



Valmont Industries, Inc.
PO Box 358, 28800 Ida Street
Valley, NE 68064 USA
1-800-547-2151

Communication Structure Calculations
for
VzW
Antelope Crossing, Antelope, CA

626976-P1RevA

Friday, 20 September 2024

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Reviewed By:
CR

9/20/2024



Proprietary Information

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Valmont Industries, Inc.
 Project Summary
 VzW
 626976

Structure Identifier	Pole Height (ft)	Emb. Length (ft)	Anchor Bolts			Shaft Diameters			Weight (lb)								Global Base Reactions For Pole Shaft Governing Load Case				
			Max Bolt Circle (in)	Anchor Bolt Length (in)	Qty	Base (in)	Ground Line (in)	Top (in)	Sect A	Sect B	Sect C	Sect D	Sect E	Sect F	Base Plate	Anchor Bolts	Load Case Identifier	Moment (in-kip)	Shear (kips)	Axial (kips)	Max Defl (in)
626976-P1RevA	49.00	----	29.99	66	4	24.00	24.00	18.00	2053	----	----	----	----	----	340	374	WIND	2146	4.4	6.0	10

Valmont Industries, Inc.
 Project Summary
 VzW
 626976

Structure Identifier	Shaft Yield Stress (ksi)	Shaft Taper (in/ft)	Shaft Shape	Anchor Bolt Diameter (in)	Base Plate Width/Length (in)	Base Plate Thickness (in)	Camber (in)	Length (ft)						Thickness (in)					
								Sect A	Sect B	Sect C	Sect D	Sect E	Sect F	Sect A	Sect B	Sect C	Sect D	Sect E	Sect F
626976-PIRevA	65	0.122	18	1.75	34.26	1.75	0.0	49.00	----	----	----	----	----	0.188	----	----	----	----	----

Valmont Industries, Inc.
 Project Summary
 VzW
 626976

Structure Identifier	Section Data																
	"A" Base Diameter (in)	"A" Top Diameter (in)	"B" Base Diameter (in)	"B" Top Diameter (in)	"C" Base Diameter (in)	"C" Top Diameter (in)	"D" Base Diameter (in)	"D" Top Diameter (in)	"E" Base Diameter (in)	"E" Top Diameter (in)	"F" Base Diameter (in)	"F" Top Diameter (in)	"A"- "B" Joint Type	"B"- "C" Joint Type	"C"- "D" Joint Type	"D"- "E" Joint Type	"E"- "F" Joint Type
626976-P1RevA	24.00	18.00	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Valmont Industries, Inc.
Engineering Data

*** OVERVIEW ***

- 1 Structure design conforms to TIA-222-H including:
 - 95 mph Wind Speed (3 second gust, 700 year mean recurrence interval)
 - No radial ice considered in the design
 - 60.0 mph Basic Wind Speed with no ice for twist and sway
 - Exposure Category C
 - Risk Category II
 - Topographic Category 1
 - Site Elevation = 135 (ft) above mean sea level
 - Spectral response acceleration at short periods, $S_s = 0.46$ and 1 sec, $S_1 = 0.23$.
 - Site class = D
2. Feedlines are assumed to be placed interior to the pole
3. Total pole height is 50.0 ft agl
4. Elevations are measured from top of base plate (approximately 1.0 ft agl)
5. Pole Rating : 45%
6. Minimum Top Diameter = 18"
7. 2 - 4" conduits to be routed through foundation

*** Structure Anchorage Information ***

Pole Height (ft):	49.0	Number of Anchor Bolts:	4
Bolt Circle (in):	29.99	Diameter of Anchor Bolts (in):	1.75
Base Shear (lbs):	4363	Length of Anchor Bolts (in):	66.00
Base Vertical (lbs):	6351	Projection Length (in):	9.00
Base Moment (in-kips):	2146	Template OD (in):	33.49

*** Loading Data***

Qty	Description	ABP Height (ft)	Without Ice	
			EPA (ft ²)	Weight (lbs)
3	AIR6419 (W/PM)	46.00	15.81	336
4	NHH-65B-R2B (W/PM)	46.00	25.00	292
4	NHH-33B-R2B (W/PM)	46.00	38.68	496
4	RADIO 4490	46.00	6.28	284
4	RADIO 4890	46.00	9.36	340
4	AIR 3268 B48/CBRS	46.00	6.16	132
3	LIGHTING	39.00	6.66	150
1	CROSS ARM FOR LIGHTS (CR3)	39.00	2.45	65
1	1/2" X 4'	49.00	0.20	14
1	RAYCAP RXXDC-6627-PF-48 (W/PM)	46.00	4.30	61
4	T-ARM SP1 18" S/O 8' C/A	46.00	10.52	752

