



**STRUCTURES**

VALMONT STRUCTURES  
7002 NORTH 288<sup>TH</sup> STREET  
VALLEY, NEBRASKA 68064-0358  
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ENGINEER: Mike Seidl  
Reviewed by:

**COMMUNICATION POLE  
REVISION F  
DESIGN CALCULATIONS**

T-MOBILE  
VALMONT ORDER #: 200986-P3  
SITE NAME: CT11098 SILVER HILLS (NEW CANAAN, CT)  
POLE HEIGHT: 79' POLE W/40' RADOME – 119' TOTAL (ABP)



# STRUCTURES

1/23/13  
ENGINEERING DATA  
for

T-MOBILE  
CT11098 SILVER HILLS (NEW CANAAN, CT)  
VALMONT QUOTATION 200986

- 1) STRUCTURE DESIGN CONFORMS TO EIA/TIA-222-F INCLUDING:  
115.0 MPH FASTEST MILE BASIC WIND SPEED WITH NO ICE  
100.0 MPH FASTEST MILE BASIC WIND SPEED WITH ICE  
DESIGN ICE THICKNESS = 0.75 INCHES  
TWIST AND SWAY EVALUATION NOT REQUIRED
- 2) FEEDLINES ARE ASSUMED TO BE PLACED INTERIOR TO THE POLE.
- 3) ALL MICROWAVE ASSUMED TO BE 6 GHz UNLESS OTHERWISE NOTED.
- 4) ELEVATIONS ON THE DRAWING ARE BASED ON ABP (ABOVE BASE PLATE).
- 5) 79' POLE W/40' RADOME FOR A TOTAL HEIGHT OF 119' ABP.
- 6) THE POLE WILL HAVE A MAXIMUM FALL RADIUS OF 65'.
- 7) LOADING AS FOLLOWS:  
79.0' POLE  
1 - CELLSILO @ 79.0

### STRUCTURE ANCHORAGE INFORMATION

POLE HEIGHT(FT):	79	NUMBER OF A.B.'s:	8
BOLT CIRCLE(IN):	56.26	DIA. OF A.B.'s(IN):	2.25
BASE VERTICAL(K):	24.78	LENGTH OF A.B.'s(IN):	68.00
BASE SHEAR(K):	19.20	PROJECTION LENGTH(IN):	11.50
BASE MOMENT(FT-K):	1375	TEMPLATE OD(IN):	59.76

BY \_\_\_\_\_ DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

## STRUCTURES

SHEET NO. \_\_\_\_\_

1/23/13  
ENGINEERING DATA  
for  
T-MOBILE  
CT11098 SILVER HILLS (NEW CANAAN, CT)  
VALMONT QUOTATION 200986

EIA/TIA-222-F  
BASIC WIND: 115.0 MPH  
WIND & ICE: 100.0 MPH AND 0.75 IN. ICE  
TWIST & SWAY: NOT REQUIRED

QTY DESCRIPTION	HEIGHT	DATA W.O. ICE		DATA W/ ICE	
		EPA	WT	EPA	WT
1 CELLSILO	@ 79.0'	80.00	4500	167.00	8000

BY VALMONT INDUSTRIES FOR: T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)

DATE 01/23/13  
Fuse 1.10.0.528

32-bit

Design Code: EIA-222-F

\*\*\* SUMMARY \*\*\*

DESIGN SUMMARY

Height Above Base Plate (ft) 79.00 Ground Line Diameter (in) 49.000 Pole Shaft Weight (lbs) 11495  
Top Diameter (in) 40.020  
Pole Taper (in/ft) 0.1200 Shape: 18 Sides

Connections Between Sections /First/

Height Above Ground (ft) 39.00  
Type Slip Joint  
Overlap Length (in) 83  
Maximum Axial Force (lbs) 13975

Section Characteristics /First/ /Second/

Base Diameter (in) 49.000 45.650  
Top Diameter (in) 44.320 40.020  
Thickness (in) 0.31250 0.25000  
Length (ft) 39.000 46.917  
Weight (lbs) 6101 5394

