0	-0.02

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	0	0	0.07	3.19	0	0.02
Total		0	0	0.14	5.91	0	0

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	77.18	276.8	0.04
2	9	4.5	8	1.2	17.493	34.08	276.8	0.01
3	9	4.5	8	1.2	17.493	102.82	276.8	0.04
4	9	4.5	8	1.2	17.493	145.92	276.8	0.01
5	18	9	8	1.2	23.431	80.46	318.9	0.06
6	18	9	8	1.2	23.431	51.8	318.9	0.04
7	18	9	8	1.2	23.431	99.54	318.9	0.06
8	18	9	8	1.2	23.431	128.2	318.9	0.04
9	27	13.5	8	1.2	30.887	82.78	347.3	0.09
10	27	13.5	8	1.2	30.887	62.02	347.3	0.07
11	27	13.5	8	1.2	30.887	97.22	347.3	0.09
12	27	13.5	8	1.2	30.887	117.98	347.3	0.07
13	36	18	16	1.2	39	84.29	369	0.23
14	36	18	16	1.2	39	68.19	369	0.2
15	36	18	16	1.2	39	95.71	369	0.23
16	36	18	16	1.2	39	111.81	369	0.2
17	40	20	20	1.2	42.72	84.79	377.3	0.33
18	40	20	20	1.2	42.72	70.17	377.3	0.29
19	40	20	20	1.2	42.72	95.21	377.3	0.33
20	40	20	20	1.2	42.72	109.83	377.3	0.29

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.01	0	0.04	0.16	0.06	-0.28
2	9	4.5	0	0.01	0.01	-0.04	-0.04	0.04
3	9	4.5	-0.01	0	0.04	0.16	0.06	0.28
4	9	4.5	0	-0.01	0.01	-0.04	-0.04	-0.04
5	18	9	-0.01	0.01	0.06	0.51	0.11	-0.44
6	18	9	0	0.02	0.03	0.1	-0.09	0.09
7	18	9	-0.01	-0.01	0.06	0.51	0.11	0.44
8	18	9	0	-0.02	0.03	0.1	-0.09	-0.09
9	27	13.5	-0.01	0.01	0.09	1.14	0.14	-0.63
10	27	13.5	0	0.03	0.06	0.58	-0.12	0.15
11	27	13.5	-0.01	-0.01	0.09	1.14	0.14	0.63

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	0	-0.03	0.06	0.58	-0.12	-0.15
13	36	18	-0.01	0.02	0.23	4.12	0.31	-1.69
14	36	18	0.01	0.07	0.19	2.84	-0.29	0.42
15	36	18	-0.01	-0.02	0.23	4.12	0.31	1.69
16	36	18	0.01	-0.07	0.19	2.84	-0.29	-0.42
17	40	20	-0.01	0.03	0.32	6.44	0.4	-2.37
18	40	20	0.01	0.1	0.27	4.76	-0.38	0.6
19	40	20	-0.01	-0.03	0.32	6.44	0.4	2.37
20	40	20	0.01	-0.1	0.27	4.76	-0.38	-0.6
Total			-0.01	0	2.59	41.24	0.22	0

**Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 315**

Gust effect factor	G <sub>h</sub> =	0.85
Direction probability	K <sub>d</sub> =	0.85
Important factor	I =	1

**Wind forces on pole parts**

Part No.	Wind slice No.	Mean Elev. m	L m	D <sub>av</sub> m	Area m <sup>2</sup>	t <sub>iz</sub> mm	R <sub>a</sub>	C	C <sub>f</sub>	EPA m <sup>2</sup>	q <sub>z</sub> N/m <sup>2</sup>	Force KN
1	1	43.5	3	0.25	0.75	0	0	7.3	0.72	0.537	444.3	0.2
	2	41	2	0.25	0.5	0	0.97	7.26	1.2	0.6	438.8	0.22
2	1	38	4	0.25	1	0	0.97	7.2	1.2	1.2	431.8	0.44
	3	33.75	4.5	0.25	1.125	0	0.97	7.11	1.2	1.35	421.2	0.48
4	2	29.25	4.5	0.25	1.125	0	0.97	7	1.2	1.35	408.7	0.47
	1	24.75	4.5	0.25	1.125	0	0.97	6.88	1.2	1.35	394.6	0.45
5	2	20.25	4.5	0.25	1.125	0	0.97	6.74	1.2	1.35	378.3	0.43
	1	15.75	4.5	0.25	1.125	0	0.97	6.56	1.2	1.35	358.8	0.41
6	2	11.25	4.5	0.25	1.125	0	0.97	6.33	1.2	1.35	334.2	0.38
	1	6.75	4.5	0.25	1.125	0	0.97	6	1.2	1.35	300.1	0.34
6	2	2.25	4.5	0.25	1.125	0	0.97	5.76	1.2	1.35	276.8	0.32
	Total										13.137	---

**Wind forces from transmission line clusters**

#	Elev. m	Z m	K <sub>a</sub>	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40 To 42	41	1	0.804	0.228	0.516	0	438.8	45	0.19
2	36 To 40	38	1	1.608	0.456	1.032	0	431.8	45	0.38
3	31.5 To 36	33.75	1	1.809	0.513	1.161	0	421.2	45	0.42
4	27 To 31.5	29.25	1	1.809	0.513	1.161	0	408.7	45	0.4
5	22.5 To 27	24.75	1	1.809	0.513	1.161	0	394.6	45	0.39

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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN	
6	18 To 22.5	20.25	1	1.809	0.513	1.161	0	378.3	45	0.37	
7	13.5 To 18	15.75	1	1.809	0.513	1.161	0	358.8	45	0.35	
8	9 To 13.5	11.25	1	1.809	0.513	1.161	0	334.2	45	0.33	
9	4.5 To 9	6.75	1	1.809	0.513	1.161	0	300.1	45	0.3	
10	0 To 4.5	2.25	1	1.809	0.513	1.161	0	276.8	45	0.27	
Total							10.836	---	---	---	3.41

**Wind vector from transmission line clusters**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	41	-0.14	0	0.14	5.58	5.58	-0.04
2	38	-0.27	0	0.27	10.18	10.18	-0.08
3	33.75	-0.29	0	0.29	9.92	9.92	-0.09
4	29.25	-0.29	0	0.29	8.34	8.34	-0.09
5	24.75	-0.28	0	0.28	6.81	6.81	-0.08
6	20.25	-0.26	0	0.26	5.34	5.34	-0.08
7	15.75	-0.25	0	0.25	3.94	3.94	-0.08
8	11.25	-0.23	0	0.23	2.62	2.62	-0.07
9	6.75	-0.21	0	0.21	1.41	1.41	-0.06
10	2.25	-0.19	0	0.19	0.43	0.43	-0.06
Total		-2.41	0	2.41	54.59	54.59	-0.72

**Wind forces from panel antenna**

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	1.815	0.62	0.7	0	441	75	0.26
2	42	42	1	1.815	0.62	1.735	0	441	165	0.65
3	42	42	1	1.815	0.62	1.217	0	441	45	0.46
Total							3.652	---	---	1.37

**Wind vector from panel antenna**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.19	0	0.19	7.79	7.79	-0.15
2	42	-0.46	0	0.46	19.31	19.31	0.1
3	42	-0.32	0	0.32	13.55	13.55	0.19
Total		-0.97	0	0.97	40.66	40.66	0.14

**Wind forces from mounts of panel antenna**



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#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	42	42	1	0.034	0.358	0.336	0	441	75	0.13
2	42	42	1	0.034	0.358	0.056	0	441	165	0.02
3	42	42	1	0.034	0.358	0.196	0	441	45	0.07
Total						0.587	---	---	---	0.22

**Wind vector from mounts of panel antenna**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	42	-0.09	0	0.09	3.74	3.74	-0.05
2	42	-0.01	0	0.01	0.62	0.62	0
3	42	-0.05	0	0.05	2.18	2.18	0.02
Total		-0.16	0	0.16	6.54	6.54	-0.02

**Wind forces from MW dishes**

#	Elev. m	Z m	O.D. mm	Area m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	C <sub>a</sub>	C <sub>s</sub>	C <sub>m</sub>	F <sub>a</sub> KN	F <sub>s</sub> KN	M <sub>m</sub> KN
1	40	40	2400	4.524	0	436.5	285	0.47	-0.53	-0.05	0.79	-0.89	-0.19
2	44	44	1200	1.131	0	445.4	165	-0.98	0.12	0.03	-0.42	0.05	0.02

**Wind vectors from MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-1.13	0	0.37	0	-0.19	0	14.91	45.25	-0.65
2	44	-0.34	0	0.26	0	0.02	0	11.28	14.9	0.04
Total		-1.47	0	0.63	---	---	---	26.19	60.16	-0.61

**Wind forces from mounts Of MW dishes**

#	Elev. m	Z m	Ka	EPA <sub>n</sub> m <sup>2</sup>	EPA <sub>t</sub> m <sup>2</sup>	EPA <sub>a</sub> m <sup>2</sup>	t <sub>iz</sub> mm	q <sub>z</sub> N/m <sup>2</sup>	q Deg	Force KN
1	40	40	1	0	0.244	0.228	0	436.5	75	0.08
2	44	44	1	0.034	0.244	0.048	0	445.4	165	0.02
Total						0.276	---	---	---	0.1

**Wind vectors from mounts Of MW dishes**

#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	40	-0.06	0	0.06	2.39	2.39	-0.03

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#	Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
2	44	-0.01	0	0.01	0.57	0.57	0
Total		-0.07	0	0.07	2.96	2.96	-0.03

**Wind forces from guy wires**

#	Attach Elev. m	Mean Elev. m	Dia. mm	C <sub>d</sub>	L <sub>g</sub> m	qg Deg	q <sub>z</sub> N/m <sup>2</sup>	Fw KN
1	9	4.5	8	1.2	17.493	115.39	276.8	0.03
2	9	4.5	8	1.2	17.493	42.05	276.8	0.02
3	9	4.5	8	1.2	17.493	64.61	276.8	0.03
4	9	4.5	8	1.2	17.493	137.95	276.8	0.02
5	18	9	8	1.2	23.431	108.67	318.9	0.05
6	18	9	8	1.2	23.431	56.33	318.9	0.04
7	18	9	8	1.2	23.431	71.33	318.9	0.05
8	18	9	8	1.2	23.431	123.67	318.9	0.04
9	27	13.5	8	1.2	30.887	104.05	347.3	0.08
10	27	13.5	8	1.2	30.887	65.13	347.3	0.07
11	27	13.5	8	1.2	30.887	75.95	347.3	0.08
12	27	13.5	8	1.2	30.887	114.87	347.3	0.07
13	36	18	16	1.2	39	101.09	369	0.23
14	36	18	16	1.2	39	70.54	369	0.21
15	36	18	16	1.2	39	78.91	369	0.23
16	36	18	16	1.2	39	109.46	369	0.21
17	40	20	20	1.2	42.72	100.11	377.3	0.32
18	40	20	20	1.2	42.72	72.3	377.3	0.3
19	40	20	20	1.2	42.72	79.89	377.3	0.32
20	40	20	20	1.2	42.72	107.7	377.3	0.3

**Wind vector from guy wires**

#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
1	9	4.5	-0.01	-0.01	0.03	0.14	0	-0.23
2	9	4.5	-0.01	0.01	0	-0.06	0.04	-0.1
3	9	4.5	-0.01	0.01	0.03	0.14	0	0.23
4	9	4.5	-0.01	-0.01	0	-0.06	0.04	0.1
5	18	9	-0.03	-0.01	0.04	0.42	0.16	-0.38
6	18	9	-0.03	0.02	0.02	0.01	0.24	-0.19
7	18	9	-0.03	0.01	0.04	0.42	0.16	0.38
8	18	9	-0.03	-0.02	0.02	0.01	0.24	0.19
9	27	13.5	-0.05	-0.02	0.06	0.88	0.55	-0.55
10	27	13.5	-0.05	0.03	0.04	0.34	0.64	-0.3
11	27	13.5	-0.05	0.02	0.06	0.88	0.55	0.55

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#	Attach Elev. m	Mean Elev. m	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	OTM <sub>x</sub> KN.m	OTM <sub>z</sub> KN.m	Torque KN.m
12	27	13.5	-0.05	-0.03	0.04	0.34	0.64	0.3
13	36	18	-0.15	-0.04	0.17	3.09	2.34	-1.5
14	36	18	-0.15	0.07	0.13	1.83	2.55	-0.83
15	36	18	-0.15	0.04	0.17	3.09	2.34	1.5
16	36	18	-0.15	-0.07	0.13	1.83	2.55	0.83
17	40	20	-0.21	-0.05	0.23	4.78	3.81	-2.1
18	40	20	-0.21	0.09	0.19	3.14	4.08	-1.17
19	40	20	-0.21	0.05	0.23	4.78	3.81	2.1
20	40	20	-0.21	-0.09	0.19	3.14	4.08	1.17
Total			-1.82	0	1.83	29.15	28.85	0

