

ASMTower 2018.4

Job No. 45m Tri Tower
Client military
Project GSM Network

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

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Structure Design For 45m Tri Tower

Client: military
Project: GSM Network

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

Design Basics

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

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

Executive Summary

The structure is Unsafe with maximum members rating are as following:

- Main leg rating is 1.09
- Main diagonal rating is 0.99
- Main horizontal rating is 0.05
- Secondary diagonal rating is 0.41
- Secondary horizontal rating is 0.41
- Base connection rating is 0.43

Antenna Loading Configuration

The tower is designed to carry the following:

ID	Antenna Name	Elev. m	Qty.	Type	Width mm	Thick. mm	Height mm	Mount Name
1	Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000
2	Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000
3	Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000
4	Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000
5	Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000
6	Quad Band	40	1	Flat	548	135	2555	Mount 76x3000

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ID	Antenna Name	Elev. m	Qty.	Type	Width mm	Thick. mm	Height mm	Mount Name
7	Antenna Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000
8	Quad Band Antenna	40	1	Flat	548	135	2555	Mount 76x3000

Microwave antennas

ID	MW Name	Elev. m	Qty.	Type	Diameter mm	Mount Name
1	HP 2.4m	35	1	HP	2400	Mount 114x1500
2	HP 2.4m	35	1	HP	2400	Mount 114x1500
3	HP 3.7m	44	1	HP	3700	Mount 114x1500

Latticed Panel Geometry

Panel No.	Bottom Elev. m	Top Elev. m	Bottom Width m	Top Width m	Type	Sub Divide
1	42	45	1.8	1.8	X	1
2	39	42	1.8	1.8	X	1
3	36	39	1.8	1.8	X	1
4	33	36	1.8	1.8	X	1
5	30	33	1.8	1.8	X	1
6	27	30	2.085	1.8	X	1
7	24	27	2.37	2.085	X	1
8	21	24	2.655	2.37	X	1
9	18	21	2.94	2.655	X	1
10	12	18	3.51	2.94	X	3
11	6	12	4.08	3.51	X	3
12	0	6	4.65	4.08	X	3

Section Properties

ID	Name	Area mm ²	ey mm	ez mm	q Deg	rmin mm	rmax mm	ry mm	rz mm
1	L120x11	2537	34.1	34.1	45	23.6	46.8	37.1	37.1
2	L80x8	1230	22.9	22.9	45	15.7	31.1	24.6	24.6
3	L70x5	675	19.4	19.4	45	13.9	27.6	21.8	21.8
4	L60x5	582	16.8	16.8	45	11.8	23.5	18.6	18.6
5	L50x4	389	14	14	45	9.9	19.6	15.5	15.5
6	Rod 20	314.2	10	10	0	5	5	5	5
7	Rod 10	78.5	5	5	0	2.5	2.5	2.5	2.5

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Latticed Panel Weights

Panel No.	Main Leg Weight kg	Main Diag. Weight kg	Main Horiz. Weight kg	Sec. Diag. Weight kg	Sec. Horiz. Weight kg	Hip bracing Weight kg	Plan bracing Weight kg	Total Weight kg
1	243.7	151.2	38.9	0	22.4	0	0	456.2
2	243.7	151.2	38.9	0	22.4	0	0	456.2
3	243.7	151.2	0	0	22.4	0	0	417.3
4	243.7	151.2	0	0	22.4	0	0	417.3
5	243.7	151.2	0	0	22.4	0	0	417.3
6	244.2	154.6	38.9	0	24.1	0	0	461.8
7	244.2	161.6	0	0	27.6	0	0	433.5
8	244.2	169.3	0	0	31.2	0	0	444.7
9	244.2	177.4	0	0	34.8	0	0	456.4
10	488.5	294.7	0	84.9	79.7	0	0	947.8
11	488.5	307.1	0	88.4	94	0	0	978
12	488.5	321	0	92.4	54.1	0	377.8	1333.8
Total	3661	2341.9	116.7	265.7	457.6	0	377.8	7220.6

List of used profiles in the tower

ID	Type	Name	Grade	Length m	Weight kg	Paint Area m ²
1	EqualAngle	L120x11	S355J0	180.27	3661	82.564
2	EqualAngle	L80x8	S355J0	59.358	584.4	18.045
3	EqualAngle	L70x5	S235J0	455.018	2458.6	122.855
4	EqualAngle	L60x5	S235J0	90.144	420	20.733
5	EqualAngle	L50x4	S235J0	232.269	723.3	44.596
6	SolidRound	Rod 20	S235J0	62.8	157.9	3.946
7	SolidRound	Rod 10	S235J0	45.072	28.3	1.416
Total					8033.4	294.154

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	927	3.1
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	913.2	3.05
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	898.5	2.83
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	882.9	2.78

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Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	866.1	2.72
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	848.1	2.93
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	828.4	2.86
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	806.9	2.93
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	782.9	2.99
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	740.9	6.13
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	665.3	5.86
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	577.5	5.55
Total										67.262	---	43.73

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	42 To 45	43.5	0.6	0.843	0.756	0.506	0	927	0	0.4
2	39 To 42	40.5	0.6	0.843	0.756	0.506	0	913.2	0	0.39
3	36 To 39	37.5	0.6	0.843	0.756	0.506	0	898.5	0	0.39
4	33 To 36	34.5	0.6	0.843	0.756	0.506	0	882.9	0	0.38
5	30 To 33	31.5	0.6	0.843	0.756	0.506	0	866.1	0	0.37
6	27 To 30	28.5	0.6	0.843	0.758	0.506	0	848.1	0	0.36
7	24 To 27	25.5	0.6	0.843	0.758	0.506	0	828.4	0	0.36
8	21 To 24	22.5	0.6	0.843	0.758	0.506	0	806.9	0	0.35
9	18 To 21	19.5	0.6	0.843	0.758	0.506	0	782.9	0	0.34
10	12 To 18	15	0.6	1.687	1.516	1.012	0	740.9	0	0.64
11	6 To 12	9	0.6	1.687	1.516	1.012	0	665.3	0	0.57
12	0 To 6	3	0.6	1.687	1.516	1.012	0	577.5	0	0.5
Total						7.589	---	---	---	5.04

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	43.5	-0.4	0	0	0	17.34	0
2	40.5	-0.39	0	0	0	15.9	0
3	37.5	-0.39	0	0	0	14.49	0
4	34.5	-0.38	0	0	0	13.1	0
5	31.5	-0.37	0	0	0	11.73	0
6	28.5	-0.36	0	0	0	10.4	0
7	25.5	-0.36	0	0	0	9.09	0
8	22.5	-0.35	0	0	0	7.81	0
9	19.5	-0.34	0	0	0	6.57	0
10	15	-0.64	0	0	0	9.56	0
11	9	-0.57	0	0	0	5.15	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
12	3	-0.5	0	0	0	1.49	0
Total		-5.04	0	0	0	122.61	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	42 To 42.3	42.15	0.6	0.163	0.093	0.098	0	920.9	0	0.08	
2	39 To 42	40.5	0.6	1.629	0.927	0.977	0	913.2	0	0.76	
3	36 To 39	37.5	0.6	1.629	0.927	0.977	0	898.5	0	0.75	
4	33 To 36	34.5	0.6	1.629	0.927	0.977	0	882.9	0	0.73	
5	30 To 33	31.5	0.6	1.629	0.927	0.977	0	866.1	0	0.72	
6	27 To 30	28.5	0.6	1.633	0.929	0.98	0	848.1	0	0.71	
7	24 To 27	25.5	0.6	1.633	0.929	0.98	0	828.4	0	0.69	
8	21 To 24	22.5	0.6	1.633	0.929	0.98	0	806.9	0	0.67	
9	18 To 21	19.5	0.6	1.633	0.929	0.98	0	782.9	0	0.65	
10	12 To 18	15	0.6	3.266	1.859	1.96	0	740.9	0	1.23	
11	6 To 12	9	0.6	3.266	1.859	1.96	0	665.3	0	1.11	
12	2 To 6	4	0.6	2.177	1.239	1.306	0	577.5	0	0.64	
Total							13.153	---	---	---	8.74

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	42.15	-0.08	0	0	0	3.22	0
2	40.5	-0.76	0	0	0	30.73	0
3	37.5	-0.75	0	0	0	27.99	0
4	34.5	-0.73	0	0	0	25.31	0
5	31.5	-0.72	0	0	0	22.67	0
6	28.5	-0.71	0	0	0	20.13	0
7	25.5	-0.69	0	0	0	17.59	0
8	22.5	-0.67	0	0	0	15.12	0
9	19.5	-0.65	0	0	0	12.72	0
10	15	-1.23	0	0	0	18.51	0
11	9	-1.11	0	0	0	9.97	0
12	4	-0.64	0	0	0	2.57	0
Total		-8.74	0	0	0	206.53	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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#	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	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
2	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
3	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
4	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
5	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
6	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
7	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
8	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
Total							9.739	---	---	---	7.54

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	40	-0.94	0	0	0	37.7	1.69
2	40	-0.94	0	0	0	37.7	1.03
3	40	-0.94	0	0	0	37.7	-1.03
4	40	-0.94	0	0	0	37.7	-1.69
5	40	-0.94	0	0	0	37.7	-1.69
6	40	-0.94	0	0	0	37.7	-1.03
7	40	-0.94	0	0	0	37.7	1.03
8	40	-0.94	0	0	0	37.7	1.69
Total		-7.54	0	0	0	301.59	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	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
2	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
3	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
4	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
5	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
6	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
7	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
8	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
Total							1.565	---	---	---	1.21

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	40	-0.15	0	0	0	6.06	0.25

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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
2	40	-0.15	0	0	0	6.06	0.14
3	40	-0.15	0	0	0	6.06	-0.14
4	40	-0.15	0	0	0	6.06	-0.25
5	40	-0.15	0	0	0	6.06	-0.25
6	40	-0.15	0	0	0	6.06	-0.14
7	40	-0.15	0	0	0	6.06	0.14
8	40	-0.15	0	0	0	6.06	0.25
Total		-1.21	0	0	0	48.47	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	45	1.12	0.29	-0.04	3.82	1	-0.33
2	35	35	2400	4.524	0	885.6	315	1.12	-0.29	0.04	3.82	-1	0.33
3	44	44	3700	10.752	0	929.3	225	-0.9	-0.27	-0.09	-7.61	-2.31	-2.68

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-3.4	0	1.99	0	-0.33	0	69.79	119.17	1.44
2	35	-3.4	0	-1.99	0	0.33	0	-69.79	119.17	-1.44
3	44	-7.01	0	3.75	0	-2.68	0	165.15	308.62	-6.76
Total		-13.82	0	3.75	---	---	---	165.15	546.97	-6.76

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.236	0.118	0	885.6	45	0.09	
2	35	35	1	0	0.236	0.118	0	885.6	45	0.09	
3	44	44	1	0	0.234	0.117	0	929.3	135	0.09	
Total								0.353	---	---	0.27

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-0.09	0	0	0	3.11	0.1
2	35	-0.09	0	0	0	3.11	-0.1
3	44	-0.09	0	0	0	4.06	-0.11

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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		-0.27	0	0	0	10.28	-0.11

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	-3.55	0	0	0	156.22	0
Total		-3.55	0	0	0	156.22	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	C _f	D _f	D _r	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	927	3.69
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	913.2	3.63
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	898.5	3.32
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	882.9	3.26
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	866.1	3.2
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	848.1	3.46
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	828.4	3.28
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	806.9	3.33
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	782.9	3.36
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	740.9	6.84
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	665.3	6.46
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	577.5	6.09
Total										76.447	---	49.92

Wind force from ladder

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 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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	927	45	0.38	
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	913.2	45	0.37	
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	898.5	45	0.37	
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	882.9	45	0.36	
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	866.1	45	0.35	
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	848.1	45	0.35	
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	828.4	45	0.34	
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	806.9	45	0.33	
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	782.9	45	0.32	
10	12 To 18	15	0.6	1.687	1.516	0.961	0	740.9	45	0.6	
11	6 To 12	9	0.6	1.687	1.516	0.961	0	665.3	45	0.54	
12	0 To 6	3	0.6	1.687	1.516	0.961	0	577.5	45	0.47	
Total								7.202	---	---	4.78

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	43.5	-0.27	0	-0.27	-11.63	11.63	-0.06
2	40.5	-0.26	0	-0.26	-10.66	10.66	-0.06
3	37.5	-0.26	0	-0.26	-9.72	9.72	-0.06
4	34.5	-0.25	0	-0.25	-8.78	8.78	-0.06
5	31.5	-0.25	0	-0.25	-7.87	7.87	-0.05
6	28.5	-0.24	0	-0.24	-6.98	6.98	-0.03
7	25.5	-0.24	0	-0.24	-6.1	6.1	0.02
8	22.5	-0.23	0	-0.23	-5.24	5.24	0.07
9	19.5	-0.23	0	-0.23	-4.41	4.41	0.11
10	15	-0.43	0	-0.43	-6.42	6.42	0.35
11	9	-0.38	0	-0.38	-3.46	3.46	0.47
12	3	-0.33	0	-0.33	-1	1	0.55
Total		-3.38	0	-3.38	-82.26	82.26	1.27

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	920.9	45	0.06
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	913.2	45	0.6
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	898.5	45	0.59
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	882.9	45	0.58
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	866.1	45	0.56
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	848.1	45	0.55
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	828.4	45	0.54

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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	
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	806.9	45	0.53	
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	782.9	45	0.51	
10	12 To 18	15	0.6	3.266	1.859	1.537	0	740.9	45	0.97	
11	6 To 12	9	0.6	3.266	1.859	1.537	0	665.3	45	0.87	
12	2 To 6	4	0.6	2.177	1.239	1.025	0	577.5	45	0.5	
Total								10.319	---	---	6.86

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	42.15	-0.04	0	-0.04	-1.79	1.79	-0.02
2	40.5	-0.42	0	-0.42	-17.05	17.05	-0.18
3	37.5	-0.41	0	-0.41	-15.53	15.53	-0.17
4	34.5	-0.41	0	-0.41	-14.04	14.04	-0.17
5	31.5	-0.4	0	-0.4	-12.57	12.57	-0.17
6	28.5	-0.39	0	-0.39	-11.17	11.17	-0.12
7	25.5	-0.38	0	-0.38	-9.76	9.76	-0.04
8	22.5	-0.37	0	-0.37	-8.39	8.39	0.04
9	19.5	-0.36	0	-0.36	-7.05	7.05	0.12
10	15	-0.68	0	-0.68	-10.27	10.27	0.44
11	9	-0.61	0	-0.61	-5.53	5.53	0.65
12	4	-0.36	0	-0.36	-1.42	1.42	0.5
Total		-4.85	0	-4.85	-114.57	114.57	0.89

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	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
2	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
3	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4	
4	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4	
5	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
6	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
7	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4	
8	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4	
Total								9.739	---	---	7.54

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
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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	40	-0.34	0	-0.34	-13.58	13.58	0.98
2	40	-0.34	0	-0.34	-13.58	13.58	0.98
3	40	-0.99	0	-0.99	-39.74	39.74	0.7
4	40	-0.99	0	-0.99	-39.74	39.74	-0.7
5	40	-0.34	0	-0.34	-13.58	13.58	-0.98
6	40	-0.34	0	-0.34	-13.58	13.58	-0.98
7	40	-0.99	0	-0.99	-39.74	39.74	-0.7
8	40	-0.99	0	-0.99	-39.74	39.74	0.7
Total		-5.33	0	-5.33	-213.26	213.26	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	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
2	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
3	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03
4	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03
5	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
6	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
7	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03
8	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03
Total						1.565	---	---	---	1.21

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	40	-0.2	0	-0.2	-7.83	7.83	0.51
2	40	-0.2	0	-0.2	-7.83	7.83	0.51
3	40	-0.02	0	-0.02	-0.74	0.74	0.01
4	40	-0.02	0	-0.02	-0.74	0.74	-0.01
5	40	-0.2	0	-0.2	-7.83	7.83	-0.51
6	40	-0.2	0	-0.2	-7.83	7.83	-0.51
7	40	-0.02	0	-0.02	-0.74	0.74	-0.01
8	40	-0.02	0	-0.02	-0.74	0.74	0.01
Total		-0.86	0	-0.86	-34.28	34.28	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	90	-0.11	0.62	0.1	-0.37	2.13	0.8

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#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
2	35	35	2400	4.524	0	885.6	0	1.26	0	0	4.3	0	0
3	44	44	3700	10.752	0	929.3	270	-0.11	-0.62	-0.1	-0.93	-5.31	-3.08

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-1.24	0	-1.77	0	0.8	0	-61.89	43.45	4.57
2	35	-3.04	0	-3.04	0	0	0	-106.33	106.33	0
3	44	-4.41	0	-3.1	0	-3.08	0	-136.24	194.05	-12.49
Total		-8.69	0	-7.9	---	---	---	-304.46	343.83	-7.92

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.236	0.236	0	885.6	90	0.18
2	35	35	1	0	0.236	0	0	885.6	0	0
3	44	44	1	0	0.234	0.234	0	929.3	90	0.18
Total							0.47	---	---	0.36

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-0.13	0	-0.13	-4.4	4.4	0.29
2	35	0	0	0	0	0	0
3	44	-0.13	0	-0.13	-5.74	5.74	-0.3
Total		-0.26	0	-0.26	-10.14	10.14	-0.01

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	-2.51	0	-2.51	-110.46	110.46	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
Total		-2.51	0	-2.51	-110.46	110.46	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	927	3.1
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	913.2	3.05
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	898.5	2.83
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	882.9	2.78
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	866.1	2.72
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	848.1	2.93
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	828.4	2.86
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	806.9	2.93
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	782.9	2.99
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	740.9	6.13
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	665.3	5.86
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	577.5	5.55
Total										67.262	---	43.73

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	42 To 45	43.5	0.6	0.843	0.756	0.454	0	927	90	0.36
2	39 To 42	40.5	0.6	0.843	0.756	0.454	0	913.2	90	0.35
3	36 To 39	37.5	0.6	0.843	0.756	0.454	0	898.5	90	0.35
4	33 To 36	34.5	0.6	0.843	0.756	0.454	0	882.9	90	0.34
5	30 To 33	31.5	0.6	0.843	0.756	0.454	0	866.1	90	0.33
6	27 To 30	28.5	0.6	0.843	0.758	0.455	0	848.1	90	0.33
7	24 To 27	25.5	0.6	0.843	0.758	0.455	0	828.4	90	0.32
8	21 To 24	22.5	0.6	0.843	0.758	0.455	0	806.9	90	0.31
9	18 To 21	19.5	0.6	0.843	0.758	0.455	0	782.9	90	0.3
10	12 To 18	15	0.6	1.687	1.516	0.909	0	740.9	90	0.57
11	6 To 12	9	0.6	1.687	1.516	0.909	0	665.3	90	0.51
12	0 To 6	3	0.6	1.687	1.516	0.909	0	577.5	90	0.45
Total							6.815	---	---	4.53

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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	43.5	0	0	-0.36	-15.55	0	-0.08
2	40.5	0	0	-0.35	-14.26	0	-0.08
3	37.5	0	0	-0.35	-12.99	0	-0.08
4	34.5	0	0	-0.34	-11.74	0	-0.07
5	31.5	0	0	-0.33	-10.52	0	-0.07
6	28.5	0	0	-0.33	-9.34	0	-0.04
7	25.5	0	0	-0.32	-8.16	0	0.03
8	22.5	0	0	-0.31	-7.02	0	0.09
9	19.5	0	0	-0.3	-5.9	0	0.15
10	15	0	0	-0.57	-8.59	0	0.47
11	9	0	0	-0.51	-4.63	0	0.64
12	3	0	0	-0.45	-1.34	0	0.74
Total		0	0	-4.53	-110.04	0	1.7

Wind forces from transmission line clusters

#	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	42 To 42.3	42.15	0.6	0.163	0.093	0.056	0	920.9	90	0.04
2	39 To 42	40.5	0.6	1.629	0.927	0.556	0	913.2	90	0.43
3	36 To 39	37.5	0.6	1.629	0.927	0.556	0	898.5	90	0.42
4	33 To 36	34.5	0.6	1.629	0.927	0.556	0	882.9	90	0.42
5	30 To 33	31.5	0.6	1.629	0.927	0.556	0	866.1	90	0.41
6	27 To 30	28.5	0.6	1.633	0.929	0.558	0	848.1	90	0.4
7	24 To 27	25.5	0.6	1.633	0.929	0.558	0	828.4	90	0.39
8	21 To 24	22.5	0.6	1.633	0.929	0.558	0	806.9	90	0.38
9	18 To 21	19.5	0.6	1.633	0.929	0.558	0	782.9	90	0.37
10	12 To 18	15	0.6	3.266	1.859	1.115	0	740.9	90	0.7
11	6 To 12	9	0.6	3.266	1.859	1.115	0	665.3	90	0.63
12	2 To 6	4	0.6	2.177	1.239	0.743	0	577.5	90	0.36
Total						7.485	---	---	---	4.97