ANALYSIS SUMMARY

	Pt. of Fixity		Governing Level		Governing Level		Pole Top	
	ICE + WIND	ICE + WIND	Sec.1	Sec.2	Sec.1	Sec.2	ICE + WIND	ICE + WIND
Governing Load Case	0.00	0.00	ICE + WIND	ICE + WIND	ICE + WIND	ICE + WIND	ICE + WIND	ICE + WIND
Height (ft)	16495	16495	16495	8486	8486	2431	2431	2431
Resultant Moment (in-kips)	19225	19225	19225	15008	15008	10127	10127	10127
Shear Force (lbs)	23087	23087	23087	13975	13975	7733	7733	7733
Axial Force (lbs)	28.86	28.86	28.86	22.16	22.16	8.08	8.08	8.08
Combined Stress (ksi)	51.03	51.03	51.03	47.67	47.67	50.54	50.54	50.54
Allowable Stress (ksi)	1.77	1.77	1.77	2.15	2.15	6.25	6.25	6.25
Allowable/Combined Stress	0.00	0.00	0.00	3.91	3.91	14.57	14.57	14.57
Total Deflection (in)								

Note: Diameters are outside, measured across the flats  
Forces and moments are reported in the local element coordinate system

BY VALMONT INDUSTRIES FOR: T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)  
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\*\*\* POLE SHAFT POINT OF FIXITY REACTIONS \*\*\*

Loading Case Identifier	Moments About X-Axis (in-kips)	Moments About Y-Axis (in-kips)	Moments Resultant (X & Y) (in-kips)	Moments Torsional (in-kips)	Vertical Force (lbs)	Shear In X-Direction (lbs)	Shear In Y-Direction (lbs)	Shear Resultant (X & Y) (lbs)	Notes
WIND	10187	-8548	13299	0	16134	11675	13914	18163	
ICE + WIND	12636	-10603	16495	0	23105	12344	14711	19203	

Note: Positive vertical force is downward.  
 Reactions are considered in the global coordinate system.



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T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)

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\*\*\* INPUT LOADS \*\*\*

Design Code EIA-222-F  
Loading Case ICE + WIND

Basic Wind Velocity is 100.00 mph Ice Thickness 0.75  
Wind Orientation is 50.0 Degrees Clockwise From -X- Axis  
Structure Weight Overload Factor is 1.000  
Exposure C, Gust Factor 1.69  
Orientations are Measured Clockwise From -X- Axis  
Positive -Y- Axis is 90 Degrees Clockwise From -X- Axis  
Foundation Rotation of 0.00 Degrees  
Elevation of structure base above surrounding terrain = 1.00 ft

Orientation of System

+\*\*\*\*\* +X-Axis  
\* \* \* \* \* (Transverse)  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \* (Longitudinal) \* \* \* (Vertical)  
+Y-Axis \* \* \* +Z-Axis

Load Number	Mounting Height (ft)	Load Height (ft)	Load Eccentricity (ft)	Load Orientation in XY Plane (Degrees)	Force-X (lbs)	Force-Y (lbs)	Force-Z (lbs)	EPA (ft^2)
1	79.00	99.00	0.00	50.00	6375	7597	8000	167.00

1-CELLSILO

DATE 01/23/13  
Fuse 1.10.0.528

T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)

BY VALMONT INDUSTRIES FOR:

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\*\*\* Properties \*\*\*

Connection Locations	Distance From Base (ft)	Diameter Across Flats (in)	Wall Thickness (in)	D/t Across Flats	w/t Across Flats	Moments of Inertia (in^4)	Area (in^2)
Top of Sect 2	79.00	40.020	0.2500	160.08	26.46	6304	31.56
	74.00	40.620	0.2500	162.48	26.89	6593	32.03
	69.00	41.220	0.2500	164.88	27.31	6892	32.51
	64.00	41.820	0.2500	167.28	27.73	7199	32.98
	59.00	42.420	0.2500	169.68	28.16	7515	33.46
	54.00	43.020	0.2500	172.08	28.58	7840	33.94
	49.00	43.620	0.2500	174.48	29.00	8175	34.41
	44.00	44.220	0.2500	176.88	29.43	8519	34.89
	39.00	44.820	0.2500	179.28	29.85	8873	35.37
	Top of Sect 1	39.00	44.320	0.3125	141.82	23.24	10676
34.00		44.920	0.3125	143.74	23.58	11119	44.24
Base of Sect 2	32.08	45.150	0.3125	144.48	23.71	11292	44.47
	29.00	45.520	0.3125	145.66	23.92	11574	44.84
	24.00	46.120	0.3125	147.58	24.26	12041	45.43
	19.00	46.720	0.3125	149.50	24.60	12520	46.03
	14.00	47.320	0.3125	151.42	24.94	13012	46.62
	9.00	47.920	0.3125	153.34	25.28	13516	47.22
Pt of Fixity	4.00	48.520	0.3125	155.26	25.61	14034	47.81
	0.00	49.000	0.3125	156.80	25.88	14457	48.29



