

ASMTower 2018.4

Job No. 9m Pole
Client GN UAE
Project GSM Network

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

ASMTower 2018.4

Structure Design For 9m Pole

Client: GN UAE
Project: GSM Network

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

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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 21 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 0.75
- Struts rating is 0.37
- Base connection rating is 0.88

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	Ets Antenna	7.73	1	Flat	298	146	2550	Pipe 76x3000
2	Ets Antenna	7.73	1	Flat	298	146	2550	Pipe 76x3000
3	Ets Antenna	7.73	1	Flat	298	146	2550	Pipe 76x3000
4	Ets Antenna	7.73	1	Flat	298	146	2550	Pipe 76x3000
5	Ets Antenna	7.73	1	Flat	298	146	2550	Pipe 76x3000
6	Ets Antenna	7.73	1	Flat	298	146	2550	Pipe 76x3000

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
4	6	9	3	219	219	4	ROUND	0	A53-B	64.9

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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
3	4.5	6	1.5	219	219	4	ROUND	0	A53-B	32.4
2	3	4.5	1.5	219	219	4	ROUND	0	A53-B	32.4
1	0	3	3	219	219	4	ROUND	0	A53-B	64.9
Total										194.6

Section Properties

ID	Name	Area mm ²	ey mm	ez mm	q Deg	rmin mm	rmax mm	ry mm	rz mm
1	P88.9x4	1066.9	44.4	44.4	0	30	30	30	30
2	Rod 20	314.2	10	10	0	5	5	5	5
3	Rod 10	78.5	5	5	0	2.5	2.5	2.5	2.5

List of used profiles in the tower

ID	Type	Name	Grade	Length m	Weight kg	Paint Area m ²
1	Pipe	P88.9x4	A53-B	21.545	184	11.493
2	SolidRound	Rod 20	S235J0	7	17.6	0.44
3	SolidRound	Rod 10	S235J0	9	5.7	0.283
Total					207.3	12.216

Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 0

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$
 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	7.5	3	0.219	0.657	0	0.08	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	1.03	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	1.03	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	1.03	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	1.03	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	0	0	
2	6 To 9	28.5	1	0.017	0	0	0	947.8	100	0	
3	6 To 9	28.5	1	0.017	0	0	0	947.8	170	0	
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	931.5	0	0.02	
5	4.5 To 6	26.25	1	0.009	0	0	0	931.5	100	0	
6	4.5 To 6	26.25	1	0.009	0	0.008	0	931.5	170	0.01	
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	920	0	0.02	
8	3 To 4.5	24.75	1	0.009	0	0	0	920	100	0	
9	3 To 4.5	24.75	1	0.009	0	0.008	0	920	170	0.01	
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	903	0	0.03	
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	890.1	0	0	
12	0.3 To 3	22.65	1	0.016	0	0	0	903	100	0	
13	0.3 To 3	22.65	1	0.016	0	0.015	0	903	170	0.02	
14	0 To 0.3	21.15	1	0.002	0	0.002	0	890.1	170	0	
Total							0.106	---	---	---	0.11

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	-0.02	0	0	0	0.1	0
5	5.25	0	0	0	0	0	0
6	5.25	-0.01	0	0	0	0.05	0
7	3.75	-0.02	0	0	0	0.07	0
8	3.75	0	0	0	0	0	0
9	3.75	-0.01	0	0	0	0.03	0
10	1.65	-0.03	0	0	0	0.05	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	-0.02	0	0	0	0.02	0
14	0.15	0	0	0	0	0	0
Total		-0.11	0	0	0	0.32	-0.02

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.333	0	931.5	45	0.34
2	3 To 4.5	24.75	1	0.387	0.279	0.333	0	920	45	0.34
3	0.3 To 3	22.65	1	0.697	0.502	0.599	0	903	45	0.6

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4	0 To 0.3	21.15	1	0.077	0.056	0.067	0	890.1	45	0.07
Total							1.332	---	---	1.34

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	-0.34	0	0	0	1.79	0.07
2	3.75	-0.34	0	0	0	1.26	0.07
3	1.65	-0.6	0	0	0	0.98	0.13
4	0.15	-0.07	0	0	0	0.01	0.01
Total		-1.34	0	0	0	4.05	0.28

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	30	0.83
2	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	30	0.83
3	7.73	28.73	0.8	1.103	0.651	0.521	0	949.4	90	0.54
4	7.73	28.73	0.8	1.103	0.651	0.521	0	949.4	90	0.54
5	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	150	0.83
6	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	150	0.83
Total							4.211	---	---	4.4

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.83	0	0	0	6.4	0
2	7.73	-0.83	0	0	0	6.4	0.43
3	7.73	-0.54	0	0	0	4.2	-0.29
4	7.73	-0.54	0	0	0	4.2	-0.29
5	7.73	-0.83	0	0	0	6.4	0.43
6	7.73	-0.83	0	0	0	6.4	0
Total		-4.4	0	0	0	33.99	0.3

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	30	0.08

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
2	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	30	0.08
3	7.73	28.73	0.8	0.034	0.274	0.219	0	949.4	90	0.23
4	7.73	28.73	0.8	0.034	0.274	0.219	0	949.4	90	0.23
5	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	150	0.08
6	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	150	0.08
Total						0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.08	0	0	0	0.61	-0.01
2	7.73	-0.08	0	0	0	0.61	0.03
3	7.73	-0.23	0	0	0	1.77	-0.06
4	7.73	-0.23	0	0	0	1.77	-0.06
5	7.73	-0.08	0	0	0	0.61	0.03
6	7.73	-0.08	0	0	0	0.61	-0.01
Total		-0.77	0	0	0	5.96	-0.08

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	56.66	908	0.4
2	4.5	2.25	88.9	1.2	5.386	90	908	0.57
3	4.5	2.25	88.9	1.2	5.386	123.34	908	0.4
4	4.5	2.25	88.9	1.2	5.386	90	908	0.57

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	-0.33	-0.22	0	0	0.43	0
2	4.5	2.25	-0.57	0	0	0	1.29	-0.85
3	4.5	2.25	-0.33	0.22	0	0	0.43	0
4	4.5	2.25	-0.57	0	0	0	1.29	0.85
Total			-1.82	0	0	0	3.44	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$

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Important factor | = 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	7.5	3	0.219	0.657	0	0.09	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	0.66	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	0.66	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	0.66	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	0.64	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	45	0
2	6 To 9	28.5	1	0.017	0	0	0	947.8	145	0
3	6 To 9	28.5	1	0.017	0	0	0	947.8	145	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	931.5	45	0.02
5	4.5 To 6	26.25	1	0.009	0	0.005	0	931.5	145	0.01
6	4.5 To 6	26.25	1	0.009	0	0.006	0	931.5	145	0.01
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	920	45	0.02
8	3 To 4.5	24.75	1	0.009	0	0.005	0	920	145	0.01
9	3 To 4.5	24.75	1	0.009	0	0.006	0	920	145	0.01
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	903	45	0.03
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	890.1	45	0
12	0.3 To 3	22.65	1	0.016	0	0.009	0	903	145	0.01
13	0.3 To 3	22.65	1	0.016	0	0.01	0	903	145	0.01
14	0 To 0.3	21.15	1	0.002	0	0.001	0	890.1	145	0
Total						0.115	---	---	---	0.12

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	-0.01	0	-0.01	-0.07	0.07	0
5	5.25	0	0	0	-0.02	0.02	0
6	5.25	0	0	0	-0.02	0.02	0
7	3.75	-0.01	0	-0.01	-0.05	0.05	0
8	3.75	0	0	0	-0.01	0.01	0

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
9	3.75	0	0	0	-0.02	0.02	0
10	1.65	-0.02	0	-0.02	-0.04	0.04	-0.01
11	0.15	0	0	0	0	0	0
12	1.65	-0.01	0	-0.01	-0.01	0.01	0
13	1.65	-0.01	0	-0.01	-0.01	0.01	0
14	0.15	0	0	0	0	0	0
Total		-0.08	0	-0.08	-0.25	0.25	-0.02

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.279	0	931.5	90	0.29
2	3 To 4.5	24.75	1	0.387	0.279	0.279	0	920	90	0.28
3	0.3 To 3	22.65	1	0.697	0.502	0.502	0	903	90	0.5
4	0 To 0.3	21.15	1	0.077	0.056	0.056	0	890.1	90	0.05
Total						1.116	---	---	---	1.12

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	-0.2	0	-0.2	-1.06	1.06	0.09
2	3.75	-0.2	0	-0.2	-0.75	0.75	0.08
3	1.65	-0.35	0	-0.35	-0.58	0.58	0.15
4	0.15	-0.04	0	-0.04	-0.01	0.01	0.02
Total		-0.79	0	-0.79	-2.4	2.4	0.34

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	75	0.57
2	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	75	0.57
3	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	45	0.73
4	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	45	0.73
5	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	165	0.9
6	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	165	0.9
Total						4.211	---	---	---	4.4

Wind vector from panel antenna

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.4	0	-0.4	-3.11	3.11	0.25
2	7.73	-0.4	0	-0.4	-3.11	3.11	0.33
3	7.73	-0.52	0	-0.52	-4.01	4.01	-0.43
4	7.73	-0.52	0	-0.52	-4.01	4.01	-0.12
5	7.73	-0.63	0	-0.63	-4.9	4.9	0.14
6	7.73	-0.63	0	-0.63	-4.9	4.9	-0.38
Total		-3.11	0	-3.11	-24.03	24.03	-0.21

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	75	0.22
2	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	75	0.22
3	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	45	0.13
4	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	45	0.13
5	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	165	0.04
6	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	165	0.04
Total						0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.15	0	-0.15	-1.18	1.18	0.04
2	7.73	-0.15	0	-0.15	-1.18	1.18	0.07
3	7.73	-0.09	0	-0.09	-0.7	0.7	-0.05
4	7.73	-0.09	0	-0.09	-0.7	0.7	0
5	7.73	-0.03	0	-0.03	-0.23	0.23	0.01
6	7.73	-0.03	0	-0.03	-0.23	0.23	-0.02
Total		-0.55	0	-0.55	-4.22	4.22	0.06

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49
2	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49
3	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49
4	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49

Wind vector from struts

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#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	-0.26	-0.17	-0.37	-0.84	0.33	0.55
2	4.5	2.25	-0.37	-0.17	-0.26	-0.33	0.84	-0.55
3	4.5	2.25	-0.26	0.17	-0.37	-0.84	0.33	-0.55
4	4.5	2.25	-0.37	0.17	-0.26	-0.33	0.84	0.55
Total			-1.27	0	-1.27	-2.35	2.35	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$
 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	7.5	3	0.219	0.657	0	0.08	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	1.03	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	1.03	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	1.03	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	1	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	90	0
2	6 To 9	28.5	1	0.017	0	0	0	947.8	170	0
3	6 To 9	28.5	1	0.017	0	0	0	947.8	100	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	931.5	90	0.02
5	4.5 To 6	26.25	1	0.009	0	0.008	0	931.5	170	0.01
6	4.5 To 6	26.25	1	0.009	0	0	0	931.5	100	0
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	920	90	0.02
8	3 To 4.5	24.75	1	0.009	0	0.008	0	920	170	0.01
9	3 To 4.5	24.75	1	0.009	0	0	0	920	100	0
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	903	90	0.03
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	890.1	90	0
12	0.3 To 3	22.65	1	0.016	0	0.015	0	903	170	0.02
13	0.3 To 3	22.65	1	0.016	0	0	0	903	100	0
14	0 To 0.3	21.15	1	0.002	0	0	0	890.1	100	0
Total							0.105	---	---	0.11

ASMTower 2018.4

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	-0.02	-0.1	0	0
5	5.25	0	0	-0.01	-0.05	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	-0.02	-0.07	0	0
8	3.75	0	0	-0.01	-0.03	0	0
9	3.75	0	0	0	0	0	0
10	1.65	0	0	-0.03	-0.05	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	-0.02	-0.02	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	-0.11	-0.32	0	-0.02

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.33	0	931.5	135	0.34
2	3 To 4.5	24.75	1	0.387	0.279	0.33	0	920	135	0.33
3	0.3 To 3	22.65	1	0.697	0.502	0.594	0	903	135	0.59
4	0 To 0.3	21.15	1	0.077	0.056	0.066	0	890.1	135	0.06
Total						1.319	---	---	---	1.33

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0	0	-0.34	-1.77	0	0.07
2	3.75	0	0	-0.33	-1.25	0	0.07
3	1.65	0	0	-0.59	-0.97	0	0.13
4	0.15	0	0	-0.06	-0.01	0	0.01
Total		0	0	-1.33	-4.01	0	0.28

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	120	0.64	
2	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	120	0.64	
3	7.73	28.73	0.8	1.103	0.651	0.883	0	949.4	0	0.92	
4	7.73	28.73	0.8	1.103	0.651	0.883	0	949.4	0	0.92	
5	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	120	0.64	
6	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	120	0.64	
Total							4.211	---	---	---	4.4

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	-0.64	-4.93	0	0.39
2	7.73	0	0	-0.64	-4.93	0	0.2
3	7.73	0	0	-0.92	-7.13	0	-0.28
4	7.73	0	0	-0.92	-7.13	0	0.28
5	7.73	0	0	-0.64	-4.93	0	-0.2
6	7.73	0	0	-0.64	-4.93	0	-0.39
Total		0	0	-4.4	-33.99	0	0

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	120	0.18	
2	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	120	0.18	
3	7.73	28.73	0.8	0.034	0.274	0.027	0	949.4	0	0.03	
4	7.73	28.73	0.8	0.034	0.274	0.027	0	949.4	0	0.03	
5	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	120	0.18	
6	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	120	0.18	
Total							0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	-0.18	-1.38	0	0.07
2	7.73	0	0	-0.18	-1.38	0	0.01
3	7.73	0	0	-0.03	-0.22	0	-0.01
4	7.73	0	0	-0.03	-0.22	0	0.01
5	7.73	0	0	-0.18	-1.38	0	-0.01
6	7.73	0	0	-0.18	-1.38	0	-0.07

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Job No. 9m Pole
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 Project GSM Network

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
Total		0	0	-0.77	-5.96	0	0

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	q _g Deg	q _z N/m ²	F _w KN
1	4.5	2.25	88.9	1.2	5.386	90	908	0.57
2	4.5	2.25	88.9	1.2	5.386	56.66	908	0.4
3	4.5	2.25	88.9	1.2	5.386	90	908	0.57
4	4.5	2.25	88.9	1.2	5.386	123.34	908	0.4

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0	0	-0.57	-1.29	0	0.85
2	4.5	2.25	0	-0.22	-0.33	-0.43	0	0
3	4.5	2.25	0	0	-0.57	-1.29	0	-0.85
4	4.5	2.25	0	0.22	-0.33	-0.43	0	0
Total			0	0	-1.82	-3.44	0	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$
 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	7.5	3	0.219	0.657	0	0.09	8.83	0.6	0.394	947.8	0.41	
2	1	5.25	1.5	0.219	0.328	0	0.09	8.76	0.6	0.197	931.5	0.2	
3	1	3.75	1.5	0.219	0.328	0	0.09	8.7	0.6	0.197	920	0.2	
4	1	1.65	2.7	0.219	0.591	0	0.09	8.62	0.61	0.359	903	0.36	
	2	0.15	0.3	0.219	0.066	0	0.07	8.56	0.61	0.04	890.1	0.04	
Total											1.187	---	1.21

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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Job No. 9m Pole
 Client GN UAE
 Project GSM Network