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	42.15	0	0	-0.04	-1.84	0	-0.02
2	40.5	0	0	-0.43	-17.48	0	-0.18
3	37.5	0	0	-0.42	-15.93	0	-0.18
4	34.5	0	0	-0.42	-14.4	0	-0.18

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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
5	31.5	0	0	-0.41	-12.9	0	-0.17
6	28.5	0	0	-0.4	-11.46	0	-0.13
7	25.5	0	0	-0.39	-10.01	0	-0.04
8	22.5	0	0	-0.38	-8.6	0	0.04
9	19.5	0	0	-0.37	-7.24	0	0.12
10	15	0	0	-0.7	-10.53	0	0.45
11	9	0	0	-0.63	-5.68	0	0.67
12	4	0	0	-0.36	-1.46	0	0.52
Total		0	0	-4.97	-117.53	0	0.91

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	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
2	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
3	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
4	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
5	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
6	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
7	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
8	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
Total						9.739	---	---	---	7.54

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	40	0	0	-0.94	-37.7	0	1.03
2	40	0	0	-0.94	-37.7	0	1.69
3	40	0	0	-0.94	-37.7	0	1.69
4	40	0	0	-0.94	-37.7	0	1.03
5	40	0	0	-0.94	-37.7	0	-1.03
6	40	0	0	-0.94	-37.7	0	-1.69
7	40	0	0	-0.94	-37.7	0	-1.69
8	40	0	0	-0.94	-37.7	0	-1.03
Total		0	0	-7.54	-301.59	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	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15

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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	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
3	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
4	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
5	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
6	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15	
7	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
8	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15	
Total							1.565	---	---	---	1.21

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	40	0	0	-0.15	-6.06	0	0.14
2	40	0	0	-0.15	-6.06	0	0.25
3	40	0	0	-0.15	-6.06	0	0.25
4	40	0	0	-0.15	-6.06	0	0.14
5	40	0	0	-0.15	-6.06	0	-0.14
6	40	0	0	-0.15	-6.06	0	-0.25
7	40	0	0	-0.15	-6.06	0	-0.25
8	40	0	0	-0.15	-6.06	0	-0.14
Total		0	0	-1.21	-48.47	0	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	135	-0.9	0.27	0.09	-3.05	0.92	0.7
2	35	35	2400	4.524	0	885.6	45	1.12	0.29	-0.04	3.82	1	-0.33
3	44	44	3700	10.752	0	929.3	315	1.12	-0.29	0.04	9.52	-2.49	1.28

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	1.5	0	-2.81	0	0.7	0	-98.43	-52.67	2.33
2	35	-1.99	0	-3.4	0	-0.33	0	-119.17	69.79	1.44
3	44	4.97	0	-8.49	0	1.28	0	-373.65	-218.81	-3.14
Total		4.48	0	-14.71	---	---	---	-591.26	-201.69	0.64

Wind forces from mounts Of MW dishes

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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	35	35	1	0	0.236	0.118	0	885.6	135	0.09
2	35	35	1	0	0.236	0.118	0	885.6	45	0.09
3	44	44	1	0	0.234	0.117	0	929.3	45	0.09
Total						0.353	---	---	---	0.27

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	-0.09	-3.11	0	0.1
2	35	0	0	-0.09	-3.11	0	0.1
3	44	0	0	-0.09	-4.06	0	-0.11
Total		0	0	-0.27	-10.28	0	0.1

Wind forces from projected area

#	Elev. m	Z m	Ka	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	0	0	-3.55	-156.22	0	0
Total		0	0	-3.55	-156.22	0	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	927	3.69
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	913.2	3.63
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	898.5	3.32
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	882.9	3.26

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Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	866.1	3.2
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	848.1	3.46
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	828.4	3.28
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	806.9	3.33
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	782.9	3.36
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	740.9	6.84
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	665.3	6.46
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	577.5	6.09
Total										76.447	---	49.92

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	927	135	0.38
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	913.2	135	0.37
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	898.5	135	0.37
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	882.9	135	0.36
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	866.1	135	0.35
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	848.1	135	0.35
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	828.4	135	0.34
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	806.9	135	0.33
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	782.9	135	0.32
10	12 To 18	15	0.6	1.687	1.516	0.961	0	740.9	135	0.6
11	6 To 12	9	0.6	1.687	1.516	0.961	0	665.3	135	0.54
12	0 To 6	3	0.6	1.687	1.516	0.961	0	577.5	135	0.47
Total						7.202	---	---	---	4.78

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	43.5	0.27	0	-0.27	-11.63	-11.63	-0.06
2	40.5	0.26	0	-0.26	-10.66	-10.66	-0.06
3	37.5	0.26	0	-0.26	-9.72	-9.72	-0.06
4	34.5	0.25	0	-0.25	-8.78	-8.78	-0.06
5	31.5	0.25	0	-0.25	-7.87	-7.87	-0.05
6	28.5	0.24	0	-0.24	-6.98	-6.98	-0.03
7	25.5	0.24	0	-0.24	-6.1	-6.1	0.02
8	22.5	0.23	0	-0.23	-5.24	-5.24	0.07
9	19.5	0.23	0	-0.23	-4.41	-4.41	0.11
10	15	0.43	0	-0.43	-6.42	-6.42	0.35
11	9	0.38	0	-0.38	-3.46	-3.46	0.47

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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
12	3	0.33	0	-0.33	-1	-1	0.55
Total		3.38	0	-3.38	-82.26	-82.26	1.27

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	920.9	135	0.06	
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	913.2	135	0.6	
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	898.5	135	0.59	
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	882.9	135	0.58	
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	866.1	135	0.56	
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	848.1	135	0.55	
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	828.4	135	0.54	
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	806.9	135	0.53	
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	782.9	135	0.51	
10	12 To 18	15	0.6	3.266	1.859	1.537	0	740.9	135	0.97	
11	6 To 12	9	0.6	3.266	1.859	1.537	0	665.3	135	0.87	
12	2 To 6	4	0.6	2.177	1.239	1.025	0	577.5	135	0.5	
Total							10.319	---	---	---	6.86

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	42.15	0.04	0	-0.04	-1.79	-1.79	-0.02
2	40.5	0.42	0	-0.42	-17.05	-17.05	-0.18
3	37.5	0.41	0	-0.41	-15.53	-15.53	-0.17
4	34.5	0.41	0	-0.41	-14.04	-14.04	-0.17
5	31.5	0.4	0	-0.4	-12.57	-12.57	-0.17
6	28.5	0.39	0	-0.39	-11.17	-11.17	-0.12
7	25.5	0.38	0	-0.38	-9.76	-9.76	-0.04
8	22.5	0.37	0	-0.37	-8.39	-8.39	0.04
9	19.5	0.36	0	-0.36	-7.05	-7.05	0.12
10	15	0.68	0	-0.68	-10.27	-10.27	0.44
11	9	0.61	0	-0.61	-5.53	-5.53	0.65
12	4	0.36	0	-0.36	-1.42	-1.42	0.5
Total		4.85	0	-4.85	-114.57	-114.57	0.89

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	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4	
2	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4	
3	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
4	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
5	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4	
6	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4	
7	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
8	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
Total							9.739	---	---	---	7.54

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	40	0.99	0	-0.99	-39.74	-39.74	-0.7
2	40	0.99	0	-0.99	-39.74	-39.74	0.7
3	40	0.34	0	-0.34	-13.58	-13.58	0.98
4	40	0.34	0	-0.34	-13.58	-13.58	0.98
5	40	0.99	0	-0.99	-39.74	-39.74	0.7
6	40	0.99	0	-0.99	-39.74	-39.74	-0.7
7	40	0.34	0	-0.34	-13.58	-13.58	-0.98
8	40	0.34	0	-0.34	-13.58	-13.58	-0.98
Total		5.33	0	-5.33	-213.26	-213.26	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	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03	
2	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03	
3	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28	
4	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28	
5	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03	
6	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03	
7	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28	
8	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28	
Total							1.565	---	---	---	1.21

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	40	0.02	0	-0.02	-0.74	-0.74	-0.01

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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
2	40	0.02	0	-0.02	-0.74	-0.74	0.01
3	40	0.2	0	-0.2	-7.83	-7.83	0.51
4	40	0.2	0	-0.2	-7.83	-7.83	0.51
5	40	0.02	0	-0.02	-0.74	-0.74	0.01
6	40	0.02	0	-0.02	-0.74	-0.74	-0.01
7	40	0.2	0	-0.2	-7.83	-7.83	-0.51
8	40	0.2	0	-0.2	-7.83	-7.83	-0.51
Total		0.86	0	-0.86	-34.28	-34.28	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	180	-1.02	0	0	-3.46	0	0
2	35	35	2400	4.524	0	885.6	90	-0.11	0.62	0.1	-0.37	2.13	0.8
3	44	44	3700	10.752	0	929.3	0	1.26	0	0	10.72	0	0

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	2.45	0	-2.45	0	0	0	-85.59	-85.59	0
2	35	1.77	0	-1.24	0	0.8	0	-43.45	-61.89	4.57
3	44	7.58	0	-7.58	0	0	0	-333.38	-333.38	0
Total		11.79	0	-11.26	---	---	---	-462.42	-480.86	4.57

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.236	0	0	885.6	180	0
2	35	35	1	0	0.236	0.236	0	885.6	90	0.18
3	44	44	1	0	0.234	0	0	929.3	0	0
Total							0.236	---	---	0.18

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	0	0	0	0
2	35	0.13	0	-0.13	-4.4	-4.4	0.29
3	44	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
Total		0.13	0	-0.13	-4.4	-4.4	0.29

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	2.51	0	-2.51	-110.46	-110.46	0
Total		2.51	0	-2.51	-110.46	-110.46	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	C _f	D _f	D _r	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	927	3.1
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	913.2	3.05
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	898.5	2.83
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	882.9	2.78
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	866.1	2.72
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	848.1	2.93
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	828.4	2.86
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	806.9	2.93
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	782.9	2.99
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	740.9	6.13
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	665.3	5.86
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	577.5	5.55
Total										67.262	---	43.73

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	42 To 45	43.5	0.6	0.843	0.756	0.506	0	927	180	0.4
2	39 To 42	40.5	0.6	0.843	0.756	0.506	0	913.2	180	0.39
3	36 To 39	37.5	0.6	0.843	0.756	0.506	0	898.5	180	0.39
4	33 To 36	34.5	0.6	0.843	0.756	0.506	0	882.9	180	0.38
5	30 To 33	31.5	0.6	0.843	0.756	0.506	0	866.1	180	0.37
6	27 To 30	28.5	0.6	0.843	0.758	0.506	0	848.1	180	0.36
7	24 To 27	25.5	0.6	0.843	0.758	0.506	0	828.4	180	0.36
8	21 To 24	22.5	0.6	0.843	0.758	0.506	0	806.9	180	0.35
9	18 To 21	19.5	0.6	0.843	0.758	0.506	0	782.9	180	0.34
10	12 To 18	15	0.6	1.687	1.516	1.012	0	740.9	180	0.64
11	6 To 12	9	0.6	1.687	1.516	1.012	0	665.3	180	0.57
12	0 To 6	3	0.6	1.687	1.516	1.012	0	577.5	180	0.5
Total						7.589	---	---	---	5.04

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	43.5	0.4	0	0	0	-17.34	0
2	40.5	0.39	0	0	0	-15.9	0
3	37.5	0.39	0	0	0	-14.49	0
4	34.5	0.38	0	0	0	-13.1	0
5	31.5	0.37	0	0	0	-11.73	0
6	28.5	0.36	0	0	0	-10.4	0
7	25.5	0.36	0	0	0	-9.09	0
8	22.5	0.35	0	0	0	-7.81	0
9	19.5	0.34	0	0	0	-6.57	0
10	15	0.64	0	0	0	-9.56	0
11	9	0.57	0	0	0	-5.15	0
12	3	0.5	0	0	0	-1.49	0
Total		5.04	0	0	0	-122.61	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	42 To 42.3	42.15	0.6	0.163	0.093	0.098	0	920.9	180	0.08
2	39 To 42	40.5	0.6	1.629	0.927	0.977	0	913.2	180	0.76
3	36 To 39	37.5	0.6	1.629	0.927	0.977	0	898.5	180	0.75
4	33 To 36	34.5	0.6	1.629	0.927	0.977	0	882.9	180	0.73
5	30 To 33	31.5	0.6	1.629	0.927	0.977	0	866.1	180	0.72
6	27 To 30	28.5	0.6	1.633	0.929	0.98	0	848.1	180	0.71
7	24 To 27	25.5	0.6	1.633	0.929	0.98	0	828.4	180	0.69

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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	
8	21 To 24	22.5	0.6	1.633	0.929	0.98	0	806.9	180	0.67	
9	18 To 21	19.5	0.6	1.633	0.929	0.98	0	782.9	180	0.65	
10	12 To 18	15	0.6	3.266	1.859	1.96	0	740.9	180	1.23	
11	6 To 12	9	0.6	3.266	1.859	1.96	0	665.3	180	1.11	
12	2 To 6	4	0.6	2.177	1.239	1.306	0	577.5	180	0.64	
Total								13.153	---	---	8.74

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	42.15	0.08	0	0	0	-3.22	0
2	40.5	0.76	0	0	0	-30.73	0
3	37.5	0.75	0	0	0	-27.99	0
4	34.5	0.73	0	0	0	-25.31	0
5	31.5	0.72	0	0	0	-22.67	0
6	28.5	0.71	0	0	0	-20.13	0
7	25.5	0.69	0	0	0	-17.59	0
8	22.5	0.67	0	0	0	-15.12	0
9	19.5	0.65	0	0	0	-12.72	0
10	15	1.23	0	0	0	-18.51	0
11	9	1.11	0	0	0	-9.97	0
12	4	0.64	0	0	0	-2.57	0
Total		8.74	0	0	0	-206.53	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	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
2	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
3	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
4	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94	
5	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
6	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
7	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
8	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94	
Total								9.739	---	---	7.54

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
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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	40	0.94	0	0	0	-37.7	-1.69
2	40	0.94	0	0	0	-37.7	-1.03
3	40	0.94	0	0	0	-37.7	1.03
4	40	0.94	0	0	0	-37.7	1.69
5	40	0.94	0	0	0	-37.7	1.69
6	40	0.94	0	0	0	-37.7	1.03
7	40	0.94	0	0	0	-37.7	-1.03
8	40	0.94	0	0	0	-37.7	-1.69
Total		7.54	0	0	0	-301.59	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	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
2	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
3	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
4	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
5	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
6	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
7	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
8	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
Total						1.565	---	---	---	1.21

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	40	0.15	0	0	0	-6.06	-0.25
2	40	0.15	0	0	0	-6.06	-0.14
3	40	0.15	0	0	0	-6.06	0.14
4	40	0.15	0	0	0	-6.06	0.25
5	40	0.15	0	0	0	-6.06	0.25
6	40	0.15	0	0	0	-6.06	0.14
7	40	0.15	0	0	0	-6.06	-0.14
8	40	0.15	0	0	0	-6.06	-0.25
Total		1.21	0	0	0	-48.47	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	225	-0.9	-0.27	-0.09	-3.05	-0.92	-0.7

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#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
2	35	35	2400	4.524	0	885.6	135	-0.9	0.27	0.09	-3.05	0.92	0.7
3	44	44	3700	10.752	0	929.3	45	1.12	0.29	-0.04	9.52	2.49	-1.28

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	2.81	0	-1.5	0	-0.7	0	-52.67	-98.43	-2.33
2	35	2.81	0	1.5	0	0.7	0	52.67	-98.43	2.33
3	44	8.49	0	-4.97	0	-1.28	0	-218.81	-373.65	3.14
Total		14.12	0	-4.97	---	---	---	-218.81	-570.52	3.14

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.236	0.118	0	885.6	135	0.09	
2	35	35	1	0	0.236	0.118	0	885.6	135	0.09	
3	44	44	1	0	0.234	0.117	0	929.3	45	0.09	
Total								0.353	---	---	0.27

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0.09	0	0	0	-3.11	-0.1
2	35	0.09	0	0	0	-3.11	0.1
3	44	0.09	0	0	0	-4.06	0.11
Total		0.27	0	0	0	-10.28	0.11

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	3.55	0	0	0	-156.22	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
Total		3.55	0	0	0	-156.22	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	927	3.69
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	913.2	3.63
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	898.5	3.32
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	882.9	3.26
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	866.1	3.2
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	848.1	3.46
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	828.4	3.28
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	806.9	3.33
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	782.9	3.36
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	740.9	6.84
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	665.3	6.46
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	577.5	6.09
Total										76.447	---	49.92

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	927	135	0.38
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	913.2	135	0.37
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	898.5	135	0.37
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	882.9	135	0.36
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	866.1	135	0.35
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	848.1	135	0.35
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	828.4	135	0.34
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	806.9	135	0.33
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	782.9	135	0.32
10	12 To 18	15	0.6	1.687	1.516	0.961	0	740.9	135	0.6
11	6 To 12	9	0.6	1.687	1.516	0.961	0	665.3	135	0.54
12	0 To 6	3	0.6	1.687	1.516	0.961	0	577.5	135	0.47
Total							7.202	---	---	4.78

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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	43.5	0.27	0	0.27	11.63	-11.63	0.06
2	40.5	0.26	0	0.26	10.66	-10.66	0.06
3	37.5	0.26	0	0.26	9.72	-9.72	0.06
4	34.5	0.25	0	0.25	8.78	-8.78	0.06
5	31.5	0.25	0	0.25	7.87	-7.87	0.05
6	28.5	0.24	0	0.24	6.98	-6.98	0.03
7	25.5	0.24	0	0.24	6.1	-6.1	-0.02
8	22.5	0.23	0	0.23	5.24	-5.24	-0.07
9	19.5	0.23	0	0.23	4.41	-4.41	-0.11
10	15	0.43	0	0.43	6.42	-6.42	-0.35
11	9	0.38	0	0.38	3.46	-3.46	-0.47
12	3	0.33	0	0.33	1	-1	-0.55
Total		3.38	0	3.38	82.26	-82.26	-1.27

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	920.9	135	0.06
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	913.2	135	0.6
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	898.5	135	0.59
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	882.9	135	0.58
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	866.1	135	0.56
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	848.1	135	0.55
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	828.4	135	0.54
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	806.9	135	0.53
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	782.9	135	0.51
10	12 To 18	15	0.6	3.266	1.859	1.537	0	740.9	135	0.97
11	6 To 12	9	0.6	3.266	1.859	1.537	0	665.3	135	0.87
12	2 To 6	4	0.6	2.177	1.239	1.025	0	577.5	135	0.5
Total						10.319	---	---	---	6.86

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	42.15	0.04	0	0.04	1.79	-1.79	0.02
2	40.5	0.42	0	0.42	17.05	-17.05	0.18
3	37.5	0.41	0	0.41	15.53	-15.53	0.17
4	34.5	0.41	0	0.41	14.04	-14.04	0.17

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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
5	31.5	0.4	0	0.4	12.57	-12.57	0.17
6	28.5	0.39	0	0.39	11.17	-11.17	0.12
7	25.5	0.38	0	0.38	9.76	-9.76	0.04
8	22.5	0.37	0	0.37	8.39	-8.39	-0.04
9	19.5	0.36	0	0.36	7.05	-7.05	-0.12
10	15	0.68	0	0.68	10.27	-10.27	-0.44
11	9	0.61	0	0.61	5.53	-5.53	-0.65
12	4	0.36	0	0.36	1.42	-1.42	-0.5
Total		4.85	0	4.85	114.57	-114.57	-0.89

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	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48
2	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48
3	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4
4	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4
5	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48
6	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48
7	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4
8	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4
Total							9.739	---	---	7.54

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	40	0.34	0	0.34	13.58	-13.58	-0.98
2	40	0.34	0	0.34	13.58	-13.58	-0.98
3	40	0.99	0	0.99	39.74	-39.74	-0.7
4	40	0.99	0	0.99	39.74	-39.74	0.7
5	40	0.34	0	0.34	13.58	-13.58	0.98
6	40	0.34	0	0.34	13.58	-13.58	0.98
7	40	0.99	0	0.99	39.74	-39.74	0.7
8	40	0.99	0	0.99	39.74	-39.74	-0.7
Total		5.33	0	5.33	213.26	-213.26	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	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28

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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	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
3	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03
4	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03
5	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
6	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
7	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03
8	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03
Total						1.565	---	---	---	1.21

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	40	0.2	0	0.2	7.83	-7.83	-0.51
2	40	0.2	0	0.2	7.83	-7.83	-0.51
3	40	0.02	0	0.02	0.74	-0.74	-0.01
4	40	0.02	0	0.02	0.74	-0.74	0.01
5	40	0.2	0	0.2	7.83	-7.83	0.51
6	40	0.2	0	0.2	7.83	-7.83	0.51
7	40	0.02	0	0.02	0.74	-0.74	0.01
8	40	0.02	0	0.02	0.74	-0.74	-0.01
Total		0.86	0	0.86	34.28	-34.28	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	270	-0.11	-0.62	-0.1	-0.37	-2.13	-0.8
2	35	35	2400	4.524	0	885.6	180	-1.02	0	0	-3.46	0	0
3	44	44	3700	10.752	0	929.3	90	-0.11	0.62	0.1	-0.93	5.31	3.08