*** SUMMARY ***

Design Code: TIA-222-H

----- DESIGN SUMMARY -----

Height Above Base Plate	49'- 0.00"	Dia. at Top of Baseplate (in)	24.000	Pole Shaft Weight (lbs)	2053
		Top Diameter (in)	18.000		
		Pole Taper (in/ft)	0.12245	Shape:	18 Sides

Section Characteristics	/First/
Base Diameter (in)	24.000
Top Diameter (in)	18.000
Thickness (in)	0.18750
Length	49'- 0.00"
Weight (lbs)	2053
Yield Strength (ksi)	65.00
Section Shape	18 Sides

----- ANALYSIS SUMMARY -----

	Pt. of Fixity	Governing Level Sec.1	Pole Top
Governing Load Case	WIND	WIND	WIND
Height (ft)	0.00	0.00	49.00
Resultant Moment (in-kips)	2146	2146	0
Shear Force (lbs)	4373	4373	6
Axial Force (lbs)	6003	6003	17
Effective Yield Strength (ksi)	76.93	76.93	82.55
Combined Interaction Value	0.38	0.38	0.00
Total Deflection (in)	0.00	0.00	9.59

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

BY VALMONT INDUSTRIES FOR:
 Design Id: 626976-P1RevA

VZW 49.0' POLE, SITE: ANTELOPE CROSSING, ANTELOPE, CA

DATE 09/20/2024
 IMPAX 27.2.7.14

*** 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	1379	-1644	2146	0	6011	3342	2805	4363	
T+S	491	-585	764	0	4997	1193	1001	1557	
Seismic	493	-587	767	0	6432	1124	943	1467	
Seismic 2	489	-583	761	0	4057	1124	943	1467	

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

*** INPUT LOADS ***

Design Code TIA-222-H
 Loading Case WIND (1.2 D + 1.0 Wo)

Basic Wind Velocity is 95.00 mph Ice Thickness 0.00
 Wind Orientation is 40.0 Degrees Clockwise From +X Axis
 Structure Weight Overload Factor is 1.200
 Exposure C, Gust Factor 1.10
 Risk Category II, Topographic Category 1, Crest Height 0.00 ft
 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	Load Height	Load Eccentricity	Orientation in XY Plane (Degrees)	Force-X (lbs)	Force-Y (lbs)	Force-Z (lbs)	EPA (ft^2)	
1	46.00	47.70	0.00	40.00	317	266	403	15.81	3-AIR6419
2	46.00	46.00	0.00	40.00	497	417	350	25.00	4-NHH-65B-R2B
3	46.00	46.00	0.00	40.00	769	645	595	38.68	4-NHH-33B-R2B
4	46.00	46.00	0.00	40.00	125	105	341	6.28	4-Radio 4490
5	46.00	46.00	0.00	40.00	186	156	408	9.36	4-Radio 4890
6	46.00	44.70	0.00	40.00	122	102	158	6.16	4-AIR 3268 B4
7	39.00	39.00	0.00	40.00	128	107	180	6.66	3-Lighting
8	39.00	39.00	0.00	40.00	47	39	78	2.45	1-Cross Arm f
9	49.00	51.00	0.00	40.00	4	3	17	0.20	1-1/2" x 4'
10	46.00	46.00	0.00	40.00	85	72	73	4.30	1-Raycap RXXD
11	46.00	46.00	0.00	40.00	209	175	902	10.52	4-T-arm SP1 1

*** INPUT LOADS ***

Design Code TIA-222-H
 Loading Case T+S (1.0 D + 1.0 Wo)

