Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	26	5.20	0.00	0.00
			Max. Compression	26	-5.34	0.00	0.00
			Max. Mx	43	1.54	0.11	-0.01
			Max. My	37	-1.10	0.09	-0.02
			Max. Vy	43	0.06	0.11	-0.01
			Max. Vx	45	0.00	0.00	0.00
T8	20 - 0	Leg	Max Tension	29	97.56	-1.82	0.01
			Max. Compression	12	-113.41	0.00	0.00
			Max. Mx	40	-45.07	2.85	0.01
			Max. My	16	-5.17	-0.15	-3.55
			Max. Vy	48	-0.47	-2.36	0.01
			Max. Vx	20	0.49	-0.15	3.54
		Diagonal	Max Tension	27	5.82	0.00	0.00
			Max. Compression	24	-6.38	0.00	0.00
			Max. Mx	43	-0.14	0.14	0.02
			Max. My	38	-2.06	0.11	-0.02
			Max. Vy	43	0.06	0.14	0.02
			Max. Vx	38	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	24	118.08	13.42	-7.14
	Max. H_x	24	118.08	13.42	-7.14
	Max. H_z	7	-98.39	-11.31	6.29
	Min. Vert	9	-101.37	-11.79	6.19
	Min. H_x	9	-101.37	-11.79	6.19
	Min. H_z	24	118.08	13.42	-7.14
Leg B	Max. Vert	12	119.00	-13.30	-7.50
	Max. H_x	29	-102.21	11.72	6.59
	Max. H_z	31	-99.33	11.17	6.83
	Min. Vert	29	-102.21	11.72	6.59
	Min. H_x	12	119.00	-13.30	-7.50
	Min. H_z	12	119.00	-13.30	-7.50
Leg A	Max. Vert	2	117.91	0.38	15.19
	Max. H_x	28	59.00	0.94	7.43
	Max. H_z	2	117.91	0.38	15.19
	Min. Vert	19	-101.50	-0.38	-13.31
	Min. H_x	13	-52.22	-1.06	-7.00
	Min. H_z	19	-101.50	-0.38	-13.31

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	14.53	0.00	0.00	3.53	-3.48	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	17.44	-0.17	-24.12	-1747.37	12.28	11.61
0.9 Dead+1.0 Wind 0 deg - No Ice	13.08	-0.17	-24.12	-1747.16	13.32	11.60

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 30 deg - No Ice	17.44	11.37	-19.70	-1439.27	-837.82	16.02
0.9 Dead+1.0 Wind 30 deg - No Ice	13.08	11.37	-19.70	-1439.28	-836.16	16.02
1.2 Dead+1.0 Wind 45 deg - No Ice	17.44	15.99	-15.93	-1164.74	-1178.84	16.83
0.9 Dead+1.0 Wind 45 deg - No Ice	13.08	15.99	-15.93	-1164.95	-1176.92	16.83
1.2 Dead+1.0 Wind 60 deg - No Ice	17.44	19.41	-11.18	-818.00	-1432.65	16.62
0.9 Dead+1.0 Wind 60 deg - No Ice	13.08	19.41	-11.18	-818.46	-1430.55	16.61
1.2 Dead+1.0 Wind 90 deg - No Ice	17.44	22.92	0.01	4.88	-1684.56	12.71
0.9 Dead+1.0 Wind 90 deg - No Ice	13.08	22.92	0.01	3.82	-1682.28	12.70
1.2 Dead+1.0 Wind 120 deg - No Ice	17.44	20.98	12.11	883.62	-1527.29	4.75
0.9 Dead+1.0 Wind 120 deg - No Ice	13.08	20.98	12.11	881.92	-1525.13	4.75
1.2 Dead+1.0 Wind 135 deg - No Ice	17.44	16.67	16.67	1220.07	-1220.43	0.08
0.9 Dead+1.0 Wind 135 deg - No Ice	13.08	16.67	16.67	1218.12	-1218.49	0.08
1.2 Dead+1.0 Wind 150 deg - No Ice	17.44	11.46	19.84	1459.19	-844.91	-4.47
0.9 Dead+1.0 Wind 150 deg - No Ice	13.08	11.46	19.84	1457.05	-843.25	-4.47
1.2 Dead+1.0 Wind 180 deg - No Ice	17.44	0.02	22.40	1652.46	-6.33	-11.86
0.9 Dead+1.0 Wind 180 deg - No Ice	13.08	0.02	22.40	1650.18	-5.27	-11.86
1.2 Dead+1.0 Wind 210 deg - No Ice	17.44	-11.37	19.70	1447.95	829.12	-16.02
0.9 Dead+1.0 Wind 210 deg - No Ice	13.08	-11.37	19.70	1445.83	829.56	-16.02
1.2 Dead+1.0 Wind 225 deg - No Ice	17.44	-16.06	15.89	1169.51	1177.45	-16.83
0.9 Dead+1.0 Wind 225 deg - No Ice	13.08	-16.06	15.89	1167.59	1177.63	-16.82
1.2 Dead+1.0 Wind 240 deg - No Ice	17.44	-20.98	11.91	865.80	1520.99	-16.36
0.9 Dead+1.0 Wind 240 deg - No Ice	13.08	-20.98	11.91	864.11	1520.93	-16.35
1.2 Dead+1.0 Wind 270 deg - No Ice	17.44	-22.98	-0.11	-5.88	1682.07	-12.28
0.9 Dead+1.0 Wind 270 deg - No Ice	13.08	-22.98	-0.11	-6.94	1681.88	-12.28
1.2 Dead+1.0 Wind 300 deg - No Ice	17.44	-19.60	-11.31	-829.12	1439.27	-4.75
0.9 Dead+1.0 Wind 300 deg - No Ice	13.08	-19.60	-11.31	-829.58	1439.26	-4.75
1.2 Dead+1.0 Wind 315 deg - No Ice	17.44	-16.18	-16.09	-1177.94	1185.97	-0.35
0.9 Dead+1.0 Wind 315 deg - No Ice	13.08	-16.18	-16.09	-1178.14	1186.15	-0.35
1.2 Dead+1.0 Wind 330 deg - No Ice	17.44	-11.58	-19.85	-1451.02	847.73	4.05
0.9 Dead+1.0 Wind 330 deg - No Ice	13.08	-11.58	-19.85	-1451.01	848.15	4.05
1.2 Dead+1.0 Ice+1.0 Temp	42.41	-0.00	-0.00	16.28	-13.18	-0.00

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	42.41	-0.03	-6.14	-458.89	-10.52	2.50
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	42.41	2.99	-5.18	-386.93	-246.07	3.76
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	42.41	4.22	-4.21	-311.85	-342.32	4.05
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	42.41	5.15	-2.97	-215.36	-415.22	4.09
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	42.41	6.01	0.00	16.43	-481.01	3.31
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	42.41	5.33	3.08	254.49	-425.72	1.54
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	42.41	4.30	4.30	350.10	-347.06	0.46
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	42.41	3.01	5.20	421.39	-247.20	-0.64
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	42.41	0.00	5.95	480.32	-13.57	-2.54
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	42.41	-2.99	5.18	419.61	219.58	-3.76
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	42.41	-4.23	4.21	343.89	317.03	-4.05
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	42.41	-5.33	3.04	251.60	399.69	-4.04
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	42.41	-6.02	-0.02	14.67	455.53	-3.24
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	42.41	-5.18	-2.99	-217.15	391.18	-1.54
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	42.41	-4.25	-4.24	-313.95	318.37	-0.50
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	42.41	-3.02	-5.20	-388.79	222.60	0.57
Dead+Wind 0 deg - Service	14.53	-0.03	-4.77	-342.50	-0.23	2.30
Dead+Wind 30 deg - Service	14.53	2.25	-3.89	-281.64	-168.17	3.18
Dead+Wind 45 deg - Service	14.53	3.16	-3.15	-227.41	-235.54	3.34
Dead+Wind 60 deg - Service	14.53	3.84	-2.21	-158.91	-285.69	3.29
Dead+Wind 90 deg - Service	14.53	4.53	0.00	3.66	-335.45	2.52
Dead+Wind 120 deg - Service	14.53	4.15	2.39	177.26	-304.38	0.94
Dead+Wind 135 deg - Service	14.53	3.29	3.29	243.73	-243.76	0.01
Dead+Wind 150 deg - Service	14.53	2.27	3.92	290.97	-169.58	-0.89
Dead+Wind 180 deg - Service	14.53	0.00	4.43	329.15	-3.91	-2.35
Dead+Wind 210 deg - Service	14.53	-2.25	3.89	288.75	161.14	-3.18
Dead+Wind 225 deg - Service	14.53	-3.17	3.14	233.74	229.96	-3.33
Dead+Wind 240 deg - Service	14.53	-4.15	2.35	173.74	297.82	-3.24
Dead+Wind 270 deg - Service	14.53	-4.54	-0.02	1.54	329.64	-2.43
Dead+Wind 300 deg - Service	14.53	-3.87	-2.24	-161.10	281.68	-0.94
Dead+Wind 315 deg - Service	14.53	-3.20	-3.18	-230.01	231.63	-0.07
Dead+Wind 330 deg - Service	14.53	-2.29	-3.92	-283.96	164.81	0.81