### Combination

Comb. No.	Description
1	1.2D.L.+1Dg+1.6DesignWL_0Deg_36.11m/s
2	1.2D.L.+1Dg+1.6DesignWL_45Deg_36.11m/s
3	1.2D.L.+1Dg+1.6DesignWL_90Deg_36.11m/s
4	1.2D.L.+1Dg+1.6DesignWL_135Deg_36.11m/s
5	1.2D.L.+1Dg+1.6DesignWL_180Deg_36.11m/s
6	1.2D.L.+1Dg+1.6DesignWL_225Deg_36.11m/s
7	1.2D.L.+1Dg+1.6DesignWL_270Deg_36.11m/s
8	1.2D.L.+1Dg+1.6DesignWL_315Deg_36.11m/s
9	1D.L.+1Dg+1ServiceWL_0Deg_25m/s
10	1D.L.+1Dg+1ServiceWL_45Deg_25m/s
11	1D.L.+1Dg+1ServiceWL_90Deg_25m/s
12	1D.L.+1Dg+1ServiceWL_135Deg_25m/s
13	1D.L.+1Dg+1ServiceWL_180Deg_25m/s
14	1D.L.+1Dg+1ServiceWL_225Deg_25m/s
15	1D.L.+1Dg+1ServiceWL_270Deg_25m/s
16	1D.L.+1Dg+1ServiceWL_315Deg_25m/s

### Pole Section Properties

Sec. No.	Elev. m	Diameter mm	Thick. mm	Area mm <sup>2</sup>	Inertia mm <sup>4</sup>	Elastic Modulus mm <sup>3</sup>	Plastic Modulus mm <sup>3</sup>
1	45	250	10	7539.8	54380969	435048	576333
2	44	250	10	7539.8	54380969	435048	576333
3	44	250	10	7539.8	54380969	435048	576333
4	43	250	10	7539.8	54380969	435048	576333
5	43	250	10	7539.8	54380969	435048	576333
6	42	250	10	7539.8	54380969	435048	576333
7	42	250	10	7539.8	54380969	435048	576333

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Sec. No.	Elev. m	Diameter mm	Thick. mm	Area mm <sup>2</sup>	Inertia mm <sup>4</sup>	Elastic Modulus mm <sup>3</sup>	Plastic Modulus mm <sup>3</sup>
8	41	250	10	7539.8	54380969	435048	576333
9	41	250	10	7539.8	54380969	435048	576333
10	40	250	10	7539.8	54380969	435048	576333
11	40	250	10	7539.8	54380969	435048	576333
12	39.2	250	10	7539.8	54380969	435048	576333
13	39.2	250	10	7539.8	54380969	435048	576333
14	38.4	250	10	7539.8	54380969	435048	576333
15	38.4	250	10	7539.8	54380969	435048	576333
16	37.6	250	10	7539.8	54380969	435048	576333
17	37.6	250	10	7539.8	54380969	435048	576333
18	36.8	250	10	7539.8	54380969	435048	576333
19	36.8	250	10	7539.8	54380969	435048	576333
20	36	250	10	7539.8	54380969	435048	576333
21	36	250	10	7539.8	54380969	435048	576333
22	34.2	250	10	7539.8	54380969	435048	576333
23	34.2	250	10	7539.8	54380969	435048	576333
24	32.4	250	10	7539.8	54380969	435048	576333
25	32.4	250	10	7539.8	54380969	435048	576333
26	30.6	250	10	7539.8	54380969	435048	576333
27	30.6	250	10	7539.8	54380969	435048	576333
28	28.8	250	10	7539.8	54380969	435048	576333
29	28.8	250	10	7539.8	54380969	435048	576333
30	27	250	10	7539.8	54380969	435048	576333
31	27	250	10	7539.8	54380969	435048	576333
32	25.2	250	10	7539.8	54380969	435048	576333
33	25.2	250	10	7539.8	54380969	435048	576333
34	23.4	250	10	7539.8	54380969	435048	576333
35	23.4	250	10	7539.8	54380969	435048	576333
36	21.6	250	10	7539.8	54380969	435048	576333
37	21.6	250	10	7539.8	54380969	435048	576333
38	19.8	250	10	7539.8	54380969	435048	576333
39	19.8	250	10	7539.8	54380969	435048	576333
40	18	250	10	7539.8	54380969	435048	576333
41	18	250	10	7539.8	54380969	435048	576333
42	16.2	250	10	7539.8	54380969	435048	576333
43	16.2	250	10	7539.8	54380969	435048	576333
44	14.4	250	10	7539.8	54380969	435048	576333
45	14.4	250	10	7539.8	54380969	435048	576333
46	12.6	250	10	7539.8	54380969	435048	576333
47	12.6	250	10	7539.8	54380969	435048	576333
48	10.8	250	10	7539.8	54380969	435048	576333
49	10.8	250	10	7539.8	54380969	435048	576333
50	9	250	10	7539.8	54380969	435048	576333

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Sec. No.	Elev. m	Diameter mm	Thick. mm	Area mm <sup>2</sup>	Inertia mm <sup>4</sup>	Elastic Modulus mm <sup>3</sup>	Plastic Modulus mm <sup>3</sup>
51	9	250	10	7539.8	54380969	435048	576333
52	7.2	250	10	7539.8	54380969	435048	576333
53	7.2	250	10	7539.8	54380969	435048	576333
54	5.4	250	10	7539.8	54380969	435048	576333
55	5.4	250	10	7539.8	54380969	435048	576333
56	3.6	250	10	7539.8	54380969	435048	576333
57	3.6	250	10	7539.8	54380969	435048	576333
58	1.8	250	10	7539.8	54380969	435048	576333
59	1.8	250	10	7539.8	54380969	435048	576333
60	0	250	10	7539.8	54380969	435048	576333

### Pole capacity details

Sec. No.	Elev. m	W/t or D/t	Fy' MPa	fPn KN	fMn KN.m	fVn KN.m	fTn KN.m	Comment
1	45	25	248	1682.89	128.64	841.44	194.21	
2	44	25	248	1682.89	128.64	841.44	194.21	
3	44	25	248	1682.89	128.64	841.44	194.21	
4	43	25	248	1682.89	128.64	841.44	194.21	
5	43	25	248	1682.89	128.64	841.44	194.21	
6	42	25	248	1682.89	128.64	841.44	194.21	
7	42	25	248	1682.89	128.64	841.44	194.21	
8	41	25	248	1682.89	128.64	841.44	194.21	
9	41	25	248	1682.89	128.64	841.44	194.21	
10	40	25	248	1682.89	128.64	841.44	194.21	
11	40	25	248	1682.89	128.64	841.44	194.21	
12	39.2	25	248	1682.89	128.64	841.44	194.21	
13	39.2	25	248	1682.89	128.64	841.44	194.21	
14	38.4	25	248	1682.89	128.64	841.44	194.21	
15	38.4	25	248	1682.89	128.64	841.44	194.21	
16	37.6	25	248	1682.89	128.64	841.44	194.21	
17	37.6	25	248	1682.89	128.64	841.44	194.21	
18	36.8	25	248	1682.89	128.64	841.44	194.21	
19	36.8	25	248	1682.89	128.64	841.44	194.21	
20	36	25	248	1682.89	128.64	841.44	194.21	
21	36	25	248	1682.89	128.64	841.44	194.21	
22	34.2	25	248	1682.89	128.64	841.44	194.21	
23	34.2	25	248	1682.89	128.64	841.44	194.21	
24	32.4	25	248	1682.89	128.64	841.44	194.21	
25	32.4	25	248	1682.89	128.64	841.44	194.21	
26	30.6	25	248	1682.89	128.64	841.44	194.21	
27	30.6	25	248	1682.89	128.64	841.44	194.21	
28	28.8	25	248	1682.89	128.64	841.44	194.21	

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Sec. No.	Elev. m	W/t or D/t	Fy' MPa	fPn KN	fMn KN.m	fVn KN.m	fTn KN.m	Comment
29	28.8	25	248	1682.89	128.64	841.44	194.21	
30	27	25	248	1682.89	128.64	841.44	194.21	
31	27	25	248	1682.89	128.64	841.44	194.21	
32	25.2	25	248	1682.89	128.64	841.44	194.21	
33	25.2	25	248	1682.89	128.64	841.44	194.21	
34	23.4	25	248	1682.89	128.64	841.44	194.21	
35	23.4	25	248	1682.89	128.64	841.44	194.21	
36	21.6	25	248	1682.89	128.64	841.44	194.21	
37	21.6	25	248	1682.89	128.64	841.44	194.21	
38	19.8	25	248	1682.89	128.64	841.44	194.21	
39	19.8	25	248	1682.89	128.64	841.44	194.21	
40	18	25	248	1682.89	128.64	841.44	194.21	
41	18	25	248	1682.89	128.64	841.44	194.21	
42	16.2	25	248	1682.89	128.64	841.44	194.21	
43	16.2	25	248	1682.89	128.64	841.44	194.21	
44	14.4	25	248	1682.89	128.64	841.44	194.21	
45	14.4	25	248	1682.89	128.64	841.44	194.21	
46	12.6	25	248	1682.89	128.64	841.44	194.21	
47	12.6	25	248	1682.89	128.64	841.44	194.21	
48	10.8	25	248	1682.89	128.64	841.44	194.21	
49	10.8	25	248	1682.89	128.64	841.44	194.21	
50	9	25	248	1682.89	128.64	841.44	194.21	
51	9	25	248	1682.89	128.64	841.44	194.21	
52	7.2	25	248	1682.89	128.64	841.44	194.21	
53	7.2	25	248	1682.89	128.64	841.44	194.21	
54	5.4	25	248	1682.89	128.64	841.44	194.21	
55	5.4	25	248	1682.89	128.64	841.44	194.21	
56	3.6	25	248	1682.89	128.64	841.44	194.21	
57	3.6	25	248	1682.89	128.64	841.44	194.21	
58	1.8	25	248	1682.89	128.64	841.44	194.21	
59	1.8	25	248	1682.89	128.64	841.44	194.21	
60	0	25	248	1682.89	128.64	841.44	194.21	

### Pole Sections Check

Sec. No.	Elev. m	Pu KN	Mu KN.m	Vu KN	Tu KN.m	Comb . No.	Pu / fPn	Mu / fMn	Vu / fVn	Tu / fTn	Comb. Stress Ratio	Check
1	45	0	0	0	0	2	0	0	0	0	0	Safe
2	44	1.42	0.81	1.07	-0.08	8	0	0.01	0	0	0.01	Safe
3	44	1.42	0.81	1.07	-0.08	8	0	0.01	0	0	0.01	Safe
4	43	2.85	2.57	1.85	-0.16	8	0	0.02	0	0	0.02	Safe
5	43	2.85	2.57	1.85	-0.16	8	0	0.02	0	0	0.02	Safe
6	42	5.28	7.24	4.69	-0.35	8	0	0.06	0.01	0	0.06	Safe

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Sec. No.	Elev. m	Pu KN	Mu KN.m	Vu KN	Tu KN.m	Comb . No.	Pu / fPn	Mu / fMn	Vu / fVn	Tu / fTn	Comb. Stress Ratio	Check
7	42	5.28	7.24	4.69	-0.35	8	0	0.06	0.01	0	0.06	Safe
8	41	6.06	12.35	5.38	-0.28	8	0	0.1	0.01	0	0.1	Safe
9	41	6.06	12.35	5.38	-0.28	8	0	0.1	0.01	0	0.1	Safe
10	40	10.07	22.35	11.2	-1.33	4	0.01	0.17	0.01	0.01	0.18	Safe
11	40	114.17	22.02	4.8	0.81	1	0.07	0.17	0.01	0	0.24	Safe
12	39.2	111.61	22.7	0.93	-2.01	5	0.07	0.18	0	0.01	0.24	Safe
13	39.2	111.61	22.7	0.93	-2.01	5	0.07	0.18	0	0.01	0.24	Safe
14	38.4	112.24	23.99	0.8	-2.01	5	0.07	0.19	0	0.01	0.25	Safe
15	38.4	112.24	23.99	0.8	-2.01	5	0.07	0.19	0	0.01	0.25	Safe
16	37.6	112.86	25.25	0.68	-2.01	5	0.07	0.2	0	0.01	0.26	Safe
17	37.6	112.86	25.25	0.68	-2.01	5	0.07	0.2	0	0.01	0.26	Safe
18	36.8	113.49	26.48	0.58	-2.01	5	0.07	0.21	0	0.01	0.27	Safe
19	36.8	113.49	26.48	0.58	-2.01	5	0.07	0.21	0	0.01	0.27	Safe
20	36	114.11	27.67	0.49	-2.01	5	0.07	0.22	0	0.01	0.28	Safe
21	36	181.55	27.22	7.18	0.81	1	0.11	0.21	0.01	0	0.32	Safe
22	34.2	172.02	24.41	3.77	-2.01	5	0.1	0.19	0	0.01	0.29	Safe
23	34.2	172.02	24.41	3.77	-2.01	5	0.1	0.19	0	0.01	0.29	Safe
24	32.4	173.43	20.52	3.45	-2.01	5	0.1	0.16	0	0.01	0.26	Safe
25	32.4	173.43	20.52	3.45	-2.01	5	0.1	0.16	0	0.01	0.26	Safe
26	30.6	174.83	16.17	3.13	-2.01	5	0.1	0.13	0	0.01	0.23	Safe
27	30.6	174.83	16.17	3.13	-2.01	5	0.1	0.13	0	0.01	0.23	Safe
28	28.8	176.24	11.56	2.82	-2.01	5	0.1	0.09	0	0.01	0.19	Safe
29	28.8	176.24	11.56	2.82	-2.01	5	0.1	0.09	0	0.01	0.19	Safe
30	27	177.64	6.92	2.51	-2.01	5	0.11	0.05	0	0.01	0.16	Safe
31	27	192.22	6.92	1.52	-2.01	5	0.11	0.05	0	0.01	0.17	Safe
32	25.2	207.38	6.43	2.13	0.81	1	0.12	0.05	0	0	0.17	Safe
33	25.2	207.38	6.43	2.13	0.81	1	0.12	0.05	0	0	0.17	Safe
34	23.4	208.79	8.45	0.72	0.81	1	0.12	0.07	0	0	0.19	Safe
35	23.4	208.79	8.45	0.72	0.81	1	0.12	0.07	0	0	0.19	Safe
36	21.6	210.19	7.44	0.69	0.81	1	0.12	0.06	0	0	0.18	Safe
37	21.6	210.19	7.44	0.69	0.81	1	0.12	0.06	0	0	0.18	Safe
38	19.8	211.6	3.51	2.04	0.81	1	0.13	0.03	0	0	0.15	Safe
39	19.8	211.6	3.51	2.04	0.81	1	0.13	0.03	0	0	0.15	Safe
40	18	213	3.07	3.39	0.81	1	0.13	0.02	0	0	0.15	Safe
41	18	228.42	3.07	3.42	0.81	1	0.14	0.02	0	0	0.16	Safe
42	16.2	212.25	3.13	0.02	-2.01	5	0.13	0.02	0	0.01	0.15	Safe
43	16.2	212.25	3.13	0.02	-2.01	5	0.13	0.02	0	0.01	0.15	Safe
44	14.4	213.65	3.07	0.29	-2.01	5	0.13	0.02	0	0.01	0.15	Safe
45	14.4	213.65	3.07	0.29	-2.01	5	0.13	0.02	0	0.01	0.15	Safe
46	12.6	215.06	2.32	0.55	-2.01	5	0.13	0.02	0	0.01	0.15	Safe
47	12.6	215.06	2.32	0.55	-2.01	5	0.13	0.02	0	0.01	0.15	Safe
48	10.8	234.04	3.91	1.59	0.81	1	0.14	0.03	0	0	0.17	Safe
49	10.8	234.04	3.91	1.59	0.81	1	0.14	0.03	0	0	0.17	Safe