Basic Wind Velocity is 60.00 mph Ice Thickness 0.00
 Wind Orientation is 40.0 Degrees Clockwise From +X Axis
 Structure Weight Overload Factor is 1.000
 Exposure C, Gust Factor 1.10
 Risk Category II, Topographic Category 1, Crest Height 0.00 ft
 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	Load Height	Load Eccentricity	Orientation in XY Plane (Degrees)	Force-X (lbs)	Force-Y (lbs)	Force-Z (lbs)	EPA (ft^2)	
1	46.00	47.70	0.00	40.00	113	95	336	15.81	3-AIR6419
2	46.00	46.00	0.00	40.00	177	149	292	25.00	4-NHH-65B-R2B
3	46.00	46.00	0.00	40.00	274	230	496	38.68	4-NHH-33B-R2B
4	46.00	46.00	0.00	40.00	45	37	284	6.28	4-Radio 4490
5	46.00	46.00	0.00	40.00	66	56	340	9.36	4-Radio 4890
6	46.00	44.70	0.00	40.00	43	36	132	6.16	4-AIR 3268 B4
7	39.00	39.00	0.00	40.00	46	38	150	6.66	3-Lighting
8	39.00	39.00	0.00	40.00	17	14	65	2.45	1-Cross Arm f
9	49.00	51.00	0.00	40.00	1	1	14	0.20	1-1/2" x 4'
10	46.00	46.00	0.00	40.00	30	26	61	4.30	1-Raycap RXXD
11	46.00	46.00	0.00	40.00	75	63	752	10.52	4-T-arm SP1 1

*** INPUT LOADS ***

Design Code TIA-222-H
 Loading Case Seismic (1.2 D + 1.0 Ev + 1.0 Eh)

Seismic analysis following the Equivalent Lateral Force Procedure
 Risk Category: II
 Site Class: D
 Response Acceleration at short periods: 0.46
 Response Acceleration at one second: 0.23
 The above are used to obtain the acceleration and velocity based site coefficients Fa and Fv
 Foundation Rotation of 0.00 Degrees
 Elevation of structure base above surrounding terrain = 1.00 ft

Load Number	Mounting Height	Load Height	Load Eccentricity	Orientation in XY Plane (Degrees)	Force-X (lbs)	Force-Y (lbs)	Force-Z (lbs)	EPA (ft^2)	
1	46.00	47.70	0.00	40.00	0	0	403	15.81	3-AIR6419
2	46.00	46.00	0.00	40.00	0	0	350	25.00	4-NHH-65B-R2B
3	46.00	46.00	0.00	40.00	0	0	595	38.68	4-NHH-33B-R2B
4	46.00	46.00	0.00	40.00	0	0	341	6.28	4-Radio 4490
5	46.00	46.00	0.00	40.00	0	0	408	9.36	4-Radio 4890
6	46.00	44.70	0.00	40.00	0	0	158	6.16	4-AIR 3268 B4
7	39.00	39.00	0.00	40.00	0	0	180	6.66	3-Lighting
8	39.00	39.00	0.00	40.00	0	0	78	2.45	1-Cross Arm f
9	49.00	51.00	0.00	40.00	0	0	17	0.20	1-1/2" x 4'
10	46.00	46.00	0.00	40.00	0	0	73	4.30	1-Raycap RXXD
11	46.00	46.00	0.00	40.00	0	0	902	10.52	4-T-arm SP1 1

BY VALMONT INDUSTRIES FOR: VZW 49.0' POLE, SITE: ANTELOPE CROSSING, ANTELOPE, CA
 Design Id: 626976-P1RevA

DATE 09/20/2024
 IMPAX 27.2.7.14

*** INPUT LOADS ***

Design Code TIA-222-H
 Loading Case Seismic 2 (0.9 D - 1.0 Ev + 1.0 Eh)

Seismic analysis following the Equivalent Lateral Force Procedure
 Risk Category: II
 Site Class: D
 Response Acceleration at short periods: 0.46
 Response Acceleration at one second: 0.23
 The above are used to obtain the acceleration and velocity based site coefficients Fa and Fv
 Foundation Rotation of 0.00 Degrees
 Elevation of structure base above surrounding terrain = 1.00 ft

Load Number	Mounting Height	Load Height	Load Eccentricity	Orientation in XY Plane (Degrees)	Force-X (lbs)	Force-Y (lbs)	Force-Z (lbs)	EPA (ft^2)	
1	46.00	47.70	0.00	40.00	0	0	302	15.81	3-AIR6419
2	46.00	46.00	0.00	40.00	0	0	263	25.00	4-NHH-65B-R2B
3	46.00	46.00	0.00	40.00	0	0	446	38.68	4-NHH-33B-R2B
4	46.00	46.00	0.00	40.00	0	0	256	6.28	4-Radio 4490
5	46.00	46.00	0.00	40.00	0	0	306	9.36	4-Radio 4890
6	46.00	44.70	0.00	40.00	0	0	119	6.16	4-AIR 3268 B4
7	39.00	39.00	0.00	40.00	0	0	135	6.66	3-Lighting
8	39.00	39.00	0.00	40.00	0	0	58	2.45	1-Cross Arm f
9	49.00	51.00	0.00	40.00	0	0	13	0.20	1-1/2" x 4'
10	46.00	46.00	0.00	40.00	0	0	55	4.30	1-Raycap RXXD
11	46.00	46.00	0.00	40.00	0	0	677	10.52	4-T-arm SP1 1