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	1.77	0	1.24	0	-0.8	0	43.45	-61.89	-4.57
2	35	2.45	0	2.45	0	0	0	85.59	-85.59	0
3	44	3.1	0	4.41	0	3.08	0	194.05	-136.24	12.49
Total		7.31	0	8.1	---	---	---	323.09	-283.72	7.92

Wind forces from mounts Of MW dishes

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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	35	35	1	0	0.236	0.236	0	885.6	90	0.18
2	35	35	1	0	0.236	0	0	885.6	180	0
3	44	44	1	0	0.234	0.234	0	929.3	90	0.18
Total						0.47	---	---	---	0.36

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0.13	0	0.13	4.4	-4.4	-0.29
2	35	0	0	0	0	0	0
3	44	0.13	0	0.13	5.74	-5.74	0.3
Total		0.26	0	0.26	10.14	-10.14	0.01

Wind forces from projected area

#	Elev. m	Z m	Ka	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	2.51	0	2.51	110.46	-110.46	0
Total		2.51	0	2.51	110.46	-110.46	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	927	3.1
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	913.2	3.05
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	898.5	2.83
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	882.9	2.78

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Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	866.1	2.72
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	848.1	2.93
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	828.4	2.86
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	806.9	2.93
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	782.9	2.99
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	740.9	6.13
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	665.3	5.86
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	577.5	5.55
Total										67.262	---	43.73

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	42 To 45	43.5	0.6	0.843	0.756	0.454	0	927	90	0.36
2	39 To 42	40.5	0.6	0.843	0.756	0.454	0	913.2	90	0.35
3	36 To 39	37.5	0.6	0.843	0.756	0.454	0	898.5	90	0.35
4	33 To 36	34.5	0.6	0.843	0.756	0.454	0	882.9	90	0.34
5	30 To 33	31.5	0.6	0.843	0.756	0.454	0	866.1	90	0.33
6	27 To 30	28.5	0.6	0.843	0.758	0.455	0	848.1	90	0.33
7	24 To 27	25.5	0.6	0.843	0.758	0.455	0	828.4	90	0.32
8	21 To 24	22.5	0.6	0.843	0.758	0.455	0	806.9	90	0.31
9	18 To 21	19.5	0.6	0.843	0.758	0.455	0	782.9	90	0.3
10	12 To 18	15	0.6	1.687	1.516	0.909	0	740.9	90	0.57
11	6 To 12	9	0.6	1.687	1.516	0.909	0	665.3	90	0.51
12	0 To 6	3	0.6	1.687	1.516	0.909	0	577.5	90	0.45
Total						6.815	---	---	---	4.53

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	43.5	0	0	0.36	15.55	0	0.08
2	40.5	0	0	0.35	14.26	0	0.08
3	37.5	0	0	0.35	12.99	0	0.08
4	34.5	0	0	0.34	11.74	0	0.07
5	31.5	0	0	0.33	10.52	0	0.07
6	28.5	0	0	0.33	9.34	0	0.04
7	25.5	0	0	0.32	8.16	0	-0.03
8	22.5	0	0	0.31	7.02	0	-0.09
9	19.5	0	0	0.3	5.9	0	-0.15
10	15	0	0	0.57	8.59	0	-0.47
11	9	0	0	0.51	4.63	0	-0.64

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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
12	3	0	0	0.45	1.34	0	-0.74
Total		0	0	4.53	110.04	0	-1.7

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	42 To 42.3	42.15	0.6	0.163	0.093	0.056	0	920.9	90	0.04	
2	39 To 42	40.5	0.6	1.629	0.927	0.556	0	913.2	90	0.43	
3	36 To 39	37.5	0.6	1.629	0.927	0.556	0	898.5	90	0.42	
4	33 To 36	34.5	0.6	1.629	0.927	0.556	0	882.9	90	0.42	
5	30 To 33	31.5	0.6	1.629	0.927	0.556	0	866.1	90	0.41	
6	27 To 30	28.5	0.6	1.633	0.929	0.558	0	848.1	90	0.4	
7	24 To 27	25.5	0.6	1.633	0.929	0.558	0	828.4	90	0.39	
8	21 To 24	22.5	0.6	1.633	0.929	0.558	0	806.9	90	0.38	
9	18 To 21	19.5	0.6	1.633	0.929	0.558	0	782.9	90	0.37	
10	12 To 18	15	0.6	3.266	1.859	1.115	0	740.9	90	0.7	
11	6 To 12	9	0.6	3.266	1.859	1.115	0	665.3	90	0.63	
12	2 To 6	4	0.6	2.177	1.239	0.743	0	577.5	90	0.36	
Total							7.485	---	---	---	4.97

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	42.15	0	0	0.04	1.84	0	0.02
2	40.5	0	0	0.43	17.48	0	0.18
3	37.5	0	0	0.42	15.93	0	0.18
4	34.5	0	0	0.42	14.4	0	0.18
5	31.5	0	0	0.41	12.9	0	0.17
6	28.5	0	0	0.4	11.46	0	0.13
7	25.5	0	0	0.39	10.01	0	0.04
8	22.5	0	0	0.38	8.6	0	-0.04
9	19.5	0	0	0.37	7.24	0	-0.12
10	15	0	0	0.7	10.53	0	-0.45
11	9	0	0	0.63	5.68	0	-0.67
12	4	0	0	0.36	1.46	0	-0.52
Total		0	0	4.97	117.53	0	-0.91

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	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
2	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
3	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
4	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
5	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
6	40	40	1	1.815	0.62	1.217	0	910.8	135	0.94
7	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
8	40	40	1	1.815	0.62	1.217	0	910.8	45	0.94
Total						9.739	---	---	---	7.54

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	40	0	0	0.94	37.7	0	-1.03
2	40	0	0	0.94	37.7	0	-1.69
3	40	0	0	0.94	37.7	0	-1.69
4	40	0	0	0.94	37.7	0	-1.03
5	40	0	0	0.94	37.7	0	1.03
6	40	0	0	0.94	37.7	0	1.69
7	40	0	0	0.94	37.7	0	1.69
8	40	0	0	0.94	37.7	0	1.03
Total		0	0	7.54	301.59	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	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
2	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
3	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
4	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
5	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
6	40	40	1	0.034	0.358	0.196	0	910.8	135	0.15
7	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
8	40	40	1	0.034	0.358	0.196	0	910.8	45	0.15
Total						1.565	---	---	---	1.21

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	40	0	0	0.15	6.06	0	-0.14

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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
2	40	0	0	0.15	6.06	0	-0.25
3	40	0	0	0.15	6.06	0	-0.25
4	40	0	0	0.15	6.06	0	-0.14
5	40	0	0	0.15	6.06	0	0.14
6	40	0	0	0.15	6.06	0	0.25
7	40	0	0	0.15	6.06	0	0.25
8	40	0	0	0.15	6.06	0	0.14
Total		0	0	1.21	48.47	0	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	315	1.12	-0.29	0.04	3.82	-1	0.33
2	35	35	2400	4.524	0	885.6	225	-0.9	-0.27	-0.09	-3.05	-0.92	-0.7
3	44	44	3700	10.752	0	929.3	135	-0.9	0.27	0.09	-7.61	2.31	2.68

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-1.99	0	3.4	0	0.33	0	119.17	69.79	-1.44
2	35	1.5	0	2.81	0	-0.7	0	98.43	-52.67	-2.33
3	44	-3.75	0	7.01	0	2.68	0	308.62	165.15	6.76
Total		-4.24	0	13.23	---	---	---	526.23	182.26	2.99

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.236	0.118	0	885.6	45	0.09
2	35	35	1	0	0.236	0.118	0	885.6	135	0.09
3	44	44	1	0	0.234	0.117	0	929.3	135	0.09
Total							0.353	---	---	0.27

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	0.09	3.11	0	-0.1
2	35	0	0	0.09	3.11	0	-0.1
3	44	0	0	0.09	4.06	0	0.11

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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	0.27	10.28	0	-0.1

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	0	0	3.55	156.22	0	0
Total		0	0	3.55	156.22	0	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	C _f	D _f	D _r	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	927	3.69
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	913.2	3.63
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	898.5	3.32
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	882.9	3.26
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	866.1	3.2
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	848.1	3.46
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	828.4	3.28
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	806.9	3.33
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	782.9	3.36
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	740.9	6.84
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	665.3	6.46
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	577.5	6.09
Total										76.447	---	49.92

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	927	45	0.38	
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	913.2	45	0.37	
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	898.5	45	0.37	
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	882.9	45	0.36	
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	866.1	45	0.35	
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	848.1	45	0.35	
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	828.4	45	0.34	
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	806.9	45	0.33	
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	782.9	45	0.32	
10	12 To 18	15	0.6	1.687	1.516	0.961	0	740.9	45	0.6	
11	6 To 12	9	0.6	1.687	1.516	0.961	0	665.3	45	0.54	
12	0 To 6	3	0.6	1.687	1.516	0.961	0	577.5	45	0.47	
Total								7.202	---	---	4.78

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	43.5	-0.27	0	0.27	11.63	11.63	0.06
2	40.5	-0.26	0	0.26	10.66	10.66	0.06
3	37.5	-0.26	0	0.26	9.72	9.72	0.06
4	34.5	-0.25	0	0.25	8.78	8.78	0.06
5	31.5	-0.25	0	0.25	7.87	7.87	0.05
6	28.5	-0.24	0	0.24	6.98	6.98	0.03
7	25.5	-0.24	0	0.24	6.1	6.1	-0.02
8	22.5	-0.23	0	0.23	5.24	5.24	-0.07
9	19.5	-0.23	0	0.23	4.41	4.41	-0.11
10	15	-0.43	0	0.43	6.42	6.42	-0.35
11	9	-0.38	0	0.38	3.46	3.46	-0.47
12	3	-0.33	0	0.33	1	1	-0.55
Total		-3.38	0	3.38	82.26	82.26	-1.27

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	920.9	45	0.06
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	913.2	45	0.6
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	898.5	45	0.59
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	882.9	45	0.58
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	866.1	45	0.56
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	848.1	45	0.55
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	828.4	45	0.54

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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	
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	806.9	45	0.53	
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	782.9	45	0.51	
10	12 To 18	15	0.6	3.266	1.859	1.537	0	740.9	45	0.97	
11	6 To 12	9	0.6	3.266	1.859	1.537	0	665.3	45	0.87	
12	2 To 6	4	0.6	2.177	1.239	1.025	0	577.5	45	0.5	
Total								10.319	---	---	6.86

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	42.15	-0.04	0	0.04	1.79	1.79	0.02
2	40.5	-0.42	0	0.42	17.05	17.05	0.18
3	37.5	-0.41	0	0.41	15.53	15.53	0.17
4	34.5	-0.41	0	0.41	14.04	14.04	0.17
5	31.5	-0.4	0	0.4	12.57	12.57	0.17
6	28.5	-0.39	0	0.39	11.17	11.17	0.12
7	25.5	-0.38	0	0.38	9.76	9.76	0.04
8	22.5	-0.37	0	0.37	8.39	8.39	-0.04
9	19.5	-0.36	0	0.36	7.05	7.05	-0.12
10	15	-0.68	0	0.68	10.27	10.27	-0.44
11	9	-0.61	0	0.61	5.53	5.53	-0.65
12	4	-0.36	0	0.36	1.42	1.42	-0.5
Total		-4.85	0	4.85	114.57	114.57	-0.89

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	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4	
2	40	40	1	1.815	0.62	1.815	0	910.8	0	1.4	
3	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
4	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
5	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4	
6	40	40	1	1.815	0.62	1.815	0	910.8	180	1.4	
7	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
8	40	40	1	1.815	0.62	0.62	0	910.8	90	0.48	
Total								9.739	---	---	7.54

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
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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	40	-0.99	0	0.99	39.74	39.74	0.7
2	40	-0.99	0	0.99	39.74	39.74	-0.7
3	40	-0.34	0	0.34	13.58	13.58	-0.98
4	40	-0.34	0	0.34	13.58	13.58	-0.98
5	40	-0.99	0	0.99	39.74	39.74	-0.7
6	40	-0.99	0	0.99	39.74	39.74	0.7
7	40	-0.34	0	0.34	13.58	13.58	0.98
8	40	-0.34	0	0.34	13.58	13.58	0.98
Total		-5.33	0	5.33	213.26	213.26	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	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03
2	40	40	1	0.034	0.358	0.034	0	910.8	0	0.03
3	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
4	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
5	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03
6	40	40	1	0.034	0.358	0.034	0	910.8	180	0.03
7	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
8	40	40	1	0.034	0.358	0.358	0	910.8	90	0.28
Total						1.565	---	---	---	1.21

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	40	-0.02	0	0.02	0.74	0.74	0.01
2	40	-0.02	0	0.02	0.74	0.74	-0.01
3	40	-0.2	0	0.2	7.83	7.83	-0.51
4	40	-0.2	0	0.2	7.83	7.83	-0.51
5	40	-0.02	0	0.02	0.74	0.74	-0.01
6	40	-0.02	0	0.02	0.74	0.74	0.01
7	40	-0.2	0	0.2	7.83	7.83	0.51
8	40	-0.2	0	0.2	7.83	7.83	0.51
Total		-0.86	0	0.86	34.28	34.28	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	885.6	0	1.26	0	0	4.3	0	0

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#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
2	35	35	2400	4.524	0	885.6	270	-0.11	-0.62	-0.1	-0.37	-2.13	-0.8
3	44	44	3700	10.752	0	929.3	180	-1.02	0	0	-8.63	0	0

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-3.04	0	3.04	0	0	0	106.33	106.33	0
2	35	-1.24	0	1.77	0	-0.8	0	61.89	43.45	-4.57
3	44	-6.1	0	6.1	0	0	0	268.35	268.35	0
Total		-10.38	0	10.91	---	---	---	436.58	418.14	-4.57

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.236	0	0	885.6	0	0
2	35	35	1	0	0.236	0.236	0	885.6	90	0.18
3	44	44	1	0	0.234	0	0	929.3	180	0
Total							0.236	---	---	0.18

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	0	0	0	0
2	35	-0.13	0	0.13	4.4	4.4	-0.29
3	44	0	0	0	0	0	0
Total		-0.13	0	0.13	4.4	4.4	-0.29

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	929.3	3.55	0
Total				4.495	0	---	3.55	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	-2.51	0	2.51	110.46	110.46	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
Total		-2.51	0	2.51	110.46	110.46	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	444.3	1.49
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	437.7	1.46
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	430.6	1.35
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	423.2	1.33
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	415.1	1.31
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	406.5	1.41
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	397.1	1.37
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	386.7	1.41
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	375.3	1.43
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	355.1	2.94
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	318.9	2.81
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	276.8	2.66
Total										67.262	---	20.96

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	42 To 45	43.5	0.6	0.843	0.756	0.506	0	444.3	0	0.19
2	39 To 42	40.5	0.6	0.843	0.756	0.506	0	437.7	0	0.19
3	36 To 39	37.5	0.6	0.843	0.756	0.506	0	430.6	0	0.19
4	33 To 36	34.5	0.6	0.843	0.756	0.506	0	423.2	0	0.18
5	30 To 33	31.5	0.6	0.843	0.756	0.506	0	415.1	0	0.18
6	27 To 30	28.5	0.6	0.843	0.758	0.506	0	406.5	0	0.17
7	24 To 27	25.5	0.6	0.843	0.758	0.506	0	397.1	0	0.17
8	21 To 24	22.5	0.6	0.843	0.758	0.506	0	386.7	0	0.17
9	18 To 21	19.5	0.6	0.843	0.758	0.506	0	375.3	0	0.16
10	12 To 18	15	0.6	1.687	1.516	1.012	0	355.1	0	0.31
11	6 To 12	9	0.6	1.687	1.516	1.012	0	318.9	0	0.27
12	0 To 6	3	0.6	1.687	1.516	1.012	0	276.8	0	0.24
Total							7.589	---	---	2.42

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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	43.5	-0.19	0	0	0	8.31	0
2	40.5	-0.19	0	0	0	7.62	0
3	37.5	-0.19	0	0	0	6.94	0
4	34.5	-0.18	0	0	0	6.28	0
5	31.5	-0.18	0	0	0	5.62	0
6	28.5	-0.17	0	0	0	4.98	0
7	25.5	-0.17	0	0	0	4.35	0
8	22.5	-0.17	0	0	0	3.74	0
9	19.5	-0.16	0	0	0	3.15	0
10	15	-0.31	0	0	0	4.58	0
11	9	-0.27	0	0	0	2.47	0
12	3	-0.24	0	0	0	0.71	0
Total		-2.42	0	0	0	58.77	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	42 To 42.3	42.15	0.6	0.163	0.093	0.098	0	441.4	0	0.04
2	39 To 42	40.5	0.6	1.629	0.927	0.977	0	437.7	0	0.36
3	36 To 39	37.5	0.6	1.629	0.927	0.977	0	430.6	0	0.36
4	33 To 36	34.5	0.6	1.629	0.927	0.977	0	423.2	0	0.35
5	30 To 33	31.5	0.6	1.629	0.927	0.977	0	415.1	0	0.34
6	27 To 30	28.5	0.6	1.633	0.929	0.98	0	406.5	0	0.34
7	24 To 27	25.5	0.6	1.633	0.929	0.98	0	397.1	0	0.33
8	21 To 24	22.5	0.6	1.633	0.929	0.98	0	386.7	0	0.32
9	18 To 21	19.5	0.6	1.633	0.929	0.98	0	375.3	0	0.31
10	12 To 18	15	0.6	3.266	1.859	1.96	0	355.1	0	0.59
11	6 To 12	9	0.6	3.266	1.859	1.96	0	318.9	0	0.53
12	2 To 6	4	0.6	2.177	1.239	1.306	0	276.8	0	0.31
Total						13.153	---	---	---	4.19

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	42.15	-0.04	0	0	0	1.55	0
2	40.5	-0.36	0	0	0	14.73	0
3	37.5	-0.36	0	0	0	13.42	0
4	34.5	-0.35	0	0	0	12.13	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
5	31.5	-0.34	0	0	0	10.86	0
6	28.5	-0.34	0	0	0	9.65	0
7	25.5	-0.33	0	0	0	8.43	0
8	22.5	-0.32	0	0	0	7.25	0
9	19.5	-0.31	0	0	0	6.09	0
10	15	-0.59	0	0	0	8.87	0
11	9	-0.53	0	0	0	4.78	0
12	4	-0.31	0	0	0	1.23	0
Total		-4.19	0	0	0	98.99	0

Wind forces from 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	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
2	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
3	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
4	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
5	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
6	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
7	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
8	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
Total						9.739	---	---	---	3.61

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	40	-0.45	0	0	0	18.07	0.81
2	40	-0.45	0	0	0	18.07	0.49
3	40	-0.45	0	0	0	18.07	-0.49
4	40	-0.45	0	0	0	18.07	-0.81
5	40	-0.45	0	0	0	18.07	-0.81
6	40	-0.45	0	0	0	18.07	-0.49
7	40	-0.45	0	0	0	18.07	0.49
8	40	-0.45	0	0	0	18.07	0.81
Total		-3.61	0	0	0	144.55	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	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07

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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	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07	
3	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07	
4	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07	
5	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
6	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
7	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
8	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
Total							1.565	---	---	---	0.58

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	40	-0.07	0	0	0	2.9	0.12
2	40	-0.07	0	0	0	2.9	0.07
3	40	-0.07	0	0	0	2.9	-0.07
4	40	-0.07	0	0	0	2.9	-0.12
5	40	-0.07	0	0	0	2.9	-0.12
6	40	-0.07	0	0	0	2.9	-0.07
7	40	-0.07	0	0	0	2.9	0.07
8	40	-0.07	0	0	0	2.9	0.12
Total		-0.58	0	0	0	23.23	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	45	1.12	0.29	-0.04	1.83	0.48	-0.16
2	35	35	2400	4.524	0	424.4	315	1.12	-0.29	0.04	1.83	-0.48	0.16
3	44	44	3700	10.752	0	445.4	225	-0.9	-0.27	-0.09	-3.65	-1.11	-1.28

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-1.63	0	0.96	0	-0.16	0	33.45	57.12	0.69
2	35	-1.63	0	-0.96	0	0.16	0	-33.45	57.12	-0.69
3	44	-3.36	0	1.8	0	-1.28	0	79.15	147.92	-3.24
Total		-6.63	0	1.8	---	---	---	79.15	262.16	-3.24

Wind forces from mounts Of MW dishes

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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	35	35	1	0	0.244	0.122	0	424.4	45	0.04
2	35	35	1	0	0.244	0.122	0	424.4	45	0.04
3	44	44	1	0	0.244	0.122	0	445.4	135	0.05
Total						0.366	---	---	---	0.13