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-14.53	0.00	0.00	14.53	0.00	0.000%
2	-0.17	-17.44	-24.12	0.17	17.44	24.12	0.000%
3	-0.17	-13.08	-24.12	0.17	13.08	24.12	0.000%
4	11.37	-17.44	-19.70	-11.37	17.44	19.70	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
5	11.37	-13.08	-19.70	-11.37	13.08	19.70	0.000%
6	15.99	-17.44	-15.93	-15.99	17.44	15.93	0.000%
7	15.99	-13.08	-15.93	-15.99	13.08	15.93	0.000%
8	19.41	-17.44	-11.18	-19.41	17.44	11.18	0.000%
9	19.41	-13.08	-11.18	-19.41	13.08	11.18	0.000%
10	22.92	-17.44	0.01	-22.92	17.44	-0.01	0.000%
11	22.92	-13.08	0.01	-22.92	13.08	-0.01	0.000%
12	20.98	-17.44	12.11	-20.98	17.44	-12.11	0.000%
13	20.98	-13.08	12.11	-20.98	13.08	-12.11	0.000%
14	16.67	-17.44	16.67	-16.67	17.44	-16.67	0.000%
15	16.67	-13.08	16.67	-16.67	13.08	-16.67	0.000%
16	11.46	-17.44	19.84	-11.46	17.44	-19.84	0.000%
17	11.46	-13.08	19.84	-11.46	13.08	-19.84	0.000%
18	0.02	-17.44	22.40	-0.02	17.44	-22.40	0.000%
19	0.02	-13.08	22.40	-0.02	13.08	-22.40	0.000%
20	-11.37	-17.44	19.70	11.37	17.44	-19.70	0.002%
21	-11.37	-13.08	19.70	11.37	13.08	-19.70	0.000%
22	-16.06	-17.44	15.89	16.06	17.44	-15.89	0.000%
23	-16.06	-13.08	15.89	16.06	13.08	-15.89	0.000%
24	-20.98	-17.44	11.91	20.98	17.44	-11.91	0.000%
25	-20.98	-13.08	11.91	20.98	13.08	-11.91	0.000%
26	-22.98	-17.44	-0.11	22.98	17.44	0.11	0.000%
27	-22.98	-13.08	-0.11	22.98	13.08	0.11	0.000%
28	-19.60	-17.44	-11.31	19.60	17.44	11.31	0.000%
29	-19.60	-13.08	-11.31	19.60	13.08	11.31	0.000%
30	-16.18	-17.44	-16.09	16.18	17.44	16.09	0.000%
31	-16.18	-13.08	-16.09	16.18	13.08	16.09	0.000%
32	-11.58	-17.44	-19.85	11.58	17.44	19.85	0.000%
33	-11.58	-13.08	-19.85	11.58	13.08	19.85	0.000%
34	0.00	-42.41	0.00	0.00	42.41	0.00	0.000%
35	-0.03	-42.41	-6.14	0.03	42.41	6.14	0.000%
36	2.99	-42.41	-5.18	-2.99	42.41	5.18	0.000%
37	4.22	-42.41	-4.21	-4.22	42.41	4.21	0.000%
38	5.15	-42.41	-2.97	-5.15	42.41	2.97	0.000%
39	6.01	-42.41	0.00	-6.01	42.41	-0.00	0.000%
40	5.33	-42.41	3.08	-5.33	42.41	-3.08	0.000%
41	4.30	-42.41	4.30	-4.30	42.41	-4.30	0.000%
42	3.01	-42.41	5.20	-3.01	42.41	-5.20	0.000%
43	0.00	-42.41	5.95	-0.00	42.41	-5.95	0.000%
44	-2.99	-42.41	5.18	2.99	42.41	-5.18	0.000%
45	-4.23	-42.41	4.21	4.23	42.41	-4.21	0.000%
46	-5.33	-42.41	3.04	5.33	42.41	-3.04	0.000%
47	-6.02	-42.41	-0.02	6.02	42.41	0.02	0.000%
48	-5.18	-42.41	-2.99	5.18	42.41	2.99	0.000%
49	-4.25	-42.41	-4.24	4.25	42.41	4.24	0.000%
50	-3.02	-42.41	-5.20	3.02	42.41	5.20	0.000%
51	-0.03	-14.53	-4.77	0.03	14.53	4.77	0.000%
52	2.25	-14.53	-3.89	-2.25	14.53	3.89	0.000%
53	3.16	-14.53	-3.15	-3.16	14.53	3.15	0.000%
54	3.84	-14.53	-2.21	-3.84	14.53	2.21	0.000%
55	4.53	-14.53	0.00	-4.53	14.53	-0.00	0.000%
56	4.15	-14.53	2.39	-4.15	14.53	-2.39	0.000%
57	3.29	-14.53	3.29	-3.29	14.53	-3.29	0.000%
58	2.27	-14.53	3.92	-2.27	14.53	-3.92	0.000%
59	0.00	-14.53	4.43	-0.00	14.53	-4.43	0.000%
60	-2.25	-14.53	3.89	2.25	14.53	-3.89	0.000%
61	-3.17	-14.53	3.14	3.17	14.53	-3.14	0.000%
62	-4.15	-14.53	2.35	4.15	14.53	-2.35	0.000%
63	-4.54	-14.53	-0.02	4.54	14.53	0.02	0.000%
64	-3.87	-14.53	-2.24	3.87	14.53	2.24	0.000%
65	-3.20	-14.53	-3.18	3.20	14.53	3.18	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
66	-2.29	-14.53	-3.92	2.29	14.53	3.92	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	2.034	56	0.1001	0.0137
T2	130 - 120	1.719	56	0.0983	0.0138
T3	120 - 100	1.512	56	0.0964	0.0134
T4	100 - 80	1.113	56	0.0891	0.0121
T5	80 - 60	0.752	56	0.0769	0.0097
T6	60 - 40	0.449	56	0.0613	0.0071
T7	40 - 20	0.214	56	0.0427	0.0042
T8	20 - 0	0.063	56	0.0221	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	10-ft Lightning Rod	56	2.034	0.1001	0.0137	Inf
144.00	3' Side Mount Standoff	56	2.013	0.1000	0.0137	Inf
138.00	DB589-Y	56	1.886	0.0993	0.0138	852307
133.00	3' Side Mount Standoff	56	1.781	0.0987	0.0138	498755
125.00	ANT150F2	56	1.615	0.0975	0.0136	354042
115.00	ANT150D	56	1.410	0.0951	0.0132	227979
110.00	ANT150D	56	1.309	0.0934	0.0129	175513
105.00	ANT150D	56	1.210	0.0914	0.0126	141664
102.00	ANT150D	56	1.151	0.0900	0.0123	127256
95.00	SPD2-4.7	56	1.018	0.0864	0.0116	107606
70.00	NNVVS4-360S-BF2	56	0.593	0.0695	0.0084	75323
67.00	RF4461d-13A	56	0.548	0.0671	0.0080	73070

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	10.153	12	0.4998	0.0689
T2	130 - 120	8.581	12	0.4908	0.0695
T3	120 - 100	7.548	12	0.4811	0.0675
T4	100 - 80	5.557	12	0.4438	0.0610
T5	80 - 60	3.760	12	0.3834	0.0488
T6	60 - 40	2.246	12	0.3053	0.0356
T7	40 - 20	1.075	12	0.2134	0.0214
T8	20 - 0	0.316	12	0.1106	0.0104

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	10-ft Lightning Rod	12	10.153	0.4998	0.0689	241617
144.00	3' Side Mount Standoff	12	10.048	0.4993	0.0690	241617
138.00	DB589-Y	12	9.418	0.4960	0.0696	172583
133.00	3' Side Mount Standoff	12	8.894	0.4929	0.0697	100959
125.00	ANT150F2	12	8.062	0.4866	0.0687	70791
115.00	ANT150D	12	7.038	0.4741	0.0664	45334
110.00	ANT150D	12	6.535	0.4656	0.0651	34849
105.00	ANT150D	12	6.041	0.4555	0.0633	28245
102.00	ANT150D	12	5.749	0.4487	0.0620	25416
95.00	SPD2-4.7	12	5.086	0.4307	0.0583	21528
70.00	NNVVS4-360S-BF2	12	2.964	0.3463	0.0423	15185
67.00	RF4461d-13A	12	2.740	0.3344	0.0404	14756