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Job No. 40m Guyed Pole

Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

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Sec. No.	Elev. m	Pu KN	Mu KN.m	Vu KN	Tu KN.m	Comb. No.	Pu / fPn	Mu / fMn	Vu / fVn	Tu / fTn	Comb. Stress Ratio	Check
50	9	235.44	9.39	2.79	0.81	1	0.14	0.07	0	0	0.21	Safe
51	9	243.84	9.39	4.19	0.81	1	0.14	0.07	0	0	0.22	Safe
52	7.2	245.24	3.88	3.11	0.81	1	0.15	0.03	0	0	0.18	Safe
53	7.2	245.24	3.88	3.11	0.81	1	0.15	0.03	0	0	0.18	Safe
54	5.4	246.65	0.05	2.03	0.81	1	0.15	0	0	0	0.15	Safe
55	5.4	246.65	0.05	2.03	0.81	1	0.15	0	0	0	0.15	Safe
56	3.6	248.06	1.91	1	0.81	1	0.15	0.01	0	0	0.16	Safe
57	3.6	248.06	1.91	1	0.81	1	0.15	0.01	0	0	0.16	Safe
58	1.8	249.46	1.92	0.01	0.81	1	0.15	0.01	0	0	0.16	Safe
59	1.8	249.46	1.92	0.01	0.81	1	0.15	0.01	0	0	0.16	Safe
60	0	250.87	0	0.99	0.81	1	0.15	0	0	0	0.15	Safe

## Guy Wire Input Data

Wire No.	Elev. of Attach. m	Elev. of Base m	Radius of Base m	Offset Type**	Leg Or Face ID	Horizontal Offset m	Lateral Offset m	Azimuth Adjust m	Initial Tension %	Efficiency %	Comment
1	9	0	15	1	A	0	0	-15	10	90	
2	9	0	15	1	B	0	0	-45	10	90	
3	9	0	15	1	C	0	0	-75	10	90	
4	9	0	15	1	C	0	0	15	10	90	
5	18	0	15	1	A	0	0	-15	10	90	
6	18	0	15	1	B	0	0	-45	10	90	
7	18	0	15	1	C	0	0	-75	10	90	
8	18	0	15	1	C	0	0	15	10	90	
9	27	0	15	1	A	0	0	-15	10	90	
10	27	0	15	1	B	0	0	-45	10	90	
11	27	0	15	1	C	0	0	-75	10	90	
12	27	0	15	1	C	0	0	15	10	90	
13	36	0	15	1	A	0	0	-15	10	90	
14	36	0	15	1	B	0	0	-45	10	90	
15	36	0	15	1	C	0	0	-75	10	90	
16	36	0	15	1	C	0	0	15	10	90	
17	40	0	15	1	A	0	0	-15	10	90	
18	40	0	15	1	B	0	0	-45	10	90	
19	40	0	15	1	C	0	0	-75	10	90	
20	40	0	15	1	C	0	0	15	10	90	

\*\*Offset Type :

1 SINGLE LEG

## Guy Wire Check



ASMTower 2018.4

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Wire No.	Diam. mm	Force KN	Breaking Strength KN	T <sub>g</sub> KN	f <sub>g</sub>	f <sub>g</sub> T <sub>g</sub> KN	Ratio	Check
1	8	8.26 (1)	37.6	33.84	0.6	20.3	0.41	Safe
2	8	6.47 (4)	37.6	33.84	0.6	20.3	0.32	Safe
3	8	6.5 (6)	37.6	33.84	0.6	20.3	0.32	Safe
4	8	6.71 (8)	37.6	33.84	0.6	20.3	0.33	Safe
5	8	11.22 (1)	37.6	33.84	0.6	20.3	0.55	Safe
6	8	8.13 (4)	37.6	33.84	0.6	20.3	0.4	Safe
7	8	7.81 (6)	37.6	33.84	0.6	20.3	0.38	Safe
8	8	8.67 (8)	37.6	33.84	0.6	20.3	0.43	Safe
9	8	9.81 (1)	37.6	33.84	0.6	20.3	0.48	Safe
10	8	7.19 (4)	37.6	33.84	0.6	20.3	0.35	Safe
11	8	6.82 (6)	37.6	33.84	0.6	20.3	0.34	Safe
12	8	7.62 (8)	37.6	33.84	0.6	20.3	0.38	Safe
13	16	32.43 (1)	150	135	0.6	81	0.4	Safe
14	16	25.29 (4)	150	135	0.6	81	0.31	Safe
15	16	26.49 (6)	150	135	0.6	81	0.33	Safe
16	16	25.49 (8)	150	135	0.6	81	0.31	Safe
17	20	57.58 (1)	235	211.5	0.6	126.9	0.45	Safe
18	20	49.37 (3)	235	211.5	0.6	126.9	0.39	Safe
19	20	51.48 (5)	235	211.5	0.6	126.9	0.41	Safe
20	20	49.42 (7)	235	211.5	0.6	126.9	0.39	Safe

## Guy Wire Force

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
1	1	6.85	-4.2	1.82	8.24	-6.83	4.28	-1.84	8.26
1	2	5.55	-3.4	1.51	6.68	-5.54	3.48	-1.46	6.71
1	3	3.65	-2.25	1.04	4.41	-3.67	2.3	-0.92	4.43
1	4	1.84	-1.14	0.55	2.23	-1.88	1.16	-0.45	2.25
1	5	2.01	-1.25	0.55	2.43	-2.03	1.26	-0.53	2.45
1	6	0.85	-0.52	0.2	1.02	-0.85	0.53	-0.25	1.04
1	7	2.64	-1.62	0.64	3.16	-2.61	1.65	-0.76	3.18
1	8	4.56	-2.78	1.16	5.47	-4.52	2.85	-1.26	5.49
1	9	3.93	-2.41	1.05	4.73	-3.92	2.46	-1.05	4.75
1	10	3.67	-2.25	0.99	4.42	-3.67	2.31	-0.98	4.44
1	11	3.14	-1.93	0.86	3.79	-3.15	1.98	-0.83	3.81
1	12	2.6	-1.6	0.71	3.14	-2.61	1.64	-0.68	3.16
1	13	2.63	-1.62	0.71	3.17	-2.63	1.65	-0.7	3.19
1	14	2.32	-1.43	0.62	2.8	-2.33	1.46	-0.63	2.82
1	15	2.84	-1.74	0.74	3.42	-2.83	1.78	-0.78	3.44
1	16	3.39	-2.08	0.89	4.08	-3.38	2.13	-0.92	4.1
2	1	-0.55	-1.41	2.31	2.76	0.67	1.44	-2.29	2.79
2	2	-1.15	-2.76	4.52	5.42	1.25	2.83	-4.48	5.45

ASMTower 2018.4

Job No. 40m Guyed Pole  
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Rev. No. A  
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ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
2	3	-1.33	-3.06	5.01	6.02	1.34	3.14	-4.98	6.04
2	4	-1.46	-3.28	5.36	6.45	1.41	3.36	-5.35	6.47
2	5	-0.97	-2.08	3.38	4.09	0.85	2.14	-3.41	4.11
2	6	-0.56	-1.17	1.87	2.28	0.46	1.19	-1.92	2.3
2	7	-0.26	-0.58	0.93	1.12	0.25	0.59	-0.95	1.15
2	8	-0.18	-0.47	0.75	0.9	0.23	0.48	-0.76	0.92
2	9	-0.71	-1.68	2.74	3.29	0.75	1.72	-2.74	3.32
2	10	-0.89	-2.07	3.39	4.07	0.92	2.13	-3.38	4.09
2	11	-0.95	-2.19	3.57	4.29	0.96	2.24	-3.56	4.31
2	12	-0.98	-2.22	3.63	4.37	0.96	2.28	-3.62	4.39
2	13	-0.85	-1.89	3.08	3.72	0.81	1.94	-3.09	3.74
2	14	-0.72	-1.61	2.61	3.15	0.69	1.65	-2.63	3.17
2	15	-0.64	-1.47	2.38	2.87	0.64	1.5	-2.39	2.89
2	16	-0.61	-1.41	2.29	2.75	0.62	1.44	-2.29	2.78
3	1	-0.18	-0.12	-0.06	0.23	0.21	0.13	0.05	0.25
3	2	-0.75	-0.46	-0.18	0.9	0.76	0.48	0.23	0.92
3	3	-2.66	-1.63	-0.65	3.19	2.64	1.66	0.77	3.21
3	4	-4.5	-2.74	-1.15	5.39	4.46	2.81	1.24	5.42
3	5	-3.92	-2.39	-1.04	4.7	3.89	2.46	1.05	4.73
3	6	-5.38	-3.3	-1.47	6.47	5.37	3.37	1.42	6.5
3	7	-3.68	-2.26	-1.05	4.44	3.7	2.32	0.93	4.46
3	8	-1.79	-1.12	-0.53	2.18	1.83	1.13	0.44	2.2
3	9	-2.03	-1.25	-0.55	2.45	2.04	1.28	0.54	2.47
3	10	-2.29	-1.41	-0.61	2.76	2.3	1.44	0.62	2.78
3	11	-2.85	-1.75	-0.75	3.43	2.85	1.79	0.78	3.45
3	12	-3.38	-2.07	-0.89	4.07	3.37	2.12	0.92	4.09
3	13	-3.33	-2.04	-0.89	4.01	3.32	2.09	0.89	4.03
3	14	-3.64	-2.23	-0.98	4.38	3.64	2.29	0.97	4.4
3	15	-3.16	-1.94	-0.87	3.8	3.16	1.99	0.83	3.82
3	16	-2.59	-1.6	-0.71	3.13	2.6	1.63	0.68	3.15
4	1	1.15	-2.49	-4.04	4.88	-1.03	2.55	4.06	4.9
4	2	0.54	-1.13	-1.81	2.2	-0.44	1.15	1.85	2.22
4	3	0.26	-0.58	-0.94	1.13	-0.25	0.6	0.96	1.16
4	4	0.21	-0.53	-0.86	1.03	-0.25	0.54	0.87	1.05
4	5	0.71	-1.79	-2.91	3.49	-0.84	1.82	2.89	3.51
4	6	1.13	-2.71	-4.44	5.33	-1.23	2.78	4.4	5.35
4	7	1.33	-3.07	-5.02	6.03	-1.35	3.14	4.99	6.05
4	8	1.51	-3.41	-5.56	6.69	-1.47	3.49	5.55	6.71
4	9	0.89	-2	-3.26	3.92	-0.86	2.05	3.26	3.95
4	10	0.71	-1.6	-2.6	3.13	-0.68	1.64	2.61	3.16
4	11	0.64	-1.47	-2.39	2.88	-0.64	1.51	2.4	2.9
4	12	0.62	-1.44	-2.34	2.81	-0.63	1.47	2.34	2.83
4	13	0.76	-1.79	-2.91	3.5	-0.8	1.83	2.91	3.52