BY VALMONT INDUSTRIES FOR:

T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)

DATE 01/23/13  
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Forces and Moments for Pole in the Local Element Coordinate System

Loading Case WIND

Dist. From Base (ft)	Mx (in-kips)	My (in-kips)	Resultant Mx & My (in-kips)	Torsion (in-kips)	Shear X-Dir. (lbs)	Shear Y-Dir. (lbs)	Resultant Shear (lbs)	Axial (lbs)
79.00	1171	-983	1529	0	4094	4879	6369	4377
74.00	1483	-1244	1935	0	4612	5496	7174	4922
69.00	1831	-1536	2390	0	5126	6109	7975	5477
64.00	2216	-1859	2892	0	5636	6717	8769	6041
59.00	2637	-2213	3442	0	6142	7320	9556	6615
54.00	3094	-2596	4039	0	6642	7916	10333	7200
49.00	3587	-3010	4682	0	7134	8502	11099	7794
44.00	4115	-3453	5371	0	7618	9079	11852	8399
39.00	4677	-3924	6105	0	8100	9653	12601	8997
39.00	4677	-3924	6105	0	8092	9644	12589	9013
34.00	5272	-4424	6882	0	8562	10204	13321	10378
32.08	5509	-4623	7192	0	8737	10412	13592	10911
29.00	5901	-4951	7703	0	9010	10738	14017	11395
24.00	6562	-5506	8566	0	9459	11273	14716	12185
19.00	7255	-6087	9470	0	9912	11813	15421	12987
14.00	7980	-6696	10417	0	10369	12357	16131	13802
9.00	8739	-7333	11408	0	10829	12905	16847	14629
4.00	9530	-7997	12441	0	11294	13460	17570	15467
0.00	10187	-8548	13299	0	11683	13923	18175	16121

BY VALMONT INDUSTRIES FOR:  
 Deflections and Stresses for Pole

T-MOBILE 79' POLE, SITE: C111098 SILVER HILLS (NEW CANAAN, CT)

DATE 01/23/13  
 Fuse 1.10.0.528

Loading Case WIND

\*\*\* Deflections and Stresses \*\*\*

Distance From Base (ft)	Defl. X-Dir (in)	Defl. Y-Dir (in)	Defl. Resultant X & Y (in)	Defl. Z-Dir (in)	Rotation (Deg.)	Applied Bending Stress (ksi)	Applied Axial Stress (ksi)	Applied Torsion Stress (ksi)	Applied Shear Stress (ksi)	Applied Combined Stress (ksi)	Allowable Stress (ksi)	Allowable Divided by Combined
79.00	7.1	8.4	11.0	0.1	1.13	4.93	0.14	0.00	0.41	5.07	50.54	9.97
74.00	6.3	7.5	9.8	0.1	1.10	6.05	0.15	0.00	0.45	6.21	50.18	8.08
69.00	5.6	6.7	8.7	0.1	1.06	7.26	0.17	0.00	0.49	7.43	49.82	6.71
64.00	4.9	5.8	7.6	0.1	1.02	8.53	0.18	0.00	0.53	8.71	49.47	5.68
59.00	4.2	5.0	6.6	0.0	0.97	9.87	0.20	0.00	0.57	10.06	49.11	4.88
54.00	3.6	4.3	5.6	0.0	0.91	11.25	0.21	0.00	0.61	11.46	48.75	4.25
49.00	3.0	3.6	4.7	0.0	0.84	12.68	0.23	0.00	0.65	12.91	48.39	3.75
44.00	2.5	2.9	3.8	0.0	0.77	14.16	0.24	0.00	0.68	14.40	48.03	3.34
39.00	2.0	2.3	3.1	0.0	0.69	15.66	0.25	0.00	0.72	15.91	47.67	3.00
39.00	2.0	2.3	3.1	0.0	0.69	12.87	0.21	0.00	0.58	13.07	51.99	3.98
34.00	1.5	1.8	2.4	0.0	0.62	14.12	0.23	0.00	0.61	14.35	51.99	3.62
32.08	1.4	1.6	2.1	0.0	0.59	14.60	0.25	0.00	0.61	14.85	51.99	3.50
29.00	1.1	1.3	1.8	0.0	0.55	15.38	0.25	0.00	0.63	15.64	51.99	3.32
24.00	0.8	0.9	1.2	0.0	0.47	16.66	0.27	0.00	0.65	16.93	51.99	3.07
19.00	0.5	0.6	0.8	0.0	0.38	17.94	0.28	0.00	0.67	18.22	51.99	2.85
14.00	0.3	0.3	0.4	0.0	0.29	19.23	0.30	0.00	0.70	19.53	51.83	2.65
9.00	0.1	0.1	0.2	0.0	0.19	20.53	0.31	0.00	0.72	20.84	51.55	2.47
4.00	0.0	0.0	0.0	0.0	0.09	21.84	0.32	0.00	0.74	22.16	51.26	2.31
0.00	0.0	0.0	0.0	0.0	0.00	22.88	0.33	0.00	0.76	23.22	51.03	2.20