Equivalent Lateral Force Values for Pole

W = 4,995 lbs
 Cs = 0.29
 Vs = 1,462 lbs
 Sds = 0.44
 Ev = 439 lbs
 Fa = 1.43
 Fv = 2.14
 k = 1.28
 f1 = 0.939 Hz

Distance From Fixity	Weight			Load Distribution	Lateral Seismic Force
H	Wx	H^k	H^k * Wx	Factor	Fx
(ft)	(lbs)				(lbs)
49.00	14	147.17	2,060	0.0040	6
48.63	27	145.73	3,925	0.0076	11
48.25	1	144.29	144	0.0003	0
47.13	82	139.99	11,428	0.0221	32
46.00	2,693	135.72	365,483	0.7062	1,033
45.00	74	131.94	9,714	0.0188	27
43.00	75	124.47	9,287	0.0179	26
42.00	2	120.77	242	0.0005	1
40.50	114	115.27	13,115	0.0253	37
39.00	215	109.82	23,611	0.0456	67
37.50	116	104.43	12,115	0.0234	34
36.00	6	99.10	595	0.0011	2
35.00	79	95.59	7,511	0.0145	21
32.38	130	86.49	11,227	0.0217	32
30.75	4	80.96	324	0.0006	1
29.88	71	78.02	5,538	0.0107	16
26.75	186	67.71	12,595	0.0243	36
24.50	2	60.50	121	0.0002	0
24.25	21	59.71	1,252	0.0024	4
21.50	213	51.16	10,908	0.0211	31
18.63	33	42.56	1,384	0.0027	4
18.25	2	41.46	83	0.0002	0
16.13	187	35.38	6,611	0.0128	19
13.00	89	26.84	2,402	0.0046	7
12.00	3	24.22	73	0.0001	0
10.50	136	20.41	2,777	0.0054	8
6.50	232	11.03	2,557	0.0049	7
2.00	190	2.43	462	0.0009	1

*** 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 1	49.00	18.000	0.1875	96.00	15.16	425	10.60
	48.25	18.092	0.1875	96.49	15.25	431	10.65
	46.00	18.367	0.1875	97.96	15.51	452	10.82
	44.00	18.612	0.1875	99.27	15.74	470	10.96
	42.00	18.857	0.1875	100.57	15.97	489	11.11
	39.00	19.224	0.1875	102.53	16.32	519	11.33
	36.00	19.592	0.1875	104.49	16.66	549	11.55
	34.00	19.837	0.1875	105.80	16.89	570	11.69
	30.75	20.235	0.1875	107.92	17.27	606	11.93
	29.00	20.449	0.1875	109.06	17.47	625	12.06
	24.50	21.000	0.1875	112.00	17.99	678	12.39
	24.00	21.061	0.1875	112.33	18.04	684	12.42
	19.00	21.673	0.1875	115.59	18.62	746	12.79
	18.25	21.765	0.1875	116.08	18.71	755	12.84
	14.00	22.286	0.1875	118.86	19.19	811	13.15
	12.00	22.531	0.1875	120.16	19.42	838	13.30
	9.00	22.898	0.1875	122.12	19.77	880	13.52
4.00	23.510	0.1875	125.39	20.35	954	13.88	
Pt of Fixity	0.00	24.000	0.1875	128.00	20.81	1015	14.17