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Job No. 40m Guyed Pole  
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Rev. No. A  
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ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
4	14	0.89	-2.06	-3.37	4.05	-0.92	2.12	3.36	4.07
4	15	0.96	-2.19	-3.58	4.3	-0.96	2.25	3.57	4.32
4	16	0.99	-2.25	-3.67	4.42	-0.98	2.31	3.67	4.45
5	1	6.99	-8.52	1.85	11.18	-6.89	8.66	-1.86	11.22
5	2	5.1	-6.21	1.42	8.16	-5.03	6.34	-1.31	8.2
5	3	2.88	-3.55	0.88	4.65	-2.9	3.63	-0.68	4.7
5	4	1.31	-1.69	0.44	2.18	-1.41	1.7	-0.29	2.23
5	5	1.93	-2.47	0.54	3.18	-2.03	2.45	-0.52	3.22
5	6	0.66	-0.87	0.13	1.1	-0.72	0.85	-0.24	1.14
5	7	1.98	-2.43	0.43	3.17	-1.96	2.47	-0.62	3.21
5	8	3.95	-4.79	0.96	6.28	-3.85	4.89	-1.11	6.33
5	9	3.15	-3.85	0.84	5.05	-3.12	3.94	-0.84	5.1
5	10	2.83	-3.47	0.77	4.55	-2.82	3.55	-0.74	4.59
5	11	2.29	-2.82	0.65	3.69	-2.3	2.88	-0.59	3.73
5	12	1.76	-2.19	0.5	2.86	-1.79	2.23	-0.46	2.9
5	13	1.91	-2.37	0.52	3.09	-1.94	2.41	-0.51	3.13
5	14	1.46	-1.81	0.38	2.35	-1.48	1.84	-0.41	2.4
5	15	2.01	-2.47	0.51	3.22	-2.01	2.52	-0.57	3.27
5	16	2.56	-3.13	0.66	4.1	-2.54	3.2	-0.7	4.14
6	1	-0.32	-1.94	1.58	2.52	0.51	1.97	-1.56	2.57
6	2	-1	-4.95	4.08	6.49	1.14	5.05	-3.98	6.54
6	3	-1.15	-5.31	4.39	6.98	1.17	5.45	-4.29	7.03
6	4	-1.4	-6.16	5.05	8.09	1.3	6.29	-4.99	8.13
6	5	-0.77	-3.08	2.5	4.04	0.58	3.16	-2.52	4.09
6	6	-0.42	-1.57	1.22	2.03	0.27	1.58	-1.32	2.07
6	7	-0.2	-0.88	0.65	1.11	0.18	0.86	-0.75	1.16
6	8	-0.11	-0.75	0.57	0.95	0.21	0.74	-0.63	1
6	9	-0.47	-2.3	1.87	3	0.53	2.35	-1.87	3.05
6	10	-0.66	-3.15	2.58	4.13	0.71	3.22	-2.55	4.17
6	11	-0.72	-3.31	2.71	4.33	0.72	3.39	-2.68	4.38
6	12	-0.77	-3.44	2.81	4.5	0.74	3.52	-2.79	4.55
6	13	-0.62	-2.71	2.21	3.55	0.56	2.78	-2.21	3.6
6	14	-0.49	-2.15	1.73	2.81	0.45	2.2	-1.76	2.85
6	15	-0.42	-1.9	1.53	2.47	0.41	1.93	-1.56	2.51
6	16	-0.36	-1.71	1.38	2.23	0.39	1.75	-1.4	2.27
7	1	-0.31	-0.46	-0.11	0.57	0.41	0.44	0.09	0.61
7	2	-0.61	-0.81	-0.12	1.02	0.68	0.8	0.22	1.07
7	3	-1.98	-2.43	-0.43	3.16	1.96	2.46	0.62	3.2
7	4	-3.74	-4.52	-0.91	5.93	3.64	4.63	1.05	5.98
7	5	-2.5	-2.97	-0.65	3.93	2.4	3.11	0.66	3.98
7	6	-4.85	-5.91	-1.35	7.77	4.79	6.04	1.25	7.81
7	7	-2.87	-3.54	-0.88	4.64	2.9	3.63	0.68	4.69
7	8	-1.21	-1.56	-0.41	2.02	1.31	1.58	0.27	2.07

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ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
7	9	-1.07	-1.33	-0.29	1.73	1.1	1.36	0.29	1.77
7	10	-1.4	-1.74	-0.36	2.26	1.42	1.77	0.39	2.31
7	11	-2	-2.46	-0.51	3.21	1.99	2.51	0.56	3.25
7	12	-2.51	-3.07	-0.65	4.02	2.48	3.14	0.69	4.06
7	13	-2.33	-2.83	-0.62	3.72	2.3	2.92	0.62	3.77
7	14	-2.78	-3.4	-0.76	4.45	2.76	3.48	0.73	4.5
7	15	-2.28	-2.8	-0.64	3.67	2.29	2.87	0.58	3.72
7	16	-1.71	-2.13	-0.49	2.77	1.74	2.17	0.44	2.82
8	1	1.04	-4.26	-3.45	5.58	-0.84	4.34	3.47	5.62
8	2	0.4	-1.49	-1.15	1.93	-0.25	1.5	1.25	1.97
8	3	0.2	-0.88	-0.65	1.11	-0.18	0.86	0.75	1.15
8	4	0.12	-0.82	-0.62	1.04	-0.23	0.81	0.69	1.08
8	5	0.52	-2.84	-2.31	3.7	-0.71	2.87	2.29	3.74
8	6	0.96	-4.77	-3.94	6.25	-1.11	4.87	3.84	6.3
8	7	1.15	-5.29	-4.37	6.96	-1.16	5.43	4.27	7.01
8	8	1.49	-6.57	-5.38	8.62	-1.39	6.7	5.32	8.67
8	9	0.68	-2.98	-2.42	3.9	-0.62	3.04	2.43	3.94
8	10	0.48	-2.1	-1.7	2.75	-0.44	2.15	1.73	2.79
8	11	0.41	-1.88	-1.52	2.45	-0.41	1.92	1.55	2.5
8	12	0.37	-1.77	-1.43	2.3	-0.4	1.81	1.45	2.35
8	13	0.53	-2.56	-2.09	3.34	-0.59	2.61	2.08	3.39
8	14	0.65	-3.1	-2.54	4.07	-0.7	3.18	2.51	4.11
8	15	0.72	-3.29	-2.7	4.32	-0.72	3.38	2.67	4.36
8	16	0.78	-3.5	-2.86	4.58	-0.75	3.58	2.84	4.63
9	1	4.71	-8.44	1.22	9.74	-4.5	8.63	-1.24	9.81
9	2	3.46	-6.21	1	7.18	-3.32	6.39	-0.83	7.25
9	3	2.28	-4.21	0.76	4.85	-2.3	4.32	-0.48	4.91
9	4	1.37	-2.71	0.5	3.08	-1.54	2.73	-0.29	3.15
9	5	2.02	-3.97	0.58	4.49	-2.23	3.94	-0.56	4.56
9	6	0.92	-1.85	0.18	2.08	-1.06	1.83	-0.35	2.15
9	7	1.77	-3.26	0.33	3.72	-1.75	3.3	-0.61	3.79
9	8	2.86	-5.08	0.63	5.87	-2.69	5.22	-0.84	5.93
9	9	2.26	-4.09	0.59	4.71	-2.2	4.2	-0.6	4.78
9	10	2.03	-3.69	0.57	4.25	-1.99	3.8	-0.51	4.32
9	11	1.73	-3.18	0.51	3.66	-1.73	3.27	-0.42	3.73
9	12	1.43	-2.67	0.42	3.06	-1.48	2.73	-0.36	3.13
9	13	1.58	-2.97	0.43	3.39	-1.64	3.02	-0.43	3.46
9	14	1.23	-2.31	0.31	2.64	-1.27	2.36	-0.36	2.71
9	15	1.56	-2.88	0.38	3.3	-1.56	2.94	-0.46	3.36
9	16	1.89	-3.42	0.47	3.93	-1.84	3.51	-0.53	4
10	1	-0.26	-2.83	1.54	3.23	0.54	2.87	-1.52	3.29
10	2	-0.67	-5.37	3.01	6.19	0.88	5.5	-2.84	6.25
10	3	-0.76	-5.28	2.99	6.12	0.78	5.46	-2.79	6.18

ASMTower 2018.4

Job No. 40m Guyed Pole  
 Client OG  
 Project GSM Network

Rev. No. A  
 Date 5/11/2017  
 Designed by M.Joe  
 Checked by A.S.M

ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
10	4	-0.99	-6.16	3.43	7.12	0.82	6.33	-3.29	7.19
10	5	-0.66	-3.57	1.94	4.11	0.38	3.68	-1.95	4.18
10	6	-0.46	-2.46	1.24	2.79	0.25	2.47	-1.4	2.85
10	7	-0.29	-2.01	0.97	2.25	0.28	1.98	-1.17	2.32
10	8	-0.15	-1.64	0.8	1.83	0.32	1.62	-0.94	1.9
10	9	-0.35	-2.72	1.48	3.12	0.44	2.79	-1.48	3.19
10	10	-0.47	-3.47	1.92	4	0.54	3.57	-1.87	4.06
10	11	-0.51	-3.5	1.94	4.03	0.51	3.61	-1.88	4.1
10	12	-0.56	-3.66	2.02	4.22	0.51	3.77	-1.98	4.29
10	13	-0.48	-3.01	1.64	3.46	0.4	3.1	-1.64	3.53
10	14	-0.41	-2.57	1.37	2.94	0.34	2.63	-1.42	3.01
10	15	-0.35	-2.41	1.28	2.75	0.35	2.46	-1.34	2.82
10	16	-0.29	-2.18	1.16	2.49	0.34	2.23	-1.2	2.56
11	1	-0.52	-1.17	-0.17	1.29	0.72	1.14	0.16	1.36
11	2	-0.85	-1.73	-0.16	1.93	0.99	1.71	0.33	2
11	3	-1.72	-3.16	-0.31	3.61	1.7	3.21	0.6	3.68
11	4	-2.64	-4.69	-0.57	5.41	2.47	4.82	0.78	5.48
11	5	-1.75	-2.98	-0.43	3.48	1.55	3.16	0.45	3.55
11	6	-3.26	-5.84	-0.95	6.75	3.12	6.01	0.77	6.82
11	7	-2.22	-4.09	-0.74	4.71	2.23	4.2	0.46	4.78
11	8	-1.25	-2.48	-0.47	2.82	1.42	2.5	0.26	2.89
11	9	-0.92	-1.75	-0.26	1.99	0.98	1.8	0.25	2.06
11	10	-1.16	-2.18	-0.29	2.49	1.2	2.23	0.34	2.55
11	11	-1.52	-2.79	-0.36	3.2	1.51	2.86	0.45	3.26
11	12	-1.81	-3.27	-0.45	3.77	1.76	3.37	0.51	3.83
11	13	-1.63	-2.92	-0.43	3.37	1.57	3.03	0.43	3.44
11	14	-1.96	-3.56	-0.55	4.1	1.92	3.67	0.49	4.17
11	15	-1.68	-3.1	-0.49	3.56	1.69	3.18	0.41	3.63
11	16	-1.35	-2.53	-0.4	2.89	1.4	2.59	0.34	2.96
12	1	0.83	-4.66	-2.52	5.36	-0.55	4.76	2.54	5.43
12	2	0.44	-2.34	-1.17	2.65	-0.24	2.35	1.34	2.72
12	3	0.29	-1.98	-0.95	2.22	-0.28	1.95	1.15	2.28
12	4	0.16	-1.75	-0.86	1.96	-0.34	1.73	1	2.02
12	5	0.4	-3.75	-2.03	4.29	-0.69	3.8	2.02	4.35
12	6	0.64	-5.13	-2.88	5.92	-0.85	5.27	2.71	5.99
12	7	0.76	-5.22	-2.96	6.04	-0.77	5.4	2.75	6.11
12	8	1.05	-6.54	-3.64	7.56	-0.88	6.72	3.5	7.62
12	9	0.52	-3.25	-1.77	3.74	-0.43	3.34	1.77	3.8
12	10	0.39	-2.47	-1.32	2.83	-0.33	2.53	1.37	2.9
12	11	0.34	-2.35	-1.24	2.68	-0.34	2.4	1.3	2.75
12	12	0.29	-2.21	-1.18	2.52	-0.35	2.26	1.22	2.59
12	13	0.39	-2.96	-1.61	3.39	-0.47	3.03	1.61	3.46
12	14	0.46	-3.37	-1.86	3.88	-0.52	3.47	1.81	3.95