DATE 01/23/13  
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BY VALMONT INDUSTRIES FOR: T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)

32-bit  
Forces and Moments for Pole in the Local Element Coordinate System

Loading Case ICE + WIND

Dist. From Base (ft)	Mx (in-kips)	My (in-kips)	Resultant Mx & My (in-kips)	Torsion (in-kips)	Shear X-Dir. (lbs)	Shear Y-Dir. (lbs)	Resultant Shear (lbs)	Axial (lbs)
79.00	1862	-1563	2431	0	6509	7758	10127	7733
74.00	2343	-1966	3058	0	6919	8245	10763	8470
69.00	2852	-2393	3723	0	7324	8728	11394	9219
64.00	3391	-2845	4426	0	7725	9206	12018	9983
59.00	3957	-3321	5166	0	8121	9678	12634	10760
54.00	4552	-3820	5943	0	8510	10142	13239	11550
49.00	5175	-4342	6756	0	8892	10597	13834	12354
44.00	5825	-4888	7604	0	9266	11042	14415	13173
39.00	6501	-5455	8486	0	9647	11497	15008	13975
39.00	6501	-5455	8486	0	9631	11477	14982	14002
34.00	7203	-6044	9403	0	9999	11917	15556	15745
32.08	7479	-6276	9763	0	10133	12076	15763	16426
29.00	7931	-6655	10353	0	10338	12321	16084	17048
24.00	8683	-7286	11335	0	10679	12727	16614	18059
19.00	9460	-7938	12349	0	11021	13135	17146	19085
14.00	10261	-8610	13395	0	11364	13543	17679	20127
9.00	11087	-9303	14473	0	11707	13952	18213	21185
4.00	11938	-10017	15584	0	12054	14366	18753	22254
0.00	12636	-10603	16495	0	12357	14727	19225	23087

DATE 01/23/13  
Fuse 1.10.0.528

T-MOBILE 79' POLE, SITE: CT11098 SILVER HILLS (NEW CANAAN, CT)

BY VALMONT INDUSTRIES FOR:

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Deflections and Stresses for Pole

\*\*\* Deflections and Stresses \*\*\*

Loading Case ICE + WIND

Distance From Base (ft)	Defl. X-Dir (in)	Defl. Y-Dir (in)	Defl. Resultant X & Y (in)	Defl. Z-Dir (in)	Rotation (deg.)	Applied Bending Stress (ksi)	Applied Axial Stress (ksi)	Applied Torsion Stress (ksi)	Applied Shear Stress (ksi)	Applied Combined Stress (ksi)	Allowable Stress (ksi)	Allowable Divided by Combined
79.00	9.4	11.2	14.6	0.2	1.55	7.84	0.25	0.00	0.65	8.08	50.54	6.25
74.00	8.3	9.9	13.0	0.1	1.50	9.57	0.26	0.00	0.68	9.83	50.18	5.10
69.00	7.3	8.8	11.4	0.1	1.44	11.31	0.28	0.00	0.70	11.59	49.82	4.30
64.00	6.4	7.6	10.0	0.1	1.37	13.05	0.30	0.00	0.73	13.36	49.47	3.70
59.00	5.5	6.6	8.6	0.1	1.29	14.81	0.32	0.00	0.76	15.13	49.11	3.25
54.00	4.7	5.6	7.2	0.1	1.21	16.56	0.34	0.00	0.78	16.90	48.75	2.89
49.00	3.9	4.6	6.0	0.0	1.12	18.30	0.36	0.00	0.81	18.66	48.39	2.59
44.00	3.2	3.8	4.9	0.0	1.01	20.04	0.38	0.00	0.83	20.42	48.03	2.35
39.00	2.5	3.0	3.9	0.0	0.90	21.77	0.40	0.00	0.85	22.16	47.67	2.15
39.00	2.5	3.0	3.9	0.0	0.90	17.89	0.32	0.00	0.69	18.21	51.99	2.86
34.00	1.9	2.3	3.0	0.0	0.81	19.29	0.36	0.00	0.71	19.64	51.99	2.65
32.08	1.7	2.1	2.7	0.0	0.77	19.82	0.37	0.00	0.71	20.19	51.99	2.57
29.00	1.4	1.7	2.2	0.0	0.70	20.67	0.38	0.00	0.72	21.05	51.99	2.47
24.00	1.0	1.2	1.5	0.0	0.59	22.04	0.40	0.00	0.74	22.44	51.99	2.32
19.00	0.6	0.8	1.0	0.0	0.48	23.40	0.41	0.00	0.75	23.81	51.99	2.18
14.00	0.3	0.4	0.5	0.0	0.36	24.73	0.43	0.00	0.76	25.16	51.83	2.06
9.00	0.1	0.2	0.2	0.0	0.24	26.05	0.45	0.00	0.78	26.50	51.55	1.95
4.00	0.0	0.0	0.0	0.0	0.11	27.35	0.47	0.00	0.79	27.82	51.26	1.84
0.00	0.0	0.0	0.0	0.0	0.00	28.38	0.48	0.00	0.80	28.86	51.03	1.77