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	145	Leg	A325N	1.0000	6	0.63	54.52	0.012 ✔	1	Bolt Tension
T2	130	Leg	A325N	1.0000	6	0.99	54.52	0.018 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	1.54	12.72	0.121 ✔	1	Member Bearing
		Top Girt	A325N	1.0000	1	0.03	12.72	0.003 ✔	1	Member Bearing
T3	120	Leg	A325N	1.0000	6	2.87	54.52	0.053 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	2.72	12.72	0.214 ✔	1	Member Bearing
T4	100	Leg	A325N	1.0000	6	5.32	54.52	0.098 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	3.49	12.72	0.275 ✔	1	Member Bearing
T5	80	Leg	A325N	1.0000	6	7.95	54.52	0.146 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	4.17	12.72	0.328 ✔	1	Member Bearing
T6	60	Leg	A325N	1.0000	6	10.72	54.52	0.197 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	4.66	12.72	0.367 ✔	1	Member Bearing
T7	40	Leg	A325N	1.0000	6	13.52	54.52	0.248 ✔	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T8	20	Diagonal	A325N	1.0000	1	5.20	12.72	0.409 ✔	1	Member Bearing
		Leg	F1554-105	1.0000	6	16.26	56.79	0.286 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.82	12.72	0.458 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$
T1	145 - 130	1 3/4	15.00	2.50	68.6 K=1.00	2.4053	-4.49	76.75	0.059 [1] ✔
T2	130 - 120	Pirod 207628	10.02	10.02	44.8 K=1.00	3.6816	-7.25	143.06	0.051 [1] ✔
T3	120 - 100	Pirod 207628	20.03	10.02	44.8 K=1.00	3.6816	-20.36	143.06	0.142 [1] ✔
T4	100 - 80	Pirod 207628	20.03	10.02	44.8 K=1.00	3.6816	-37.18	143.06	0.260 [1] ✔
T5	80 - 60	Pirod 207628	20.03	10.02	44.8 K=1.00	3.6816	-55.53	143.06	0.388 [1] ✔
T6	60 - 40	Pirod 207628	20.03	10.02	44.8 K=1.00	3.6816	-74.74	143.06	0.522 [1] ✔
T7	40 - 20	Pirod 207628	20.03	10.02	44.8 K=1.00	3.6816	-94.18	143.06	0.658 [1] ✔
T8	20 - 0	Pirod 207628	20.03	10.02	44.8 K=1.00	3.6816	-113.41	143.06	0.793 [1] ✔

[1] P_u / P_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	P_n K	A in^2	V_u K	V_n K	Stress Ratio
T2	130 - 120	0.5	1.47	120.0	165.67	0.1963	0.36	3.47	0.103 ✔
T3	120 - 100	0.5	1.47	120.0	165.67	0.1963	0.30	3.47	0.087 ✔
T4	100 - 80	0.5	1.47	120.0	165.67	0.1963	0.24	3.47	0.069 ✔
T5	80 - 60	0.5	1.47	120.0	165.67	0.1963	0.29	3.47	0.084 ✔

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	P_n K	A in²	V_u K	V_n K	Stress Ratio
T6	60 - 40	0.5	1.47	120.0	165.67	0.1963	0.21	3.47	0.060 ✓
T7	40 - 20	0.5	1.47	120.0	165.67	0.1963	0.34	3.47	0.098 ✓
T8	20 - 0	0.5	1.47	120.0	165.67	0.1963	0.49	3.47	0.141 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$
T1	145 - 130	7/8	5.59	2.71	134.0 K=0.90	0.6013	-0.72	7.57	0.096 [1] ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	11.42	5.02	121.8 K=1.00	0.9020	-1.66	17.33	0.096 [1] ✓
T3	120 - 100	L2 1/2x2 1/2x3/16	12.50	5.67	137.4 K=1.00	0.9020	-2.76	13.67	0.202 [1] ✓
T4	100 - 80	L2 1/2x2 1/2x3/16	13.80	6.37	154.4 K=1.00	0.9020	-3.54	10.83	0.327 [1] ✓
T5	80 - 60	L2 1/2x2 1/2x3/16	15.24	7.12	172.7 K=1.00	0.9020	-4.24	8.66	0.490 [1] ✓
T6	60 - 40	L2 1/2x2 1/2x3/16	16.80	7.92	192.1 K=1.00	0.9020	-4.76	7.00	0.680 [1] ✓
T7	40 - 20	L3x3x3/16	18.45	8.76	176.4 K=1.00	1.0900	-5.34	10.03	0.532 [1] ✓
T8	20 - 0	L3x3x3/16	20.16	9.62	193.8 K=1.00	1.0900	-6.38	8.31	0.768 [1] ✓

[1] P_u / P_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$
T1	145 - 130	7/8	5.00	4.85	186.4 K=0.70	0.6013	-0.08	3.91	0.020 [1] ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	5.00	3.67	104.4 K=1.17	0.9020	-0.02	21.33	0.001 [1] ✓

[1] P_u / P_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$
T1	145 - 130	1 3/4	15.00	2.50	68.6	2.4053	3.77	108.24	0.035 [1] ✔
T2	130 - 120	Pirod 207628	10.02	10.02	44.8	3.6816	5.94	165.67	0.036 [1] ✔
T3	120 - 100	Pirod 207628	20.03	10.02	44.8	3.6816	17.21	165.67	0.104 [1] ✔
T4	100 - 80	Pirod 207628	20.03	10.02	44.8	3.6816	31.90	165.67	0.193 [1] ✔
T5	80 - 60	Pirod 207628	20.03	10.02	44.8	3.6816	47.71	165.67	0.288 [1] ✔
T6	60 - 40	Pirod 207628	20.03	10.02	44.8	3.6816	64.32	165.67	0.388 [1] ✔
T7	40 - 20	Pirod 207628	20.03	10.02	44.8	3.6816	81.14	165.67	0.490 [1] ✔
T8	20 - 0	Pirod 207628	20.03	10.02	44.8	3.6816	97.56	165.67	0.589 [1] ✔

[1] P_u / P_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	P_n K	A in^2	V_u K	V_n K	Stress Ratio
T2	130 - 120	0.5	1.47	120.0	165.67	0.1963	0.36	3.47	0.103 ✔
T3	120 - 100	0.5	1.47	120.0	165.67	0.1963	0.30	3.47	0.087 ✔
T4	100 - 80	0.5	1.47	120.0	165.67	0.1963	0.24	3.47	0.069 ✔
T5	80 - 60	0.5	1.47	120.0	165.67	0.1963	0.29	3.47	0.084 ✔
T6	60 - 40	0.5	1.47	120.0	165.67	0.1963	0.21	3.47	0.060 ✔
T7	40 - 20	0.5	1.47	120.0	165.67	0.1963	0.34	3.47	0.098 ✔
T8	20 - 0	0.5	1.47	120.0	165.67	0.1963	0.49	3.47	0.141 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$
T1	145 - 130	7/8	5.59	2.71	148.9	0.6013	0.72	27.06	0.027 [1] ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	11.42	5.02	80.1	0.9020	1.54	29.22	0.053 [1] ✓
T3	120 - 100	L2 1/2x2 1/2x3/16	12.50	5.67	90.0	0.9020	2.72	29.22	0.093 [1] ✓
T4	100 - 80	L2 1/2x2 1/2x3/16	13.80	6.37	100.8	0.9020	3.49	29.22	0.120 [1] ✓
T5	80 - 60	L2 1/2x2 1/2x3/16	15.24	7.12	112.4	0.9020	4.17	29.22	0.143 [1] ✓
T6	60 - 40	L2 1/2x2 1/2x3/16	16.80	7.92	124.8	0.9020	4.66	29.22	0.160 [1] ✓
T7	40 - 20	L3x3x3/16	18.45	8.76	114.1	1.0900	5.20	35.32	0.147 [1] ✓
T8	20 - 0	L3x3x3/16	20.16	9.62	125.1	1.0900	5.82	35.32	0.165 [1] ✓

[1] P_u / P_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	P_n K	Ratio $\frac{P_u}{P_n}$
T1	145 - 130	7/8	5.00	4.85	266.3	0.6013	0.06	27.06	0.002 [1] ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	5.00	3.67	61.7	0.9020	0.03	29.22	0.001 [1] ✓

[1] P_u / P_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	145 - 130	Leg	1 3/4	1	-4.49	76.75	5.9	Pass
T2	130 - 120	Leg	Pirod 207628	44	-7.22	143.06	10.3	Pass
T3	120 - 100	Leg	Pirod 207628	56	-20.36	143.06	14.2	Pass
T4	100 - 80	Leg	Pirod 207628	71	-37.18	143.06	26.0	Pass
T5	80 - 60	Leg	Pirod 207628	86	-55.53	143.06	38.8	Pass
T6	60 - 40	Leg	Pirod 207628	101	-74.74	143.06	52.2	Pass
T7	40 - 20	Leg	Pirod 207628	116	-94.18	143.06	65.8	Pass
T8	20 - 0	Leg	Pirod 207628	131	-113.41	143.06	79.3	Pass
T1	145 - 130	Diagonal	7/8	8	-0.72	7.57	9.6	Pass
T2	130 - 120	Diagonal	L2 1/2x2 1/2x3/16	50	-1.66	17.33	9.6 12.1 (b)	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	58	-2.76	13.67	20.2 21.4 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	74	-3.54	10.83	32.7	Pass
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	88	-4.24	8.66	49.0	Pass
T6	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	103	-4.76	7.00	68.0	Pass
T7	40 - 20	Diagonal	L3x3x3/16	118	-5.34	10.03	53.2	Pass
T8	20 - 0	Diagonal	L3x3x3/16	133	-6.38	8.31	76.8	Pass
T1	145 - 130	Top Girt	7/8	4	-0.08	3.91	2.0	Pass
T2	130 - 120	Top Girt	L2 1/2x2 1/2x3/16	46	0.03	29.22	0.3	Pass
							Summary	
						Leg (T8)	79.3	Pass
						Diagonal (T8)	76.8	Pass
						Top Girt (T1)	2.0	Pass
						Bolt Checks	45.8	Pass
						RATING =	**79.3**	**Pass**