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	135	0
2	6 To 9	28.5	1	0.017	0	0	0	947.8	125	0
3	6 To 9	28.5	1	0.017	0	0	0	947.8	55	0
4	4.5 To 6	26.25	1	0.018	0.018	0	0	931.5	135	0
5	4.5 To 6	26.25	1	0.009	0	0	0	931.5	125	0
6	4.5 To 6	26.25	1	0.009	0	0	0	931.5	55	0
7	3 To 4.5	24.75	1	0.018	0.018	0	0	920	135	0
8	3 To 4.5	24.75	1	0.009	0	0	0	920	125	0
9	3 To 4.5	24.75	1	0.009	0	0	0	920	55	0
10	0.3 To 3	22.65	1	0.032	0.032	0	0	903	135	0
11	0 To 0.3	21.15	1	0.004	0.004	0	0	890.1	135	0
12	0.3 To 3	22.65	1	0.016	0	0	0	903	125	0
13	0.3 To 3	22.65	1	0.016	0	0	0	903	55	0
14	0 To 0.3	21.15	1	0.002	0	0	0	890.1	55	0
Total							0	---	---	0

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	0	0	0	0
5	5.25	0	0	0	0	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	0	0	0	0
8	3.75	0	0	0	0	0	0
9	3.75	0	0	0	0	0	0
10	1.65	0	0	0	0	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	0	0	0	0

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0	0	931.5	180	0
2	3 To 4.5	24.75	1	0.387	0.279	0	0	920	180	0
3	0.3 To 3	22.65	1	0.697	0.502	0	0	903	180	0

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
4	0 To 0.3	21.15	1	0.077	0.056	0	0	890.1	180	0
Total							0	---	---	0

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0	0	0	0	0	0
2	3.75	0	0	0	0	0	0
3	1.65	0	0	0	0	0	0
4	0.15	0	0	0	0	0	0
Total		0	0	0	0	0	0

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	165	0.9
2	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	165	0.9
3	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	45	0.73
4	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	45	0.73
5	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	75	0.57
6	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	75	0.57
Total							4.211	---	---	4.4

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.63	0	-0.63	-4.9	-4.9	0.38
2	7.73	0.63	0	-0.63	-4.9	-4.9	-0.14
3	7.73	0.52	0	-0.52	-4.01	-4.01	0.12
4	7.73	0.52	0	-0.52	-4.01	-4.01	0.43
5	7.73	0.4	0	-0.4	-3.11	-3.11	-0.33
6	7.73	0.4	0	-0.4	-3.11	-3.11	-0.25
Total		3.11	0	-3.11	-24.03	-24.03	0.21

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	165	0.04

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
2	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	165	0.04	
3	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	45	0.13	
4	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	45	0.13	
5	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	75	0.22	
6	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	75	0.22	
Total							0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.03	0	-0.03	-0.23	-0.23	0.02
2	7.73	0.03	0	-0.03	-0.23	-0.23	-0.01
3	7.73	0.09	0	-0.09	-0.7	-0.7	0
4	7.73	0.09	0	-0.09	-0.7	-0.7	0.05
5	7.73	0.15	0	-0.15	-1.18	-1.18	-0.07
6	7.73	0.15	0	-0.15	-1.18	-1.18	-0.04
Total		0.55	0	-0.55	-4.22	-4.22	-0.06

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49
2	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49
3	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49
4	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0.26	0.17	-0.37	-0.84	-0.33	0.55
2	4.5	2.25	0.37	-0.17	-0.26	-0.33	-0.84	0.55
3	4.5	2.25	0.26	-0.17	-0.37	-0.84	-0.33	-0.55
4	4.5	2.25	0.37	0.17	-0.26	-0.33	-0.84	-0.55
Total			1.27	0	-1.27	-2.35	-2.35	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$

ASMTower 2018.4

Important factor | = 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	7.5	3	0.219	0.657	0	0.08	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	1.03	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	1.03	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	1.03	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	1.02	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	180	0
2	6 To 9	28.5	1	0.017	0	0	0	947.8	80	0
3	6 To 9	28.5	1	0.017	0	0	0	947.8	10	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	931.5	180	0.02
5	4.5 To 6	26.25	1	0.009	0	0	0	931.5	80	0
6	4.5 To 6	26.25	1	0.009	0	0.008	0	931.5	10	0.01
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	920	180	0.02
8	3 To 4.5	24.75	1	0.009	0	0	0	920	80	0
9	3 To 4.5	24.75	1	0.009	0	0.008	0	920	10	0.01
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	903	180	0.03
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	890.1	180	0
12	0.3 To 3	22.65	1	0.016	0	0	0	903	80	0
13	0.3 To 3	22.65	1	0.016	0	0.015	0	903	10	0.02
14	0 To 0.3	21.15	1	0.002	0	0.002	0	890.1	10	0
Total						0.107	---	---	---	0.11

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0.02	0	0	0	-0.1	0
5	5.25	0	0	0	0	0	0
6	5.25	0.01	0	0	0	-0.05	0
7	3.75	0.02	0	0	0	-0.07	0
8	3.75	0	0	0	0	0	0

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
9	3.75	0.01	0	0	0	-0.03	0
10	1.65	0.03	0	0	0	-0.05	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0.02	0	0	0	-0.02	0
14	0.15	0	0	0	0	0	0
Total		0.11	0	0	0	-0.32	0.02

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.33	0	931.5	135	0.34
2	3 To 4.5	24.75	1	0.387	0.279	0.33	0	920	135	0.33
3	0.3 To 3	22.65	1	0.697	0.502	0.594	0	903	135	0.59
4	0 To 0.3	21.15	1	0.077	0.056	0.066	0	890.1	135	0.06
Total						1.319	---	---	---	1.33

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0.34	0	0	0	-1.77	-0.07
2	3.75	0.33	0	0	0	-1.25	-0.07
3	1.65	0.59	0	0	0	-0.97	-0.13
4	0.15	0.06	0	0	0	-0.01	-0.01
Total		1.33	0	0	0	-4.01	-0.28

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	150	0.83
2	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	150	0.83
3	7.73	28.73	0.8	1.103	0.651	0.521	0	949.4	90	0.54
4	7.73	28.73	0.8	1.103	0.651	0.521	0	949.4	90	0.54
5	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	30	0.83
6	7.73	28.73	0.8	1.103	0.651	0.792	0	949.4	30	0.83
Total						4.211	---	---	---	4.4

Wind vector from panel antenna

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.83	0	0	0	-6.4	0
2	7.73	0.83	0	0	0	-6.4	-0.43
3	7.73	0.54	0	0	0	-4.2	0.29
4	7.73	0.54	0	0	0	-4.2	0.29
5	7.73	0.83	0	0	0	-6.4	-0.43
6	7.73	0.83	0	0	0	-6.4	0
Total		4.4	0	0	0	-33.99	-0.3

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	150	0.08
2	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	150	0.08
3	7.73	28.73	0.8	0.034	0.274	0.219	0	949.4	90	0.23
4	7.73	28.73	0.8	0.034	0.274	0.219	0	949.4	90	0.23
5	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	30	0.08
6	7.73	28.73	0.8	0.034	0.274	0.075	0	949.4	30	0.08
Total						0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.08	0	0	0	-0.61	0.01
2	7.73	0.08	0	0	0	-0.61	-0.03
3	7.73	0.23	0	0	0	-1.77	0.06
4	7.73	0.23	0	0	0	-1.77	0.06
5	7.73	0.08	0	0	0	-0.61	-0.03
6	7.73	0.08	0	0	0	-0.61	0.01
Total		0.77	0	0	0	-5.96	0.08

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	123.34	908	0.4
2	4.5	2.25	88.9	1.2	5.386	90	908	0.57
3	4.5	2.25	88.9	1.2	5.386	56.66	908	0.4
4	4.5	2.25	88.9	1.2	5.386	90	908	0.57

Wind vector from struts

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#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0.33	0.22	0	0	-0.43	0
2	4.5	2.25	0.57	0	0	0	-1.29	0.85
3	4.5	2.25	0.33	-0.22	0	0	-0.43	0
4	4.5	2.25	0.57	0	0	0	-1.29	-0.85
Total			1.82	0	0	0	-3.44	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$
 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	7.5	3	0.219	0.657	0	0.09	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	0.66	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	0.66	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	0.66	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	0.64	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	135	0
2	6 To 9	28.5	1	0.017	0	0	0	947.8	35	0
3	6 To 9	28.5	1	0.017	0	0	0	947.8	35	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	931.5	135	0.02
5	4.5 To 6	26.25	1	0.009	0	0.006	0	931.5	35	0.01
6	4.5 To 6	26.25	1	0.009	0	0.005	0	931.5	35	0.01
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	920	135	0.02
8	3 To 4.5	24.75	1	0.009	0	0.006	0	920	35	0.01
9	3 To 4.5	24.75	1	0.009	0	0.005	0	920	35	0.01
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	903	135	0.03
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	890.1	135	0
12	0.3 To 3	22.65	1	0.016	0	0.01	0	903	35	0.01
13	0.3 To 3	22.65	1	0.016	0	0.009	0	903	35	0.01
14	0 To 0.3	21.15	1	0.002	0	0.001	0	890.1	35	0
Total							0.115	---	---	0.12

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Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0.01	0	0.01	0.07	-0.07	0
5	5.25	0	0	0	0.02	-0.02	0
6	5.25	0	0	0	0.02	-0.02	0
7	3.75	0.01	0	0.01	0.05	-0.05	0
8	3.75	0	0	0	0.02	-0.02	0
9	3.75	0	0	0	0.01	-0.01	0
10	1.65	0.02	0	0.02	0.04	-0.04	0.01
11	0.15	0	0	0	0	0	0
12	1.65	0.01	0	0.01	0.01	-0.01	0
13	1.65	0.01	0	0.01	0.01	-0.01	0
14	0.15	0	0	0	0	0	0
Total		0.08	0	0.08	0.25	-0.25	0.02

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.279	0	931.5	90	0.29
2	3 To 4.5	24.75	1	0.387	0.279	0.279	0	920	90	0.28
3	0.3 To 3	22.65	1	0.697	0.502	0.502	0	903	90	0.5
4	0 To 0.3	21.15	1	0.077	0.056	0.056	0	890.1	90	0.05
Total						1.116	---	---	---	1.12

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0.2	0	0.2	1.06	-1.06	-0.09
2	3.75	0.2	0	0.2	0.75	-0.75	-0.08
3	1.65	0.35	0	0.35	0.58	-0.58	-0.15
4	0.15	0.04	0	0.04	0.01	-0.01	-0.02
Total		0.79	0	0.79	2.4	-2.4	-0.34

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	105	0.57	
2	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	105	0.57	
3	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	135	0.73	
4	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	135	0.73	
5	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	15	0.9	
6	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	15	0.9	
Total							4.211	---	---	---	4.4

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.4	0	0.4	3.11	-3.11	-0.25
2	7.73	0.4	0	0.4	3.11	-3.11	-0.33
3	7.73	0.52	0	0.52	4.01	-4.01	0.43
4	7.73	0.52	0	0.52	4.01	-4.01	0.12
5	7.73	0.63	0	0.63	4.9	-4.9	-0.14
6	7.73	0.63	0	0.63	4.9	-4.9	0.38
Total		3.11	0	3.11	24.03	-24.03	0.21

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	105	0.22	
2	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	105	0.22	
3	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	135	0.13	
4	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	135	0.13	
5	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	15	0.04	
6	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	15	0.04	
Total							0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.15	0	0.15	1.18	-1.18	-0.04
2	7.73	0.15	0	0.15	1.18	-1.18	-0.07
3	7.73	0.09	0	0.09	0.7	-0.7	0.05
4	7.73	0.09	0	0.09	0.7	-0.7	0
5	7.73	0.03	0	0.03	0.23	-0.23	-0.01
6	7.73	0.03	0	0.03	0.23	-0.23	0.02

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Job No. 9m Pole
 Client GN UAE
 Project GSM Network

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

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
Total		0.55	0	0.55	4.22	-4.22	-0.06

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49
2	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49
3	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49
4	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0.26	0.17	0.37	0.84	-0.33	-0.55
2	4.5	2.25	0.37	0.17	0.26	0.33	-0.84	0.55
3	4.5	2.25	0.26	-0.17	0.37	0.84	-0.33	0.55
4	4.5	2.25	0.37	-0.17	0.26	0.33	-0.84	-0.55
Total			1.27	0	1.27	2.35	-2.35	0

Wind Calculation Of Basic Design Wind Speed 36.11 m/s Dir. 270

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$
 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	7.5	3	0.219	0.657	0	0.08	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	1.03	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	1.03	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	1.03	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	1	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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ASMTower 2018.4

Job No. 9m Pole
 Client GN UAE
 Project GSM Network

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

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	90	0	
2	6 To 9	28.5	1	0.017	0	0	0	947.8	10	0	
3	6 To 9	28.5	1	0.017	0	0	0	947.8	80	0	
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	931.5	90	0.02	
5	4.5 To 6	26.25	1	0.009	0	0.008	0	931.5	10	0.01	
6	4.5 To 6	26.25	1	0.009	0	0	0	931.5	80	0	
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	920	90	0.02	
8	3 To 4.5	24.75	1	0.009	0	0.008	0	920	10	0.01	
9	3 To 4.5	24.75	1	0.009	0	0	0	920	80	0	
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	903	90	0.03	
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	890.1	90	0	
12	0.3 To 3	22.65	1	0.016	0	0.015	0	903	10	0.02	
13	0.3 To 3	22.65	1	0.016	0	0	0	903	80	0	
14	0 To 0.3	21.15	1	0.002	0	0	0	890.1	80	0	
Total							0.104	---	---	---	0.1

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	0.02	0.1	0	0
5	5.25	0	0	0.01	0.05	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	0.02	0.07	0	0
8	3.75	0	0	0.01	0.03	0	0
9	3.75	0	0	0	0	0	0
10	1.65	0	0	0.03	0.05	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0.02	0.02	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	0.1	0.32	0	0.02

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.333	0	931.5	45	0.34
2	3 To 4.5	24.75	1	0.387	0.279	0.333	0	920	45	0.34
3	0.3 To 3	22.65	1	0.697	0.502	0.599	0	903	45	0.6

ASMTower 2018.4

Job No. 9m Pole
 Client GN UAE
 Project GSM Network

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

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
4	0 To 0.3	21.15	1	0.077	0.056	0.067	0	890.1	45	0.07
Total							1.332	---	---	1.34

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0	0	0.34	1.79	0	-0.07
2	3.75	0	0	0.34	1.26	0	-0.07
3	1.65	0	0	0.6	0.98	0	-0.13
4	0.15	0	0	0.07	0.01	0	-0.01
Total		0	0	1.34	4.05	0	-0.28

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	60	0.64
2	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	60	0.64
3	7.73	28.73	0.8	1.103	0.651	0.883	0	949.4	180	0.92
4	7.73	28.73	0.8	1.103	0.651	0.883	0	949.4	180	0.92
5	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	60	0.64
6	7.73	28.73	0.8	1.103	0.651	0.611	0	949.4	60	0.64
Total							4.211	---	---	4.4

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	0.64	4.93	0	-0.39
2	7.73	0	0	0.64	4.93	0	-0.2
3	7.73	0	0	0.92	7.13	0	0.28
4	7.73	0	0	0.92	7.13	0	-0.28
5	7.73	0	0	0.64	4.93	0	0.2
6	7.73	0	0	0.64	4.93	0	0.39
Total		0	0	4.4	33.99	0	0

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	60	0.18

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Job No. 9m Pole
 Client GN UAE
 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 _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
2	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	60	0.18
3	7.73	28.73	0.8	0.034	0.274	0.027	0	949.4	180	0.03
4	7.73	28.73	0.8	0.034	0.274	0.027	0	949.4	180	0.03
5	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	60	0.18
6	7.73	28.73	0.8	0.034	0.274	0.171	0	949.4	60	0.18
Total						0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	0.18	1.38	0	-0.07
2	7.73	0	0	0.18	1.38	0	-0.01
3	7.73	0	0	0.03	0.22	0	0.01
4	7.73	0	0	0.03	0.22	0	-0.01
5	7.73	0	0	0.18	1.38	0	0.01
6	7.73	0	0	0.18	1.38	0	0.07
Total		0	0	0.77	5.96	0	0

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	90	908	0.57
2	4.5	2.25	88.9	1.2	5.386	123.34	908	0.4
3	4.5	2.25	88.9	1.2	5.386	90	908	0.57
4	4.5	2.25	88.9	1.2	5.386	56.66	908	0.4