ASMTower 2018.4

Job No. 40m Guyed Pole  
 Client OG  
 Project GSM Network

Rev. No. A  
 Date 5/11/2017  
 Designed by M.Joe  
 Checked by A.S.M

ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
12	15	0.5	-3.44	-1.91	3.96	-0.5	3.55	1.85	4.03
12	16	0.57	-3.69	-2.03	4.25	-0.51	3.8	1.99	4.32
13	1	12.36	-29.42	3.2	32.07	-11.73	30.06	-3.23	32.43
13	2	10.63	-25.47	3.07	27.77	-10.2	26.09	-2.57	28.13
13	3	7.07	-17.36	2.31	18.89	-7.1	17.82	-1.54	19.25
13	4	3.41	-8.97	1.27	9.68	-3.9	9.23	-0.71	10.04
13	5	2.79	-7.66	0.85	8.19	-3.42	7.8	-0.82	8.55
13	6	2.21	-5.97	0.4	6.38	-2.64	6.13	-0.9	6.74
13	7	4.55	-11.1	0.81	12.02	-4.52	11.42	-1.58	12.38
13	8	8.34	-19.78	1.86	21.55	-7.85	20.31	-2.42	21.91
13	9	6.49	-15.65	1.71	17.03	-6.31	16.12	-1.72	17.39
13	10	6.18	-14.95	1.72	16.27	-6.05	15.41	-1.57	16.63
13	11	5.42	-13.28	1.57	14.43	-5.43	13.69	-1.34	14.79
13	12	4.34	-10.81	1.27	11.72	-4.49	11.16	-1.1	12.08
13	13	4.2	-10.51	1.15	11.38	-4.39	10.83	-1.15	11.74
13	14	3.9	-9.7	0.99	10.5	-4.03	10.02	-1.14	10.86
13	15	4.7	-11.47	1.14	12.45	-4.69	11.84	-1.37	12.81
13	16	5.73	-13.83	1.43	15.04	-5.59	14.26	-1.6	15.4
14	1	-0.83	-11.36	4.65	12.3	1.6	11.67	-4.62	12.66
14	2	-1.8	-19.35	8.17	21.09	2.36	19.88	-7.68	21.44
14	3	-2.47	-22.72	9.63	24.8	2.49	23.36	-9	25.16
14	4	-2.78	-22.86	9.57	24.93	2.28	23.47	-9.14	25.29
14	5	-2.01	-14.68	5.98	15.98	1.24	15.14	-6.01	16.34
14	6	-1.31	-9.3	3.54	10.03	0.75	9.55	-4.03	10.39
14	7	-0.7	-6.25	2.22	6.67	0.67	6.39	-2.85	7.03
14	8	-0.43	-6.33	2.36	6.76	0.93	6.49	-2.79	7.12
14	9	-1.15	-11.6	4.75	12.58	1.38	11.96	-4.74	12.94
14	10	-1.42	-13.76	5.7	14.96	1.59	14.19	-5.56	15.32
14	11	-1.58	-14.43	6	15.7	1.58	14.89	-5.81	16.06
14	12	-1.66	-14.47	5.99	15.75	1.51	14.93	-5.86	16.11
14	13	-1.5	-12.57	5.14	13.66	1.26	12.98	-5.15	14.02
14	14	-1.28	-10.9	4.38	11.81	1.11	11.25	-4.53	12.17
14	15	-1.09	-9.93	3.96	10.75	1.08	10.25	-4.15	11.11
14	16	-1	-9.85	3.96	10.66	1.15	10.17	-4.09	11.02
15	1	-1.42	-4.26	-0.48	4.51	2.05	4.4	0.45	4.87
15	2	-2.01	-5.47	-0.34	5.83	2.44	5.63	0.84	6.19
15	3	-4.33	-10.57	-0.76	11.45	4.3	10.89	1.53	11.81
15	4	-8.14	-19.29	-1.81	21.01	7.65	19.82	2.36	21.37
15	5	-8.44	-19.81	-2.16	21.64	7.81	20.45	2.19	21.99
15	6	-10.02	-23.96	-2.9	26.13	9.59	24.58	2.4	26.49
15	7	-6.79	-16.66	-2.23	18.13	6.82	17.12	1.46	18.49
15	8	-3.29	-8.69	-1.24	9.37	3.78	8.94	0.68	9.73
15	9	-3.4	-8.53	-0.94	9.23	3.59	8.84	0.93	9.59

ASMTower 2018.4

Job No. 40m Guyed Pole  
 Client OG  
 Project GSM Network

Rev. No. A  
 Date 5/11/2017  
 Designed by M.Joe  
 Checked by A.S.M

ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
15	10	-3.74	-9.3	-0.94	10.07	3.87	9.63	1.09	10.43
15	11	-4.58	-11.19	-1.11	12.14	4.57	11.56	1.34	12.5
15	12	-5.64	-13.61	-1.4	14.79	5.49	14.04	1.57	15.15
15	13	-5.72	-13.74	-1.5	14.96	5.53	14.21	1.51	15.32
15	14	-6.02	-14.56	-1.67	15.85	5.89	15.02	1.52	16.21
15	15	-5.31	-12.99	-1.54	14.12	5.32	13.4	1.31	14.48
15	16	-4.25	-10.58	-1.25	11.47	4.4	10.93	1.08	11.83
16	1	2.2	-16.16	-6.58	17.58	-1.42	16.62	6.61	17.94
16	2	1.26	-8.89	-3.37	9.59	-0.71	9.14	3.86	9.95
16	3	0.69	-6.17	-2.19	6.59	-0.66	6.31	2.82	6.95
16	4	0.44	-6.4	-2.39	6.84	-0.94	6.56	2.82	7.2
16	5	1	-12.81	-5.23	13.87	-1.77	13.12	5.21	14.23
16	6	1.74	-18.75	-7.92	20.43	-2.3	19.27	7.43	20.78
16	7	2.45	-22.55	-9.55	24.61	-2.48	23.19	8.93	24.97
16	8	2.8	-23.04	-9.64	25.13	-2.3	23.66	9.21	25.49
16	9	1.53	-12.87	-5.26	13.99	-1.3	13.28	5.27	14.35
16	10	1.25	-10.65	-4.28	11.55	-1.09	11	4.43	11.91
16	11	1.08	-9.8	-3.91	10.6	-1.07	10.11	4.1	10.96
16	12	1	-9.79	-3.94	10.6	-1.15	10.11	4.07	10.96
16	13	1.19	-11.9	-4.87	12.91	-1.42	12.27	4.86	13.27
16	14	1.39	-13.52	-5.6	14.7	-1.56	13.95	5.46	15.06
16	15	1.56	-14.29	-5.95	15.56	-1.57	14.76	5.76	15.92
16	16	1.66	-14.42	-5.96	15.69	-1.51	14.88	5.84	16.05
17	1	20.05	-53.06	5.2	56.96	-19.13	54.06	-5.23	57.58
17	2	18.44	-49.19	5.28	52.8	-17.81	50.16	-4.57	53.42
17	3	10.85	-29.58	3.53	31.71	-10.88	30.35	-2.45	32.33
17	4	3.54	-10.55	1.45	11.22	-4.24	11.04	-0.67	11.84
17	5	1.81	-6.11	0.62	6.4	-2.72	6.45	-0.59	7.03
17	6	2.11	-6.56	0.29	6.89	-2.75	6.93	-1	7.52
17	7	5.58	-15.07	0.91	16.09	-5.54	15.65	-1.99	16.72
17	8	13.47	-35.59	3.04	38.18	-12.77	36.44	-3.82	38.8
17	9	9.89	-26.47	2.6	28.38	-9.61	27.24	-2.61	29.01
17	10	9.58	-25.77	2.66	27.62	-9.39	26.52	-2.44	28.24
17	11	7.93	-21.57	2.3	23.09	-7.94	22.26	-1.98	23.72
17	12	5.55	-15.31	1.64	16.37	-5.76	15.93	-1.4	16.99
17	13	4.56	-12.71	1.27	13.57	-4.84	13.28	-1.26	14.19
17	14	4.7	-12.95	1.17	13.83	-4.89	13.53	-1.39	14.45
17	15	6.36	-17.22	1.53	18.42	-6.35	17.86	-1.85	19.04
17	16	8.59	-23.04	2.14	24.68	-8.38	23.76	-2.38	25.31
18	1	-1.04	-16.58	6.13	17.71	2.12	17.16	-6.1	18.34
18	2	-2.74	-32.73	12.43	35.12	3.52	33.58	-11.73	35.75
18	3	-4.43	-45.39	17.21	48.74	4.46	46.39	-16.29	49.37
18	4	-4.61	-42.39	15.93	45.52	3.9	43.36	-15.29	46.14

ASMTower 2018.4

Job No. 40m Guyed Pole  
 Client OG  
 Project GSM Network

Rev. No. A  
 Date 5/11/2017  
 Designed by M.Joe  
 Checked by A.S.M

ASMTower 2018.4

Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
18	5	-3.18	-26.04	9.55	27.92	2.1	26.81	-9.58	28.55
18	6	-1.66	-12.57	4.27	13.38	0.88	13.07	-4.97	14.01
18	7	-0.66	-6.45	1.93	6.77	0.63	6.79	-2.84	7.39
18	8	-0.39	-7.66	2.52	8.07	1.1	8.03	-3.15	8.7
18	9	-1.59	-17.82	6.58	19.06	1.91	18.46	-6.57	19.69
18	10	-2.08	-22.44	8.37	24.04	2.32	23.16	-8.16	24.67
18	11	-2.47	-25.14	9.4	26.96	2.48	25.91	-9.13	27.59
18	12	-2.54	-24.57	9.14	26.33	2.33	25.33	-8.95	26.96
18	13	-2.22	-20.69	7.62	22.16	1.89	21.39	-7.63	22.79
18	14	-1.74	-16.31	5.91	17.43	1.5	16.93	-6.12	18.06
18	15	-1.31	-13.13	4.72	14.01	1.3	13.7	-4.99	14.64
18	16	-1.27	-13.92	5.05	14.86	1.48	14.5	-5.24	15.49
19	1	-1.5	-5.25	-0.54	5.49	2.41	5.6	0.51	6.11
19	2	-1.97	-6.15	-0.25	6.47	2.6	6.53	0.96	7.09
19	3	-5.42	-14.64	-0.87	15.63	5.39	15.21	1.95	16.26
19	4	-13.83	-36.55	-3.13	39.2	13.13	37.39	3.91	39.82
19	5	-17.93	-47.36	-4.64	50.86	17.02	48.36	4.67	51.48
19	6	-17.58	-46.87	-5.04	50.31	16.95	47.83	4.33	50.93
19	7	-10.61	-28.93	-3.47	31.01	10.64	29.7	2.38	31.63
19	8	-3.68	-10.94	-1.49	11.63	4.38	11.43	0.71	12.26
19	9	-4.29	-11.96	-1.19	12.76	4.56	12.53	1.18	13.39
19	10	-4.63	-12.77	-1.16	13.64	4.82	13.35	1.37	14.26
19	11	-6.38	-17.29	-1.54	18.49	6.37	17.93	1.86	19.12
19	12	-8.75	-23.47	-2.19	25.14	8.54	24.19	2.42	25.77
19	13	-9.61	-25.73	-2.53	27.58	9.34	26.5	2.54	28.21
19	14	-9.51	-25.59	-2.64	27.42	9.32	26.35	2.43	28.05
19	15	-7.96	-21.64	-2.31	23.17	7.97	22.33	1.98	23.8
19	16	-5.7	-15.74	-1.68	16.83	5.91	16.36	1.45	17.45
20	1	3.24	-26.52	-9.72	28.43	-2.16	27.28	9.75	29.05
20	2	1.63	-12.24	-4.15	13.03	-0.85	12.74	4.85	13.66
20	3	0.66	-6.46	-1.93	6.77	-0.63	6.8	2.85	7.4
20	4	0.38	-7.51	-2.46	7.92	-1.09	7.89	3.09	8.54
20	5	1.11	-17.22	-6.36	18.39	-2.19	17.79	6.33	19.01
20	6	2.7	-32.19	-12.23	34.54	-3.48	33.04	11.53	35.17
20	7	4.44	-45.44	-17.23	48.8	-4.47	46.44	16.31	49.42
20	8	4.55	-41.81	-15.71	44.9	-3.84	42.78	15.08	45.53
20	9	2.25	-21.04	-7.74	22.53	-1.93	21.74	7.75	23.16
20	10	1.74	-16.34	-5.92	17.47	-1.51	16.96	6.13	18.1
20	11	1.33	-13.31	-4.78	14.21	-1.32	13.88	5.05	14.83
20	12	1.27	-13.99	-5.07	14.93	-1.49	14.57	5.26	15.56
20	13	1.62	-18.16	-6.7	19.42	-1.94	18.8	6.69	20.05
20	14	2.09	-22.47	-8.39	24.08	-2.32	23.2	8.18	24.7
20	15	2.49	-25.32	-9.46	27.15	-2.5	26.09	9.19	27.77



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Rev. No. A

Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

Checked by A.S.M

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Wire No.	Comb. No.	Fx at Base KN	Fy at Base KN	Fz at Base KN	Ft at Base KN	Fx at Attach. KN	Fy at Attach. KN	Fz at Attach. KN	Ft at Attach. KN
20	16	2.55	-24.63	-9.16	26.4	-2.33	25.39	8.97	27.03

### Reactions From The Tower

#### Total reaction on foundation

Comb No.	Shear X KN	Vertical KN	Shear Z KN	Horiz. Shear KN	Moment Mx KN.m	Torque My KN.m	Moment Mz KN.m	Horiz. Moment KN.m
1	53.48	47.77	1.83	53.51	69.54	0.72	-1416.14	1417.85
2	34.53	47.77	32.38	47.34	860.65	-1.91	-947.54	1280.06
3	2.61	47.77	38.78	38.86	1047.03	-2.24	-100.25	1051.81
4	-31.88	47.77	29.33	43.33	759.06	-4.91	866.88	1152.24
5	-28.14	47.77	-1.29	28.17	-49.76	-2.04	826.08	827.58
6	-32.13	47.77	-30.35	44.19	-800.73	2.76	874.06	1185.39
7	-1.62	47.77	-38.38	38.41	-1033.01	3.65	65	1035.06
8	32.75	47.77	-29.99	44.41	-767.12	4.16	-877.03	1165.19
9	16.06	40.64	0.55	16.06	20.2	0.24	-424.33	424.82
10	10.37	40.64	9.73	14.22	258.09	-0.6	-283.78	383.59
11	0.78	40.64	11.65	11.68	314.4	-0.66	-29.15	315.75
12	-9.58	40.64	8.81	13.01	227.67	-1.48	261.39	346.64
13	-9.06	40.64	-0.39	9.07	-15.47	-0.6	261.15	261.61
14	-9.65	40.64	-9.12	13.28	-241.34	0.8	263.53	357.35
15	-0.48	40.64	-11.54	11.55	-311.38	1.1	20.33	312.04
16	9.84	40.64	-9.01	13.34	-231.25	1.24	-262.71	349.99
Max.	53.48	47.77	38.78	53.51	1047.03	-4.91	-1416.14	1417.85