Anchor Bolt Analysis:

Input Data:

Tower Reactions:		
Tension Force =	$Tension := 102 \cdot kip$	(Input From tnxTower)
Compression Force =	$Compression := 119 \cdot kip$	(Input From tnxTower)
Shear Force =	$Shear := 15 \cdot kip$	(Input From tnxTower)
Anchor Bolt Data:	ASTM F1554	
Number of Anchor Bolts =	$N_A := 6$	(User Input)
Bolt Ultimate Strength =	$F_{u.A} := 150 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_{y.A} := 105 \cdot ksi$	(User Input)
Bolt Modulus =	$E_A := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D_A := 1.0 \cdot in$	(User Input)
Threads per Inch =	$n_A := 8$	(User Input)
Resistance Factor for Flexure =	$\phi_f := 0.9$	
Resistance Factor for Compression =	$\phi_c := 0.9$	
Resistance Factor for Tension =	$\phi_t := 0.75$	
Resistance Factor for Shear =	$\phi_v := 0.75$	

Anchor Bolts:

Calculated Anchor Bolt Properties:

Gross Area of Bolt = $A_{g.A} := \frac{\pi}{4} \cdot D_A^{\,2} = 0.785\ in^2$

Net Area of Bolt = $A_{n.A} := \frac{\pi}{4} \cdot \left(D_A - \frac{0.9743 \cdot in}{n_A}\right)^2 = 0.606\ in^2$

Anchor Bolt Design Strength:

Design Tensile Strength = $\Phi R_{nt.A} := \phi_t \cdot F_{u.A} \cdot A_{n.A} = 68.1\ kip$

Design Compression Strength = $\Phi R_{nc.A} := \phi_c \cdot F_{y.A} \cdot A_{g.A} = 74.2\ kip$

Design Shear Strength (Tension) = $\Phi R_{nv.A} := \phi_v \cdot 0.5 \cdot F_{u.A} \cdot A_{g.A} = 44.2\ kip$

Design Shear Strength (Compression) = $\Phi R_{nvc.A} := \phi_c \cdot 0.6 \cdot F_{y.A} \cdot A_{g.A} \cdot 0.75 = 33.4\ kip$

Check Anchor Bolts:

Maximum Tensile Force = $P_{ut} := \frac{Tension}{N_A} = 17\ kip$

Maximum Compressive Force = $P_{uc} := \frac{Compression}{N_A} = 19.8\ kip$

Maximum Shear Force = $V_u := \frac{Shear}{N_A} = 2.5\ kip$

Condition1 = $Condition1 := \mathbf{if}\left(\left(\left(\frac{P_{ut}}{\Phi R_{nt.A}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv.A}}\right)^2\right) \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Condition1 = \text{"OK"}$

Condition2 = $Condition2 := \mathbf{if}\left(\left(\left(\frac{P_{uc}}{\Phi R_{nc.A}}\right) + \left(\frac{V_u}{\Phi R_{nvc.A}}\right)^2\right) \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Condition2 = \text{"OK"}$

Bolt % of Capacity = $\max\left(\left(\frac{P_{ut}}{\Phi R_{nt.A}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv.A}}\right)^2, \left(\frac{P_{uc}}{\Phi R_{nc.A}}\right) + \left(\frac{V_u}{\Phi R_{nvc.A}}\right)^2\right) = 27.3\%$

Pier and Mat Foundation Analysis:

Input Data:

Tower Data:			
Overturning Moment =	$OM := 1764 \cdot ft \cdot kip$	(User Input from tnxTower)	
Shear Force =	$S_t := 24 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 17 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 119 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 102 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 145 \cdot ft$	(User Input)	
Tower Width =	$W_t := 18 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	
Footing Data:			
Overall Depth of Footing =	$D_f := 5.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 1.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 26.5 \cdot ft$	(User Input)	
Material Properties:			
Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcement Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Buoyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:			
Bar Size =	$BS_{pier} := 6$	(User Input)	
Bar Diameter =	$d_{bpier} := 0.75 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.375 \cdot in$	(User Input)	
Pad Reinforcement:			
Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.75 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 39$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 6$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.75 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 39$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Calculated Factors:			
Pier Reinforcement Bar Area =	$A_{bpier} := \frac{\pi \cdot d_{bpier}^{2}}{4} = 0.442\ in^2$		
Pad Top Reinforcement Bar Area =	$A_{btop} := \frac{\pi \cdot d_{btop}^{2}}{4} = 0.442\ in^2$		
Pad Bottom Reinforcement Bar Area =	$A_{bbot} := \frac{\pi \cdot d_{bbot}^{2}}{4} = 0.442\ in^2$		
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$		
Load Factor =	$LF := 1$		

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}\left(Bouyancy = 1, \gamma_{conc} - 62.4 \cdot pcf, \gamma_{conc}\right) = 150\ pcf$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}\left(Bouyancy = 1, \gamma_{soil} - 62.4 \cdot pcf, \gamma_{soil}\right) = 100\ pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0\ ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.2\ ksf$

$P_{top} := \text{if}\left(n < (D_f - T_f), P_{pt}, P_{pn}\right) = 1.2\ ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.65\ ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.425\ ksf$

$T_p := \text{if}\left(n < (D_f - T_f), T_f, (D_f - n)\right) = 1.5\ ft$

$A_p := W_f \cdot T_p = 39.75\ ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 56.644\ kip$

Weight of Concrete = $WT_c := \left(\left(W_f^2 \cdot T_f\right) + (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} \cdot L_p\right)\right) \cdot \gamma_c = 172.32\ kip$

Weight of Soil Above Footing = $WT_{s1} := \left(\left(W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right) \cdot \left(|L_p - L_{pag} - n|\right)\right) \cdot \gamma_s = 272.42\ kip$

Tower Offset = $X_{t1} := \left(\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right)$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := \text{if}\left(Pos_t = 1, X_{t1}, X_{t2}\right) = 5.456\ ft$

$X_{off2} := 0$

$X_{off1} := \frac{W_f}{2} - \left(\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right) = 2.598\ ft$

$X_{off} := \text{if}\left(Pos_t = 1, X_{off1}, X_{off2}\right)$ $X_{off} = 2.598\ ft$

Total Weight = $WT_{tot} := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} = 359.4\ kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9 \cdot WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75 \cdot \left(S_u \cdot \frac{T_p}{3}\right) = 4946\ kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 1908\ ft \cdot kip$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.59$

Factor of Safety Required = $FS_{req} := 1$

$OverTurning\_Moment\_Check := \text{if}\left(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"}\right)$

$OverTurning\_Moment\_Check = \text{"Okay"}$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 218.374\ kip$

$Shear\_Check := \text{if}\left(S_p > S_t, \text{"Okay"}, \text{"No Good"}\right)$

$Shear\_Check = \text{"Okay"}$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 462\ kip$

Area of the Mat = $A_{mat} := W_f^2 = 702.25\ ft^2$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 3101.6\ ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot} \cdot 0.83}{A_{mat}} + \frac{M_{ot} \cdot 0.625}{S} = 0.93\ ksf$

$Max\_Pressure\_Check := \text{if}\left(P_{max} < 0.75 \cdot q_s, \text{"Okay"}, \text{"No Good"}\right)$

$Max\_Pressure\_Check = \text{"Okay"}$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot} \cdot 0.83}{A_{mat}} - \frac{M_{ot} \cdot 0.625}{S} = 0.161\ ksf$

$Min\_Pressure\_Check := \text{if}\left(\left(P_{min} \geq 0\right) \cdot \left(P_{min} < 0.75 \cdot q_s\right), \text{"Okay"}, \text{"No Good"}\right)$

$Min\_Pressure\_Check = \text{"Okay"}$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 10.686\ ft$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.417\ ft$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 4.132\ ft$

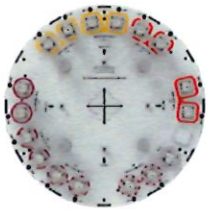
Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot} \cdot 0.83}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.057\ ksf$

$q_{adj} := \text{if}\left(P_{min} < 0, P_a, P_{max}\right) = 0.93\ ksf$

$Pressure\_Check := \text{if}\left(q_{adj} < 0.75 \cdot q_s, \text{"Okay"}, \text{"No Good"}\right)$

$Pressure\_Check = \text{"Okay"}$

NNVVS4-360S-BF2



16-port small cell antenna, 4x 698-896, 4x 1695–2690 and 8x Beamforming 3300- 4000, 360° Horizontal Beamwidth, fixed tilt.