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0	0	0.57	1.29	0	-0.85
2	4.5	2.25	0	0.22	0.33	0.43	0	0
3	4.5	2.25	0	0	0.57	1.29	0	0.85
4	4.5	2.25	0	-0.22	0.33	0.43	0	0
Total			0	0	1.82	3.44	0	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.95$

ASMTower 2018.4

Important factor | = 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	7.5	3	0.219	0.657	0	0.02	8.83	0.6	0.394	947.8	0.41
2	1	5.25	1.5	0.219	0.328	0	0.81	8.76	1.2	0.394	931.5	0.4
3	1	3.75	1.5	0.219	0.328	0	0.81	8.7	1.2	0.394	920	0.4
4	1	1.65	2.7	0.219	0.591	0	0.81	8.62	1.2	0.71	903	0.7
	2	0.15	0.3	0.219	0.066	0	0.8	8.56	1.2	0.079	890.1	0.08
Total										1.971	---	2

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	947.8	45	0
2	6 To 9	28.5	1	0.017	0	0	0	947.8	55	0
3	6 To 9	28.5	1	0.017	0	0	0	947.8	125	0
4	4.5 To 6	26.25	1	0.018	0.018	0	0	931.5	45	0
5	4.5 To 6	26.25	1	0.009	0	0.002	0	931.5	55	0
6	4.5 To 6	26.25	1	0.009	0	0.002	0	931.5	125	0
7	3 To 4.5	24.75	1	0.018	0.018	0	0	920	45	0
8	3 To 4.5	24.75	1	0.009	0	0.002	0	920	55	0
9	3 To 4.5	24.75	1	0.009	0	0.002	0	920	125	0
10	0.3 To 3	22.65	1	0.032	0.032	0	0	903	45	0
11	0 To 0.3	21.15	1	0.004	0.004	0	0	890.1	45	0
12	0.3 To 3	22.65	1	0.016	0	0.003	0	903	55	0
13	0.3 To 3	22.65	1	0.016	0	0.003	0	903	125	0
14	0 To 0.3	21.15	1	0.002	0	0	0	890.1	125	0
Total						0.014	---	---	---	0.01

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	0	0	0	0
5	5.25	0	0	0	0.01	0.01	0
6	5.25	0	0	0	0.01	0.01	0
7	3.75	0	0	0	0	0	0
8	3.75	0	0	0	0	0	0

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
9	3.75	0	0	0	0	0	0
10	1.65	0	0	0	0	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		-0.01	0	0.01	0.03	0.03	0

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.387	0	931.5	0	0.4
2	3 To 4.5	24.75	1	0.387	0.279	0.387	0	920	0	0.39
3	0.3 To 3	22.65	1	0.697	0.502	0.697	0	903	0	0.69
4	0 To 0.3	21.15	1	0.077	0.056	0.077	0	890.1	0	0.08
Total						1.548	---	---	---	1.56

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	-0.28	0	0.28	1.47	1.47	0
2	3.75	-0.28	0	0.28	1.04	1.04	0
3	1.65	-0.49	0	0.49	0.81	0.81	0
4	0.15	-0.05	0	0.05	0.01	0.01	0
Total		-1.1	0	1.1	3.33	3.33	0

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	15	0.9
2	7.73	28.73	0.8	1.103	0.651	0.858	0	949.4	15	0.9
3	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	135	0.73
4	7.73	28.73	0.8	1.103	0.651	0.702	0	949.4	135	0.73
5	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	105	0.57
6	7.73	28.73	0.8	1.103	0.651	0.545	0	949.4	105	0.57
Total						4.211	---	---	---	4.4

Wind vector from panel antenna

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.63	0	0.63	4.9	4.9	-0.38
2	7.73	-0.63	0	0.63	4.9	4.9	0.14
3	7.73	-0.52	0	0.52	4.01	4.01	-0.12
4	7.73	-0.52	0	0.52	4.01	4.01	-0.43
5	7.73	-0.4	0	0.4	3.11	3.11	0.33
6	7.73	-0.4	0	0.4	3.11	3.11	0.25
Total		-3.11	0	3.11	24.03	24.03	-0.21

Wind forces from mounts of panel antenna

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	15	0.04	
2	7.73	28.73	0.8	0.034	0.274	0.04	0	949.4	15	0.04	
3	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	135	0.13	
4	7.73	28.73	0.8	0.034	0.274	0.123	0	949.4	135	0.13	
5	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	105	0.22	
6	7.73	28.73	0.8	0.034	0.274	0.206	0	949.4	105	0.22	
Total							0.739	---	---	---	0.77

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.03	0	0.03	0.23	0.23	-0.02
2	7.73	-0.03	0	0.03	0.23	0.23	0.01
3	7.73	-0.09	0	0.09	0.7	0.7	0
4	7.73	-0.09	0	0.09	0.7	0.7	-0.05
5	7.73	-0.15	0	0.15	1.18	1.18	0.07
6	7.73	-0.15	0	0.15	1.18	1.18	0.04
Total		-0.55	0	0.55	4.22	4.22	0.06

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49
2	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49
3	4.5	2.25	88.9	1.2	5.386	112.87	908	0.49
4	4.5	2.25	88.9	1.2	5.386	67.13	908	0.49

Wind vector from struts

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#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	-0.26	-0.17	0.37	0.84	0.33	-0.55
2	4.5	2.25	-0.37	0.17	0.26	0.33	0.84	-0.55
3	4.5	2.25	-0.26	0.17	0.37	0.84	0.33	0.55
4	4.5	2.25	-0.37	-0.17	0.26	0.33	0.84	0.55
Total			-1.27	0	1.27	2.35	2.35	0

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

Gust effect factor $G_h = 1.1$
 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	7.5	3	0.219	0.657	0	0.08	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	1.03	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	1.03	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	1.03	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	1.03	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	0	0
2	6 To 9	28.5	1	0.017	0	0	0	406.5	100	0
3	6 To 9	28.5	1	0.017	0	0	0	406.5	170	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	399.5	0	0.01
5	4.5 To 6	26.25	1	0.009	0	0	0	399.5	100	0
6	4.5 To 6	26.25	1	0.009	0	0.008	0	399.5	170	0
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	394.6	0	0.01
8	3 To 4.5	24.75	1	0.009	0	0	0	394.6	100	0
9	3 To 4.5	24.75	1	0.009	0	0.008	0	394.6	170	0
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	387.3	0	0.01
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	381.7	0	0
12	0.3 To 3	22.65	1	0.016	0	0	0	387.3	100	0
13	0.3 To 3	22.65	1	0.016	0	0.015	0	387.3	170	0.01
14	0 To 0.3	21.15	1	0.002	0	0.002	0	381.7	170	0
Total							0.106	---	---	0.05

ASMTower 2018.4

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	-0.01	0	0	0	0.04	0
5	5.25	0	0	0	0	0	0
6	5.25	0	0	0	0	0.02	0
7	3.75	-0.01	0	0	0	0.03	0
8	3.75	0	0	0	0	0	0
9	3.75	0	0	0	0	0.01	0
10	1.65	-0.01	0	0	0	0.02	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	-0.01	0	0	0	0.01	0
14	0.15	0	0	0	0	0	0
Total		-0.05	0	0	0	0.14	-0.01

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.333	0	399.5	45	0.15
2	3 To 4.5	24.75	1	0.387	0.279	0.333	0	394.6	45	0.14
3	0.3 To 3	22.65	1	0.697	0.502	0.599	0	387.3	45	0.26
4	0 To 0.3	21.15	1	0.077	0.056	0.067	0	381.7	45	0.03
Total						1.332	---	---	---	0.57

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	-0.15	0	0	0	0.77	0.03
2	3.75	-0.14	0	0	0	0.54	0.03
3	1.65	-0.26	0	0	0	0.42	0.05
4	0.15	-0.03	0	0	0	0	0.01
Total		-0.57	0	0	0	1.74	0.12

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	30	0.35
2	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	30	0.35
3	7.73	28.73	0.8	1.103	0.651	0.521	0	407.2	90	0.23
4	7.73	28.73	0.8	1.103	0.651	0.521	0	407.2	90	0.23
5	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	150	0.35
6	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	150	0.35
Total						4.211	---	---	---	1.89

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.35	0	0	0	2.74	0
2	7.73	-0.35	0	0	0	2.74	0.19
3	7.73	-0.23	0	0	0	1.8	-0.12
4	7.73	-0.23	0	0	0	1.8	-0.12
5	7.73	-0.35	0	0	0	2.74	0.19
6	7.73	-0.35	0	0	0	2.74	0
Total		-1.89	0	0	0	14.58	0.13

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	30	0.03
2	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	30	0.03
3	7.73	28.73	0.8	0.034	0.274	0.219	0	407.2	90	0.1
4	7.73	28.73	0.8	0.034	0.274	0.219	0	407.2	90	0.1
5	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	150	0.03
6	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	150	0.03
Total						0.739	---	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.03	0	0	0	0.26	0
2	7.73	-0.03	0	0	0	0.26	0.01
3	7.73	-0.1	0	0	0	0.76	-0.03
4	7.73	-0.1	0	0	0	0.76	-0.03
5	7.73	-0.03	0	0	0	0.26	0.01
6	7.73	-0.03	0	0	0	0.26	0

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Job No. 9m Pole
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 Project GSM Network

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 Designed by M.Joe
 Checked by A.S.M

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
Total		-0.33	0	0	0	2.56	-0.03

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	q _g Deg	q _z N/m ²	F _w KN
1	4.5	2.25	88.9	1.2	5.386	56.66	389.4	0.17
2	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25
3	4.5	2.25	88.9	1.2	5.386	123.34	389.4	0.17
4	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	-0.14	-0.09	0	0	0.18	0
2	4.5	2.25	-0.25	0	0	0	0.55	-0.36
3	4.5	2.25	-0.14	0.09	0	0	0.18	0
4	4.5	2.25	-0.25	0	0	0	0.55	0.36
Total			-0.78	0	0	0	1.47	0

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

Gust effect factor $G_h = 1.1$
 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	7.5	3	0.219	0.657	0	0.09	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	0.66	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	0.66	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	0.66	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	0.64	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	45	0	
2	6 To 9	28.5	1	0.017	0	0	0	406.5	145	0	
3	6 To 9	28.5	1	0.017	0	0	0	406.5	145	0	
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	399.5	45	0.01	
5	4.5 To 6	26.25	1	0.009	0	0.005	0	399.5	145	0	
6	4.5 To 6	26.25	1	0.009	0	0.006	0	399.5	145	0	
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	394.6	45	0.01	
8	3 To 4.5	24.75	1	0.009	0	0.005	0	394.6	145	0	
9	3 To 4.5	24.75	1	0.009	0	0.006	0	394.6	145	0	
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	387.3	45	0.01	
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	381.7	45	0	
12	0.3 To 3	22.65	1	0.016	0	0.009	0	387.3	145	0	
13	0.3 To 3	22.65	1	0.016	0	0.01	0	387.3	145	0	
14	0 To 0.3	21.15	1	0.002	0	0.001	0	381.7	145	0	
Total							0.115	---	---	---	0.05

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	-0.01	0	-0.01	-0.03	0.03	0
5	5.25	0	0	0	-0.01	0.01	0
6	5.25	0	0	0	-0.01	0.01	0
7	3.75	-0.01	0	-0.01	-0.02	0.02	0
8	3.75	0	0	0	-0.01	0.01	0
9	3.75	0	0	0	-0.01	0.01	0
10	1.65	-0.01	0	-0.01	-0.02	0.02	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0	0	0	-0.01	0.01	0
14	0.15	0	0	0	0	0	0
Total		-0.04	0	-0.04	-0.11	0.11	-0.01

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.279	0	399.5	90	0.12
2	3 To 4.5	24.75	1	0.387	0.279	0.279	0	394.6	90	0.12
3	0.3 To 3	22.65	1	0.697	0.502	0.502	0	387.3	90	0.21

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
4	0 To 0.3	21.15	1	0.077	0.056	0.056	0	381.7	90	0.02
Total							1.116	---	---	0.48

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	-0.09	0	-0.09	-0.46	0.46	0.04
2	3.75	-0.09	0	-0.09	-0.32	0.32	0.04
3	1.65	-0.15	0	-0.15	-0.25	0.25	0.06
4	0.15	-0.02	0	-0.02	0	0	0.01
Total		-0.34	0	-0.34	-1.03	1.03	0.14

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	75	0.24
2	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	75	0.24
3	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	45	0.31
4	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	45	0.31
5	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	165	0.38
6	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	165	0.38
Total							4.211	---	---	1.89

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.17	0	-0.17	-1.33	1.33	0.11
2	7.73	-0.17	0	-0.17	-1.33	1.33	0.14
3	7.73	-0.22	0	-0.22	-1.72	1.72	-0.18
4	7.73	-0.22	0	-0.22	-1.72	1.72	-0.05
5	7.73	-0.27	0	-0.27	-2.1	2.1	0.06
6	7.73	-0.27	0	-0.27	-2.1	2.1	-0.16
Total		-1.33	0	-1.33	-10.31	10.31	-0.09

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	75	0.09

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
2	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	75	0.09
3	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	45	0.06
4	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	45	0.06
5	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	165	0.02
6	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	165	0.02
Total						0.739	---	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.07	0	-0.07	-0.5	0.5	0.02
2	7.73	-0.07	0	-0.07	-0.5	0.5	0.03
3	7.73	-0.04	0	-0.04	-0.3	0.3	-0.02
4	7.73	-0.04	0	-0.04	-0.3	0.3	0
5	7.73	-0.01	0	-0.01	-0.1	0.1	0
6	7.73	-0.01	0	-0.01	-0.1	0.1	-0.01
Total		-0.23	0	-0.23	-1.81	1.81	0.02

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21
2	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21
3	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21
4	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	-0.11	-0.07	-0.16	-0.36	0.14	0.24
2	4.5	2.25	-0.16	-0.07	-0.11	-0.14	0.36	-0.24
3	4.5	2.25	-0.11	0.07	-0.16	-0.36	0.14	-0.24
4	4.5	2.25	-0.16	0.07	-0.11	-0.14	0.36	0.24
Total			-0.54	0	-0.54	-1.01	1.01	0

Wind Calculation Of Basic Service Wind Speed 25 m/s Dir. 90

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.85$

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Important factor | = 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	7.5	3	0.219	0.657	0	0.08	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	1.03	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	1.03	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	1.03	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	1	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	90	0
2	6 To 9	28.5	1	0.017	0	0	0	406.5	170	0
3	6 To 9	28.5	1	0.017	0	0	0	406.5	100	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	399.5	90	0.01
5	4.5 To 6	26.25	1	0.009	0	0.008	0	399.5	170	0
6	4.5 To 6	26.25	1	0.009	0	0	0	399.5	100	0
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	394.6	90	0.01
8	3 To 4.5	24.75	1	0.009	0	0.008	0	394.6	170	0
9	3 To 4.5	24.75	1	0.009	0	0	0	394.6	100	0
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	387.3	90	0.01
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	381.7	90	0
12	0.3 To 3	22.65	1	0.016	0	0.015	0	387.3	170	0.01
13	0.3 To 3	22.65	1	0.016	0	0	0	387.3	100	0
14	0 To 0.3	21.15	1	0.002	0	0	0	381.7	100	0
Total						0.105	---	---	---	0.05

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	-0.01	-0.04	0	0
5	5.25	0	0	0	-0.02	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	-0.01	-0.03	0	0
8	3.75	0	0	0	-0.01	0	0

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
9	3.75	0	0	0	0	0	0
10	1.65	0	0	-0.01	-0.02	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	-0.01	-0.01	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	-0.05	-0.14	0	-0.01

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.33	0	399.5	135	0.14
2	3 To 4.5	24.75	1	0.387	0.279	0.33	0	394.6	135	0.14
3	0.3 To 3	22.65	1	0.697	0.502	0.594	0	387.3	135	0.25
4	0 To 0.3	21.15	1	0.077	0.056	0.066	0	381.7	135	0.03
Total						1.319	---	---	---	0.57