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)
49.00	0	0	0	0	4	4	6	17
48.25	0	0	0	0	17	14	22	49
48.25	0	0	0	0	22	18	28	50
46.00	1	-1	2	0	59	49	76	148
46.00	5	-6	8	0	2428	2038	3170	3303
44.00	54	-65	84	0	2461	2065	3213	3392
42.00	104	-124	162	0	2495	2093	3257	3482
42.00	104	-124	162	0	2500	2098	3264	3485
39.00	180	-215	281	0	2551	2140	3330	3622
39.00	180	-215	281	0	2729	2290	3562	3876
36.00	264	-314	410	0	2780	2333	3629	4016
36.00	264	-314	410	0	2788	2339	3639	4025
34.00	320	-381	498	0	2819	2366	3680	4123
30.75	413	-493	643	0	2875	2413	3754	4279
30.75	413	-493	643	0	2879	2416	3759	4287
29.00	464	-553	722	0	2905	2437	3792	4378
24.50	598	-712	930	0	2983	2503	3894	4602
24.50	598	-712	930	0	2984	2504	3895	4609
24.00	613	-730	953	0	2986	2506	3899	4641
19.00	765	-912	1191	0	3066	2573	4003	4904
18.25	788	-940	1227	0	3079	2584	4019	4943
18.25	788	-940	1227	0	3078	2582	4018	4952
14.00	922	-1098	1434	0	3141	2635	4100	5186
12.00	985	-1174	1533	0	3174	2663	4143	5293
12.00	985	-1174	1533	0	3172	2661	4140	5304
9.00	1082	-1289	1683	0	3209	2693	4189	5481
4.00	1246	-1484	1938	0	3279	2752	4281	5775
0.00	1379	-1644	2146	0	3350	2811	4373	6003

Loading Case WIND

Distance	Defl.	Defl.	Defl.	Defl.	Rotation
From	X-Dir	Y-Dir	Resultant	Z-Dir	
Base	(in)	(in)	X & Y	(in)	(deg.)
(ft)					
49.00	7.3	6.2	9.6	0.1	1.43
48.25	7.2	6.0	9.4	0.1	1.43
48.25	7.2	6.0	9.4	0.1	1.43
46.00	6.7	5.6	8.7	0.1	1.43
46.00	6.7	5.6	8.7	0.1	1.43
44.00	6.2	5.2	8.1	0.1	1.43
42.00	5.7	4.8	7.5	0.1	1.41
42.00	5.7	4.8	7.5	0.1	1.41
39.00	5.1	4.3	6.6	0.1	1.38
39.00	5.1	4.3	6.6	0.1	1.38
36.00	4.4	3.7	5.8	0.1	1.34
36.00	4.4	3.7	5.8	0.1	1.34
34.00	4.0	3.4	5.2	0.0	1.30
30.75	3.3	2.8	4.4	0.0	1.22
30.75	3.3	2.8	4.4	0.0	1.22
29.00	3.0	2.5	3.9	0.0	1.18
24.50	2.2	1.8	2.9	0.0	1.04
24.50	2.2	1.8	2.9	0.0	1.04
24.00	2.1	1.8	2.8	0.0	1.03
19.00	1.4	1.1	1.8	0.0	0.85
18.25	1.3	1.1	1.6	0.0	0.82
18.25	1.3	1.1	1.6	0.0	0.82
14.00	0.8	0.6	1.0	0.0	0.65
12.00	0.6	0.5	0.7	0.0	0.56
12.00	0.6	0.5	0.7	0.0	0.56
9.00	0.3	0.3	0.4	0.0	0.43
4.00	0.1	0.1	0.1	0.0	0.20
0.00	0.0	0.0	0.0	0.0	0.00

Loading Case WIND

Distance From Base (ft)	Nominal Axial Strength (lbs)	Nominal Flexural Strength (in-kips)	Nominal Shear Strength (lbs)	Nominal Torsional Strength (in-kips)	Axial Interaction Term	Flexural Interaction Term	Shear Interaction Term	Torsion Interaction Term	Combined Stress Interaction
49.00	689,018	3,837	206,706	3,666	0.00	0.00	0.00	0.00	0.01
48.25	692,571	3,877	207,771	3,704	0.00	0.00	0.00	0.00	0.01
46.00	703,228	3,998	210,968	3,819	0.01	0.00	0.02	0.00	0.01
44.00	712,701	4,107	213,810	3,922	0.01	0.02	0.02	0.00	0.03
42.00	722,174	4,217	216,652	4,027	0.01	0.04	0.02	0.00	0.05
39.00	736,384	4,368	220,915	4,187	0.01	0.07	0.02	0.00	0.08
36.00	750,593	4,516	225,178	4,350	0.01	0.10	0.02	0.00	0.11
34.00	760,066	4,616	228,020	4,461	0.01	0.12	0.02	0.00	0.13
30.75	775,460	4,780	232,638	4,643	0.01	0.15	0.02	0.00	0.16
29.00	783,749	4,869	235,125	4,743	0.01	0.16	0.02	0.00	0.17
24.50	805,064	5,100	241,519	5,005	0.01	0.20	0.02	0.00	0.21
24.00	807,432	5,126	242,230	5,034	0.01	0.21	0.02	0.00	0.21
19.00	831,114	5,386	249,334	5,334	0.01	0.25	0.02	0.00	0.25
18.25	834,667	5,426	250,400	5,379	0.01	0.25	0.02	0.00	0.26
14.00	854,797	5,650	256,439	5,642	0.01	0.28	0.02	0.00	0.29
12.00	864,270	5,757	259,281	5,768	0.01	0.30	0.02	0.00	0.30
9.00	878,480	5,918	263,544	5,959	0.01	0.32	0.02	0.00	0.32
4.00	902,163	6,189	270,649	6,285	0.01	0.35	0.02	0.00	0.36
0.00	921,109	6,407	276,333	6,551	0.01	0.37	0.02	0.00	0.38