#### Individual support reaction

Joint No.	Comb No.	Rx KN	Ry KN	Rz KN	RMx KN.m	RMy KN.m	RMz KN.m
Pole	1	0.99	250.87	-0.01	0	0.81	0
	2	0.64	244.12	0.61	0	-1.99	0
	3	0.04	234.98	0.7	0	-2.21	0
	4	-0.57	238.48	0.55	0	-4.92	0
	5	-0.32	232.57	-0.01	0	-2.01	0
	6	-0.57	240.02	-0.57	0	2.69	0
	7	0.01	234.47	-0.7	0	3.68	0
	8	0.64	238.8	-0.57	0	4.14	0
	9	0.44	196.18	0	0	0.24	0
	10	0.26	196.23	0.24	0	-0.6	0
	11	0.02	196.26	0.25	0	-0.66	0
	12	-0.2	196.26	0.22	0	-1.48	0

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Joint No.	Comb No.	Rx KN	Ry KN	Rz KN	RMx KN.m	RMy KN.m	RMz KN.m
	13	-0.13	196.33	0	0	-0.6	0
	14	-0.2	196.24	-0.22	0	0.81	0
	15	0.02	196.26	-0.25	0	1.1	0
	16	0.25	196.26	-0.23	0	1.24	0
	Max	0.99	250.87	0.7	0	-4.92	0
Guy @15m 165Deg	1	50.96	-103.65	13.29	0	0	0
	2	43.17	-90.49	12.28	0	0	0
	3	26.73	-56.95	8.53	0	0	0
	4	11.46	-25.06	4.21	0	0	0
	5	10.56	-21.45	3.13	0	0	0
	6	6.76	-15.77	1.2	0	0	0
	7	16.51	-33.48	3.12	0	0	0
	8	33.19	-68.03	7.66	0	0	0
	9	25.72	-52.48	6.79	0	0	0
	10	24.3	-50.13	6.7	0	0	0
	11	20.52	-42.77	5.89	0	0	0
	12	15.68	-32.58	4.54	0	0	0
	13	14.87	-30.18	4.08	0	0	0
	14	13.62	-28.2	3.46	0	0	0
	15	17.47	-35.78	4.29	0	0	0
	16	22.17	-45.5	5.59	0	0	0
		Max	50.96	-103.65	13.29	0	0
Guy @15m 75Deg	1	-3	-34.12	16.22	0	0	0
	2	-7.37	-65.16	32.21	0	0	0
	3	-10.14	-81.77	39.22	0	0	0
	4	-11.25	-80.85	39.33	0	0	0
	5	-7.59	-49.45	23.36	0	0	0
	6	-4.4	-27.06	12.14	0	0	0
	7	-2.1	-16.17	6.7	0	0	0
	8	-1.26	-16.84	7	0	0	0
	9	-4.27	-36.12	17.42	0	0	0
	10	-5.53	-44.9	21.96	0	0	0
	11	-6.23	-48.56	23.61	0	0	0
	12	-6.51	-48.36	23.58	0	0	0
	13	-5.66	-40.88	19.68	0	0	0
	14	-4.63	-33.54	16.01	0	0	0
	15	-3.81	-28.84	13.87	0	0	0
	16	-3.52	-29.06	13.84	0	0	0
		Max	-11.25	-81.77	39.33	0	0
Guy @15m 345Deg	1	-3.93	-11.26	-1.36	0	0	0
	2	-6.2	-14.62	-1.05	0	0	0
	3	-16.1	-32.43	-3.01	0	0	0
	4	-32.84	-67.79	-7.57	0	0	0

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Joint No.	Comb No.	Rx KN	Ry KN	Rz KN	RMx KN.m	RMy KN.m	RMz KN.m
	5	-34.53	-75.51	-8.92	0	0	0
	6	-41.08	-85.87	-11.7	0	0	0
	7	-26.16	-55.49	-8.37	0	0	0
	8	-11.22	-24.79	-4.15	0	0	0
	9	-11.71	-24.81	-3.23	0	0	0
	10	-13.23	-27.4	-3.36	0	0	0
	11	-17.34	-35.47	-4.26	0	0	0
	12	-22.1	-45.49	-5.57	0	0	0
	13	-22.62	-47.27	-5.97	0	0	0
	14	-23.91	-49.34	-6.6	0	0	0
	15	-20.38	-42.46	-5.85	0	0	0
	16	-15.61	-32.57	-4.52	0	0	0
	Max	-41.08	-85.87	-11.7	0	0	0
Guy @15m 255Deg	1	8.46	-54.07	-26.31	0	0	0
	2	4.28	-26.09	-11.66	0	0	0
	3	2.1	-16.07	-6.66	0	0	0
	4	1.31	-17.01	-7.19	0	0	0
	5	3.74	-38.4	-18.85	0	0	0
	6	7.17	-63.55	-31.41	0	0	0
	7	10.12	-81.57	-39.13	0	0	0
	8	11.41	-81.37	-39.93	0	0	0
	9	5.88	-42.14	-20.44	0	0	0
	10	4.58	-33.17	-15.81	0	0	0
	11	3.8	-28.82	-13.84	0	0	0
	12	3.55	-29.19	-13.95	0	0	0
	13	4.48	-37.37	-18.18	0	0	0
	14	5.48	-44.53	-21.77	0	0	0
	15	6.22	-48.54	-23.59	0	0	0
	16	6.54	-48.49	-23.69	0	0	0
		Max	11.41	-81.57	-39.93	0	0

### Comparison of Reaction Force Vs. Applied Loads

#### Base moment reaction Vs. applied base moment

Comb No.	Reaction OTM X KN.m	Reaction Torque KN.m	Reaction OTM Z KN.m	Applied OTM X KN.m	Applied Torque KN.m	Applied OTM Z KN.m	Change %
1	69.54	0.72	-1416.14	-69.33	-0.81	1411.41	0.3352
2	860.65	-1.91	-947.54	-857.87	1.99	944.41	0.3288
3	1047.03	-2.24	-100.25	-1043.55	2.21	100.08	0.3324
4	759.06	-4.91	866.88	-756.53	4.92	-864.06	0.3296
5	-49.76	-2.04	826.08	49.63	2.01	-823.07	0.3649

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Comb No.	Reaction OTM X KN.m	Reaction Torque KN.m	Reaction OTM Z KN.m	Applied OTM X KN.m	Applied Torque KN.m	Applied OTM Z KN.m	Change %
6	-800.73	2.76	874.06	798.11	-2.69	-871.16	0.3307
7	-1033.01	3.65	65	1029.55	-3.68	-64.89	0.3356
8	-767.12	4.16	-877.03	764.55	-4.14	874.23	0.3275
9	20.2	0.24	-424.33	-20.19	-0.24	423.45	0.2085
10	258.09	-0.6	-283.78	-257.54	0.6	283.18	0.2142
11	314.4	-0.66	-29.15	-313.69	0.66	29.12	0.2262
12	227.67	-1.48	261.39	-227.16	1.48	-260.81	0.224
13	-15.47	-0.6	261.15	15.45	0.6	-260.5	0.2489
14	-241.34	0.8	263.53	240.8	-0.81	-262.96	0.2228
15	-311.38	1.1	20.33	310.66	-1.1	-20.3	0.232
16	-231.25	1.24	-262.71	230.72	-1.24	262.14	0.2233

**Force reaction Vs. applied forces**

Comb No.	Reaction Shear X KN	Reaction Vertical KN	Reaction Shear Z KN	Applied Shear X KN	Applied Vertical KN	Applied Shear Z KN	Error %
1	53.48	47.77	1.83	-53.48	-47.77	-1.83	0
2	34.53	47.77	32.38	-34.53	-47.77	-32.38	0
3	2.61	47.77	38.78	-2.61	-47.77	-38.78	0
4	-31.88	47.77	29.33	31.88	-47.77	-29.33	0
5	-28.14	47.77	-1.29	28.14	-47.77	1.29	0
6	-32.13	47.77	-30.35	32.13	-47.77	30.35	0
7	-1.62	47.77	-38.38	1.62	-47.77	38.38	0
8	32.75	47.77	-29.99	-32.75	-47.77	29.99	0
9	16.06	40.64	0.55	-16.06	-40.64	-0.55	0
10	10.37	40.64	9.73	-10.37	-40.64	-9.73	0
11	0.78	40.64	11.65	-0.78	-40.64	-11.65	0
12	-9.58	40.64	8.81	9.58	-40.64	-8.81	0
13	-9.06	40.64	-0.39	9.06	-40.64	0.39	0
14	-9.65	40.64	-9.12	9.65	-40.64	9.12	0
15	-0.48	40.64	-11.54	0.48	-40.64	11.54	0
16	9.84	40.64	-9.01	-9.84	-40.64	9.01	0

**Displacement at non service condition**

Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
45	243.9 (5)	-5.5 (1)	208.9 (7)	244.2 (5)	1.51 (5)	1.1 (4)
40	-139.6 (1)	-5.5 (1)	-111.8 (3)	140.1 (1)	1.35 (5)	1.1 (4)
36	-94.6 (1)	-5.2 (1)	-59.6 (3)	95 (1)	0.83 (5)	1.02 (4)
27	-81 (1)	-4.1 (1)	-41.9 (2)	81.1 (1)	0.03 (3)	0.81 (4)
18	-57.3 (1)	-2.9 (1)	30.7 (8)	57.3 (1)	0.26 (1)	0.56 (4)
9	-19.1 (1)	-1.5 (1)	10.1 (7)	19.1 (1)	0.18 (1)	0.29 (4)

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Client OG

Date 5/11/2017

Project GSM Network

Designed by M.Joe

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**Displacement at service condition**

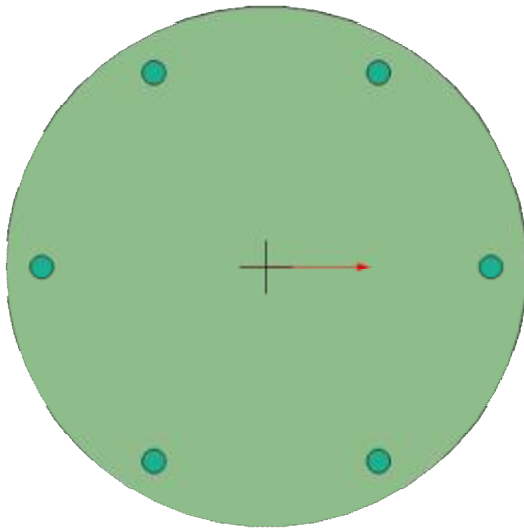
Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
45	58 (13)	-4.3 (13)	52.3 (15)	58.1 (13)	0.38 (13)	0.33 (12)
40	-29.3 (9)	-4.3 (13)	25.3 (15)	29.3 (9)	0.33 (13)	0.33 (12)
36	-18.6 (9)	-4.1 (13)	-12.6 (11)	18.7 (9)	0.18 (13)	0.31 (12)
27	-16.8 (9)	-3.2 (13)	-9.6 (10)	16.8 (9)	0.02 (13)	0.24 (12)
18	-12 (9)	-2.2 (13)	-6.8 (10)	12 (9)	0.05 (9)	0.17 (12)
9	-4.7 (9)	-1.2 (13)	2.9 (15)	4.7 (9)	0.04 (9)	0.09 (12)

**DESIGN OF ANCHOR ROD***Name: BaseConn**Design is safe with usage ratio 0.18***Connection Parameters**

Located at: Pole.

Design code		=	ANSI/TIA-222-G-2
Diameter of base plate		=	360 mm
Type of bolt analysis		=	Elastic
Dist. above concrete to bottom of leveling nut		=	75 mm
Orientation of the connection		=	0 Deg
Location of support reaction	X	=	0 mm
	Z	=	0 mm
Use of grout under base plate		=	YES
Use of leveling nut under base plate		=	NO
Total length of anchor rod		=	600 mm

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### Bolt Specification

#	Diam mm	X-Coord. mm	Z-Coord. mm	Material Name
1	16	155	0	A572-50
2	16	77.5	134.2	A572-50
3	16	-77.5	134.2	A572-50
4	16	-155	0	A572-50
5	16	-77.5	-134.2	A572-50
6	16	77.5	-134.2	A572-50

### Critical Reaction in Global Coordinate System

#	Support	Load Com.	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	Horiz. Force KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	Horiz. Moment KN.m
1	Pole	4	-0.57	238.48	0.55	0.8	0	-4.92	0	0

### Critical Action in Local Coordinates of Connection

#	Support	Load Com.	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	Horiz. Force KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	Horiz. Moment KN.m
1	Pole	4	0.57	-238.48	-0.55	0.8	0	4.92	0	0

### Force distribution in anchor rods

#	Diam mm	F <sub>x</sub> #1 KN	F <sub>y</sub> #1 KN	F <sub>z</sub> #1 KN

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#	Diam mm	F <sub>x</sub> #1 KN	F <sub>y</sub> #1 KN	F <sub>z</sub> #1 KN
1	16	0.1	-39.75	-5.39
2	16	4.68	-39.75	-2.74
3	16	4.68	-39.75	2.56
4	16	0.1	-39.75	5.2
5	16	-4.49	-39.75	2.56
6	16	-4.49	-39.75	-2.74

### Bolt Design

Anchor rod diameter	d	=	16	mm
Material of anchor rod		=	A572-50	
Gross area of anchor rod	A <sub>g</sub>	=	201.1	mm <sup>2</sup>
Net area of anchor rod	A <sub>n</sub>	=	150.8	mm <sup>2</sup>
Minimum tensile strength of anchor rod	F <sub>u</sub>	=	448.2	MPa
Minimum yield strength of anchor rod	F <sub>y</sub>	=	344.7	MPa
Maximum compression	P <sub>uc</sub>	=	41.81	KN
Maximum tension	P <sub>ut</sub>	=	0	KN
Considered axial force in interaction 1	P <sub>u1</sub>	=	0	KN
Shear force in interaction 1	V <sub>u1</sub>	=	5.42	KN
Nominal tensile strength of anchor rod	R <sub>nt</sub>	=	67.58	KN
	φ	=	0.8	
	η	=	0.55	
Interaction equation		=	[ P <sub>u1</sub> + ( V <sub>u1</sub> / η ) ] / φR <sub>nt</sub>	
		=	0.18	

**Bolt status**

**Safe as 0.18 < 1.0**

## DESIGN OF ANCHOR ROD

**Name: Guy Base**

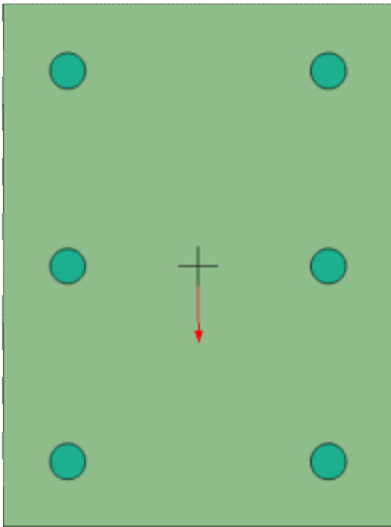
**Design is safe with usage ratio 0.86**

Connection Parameters

Located at: Guy @15m 165Deg, Guy @15m 75Deg, Guy @15m 345Deg and Guy @15m 255Deg.