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0	0	-0.14	-0.76	0	0.03
2	3.75	0	0	-0.14	-0.54	0	0.03
3	1.65	0	0	-0.25	-0.42	0	0.05
4	0.15	0	0	-0.03	0	0	0.01
Total		0	0	-0.57	-1.72	0	0.12

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	120	0.27
2	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	120	0.27
3	7.73	28.73	0.8	1.103	0.651	0.883	0	407.2	0	0.4
4	7.73	28.73	0.8	1.103	0.651	0.883	0	407.2	0	0.4
5	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	120	0.27
6	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	120	0.27
Total						4.211	---	---	---	1.89

Wind vector from panel antenna

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	-0.27	-2.12	0	0.17
2	7.73	0	0	-0.27	-2.12	0	0.08
3	7.73	0	0	-0.4	-3.06	0	-0.12
4	7.73	0	0	-0.4	-3.06	0	0.12
5	7.73	0	0	-0.27	-2.12	0	-0.08
6	7.73	0	0	-0.27	-2.12	0	-0.17
Total		0	0	-1.89	-14.58	0	0

Wind forces from mounts of panel antenna

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	120	0.08
2	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	120	0.08
3	7.73	28.73	0.8	0.034	0.274	0.027	0	407.2	0	0.01
4	7.73	28.73	0.8	0.034	0.274	0.027	0	407.2	0	0.01
5	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	120	0.08
6	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	120	0.08
Total							0.739	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	-0.08	-0.59	0	0.03
2	7.73	0	0	-0.08	-0.59	0	0.01
3	7.73	0	0	-0.01	-0.09	0	0
4	7.73	0	0	-0.01	-0.09	0	0
5	7.73	0	0	-0.08	-0.59	0	-0.01
6	7.73	0	0	-0.08	-0.59	0	-0.03
Total		0	0	-0.33	-2.56	0	0

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25
2	4.5	2.25	88.9	1.2	5.386	56.66	389.4	0.17
3	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25
4	4.5	2.25	88.9	1.2	5.386	123.34	389.4	0.17

Wind vector from struts

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#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0	0	-0.25	-0.55	0	0.36
2	4.5	2.25	0	-0.09	-0.14	-0.18	0	0
3	4.5	2.25	0	0	-0.25	-0.55	0	-0.36
4	4.5	2.25	0	0.09	-0.14	-0.18	0	0
Total			0	0	-0.78	-1.47	0	0

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

Gust effect factor $G_h = 1.1$
 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	7.5	3	0.219	0.657	0	0.09	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	0.09	6.06	0.86	0.283	399.5	0.12
3	1	3.75	1.5	0.219	0.328	0	0.09	6.03	0.87	0.285	394.6	0.12
4	1	1.65	2.7	0.219	0.591	0	0.09	5.97	0.88	0.518	387.3	0.22
	2	0.15	0.3	0.219	0.066	0	0.07	5.93	0.88	0.058	381.7	0.02
Total										1.706	---	0.74

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	135	0
2	6 To 9	28.5	1	0.017	0	0	0	406.5	125	0
3	6 To 9	28.5	1	0.017	0	0	0	406.5	55	0
4	4.5 To 6	26.25	1	0.018	0.018	0	0	399.5	135	0
5	4.5 To 6	26.25	1	0.009	0	0	0	399.5	125	0
6	4.5 To 6	26.25	1	0.009	0	0	0	399.5	55	0
7	3 To 4.5	24.75	1	0.018	0.018	0	0	394.6	135	0
8	3 To 4.5	24.75	1	0.009	0	0	0	394.6	125	0
9	3 To 4.5	24.75	1	0.009	0	0	0	394.6	55	0
10	0.3 To 3	22.65	1	0.032	0.032	0	0	387.3	135	0
11	0 To 0.3	21.15	1	0.004	0.004	0	0	381.7	135	0
12	0.3 To 3	22.65	1	0.016	0	0	0	387.3	125	0
13	0.3 To 3	22.65	1	0.016	0	0	0	387.3	55	0
14	0 To 0.3	21.15	1	0.002	0	0	0	381.7	55	0
Total							0	---	---	0

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Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	0	0	0	0
5	5.25	0	0	0	0	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	0	0	0	0
8	3.75	0	0	0	0	0	0
9	3.75	0	0	0	0	0	0
10	1.65	0	0	0	0	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	0	0	0	0

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0	0	399.5	180	0
2	3 To 4.5	24.75	1	0.387	0.279	0	0	394.6	180	0
3	0.3 To 3	22.65	1	0.697	0.502	0	0	387.3	180	0
4	0 To 0.3	21.15	1	0.077	0.056	0	0	381.7	180	0
Total						0	---	---	---	0

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0	0	0	0	0	0
2	3.75	0	0	0	0	0	0
3	1.65	0	0	0	0	0	0
4	0.15	0	0	0	0	0	0
Total		0	0	0	0	0	0

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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ASMTower 2018.4

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	165	0.38	
2	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	165	0.38	
3	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	45	0.31	
4	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	45	0.31	
5	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	75	0.24	
6	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	75	0.24	
Total							4.211	---	---	---	1.89

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.27	0	-0.27	-2.1	-2.1	0.16
2	7.73	0.27	0	-0.27	-2.1	-2.1	-0.06
3	7.73	0.22	0	-0.22	-1.72	-1.72	0.05
4	7.73	0.22	0	-0.22	-1.72	-1.72	0.18
5	7.73	0.17	0	-0.17	-1.33	-1.33	-0.14
6	7.73	0.17	0	-0.17	-1.33	-1.33	-0.11
Total		1.33	0	-1.33	-10.31	-10.31	0.09

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	165	0.02	
2	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	165	0.02	
3	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	45	0.06	
4	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	45	0.06	
5	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	75	0.09	
6	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	75	0.09	
Total							0.739	---	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.01	0	-0.01	-0.1	-0.1	0.01
2	7.73	0.01	0	-0.01	-0.1	-0.1	0
3	7.73	0.04	0	-0.04	-0.3	-0.3	0
4	7.73	0.04	0	-0.04	-0.3	-0.3	0.02
5	7.73	0.07	0	-0.07	-0.5	-0.5	-0.03
6	7.73	0.07	0	-0.07	-0.5	-0.5	-0.02

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 Client GN UAE
 Project GSM Network

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 Checked by A.S.M

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
Total		0.23	0	-0.23	-1.81	-1.81	-0.02

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	q _g Deg	q _z N/m ²	F _w KN
1	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21
2	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21
3	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21
4	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0.11	0.07	-0.16	-0.36	-0.14	0.24
2	4.5	2.25	0.16	-0.07	-0.11	-0.14	-0.36	0.24
3	4.5	2.25	0.11	-0.07	-0.16	-0.36	-0.14	-0.24
4	4.5	2.25	0.16	0.07	-0.11	-0.14	-0.36	-0.24
Total			0.54	0	-0.54	-1.01	-1.01	0

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

Gust effect factor $G_h = 1.1$
 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	7.5	3	0.219	0.657	0	0.08	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	1.03	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	1.03	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	1.03	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	1.02	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	180	0	
2	6 To 9	28.5	1	0.017	0	0	0	406.5	80	0	
3	6 To 9	28.5	1	0.017	0	0	0	406.5	10	0	
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	399.5	180	0.01	
5	4.5 To 6	26.25	1	0.009	0	0	0	399.5	80	0	
6	4.5 To 6	26.25	1	0.009	0	0.008	0	399.5	10	0	
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	394.6	180	0.01	
8	3 To 4.5	24.75	1	0.009	0	0	0	394.6	80	0	
9	3 To 4.5	24.75	1	0.009	0	0.008	0	394.6	10	0	
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	387.3	180	0.01	
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	381.7	180	0	
12	0.3 To 3	22.65	1	0.016	0	0	0	387.3	80	0	
13	0.3 To 3	22.65	1	0.016	0	0.015	0	387.3	10	0.01	
14	0 To 0.3	21.15	1	0.002	0	0.002	0	381.7	10	0	
Total								0.107	---	---	0.05

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0.01	0	0	0	-0.04	0
5	5.25	0	0	0	0	0	0
6	5.25	0	0	0	0	-0.02	0
7	3.75	0.01	0	0	0	-0.03	0
8	3.75	0	0	0	0	0	0
9	3.75	0	0	0	0	-0.01	0
10	1.65	0.01	0	0	0	-0.02	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0.01	0	0	0	-0.01	0
14	0.15	0	0	0	0	0	0
Total		0.05	0	0	0	-0.14	0.01

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.33	0	399.5	135	0.14
2	3 To 4.5	24.75	1	0.387	0.279	0.33	0	394.6	135	0.14
3	0.3 To 3	22.65	1	0.697	0.502	0.594	0	387.3	135	0.25

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
4	0 To 0.3	21.15	1	0.077	0.056	0.066	0	381.7	135	0.03
Total							1.319	---	---	0.57

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0.14	0	0	0	-0.76	-0.03
2	3.75	0.14	0	0	0	-0.54	-0.03
3	1.65	0.25	0	0	0	-0.42	-0.05
4	0.15	0.03	0	0	0	0	-0.01
Total		0.57	0	0	0	-1.72	-0.12

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	150	0.35
2	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	150	0.35
3	7.73	28.73	0.8	1.103	0.651	0.521	0	407.2	90	0.23
4	7.73	28.73	0.8	1.103	0.651	0.521	0	407.2	90	0.23
5	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	30	0.35
6	7.73	28.73	0.8	1.103	0.651	0.792	0	407.2	30	0.35
Total							4.211	---	---	1.89

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.35	0	0	0	-2.74	0
2	7.73	0.35	0	0	0	-2.74	-0.19
3	7.73	0.23	0	0	0	-1.8	0.12
4	7.73	0.23	0	0	0	-1.8	0.12
5	7.73	0.35	0	0	0	-2.74	-0.19
6	7.73	0.35	0	0	0	-2.74	0
Total		1.89	0	0	0	-14.58	-0.13

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	150	0.03

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
2	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	150	0.03	
3	7.73	28.73	0.8	0.034	0.274	0.219	0	407.2	90	0.1	
4	7.73	28.73	0.8	0.034	0.274	0.219	0	407.2	90	0.1	
5	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	30	0.03	
6	7.73	28.73	0.8	0.034	0.274	0.075	0	407.2	30	0.03	
Total							0.739	---	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.03	0	0	0	-0.26	0
2	7.73	0.03	0	0	0	-0.26	-0.01
3	7.73	0.1	0	0	0	-0.76	0.03
4	7.73	0.1	0	0	0	-0.76	0.03
5	7.73	0.03	0	0	0	-0.26	-0.01
6	7.73	0.03	0	0	0	-0.26	0
Total		0.33	0	0	0	-2.56	0.03

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	123.34	389.4	0.17
2	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25
3	4.5	2.25	88.9	1.2	5.386	56.66	389.4	0.17
4	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0.14	0.09	0	0	-0.18	0
2	4.5	2.25	0.25	0	0	0	-0.55	0.36
3	4.5	2.25	0.14	-0.09	0	0	-0.18	0
4	4.5	2.25	0.25	0	0	0	-0.55	-0.36
Total			0.78	0	0	0	-1.47	0

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

Gust effect factor $G_h = 1.1$
 Direction probability $K_d = 0.85$

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Important factor | = 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	7.5	3	0.219	0.657	0	0.09	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	0.66	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	0.66	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	0.66	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	0.64	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	135	0
2	6 To 9	28.5	1	0.017	0	0	0	406.5	35	0
3	6 To 9	28.5	1	0.017	0	0	0	406.5	35	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	399.5	135	0.01
5	4.5 To 6	26.25	1	0.009	0	0.006	0	399.5	35	0
6	4.5 To 6	26.25	1	0.009	0	0.005	0	399.5	35	0
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	394.6	135	0.01
8	3 To 4.5	24.75	1	0.009	0	0.006	0	394.6	35	0
9	3 To 4.5	24.75	1	0.009	0	0.005	0	394.6	35	0
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	387.3	135	0.01
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	381.7	135	0
12	0.3 To 3	22.65	1	0.016	0	0.01	0	387.3	35	0
13	0.3 To 3	22.65	1	0.016	0	0.009	0	387.3	35	0
14	0 To 0.3	21.15	1	0.002	0	0.001	0	381.7	35	0
Total						0.115	---	---	---	0.05

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0.01	0	0.01	0.03	-0.03	0
5	5.25	0	0	0	0.01	-0.01	0
6	5.25	0	0	0	0.01	-0.01	0
7	3.75	0.01	0	0.01	0.02	-0.02	0
8	3.75	0	0	0	0.01	-0.01	0

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
9	3.75	0	0	0	0.01	-0.01	0
10	1.65	0.01	0	0.01	0.02	-0.02	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0.01	-0.01	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0.03	0	0.03	0.11	-0.11	0.01

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.279	0	399.5	90	0.12
2	3 To 4.5	24.75	1	0.387	0.279	0.279	0	394.6	90	0.12
3	0.3 To 3	22.65	1	0.697	0.502	0.502	0	387.3	90	0.21
4	0 To 0.3	21.15	1	0.077	0.056	0.056	0	381.7	90	0.02
Total						1.116	---	---	---	0.48

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0.09	0	0.09	0.46	-0.46	-0.04
2	3.75	0.09	0	0.09	0.32	-0.32	-0.04
3	1.65	0.15	0	0.15	0.25	-0.25	-0.06
4	0.15	0.02	0	0.02	0	0	-0.01
Total		0.34	0	0.34	1.03	-1.03	-0.14

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	105	0.24
2	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	105	0.24
3	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	135	0.31
4	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	135	0.31
5	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	15	0.38
6	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	15	0.38
Total						4.211	---	---	---	1.89

Wind vector from panel antenna

ASMTower 2018.4

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.17	0	0.17	1.33	-1.33	-0.11
2	7.73	0.17	0	0.17	1.33	-1.33	-0.14
3	7.73	0.22	0	0.22	1.72	-1.72	0.18
4	7.73	0.22	0	0.22	1.72	-1.72	0.05
5	7.73	0.27	0	0.27	2.1	-2.1	-0.06
6	7.73	0.27	0	0.27	2.1	-2.1	0.16
Total		1.33	0	1.33	10.31	-10.31	0.09

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	105	0.09
2	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	105	0.09
3	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	135	0.06
4	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	135	0.06
5	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	15	0.02
6	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	15	0.02
Total							0.739	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0.07	0	0.07	0.5	-0.5	-0.02
2	7.73	0.07	0	0.07	0.5	-0.5	-0.03
3	7.73	0.04	0	0.04	0.3	-0.3	0.02
4	7.73	0.04	0	0.04	0.3	-0.3	0
5	7.73	0.01	0	0.01	0.1	-0.1	0
6	7.73	0.01	0	0.01	0.1	-0.1	0.01
Total		0.23	0	0.23	1.81	-1.81	-0.02

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21
2	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21
3	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21
4	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21

Wind vector from struts

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#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0.11	0.07	0.16	0.36	-0.14	-0.24
2	4.5	2.25	0.16	0.07	0.11	0.14	-0.36	0.24
3	4.5	2.25	0.11	-0.07	0.16	0.36	-0.14	0.24
4	4.5	2.25	0.16	-0.07	0.11	0.14	-0.36	-0.24
Total			0.54	0	0.54	1.01	-1.01	0

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

Gust effect factor $G_h = 1.1$
 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	7.5	3	0.219	0.657	0	0.08	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	1.03	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	1.03	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	1.03	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	1	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	K _a	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	90	0
2	6 To 9	28.5	1	0.017	0	0	0	406.5	10	0
3	6 To 9	28.5	1	0.017	0	0	0	406.5	80	0
4	4.5 To 6	26.25	1	0.018	0.018	0.018	0	399.5	90	0.01
5	4.5 To 6	26.25	1	0.009	0	0.008	0	399.5	10	0
6	4.5 To 6	26.25	1	0.009	0	0	0	399.5	80	0
7	3 To 4.5	24.75	1	0.018	0.018	0.018	0	394.6	90	0.01
8	3 To 4.5	24.75	1	0.009	0	0.008	0	394.6	10	0
9	3 To 4.5	24.75	1	0.009	0	0	0	394.6	80	0
10	0.3 To 3	22.65	1	0.032	0.032	0.032	0	387.3	90	0.01
11	0 To 0.3	21.15	1	0.004	0.004	0.004	0	381.7	90	0
12	0.3 To 3	22.65	1	0.016	0	0.015	0	387.3	10	0.01
13	0.3 To 3	22.65	1	0.016	0	0	0	387.3	80	0
14	0 To 0.3	21.15	1	0.002	0	0	0	381.7	80	0
Total							0.104	---	---	0.04