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-0.04	0	0	0	1.54	0.05
2	35	-0.04	0	0	0	1.54	-0.05
3	44	-0.05	0	0	0	2.03	-0.05
Total		-0.13	0	0	0	5.12	-0.05

Wind forces from projected area

#	Elev. m	Z m	Ka	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	-1.7	0	0	0	74.87	0
Total		-1.7	0	0	0	74.87	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	444.3	1.77
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	437.7	1.74
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	430.6	1.59
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	423.2	1.56

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Job No. 45m Tri Tower
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 Date 5/11/2017
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Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	415.1	1.53
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	406.5	1.66
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	397.1	1.57
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	386.7	1.6
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	375.3	1.61
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	355.1	3.28
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	318.9	3.1
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	276.8	2.92
Total										76.447	---	23.93

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	444.3	45	0.18
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	437.7	45	0.18
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	430.6	45	0.18
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	423.2	45	0.17
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	415.1	45	0.17
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	406.5	45	0.17
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	397.1	45	0.16
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	386.7	45	0.16
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	375.3	45	0.15
10	12 To 18	15	0.6	1.687	1.516	0.961	0	355.1	45	0.29
11	6 To 12	9	0.6	1.687	1.516	0.961	0	318.9	45	0.26
12	0 To 6	3	0.6	1.687	1.516	0.961	0	276.8	45	0.23
Total						7.202	---	---	---	2.29

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	43.5	-0.13	0	-0.13	-5.57	5.57	-0.03
2	40.5	-0.13	0	-0.13	-5.11	5.11	-0.03
3	37.5	-0.12	0	-0.12	-4.66	4.66	-0.03
4	34.5	-0.12	0	-0.12	-4.21	4.21	-0.03
5	31.5	-0.12	0	-0.12	-3.77	3.77	-0.03
6	28.5	-0.12	0	-0.12	-3.34	3.34	-0.01
7	25.5	-0.11	0	-0.11	-2.92	2.92	0.01
8	22.5	-0.11	0	-0.11	-2.51	2.51	0.03
9	19.5	-0.11	0	-0.11	-2.11	2.11	0.06
10	15	-0.21	0	-0.21	-3.08	3.08	0.17
11	9	-0.18	0	-0.18	-1.66	1.66	0.23

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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
12	3	-0.16	0	-0.16	-0.48	0.48	0.26
Total		-1.62	0	-1.62	-39.42	39.42	0.61

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	441.4	45	0.03	
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	437.7	45	0.29	
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	430.6	45	0.28	
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	423.2	45	0.28	
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	415.1	45	0.27	
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	406.5	45	0.27	
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	397.1	45	0.26	
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	386.7	45	0.25	
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	375.3	45	0.25	
10	12 To 18	15	0.6	3.266	1.859	1.537	0	355.1	45	0.46	
11	6 To 12	9	0.6	3.266	1.859	1.537	0	318.9	45	0.42	
12	2 To 6	4	0.6	2.177	1.239	1.025	0	276.8	45	0.24	
Total							10.319	---	---	---	3.29

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	42.15	-0.02	0	-0.02	-0.86	0.86	-0.01
2	40.5	-0.2	0	-0.2	-8.17	8.17	-0.08
3	37.5	-0.2	0	-0.2	-7.44	7.44	-0.08
4	34.5	-0.2	0	-0.2	-6.73	6.73	-0.08
5	31.5	-0.19	0	-0.19	-6.03	6.03	-0.08
6	28.5	-0.19	0	-0.19	-5.35	5.35	-0.06
7	25.5	-0.18	0	-0.18	-4.68	4.68	-0.02
8	22.5	-0.18	0	-0.18	-4.02	4.02	0.02
9	19.5	-0.17	0	-0.17	-3.38	3.38	0.06
10	15	-0.33	0	-0.33	-4.92	4.92	0.21
11	9	-0.29	0	-0.29	-2.65	2.65	0.31
12	4	-0.17	0	-0.17	-0.68	0.68	0.24
Total		-2.32	0	-2.32	-54.91	54.91	0.43

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	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
2	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
3	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67	
4	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67	
5	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
6	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
7	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67	
8	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67	
Total							9.739	---	---	---	3.61

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	40	-0.16	0	-0.16	-6.51	6.51	0.47
2	40	-0.16	0	-0.16	-6.51	6.51	0.47
3	40	-0.48	0	-0.48	-19.05	19.05	0.34
4	40	-0.48	0	-0.48	-19.05	19.05	-0.34
5	40	-0.16	0	-0.16	-6.51	6.51	-0.47
6	40	-0.16	0	-0.16	-6.51	6.51	-0.47
7	40	-0.48	0	-0.48	-19.05	19.05	-0.34
8	40	-0.48	0	-0.48	-19.05	19.05	0.34
Total		-2.56	0	-2.56	-102.21	102.21	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	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
2	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
3	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01	
4	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01	
5	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
6	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
7	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01	
8	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01	
Total							1.565	---	---	---	0.58

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	40	-0.09	0	-0.09	-3.75	3.75	0.24

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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
2	40	-0.09	0	-0.09	-3.75	3.75	0.24
3	40	-0.01	0	-0.01	-0.35	0.35	0.01
4	40	-0.01	0	-0.01	-0.35	0.35	-0.01
5	40	-0.09	0	-0.09	-3.75	3.75	-0.24
6	40	-0.09	0	-0.09	-3.75	3.75	-0.24
7	40	-0.01	0	-0.01	-0.35	0.35	-0.01
8	40	-0.01	0	-0.01	-0.35	0.35	0.01
Total		-0.41	0	-0.41	-16.43	16.43	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	90	-0.11	0.62	0.1	-0.18	1.02	0.38
2	35	35	2400	4.524	0	424.4	0	1.26	0	0	2.06	0	0
3	44	44	3700	10.752	0	445.4	270	-0.11	-0.62	-0.1	-0.45	-2.54	-1.48

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-0.6	0	-0.85	0	0.38	0	-29.66	20.83	2.19
2	35	-1.46	0	-1.46	0	0	0	-50.96	50.96	0
3	44	-2.11	0	-1.48	0	-1.48	0	-65.3	93.01	-5.99
Total		-4.16	0	-3.79	---	---	---	-145.92	164.8	-3.79

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.244	0.244	0	424.4	90	0.09	
2	35	35	1	0	0.244	0	0	424.4	0	0	
3	44	44	1	0	0.244	0.244	0	445.4	90	0.09	
Total								0.488	---	---	0.18

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-0.06	0	-0.06	-2.18	2.18	0.14
2	35	0	0	0	0	0	0
3	44	-0.07	0	-0.07	-2.88	2.88	-0.15

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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		-0.13	0	-0.13	-5.05	5.05	-0.01

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	-1.2	0	-1.2	-52.94	52.94	0
Total		-1.2	0	-1.2	-52.94	52.94	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	C _f	D _f	D _r	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	444.3	1.49
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	437.7	1.46
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	430.6	1.35
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	423.2	1.33
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	415.1	1.31
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	406.5	1.41
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	397.1	1.37
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	386.7	1.41
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	375.3	1.43
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	355.1	2.94
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	318.9	2.81
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	276.8	2.66
Total										67.262	---	20.96

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	42 To 45	43.5	0.6	0.843	0.756	0.454	0	444.3	90	0.17	
2	39 To 42	40.5	0.6	0.843	0.756	0.454	0	437.7	90	0.17	
3	36 To 39	37.5	0.6	0.843	0.756	0.454	0	430.6	90	0.17	
4	33 To 36	34.5	0.6	0.843	0.756	0.454	0	423.2	90	0.16	
5	30 To 33	31.5	0.6	0.843	0.756	0.454	0	415.1	90	0.16	
6	27 To 30	28.5	0.6	0.843	0.758	0.455	0	406.5	90	0.16	
7	24 To 27	25.5	0.6	0.843	0.758	0.455	0	397.1	90	0.15	
8	21 To 24	22.5	0.6	0.843	0.758	0.455	0	386.7	90	0.15	
9	18 To 21	19.5	0.6	0.843	0.758	0.455	0	375.3	90	0.15	
10	12 To 18	15	0.6	1.687	1.516	0.909	0	355.1	90	0.27	
11	6 To 12	9	0.6	1.687	1.516	0.909	0	318.9	90	0.25	
12	0 To 6	3	0.6	1.687	1.516	0.909	0	276.8	90	0.21	
Total								6.815	---	---	2.17

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	43.5	0	0	-0.17	-7.45	0	-0.04
2	40.5	0	0	-0.17	-6.83	0	-0.04
3	37.5	0	0	-0.17	-6.23	0	-0.04
4	34.5	0	0	-0.16	-5.63	0	-0.04
5	31.5	0	0	-0.16	-5.04	0	-0.04
6	28.5	0	0	-0.16	-4.48	0	-0.02
7	25.5	0	0	-0.15	-3.91	0	0.01
8	22.5	0	0	-0.15	-3.36	0	0.04
9	19.5	0	0	-0.15	-2.83	0	0.07
10	15	0	0	-0.27	-4.12	0	0.23
11	9	0	0	-0.25	-2.22	0	0.3
12	3	0	0	-0.21	-0.64	0	0.35
Total		0	0	-2.17	-52.74	0	0.82

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	42 To 42.3	42.15	0.6	0.163	0.093	0.056	0	441.4	90	0.02
2	39 To 42	40.5	0.6	1.629	0.927	0.556	0	437.7	90	0.21
3	36 To 39	37.5	0.6	1.629	0.927	0.556	0	430.6	90	0.2
4	33 To 36	34.5	0.6	1.629	0.927	0.556	0	423.2	90	0.2
5	30 To 33	31.5	0.6	1.629	0.927	0.556	0	415.1	90	0.2
6	27 To 30	28.5	0.6	1.633	0.929	0.558	0	406.5	90	0.19
7	24 To 27	25.5	0.6	1.633	0.929	0.558	0	397.1	90	0.19

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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	
8	21 To 24	22.5	0.6	1.633	0.929	0.558	0	386.7	90	0.18	
9	18 To 21	19.5	0.6	1.633	0.929	0.558	0	375.3	90	0.18	
10	12 To 18	15	0.6	3.266	1.859	1.115	0	355.1	90	0.34	
11	6 To 12	9	0.6	3.266	1.859	1.115	0	318.9	90	0.3	
12	2 To 6	4	0.6	2.177	1.239	0.743	0	276.8	90	0.17	
Total							7.485	---	---	---	2.38

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	42.15	0	0	-0.02	-0.88	0	-0.01
2	40.5	0	0	-0.21	-8.38	0	-0.09
3	37.5	0	0	-0.2	-7.63	0	-0.09
4	34.5	0	0	-0.2	-6.9	0	-0.08
5	31.5	0	0	-0.2	-6.18	0	-0.08
6	28.5	0	0	-0.19	-5.49	0	-0.06
7	25.5	0	0	-0.19	-4.8	0	-0.02
8	22.5	0	0	-0.18	-4.12	0	0.02
9	19.5	0	0	-0.18	-3.47	0	0.06
10	15	0	0	-0.34	-5.05	0	0.22
11	9	0	0	-0.3	-2.72	0	0.32
12	4	0	0	-0.17	-0.7	0	0.25
Total		0	0	-2.38	-56.33	0	0.44

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	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45	
2	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45	
3	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45	
4	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45	
5	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45	
6	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45	
7	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45	
8	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45	
Total							9.739	---	---	---	3.61

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
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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	40	0	0	-0.45	-18.07	0	0.49
2	40	0	0	-0.45	-18.07	0	0.81
3	40	0	0	-0.45	-18.07	0	0.81
4	40	0	0	-0.45	-18.07	0	0.49
5	40	0	0	-0.45	-18.07	0	-0.49
6	40	0	0	-0.45	-18.07	0	-0.81
7	40	0	0	-0.45	-18.07	0	-0.81
8	40	0	0	-0.45	-18.07	0	-0.49
Total		0	0	-3.61	-144.55	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	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
2	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
3	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
4	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
5	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
6	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
7	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
8	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
Total						1.565	---	---	---	0.58

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	40	0	0	-0.07	-2.9	0	0.07
2	40	0	0	-0.07	-2.9	0	0.12
3	40	0	0	-0.07	-2.9	0	0.12
4	40	0	0	-0.07	-2.9	0	0.07
5	40	0	0	-0.07	-2.9	0	-0.07
6	40	0	0	-0.07	-2.9	0	-0.12
7	40	0	0	-0.07	-2.9	0	-0.12
8	40	0	0	-0.07	-2.9	0	-0.07
Total		0	0	-0.58	-23.23	0	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	135	-0.9	0.27	0.09	-1.46	0.44	0.33

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#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
2	35	35	2400	4.524	0	424.4	45	1.12	0.29	-0.04	1.83	0.48	-0.16
3	44	44	3700	10.752	0	445.4	315	1.12	-0.29	0.04	4.56	-1.19	0.61

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0.72	0	-1.35	0	0.33	0	-47.18	-25.25	1.12
2	35	-0.96	0	-1.63	0	-0.16	0	-57.12	33.45	0.69
3	44	2.38	0	-4.07	0	0.61	0	-179.09	-104.87	-1.5
Total		2.15	0	-7.05	---	---	---	-283.38	-96.67	0.3

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.244	0.122	0	424.4	135	0.04
2	35	35	1	0	0.244	0.122	0	424.4	45	0.04
3	44	44	1	0	0.244	0.122	0	445.4	45	0.05
Total							0.366	---	---	0.13

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	-0.04	-1.54	0	0.05
2	35	0	0	-0.04	-1.54	0	0.05
3	44	0	0	-0.05	-2.03	0	-0.05
Total		0	0	-0.13	-5.12	0	0.05

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	0	0	-1.7	-74.87	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
Total		0	0	-1.7	-74.87	0	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	444.3	1.77
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	437.7	1.74
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	430.6	1.59
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	423.2	1.56
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	415.1	1.53
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	406.5	1.66
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	397.1	1.57
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	386.7	1.6
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	375.3	1.61
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	355.1	3.28
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	318.9	3.1
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	276.8	2.92
Total										76.447	---	23.93

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	444.3	135	0.18
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	437.7	135	0.18
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	430.6	135	0.18
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	423.2	135	0.17
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	415.1	135	0.17
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	406.5	135	0.17
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	397.1	135	0.16
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	386.7	135	0.16
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	375.3	135	0.15
10	12 To 18	15	0.6	1.687	1.516	0.961	0	355.1	135	0.29
11	6 To 12	9	0.6	1.687	1.516	0.961	0	318.9	135	0.26
12	0 To 6	3	0.6	1.687	1.516	0.961	0	276.8	135	0.23
Total							7.202	---	---	2.29

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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	43.5	0.13	0	-0.13	-5.57	-5.57	-0.03
2	40.5	0.13	0	-0.13	-5.11	-5.11	-0.03
3	37.5	0.12	0	-0.12	-4.66	-4.66	-0.03
4	34.5	0.12	0	-0.12	-4.21	-4.21	-0.03
5	31.5	0.12	0	-0.12	-3.77	-3.77	-0.03
6	28.5	0.12	0	-0.12	-3.34	-3.34	-0.01
7	25.5	0.11	0	-0.11	-2.92	-2.92	0.01
8	22.5	0.11	0	-0.11	-2.51	-2.51	0.03
9	19.5	0.11	0	-0.11	-2.11	-2.11	0.06
10	15	0.21	0	-0.21	-3.08	-3.08	0.17
11	9	0.18	0	-0.18	-1.66	-1.66	0.23
12	3	0.16	0	-0.16	-0.48	-0.48	0.26
Total		1.62	0	-1.62	-39.42	-39.42	0.61

Wind forces from transmission line clusters

#	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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	441.4	135	0.03
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	437.7	135	0.29
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	430.6	135	0.28
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	423.2	135	0.28
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	415.1	135	0.27
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	406.5	135	0.27
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	397.1	135	0.26
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	386.7	135	0.25
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	375.3	135	0.25
10	12 To 18	15	0.6	3.266	1.859	1.537	0	355.1	135	0.46
11	6 To 12	9	0.6	3.266	1.859	1.537	0	318.9	135	0.42
12	2 To 6	4	0.6	2.177	1.239	1.025	0	276.8	135	0.24
Total						10.319	---	---	---	3.29

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	42.15	0.02	0	-0.02	-0.86	-0.86	-0.01
2	40.5	0.2	0	-0.2	-8.17	-8.17	-0.08
3	37.5	0.2	0	-0.2	-7.44	-7.44	-0.08
4	34.5	0.2	0	-0.2	-6.73	-6.73	-0.08

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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
5	31.5	0.19	0	-0.19	-6.03	-6.03	-0.08
6	28.5	0.19	0	-0.19	-5.35	-5.35	-0.06
7	25.5	0.18	0	-0.18	-4.68	-4.68	-0.02
8	22.5	0.18	0	-0.18	-4.02	-4.02	0.02
9	19.5	0.17	0	-0.17	-3.38	-3.38	0.06
10	15	0.33	0	-0.33	-4.92	-4.92	0.21
11	9	0.29	0	-0.29	-2.65	-2.65	0.31
12	4	0.17	0	-0.17	-0.68	-0.68	0.24
Total		2.32	0	-2.32	-54.91	-54.91	0.43

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	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67
2	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67
3	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23
4	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23
5	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67
6	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67
7	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23
8	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23
Total						9.739	---	---	---	3.61

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	40	0.48	0	-0.48	-19.05	-19.05	-0.34
2	40	0.48	0	-0.48	-19.05	-19.05	0.34
3	40	0.16	0	-0.16	-6.51	-6.51	0.47
4	40	0.16	0	-0.16	-6.51	-6.51	0.47
5	40	0.48	0	-0.48	-19.05	-19.05	0.34
6	40	0.48	0	-0.48	-19.05	-19.05	-0.34
7	40	0.16	0	-0.16	-6.51	-6.51	-0.47
8	40	0.16	0	-0.16	-6.51	-6.51	-0.47
Total		2.56	0	-2.56	-102.21	-102.21	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	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01

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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	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01	
3	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
4	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
5	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01	
6	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01	
7	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
8	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
Total							1.565	---	---	---	0.58

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	40	0.01	0	-0.01	-0.35	-0.35	-0.01
2	40	0.01	0	-0.01	-0.35	-0.35	0.01
3	40	0.09	0	-0.09	-3.75	-3.75	0.24
4	40	0.09	0	-0.09	-3.75	-3.75	0.24
5	40	0.01	0	-0.01	-0.35	-0.35	0.01
6	40	0.01	0	-0.01	-0.35	-0.35	-0.01
7	40	0.09	0	-0.09	-3.75	-3.75	-0.24
8	40	0.09	0	-0.09	-3.75	-3.75	-0.24
Total		0.41	0	-0.41	-16.43	-16.43	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	180	-1.02	0	0	-1.66	0	0
2	35	35	2400	4.524	0	424.4	90	-0.11	0.62	0.1	-0.18	1.02	0.38
3	44	44	3700	10.752	0	445.4	0	1.26	0	0	5.14	0	0

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	1.17	0	-1.17	0	0	0	-41.02	-41.02	0
2	35	0.85	0	-0.6	0	0.38	0	-20.83	-29.66	2.19
3	44	3.63	0	-3.63	0	0	0	-159.79	-159.79	0
Total		5.65	0	-5.4	---	---	---	-221.64	-230.47	2.19

Wind forces from mounts Of MW dishes

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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	35	35	1	0	0.244	0	0	424.4	180	0
2	35	35	1	0	0.244	0.244	0	424.4	90	0.09
3	44	44	1	0	0.244	0	0	445.4	0	0
Total						0.244	---	---	---	0.09

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	0	0	0	0
2	35	0.06	0	-0.06	-2.18	-2.18	0.14
3	44	0	0	0	0	0	0
Total		0.06	0	-0.06	-2.18	-2.18	0.14

Wind forces from projected area

#	Elev. m	Z m	Ka	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	1.2	0	-1.2	-52.94	-52.94	0
Total		1.2	0	-1.2	-52.94	-52.94	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	444.3	1.49
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	437.7	1.46
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	430.6	1.35
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	423.2	1.33

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Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	415.1	1.31
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	406.5	1.41
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	397.1	1.37
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	386.7	1.41
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	375.3	1.43
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	355.1	2.94
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	318.9	2.81
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	276.8	2.66
Total										67.262	---	20.96

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	42 To 45	43.5	0.6	0.843	0.756	0.506	0	444.3	180	0.19
2	39 To 42	40.5	0.6	0.843	0.756	0.506	0	437.7	180	0.19
3	36 To 39	37.5	0.6	0.843	0.756	0.506	0	430.6	180	0.19
4	33 To 36	34.5	0.6	0.843	0.756	0.506	0	423.2	180	0.18
5	30 To 33	31.5	0.6	0.843	0.756	0.506	0	415.1	180	0.18
6	27 To 30	28.5	0.6	0.843	0.758	0.506	0	406.5	180	0.17
7	24 To 27	25.5	0.6	0.843	0.758	0.506	0	397.1	180	0.17
8	21 To 24	22.5	0.6	0.843	0.758	0.506	0	386.7	180	0.17
9	18 To 21	19.5	0.6	0.843	0.758	0.506	0	375.3	180	0.16
10	12 To 18	15	0.6	1.687	1.516	1.012	0	355.1	180	0.31
11	6 To 12	9	0.6	1.687	1.516	1.012	0	318.9	180	0.27
12	0 To 6	3	0.6	1.687	1.516	1.012	0	276.8	180	0.24
Total						7.589	---	---	---	2.42