- Two broadband low band arrays (Bands 12/13/29/14/5) with 4T4R (4X MIMO) capability
- Two broadband mid band arrays (Bands 25/66/30/40/41) with 4T4R (4X MIMO) capability
- 8T8R omni beamforming array with calibration port for 3.5 GHz (Bands 48, 77, 78)

General Specifications

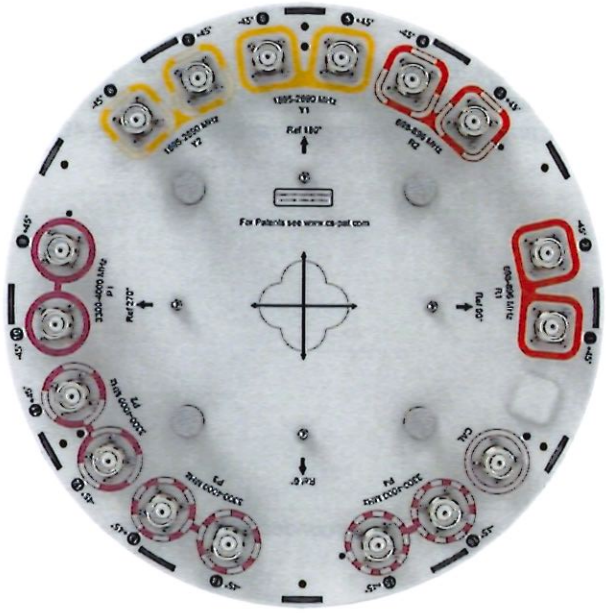
Antenna Type	Small Cell
Band	Multiband
Calibration Connector Interface	4.3-10 Female
Calibration Connector Quantity	1
Color	Light Gray (RAL 7035)
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
Radome Material	ASA
Radiator Material	Aluminum | Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	8
RF Connector Quantity, mid band	4
RF Connector Quantity, low band	4
RF Connector Quantity, total	16

Dimensions

Length	610 mm | 24.016 in
Net Weight, antenna only	14.8 kg | 32.628 lb
Outer Diameter	370 mm | 14.567 in

Port Configuration

NNVVS4-360S-BF2



Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2690 MHz | 3300 – 4000 MHz | 698 – 896 MHz
Polarization	±45°
Total Input Power, maximum	1,200 W @ 50 °C

Electrical Specifications

	R1,R2	R1,R2	Y1-Y2	Y1-Y2	Y1-Y2	Y1-Y2	P1-P4	P1-P4	P1-P4
Frequency Band, MHz	**698–806**	**806–896**	**1695–1920**	**1920–2180**	**2300–2360**	**2360–2690**	**3300–3550**	**3550–3700**	**3700–4000**
RF Port	1-4	1-4	5-8	5-8	5-8	5-8	9-16	9-16	9-16
Gain, dBi	5.3	5.5	7.8	8.3	8.8	8.6	8.3	8.8	8.8
Beamwidth, Horizontal, degrees	360	360	360	360	360	360	360	360	360
Beamwidth, Vertical,	45.9	42	21	18.2	16.4	15.6	9.5	9	8.5

NNVVS4-360S-BF2

degrees									
Beam Tilt, degrees	2	2	2	2	2	2	2	2	2
Coupling level, Amp, Antenna port to Cal port, dB							26	26	26
Coupling level, max Amp Δ, Antenna port to Cal port, dB							±2	±2	±2
Coupler, max Amp Δ, Antenna port to Cal port, dB							1	1	1
Coupler, max Phase Δ, Antenna port to Cal port, degrees							10	10	10
Isolation, Cross Polarization, dB	25	25	25	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	25	25	25	25
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153	-145	-145	-145
Input Power per Port at 50° C, maximum, watts	100	100	100	100	100	100	75	75	75

Electrical Specifications, Service Beam

Frequency Band, MHz	**3300–3550**	**3550–3700**	**3700–4000**
Steered 0° Gain, dBi	12.1	12.2	12.3
Steered 0° Beamwidth, Horizontal, degrees	63	63	61

Electrical Specifications, Broadcast 360°

Frequency Band, MHz	**3300–3550**	**3550–3700**	**3700–4000**
Gain, dBi	8.5	8.5	8.7
Beamwidth, Horizontal at 3 dB, degrees	360	360	360
Beamwidth, Vertical, degrees	9.6	8.7	8

Mechanical Specifications

Wind Loading @ Velocity, frontal	129.0 N @ 150 km/h (29.0 lbf @ 150 km/h)
Wind Loading @ Velocity, lateral	129.0 N @ 150 km/h (29.0 lbf @ 150 km/h)
Wind Loading @ Velocity, maximum	129.0 N @ 150 km/h (29.0 lbf @ 150 km/h)
Wind Loading @ Velocity, rear	129.0 N @ 150 km/h (29.0 lbf @ 150 km/h)

NNVVS4-360S-BF2

Wind Speed, maximum	241 km/h (150 mph)

Packaging and Weights

Width, packed	478 mm | 18.819 in
Depth, packed	464 mm | 18.268 in
Length, packed	894 mm | 35.197 in
Weight, gross	19 kg | 41.888 lb

Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant
UK-ROHS	Compliant

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

verizon
NPP RFDS

NORTHEAST > North East > New England > Wallingford-1 > UNCASVILLE CT SC 2 - A

Divito, Kip - kip.divito@verizonwireless.com - 20251015_083730

Project Details		Location Information	
Carrier Aggregation	N	Site Id	5000824
Ecip	N	Search Ring#	
Project Name	RADIO SWAP	E-NodeB ID#	064767
Project Alt Name	UNCASVILLE CT SC 2 - ESNAP	PSLC#	469365
Project Id	17037883	Switch Name	Wallingford-1
Designed Sector Carrier 4G	2	Tower Type	
Designed Sector Carrier 5G	2	Site Type	SMALL-CELL
Additional Sector Carrier 4G	0	Street Address	911 Route 32
Additional Sector Carrier 5G	0	City	Montville
Suffix		State	CT
FP Solution Type & Tech Type	MODIFICATION;4G_700;4G_850;5G_850; 5G_L-Sub6;4G_Radio Swap	Zip Code	06353
		County	New London
		Latitude	41.45123166/ 41° 27' 4.434"
		Longitude	-72.10521138/ 72° 6' 18.761"

Project Scope

Adding low-band and c-band in place of AWS

Antenna Summary

Added Antenna

700	850	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	Install Type	Quantity
LTE	5G,LTE		5G	CommScope	NNVVS4-360S-BF2	69.9	70.9	310(A)	PHYSICAL	1

Removed Antenna

700	850	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	Install Type	Quantity
		LTE		ANDREW	NH65PS-DG-F0M	69.9	71.1	310(A)	PHYSICAL	1

Retained Antenna

700	850	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	Install Type	Quantity

Added: 1	Removed: 1	Retained: 0

Non Antenna Summary

Added Non Antenna

Equipment Type	Location	700	850	AWS	L-Sub6	Make	Model	Install Type	Quantity
RRU	Tower	LTE	5G,LTE			Samsung	RF4461d-13A	PHYSICAL	1
RRU	Tower				5G	Samsung	RT-8808-77A	PHYSICAL	1

Removed Non Antenna

Equipment Type	Location	700	850	AWS	L-Sub6	Make	Model	Install Type	Quantity
RRU	Tower			LTE		Nokia	UHIC B4 RRH 2x60-4R	PHYSICAL	1

Retained Non Antenna

Equipment Type	Location	700	850	AWS	L-Sub6	Make	Model	Install Type	Quantity
Hybrid Cable	Tower	LTE	LTE,5G		5G	24	2x4 Hybriflex	PHYSICAL	1
OVP	Tower	LTE	LTE,5G		5G		RRFDC-1064-PF-48	PHYSICAL	1

Added: 2	Removed: 1	Retained: 2

Services		
700 LTE	0000 (309450)	0002 (311434)
Sector		02
Azimuth		310
Cell/Enodeb-Id		064767
Antenna Model		NNVVS4-360S-BF2
Antenna Make		CommScope
Centerline		69.9
DLEARFCN		5230
Mech Down-tilt		0
Elect Down-tilt		2
Tip Height		70.9
Regulatory Power		8.57 (W/MHz) ERP
Transmitter Max Power		46.0 dBm
TMA Make		
TMA Model		
RRU Make		Samsung
RRU Model		RF4461d-13A
Number of Tx,Rx		4 , 4
Operational Port Count		null
Position		1
Transmitter Id		26060757
Source		VZNPP
Bandwidth		10
Ant. Dimensions H x W x D(inch)		24.0 x 14.6 x 14.6
Weight(lb)		32.2