MINIMUM DEFLECTION RATIO // DEFLECTION LIMIT / DEFLECTION // IS

BY VALMONT INDUSTRIES FOR: T-MOBILE 79' POLE, SITE: C111098 SILVER HILLS (NEW CANAAN, CT) DATE 01/23/13 Fuse 1.10.0.528

\*\*\* ANCHOR BOLT CHARACTERISTICS GOVERNED BY LOADING CASE ICE \*\*\*

NUMBER OF BOLTS	DIAMETER (IN.)	LENGTH (IN.)	WEIGHT (LB.)	SHIPPED AS	PROJECTION LENGTH (IN.)	GALVANIZED LENGTH (IN.)	THREAD SIZE
8	2.250	66	1046	BOLTS, TEMPLATES	11.50	66.00	4.5-UNC-2A

STEEL SPECIF.	MAXIMUM BOLT FORCE (LB.)	MAXIMUM STRESS (PSI)	ALLOWABLE STRESS (PSI)	STRESS AREA (SQ. IN.)	SAFETY FACTOR	CONFIGURATION OF BOTTOM END OF ANCHOR BOLT
A615	149500	46017	59985	3.250	1.30	THREADED WITH HEAVY HEX HEAD NUT

\*\*\* BOLT COORDINATES AND FORCES \*\*\*

BOLT NO.	X-COORD	Y-COORD	MAX TENSION-LB	MAX FORCE-LB	* BOLT NO.	X-COORD	Y-COORD	MAX TENSION-LB	MAX FORCE-LB
1	28.128	0.00	2888	2888	*	19.889	19.889	100783	106560
3	0.00	28.128	143724	149500	*				

MAX. BOLT CIRCLE = 56.26 IN.

TEMPLATE DIAMETER = 62.26 IN.

\*\*\* BASE PLATE CHARACTERISTICS GOVERNED BY LOADING CASE ICE \*\*\*

DRAWING NUMBER	OVERALL LENGTH (IN.)	OVERALL WIDTH (IN.)	THICKNESS (IN.)	ACTUAL WEIGHT (LB.)	RAW MATERIAL WEIGHT (LB.)	SIDE LENGTH (IN.)
SD18-99	62.26	63.22	2.5000	1674	2787	10.98

TOP WIDTH (IN.)	POLE DIAM. (MAJOR DIAM.) (IN.)	CRITICAL FAILURE MODE	TOTAL LENGTH OF FAIL MODE LINE (IN.)	EFFECTIVE LENGTH (IN.)	TOTAL MOMENT ALONG FAIL LINE (IN.-LB.)
10.98	49.00	1	64.37	32.99	988402

VALMONT SPECIF.	OTHER	BENDING STRESS (PSI)	ALLOWABLE STRESS (PSI)	MAX. VERTICAL SHEAR STRESS (PSI)	JMAX CRITERION-LOAD CASE
S56	A572	28764	50010	3185	JMOMENT ABT. X ICE JMOMENT ABT. Y ICE JRES. MOMENT ICE JSHEAR FORCE ICE JBOLT FORCE ICE JBOLT TENSION ICE

\*\* LOADS AT POLE BASE IN THE GLOBAL COORDINATE SYSTEM \*\*\*\*\* LOADING CASES \*\*\*\*\*