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	43.5	0.19	0	0	0	-8.31	0
2	40.5	0.19	0	0	0	-7.62	0
3	37.5	0.19	0	0	0	-6.94	0
4	34.5	0.18	0	0	0	-6.28	0
5	31.5	0.18	0	0	0	-5.62	0
6	28.5	0.17	0	0	0	-4.98	0
7	25.5	0.17	0	0	0	-4.35	0
8	22.5	0.17	0	0	0	-3.74	0
9	19.5	0.16	0	0	0	-3.15	0
10	15	0.31	0	0	0	-4.58	0
11	9	0.27	0	0	0	-2.47	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
12	3	0.24	0	0	0	-0.71	0
Total		2.42	0	0	0	-58.77	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	42 To 42.3	42.15	0.6	0.163	0.093	0.098	0	441.4	180	0.04	
2	39 To 42	40.5	0.6	1.629	0.927	0.977	0	437.7	180	0.36	
3	36 To 39	37.5	0.6	1.629	0.927	0.977	0	430.6	180	0.36	
4	33 To 36	34.5	0.6	1.629	0.927	0.977	0	423.2	180	0.35	
5	30 To 33	31.5	0.6	1.629	0.927	0.977	0	415.1	180	0.34	
6	27 To 30	28.5	0.6	1.633	0.929	0.98	0	406.5	180	0.34	
7	24 To 27	25.5	0.6	1.633	0.929	0.98	0	397.1	180	0.33	
8	21 To 24	22.5	0.6	1.633	0.929	0.98	0	386.7	180	0.32	
9	18 To 21	19.5	0.6	1.633	0.929	0.98	0	375.3	180	0.31	
10	12 To 18	15	0.6	3.266	1.859	1.96	0	355.1	180	0.59	
11	6 To 12	9	0.6	3.266	1.859	1.96	0	318.9	180	0.53	
12	2 To 6	4	0.6	2.177	1.239	1.306	0	276.8	180	0.31	
Total							13.153	---	---	---	4.19

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	42.15	0.04	0	0	0	-1.55	0
2	40.5	0.36	0	0	0	-14.73	0
3	37.5	0.36	0	0	0	-13.42	0
4	34.5	0.35	0	0	0	-12.13	0
5	31.5	0.34	0	0	0	-10.86	0
6	28.5	0.34	0	0	0	-9.65	0
7	25.5	0.33	0	0	0	-8.43	0
8	22.5	0.32	0	0	0	-7.25	0
9	19.5	0.31	0	0	0	-6.09	0
10	15	0.59	0	0	0	-8.87	0
11	9	0.53	0	0	0	-4.78	0
12	4	0.31	0	0	0	-1.23	0
Total		4.19	0	0	0	-98.99	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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#	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	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
2	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
3	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
4	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
5	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
6	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
7	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
8	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
Total						9.739	---	---	---	3.61

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	40	0.45	0	0	0	-18.07	-0.81
2	40	0.45	0	0	0	-18.07	-0.49
3	40	0.45	0	0	0	-18.07	0.49
4	40	0.45	0	0	0	-18.07	0.81
5	40	0.45	0	0	0	-18.07	0.81
6	40	0.45	0	0	0	-18.07	0.49
7	40	0.45	0	0	0	-18.07	-0.49
8	40	0.45	0	0	0	-18.07	-0.81
Total		3.61	0	0	0	-144.55	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	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
2	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
3	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
4	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07
5	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
6	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
7	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
8	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07
Total						1.565	---	---	---	0.58

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	40	0.07	0	0	0	-2.9	-0.12

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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
2	40	0.07	0	0	0	-2.9	-0.07
3	40	0.07	0	0	0	-2.9	0.07
4	40	0.07	0	0	0	-2.9	0.12
5	40	0.07	0	0	0	-2.9	0.12
6	40	0.07	0	0	0	-2.9	0.07
7	40	0.07	0	0	0	-2.9	-0.07
8	40	0.07	0	0	0	-2.9	-0.12
Total		0.58	0	0	0	-23.23	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	225	-0.9	-0.27	-0.09	-1.46	-0.44	-0.33
2	35	35	2400	4.524	0	424.4	135	-0.9	0.27	0.09	-1.46	0.44	0.33
3	44	44	3700	10.752	0	445.4	45	1.12	0.29	-0.04	4.56	1.19	-0.61

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	1.35	0	-0.72	0	-0.33	0	-25.25	-47.18	-1.12
2	35	1.35	0	0.72	0	0.33	0	25.25	-47.18	1.12
3	44	4.07	0	-2.38	0	-0.61	0	-104.87	-179.09	1.5
Total		6.77	0	-2.38	---	---	---	-104.87	-273.44	1.5

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.244	0.122	0	424.4	135	0.04	
2	35	35	1	0	0.244	0.122	0	424.4	135	0.04	
3	44	44	1	0	0.244	0.122	0	445.4	45	0.05	
Total								0.366	---	---	0.13

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0.04	0	0	0	-1.54	-0.05
2	35	0.04	0	0	0	-1.54	0.05
3	44	0.05	0	0	0	-2.03	0.05

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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		0.13	0	0	0	-5.12	0.05

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	1.7	0	0	0	-74.87	0
Total		1.7	0	0	0	-74.87	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	C _f	D _f	D _r	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	444.3	1.77
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	437.7	1.74
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	430.6	1.59
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	423.2	1.56
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	415.1	1.53
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	406.5	1.66
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	397.1	1.57
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	386.7	1.6
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	375.3	1.61
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	355.1	3.28
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	318.9	3.1
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	276.8	2.92
Total										76.447	---	23.93

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	444.3	135	0.18
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	437.7	135	0.18
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	430.6	135	0.18
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	423.2	135	0.17
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	415.1	135	0.17
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	406.5	135	0.17
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	397.1	135	0.16
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	386.7	135	0.16
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	375.3	135	0.15
10	12 To 18	15	0.6	1.687	1.516	0.961	0	355.1	135	0.29
11	6 To 12	9	0.6	1.687	1.516	0.961	0	318.9	135	0.26
12	0 To 6	3	0.6	1.687	1.516	0.961	0	276.8	135	0.23
Total						7.202	---	---	---	2.29

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	43.5	0.13	0	0.13	5.57	-5.57	0.03
2	40.5	0.13	0	0.13	5.11	-5.11	0.03
3	37.5	0.12	0	0.12	4.66	-4.66	0.03
4	34.5	0.12	0	0.12	4.21	-4.21	0.03
5	31.5	0.12	0	0.12	3.77	-3.77	0.03
6	28.5	0.12	0	0.12	3.34	-3.34	0.01
7	25.5	0.11	0	0.11	2.92	-2.92	-0.01
8	22.5	0.11	0	0.11	2.51	-2.51	-0.03
9	19.5	0.11	0	0.11	2.11	-2.11	-0.06
10	15	0.21	0	0.21	3.08	-3.08	-0.17
11	9	0.18	0	0.18	1.66	-1.66	-0.23
12	3	0.16	0	0.16	0.48	-0.48	-0.26
Total		1.62	0	1.62	39.42	-39.42	-0.61

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	441.4	135	0.03
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	437.7	135	0.29
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	430.6	135	0.28
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	423.2	135	0.28
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	415.1	135	0.27
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	406.5	135	0.27
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	397.1	135	0.26

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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	
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	386.7	135	0.25	
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	375.3	135	0.25	
10	12 To 18	15	0.6	3.266	1.859	1.537	0	355.1	135	0.46	
11	6 To 12	9	0.6	3.266	1.859	1.537	0	318.9	135	0.42	
12	2 To 6	4	0.6	2.177	1.239	1.025	0	276.8	135	0.24	
Total							10.319	---	---	---	3.29

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	42.15	0.02	0	0.02	0.86	-0.86	0.01
2	40.5	0.2	0	0.2	8.17	-8.17	0.08
3	37.5	0.2	0	0.2	7.44	-7.44	0.08
4	34.5	0.2	0	0.2	6.73	-6.73	0.08
5	31.5	0.19	0	0.19	6.03	-6.03	0.08
6	28.5	0.19	0	0.19	5.35	-5.35	0.06
7	25.5	0.18	0	0.18	4.68	-4.68	0.02
8	22.5	0.18	0	0.18	4.02	-4.02	-0.02
9	19.5	0.17	0	0.17	3.38	-3.38	-0.06
10	15	0.33	0	0.33	4.92	-4.92	-0.21
11	9	0.29	0	0.29	2.65	-2.65	-0.31
12	4	0.17	0	0.17	0.68	-0.68	-0.24
Total		2.32	0	2.32	54.91	-54.91	-0.43

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	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
2	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
3	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67	
4	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67	
5	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
6	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
7	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67	
8	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67	
Total							9.739	---	---	---	3.61

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
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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	40	0.16	0	0.16	6.51	-6.51	-0.47
2	40	0.16	0	0.16	6.51	-6.51	-0.47
3	40	0.48	0	0.48	19.05	-19.05	-0.34
4	40	0.48	0	0.48	19.05	-19.05	0.34
5	40	0.16	0	0.16	6.51	-6.51	0.47
6	40	0.16	0	0.16	6.51	-6.51	0.47
7	40	0.48	0	0.48	19.05	-19.05	0.34
8	40	0.48	0	0.48	19.05	-19.05	-0.34
Total		2.56	0	2.56	102.21	-102.21	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	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13
2	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13
3	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01
4	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01
5	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13
6	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13
7	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01
8	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01
Total						1.565	---	---	---	0.58

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	40	0.09	0	0.09	3.75	-3.75	-0.24
2	40	0.09	0	0.09	3.75	-3.75	-0.24
3	40	0.01	0	0.01	0.35	-0.35	-0.01
4	40	0.01	0	0.01	0.35	-0.35	0.01
5	40	0.09	0	0.09	3.75	-3.75	0.24
6	40	0.09	0	0.09	3.75	-3.75	0.24
7	40	0.01	0	0.01	0.35	-0.35	0.01
8	40	0.01	0	0.01	0.35	-0.35	-0.01
Total		0.41	0	0.41	16.43	-16.43	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	270	-0.11	-0.62	-0.1	-0.18	-1.02	-0.38

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#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
2	35	35	2400	4.524	0	424.4	180	-1.02	0	0	-1.66	0	0
3	44	44	3700	10.752	0	445.4	90	-0.11	0.62	0.1	-0.45	2.54	1.48

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0.85	0	0.6	0	-0.38	0	20.83	-29.66	-2.19
2	35	1.17	0	1.17	0	0	0	41.02	-41.02	0
3	44	1.48	0	2.11	0	1.48	0	93.01	-65.3	5.99
Total		3.5	0	3.88	---	---	---	154.86	-135.98	3.79

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.244	0.244	0	424.4	90	0.09
2	35	35	1	0	0.244	0	0	424.4	180	0
3	44	44	1	0	0.244	0.244	0	445.4	90	0.09
Total							0.488	---	---	0.18

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0.06	0	0.06	2.18	-2.18	-0.14
2	35	0	0	0	0	0	0
3	44	0.07	0	0.07	2.88	-2.88	0.15
Total		0.13	0	0.13	5.05	-5.05	0.01

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	1.2	0	1.2	52.94	-52.94	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
Total		1.2	0	1.2	52.94	-52.94	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1	1	3.932	444.3	1.49
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1	1	3.932	437.7	1.46
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1	1	3.7	430.6	1.35
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1	1	3.7	423.2	1.33
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1	1	3.7	415.1	1.31
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1	1	4.069	406.5	1.41
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1	1	4.059	397.1	1.37
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1	1	4.278	386.7	1.41
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1	1	4.489	375.3	1.43
10	15	15	3.058	0	19.759	0.15	3.18	1	1	9.734	355.1	2.94
11	9	9	3.17	0	23.179	0.14	3.27	1	1	10.36	318.9	2.81
12	3	3	3.419	0	26.599	0.13	3.31	1	1	11.308	276.8	2.66
Total										67.262	---	20.96

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	42 To 45	43.5	0.6	0.843	0.756	0.454	0	444.3	90	0.17
2	39 To 42	40.5	0.6	0.843	0.756	0.454	0	437.7	90	0.17
3	36 To 39	37.5	0.6	0.843	0.756	0.454	0	430.6	90	0.17
4	33 To 36	34.5	0.6	0.843	0.756	0.454	0	423.2	90	0.16
5	30 To 33	31.5	0.6	0.843	0.756	0.454	0	415.1	90	0.16
6	27 To 30	28.5	0.6	0.843	0.758	0.455	0	406.5	90	0.16
7	24 To 27	25.5	0.6	0.843	0.758	0.455	0	397.1	90	0.15
8	21 To 24	22.5	0.6	0.843	0.758	0.455	0	386.7	90	0.15
9	18 To 21	19.5	0.6	0.843	0.758	0.455	0	375.3	90	0.15
10	12 To 18	15	0.6	1.687	1.516	0.909	0	355.1	90	0.27
11	6 To 12	9	0.6	1.687	1.516	0.909	0	318.9	90	0.25
12	0 To 6	3	0.6	1.687	1.516	0.909	0	276.8	90	0.21
Total							6.815	---	---	2.17

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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	43.5	0	0	0.17	7.45	0	0.04
2	40.5	0	0	0.17	6.83	0	0.04
3	37.5	0	0	0.17	6.23	0	0.04
4	34.5	0	0	0.16	5.63	0	0.04
5	31.5	0	0	0.16	5.04	0	0.04
6	28.5	0	0	0.16	4.48	0	0.02
7	25.5	0	0	0.15	3.91	0	-0.01
8	22.5	0	0	0.15	3.36	0	-0.04
9	19.5	0	0	0.15	2.83	0	-0.07
10	15	0	0	0.27	4.12	0	-0.23
11	9	0	0	0.25	2.22	0	-0.3
12	3	0	0	0.21	0.64	0	-0.35
Total		0	0	2.17	52.74	0	-0.82

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	42 To 42.3	42.15	0.6	0.163	0.093	0.056	0	441.4	90	0.02
2	39 To 42	40.5	0.6	1.629	0.927	0.556	0	437.7	90	0.21
3	36 To 39	37.5	0.6	1.629	0.927	0.556	0	430.6	90	0.2
4	33 To 36	34.5	0.6	1.629	0.927	0.556	0	423.2	90	0.2
5	30 To 33	31.5	0.6	1.629	0.927	0.556	0	415.1	90	0.2
6	27 To 30	28.5	0.6	1.633	0.929	0.558	0	406.5	90	0.19
7	24 To 27	25.5	0.6	1.633	0.929	0.558	0	397.1	90	0.19
8	21 To 24	22.5	0.6	1.633	0.929	0.558	0	386.7	90	0.18
9	18 To 21	19.5	0.6	1.633	0.929	0.558	0	375.3	90	0.18
10	12 To 18	15	0.6	3.266	1.859	1.115	0	355.1	90	0.34
11	6 To 12	9	0.6	3.266	1.859	1.115	0	318.9	90	0.3
12	2 To 6	4	0.6	2.177	1.239	0.743	0	276.8	90	0.17
Total						7.485	---	---	---	2.38

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	42.15	0	0	0.02	0.88	0	0.01
2	40.5	0	0	0.21	8.38	0	0.09
3	37.5	0	0	0.2	7.63	0	0.09
4	34.5	0	0	0.2	6.9	0	0.08

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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
5	31.5	0	0	0.2	6.18	0	0.08
6	28.5	0	0	0.19	5.49	0	0.06
7	25.5	0	0	0.19	4.8	0	0.02
8	22.5	0	0	0.18	4.12	0	-0.02
9	19.5	0	0	0.18	3.47	0	-0.06
10	15	0	0	0.34	5.05	0	-0.22
11	9	0	0	0.3	2.72	0	-0.32
12	4	0	0	0.17	0.7	0	-0.25
Total		0	0	2.38	56.33	0	-0.44

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	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
2	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
3	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
4	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
5	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
6	40	40	1	1.815	0.62	1.217	0	436.5	135	0.45
7	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
8	40	40	1	1.815	0.62	1.217	0	436.5	45	0.45
Total						9.739	---	---	---	3.61

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	40	0	0	0.45	18.07	0	-0.49
2	40	0	0	0.45	18.07	0	-0.81
3	40	0	0	0.45	18.07	0	-0.81
4	40	0	0	0.45	18.07	0	-0.49
5	40	0	0	0.45	18.07	0	0.49
6	40	0	0	0.45	18.07	0	0.81
7	40	0	0	0.45	18.07	0	0.81
8	40	0	0	0.45	18.07	0	0.49
Total		0	0	3.61	144.55	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	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07

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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	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07	
3	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
4	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
5	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
6	40	40	1	0.034	0.358	0.196	0	436.5	135	0.07	
7	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07	
8	40	40	1	0.034	0.358	0.196	0	436.5	45	0.07	
Total							1.565	---	---	---	0.58

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	40	0	0	0.07	2.9	0	-0.07
2	40	0	0	0.07	2.9	0	-0.12
3	40	0	0	0.07	2.9	0	-0.12
4	40	0	0	0.07	2.9	0	-0.07
5	40	0	0	0.07	2.9	0	0.07
6	40	0	0	0.07	2.9	0	0.12
7	40	0	0	0.07	2.9	0	0.12
8	40	0	0	0.07	2.9	0	0.07
Total		0	0	0.58	23.23	0	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	315	1.12	-0.29	0.04	1.83	-0.48	0.16
2	35	35	2400	4.524	0	424.4	225	-0.9	-0.27	-0.09	-1.46	-0.44	-0.33
3	44	44	3700	10.752	0	445.4	135	-0.9	0.27	0.09	-3.65	1.11	1.28

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-0.96	0	1.63	0	0.16	0	57.12	33.45	-0.69
2	35	0.72	0	1.35	0	-0.33	0	47.18	-25.25	-1.12
3	44	-1.8	0	3.36	0	1.28	0	147.92	79.15	3.24
Total		-2.03	0	6.34	---	---	---	252.22	87.36	1.43

Wind forces from mounts Of MW dishes

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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	35	35	1	0	0.244	0.122	0	424.4	45	0.04
2	35	35	1	0	0.244	0.122	0	424.4	135	0.04
3	44	44	1	0	0.244	0.122	0	445.4	135	0.05
Total						0.366	---	---	---	0.13

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	0.04	1.54	0	-0.05
2	35	0	0	0.04	1.54	0	-0.05
3	44	0	0	0.05	2.03	0	0.05
Total		0	0	0.13	5.12	0	-0.05

Wind forces from projected area

#	Elev. m	Z m	Ka	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	0	0	1.7	74.87	0	0
Total		0	0	1.7	74.87	0	0

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

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

Wind forces on latticed panels

Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
1	43.5	43.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	444.3	1.77
2	40.5	40.5	1.426	0	5.604	0.25	2.76	1.19	1.19	4.682	437.7	1.74
3	37.5	37.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	430.6	1.59
4	34.5	34.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	423.2	1.56

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Panel No.	Mean Elev. m	Z m	Flat Area m ²	Round Area m ²	Gross Area m ²	Solidity Ratio	Cf	Df	Dr	EPA m ²	q _z N/m ²	Force KN
5	31.5	31.5	1.3	0	5.604	0.23	2.85	1.17	1.17	4.344	415.1	1.53
6	28.5	28.5	1.445	0	6.032	0.24	2.82	1.18	1.18	4.8	406.5	1.66
7	25.5	25.5	1.356	0	6.887	0.2	2.99	1.15	1.15	4.659	397.1	1.57
8	22.5	22.5	1.395	0	7.742	0.18	3.07	1.14	1.14	4.856	386.7	1.6
9	19.5	19.5	1.436	0	8.597	0.17	3.13	1.13	1.13	5.051	375.3	1.61
10	15	15	3.058	0	19.759	0.15	3.18	1.12	1.12	10.863	355.1	3.28
11	9	9	3.17	0	23.179	0.14	3.27	1.1	1.1	11.423	318.9	3.1
12	3	3	3.419	0	26.599	0.13	3.31	1.1	1.1	12.398	276.8	2.92
Total										76.447	---	23.93

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	42 To 45	43.5	0.6	0.843	0.756	0.48	0	444.3	45	0.18
2	39 To 42	40.5	0.6	0.843	0.756	0.48	0	437.7	45	0.18
3	36 To 39	37.5	0.6	0.843	0.756	0.48	0	430.6	45	0.18
4	33 To 36	34.5	0.6	0.843	0.756	0.48	0	423.2	45	0.17
5	30 To 33	31.5	0.6	0.843	0.756	0.48	0	415.1	45	0.17
6	27 To 30	28.5	0.6	0.843	0.758	0.48	0	406.5	45	0.17
7	24 To 27	25.5	0.6	0.843	0.758	0.48	0	397.1	45	0.16
8	21 To 24	22.5	0.6	0.843	0.758	0.48	0	386.7	45	0.16
9	18 To 21	19.5	0.6	0.843	0.758	0.48	0	375.3	45	0.15
10	12 To 18	15	0.6	1.687	1.516	0.961	0	355.1	45	0.29
11	6 To 12	9	0.6	1.687	1.516	0.961	0	318.9	45	0.26
12	0 To 6	3	0.6	1.687	1.516	0.961	0	276.8	45	0.23
Total						7.202	---	---	---	2.29