Services		
850 LTE	0000 (309450)	0002 (311434)
Sector		02
Azimuth		310
Cell/Enodeb-Id		064767
Antenna Model		NNVVS4-360S-BF2
Antenna Make		CommScope
Centerline		69.9
DLEARFCN		2450
Mech Down-tilt		0
Elect Down-tilt		2
Tip Height		70.9
Regulatory Power		35.30 (W/MHz) ERPSD
Transmitter Max Power		46.0 dBm
TMA Make		
TMA Model		
RRU Make		Samsung
RRU Model		RF4461d-13A
Number of Tx,Rx		4 , 4
Operational Port Count		null
Position		1
Transmitter Id		26060758
Source		VZNPP
Bandwidth		10
Ant. Dimensions H x W x D(inch)		24.0 x 14.6 x 14.6
Weight(lb)		32.2

Services		
850 NR	0000 (309450)	0002 (311434)
Sector		0002
Azimuth		310
Cell/Enodeb-Id		0649444
Antenna Model		NNVVS4-360S-BF2
Antenna Make		CommScope
Centerline		69.9
DLEARFCN		174800
Mech Down-tilt		0
Elect Down-tilt		2
Tip Height		70.9
Regulatory Power		35.30 (W/MHz) ERPSD
Transmitter Max Power		46.0 dBm
TMA Make		
TMA Model		
RRU Make		Samsung
RRU Model		RF4461d-13A
Number of Tx,Rx		4 , 4
Operational Port Count		null
Position		1
Transmitter Id		26060758
Source		VZNPP
Bandwidth		10
Ant. Dimensions H x W x D(inch)		24.0 x 14.6 x 14.6
Weight(lb)		32.2

Services		
AWS LTE	**0000 (309450)**	**0002 (311434)**

Sector	02
Azimuth	310
Cell/Enodeb-Id	064767
Antenna Model	NH65PS-DG-F0M
Antenna Make	ANDREW
Centerline	69.9
DLEARFCN	2050
Mech Down-tilt	0
Elect Down-tilt	0
Tip Height	71.1
Regulatory Power	37.47 (W/MHz) EIRP
Transmitter Max Power	47.8 dBm
TMA Make	
TMA Model	
RRU Make	Nokia
RRU Model	UHIC B4 RRH 2x60-4R
Number of Tx,Rx	2 , 2
Operational Port Count	null
Position	1
Transmitter Id	1965788
Source	VZNPP
Bandwidth	20
Ant. Dimensions H x W x D(inch)	28.7 x 16.1 x 12.0
Weight(lb)	25.4

Services		
CBAND NR	**0000 (309450)**	**0002 (311434)**
Sector		0002
Azimuth		310
Cell/Enodeb-Id		0649444
Antenna Model		NNVVS4-360S-BF2
Antenna Make		CommScope
Centerline		69.9
DLEARFCN		650006, 655324
Mech Down-tilt		0
Elect Down-tilt		2
Tip Height		70.9
Regulatory Power		60.72 (W/MHz) EIRP, 101.21 (W/MHz) EIRP
Transmitter Max Power		55.03 dBm
TMA Make		
TMA Model		
RRU Make		Samsung
RRU Model		RT-8808-77A
Number of Tx,Rx		2 , 2
Operational Port Count		8
Position		1
Transmitter Id		26060771
Source		VZNPP
Bandwidth		100, 60
Ant. Dimensions H x W x D(inch)		24.0 x 14.6 x 14.6
Weight(lb)		32.2

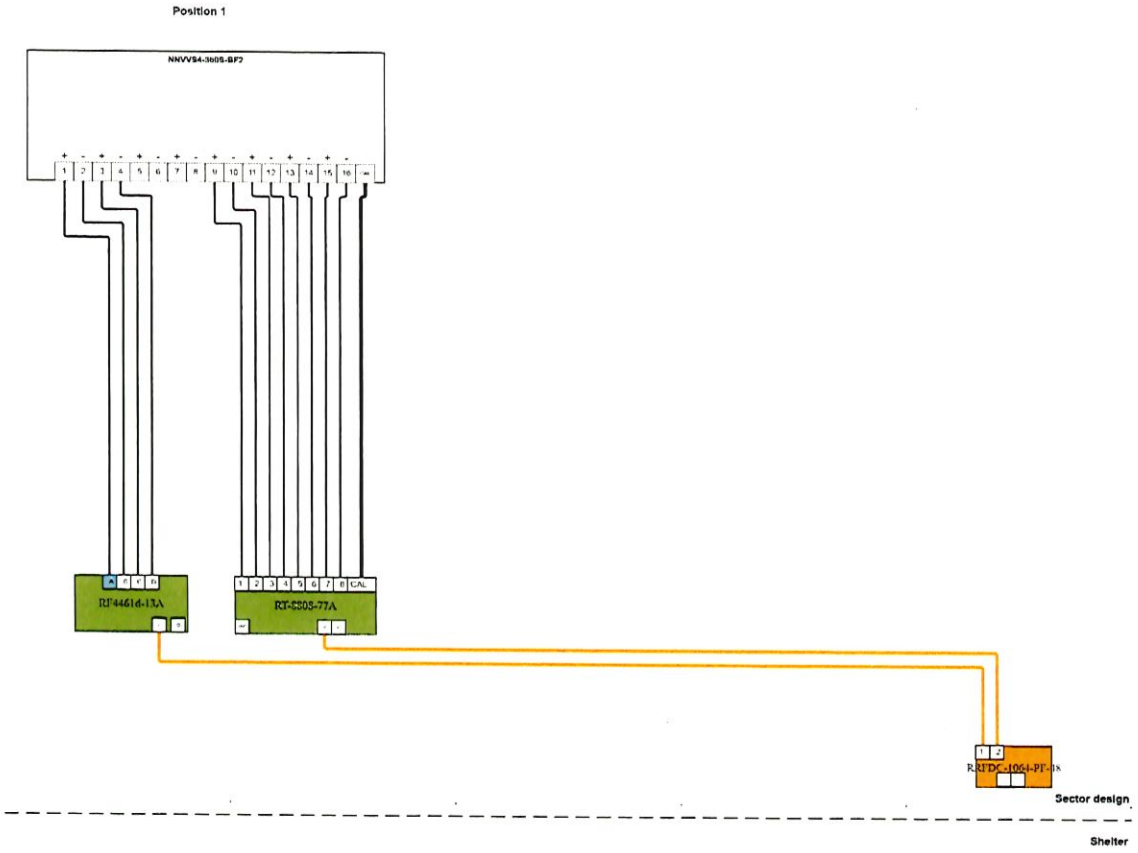
Callsigns Per Antenna

Sector	Make	Model	Ant CL Height AG	Ant Tip Height	Azimuth	Elect Down-tilt	Mech Down-tilt	Gain	Bandwidth	Regulatory Power	700	850	1900	2100	28 GHz	31 GHz	39 GHz	LSub-6	CBRS
02	CommScope	NNVVS4-360 S-BF2	69.9	70.9	310	2	0	3.07	360	8.57	WQJQ689								
0002	CommScope	NNVVS4-360 S-BF2	69.9	70.9	310	2	0	3.2	360	35.3		KNKA745							
02	CommScope	NNVVS4-360 S-BF2	69.9	70.9	310	2	0	3.2	360	35.3		KNKA745							
0002	CommScope	NNVVS4-360 S-BF2	69.9	70.9	310	2	0	10.63	360	60.72								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0002	CommScope	NNVVS4-360 S-BF2	69.9	70.9	310	2	0	10.63	360	101.21								WRNE585,WRNE586,WRNE587,WRNE58	