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Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	0.01	0.04	0	0
5	5.25	0	0	0	0.02	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	0.01	0.03	0	0
8	3.75	0	0	0	0.01	0	0
9	3.75	0	0	0	0	0	0
10	1.65	0	0	0.01	0.02	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0.01	0.01	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	0.04	0.14	0	0.01

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.333	0	399.5	45	0.15
2	3 To 4.5	24.75	1	0.387	0.279	0.333	0	394.6	45	0.14
3	0.3 To 3	22.65	1	0.697	0.502	0.599	0	387.3	45	0.26
4	0 To 0.3	21.15	1	0.077	0.056	0.067	0	381.7	45	0.03
Total						1.332	---	---	---	0.57

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	0	0	0.15	0.77	0	-0.03
2	3.75	0	0	0.14	0.54	0	-0.03
3	1.65	0	0	0.26	0.42	0	-0.05
4	0.15	0	0	0.03	0	0	-0.01
Total		0	0	0.57	1.74	0	-0.12

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	60	0.27	
2	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	60	0.27	
3	7.73	28.73	0.8	1.103	0.651	0.883	0	407.2	180	0.4	
4	7.73	28.73	0.8	1.103	0.651	0.883	0	407.2	180	0.4	
5	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	60	0.27	
6	7.73	28.73	0.8	1.103	0.651	0.611	0	407.2	60	0.27	
Total							4.211	---	---	---	1.89

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	0.27	2.12	0	-0.17
2	7.73	0	0	0.27	2.12	0	-0.08
3	7.73	0	0	0.4	3.06	0	0.12
4	7.73	0	0	0.4	3.06	0	-0.12
5	7.73	0	0	0.27	2.12	0	0.08
6	7.73	0	0	0.27	2.12	0	0.17
Total		0	0	1.89	14.58	0	0

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
1	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	60	0.08	
2	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	60	0.08	
3	7.73	28.73	0.8	0.034	0.274	0.027	0	407.2	180	0.01	
4	7.73	28.73	0.8	0.034	0.274	0.027	0	407.2	180	0.01	
5	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	60	0.08	
6	7.73	28.73	0.8	0.034	0.274	0.171	0	407.2	60	0.08	
Total							0.739	---	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	0	0	0.08	0.59	0	-0.03
2	7.73	0	0	0.08	0.59	0	-0.01
3	7.73	0	0	0.01	0.09	0	0
4	7.73	0	0	0.01	0.09	0	0
5	7.73	0	0	0.08	0.59	0	0.01
6	7.73	0	0	0.08	0.59	0	0.03

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#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
Total		0	0	0.33	2.56	0	0

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25
2	4.5	2.25	88.9	1.2	5.386	123.34	389.4	0.17
3	4.5	2.25	88.9	1.2	5.386	90	389.4	0.25
4	4.5	2.25	88.9	1.2	5.386	56.66	389.4	0.17

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	0	0	0.25	0.55	0	-0.36
2	4.5	2.25	0	0.09	0.14	0.18	0	0
3	4.5	2.25	0	0	0.25	0.55	0	0.36
4	4.5	2.25	0	-0.09	0.14	0.18	0	0
Total			0	0	0.78	1.47	0	0

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

Gust effect factor $G_h = 1.1$
 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	7.5	3	0.219	0.657	0	0.02	6.12	0.86	0.562	406.5	0.25
2	1	5.25	1.5	0.219	0.328	0	0.81	6.06	1.2	0.394	399.5	0.17
3	1	3.75	1.5	0.219	0.328	0	0.81	6.03	1.2	0.394	394.6	0.17
4	1	1.65	2.7	0.219	0.591	0	0.81	5.97	1.2	0.71	387.3	0.3
	2	0.15	0.3	0.219	0.066	0	0.8	5.93	1.2	0.079	381.7	0.03
Total										2.139	---	0.93

Wind force from ladder

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	6 To 9	28.5	1	0.036	0.036	0	0	406.5	45	0
2	6 To 9	28.5	1	0.017	0	0	0	406.5	55	0
3	6 To 9	28.5	1	0.017	0	0	0	406.5	125	0
4	4.5 To 6	26.25	1	0.018	0.018	0	0	399.5	45	0
5	4.5 To 6	26.25	1	0.009	0	0.002	0	399.5	55	0
6	4.5 To 6	26.25	1	0.009	0	0.002	0	399.5	125	0
7	3 To 4.5	24.75	1	0.018	0.018	0	0	394.6	45	0
8	3 To 4.5	24.75	1	0.009	0	0.002	0	394.6	55	0
9	3 To 4.5	24.75	1	0.009	0	0.002	0	394.6	125	0
10	0.3 To 3	22.65	1	0.032	0.032	0	0	387.3	45	0
11	0 To 0.3	21.15	1	0.004	0.004	0	0	381.7	45	0
12	0.3 To 3	22.65	1	0.016	0	0.003	0	387.3	55	0
13	0.3 To 3	22.65	1	0.016	0	0.003	0	387.3	125	0
14	0 To 0.3	21.15	1	0.002	0	0	0	381.7	125	0
Total						0.014	---	---	---	0.01

Wind vector from ladder

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.5	0	0	0	0	0	0
2	7.5	0	0	0	0	0	0
3	7.5	0	0	0	0	0	0
4	5.25	0	0	0	0	0	0
5	5.25	0	0	0	0	0	0
6	5.25	0	0	0	0	0	0
7	3.75	0	0	0	0	0	0
8	3.75	0	0	0	0	0	0
9	3.75	0	0	0	0	0	0
10	1.65	0	0	0	0	0	0
11	0.15	0	0	0	0	0	0
12	1.65	0	0	0	0	0	0
13	1.65	0	0	0	0	0	0
14	0.15	0	0	0	0	0	0
Total		0	0	0	0.01	0.01	0

Wind forces from transmission line clusters

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	4.5 To 6	26.25	1	0.387	0.279	0.387	0	399.5	0	0.17
2	3 To 4.5	24.75	1	0.387	0.279	0.387	0	394.6	0	0.17
3	0.3 To 3	22.65	1	0.697	0.502	0.697	0	387.3	0	0.3

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
4	0 To 0.3	21.15	1	0.077	0.056	0.077	0	381.7	0	0.03
Total							1.548	---	---	0.67

Wind vector from transmission line clusters

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	5.25	-0.12	0	0.12	0.63	0.63	0
2	3.75	-0.12	0	0.12	0.45	0.45	0
3	1.65	-0.21	0	0.21	0.35	0.35	0
4	0.15	-0.02	0	0.02	0	0	0
Total		-0.47	0	0.47	1.43	1.43	0

Wind forces from panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	15	0.38
2	7.73	28.73	0.8	1.103	0.651	0.858	0	407.2	15	0.38
3	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	135	0.31
4	7.73	28.73	0.8	1.103	0.651	0.702	0	407.2	135	0.31
5	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	105	0.24
6	7.73	28.73	0.8	1.103	0.651	0.545	0	407.2	105	0.24
Total							4.211	---	---	1.89

Wind vector from panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.27	0	0.27	2.1	2.1	-0.16
2	7.73	-0.27	0	0.27	2.1	2.1	0.06
3	7.73	-0.22	0	0.22	1.72	1.72	-0.05
4	7.73	-0.22	0	0.22	1.72	1.72	-0.18
5	7.73	-0.17	0	0.17	1.33	1.33	0.14
6	7.73	-0.17	0	0.17	1.33	1.33	0.11
Total		-1.33	0	1.33	10.31	10.31	-0.09

Wind forces from mounts of panel antenna

#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN
1	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	15	0.02

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#	Elev. m	Z m	Ka	EPA _n m ²	EPA _t m ²	EPA _a m ²	t _{iz} mm	q _z N/m ²	q Deg	Force KN	
2	7.73	28.73	0.8	0.034	0.274	0.04	0	407.2	15	0.02	
3	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	135	0.06	
4	7.73	28.73	0.8	0.034	0.274	0.123	0	407.2	135	0.06	
5	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	105	0.09	
6	7.73	28.73	0.8	0.034	0.274	0.206	0	407.2	105	0.09	
Total							0.739	---	---	---	0.33

Wind vector from mounts of panel antenna

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	7.73	-0.01	0	0.01	0.1	0.1	-0.01
2	7.73	-0.01	0	0.01	0.1	0.1	0
3	7.73	-0.04	0	0.04	0.3	0.3	0
4	7.73	-0.04	0	0.04	0.3	0.3	-0.02
5	7.73	-0.07	0	0.07	0.5	0.5	0.03
6	7.73	-0.07	0	0.07	0.5	0.5	0.02
Total		-0.23	0	0.23	1.81	1.81	0.02

Wind forces from struts

#	Attach Elev. m	Mean Elev. m	Dia. mm	C _d	L _g m	qg Deg	q _z N/m ²	Fw KN
1	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21
2	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21
3	4.5	2.25	88.9	1.2	5.386	112.87	389.4	0.21
4	4.5	2.25	88.9	1.2	5.386	67.13	389.4	0.21

Wind vector from struts

#	Attach Elev. m	Mean Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	4.5	2.25	-0.11	-0.07	0.16	0.36	0.14	-0.24
2	4.5	2.25	-0.16	0.07	0.11	0.14	0.36	-0.24
3	4.5	2.25	-0.11	0.07	0.16	0.36	0.14	0.24
4	4.5	2.25	-0.16	-0.07	0.11	0.14	0.36	0.24
Total			-0.54	0	0.54	1.01	1.01	0

Combination

Comb. No.	Description

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1	1.2D.L.+1.6DesignWL_0Deg_36.11m/s
2	1.2D.L.+1.6DesignWL_45Deg_36.11m/s
3	1.2D.L.+1.6DesignWL_90Deg_36.11m/s
4	1.2D.L.+1.6DesignWL_135Deg_36.11m/s
5	1.2D.L.+1.6DesignWL_180Deg_36.11m/s
6	1.2D.L.+1.6DesignWL_225Deg_36.11m/s
7	1.2D.L.+1.6DesignWL_270Deg_36.11m/s
8	1.2D.L.+1.6DesignWL_315Deg_36.11m/s
9	0.9D.L.+1.6DesignWL_0Deg_36.11m/s
10	0.9D.L.+1.6DesignWL_45Deg_36.11m/s
11	0.9D.L.+1.6DesignWL_90Deg_36.11m/s
12	0.9D.L.+1.6DesignWL_135Deg_36.11m/s
13	0.9D.L.+1.6DesignWL_180Deg_36.11m/s
14	0.9D.L.+1.6DesignWL_225Deg_36.11m/s
15	0.9D.L.+1.6DesignWL_270Deg_36.11m/s
16	0.9D.L.+1.6DesignWL_315Deg_36.11m/s
17	1D.L.+1ServiceWL_0Deg_25m/s
18	1D.L.+1ServiceWL_45Deg_25m/s
19	1D.L.+1ServiceWL_90Deg_25m/s
20	1D.L.+1ServiceWL_135Deg_25m/s
21	1D.L.+1ServiceWL_180Deg_25m/s
22	1D.L.+1ServiceWL_225Deg_25m/s
23	1D.L.+1ServiceWL_270Deg_25m/s
24	1D.L.+1ServiceWL_315Deg_25m/s

Pole Section Properties

Sec. No.	Elev. m	Diameter mm	Thick. mm	Area mm ²	Inertia mm ⁴	Elastic Modulus mm ³	Plastic Modulus mm ³
1	9	219	4	2701.8	15616566	142617	184921
2	8.4	219	4	2701.8	15616566	142617	184921
3	8.4	219	4	2701.8	15616566	142617	184921
4	7.8	219	4	2701.8	15616566	142617	184921
5	7.8	219	4	2701.8	15616566	142617	184921
6	7.2	219	4	2701.8	15616566	142617	184921
7	7.2	219	4	2701.8	15616566	142617	184921
8	6.6	219	4	2701.8	15616566	142617	184921
9	6.6	219	4	2701.8	15616566	142617	184921
10	6	219	4	2701.8	15616566	142617	184921
11	6	219	4	2701.8	15616566	142617	184921
12	5.7	219	4	2701.8	15616566	142617	184921
13	5.7	219	4	2701.8	15616566	142617	184921
14	5.4	219	4	2701.8	15616566	142617	184921

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Sec. No.	Elev. m	Diameter mm	Thick. mm	Area mm ²	Inertia mm ⁴	Elastic Modulus mm ³	Plastic Modulus mm ³
15	5.4	219	4	2701.8	15616566	142617	184921
16	5.1	219	4	2701.8	15616566	142617	184921
17	5.1	219	4	2701.8	15616566	142617	184921
18	4.8	219	4	2701.8	15616566	142617	184921
19	4.8	219	4	2701.8	15616566	142617	184921
20	4.5	219	4	2701.8	15616566	142617	184921
21	4.5	219	4	2701.8	15616566	142617	184921
22	4.2	219	4	2701.8	15616566	142617	184921
23	4.2	219	4	2701.8	15616566	142617	184921
24	3.9	219	4	2701.8	15616566	142617	184921
25	3.9	219	4	2701.8	15616566	142617	184921
26	3.6	219	4	2701.8	15616566	142617	184921
27	3.6	219	4	2701.8	15616566	142617	184921
28	3.3	219	4	2701.8	15616566	142617	184921
29	3.3	219	4	2701.8	15616566	142617	184921
30	3	219	4	2701.8	15616566	142617	184921
31	3	219	4	2701.8	15616566	142617	184921
32	2.4	219	4	2701.8	15616566	142617	184921
33	2.4	219	4	2701.8	15616566	142617	184921
34	1.8	219	4	2701.8	15616566	142617	184921
35	1.8	219	4	2701.8	15616566	142617	184921
36	1.2	219	4	2701.8	15616566	142617	184921
37	1.2	219	4	2701.8	15616566	142617	184921
38	0.6	219	4	2701.8	15616566	142617	184921
39	0.6	219	4	2701.8	15616566	142617	184921
40	0	219	4	2701.8	15616566	142617	184921

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	9	54.75	241.3	586.76	40.16	293.38	61.95	
2	8.4	54.75	241.3	586.76	40.16	293.38	61.95	
3	8.4	54.75	241.3	586.76	40.16	293.38	61.95	
4	7.8	54.75	241.3	586.76	40.16	293.38	61.95	
5	7.8	54.75	241.3	586.76	40.16	293.38	61.95	
6	7.2	54.75	241.3	586.76	40.16	293.38	61.95	
7	7.2	54.75	241.3	586.76	40.16	293.38	61.95	
8	6.6	54.75	241.3	586.76	40.16	293.38	61.95	
9	6.6	54.75	241.3	586.76	40.16	293.38	61.95	
10	6	54.75	241.3	586.76	40.16	293.38	61.95	
11	6	54.75	241.3	586.76	40.16	293.38	61.95	
12	5.7	54.75	241.3	586.76	40.16	293.38	61.95	