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	43.5	-0.13	0	0.13	5.57	5.57	0.03
2	40.5	-0.13	0	0.13	5.11	5.11	0.03
3	37.5	-0.12	0	0.12	4.66	4.66	0.03
4	34.5	-0.12	0	0.12	4.21	4.21	0.03
5	31.5	-0.12	0	0.12	3.77	3.77	0.03
6	28.5	-0.12	0	0.12	3.34	3.34	0.01
7	25.5	-0.11	0	0.11	2.92	2.92	-0.01
8	22.5	-0.11	0	0.11	2.51	2.51	-0.03
9	19.5	-0.11	0	0.11	2.11	2.11	-0.06
10	15	-0.21	0	0.21	3.08	3.08	-0.17
11	9	-0.18	0	0.18	1.66	1.66	-0.23

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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
12	3	-0.16	0	0.16	0.48	0.48	-0.26
Total		-1.62	0	1.62	39.42	39.42	-0.61

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	42 To 42.3	42.15	0.6	0.163	0.093	0.077	0	441.4	45	0.03	
2	39 To 42	40.5	0.6	1.629	0.927	0.767	0	437.7	45	0.29	
3	36 To 39	37.5	0.6	1.629	0.927	0.767	0	430.6	45	0.28	
4	33 To 36	34.5	0.6	1.629	0.927	0.767	0	423.2	45	0.28	
5	30 To 33	31.5	0.6	1.629	0.927	0.767	0	415.1	45	0.27	
6	27 To 30	28.5	0.6	1.633	0.929	0.769	0	406.5	45	0.27	
7	24 To 27	25.5	0.6	1.633	0.929	0.769	0	397.1	45	0.26	
8	21 To 24	22.5	0.6	1.633	0.929	0.769	0	386.7	45	0.25	
9	18 To 21	19.5	0.6	1.633	0.929	0.769	0	375.3	45	0.25	
10	12 To 18	15	0.6	3.266	1.859	1.537	0	355.1	45	0.46	
11	6 To 12	9	0.6	3.266	1.859	1.537	0	318.9	45	0.42	
12	2 To 6	4	0.6	2.177	1.239	1.025	0	276.8	45	0.24	
Total							10.319	---	---	---	3.29

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	42.15	-0.02	0	0.02	0.86	0.86	0.01
2	40.5	-0.2	0	0.2	8.17	8.17	0.08
3	37.5	-0.2	0	0.2	7.44	7.44	0.08
4	34.5	-0.2	0	0.2	6.73	6.73	0.08
5	31.5	-0.19	0	0.19	6.03	6.03	0.08
6	28.5	-0.19	0	0.19	5.35	5.35	0.06
7	25.5	-0.18	0	0.18	4.68	4.68	0.02
8	22.5	-0.18	0	0.18	4.02	4.02	-0.02
9	19.5	-0.17	0	0.17	3.38	3.38	-0.06
10	15	-0.33	0	0.33	4.92	4.92	-0.21
11	9	-0.29	0	0.29	2.65	2.65	-0.31
12	4	-0.17	0	0.17	0.68	0.68	-0.24
Total		-2.32	0	2.32	54.91	54.91	-0.43

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	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67	
2	40	40	1	1.815	0.62	1.815	0	436.5	0	0.67	
3	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
4	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
5	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67	
6	40	40	1	1.815	0.62	1.815	0	436.5	180	0.67	
7	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
8	40	40	1	1.815	0.62	0.62	0	436.5	90	0.23	
Total							9.739	---	---	---	3.61

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	40	-0.48	0	0.48	19.05	19.05	0.34
2	40	-0.48	0	0.48	19.05	19.05	-0.34
3	40	-0.16	0	0.16	6.51	6.51	-0.47
4	40	-0.16	0	0.16	6.51	6.51	-0.47
5	40	-0.48	0	0.48	19.05	19.05	-0.34
6	40	-0.48	0	0.48	19.05	19.05	0.34
7	40	-0.16	0	0.16	6.51	6.51	0.47
8	40	-0.16	0	0.16	6.51	6.51	0.47
Total		-2.56	0	2.56	102.21	102.21	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	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01	
2	40	40	1	0.034	0.358	0.034	0	436.5	0	0.01	
3	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
4	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
5	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01	
6	40	40	1	0.034	0.358	0.034	0	436.5	180	0.01	
7	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
8	40	40	1	0.034	0.358	0.358	0	436.5	90	0.13	
Total							1.565	---	---	---	0.58

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	40	-0.01	0	0.01	0.35	0.35	0.01

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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
2	40	-0.01	0	0.01	0.35	0.35	-0.01
3	40	-0.09	0	0.09	3.75	3.75	-0.24
4	40	-0.09	0	0.09	3.75	3.75	-0.24
5	40	-0.01	0	0.01	0.35	0.35	-0.01
6	40	-0.01	0	0.01	0.35	0.35	0.01
7	40	-0.09	0	0.09	3.75	3.75	0.24
8	40	-0.09	0	0.09	3.75	3.75	0.24
Total		-0.41	0	0.41	16.43	16.43	0

Wind forces from MW dishes

#	Elev. m	Z m	O.D. mm	Area m ²	t _{iz} mm	q _z N/m ²	q Deg	C _a	C _s	C _m	F _a KN	F _s KN	M _m KN
1	35	35	2400	4.524	0	424.4	0	1.26	0	0	2.06	0	0
2	35	35	2400	4.524	0	424.4	270	-0.11	-0.62	-0.1	-0.18	-1.02	-0.38
3	44	44	3700	10.752	0	445.4	180	-1.02	0	0	-4.13	0	0

Wind vectors from MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	M _x KN.m	M _y KN.m	M _z KN.m	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	-1.46	0	1.46	0	0	0	50.96	50.96	0
2	35	-0.6	0	0.85	0	-0.38	0	29.66	20.83	-2.19
3	44	-2.92	0	2.92	0	0	0	128.62	128.62	0
Total		-4.97	0	5.23	---	---	---	209.25	200.41	-2.19

Wind forces from mounts Of MW dishes

#	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	35	35	1	0	0.244	0	0	424.4	0	0
2	35	35	1	0	0.244	0.244	0	424.4	90	0.09
3	44	44	1	0	0.244	0	0	445.4	180	0
Total							0.244	---	---	0.09

Wind vectors from mounts Of MW dishes

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	35	0	0	0	0	0	0
2	35	-0.06	0	0.06	2.18	2.18	-0.14
3	44	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
Total		-0.06	0	0.06	2.18	2.18	-0.14

Wind forces from projected area

#	Elev. m	Z m	K _a	EPA _w m ²	EPA _p m ²	q _z N/m ²	F _w KN	F _p KN
1	44	44	1	4.495	0	445.4	1.7	0
Total				4.495	0	---	1.7	0

Wind vector from projected area

#	Elev. m	F _x KN	F _y KN	F _z KN	OTM _x KN.m	OTM _z KN.m	Torque KN.m
1	44	-1.2	0	1.2	52.94	52.94	0
Total		-1.2	0	1.2	52.94	52.94	0

Combination

Comb. No.	Description
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

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Comb. No.	Description
24	1D.L.+1ServiceWL_315Deg_25m/s

Maximum Forces In Tower Members

Maximum compression force

Panel No.	Bottom Elevation m	Top Elevation m	Main Leg KN	Main Diag KN	Main Horiz KN
1	42	45	15.21 (8)	10.72 (7)	0.3 (15)
2	39	42	55.99 (8)	19.13 (7)	0.64 (11)
3	36	39	102.6 (4)	27.69 (7)	0 (1)
4	33	36	184.87 (4)	32.6 (7)	0 (1)
5	30	33	259 (4)	38.99 (1)	0 (1)
6	27	30	318.15 (4)	28.64 (2)	3.22 (13)
7	24	27	395.54 (4)	19.74 (10)	0 (1)
8	21	24	409.87 (4)	23.26 (2)	0 (1)
9	18	21	470.62 (4)	18.28 (10)	0 (1)
10	12	18	486.16 (4)	35.87 (4)	0 (1)
11	6	12	585.3 (4)	25 (12)	0 (1)
12	0	6	626.38 (4)	29.11 (4)	0 (1)

Maximum tension force

Panel No.	Bottom Elevation m	Top Elevation m	Main Leg KN	Main Diag KN	Main Horiz KN
1	42	45	6.42 (8)	8.68 (7)	0.97 (15)
2	39	42	36.22 (8)	18.38 (7)	1.32 (11)
3	36	39	79.95 (4)	26.39 (7)	0 (1)
4	33	36	156.69 (4)	33.08 (7)	0 (1)
5	30	33	228.86 (4)	36.93 (1)	0 (1)
6	27	30	287.18 (4)	25.63 (2)	3.42 (13)
7	24	27	355.97 (4)	21.48 (10)	0 (1)
8	21	24	371.89 (4)	21.12 (2)	0 (1)
9	18	21	426.01 (4)	19.3 (10)	0 (1)
10	12	18	442.88 (4)	33.15 (4)	0 (1)
11	6	12	531.14 (4)	26.57 (12)	0 (1)
12	0	6	567.28 (4)	27.64 (4)	0 (1)

Design Of Tower Members Under Compression Force

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Design summary for latticed panels

Panel No.	Elevation m	Main Leg Ratio	Main Diag. Ratio	Main Horiz. Ratio	Sec. Diag. Ratio	Sec. Horiz. Ratio	Max. Ratio	Check
1	42 To 45	0.03	0.17	0.01	0	0.01	0.17	Safe
2	39 To 42	0.09	0.3	0.01	0	0.02	0.3	Safe
3	36 To 39	0.17	0.43	0	0	0.04	0.43	Safe
4	33 To 36	0.31	0.5	0	0	0.08	0.5	Safe
5	30 To 33	0.43	0.6	0	0	0.08	0.6	Safe
6	27 To 30	0.56	0.52	0.05	0	0.08	0.56	Safe
7	24 To 27	0.69	0.39	0	0	0.11	0.69	Safe
8	21 To 24	0.71	0.45	0	0	0.13	0.71	Safe
9	18 To 21	0.81	0.38	0	0	0.18	0.81	Safe
10	12 To 18	0.86	0.99	0	0.38	0.25	0.99	Safe
11	6 To 12	1.03	0.62	0	0.41	0.41	1.03	Unsafe
12	0 To 6	1.09	0.77	0	0.41	0.17	1.09	Unsafe
Max. Ratio		1.09	0.99	0.05	0.41	0.41	1.09	

Design of main leg

#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
1	L120x11	63.5	15.21	6.42	598.65	786.82	898.31	0.03	Safe	
2	L120x11	63.5	55.99	36.22	598.65	810.57	--	0.09	Safe	
3	L120x11	63.5	102.6	79.95	598.65	786.82	898.31	0.17	Safe	
4	L120x11	63.5	184.87	156.69	598.65	810.57	--	0.31	Safe	
5	L120x11	63.5	259	228.86	598.65	786.82	898.31	0.43	Safe	
6	L120x11	68.3	318.15	287.18	570.78	810.57	--	0.56	Safe	
7	L120x11	67.7	395.54	355.97	574.28	786.82	898.31	0.69	Safe	
8	L120x11	67.2	409.87	371.89	576.98	810.57	--	0.71	Safe	
9	L120x11	66.8	470.62	426.01	579.12	786.82	898.31	0.81	Safe	
10	L120x11	69.2	486.16	442.88	565.17	786.82	1347.46	0.86	Safe	
11	L120x11	68.4	585.3	531.14	570.13	786.82	1796.61	1.03	Unsafe	
12	L120x11	67.7	626.38	567.28	573.79	754.48	2105.4	1.09	Unsafe	

Design of main diagonal

#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
1	L70x5	126.1	10.72	8.68	64.64	129.09	--	0.17	Safe	
2	L70x5	126.1	19.13	18.38	64.64	129.09	--	0.3	Safe	
3	L70x5	126.1	27.69	26.39	64.64	129.09	--	0.43	Safe	
4	L70x5	126.1	32.6	33.08	64.64	129.09	--	0.5	Safe	
5	L70x5	126.1	38.99	36.93	64.64	129.09	--	0.6	Safe	
6	L70x5	138.4	28.64	25.63	54.92	129.09	--	0.52	Safe	

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#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
7	L70x5	143.4	19.74	21.48	51.15	129.09	--	0.39	Safe	
8	L70x5	149.1	23.26	21.12	51.98	108.06	104.45	0.45	Safe	
9	L70x5	155.5	18.28	19.3	48.62	108.06	104.45	0.38	Safe	
10	L70x5	170	35.87	33.15	36.4	129.09	--	0.99	Safe	
11	L70x5	175	25	26.57	40.1	108.06	104.45	0.62	Safe	
12	L70x5	181.2	29.11	27.64	37.86	108.06	104.45	0.77	Safe	

Design of main horizontal

#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
1	L70x5	129.8	0.3	0.97	61.7	129.09	--	0.01	Safe	
2	L70x5	129.8	0.64	1.32	61.7	129.09	--	0.01	Safe	
6	L70x5	129.8	3.22	3.42	61.7	129.09	--	0.05	Safe	

Compression capacity details of main leg

Panel No.	Elevation m	L m	L/r	Curve No	KL/r	W/t	F _y MPa	l _c	F _{cr} MPa	fPn KN	Comment
1	42 To 45	1.5	63.5	1	63.5	8.7	355	0.85	262.2	598.65	
2	39 To 42	1.5	63.5	1	63.5	8.7	355	0.85	262.2	598.65	
3	36 To 39	1.5	63.5	1	63.5	8.7	355	0.85	262.2	598.65	
4	33 To 36	1.5	63.5	1	63.5	8.7	355	0.85	262.2	598.65	
5	30 To 33	1.5	63.5	1	63.5	8.7	355	0.85	262.2	598.65	
6	27 To 30	1.614	68.3	1	68.3	8.7	355	0.92	250	570.78	
7	24 To 27	1.6	67.7	1	67.7	8.7	355	0.91	251.5	574.28	
8	21 To 24	1.589	67.2	1	67.2	8.7	355	0.9	252.7	576.98	
9	18 To 21	1.58	66.8	1	66.8	8.7	355	0.9	253.6	579.12	
10	12 To 18	1.636	69.2	1	69.2	8.7	355	0.93	247.5	565.17	
11	6 To 12	1.616	68.4	1	68.4	8.7	355	0.92	249.7	570.13	
12	0 To 6	1.602	67.7	1	67.7	8.7	355	0.91	251.3	573.79	

Compression capacity details of main diagonal

Panel No.	Elevation m	L m	L/r	Curve No	KL/r	W/t	F _y MPa	l _c	F _{cr} MPa	fPn KN	Comment
1	42 To 45	1.749	126.1	4	126.1	11.2	235	1.38	106.4	64.64	
2	39 To 42	1.749	126.1	4	126.1	11.2	235	1.38	106.4	64.64	
3	36 To 39	1.749	126.1	4	126.1	11.2	235	1.38	106.4	64.64	
4	33 To 36	1.749	126.1	4	126.1	11.2	235	1.38	106.4	64.64	
5	30 To 33	1.749	126.1	4	126.1	11.2	235	1.38	106.4	64.64	
6	27 To 30	1.92	138.4	4	138.4	11.2	235	1.51	90.4	54.92	
7	24 To 27	1.989	143.4	4	143.4	11.2	235	1.56	84.2	51.15	

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Panel No.	Elevation m	L m	L/r	Curve No	KL/r	W/t	Fy' MPa	I_c	Fcr MPa	fPn KN	Comment
8	21 To 24	2.069	149.1	5	142.2	11.2	235	1.55	85.6	51.98	
9	18 To 21	2.157	155.5	5	147.1	11.2	235	1.6	80	48.62	
10	12 To 18	3.71	170	4	170	11.2	235	1.85	59.9	36.4	
11	6 To 12	3.819	175	5	161.9	11.2	235	1.77	66	40.1	
12	0 To 6	3.955	181.2	5	166.7	11.2	235	1.82	62.3	37.86	

Compression capacity details of main horizontal

Panel No.	Elevation m	L m	L/r	Curve No	KL/r	W/t	Fy' MPa	I_c	Fcr MPa	fPn KN	Comment
1	42 To 45	1.8	129.8	4	129.8	11.2	235	1.42	101.6	61.7	
2	39 To 42	1.8	129.8	4	129.8	11.2	235	1.42	101.6	61.7	
6	27 To 30	1.8	129.8	4	129.8	11.2	235	1.42	101.6	61.7	

Design of secondary horizontals under compression force

#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
1	L50x4	91.1	0.25	0.33	47.23	74.4	--	0.01	Safe	
2	L50x4	91.1	1.18	1.7	47.23	74.4	--	0.02	Safe	
3	L50x4	91.1	1.76	2.47	47.23	74.4	--	0.04	Safe	
4	L50x4	91.1	3.8	4.75	47.23	74.4	--	0.08	Safe	
5	L50x4	91.1	3.83	4.56	47.23	74.4	--	0.08	Safe	
6	L50x4	97.7	3.68	3.68	45.58	74.4	--	0.08	Safe	
7	L50x4	112.2	4.55	4.55	42.02	74.4	--	0.11	Safe	
8	L50x4	126.7	4.69	4.69	36.97	74.4	--	0.13	Safe	
9	L50x4	141.2	5.37	5.37	30.41	74.4	--	0.18	Safe	
10	L50x4	80.9	5.68	5.68	49.75	74.4	--	0.11	Safe	
10	L50x4	161.9	5.68	5.68	23.12	74.4	--	0.25	Safe	
10	L50x4	80.9	5.68	5.68	49.75	74.4	--	0.11	Safe	
11	L50x4	95.5	6.78	6.78	46.14	74.4	--	0.15	Safe	
11	L50x4	190.9	6.78	6.78	16.63	74.4	--	0.41	Safe	
11	L50x4	95.5	6.78	6.78	46.14	74.4	--	0.15	Safe	
12	L50x4	110	7.21	7.21	42.58	74.4	--	0.17	Safe	
12	L80x8	138.2	7.21	7.21	100.36	339.02	--	0.07	Safe	
12	L50x4	110	7.21	7.21	42.58	74.4	--	0.17	Safe	

Design of secondary diagonals under compression force

#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
10	L50x4	180.8	7.03	7.03	18.54	74.4	--	0.38	Safe	
10	L50x4	163.9	5.32	5.32	22.57	74.4	--	0.24	Safe	

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#	Section Name	L/r	Comp. Force KN	Tension Force KN	fPn _c KN	fPn _t KN	fPn _{bolt} KN	Ratio	Check	Comment
11	L50x4	185.4	7.17	7.17	17.63	74.4	--	0.41	Safe	
11	L50x4	173.7	5.77	5.77	20.08	74.4	--	0.29	Safe	
12	L50x4	191.5	6.75	6.75	16.53	74.4	--	0.41	Safe	
12	L50x4	183.8	5.68	5.68	17.94	74.4	--	0.32	Safe	

Compression capacity details of secondary horizontals

Panel No.	Section Name	L m	L/r	Curve No	KL/r	W/t	Fy' MPa	l _c	Fcr MPa	fPn KN	Comment
1	L50x4	0.9	91.1	3	105.5	9.8	235	1.15	134.9	47.23	
2	L50x4	0.9	91.1	3	105.5	9.8	235	1.15	134.9	47.23	
3	L50x4	0.9	91.1	3	105.5	9.8	235	1.15	134.9	47.23	
4	L50x4	0.9	91.1	3	105.5	9.8	235	1.15	134.9	47.23	
5	L50x4	0.9	91.1	3	105.5	9.8	235	1.15	134.9	47.23	
6	L50x4	0.966	97.7	3	108.9	9.8	235	1.19	130.2	45.58	
7	L50x4	1.109	112.2	3	116.1	9.8	235	1.27	120	42.02	
8	L50x4	1.252	126.7	4	126.7	9.8	235	1.38	105.6	36.97	
9	L50x4	1.395	141.2	4	141.2	9.8	235	1.54	86.9	30.41	
10	L50x4	0.8	80.9	3	100.5	9.8	235	1.1	142.1	49.75	
10	L50x4	1.6	161.9	4	161.9	9.8	235	1.77	66.1	23.12	
10	L50x4	0.8	80.9	3	100.5	9.8	235	1.1	142.1	49.75	
11	L50x4	0.943	95.5	3	107.7	9.8	235	1.18	131.8	46.14	
11	L50x4	1.887	190.9	4	190.9	9.8	235	2.08	47.5	16.63	
11	L50x4	0.943	95.5	3	107.7	9.8	235	1.18	131.8	46.14	
12	L50x4	1.087	110	3	115	9.8	235	1.25	121.6	42.58	
12	L80x8	2.173	138.2	4	138.2	7.8	355	1.85	90.7	100.36	
12	L50x4	1.087	110	3	115	9.8	235	1.25	121.6	42.58	