Callsigns

Callsign	Market	Radio Code	Market #	Block	State	County	License Name	Wholly Owner	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs/Sq. mil	Status	Action	Approve for insvc
WQJQ689	Northeast	WU	REA001	C	CT	9011	Cellco Partnership	Yes	22.000	746.000 - 757.000/.000 - .000	776.000 - 787.000/.000 - .000	746.000 - 757.000/.000 - .000	776.000 - 787.000/.000 - .000	8.57	1000	403.90	proposed	added	1
KNKA745	New London-Norwich, CT	CL	CMA154	A	CT	9011	Cellco Partnership	Yes	25.000	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	35.3	1000	403.90	proposed	added	1
WQGD494	New London-Norwich, CT	AW	CMA154	A	CT	9011	Cellco Partnership	Yes	20.000	1710.000 1720.000/.000 - .000	2110.000 2120.000/.000 - .000	1710.000 1720.000/.000 - .000	2110.000 2120.000/.000 - .000		1640	403.90	proposed	removed	1
WRNE581	New York, NY	PM	PEA001	A1	CT	9011	Cellco Partnership	Yes	20.000	3700.000 3720.000/.000 - .000	.000 - .000/.000 - .000	3700.000 3720.000/.000 - .000	.000 - .000/.000 - .000	60.72	1640	403.90	proposed	added	1
WRNE582	New York, NY	PM	PEA001	A2	CT	9011	Cellco Partnership	Yes	20.000	3720.000 3740.000/.000 - .000	.000 - .000/.000 - .000	3720.000 3740.000/.000 - .000	.000 - .000/.000 - .000	60.72	1640	403.90	proposed	added	1
WRNE583	New York, NY	PM	PEA001	A3	CT	9011	Cellco Partnership	Yes	20.000	3740.000 3760.000/.000 - .000	.000 - .000/.000 - .000	3740.000 3760.000/.000 - .000	.000 - .000/.000 - .000	60.72	1640	403.90	proposed	added	1
WRNE584	New York, NY	PM	PEA001	A4	CT	9011	Cellco Partnership	Yes	20.000	3760.000 3780.000/.000 - .000	.000 - .000/.000 - .000	3760.000 3780.000/.000 - .000	.000 - .000/.000 - .000	60.72	1640	403.90	proposed	added	1
WRNE585	New York, NY	PM	PEA001	A5	CT	9011	Cellco Partnership	Yes	20.000	3780.000 3800.000/.000 - .000	.000 - .000/.000 - .000	3780.000 3800.000/.000 - .000	.000 - .000/.000 - .000	101.21	1640	403.90	proposed	added	1
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	9011	Cellco Partnership	Yes	20.000	1720.000 1730.000/.000 - .000	2120.000 2130.000/.000 - .000	1720.000 1730.000/.000 - .000	2120.000 2130.000/.000 - .000		1640	403.90	proposed	removed	1
WRNE586	New York, NY	PM	PEA001	B1	CT	9011	Cellco Partnership	Yes	20.000	3800.000 3820.000/.000 - .000	.000 - .000/.000 - .000	3800.000 3820.000/.000 - .000	.000 - .000/.000 - .000	101.21	1640	403.90	proposed	added	1
WRNE587	New York, NY	PM	PEA001	B2	CT	9011	Cellco Partnership	Yes	20.000	3820.000 3840.000/.000 - .000	.000 - .000/.000 - .000	3820.000 3840.000/.000 - .000	.000 - .000/.000 - .000	101.21	1640	403.90	proposed	added	1
WRNE588	New York, NY	PM	PEA001	B3	CT	9011	Cellco Partnership	Yes	20.000	3840.000 3860.000/.000 - .000	.000 - .000/.000 - .000	3840.000 3860.000/.000 - .000	.000 - .000/.000 - .000	101.21	1640	403.90	proposed	added	1

Alpha
(Proposed)



Legends

RET dc signal capable port

700/850(LB)

700(LT)

850(CB)

AWS(AW)

PCS(PC)

AWS/PCS(HB)

28GHz(U28)

39GHz(U39)

L-Sub6(S6)

CBRS(RS)

LAA(LA)

Fiber

AISG

DC

Coax

Coax Jumper

Sectors Shared Equipments

Notes:

-Antenna view is from the back of the antennas
-Colors of connections are just for clarification
-Size of objects in drawing doesn't reflect equipment true dimensions

verizon

Colliers Engineering & Design

Colliers Engineering & Design, Architecture,
Landscape Architecture, Surveying, CT P.C.
5141 Virginia Way Suite 420
Brentwood, TN 37027
615.686.2575
sean.osullivan@collierseng.com

Replacement Antenna Mount Analysis Report and PMI Requirements

Mount Analysis-R
SMART Tool Project #: 10354465
Colliers Engineering & Design Project #: 26777098

July 20, 2026

Site Information	*Site ID:*	*5000121020-VZW / UNCASVILLE 2 CT*
	Site Name:	*UNCASVILLE 2 CT*
	Carrier Name:	*Verizon Wireless*
	Address:	*911 Route 32* *Montville, Connecticut 06353* *New London County*
	Latitude:	*41.451232°*
	Longitude:	*-72.105211°*
Structure Information	*Tower Type:*	*Self Support*
	Mount Type:	*3.00-Ft Tower Mount*

FUZE ID # 17037883

Analysis Results

Tower Mount: **10.5% Pass w/ Mount Replacement***
((2) Site Pro 1: TLS-U)

***Antennas and equipment to be installed in compliance with PMI Requirements of this mount analysis.**

******Contractor PMI Requirements*:**
Included at the end of this MA report
Available & Submitted via portal at https://pmi.vzwsmart.com
For additional questions and support, please reach out to:
pmisupport@colliersengineering.com

Report Prepared By: Selene Chen

Kayla Weimert

Digitally signed by Kayla Weimert
Date: 2026.07.21 13:04:35-04'00'

Executive Summary:

The objective of this report is to determine the capacity of the proposed antenna support mount at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards. The proposed mount was assumed to be installed properly to the existing tower per the manufacturer's instructions. Colliers Engineering & Design cannot verify that the proposed mount will fit properly and is not liable for any fit-up issues during installation.

This analysis is inclusive of the mount structure only and does not address the structural capacity of the supporting structure. This mounting frame was not analyzed as an anchor attachment point for fall protection. All climbing activities are required to have a fall protection plan completed by a competent person.

Sources of Information:

Document Type	Remarks
Radio Frequency Data Sheet (RFDS)	*Verizon RFDS, Site ID: 5000824, dated October 15, 2025*
Desktop Mount Mapping Form	*Colliers Engineering & Design, Project #: 26777098, dated June 29, 2026*
Mount Specifications	*Site Pro 1, P/N: TLS-U & SCX2-K*

Analysis Criteria:

Codes and Standards:	ANSI/TIA-222-H 2022 Connecticut State Building Code (CSBC), Effective October 1, 2022	
Wind Parameters:	Basic Wind Speed (Ultimate 3-sec. Gust), V_{ULT}:	125 mph
	Ice Wind Speed (3-sec. Gust):	50 mph
	Design Ice Thickness:	1.00 in
	Risk Category:	II
	Exposure Category:	C
	Topographic Category:	1
	Topographic Feature Considered:	N/A
	Topographic Method:	N/A
	Ground Elevation Factor, K_e:	0.998
Seismic Parameters:	S_S:	0.198 g
	S_1:	0.054 g
Maintenance Parameters:	Wind Speed (3-sec. Gust):	30 mph
	Maintenance Load, Lv:	250 lbs.
	Maintenance Load, Lm:	500 lbs.
Analysis Software:	RISA-3D (V22)	

Final Loading Configuration:

The following equipment has been considered for the analysis of the mount:

Mount Elevation (ft)	Equipment Elevation (ft)	Quantity	Manufacturer	Model	Status
68.00	69.90	1	Andrew	NNVVS4-360S-BF2	Added
		1	Samsung	RF4461d-13A	
		1	Samsung	RT-8808-77A	
		1	Raycap	RRFDC-1064-PF-48	Retained

It is acceptable to install up to three (3) OVPs with dimensions not to exceed 30" x 17" x 13" and 40 lbs. at any location, other than the mount face, without affecting the structural capacity of the mount. If OVP units are installed on the mount face, a mount re-analysis may be required unless replacing an existing OVP.

Standard Conditions:

1. All engineering services are performed on the basis that the information provided to Colliers Engineering & Design and used in this analysis is current and correct. The existing equipment loading has been applied at locations determined from the supplied documentation. Any deviation from the loading locations specified in this report shall be communicated to Colliers Engineering & Design to verify deviation will not adversely impact the analysis.

2. Mounts are assumed to have been properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer's specifications.

3. For mount analyses completed from other data sources (including new replacement mounts) and not specifically mapped in accordance with the NSTD-446 Standard, the mounts are assumed to have been properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer's specifications.

4. All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.

5. The mount was checked up to, and including, the bolts that fasten it to the mount collar/attachment and threaded rod connections in collar members if applicable. Local deformation and interaction between the mount collar/attachment and the supporting tower structure are outside the scope of this analysis.

6. All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Colliers Engineering & Design is not responsible for the conclusion, opinions, and recommendations made by others based on the information supplied.

7. Structural Steel Grades have been assumed as follows, if applicable, unless otherwise noted in this analysis:
   - Channel, Solid Round, Angle, Plate — ASTM A36 (Gr. 36)
   - HSS (Rectangular) — ASTM 500 (Gr. B-46)
   - Pipe — ASTM A53 (Gr. B-35)
   - Threaded Rod — F1554 (Gr. 36)
   - Bolts — ASTM A325

Discrepancies between in-field conditions and the assumptions listed above may render this analysis invalid unless explicitly approved by Colliers Engineering & Design.