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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
13	5.7	54.75	241.3	586.76	40.16	293.38	61.95	
14	5.4	54.75	241.3	586.76	40.16	293.38	61.95	
15	5.4	54.75	241.3	586.76	40.16	293.38	61.95	
16	5.1	54.75	241.3	586.76	40.16	293.38	61.95	
17	5.1	54.75	241.3	586.76	40.16	293.38	61.95	
18	4.8	54.75	241.3	586.76	40.16	293.38	61.95	
19	4.8	54.75	241.3	586.76	40.16	293.38	61.95	
20	4.5	54.75	241.3	586.76	40.16	293.38	61.95	
21	4.5	54.75	241.3	586.76	40.16	293.38	61.95	
22	4.2	54.75	241.3	586.76	40.16	293.38	61.95	
23	4.2	54.75	241.3	586.76	40.16	293.38	61.95	
24	3.9	54.75	241.3	586.76	40.16	293.38	61.95	
25	3.9	54.75	241.3	586.76	40.16	293.38	61.95	
26	3.6	54.75	241.3	586.76	40.16	293.38	61.95	
27	3.6	54.75	241.3	586.76	40.16	293.38	61.95	
28	3.3	54.75	241.3	586.76	40.16	293.38	61.95	
29	3.3	54.75	241.3	586.76	40.16	293.38	61.95	
30	3	54.75	241.3	586.76	40.16	293.38	61.95	
31	3	54.75	241.3	586.76	40.16	293.38	61.95	
32	2.4	54.75	241.3	586.76	40.16	293.38	61.95	
33	2.4	54.75	241.3	586.76	40.16	293.38	61.95	
34	1.8	54.75	241.3	586.76	40.16	293.38	61.95	
35	1.8	54.75	241.3	586.76	40.16	293.38	61.95	
36	1.2	54.75	241.3	586.76	40.16	293.38	61.95	
37	1.2	54.75	241.3	586.76	40.16	293.38	61.95	
38	0.6	54.75	241.3	586.76	40.16	293.38	61.95	
39	0.6	54.75	241.3	586.76	40.16	293.38	61.95	
40	0	54.75	241.3	586.76	40.16	293.38	61.95	

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	9	0	0	0	0	5	0	0	0	0	0	Safe
2	8.4	0.17	0.04	0.13	0	8	0	0	0	0	0	Safe
3	8.4	0.17	0.04	0.13	0	8	0	0	0	0	0	Safe
4	7.8	0.34	0.17	0.26	0	8	0	0	0	0	0	Safe
5	7.8	0.34	0.17	0.26	0	8	0	0	0	0	0	Safe
6	7.2	3.07	4.8	8.66	-0.35	1	0.01	0.12	0.03	0.01	0.13	Safe
7	7.2	3.07	4.8	8.66	-0.35	1	0.01	0.12	0.03	0.01	0.13	Safe
8	6.6	3.24	10.09	8.8	-0.35	1	0.01	0.25	0.03	0.01	0.26	Safe
9	6.6	3.24	10.09	8.8	-0.35	1	0.01	0.25	0.03	0.01	0.26	Safe
10	6	3.41	15.46	8.93	-0.35	1	0.01	0.38	0.03	0.01	0.39	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
11	6	3.41	15.46	8.93	-0.35	1	0.01	0.38	0.03	0.01	0.39	Safe
12	5.7	3.52	18.2	9.17	-0.37	1	0.01	0.45	0.03	0.01	0.46	Safe
13	5.7	3.52	18.2	9.17	-0.37	1	0.01	0.45	0.03	0.01	0.46	Safe
14	5.4	3.62	21.01	9.44	0.25	8	0.01	0.52	0.03	0	0.53	Safe
15	5.4	3.62	21.01	9.44	0.25	8	0.01	0.52	0.03	0	0.53	Safe
16	5.1	3.73	23.9	9.7	0.25	8	0.01	0.6	0.03	0	0.6	Safe
17	5.1	3.73	23.9	9.7	0.25	8	0.01	0.6	0.03	0	0.6	Safe
18	4.8	3.83	26.86	9.96	0.25	8	0.01	0.67	0.03	0	0.68	Safe
19	4.8	3.83	26.86	9.96	0.25	8	0.01	0.67	0.03	0	0.68	Safe
20	4.5	3.94	29.9	10.21	0.25	8	0.01	0.74	0.03	0	0.75	Safe
21	4.5	2.23	29.9	8.52	0.25	8	0	0.74	0.03	0	0.75	Safe
22	4.2	2.34	27.39	8.21	0.48	5	0	0.68	0.03	0.01	0.69	Safe
23	4.2	2.34	27.39	8.21	0.48	5	0	0.68	0.03	0.01	0.69	Safe
24	3.9	2.44	25.08	6.85	-0.25	4	0	0.62	0.02	0	0.63	Safe
25	3.9	2.44	25.08	6.85	-0.25	4	0	0.62	0.02	0	0.63	Safe
26	3.6	2.55	23.04	6.79	-0.25	4	0	0.57	0.02	0	0.58	Safe
27	3.6	2.55	23.04	6.79	-0.25	4	0	0.57	0.02	0	0.58	Safe
28	3.3	2.66	21.02	6.73	-0.25	4	0	0.52	0.02	0	0.53	Safe
29	3.3	2.66	21.02	6.73	-0.25	4	0	0.52	0.02	0	0.53	Safe
30	3	2.76	19.02	6.66	-0.25	4	0	0.47	0.02	0	0.48	Safe
31	3	2.76	19.02	6.66	-0.25	4	0	0.47	0.02	0	0.48	Safe
32	2.4	2.97	15.08	6.53	-0.25	4	0.01	0.38	0.02	0	0.38	Safe
33	2.4	2.97	15.08	6.53	-0.25	4	0.01	0.38	0.02	0	0.38	Safe
34	1.8	3.18	11.2	6.41	-0.25	4	0.01	0.28	0.02	0	0.28	Safe
35	1.8	3.18	11.2	6.41	-0.25	4	0.01	0.28	0.02	0	0.28	Safe
36	1.2	3.39	7.39	6.28	-0.25	4	0.01	0.18	0.02	0	0.19	Safe
37	1.2	3.39	7.39	6.28	-0.25	4	0.01	0.18	0.02	0	0.19	Safe
38	0.6	3.61	3.66	6.16	-0.25	4	0.01	0.09	0.02	0	0.1	Safe
39	0.6	3.61	3.66	6.16	-0.25	4	0.01	0.09	0.02	0	0.1	Safe
40	0	3.81	0	4.86	0.77	5	0.01	0	0.02	0.01	0.01	Safe

Design of struts under axial force

#	Elevation m	Section Name	Comp. Force KN	Ten. Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
1	0 To 4.5	P88.9x4	19.32	17.78	51.74	231.7	--	0.37	Safe	
2	0 To 4.5	P88.9x4	19.31	17.79	51.74	231.7	--	0.37	Safe	
3	0 To 4.5	P88.9x4	19.31	17.79	51.74	231.7	--	0.37	Safe	
4	0 To 4.5	P88.9x4	19.32	17.78	51.74	231.7	--	0.37	Safe	

Compression capacity details of struts

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Strut No.	Section Name	L m	L/r	Curve No	KL/r	W/t	Fy' MPa	l _c	Fcr MPa	fPn KN	Comment
1	P88.9x4	5.386	179.2	4	179.2	22.2	241.3	1.98	53.9	51.74	
2	P88.9x4	5.386	179.2	4	179.2	22.2	241.3	1.98	53.9	51.74	
3	P88.9x4	5.386	179.2	4	179.2	22.2	241.3	1.98	53.9	51.74	
4	P88.9x4	5.386	179.2	4	179.2	22.2	241.3	1.98	53.9	51.74	

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	16.68	7.69	0	16.68	0.06	-0.78	-89.21	89.21
2	11.54	7.69	11.54	16.32	62.34	-0.26	-62.22	88.08
3	0	7.69	16.66	16.66	89.27	-0.42	0.06	89.27
4	-9.25	7.69	9.25	13.08	55.41	-0.25	55.41	78.36
5	-16.66	7.69	0	16.66	0.06	0.77	89.27	89.27
6	-11.54	7.69	-11.54	16.32	-62.22	0.26	62.34	88.08
7	0	7.69	-16.68	16.68	-89.21	0.43	0.06	89.21
8	11.91	7.69	-11.91	16.85	-63.36	0.25	-63.36	89.6
9	16.68	5.76	0	16.68	0.04	-0.78	-89.16	89.16
10	11.54	5.76	11.54	16.32	62.28	-0.26	-62.19	88.02
11	0	5.76	16.66	16.66	89.19	-0.42	0.04	89.19
12	-9.25	5.76	9.25	13.08	55.35	-0.25	55.35	78.27
13	-16.66	5.76	0	16.66	0.04	0.77	89.19	89.19
14	-11.54	5.76	-11.54	16.32	-62.19	0.26	62.28	88.02
15	0	5.76	-16.68	16.68	-89.16	0.43	0.04	89.16
16	11.91	5.76	-11.91	16.85	-63.33	0.25	-63.33	89.56
17	4.55	6.4	0	4.55	0.05	-0.21	-24.43	24.43
18	3.15	6.4	3.15	4.45	17.13	-0.07	-17.04	24.16
19	0	6.4	4.54	4.54	24.51	-0.11	0.05	24.51
20	-2.64	6.4	2.64	3.73	15.6	-0.07	15.6	22.06
21	-4.54	6.4	0	4.54	0.05	0.21	24.51	24.51
22	-3.15	6.4	-3.15	4.45	-17.04	0.07	17.13	24.16
23	0	6.4	-4.55	4.55	-24.43	0.11	0.05	24.43
24	3.25	6.4	-3.25	4.59	-17.34	0.07	-17.34	24.52
Max.	16.68	7.69	-16.68	16.85	89.27	-0.78	89.27	89.6

Individual support reaction

Joint No.	Comb No.	Rx KN	Ry KN	Rz KN	RMx KN.m	RMy KN.m	RMz KN.m
Pole	1	-4.83	3.81	-0.01	0	-0.78	0

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Joint No.	Comb No.	Rx KN	Ry KN	Rz KN	RMx KN.m	RMy KN.m	RMz KN.m
	2	-3.49	3.81	-3.51	0	-0.26	0
	3	0.01	3.81	-4.86	0	-0.42	0
	4	4.26	3.81	-4.26	0	-0.25	0
	5	4.86	3.81	-0.01	0	0.77	0
	6	3.51	3.81	3.49	0	0.26	0
	7	0.01	3.81	4.83	0	0.43	0
	8	-3.36	3.81	3.36	0	0.25	0
	9	-4.82	2.86	-0.01	0	-0.78	0
	10	-3.48	2.86	-3.5	0	-0.26	0
	11	0.01	2.86	-4.84	0	-0.42	0
	12	4.25	2.86	-4.25	0	-0.25	0
	13	4.84	2.86	-0.01	0	0.77	0
	14	3.5	2.86	3.48	0	0.26	0
	15	0.01	2.86	4.82	0	0.43	0
	16	-3.36	2.86	3.36	0	0.25	0
	17	-1.33	3.18	-0.01	0	-0.21	0
	18	-0.96	3.18	-0.98	0	-0.07	0
	19	0.01	3.18	-1.36	0	-0.11	0
	20	1.15	3.18	-1.15	0	-0.07	0
	21	1.36	3.18	-0.01	0	0.21	0
	22	0.98	3.18	0.96	0	0.07	0
	23	0.01	3.18	1.33	0	0.11	0
	24	-0.93	3.18	0.93	0	0.07	0
	Max	4.86	3.81	-4.86	0	-0.78	0
Strut @2.96m 180Deg	1	9.84	-14.1	0	0	0	0
	2	6.76	-9.54	0.3	0	0	0
	3	-0.46	0.98	0.46	0	0	0
	4	-6.91	10.33	0.3	0	0	0
	5	-10.76	16.05	0	0	0	0
	6	-7.68	11.5	-0.3	0	0	0
	7	-0.46	0.98	-0.46	0	0	0
	8	6.88	-9.73	-0.3	0	0	0
	9	9.95	-14.33	0	0	0	0
	10	6.87	-9.78	0.3	0	0	0
	11	-0.35	0.73	0.46	0	0	0
	12	-6.79	10.07	0.3	0	0	0
	13	-10.64	15.79	0	0	0	0
	14	-7.56	11.25	-0.3	0	0	0
	15	-0.35	0.73	-0.46	0	0	0
	16	6.99	-9.97	-0.3	0	0	0
	17	2.44	-3.32	0	0	0	0
	18	1.59	-2.07	0.08	0	0	0
	19	-0.39	0.81	0.12	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
	20	-2.2	3.44	0.08	0	0	0
	21	-3.21	4.95	0	0	0	0
	22	-2.37	3.7	-0.08	0	0	0
	23	-0.39	0.81	-0.12	0	0	0
	24	1.62	-2.12	-0.08	0	0	0
	Max	-10.76	16.05	-0.46	0	0	0
Strut @2.96m 90Deg	1	0.46	0.96	-0.45	0	0	0
	2	0.3	-9.56	6.77	0	0	0
	3	0	-14.11	9.85	0	0	0
	4	-0.3	-8.39	6	0	0	0
	5	-0.46	0.96	-0.45	0	0	0
	6	-0.3	11.48	-7.67	0	0	0
	7	0	16.04	-10.75	0	0	0
	8	0.3	11.67	-7.8	0	0	0
	9	0.46	0.72	-0.34	0	0	0
	10	0.3	-9.79	6.88	0	0	0
	11	0	-14.34	9.95	0	0	0
	12	-0.3	-8.62	6.11	0	0	0
	13	-0.46	0.72	-0.34	0	0	0
	14	-0.3	11.23	-7.55	0	0	0
	15	0	15.79	-10.63	0	0	0
	16	0.3	11.42	-7.68	0	0	0
	17	0.12	0.8	-0.38	0	0	0
	18	0.08	-2.09	1.6	0	0	0
	19	0	-3.33	2.44	0	0	0
	20	-0.08	-1.83	1.43	0	0	0
	21	-0.12	0.8	-0.38	0	0	0
	22	-0.08	3.68	-2.35	0	0	0
	23	0	4.93	-3.2	0	0	0
	24	0.08	3.74	-2.39	0	0	0
	Max	0.46	16.04	-10.75	0	0	0
Strut @2.96m 0Deg	1	10.75	16.04	0	0	0	0
	2	7.67	11.48	0.3	0	0	0
	3	0.45	0.96	0.46	0	0	0
	4	-6	-8.39	0.3	0	0	0
	5	-9.85	-14.11	0	0	0	0
	6	-6.77	-9.56	-0.3	0	0	0
	7	0.45	0.96	-0.46	0	0	0
	8	7.8	11.67	-0.3	0	0	0
	9	10.63	15.79	0	0	0	0
	10	7.55	11.23	0.3	0	0	0
	11	0.34	0.72	0.46	0	0	0
	12	-6.11	-8.62	0.3	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
	13	-9.95	-14.34	0	0	0	0
	14	-6.88	-9.79	-0.3	0	0	0
	15	0.34	0.72	-0.46	0	0	0
	16	7.68	11.42	-0.3	0	0	0
	17	3.2	4.93	0	0	0	0
	18	2.35	3.68	0.08	0	0	0
	19	0.38	0.8	0.12	0	0	0
	20	-1.43	-1.83	0.08	0	0	0
	21	-2.44	-3.33	0	0	0	0
	22	-1.6	-2.09	-0.08	0	0	0
	23	0.38	0.8	-0.12	0	0	0
	24	2.39	3.74	-0.08	0	0	0
	Max	10.75	16.04	-0.46	0	0	0
Strut @2.96m 270Deg	1	0.46	0.98	0.46	0	0	0
	2	0.3	11.5	7.68	0	0	0
	3	0	16.05	10.76	0	0	0
	4	-0.3	10.33	6.91	0	0	0
	5	-0.46	0.98	0.46	0	0	0
	6	-0.3	-9.54	-6.76	0	0	0
	7	0	-14.1	-9.84	0	0	0
	8	0.3	-9.73	-6.88	0	0	0
	9	0.46	0.73	0.35	0	0	0
	10	0.3	11.25	7.56	0	0	0
	11	0	15.79	10.64	0	0	0
	12	-0.3	10.07	6.79	0	0	0
	13	-0.46	0.73	0.35	0	0	0
	14	-0.3	-9.78	-6.87	0	0	0
	15	0	-14.33	-9.95	0	0	0
	16	0.3	-9.97	-6.99	0	0	0
	17	0.12	0.81	0.39	0	0	0
	18	0.08	3.7	2.37	0	0	0
	19	0	4.95	3.21	0	0	0
	20	-0.08	3.44	2.2	0	0	0
	21	-0.12	0.81	0.39	0	0	0
	22	-0.08	-2.07	-1.59	0	0	0
	23	0	-3.32	-2.44	0	0	0
	24	0.08	-2.12	-1.62	0	0	0
		Max	0.46	16.05	10.76	0	0