Compression capacity details of secondary diagonals

Panel No.	Section Name	L m	L/r	Curve No	KL/r	W/t	Fy' MPa	l _c	Fcr MPa	fPn KN	Comment
10	L50x4	1.787	180.8	4	180.8	9.8	235	1.97	52.9	18.54	
10	L50x4	1.619	163.9	4	163.9	9.8	235	1.79	64.5	22.57	
11	L50x4	1.832	185.4	4	185.4	9.8	235	2.02	50.4	17.63	
11	L50x4	1.717	173.7	4	173.7	9.8	235	1.9	57.4	20.08	
12	L50x4	1.892	191.5	4	191.5	9.8	235	2.09	47.2	16.53	
12	L50x4	1.817	183.8	4	183.8	9.8	235	2.01	51.2	17.94	

Reactions From The Tower

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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	134.25	147.63	-6.01	134.38	-270.68	10.99	-3802.51	3812.13
2	97.88	147.63	96.62	137.53	2682.41	9.23	-2745.17	3838.14
3	-7.17	147.63	128.82	129.02	3711.09	-5.35	329.39	3725.68
4	-102.63	147.63	101.79	144.55	2925.97	-11.23	2968.6	4168.2
5	-134.72	147.63	7.96	134.95	343.66	-5.19	3853.55	3868.84
6	-95.67	147.63	-96.93	136.19	-2725.11	-9.23	2662.35	3809.77
7	6.79	147.63	-126.45	126.63	-3619.93	-0.45	-284.94	3631.13
8	100.37	147.63	-101.21	142.54	-2897.5	11.23	-2854.87	4067.65
9	134.25	110.72	-6.01	134.38	-269.06	10.99	-3804.18	3813.68
10	97.88	110.72	96.62	137.53	2684.02	9.23	-2746.84	3840.46
11	-7.17	110.72	128.82	129.02	3712.7	-5.35	327.72	3727.14
12	-102.63	110.72	101.79	144.55	2927.58	-11.23	2966.93	4168.14
13	-134.72	110.72	7.96	134.95	345.27	-5.19	3851.88	3867.32
14	-95.67	110.72	-96.93	136.19	-2723.5	-9.23	2660.68	3807.45
15	6.79	110.72	-126.45	126.63	-3618.32	-0.45	-286.61	3629.65
16	100.37	110.72	-101.21	142.54	-2895.89	11.23	-2856.54	4067.68
17	40.22	123.03	-1.8	40.26	-84.52	3.29	-1135.69	1138.83
18	29.32	123.03	28.95	41.21	800.29	2.77	-818.96	1145.06
19	-2.15	123.03	38.59	38.65	1108.43	-1.6	102.24	1113.14
20	-30.75	123.03	30.49	43.3	873.13	-3.37	892.9	1248.85
21	-40.36	123.03	2.38	40.43	99.51	-1.56	1158.11	1162.38
22	-28.66	123.03	-29.04	40.8	-819.96	-2.77	801.29	1146.47
23	2.03	123.03	-37.88	37.94	-1088	-0.13	-81.79	1091.07
24	30.07	123.03	-30.32	42.7	-871.47	3.37	-851.7	1218.55
Max.	-134.72	147.63	128.82	144.55	3712.7	-11.23	3853.55	4168.2

Individual support reaction

Joint No.	Comb No.	Rx KN	Ry KN	Rz KN	RMx KN.m	RMy KN.m	RMz KN.m
Leg A	1	32.29	-401.07	-24.59	0	0	0
	2	3.82	30.16	8.14	0	0	0
	3	-28.52	471.37	37.28	0	0	0
	4	-46.88	670.73	48.16	0	0	0
	5	-38.28	488.22	30.19	0	0	0
	6	-8.02	30.16	-3.72	0	0	0
	7	23.05	-382.97	-31	0	0	0
	8	41.05	-581.63	-42.18	0	0	0
	9	32.91	-410.3	-25.23	0	0	0
	10	4.44	20.93	7.49	0	0	0
	11	-27.9	462.14	36.64	0	0	0
	12	-46.26	661.5	47.52	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	-37.66	478.99	29.55	0	0	0
	14	-7.4	20.93	-4.36	0	0	0
	15	23.67	-392.2	-31.64	0	0	0
	16	41.67	-590.86	-42.82	0	0	0
	17	8.35	-100.45	-5.99	0	0	0
	18	-0.18	28.75	3.81	0	0	0
	19	-9.87	160.94	12.54	0	0	0
	20	-15.37	220.65	15.8	0	0	0
	21	-12.79	165.98	10.42	0	0	0
	22	-3.73	28.75	0.26	0	0	0
	23	5.58	-95.03	-7.91	0	0	0
	24	10.97	-154.53	-11.26	0	0	0
	Max	-46.88	670.73	48.16	0	0	0
Leg B	1	29.76	-342.86	20.41	0	0	0
	2	40.05	-546.7	39.18	0	0	0
	3	19.86	-326.72	27.71	0	0	0
	4	-9.5	41.49	3.94	0	0	0
	5	-34.15	414.31	-25.65	0	0	0
	6	-44.88	616.2	-43.75	0	0	0
	7	-24.73	395.51	-32.18	0	0	0
	8	4.06	41.49	-9.63	0	0	0
	9	30.41	-352.44	21.05	0	0	0
	10	40.69	-556.28	39.83	0	0	0
	11	20.5	-336.3	28.35	0	0	0
	12	-8.86	31.91	4.58	0	0	0
	13	-33.5	404.74	-25.01	0	0	0
	14	-44.24	606.62	-43.11	0	0	0
	15	-24.08	385.93	-31.53	0	0	0
	16	4.71	31.91	-8.99	0	0	0
	17	7.54	-82.27	4.74	0	0	0
	18	10.62	-143.36	10.36	0	0	0
	19	4.57	-77.44	6.93	0	0	0
	20	-4.23	32.88	-0.19	0	0	0
	21	-11.61	144.58	-9.06	0	0	0
	22	-14.83	205.08	-14.48	0	0	0
	23	-8.79	138.95	-11.02	0	0	0
	24	-0.16	32.88	-4.26	0	0	0
	Max	-44.88	616.2	-43.75	0	0	0
Leg C	1	38.54	474.88	-28.48	0	0	0
	2	9.89	43.66	4.06	0	0	0
	3	-24.02	-397.55	31.63	0	0	0
	4	-43.02	-596.92	41.88	0	0	0
	5	-33.77	-414.4	24.56	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
	6	-3.95	43.66	-9.78	0	0	0
	7	28.07	456.79	-36.12	0	0	0
	8	47.33	655.44	-46.04	0	0	0
	9	37.9	465.66	-27.85	0	0	0
	10	9.24	34.44	4.68	0	0	0
	11	-24.67	-406.77	32.26	0	0	0
	12	-43.67	-606.14	42.51	0	0	0
	13	-34.41	-423.62	25.19	0	0	0
	14	-4.59	34.44	-9.16	0	0	0
	15	27.43	447.57	-35.49	0	0	0
	16	46.68	646.22	-45.42	0	0	0
	17	12.93	161.96	-9.86	0	0	0
	18	4.34	32.76	-0.12	0	0	0
	19	-5.82	-99.42	8.15	0	0	0
	20	-11.51	-159.14	11.22	0	0	0
	21	-8.74	-104.47	6.03	0	0	0
	22	0.2	32.76	-4.26	0	0	0
	23	9.79	156.54	-12.15	0	0	0
	24	15.56	216.04	-15.12	0	0	0
	Max	47.33	655.44	-46.04	0	0	0
Leg D	1	33.65	416.68	26.66	0	0	0
	2	44.12	620.52	45.24	0	0	0
	3	25.5	400.53	32.2	0	0	0
	4	-3.22	32.32	7.8	0	0	0
	5	-28.52	-340.5	-21.14	0	0	0
	6	-38.82	-542.39	-39.68	0	0	0
	7	-19.61	-321.69	-27.16	0	0	0
	8	7.93	32.32	-3.36	0	0	0
	9	33.03	407.8	26.03	0	0	0
	10	43.5	611.65	44.62	0	0	0
	11	24.88	391.66	31.58	0	0	0
	12	-3.85	23.45	7.18	0	0	0
	13	-29.14	-349.37	-21.77	0	0	0
	14	-39.44	-551.26	-40.3	0	0	0
	15	-20.23	-330.57	-27.78	0	0	0
	16	7.31	23.45	-3.98	0	0	0
	17	11.41	143.79	9.32	0	0	0
	18	14.55	204.87	14.89	0	0	0
	19	8.97	138.95	10.98	0	0	0
	20	0.36	28.63	3.67	0	0	0
	21	-7.22	-83.07	-5	0	0	0
	22	-10.3	-143.57	-10.56	0	0	0
	23	-4.55	-77.44	-6.8	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
	24	3.7	28.63	0.33	0	0	0
	Max	44.12	620.52	45.24	0	0	0

Comparison of Reaction Force Vs. Applied Loads

Base moment reaction Vs. applied base moment

Comb No.	Reaction OTM X KN.m	Reaction Torque KN.m	Reaction OTM Z KN.m	Applied OTM X KN.m	Applied Torque KN.m	Applied OTM Z KN.m	Change %
1	-270.68	10.99	-3802.51	270.68	-10.99	3802.51	0
2	2682.41	9.23	-2745.17	-2682.41	-9.23	2745.17	0
3	3711.09	-5.35	329.39	-3711.09	5.35	-329.39	0
4	2925.97	-11.23	2968.6	-2925.97	11.23	-2968.6	0
5	343.66	-5.19	3853.55	-343.66	5.19	-3853.55	0
6	-2725.11	-9.23	2662.35	2725.11	9.23	-2662.35	0
7	-3619.93	-0.45	-284.94	3619.93	0.45	284.94	0
8	-2897.5	11.23	-2854.87	2897.5	-11.23	2854.87	0
9	-269.06	10.99	-3804.18	269.06	-10.99	3804.18	0
10	2684.02	9.23	-2746.84	-2684.02	-9.23	2746.84	0
11	3712.7	-5.35	327.72	-3712.7	5.35	-327.72	0
12	2927.58	-11.23	2966.93	-2927.58	11.23	-2966.93	0
13	345.27	-5.19	3851.88	-345.27	5.19	-3851.88	0
14	-2723.5	-9.23	2660.68	2723.5	9.23	-2660.68	0
15	-3618.32	-0.45	-286.61	3618.32	0.45	286.61	0
16	-2895.89	11.23	-2856.54	2895.89	-11.23	2856.54	0
17	-84.52	3.29	-1135.69	84.52	-3.29	1135.69	0
18	800.29	2.77	-818.96	-800.29	-2.77	818.96	0
19	1108.43	-1.6	102.24	-1108.43	1.6	-102.24	0
20	873.13	-3.37	892.9	-873.13	3.37	-892.9	0
21	99.51	-1.56	1158.11	-99.51	1.56	-1158.11	0
22	-819.96	-2.77	801.29	819.96	2.77	-801.29	0
23	-1088	-0.13	-81.79	1088	0.13	81.79	0
24	-871.47	3.37	-851.7	871.47	-3.37	851.7	0

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	134.25	147.63	-6.01	-134.25	-147.63	6.01	0
2	97.88	147.63	96.62	-97.88	-147.63	-96.62	0
3	-7.17	147.63	128.82	7.17	-147.63	-128.82	0
4	-102.63	147.63	101.79	102.63	-147.63	-101.79	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 %
5	-134.72	147.63	7.96	134.72	-147.63	-7.96	0
6	-95.67	147.63	-96.93	95.67	-147.63	96.93	0
7	6.79	147.63	-126.45	-6.79	-147.63	126.45	0
8	100.37	147.63	-101.21	-100.37	-147.63	101.21	0
9	134.25	110.72	-6.01	-134.25	-110.72	6.01	0
10	97.88	110.72	96.62	-97.88	-110.72	-96.62	0
11	-7.17	110.72	128.82	7.17	-110.72	-128.82	0
12	-102.63	110.72	101.79	102.63	-110.72	-101.79	0
13	-134.72	110.72	7.96	134.72	-110.72	-7.96	0
14	-95.67	110.72	-96.93	95.67	-110.72	96.93	0
15	6.79	110.72	-126.45	-6.79	-110.72	126.45	0
16	100.37	110.72	-101.21	-100.37	-110.72	101.21	0
17	40.22	123.03	-1.8	-40.22	-123.03	1.8	0
18	29.32	123.03	28.95	-29.32	-123.03	-28.95	0
19	-2.15	123.03	38.59	2.15	-123.03	-38.59	0
20	-30.75	123.03	30.49	30.75	-123.03	-30.49	0
21	-40.36	123.03	2.38	40.36	-123.03	-2.38	0
22	-28.66	123.03	-29.04	28.66	-123.03	29.04	0
23	2.03	123.03	-37.88	-2.03	-123.03	37.88	0
24	30.07	123.03	-30.32	-30.07	-123.03	30.32	0

Displacement at non service condition

Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
45	369.1 (13)	-2 (2)	-358.7 (11)	402.5 (12)	0.85 (12)	0.11 (10)
42	328.3 (5)	-1.9 (2)	-319 (11)	357.8 (12)	0.84 (12)	0.1 (10)
39	287.5 (5)	-1.9 (2)	-279.1 (11)	313 (12)	0.83 (12)	0.08 (10)
36	247.1 (5)	-1.8 (2)	-239.7 (11)	268.8 (12)	0.81 (12)	0.07 (10)
33	207.9 (5)	-1.7 (2)	-201.5 (11)	226 (12)	0.76 (12)	0.06 (12)
30	171.1 (5)	-1.6 (2)	-165.7 (11)	185.8 (12)	0.7 (12)	0.04 (10)
27	138.6 (5)	-1.5 (2)	-134.1 (11)	150.4 (12)	0.62 (12)	0.05 (12)
24	109.7 (5)	-1.3 (2)	-106 (11)	119 (12)	0.54 (12)	0.05 (12)
21	84.5 (5)	-1.2 (2)	-81.6 (11)	91.5 (12)	0.47 (12)	0.02 (2)
18	62.8 (5)	-1 (2)	-60.6 (11)	68 (12)	0.39 (12)	0.07 (12)
12	28.7 (5)	-0.7 (2)	-27.6 (11)	31 (12)	0.26 (12)	0.07 (12)
6	7.9 (5)	-0.4 (2)	-7.6 (11)	8.6 (12)	0.12 (12)	0.11 (12)

Displacement at service condition

Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
45	110.5 (21)	-1.6 (18)	-106.5 (19)	119.9 (20)	0.25 (20)	0.03 (18)

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Elevation m	Deflection X mm	Down mm	Deflection Z mm	Horiz. Deflection mm	Tilt Deg	Twist My Deg
42	98.4 (21)	-1.6 (18)	-94.8 (19)	106.7 (20)	0.25 (20)	0.03 (18)
39	86.2 (21)	-1.6 (18)	-83 (19)	93.4 (20)	0.25 (20)	0.03 (18)
36	74.1 (21)	-1.5 (18)	-71.3 (19)	80.2 (20)	0.24 (20)	0.02 (18)
33	62.4 (21)	-1.4 (18)	-60 (19)	67.5 (20)	0.23 (20)	0.02 (20)
30	51.3 (21)	-1.3 (18)	-49.4 (19)	55.5 (20)	0.21 (20)	0.01 (18)
27	41.6 (21)	-1.2 (18)	-40 (19)	45 (20)	0.19 (20)	0.01 (20)
24	32.9 (21)	-1.1 (18)	-31.6 (19)	35.6 (20)	0.16 (20)	0.01 (20)
21	25.3 (21)	-1 (18)	-24.3 (19)	27.4 (20)	0.14 (20)	0.01 (18)
18	18.9 (21)	-0.9 (18)	-18.1 (19)	20.4 (20)	0.12 (20)	0.02 (20)
12	8.6 (21)	-0.6 (18)	-8.3 (19)	9.3 (20)	0.08 (20)	0.02 (20)
6	2.4 (21)	-0.3 (18)	-2.3 (19)	2.6 (20)	0.04 (20)	0.03 (20)

DESIGN OF ANCHOR ROD

Name: Tower

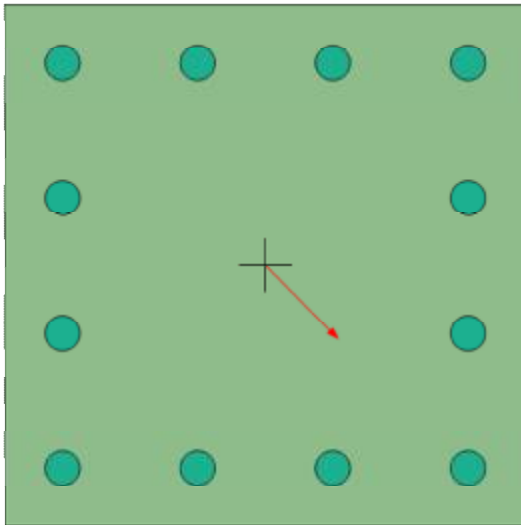
Design is safe with usage ratio 0.43

Connection Parameters

Located at: Leg A, Leg B, Leg C and Leg D.

Design code	=	ANSI/TIA-222-G-2
Width of base plate	=	450 mm
Height of base plate	=	450 mm
Type of bolt analysis	=	Elastic
Dist. above concrete to bottom of leveling nut	=	75 mm
Orientation of the connection	=	45 Deg
Location of support reaction	X	= 0 mm
	Z	= 0 mm
Use of grout under base plate	=	YES
Use of leveling nut under base plate	=	YES
Total length of anchor rod	=	1200 mm

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Bolt Specification

#	Diam mm	X-Coord. mm	Z-Coord. mm	Material Name
1	30	-175	-175	A572-50
2	30	-175	175	A572-50
3	30	-58.3	-175	A572-50
4	30	-58.3	175	A572-50
5	30	58.3	-175	A572-50
6	30	58.3	175	A572-50
7	30	175	-175	A572-50
8	30	175	175	A572-50
9	30	-175	-58.3	A572-50
10	30	175	-58.3	A572-50
11	30	-175	58.3	A572-50
12	30	175	58.3	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	Leg C	12	-43.67	-606.14	42.51	60.94	0	0	0	0

Critical Action in Local Coordinates of Connection

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#	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	Leg C	12	42.51	606.14	43.67	60.94	0	0	0	0

Force distribution in anchor rods

#	Diam mm	F _x #1 KN	F _y #1 KN	F _z #1 KN
1	30	3.54	50.51	3.64
2	30	3.54	50.51	3.64
3	30	3.54	50.51	3.64
4	30	3.54	50.51	3.64
5	30	3.54	50.51	3.64
6	30	3.54	50.51	3.64
7	30	3.54	50.51	3.64
8	30	3.54	50.51	3.64
9	30	3.54	50.51	3.64
10	30	3.54	50.51	3.64
11	30	3.54	50.51	3.64
12	30	3.54	50.51	3.64

Bolt Design

Anchor rod diameter	d	=	30	mm
Material of anchor rod		=	A572-50	
Gross area of anchor rod	A _g	=	706.9	mm ²
Net area of anchor rod	A _n	=	530.1	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}	=	55.89	KN
Maximum tension	P _{ut}	=	50.51	KN
Considered axial force in interaction 1	P _{u1}	=	50.51	KN
Shear force in interaction 1	V _{u1}	=	5.08	KN
Nominal tensile strength of anchor rod	R _{nt}	=	237.59	KN
	φ	=	0.8	

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$$\eta = 0.55$$

$$\text{Interaction equation} = [Pu1 + (Vu1 / \eta)] / \phi Rnt$$

$$= 0.31$$

Bolt status

Safe as 0.31 < 1.0

Check the Pullout Resistance of Anchor

Type of anchor rod head		=	Hex Nut	
Maximum tension in anchor	T	=	50.51	KN
Bearing area of anchor head	Abrg	=	1046.8	mm ²
Concrete compressive strength	F'c	=	21	MPa
Modification factor for pullout resistance	Ψcp	=	1	
The pullout resistance of anchor	Np	=	Ψ 8 Abrg F'c	
		=	175.86	KN
Strength reduction factor	ϕ	=	0.7	
Available pullout resistance	ϕNp	=	123.1	KN
Utilization ratio	T / ϕNp	=	0.41	

Saftey satus

Safe as 0.41 < 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		=	200	mm
Maximum spacing between reinforcement and anchor	Sa	=	100	mm
Concrete compressive strength	F'c	=	21	MPa
Yielding strength of reinforcement bars	Fy	=	235	MPa