Analysis Results:

Component	Utilization %	Pass/Fail
Mount Pipe	*9.5%*	*Pass*
New Horizontal	*10.5%*	*Pass*
Mount Connection	*2.1%*	*Pass*

Structure Rating – *(Controlling Utilization of all Components)*	**10.5%**

Mount Connection Envelope Reactions:

Connection Description	Elev. AGL (Ft)	Node Label	Envelope Wind Reactions				Envelope Wind + Ice Reactions			
			Axial (Lbs)	Lateral (Lbs)	Moment (K-Ft)	Torsion (K-Ft)	Axial (Lbs)	Lateral (Lbs)	Moment (K-Ft)	Torsion (K-Ft)
Sector A Top Standoff	68.5	C1	209	266	0.131	0.131	216	57	0.110	0.028
Sector A Bottom Standoff	67.5	N17	248	185	0.076	0.035	265	50	0.085	0.015

Notes:
- Axial loads act along the axis of the tower leg
- Lateral reactions act perpendicular to the tower leg
- Moment loads introduce bending moment to the tower leg
- Torsion loads introduce twisting moment to the tower leg
- Batch solutions by individual load cases are included at the end of this document

Considered Equipment Dimensions, Weight, and EPA:

Manufacturer	Model	Height (In)	Width (In)	Depth (In)	Weight (Lbs)	(EPA)n (Sq. Ft.)	(EPA)t (Sq. Ft.)
Andrew	*NNVVS4-360S-BF2	24.0	14.6	14.6	32.0	1.21	1.21
Samsung	RF4461d-13A	15.0	15.0	10.2	79.1	1.88	1.28
Samsung	RT-8808-77A	15.0	15.0	6.8	59.5	1.88	0.85
Raycap	*RRFDC-1064-PF-48	20.6	10.2	8.2	14.0	3.17	2.41

*Appurtenance equivalent projected area has been established through data provided by the specific manufacturer, consistent with direction per ANSI/TIA-222 Section 2.6.11.2.

Requirements:

The proposed antenna mount is **SUFFICIENT** for the final loading configuration (attachment 2) upon completion of the mount replacement (attachment 3) and requirements below.

Refer to document at the end of this form for special instructions. Contact EOR if special instructions are not available.

ANSI/ASSP rigging plan review services compliant with the requirements of ANSI/TIA 322 are available for a Construction Class IV site or other, if required. Separate review fees will apply.

Attachments:

1. **Contractor Required Post Installation Inspection (PMI) Report Deliverables**
2. Antenna Placement Diagrams
3. Mount Manufacturer Drawings
4. Existing Mount Photos
5. Analysis Calculations

Mount Desktop – Post Modification Inspection (PMI) Report Requirements

Documents & Photos Required from Contractor – New Mount Passing MA

Electronic pdf version of this can be downloaded at https://pmi.vzwsmart.com
For additional questions and support, please reach out to pmisupport@colliersengineering.com

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MDG #: 5000121020 SMART Project #: 10354465 Fuze Project ID: 17037883

Purpose – to provide SMART Tool structural vendor the proper documentation in order to complete the required Mount Desktop review of the Post Modification Inspection Report.

- Contractor is responsible for making certain the photos provided as noted below provide confirmation that the installation was completed in accordance with this Passing Mount Analysis.
- Contractor shall relay any data that can impact the performance of the mount, this includes safety issues.

Base Requirements:

- If installation will cause damage to the structure, the climbing facility, or safety climb if present or any installed system, SMART Tool vendor to be notified prior to install. Any special photos outside of the standard requirements will be indicated on the drawings.
- Provide "as built mount drawings" showing contractor's name, contact information, preparer's signature, and date. Any deviations from the drawings (Proposed modification) shall be shown. NOTE: If loading is different than what is conveyed in the passing mount analysis (MA) contact the SMART Tool vendor immediately.
- Each photo should be time and date stamped.
- Photos should be high resolution.
- Contractor shall ensure that the safety climb wire rope is supported and not adversely impacted by the install of the modification components. This may involve the install of wire rope guides, or other items to protect the wire rope. If there is conflict, contact the SMART Tool engineer for recommendations.
- The PMI can be accessed at the following portal: ***https://pmi.vzwsmart.com***

Photo Requirements:

- *Photos taken at ground level*
  - Photo of Gate Signs showing the tower owner, site name, and number.
  - Overall tower structure after installation.
  - Photos of the mount after installation; if the mounts are at different rad elevations, pictures must be provided for all elevations that equipment was installed.
- *Photos taken at Mount Elevation*
  - Photos showing the safety climb wire rope above and below the mount prior to installation.
  - Photos showing the climbing facility and safety climb if present.
  - Photos showing each individual sector after installation of mounts. Each entire sector shall be in one photo to show the interconnection of members.

    - These photos shall also certify that the placement and geometry of the equipment on the mount is as depicted in the antenna placement diagram in this form.
  - Photos that show the model number of each antenna and piece of equipment installed per sector.
  - Photos of each installed mount; pictures shall also include connection hardware (U-bolts, bolts, nuts, all-threaded rods, etc.)
  - Photos showing the installed mount elevation.

Antenna & Equipment Placement and Geometry Confirmation:

- The contractor shall certify that the antenna & equipment placement and geometry is in accordance with the sketch and table as included in the mount analysis and noted below.

☐ The contractor certifies that the photos support and the equipment on the mount is as depicted on the sketch and table included in this form and with the mount analysis provided.

OR

☐ The contractor notes that the equipment on the mount is not in accordance with the sketch and has noted the differences below and provided photo documentation of any alterations.

Special Instructions / Validation as required from the MA or any other information the contractor deems necessary to share that was identified:

Issue:

Refer to document at the end of this form for special instructions. Contact EOR if special instructions are not available.

Response:

Special Instruction Confirmation:

☐ The contractor has read and acknowledges the above special instructions.

Contractor certifies that the climbing facility / safety climb was not damaged prior to starting work:

☐ Yes ☐ No

Contractor certifies no new damage created during the current installation:

☐ Yes ☐ No

Contractor to certify the condition of the safety climb and verify no damage when leaving the site:

☐ Safety Climb in Good Condition ☐ Safety Climb Damaged

Comments:

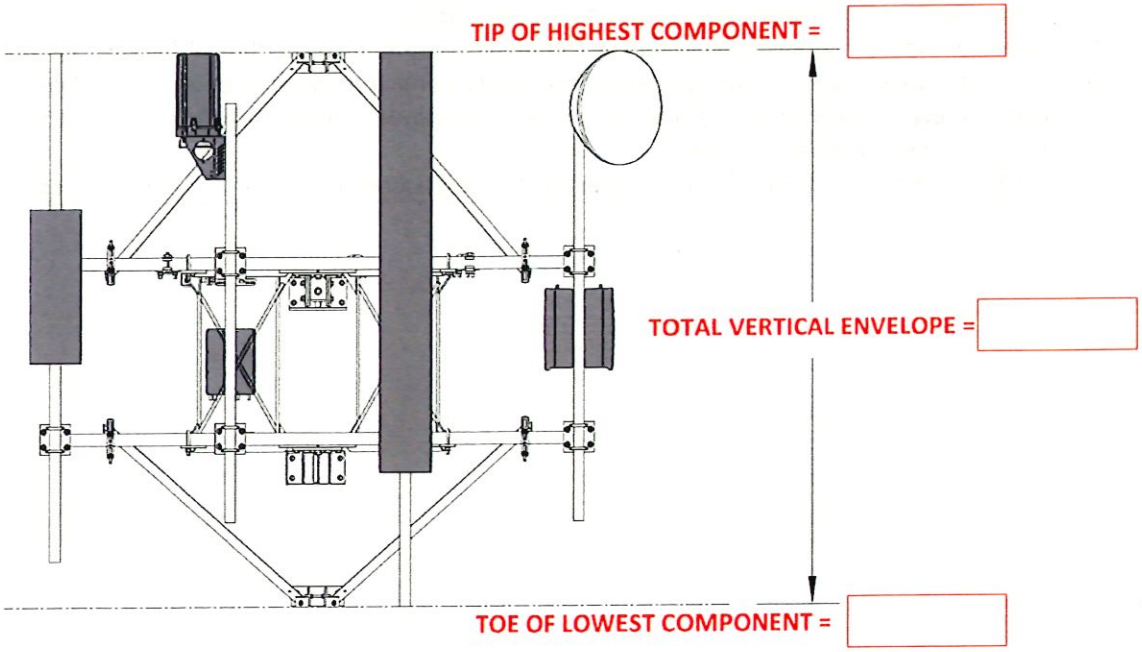
New Mount Certification:

☐ The contractor certifies that the New Mount installed is as specified in the Passing Mount Analysis.

☐ The contractor notes that the New Mount installed is not as specified and engineering approval was received for the New Mount installed.

Vertical Envelope Documentation:

- **The Contractor shall document the total vertical envelope by providing measurements from the highest components (uppermost tip of equipment or structural steel) to the lowest components (lowermost toe of equipment or structural steel) across all sectors. These measurements must be validated through supporting photographic evidence, using the provided illustration as reference.**
    - The "Tip-to-Toe" measurements must encompass the furthest vertical extents across all sectors, accounting for the following components:
        - **Appurtenance:** Including, but not limited to, antennas, RRUs, OVP units, microwave dishes, TMAs, and ODUs.
        - **Structural Steel:** Including, but not limited to, leveling pipes, equipment mounting pipes, and all mount reinforcement members extending above or below the primary mount frames.
    - Photographic documentation must clearly depict the measurement points for both the maximum elevation and the minimum elevation across the entire site configuration to certify the total vertical occupancy.



Generic Illustration
(For Reference Purposes Only)

Certifying Individual:

Company Name:	
Employee Name:	
Phone Number:	
Email:	
Date:	