Comparison of Reaction Force Vs. Applied Loads

Base moment reaction Vs. applied base moment

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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 %
1	0.06	-0.78	-89.21	-0.06	0.78	88.95	0.2873
2	62.34	-0.26	-62.22	-62.16	0.26	62.04	0.2913
3	89.27	-0.42	0.06	-89.01	0.42	-0.06	0.2872
4	55.41	-0.25	55.41	-55.22	0.25	-55.23	0.3297
5	0.06	0.77	89.27	-0.06	-0.77	-89.01	0.2872
6	-62.22	0.26	62.34	62.04	-0.26	-62.16	0.2913
7	-89.21	0.43	0.06	88.95	-0.43	-0.06	0.2874
8	-63.36	0.25	-63.36	63.18	-0.25	63.18	0.2859
9	0.04	-0.78	-89.16	-0.04	0.78	88.97	0.2149
10	62.28	-0.26	-62.19	-62.15	0.26	62.06	0.2179
11	89.19	-0.42	0.04	-89	0.42	-0.04	0.2149
12	55.35	-0.25	55.35	-55.21	0.25	-55.21	0.2467
13	0.04	0.77	89.19	-0.04	-0.77	-89	0.2149
14	-62.19	0.26	62.28	62.06	-0.26	-62.15	0.2179
15	-89.16	0.43	0.04	88.97	-0.43	-0.04	0.2149
16	-63.33	0.25	-63.33	63.19	-0.25	63.19	0.2139
17	0.05	-0.21	-24.43	-0.05	0.21	24.37	0.2407
18	17.13	-0.07	-17.04	-17.09	0.07	16.99	0.2436
19	24.51	-0.11	0.05	-24.45	0.11	-0.05	0.24
20	15.6	-0.07	15.6	-15.56	0.07	-15.56	0.2684
21	0.05	0.21	24.51	-0.05	-0.21	-24.46	0.24
22	-17.04	0.07	17.13	16.99	-0.07	-17.09	0.2436
23	-24.43	0.11	0.05	24.37	-0.11	-0.05	0.2407
24	-17.34	0.07	-17.34	17.3	-0.07	17.3	0.2396

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	16.68	7.69	0	-16.68	-7.69	0	0
2	11.54	7.69	11.54	-11.54	-7.69	-11.54	0
3	0	7.69	16.66	0	-7.69	-16.66	0
4	-9.25	7.69	9.25	9.25	-7.69	-9.25	0
5	-16.66	7.69	0	16.66	-7.69	0	0
6	-11.54	7.69	-11.54	11.54	-7.69	11.54	0
7	0	7.69	-16.68	0	-7.69	16.68	0
8	11.91	7.69	-11.91	-11.91	-7.69	11.91	0
9	16.68	5.76	0	-16.68	-5.76	0	0
10	11.54	5.76	11.54	-11.54	-5.76	-11.54	0
11	0	5.76	16.66	0	-5.76	-16.66	0
12	-9.25	5.76	9.25	9.25	-5.76	-9.25	0
13	-16.66	5.76	0	16.66	-5.76	0	0
14	-11.54	5.76	-11.54	11.54	-5.76	11.54	0

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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 %
15	0	5.76	-16.68	0	-5.76	16.68	0
16	11.91	5.76	-11.91	-11.91	-5.76	11.91	0
17	4.55	6.4	0	-4.55	-6.4	0	0
18	3.15	6.4	3.15	-3.15	-6.4	-3.15	0
19	0	6.4	4.54	0	-6.4	-4.54	0
20	-2.64	6.4	2.64	2.64	-6.4	-2.64	0
21	-4.54	6.4	0	4.54	-6.4	0	0
22	-3.15	6.4	-3.15	3.15	-6.4	3.15	0
23	0	6.4	-4.55	0	-6.4	4.55	0
24	3.25	6.4	-3.25	-3.25	-6.4	3.25	0

Displacement at non service condition

Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
9	113.8 (5)	0 (4)	-113.8 (3)	114.9 (4)	1.66 (4)	0.1 (1)
6	30.2 (5)	0 (4)	-30.2 (3)	30.5 (4)	1.41 (4)	0.08 (1)
4.5	0.8 (5)	0 (4)	-0.8 (3)	0.8 (8)	0.8 (4)	0.07 (1)
3	-10.2 (5)	0 (4)	10.2 (3)	10.9 (4)	0.14 (4)	0.05 (1)

Displacement at service condition

Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
9	31.3 (21)	0 (20)	-31.3 (19)	31.6 (20)	0.46 (20)	0.03 (17)
6	8.3 (21)	0 (20)	-8.3 (19)	8.4 (20)	0.39 (20)	0.02 (17)
4.5	0.2 (21)	0 (20)	-0.2 (19)	0.2 (24)	0.22 (20)	0.02 (17)
3	-2.8 (21)	0 (20)	2.8 (19)	3 (20)	0.04 (20)	0.01 (17)

DESIGN OF ANCHOR ROD

Name: Base Conn

Design is safe with usage ratio 0.81

Connection Parameters

Located at: Pole.

Design code = ANSI/TIA-222-G-2

Diameter of base plate = 335 mm

Type of bolt analysis = Elastic

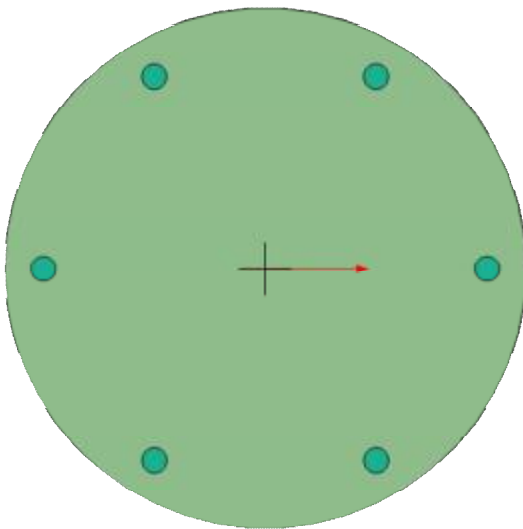
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Dist. above concrete to bottom of leveling nut = 50 mm
 Orientation of the connection = 0 Deg
 Location of support reaction X = 0 mm
 Z = 0 mm
 Use of grout under base plate = YES
 Use of leveling nut under base plate = NO
 Total length of anchor rod = 700 mm



Bolt Specification

#	Diam mm	X-Coord. mm	Z-Coord. mm	Material Name
1	16	142.5	0	A572-50
2	16	71.3	123.4	A572-50
3	16	-71.2	123.4	A572-50
4	16	-142.5	0	A572-50
5	16	-71.3	-123.4	A572-50
6	16	71.2	-123.4	A572-50

Critical Reaction in Global Coordinate System

#	Support	Load Com.	F _x KN	F _y KN	F _z KN	Horiz. Force KN	M _x KN.m	M _y KN.m	M _z KN.m	Horiz. Moment KN.m
1	Pole	5	4.86	3.81	-0.01	4.86	0	0.77	0	0

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Critical Action in Local Coordinates of Connection

#	Support	Load Com.	F _x KN	F _y KN	F _z KN	Horiz. Force KN	M _x KN.m	M _y KN.m	M _z KN.m	Horiz. Moment KN.m
1	Pole	5	-4.86	-3.81	0.01	4.86	0	-0.77	0	0

Force distribution in anchor rods

#	Diam mm	F _x #1 KN	F _y #1 KN	F _z #1 KN
1	16	-0.81	-0.64	0.91
2	16	-1.59	-0.64	0.46
3	16	-1.59	-0.64	-0.45
4	16	-0.81	-0.64	-0.9
5	16	-0.03	-0.64	-0.45
6	16	-0.03	-0.64	0.45

Bolt Design

Anchor rod diameter	d	=	16	mm
Material of anchor rod		=	A572-50	
Gross area of anchor rod	A _g	=	201.1	mm ²
Net area of anchor rod	A _n	=	150.8	mm ²
Minimum tensile strength of anchor rod	F _u	=	448.2	MPa
Minimum yield strength of anchor rod	F _y	=	344.7	MPa
Maximum compression	P _{uc}	=	0.64	KN
Maximum tension	P _{ut}	=	0	KN
Considered axial force in interaction 1	P _{u1}	=	0	KN
Shear force in interaction 1	V _{u1}	=	1.66	KN
Nominal tensile strength of anchor rod	R _{nt}	=	67.58	KN
	φ	=	0.8	
	η	=	0.55	
Interaction equation		=	[P _{u1} + (V _{u1} / η)] / φR _{nt}	
		=	0.06	

Bolt status**Safe as 0.06 < 1.0**

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Check the Pullout Resistance of Anchor

Type of anchor rod head		=	JHook	
Maximum tension in anchor	T	=	0	KN
Diameter of anchor	da	=	16	mm
Effective width of hook	eh	=	70	mm
Concrete compressive strength	F'c	=	21	MPa
Modification factor for pullout resistance	Ψ_{cp}	=	1	
The pullout resistance of anchor	Np	=	$\Psi \cdot 0.9 \cdot eh \cdot da \cdot F'c$	
		=	21.17	KN
Strength reduction factor	ϕ	=	0.7	
Available pullout resistance	ϕNp	=	14.82	KN
Utilization ratio	$T / \phi Np$	=	0	

Safety status

Safe as $0 < 1.0$

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
Yielding strength of reinforcement bars	Fy	=	360	MPa
Lesser of one-half the spacing between anchors and distance from bar to nearest concrete surface	cb	=	75	mm
Epoxy coated factor	Ψ_e	=	1	
Size factor	Ψ_s	=	0.8	

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Job No.

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Client

GN UAE

Date

5/11/2017

Project

GSM Network

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Checked by

A.S.M

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Casting position factor	Ψ_t	=	1	
Light weight concrete factor	λ	=	1	
Transverse reinforcement index	ktr	=	0	mm
Reinforcement bars development length	ldr	=	$F_y \Psi_t \Psi_e \Psi_s / [1.1 \lambda \text{ Sqrt}(F_c) (c_b + K_{tr})/d_b]$ db	
		=	not less 300	mm
		=	365.7	mm
Length of anchor above top of concrete surface	O	=	60	mm
Required embeded length for anchor rod	Lan	=	$ldr + Ct + Sa / 1.5$	
		=	515.7	mm
Required total length for anchor rod	Ltr	=	$Lan + O$	
		=	575.7	mm
Supplied total length for anchor rod	Lts	=	700	mm
Utilization ratiofor embeded length		=	0.81	

*Saftey satus**Safe as 0.81 < 1.0*

DESIGN OF ANCHOR ROD

*Name: Strut Conn**Design is safe with usage ratio 0.88*

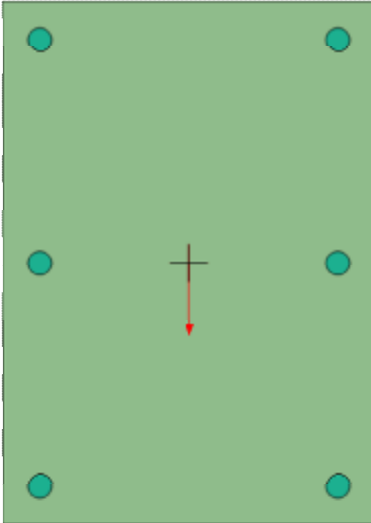
Connection Parameters

Located at: Strut @2.96m 180Deg, Strut @2.96m 90Deg, Strut @2.96m 0Deg and Strut @2.96m 270Deg.

Design code		=	ANSI/TIA-222-G-2	
Width of base plate		=	250	mm
Height of base plate		=	350	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	

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Total length of anchor rod = 700 mm



Bolt Specification

#	Diam mm	X-Coord. mm	Z-Coord. mm	Material Name
1	16	-100	-150	A572-50
2	16	-100	150	A572-50
3	16	100	-150	A572-50
4	16	100	150	A572-50
5	16	-100	0	A572-50
6	16	100	0	A572-50

Critical Reaction in Global Coordinate System

#	Support	Load Com.	F _x KN	F _y KN	F _z KN	Horiz. Force KN	M _x KN.m	M _y KN.m	M _z KN.m	Horiz. Moment KN.m
1	Strut @2.96m 0Deg	13	-9.95	-14.34	0	9.95	0	0	0	0

Critical Action in Local Coordinates of Connection

#	Support	Load Com.	F _x KN	F _y KN	F _z KN	Horiz. Force KN	M _x KN.m	M _y KN.m	M _z KN.m	Horiz. Moment KN.m
1	Strut @2.96m 0Deg	13	0	14.34	9.95	9.95	0	0	0	0

Force distribution in anchor rods

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#	Diam mm	F _x #1 KN	F _y #1 KN	F _z #1 KN
1	16	0	2.39	1.66
2	16	0	2.39	1.66
3	16	0	2.39	1.66
4	16	0	2.39	1.66
5	16	0	2.39	1.66
6	16	0	2.39	1.66

Bolt Design

Anchor rod diameter	d	=	16	mm
Material of anchor rod		=	A572-50	
Gross area of anchor rod	A _g	=	201.1	mm ²
Net area of anchor rod	A _n	=	150.8	mm ²
Minimum tensile strength of anchor rod	F _u	=	448.2	MPa
Minimum yield strength of anchor rod	F _y	=	344.7	MPa
Maximum compression	P _{uc}	=	2.67	KN
Maximum tension	P _{ut}	=	2.39	KN
Considered axial force in interaction 1	P _{u1}	=	2.39	KN
Shear force in interaction 1	V _{u1}	=	1.66	KN
Nominal tensile strength of anchor rod	R _{nt}	=	67.58	KN
	φ	=	0.8	
	η	=	0.55	
Interaction equation		=	[P _{u1} + (V _{u1} / η)] / φR _{nt}	
		=	0.1	

Bolt status**Safe as 0.1 < 1.0**

Check the Pullout Resistance of Anchor

Type of anchor rod head		=	Hex Nut	
Maximum tension in anchor	T	=	2.39	KN
Bearing area of anchor head	A _{brg}	=	297.8	mm ²
Concrete compressive strength	F' _c	=	21	MPa

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Job No.

9m Pole

Rev. No.