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Design code	=	ANSI/TIA-222-G-2
Width of base plate	=	300 mm
Height of base plate	=	400 mm
Type of bolt analysis	=	Elastic
Dist. above concrete to bottom of leveling nut	=	50 mm
Orientation of the connection	=	90 Deg
Location of support reaction	X	= 0 mm
	Z	= 0 mm
Use of grout under base plate	=	YES
Use of leveling nut under base plate	=	YES
Total length of anchor rod	=	800 mm



### Bolt Specification

#	Diam mm	X-Coord. mm	Z-Coord. mm	Material Name
1	27	-100	-150	A572-50
2	27	-100	150	A572-50
3	27	100	-150	A572-50
4	27	100	150	A572-50
5	27	-100	0	A572-50
6	27	100	0	A572-50



ASMTower 2018.4      Job No.      40m Guyed Pole  
 Client      OG  
 Project      GSM Network

Rev. No.      A  
 Date      5/11/2017  
 Designed by      M.Joe  
 Checked by      A.S.M

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**Critical Reaction in Global Coordinate System**

#	Support	Load Com.	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	Horiz. Force KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	Horiz. Moment KN.m
1	Guy @15m 165Deg	1	50.96	-103.65	13.29	52.66	0	0	0	0

**Critical Action in Local Coordinates of Connection**

#	Support	Load Com.	F <sub>x</sub> KN	F <sub>y</sub> KN	F <sub>z</sub> KN	Horiz. Force KN	M <sub>x</sub> KN.m	M <sub>y</sub> KN.m	M <sub>z</sub> KN.m	Horiz. Moment KN.m
1	Guy @15m 165Deg	1	0.35	103.65	52.66	52.66	0	0	0	0

**Force distribution in anchor rods**

#	Diam mm	F <sub>x</sub> #1 KN	F <sub>y</sub> #1 KN	F <sub>z</sub> #1 KN
1	27	0.06	17.28	8.78
2	27	0.06	17.28	8.78
3	27	0.06	17.28	8.78
4	27	0.06	17.28	8.78
5	27	0.06	17.28	8.78
6	27	0.06	17.28	8.78

**Bolt Design**

Anchor rod diameter	d	=	27	mm
Material of anchor rod		=	A572-50	
Gross area of anchor rod	A <sub>g</sub>	=	572.6	mm <sup>2</sup>
Net area of anchor rod	A <sub>n</sub>	=	429.4	mm <sup>2</sup>
Minimum tensile strength of anchor rod	F <sub>u</sub>	=	448.2	MPa
Minimum yield strength of anchor rod	F <sub>y</sub>	=	344.7	MPa
Maximum compression	P <sub>uc</sub>	=	0	KN
Maximum tension	P <sub>ut</sub>	=	17.28	KN
Considered axial force in interaction 1	P <sub>u1</sub>	=	17.28	KN
Shear force in interaction 1	V <sub>u1</sub>	=	8.78	KN
Nominal tensile strength of anchor rod	R <sub>nt</sub>	=	192.45	KN

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	Project	GSM Network	Designed by	M.Joe
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$$\phi = 0.8$$

$$\eta = 0.55$$

Interaction equation

$$= [ Pu1 + ( Vu1 / \eta ) ] / \phi Rnt$$

$$= 0.22$$

***Bolt status***

***Safe as 0.22 < 1.0***

#### Check the Pullout Resistance of Anchor

Type of anchor rod head		=	Hex Nut	
Maximum tension in anchor	T	=	17.28	KN
Bearing area of anchor head	Abrg	=	847.9	mm <sup>2</sup>
Concrete compressive strength	F'c	=	21	MPa
Modification factor for pullout resistance	Ψcp	=	1	
The pullout resistance of anchor	Np	=	Ψ 8 Abrg F'c	
		=	142.45	KN
Strength reduction factor	φ	=	0.7	
Available pullout resistance	φNp	=	99.71	KN
Utilization ratio	T / φNp	=	0.17	

***Safety satus***

***Safe as 0.17 < 1.0***

#### Check the Development Length of Anchor

##### Assumption:

The tension forces are transferred to the longitudinal rebars , which will restrain the concrete failure prism. Therefore, concrete breakout strength in tension is not checked. The longitudinal reinforcement shall be developed on either sides of the breakout surface. This development length is calculated to estimate the minimum embedment length of the anchor.

The reinforcement bars are deformed bars without hook

Diameter of reinforcement bars	db	=	16	mm
Side cover for reinforcement bars		=	75	mm
Top cover for reinforcement bars	Ct	=	50	mm
Minimum spacing between reinforcement bars		=	150	mm
Maximum spacing between reinforcement and anchor	Sa	=	150	mm
Concrete compressive strength	F'c	=	21	MPa

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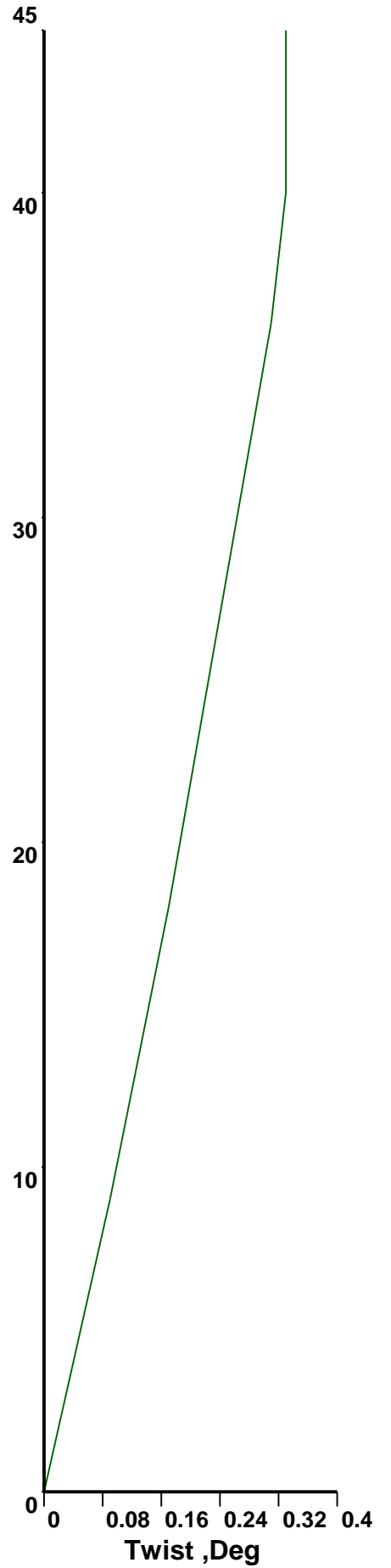
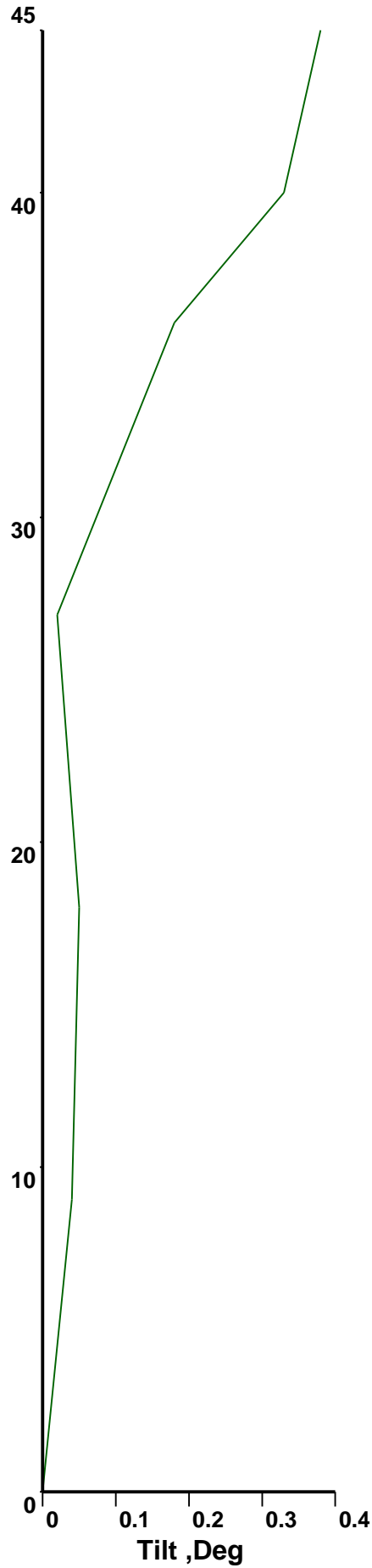
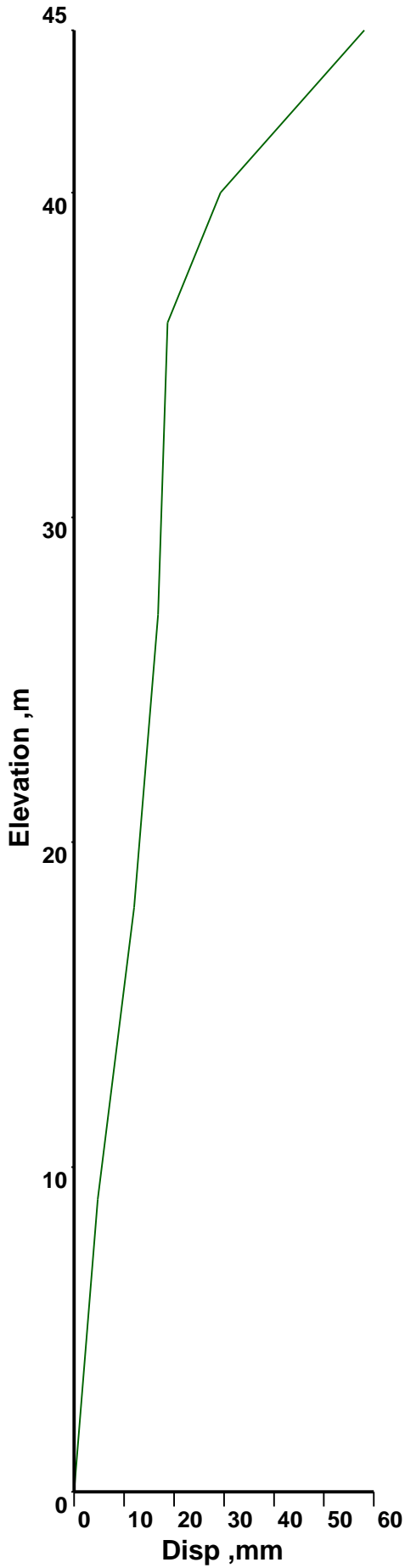
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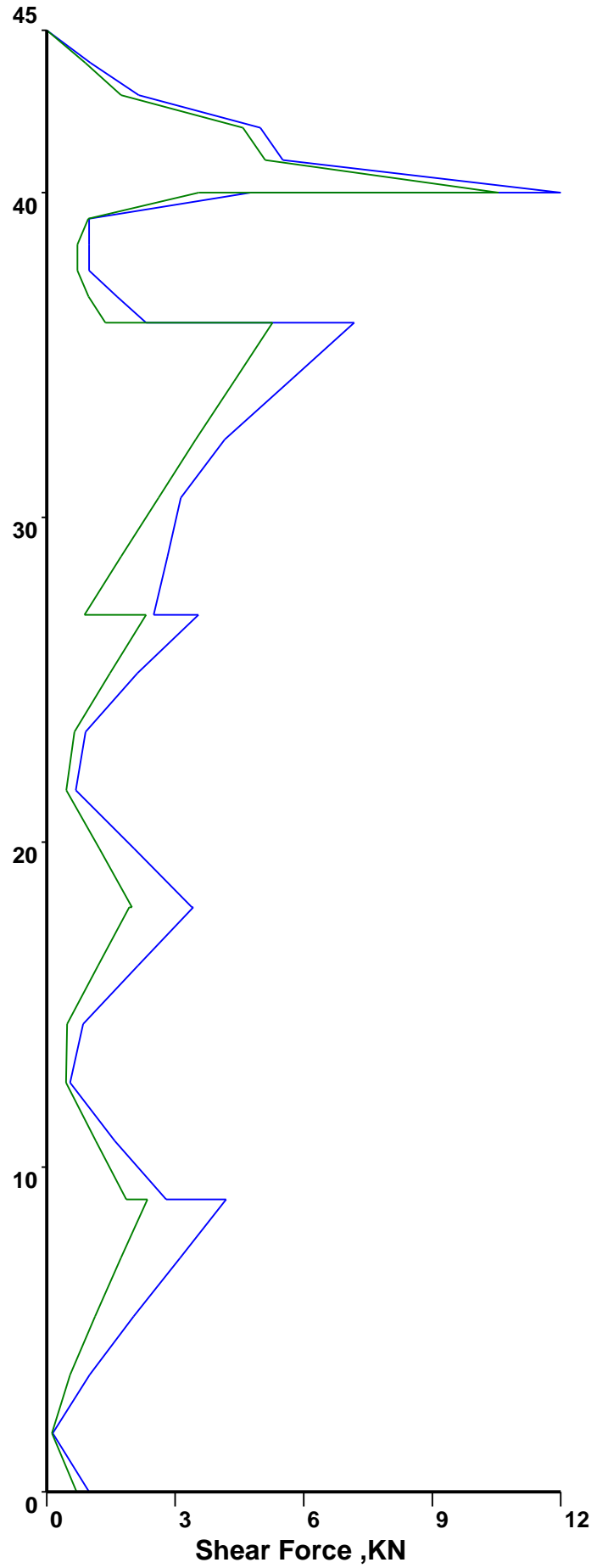
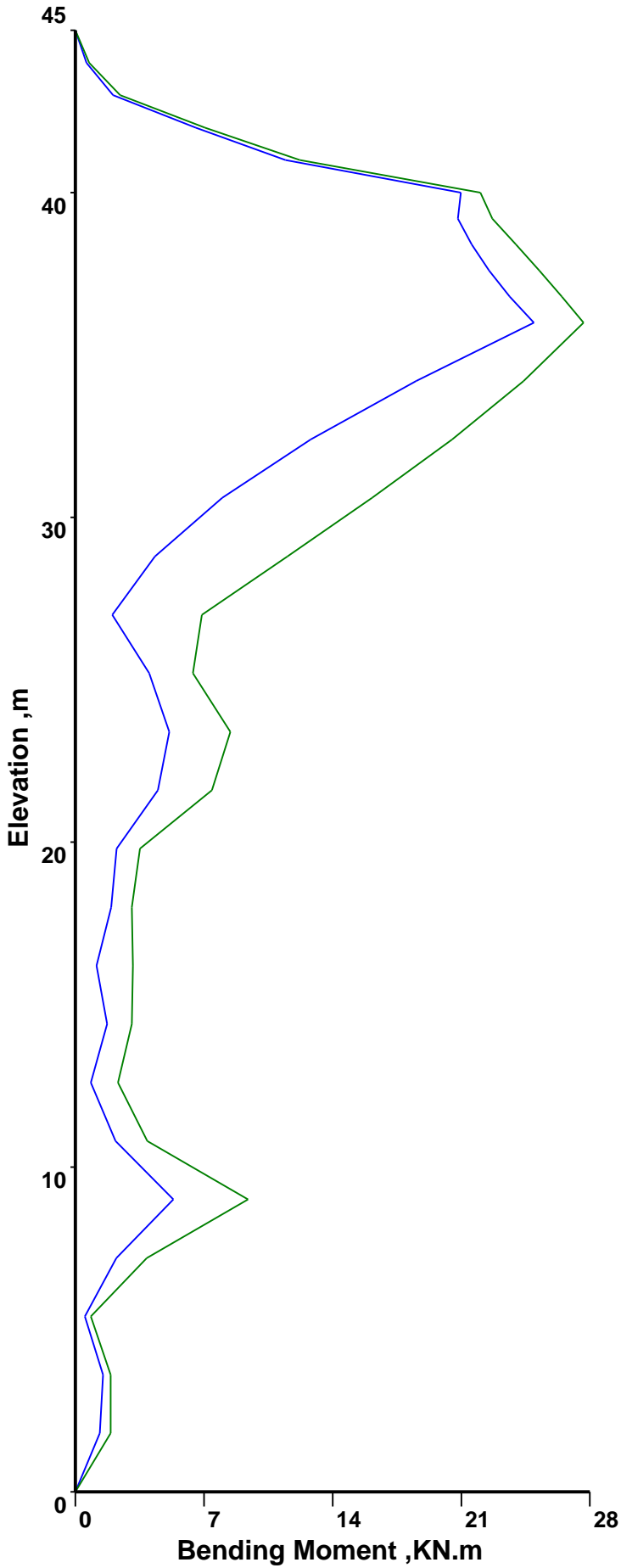
Yielding strength of reinforcement bars	Fy	=	420	MPa
Lesser of one-half the spacing between anchors and distance from bar to nearest concrete surface	cb	=	75	mm
Epoxy coated factor	$\Psi_e$	=	1	
Size factor	$\Psi_s$	=	0.8	
Casting position factor	$\Psi_t$	=	1	
Light weight concrete factor	$\lambda$	=	1	
Transverse reinforcement index	ktr	=	0	mm
Reinforcement bars development length	ldr	=	$F_y \Psi_t \Psi_e \Psi_s / [1.1 \lambda \text{ Sqrt}(F_c) (cb + K_{tr}) / db]$ db	
		=	not less 300	mm
		=	426.6	mm
Length of anchor above top of concrete surface	O	=	75	mm
Required embeded length for anchor rod	Lan	=	$ldr + C_t + S_a / 1.5 + a$	
		=	626.6	mm
Required total length for anchor rod	Ltr	=	$Lan + O$	
		=	701.6	mm
Supplied total length for anchor rod	Lts	=	800	mm
Utilization ratiofor embeded length		=	0.86	