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Date

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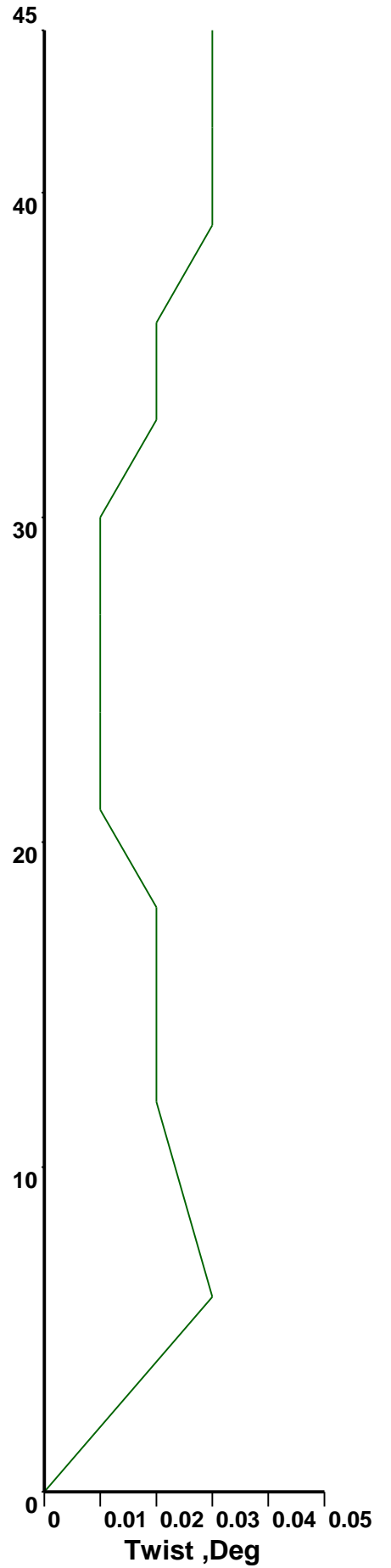
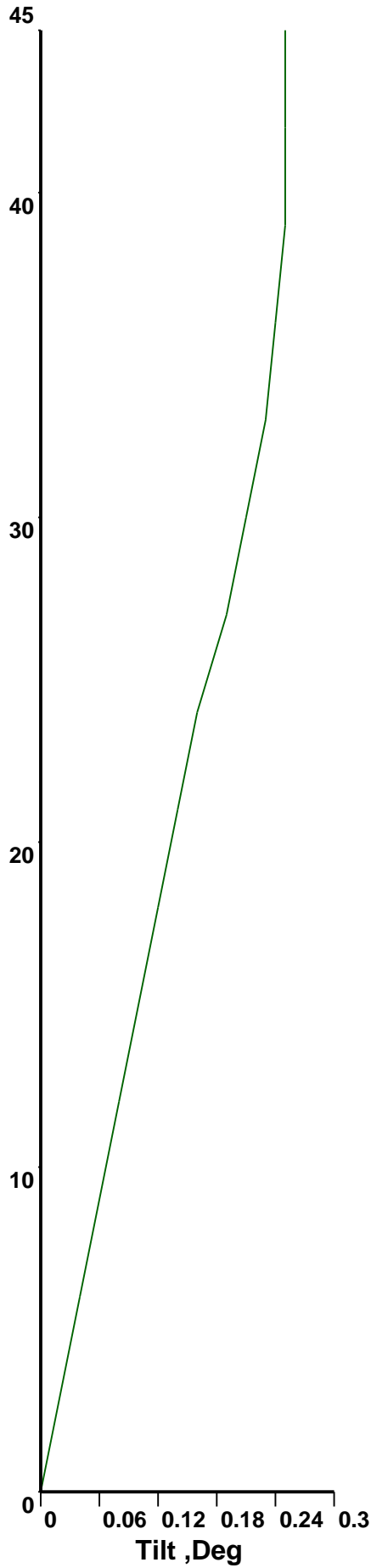
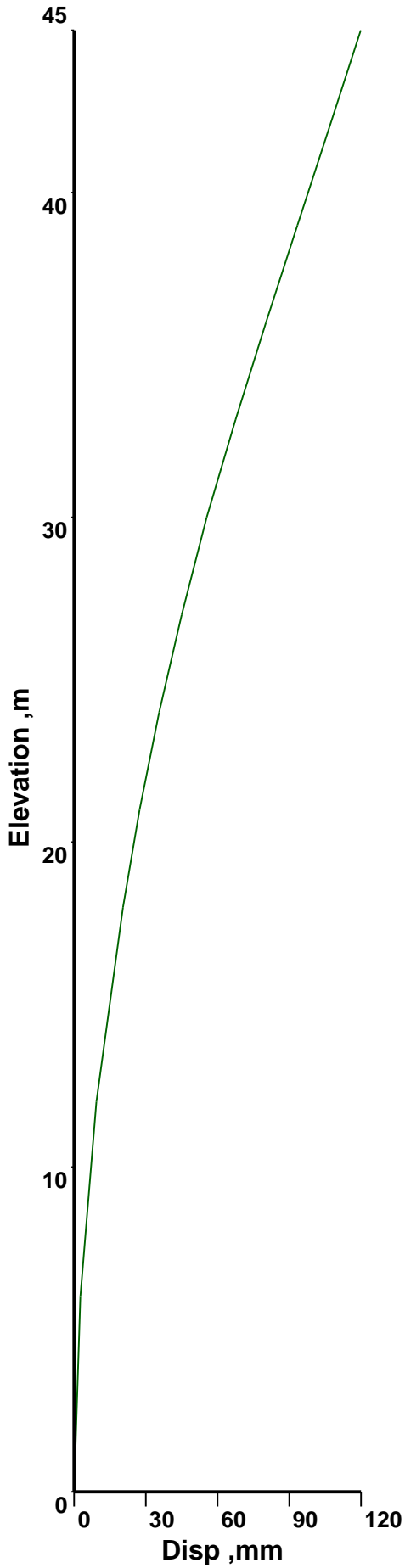
A.S.M

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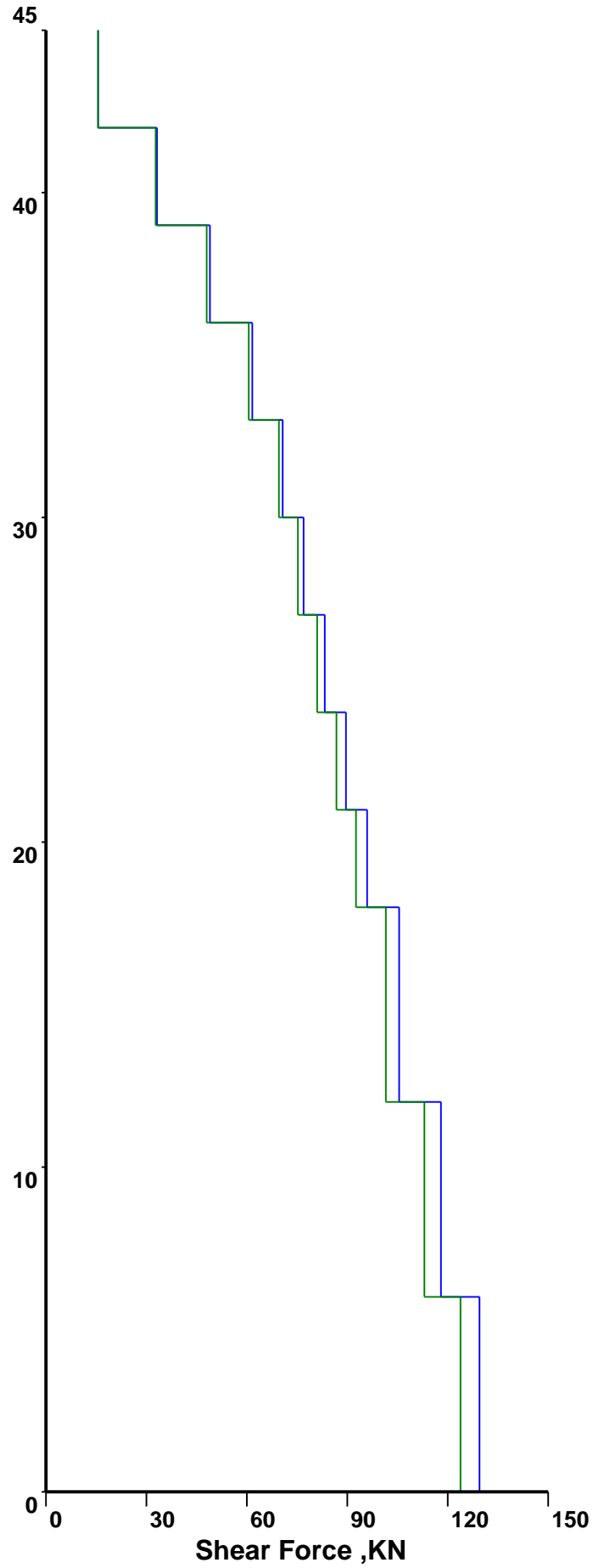
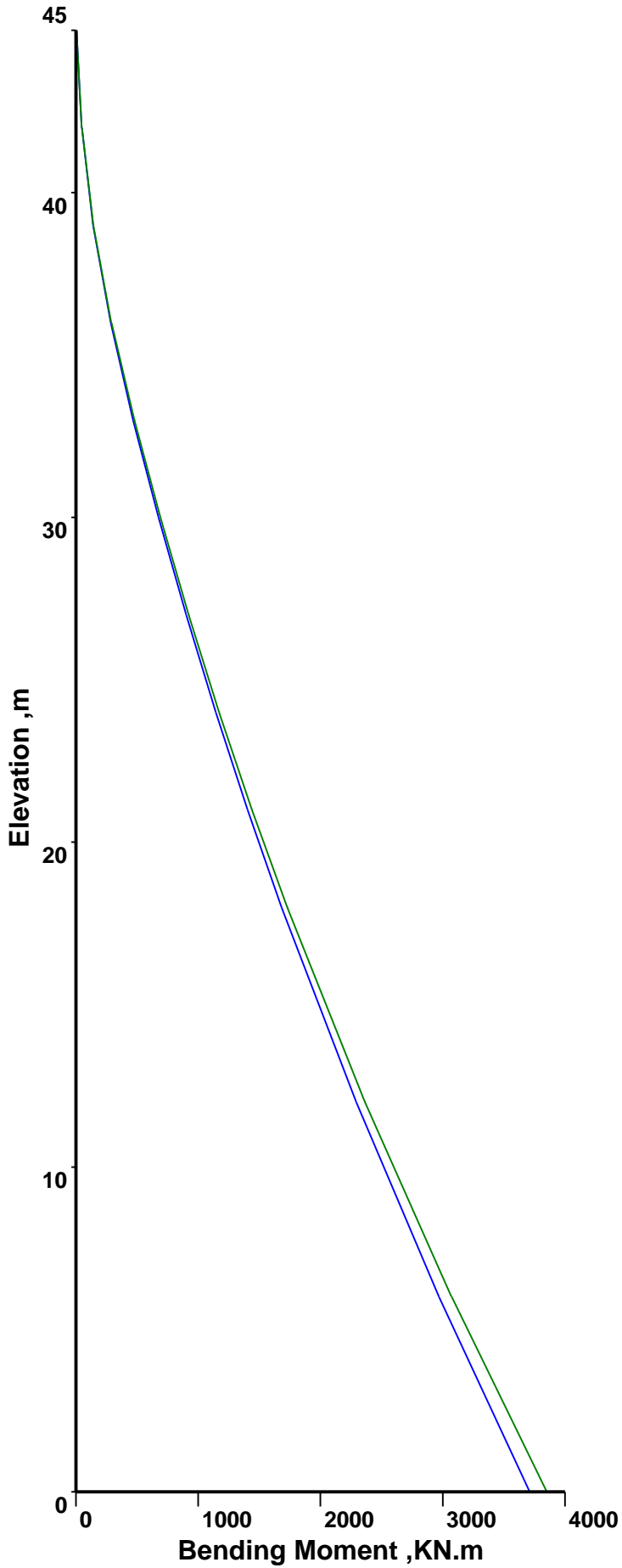
Lesser of one-half the spacing between anchors and distance from bar to nearest concrete surface	cb	=	75	mm
Epoxy coated factor	Ψ_e	=	1	
Size factor	Ψ_s	=	0.8	
Casting position factor	Ψ_t	=	1	
Light weight concrete factor	λ	=	1	
Transverse reinforcement index	ktr	=	0	mm
Reinforcement bars development length	ldr	=	$F_y \Psi_t \Psi_e \Psi_s / [1.1 \lambda \text{ Sqrt}(F_c) (cb + Ktr)/db]$ db	
		=	not less 300	mm
		=	300	mm
Length of anchor above top of concrete surface	O	=	80	mm
Required embeded length for anchor rod	Lan	=	$ldr + Ct + Sa / 1.5 + a$	
		=	476.7	mm
Required total length for anchor rod	Ltr	=	$Lan + O$	
		=	556.7	mm
Supplied total length for anchor rod	Lts	=	1200	mm
Utilization ratio for embeded length		=	0.43	

*Safety status**Safe as 0.43 < 1.0*

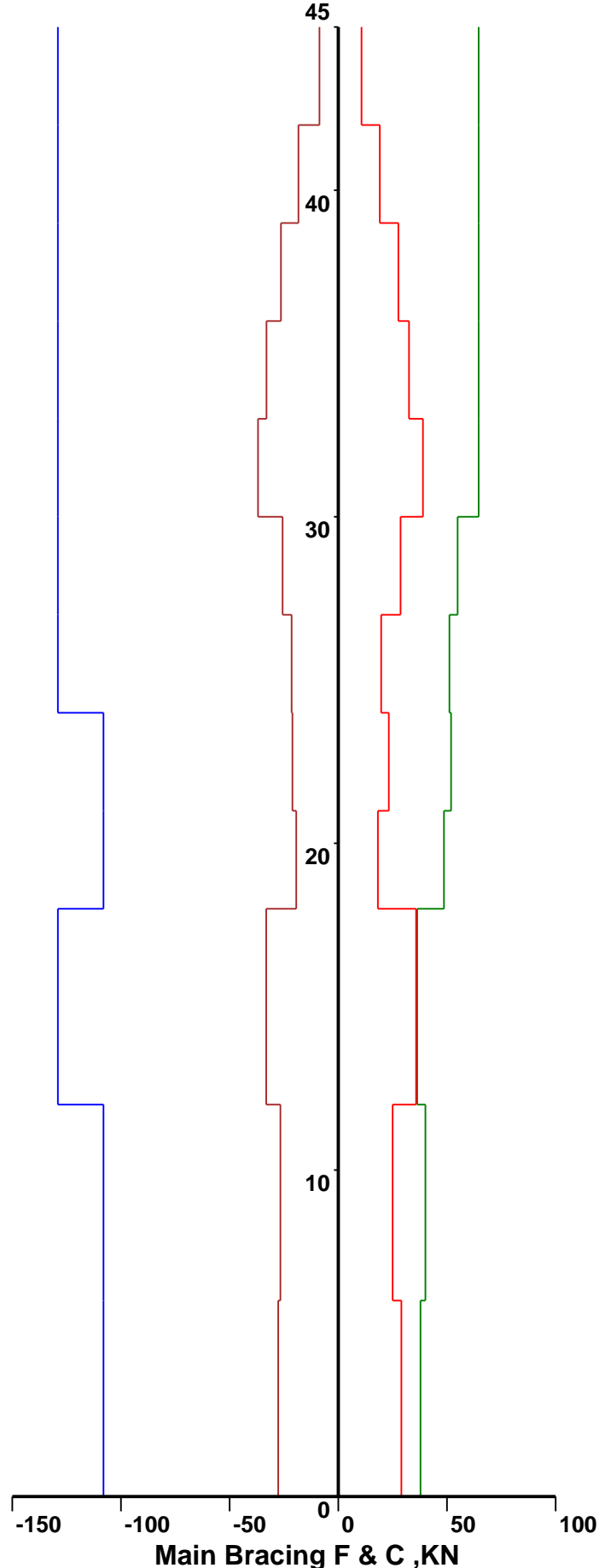
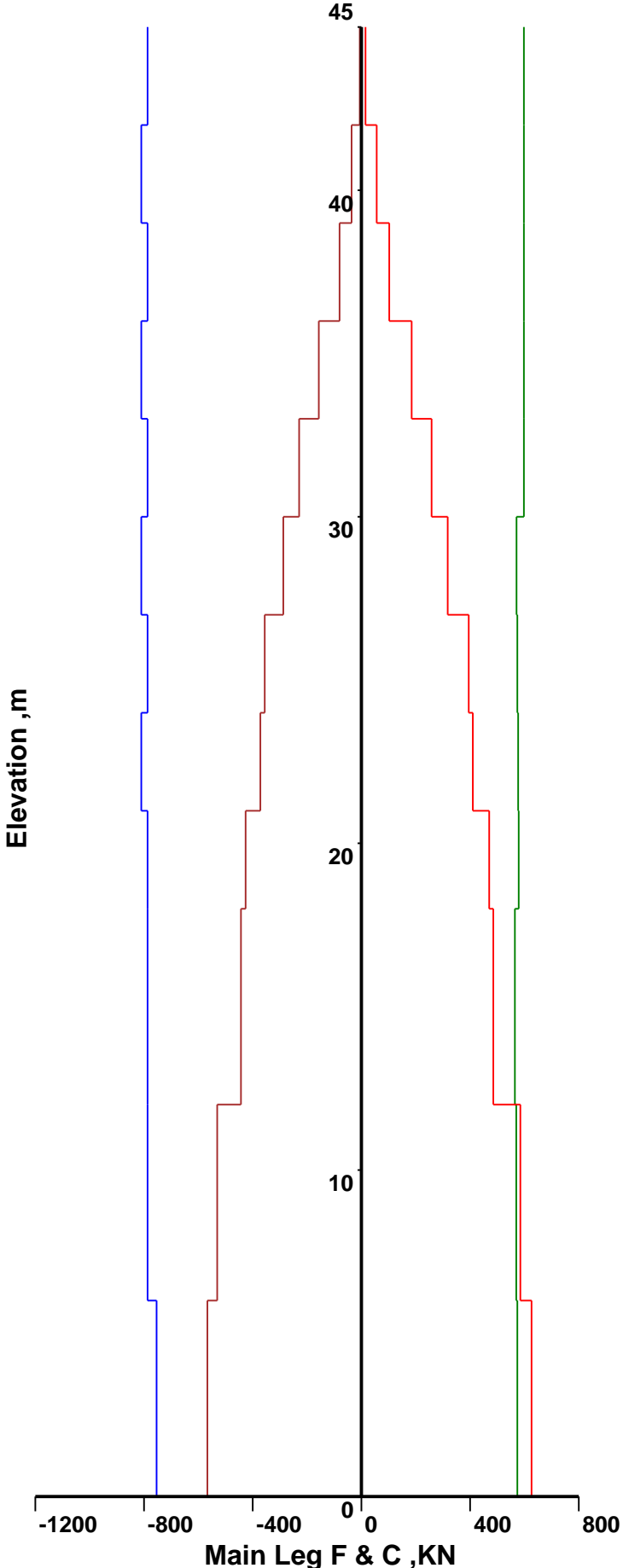
Deformation Chart Of 45m Tri Tower Max Service Wind



Global Moment and Shear Chart Of 45m Tri Tower Max Design Wind

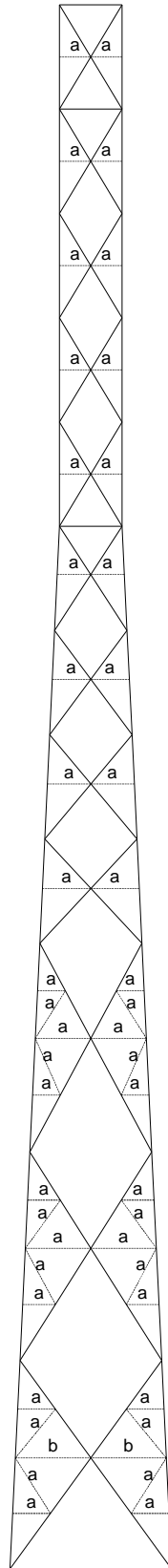


Force Vs. Capacity Chart For 45m Tri Tower





PANEL NO.	ELEVATION (m)	TOWER WIDTH (m)	MAIN LEGS	LEG GRADE	DIAGONALS	DIAGONAL GRADE	PANELS HEIGHT (m)
1	45	1.8					
2							
3							
4							
5							
6	30	1.8					9@3
7							
8			L120x11	S355J0	L70x5	S235J0	
9							
10							
11							3@6
12	0	4.65					



REDUNDANT TABLE

NOTATION	SIZE	MATERIAL
a	L50x4	S235J0
b	L80x8	S355J0

REV.	DATE	REVISION/ISSUE	DRN	DGN	CHD	APD
A	5/11/2017	First issue	M.Joe	M.Joe	A.S.M	

REVISIONS

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DRAWING TITLE :

DESIGN DRAWING

JOB NO. : 45m Tri Tower

PROJECT : GSM Network

DRAWING NO.	REV.	SHEET NO.
ASM-S-GP-25M-01	A	1 OF 1