A

Client

GN UAE

Date

5/11/2017

Project

GSM Network

Designed by

M.Joe

Checked by

A.S.M

ASMTower 2018.4

Modification factor for pullout resistance	Ψ_{cp}	=	1	
The pullout resistance of anchor	N_p	=	$\Psi \cdot 8 \cdot A_{brg} \cdot F'_c$	
		=	50.02	KN
Strength reduction factor	ϕ	=	0.7	
Available pullout resistance	ϕN_p	=	35.02	KN
Utilization ratio	$T / \phi N_p$	=	0.07	

*Safety status**Safe as 0.07 < 1.0*

Check the Development Length of Anchor

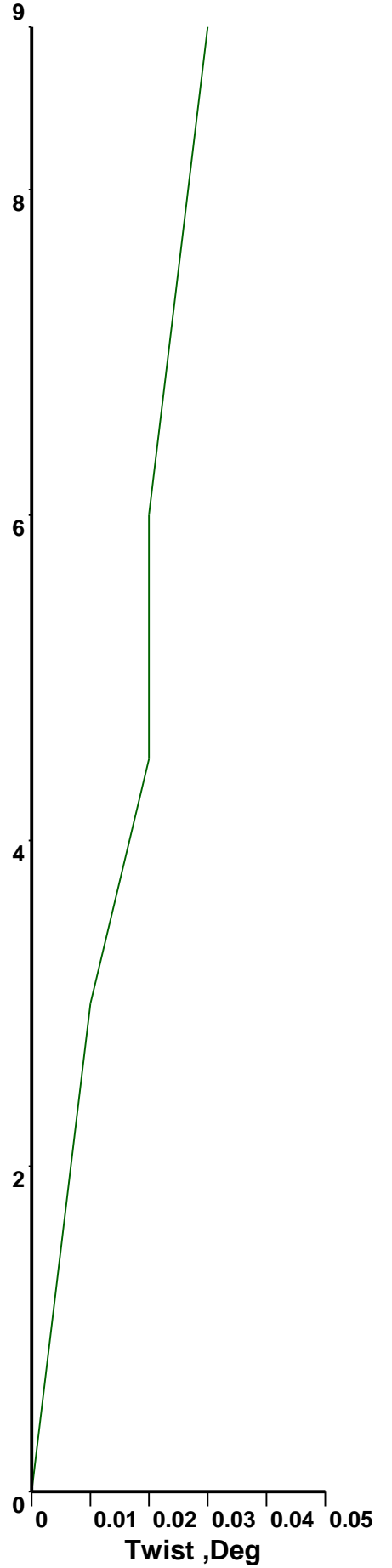
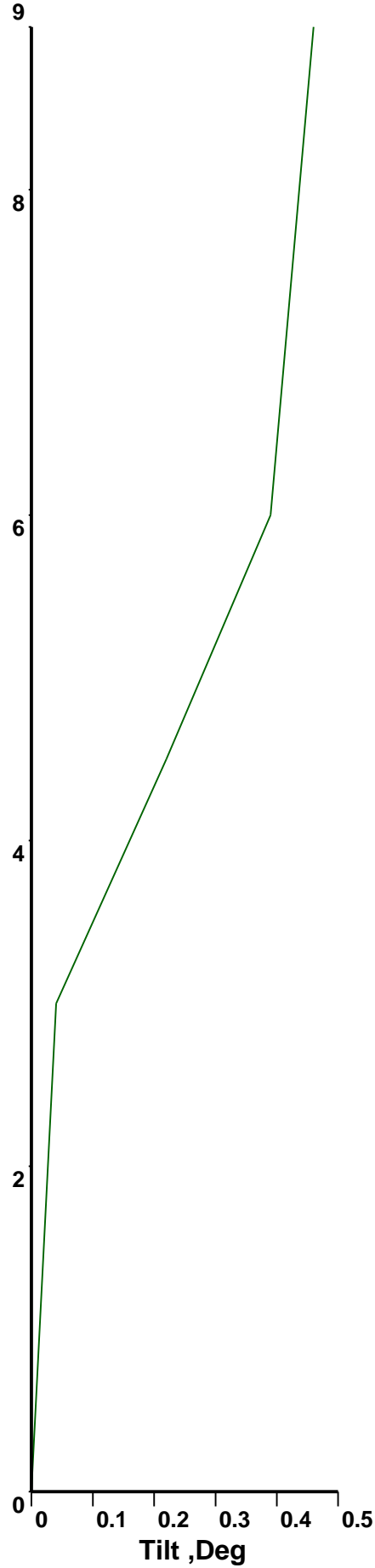
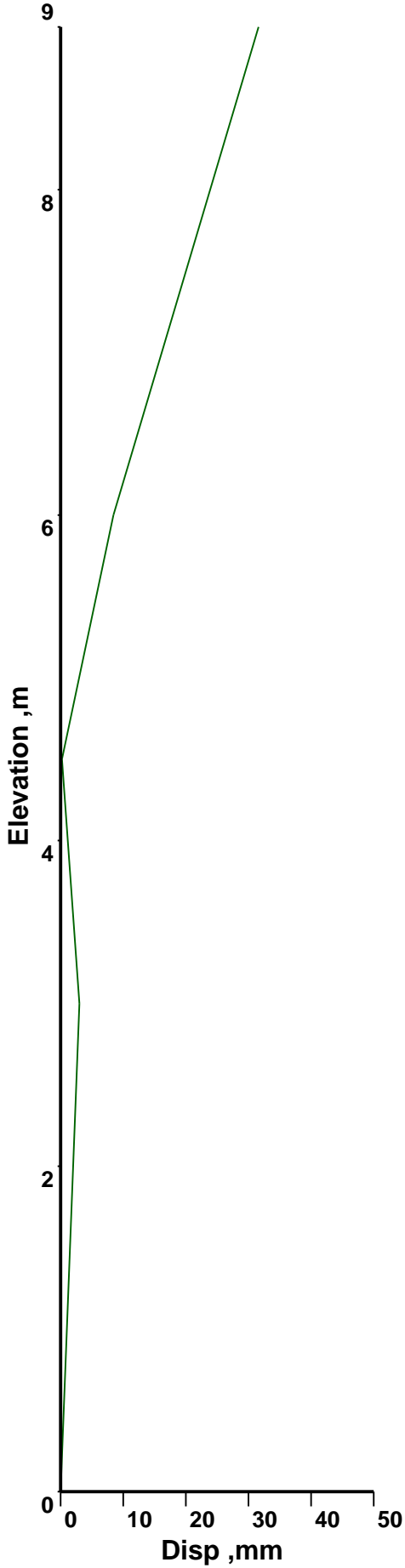
Assumption:

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.

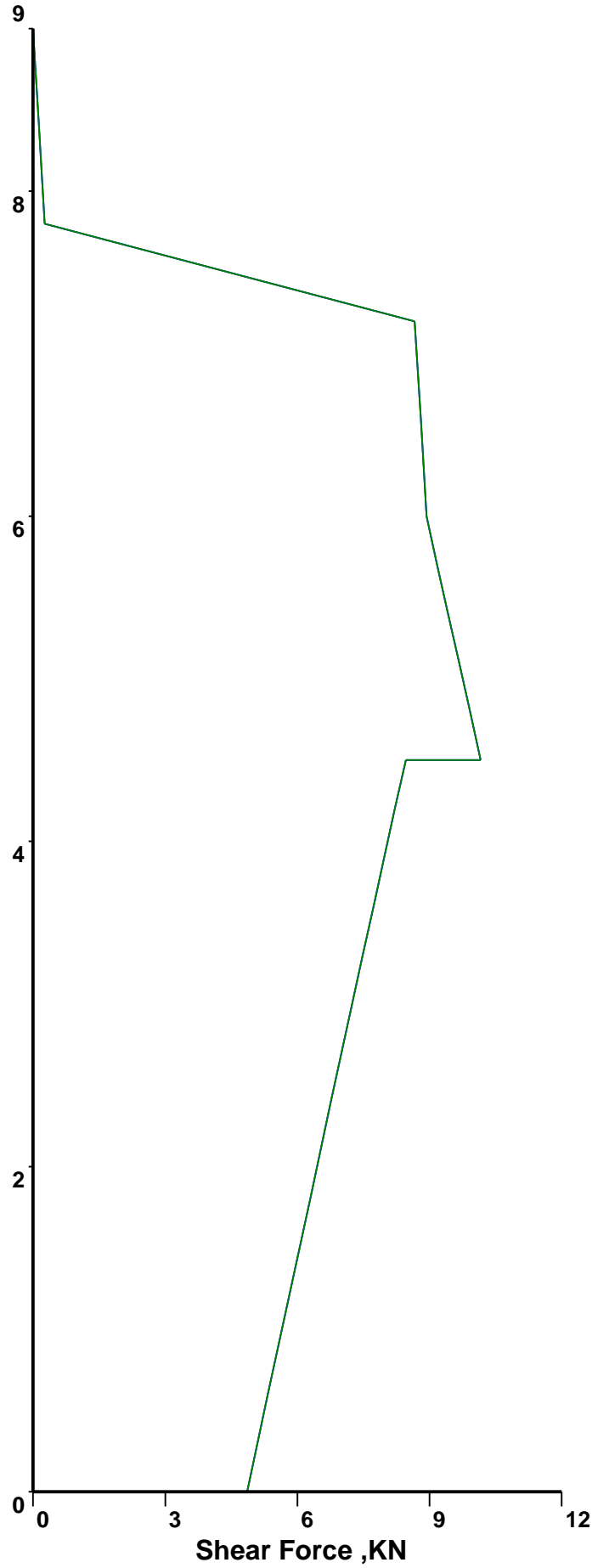
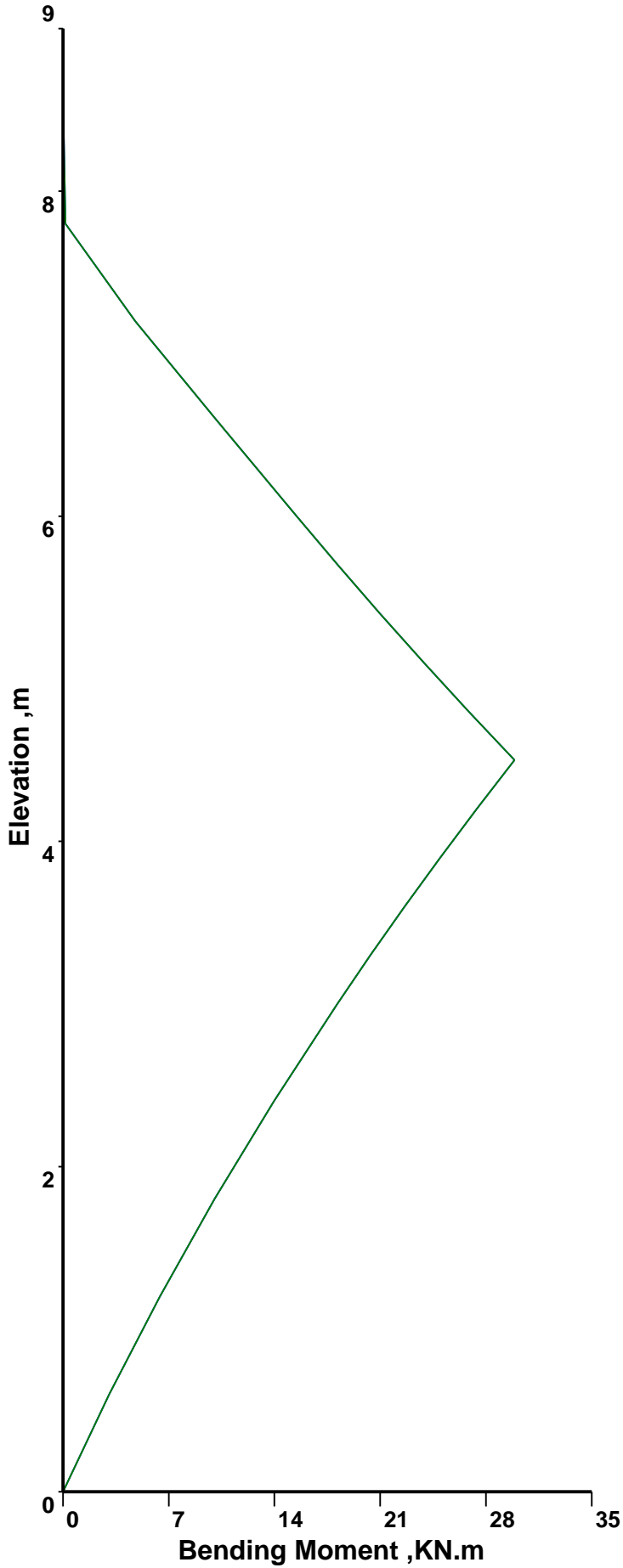
The reinforcement bars are deformed bars without hook

Diameter of reinforcement bars	d_b	=	16	mm
Side cover for reinforcement bars		=	75	mm
Top cover for reinforcement bars	C_t	=	50	mm
Minimum spacing between reinforcement bars		=	100	mm
Maximum spacing between reinforcement and anchor	S_a	=	150	mm
Concrete compressive strength	F'_c	=	21	MPa
Yielding strength of reinforcement bars	F_y	=	360	MPa
Lesser of one-half the spacing between anchors and distance from bar to nearest concrete surface	c_b	=	50	mm
Epoxy coated factor	Ψ_e	=	1	
Size factor	Ψ_s	=	0.8	
Casting position factor	Ψ_t	=	1	
Light weight concrete factor	λ	=	1	
Transverse reinforcement index	k_{tr}	=	0	mm
Reinforcement bars development length	l_{dr}	=	$F_y \Psi_t \Psi_e \Psi_s / [1.1 \lambda \text{ Sqrt}(F_c) (c_b + k_{tr}) / d_b] d_b$	
		=	not less 300	mm
		=	365.7	mm
Length of anchor above top of concrete surface	O	=	60	mm

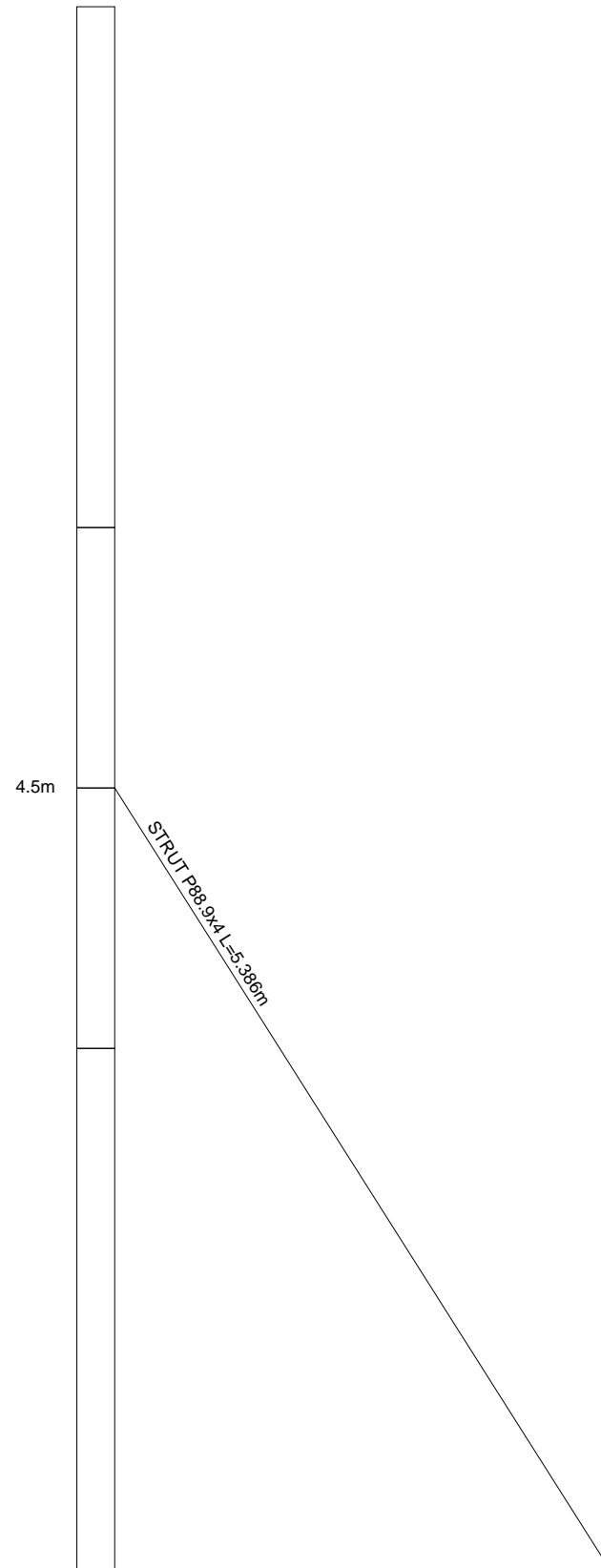
Deformation Chart Of 9m Pole Max Service Wind



Global Moment and Shear Chart Of 9m Pole Max Design Wind



PANEL NO.	ELEVATION (m)	TOWER WIDTH (m)	MAIN LEGS	LEG GRADE	DIAGONALS	DIAGONAL GRADE	PANELS HEIGHT (m)
1	9	0.219	SP 219x4mm	A53-B	ROUND	N.A.	N.A.
2	6	0.219	SP 219x4mm	A53-B	ROUND	N.A.	N.A.
3	4.5	0.219	SP 219x4mm	A53-B	ROUND	N.A.	N.A.
4	3	0.219	SP 219x4mm	A53-B	ROUND	N.A.	N.A.
0	0	0.219					



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