*Saftey satus**Safe as 0.86 < 1.0*

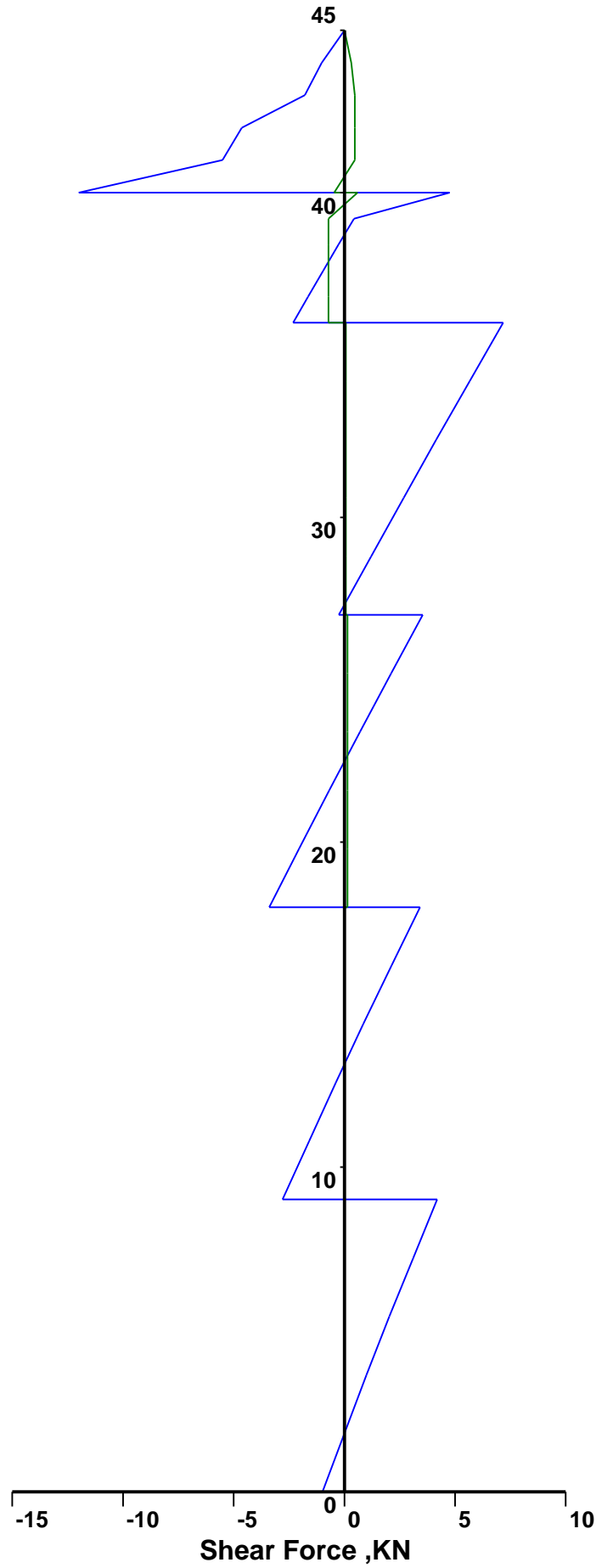
# Deformation Chart Of 40m Guyed Pole Max Service Wind



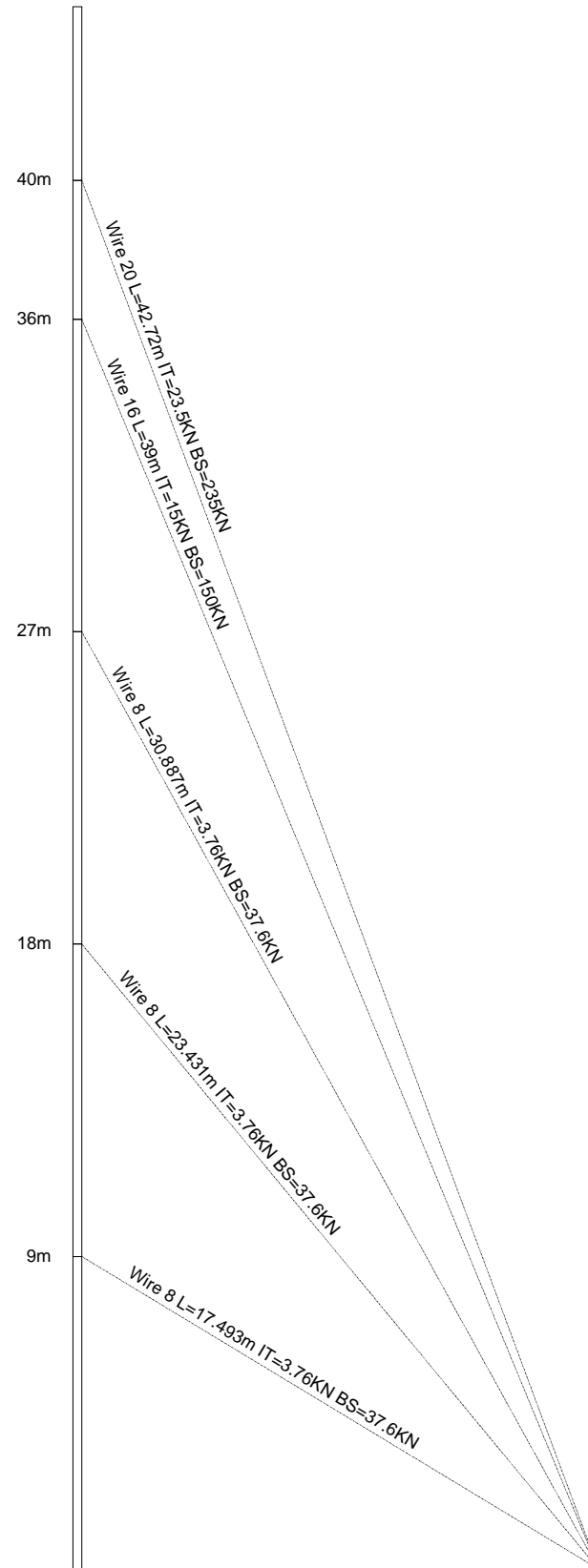
# Global Moment and Shear Chart Of 40m Guyed Pole Max Design Wind



# Global Moment and Shear Chart Of 40m Guyed Pole 1.2D.L.+1Dg+1.6DesignWL\_0Deg\_36.11m/s



PANEL NO.	ELEVATION (m)	TOWER WIDTH (m)	MAIN LEGS	LEG GRADE	DIAGONALS	DIAGONAL GRADE	PANELS HEIGHT (m)
1	45	0.25	SP 250x10mm	A36	ROUND	N.A.	N.A.
	40	0.25					
2	40	0.25	SP 250x10mm	A36	ROUND	N.A.	N.A.
	36	0.25					
3	36	0.25	SP 250x10mm	A36	ROUND	N.A.	N.A.
	27	0.25					
4	27	0.25	SP 250x10mm	A36	ROUND	N.A.	N.A.
	18	0.25					
5	18	0.25	SP 250x10mm	A36	ROUND	N.A.	N.A.
	9	0.25					
6	9	0.25	SP 250x10mm	A36	ROUND	N.A.	N.A.
	0	0.25					



A	5/11/2017	First issue	M.Joe	M.Joe	A.S.M	
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REVISIONS						
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