Forces and Moments for Pole in the Local Element Coordinate System

Loading Case T+S

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)
49.00	0	0	0	0	2	1	2	14
48.25	0	0	0	0	6	5	8	41
48.25	0	0	0	0	8	6	10	42
46.00	0	0	1	0	21	17	27	124
46.00	2	-2	3	0	863	724	1127	2807
44.00	19	-23	30	0	875	734	1142	2881
42.00	37	-44	58	0	887	744	1157	2955
42.00	37	-44	58	0	888	746	1160	2957
39.00	64	-76	100	0	906	761	1183	3071
39.00	64	-76	100	0	970	814	1266	3286
36.00	94	-112	146	0	988	829	1290	3402
36.00	94	-112	146	0	991	831	1293	3408
34.00	114	-136	177	0	1002	841	1308	3487
30.75	147	-175	229	0	1022	858	1334	3617
30.75	147	-175	229	0	1024	859	1336	3621
29.00	165	-197	257	0	1033	867	1348	3693
24.50	212	-253	330	0	1061	890	1384	3879
24.50	212	-253	330	0	1061	890	1385	3882
24.00	218	-260	339	0	1062	892	1387	3903
19.00	272	-324	423	0	1091	916	1424	4118
18.25	280	-334	436	0	1096	919	1430	4150
18.25	280	-334	436	0	1096	919	1430	4153
14.00	328	-391	510	0	1118	938	1460	4341
12.00	350	-418	545	0	1130	948	1476	4430
12.00	350	-418	545	0	1130	948	1475	4434
9.00	385	-459	599	0	1144	960	1494	4572
4.00	443	-528	689	0	1170	982	1527	4806
0.00	491	-585	764	0	1195	1003	1560	4996

Loading Case T+S

Distance	Defl.	Defl.	Defl.	Defl.	Rotation
From	X-Dir	Y-Dir	Resultant	Z-Dir	
Base	(in)	(in)	X & Y	(in)	(deg.)
(ft)					
49.00	2.6	2.2	3.4	0.0	0.51
48.25	2.6	2.1	3.3	0.0	0.51
48.25	2.6	2.1	3.3	0.0	0.51
46.00	2.4	2.0	3.1	0.0	0.51
46.00	2.4	2.0	3.1	0.0	0.51
44.00	2.2	1.9	2.9	0.0	0.51
42.00	2.0	1.7	2.7	0.0	0.50
42.00	2.0	1.7	2.7	0.0	0.50
39.00	1.8	1.5	2.4	0.0	0.49
39.00	1.8	1.5	2.4	0.0	0.49
36.00	1.6	1.3	2.1	0.0	0.48
36.00	1.6	1.3	2.1	0.0	0.48
34.00	1.4	1.2	1.9	0.0	0.46
30.75	1.2	1.0	1.5	0.0	0.44
30.75	1.2	1.0	1.5	0.0	0.44
29.00	1.1	0.9	1.4	0.0	0.42
24.50	0.8	0.7	1.0	0.0	0.37
24.50	0.8	0.7	1.0	0.0	0.37
24.00	0.8	0.6	1.0	0.0	0.37
19.00	0.5	0.4	0.6	0.0	0.30
18.25	0.4	0.4	0.6	0.0	0.29
18.25	0.4	0.4	0.6	0.0	0.29
14.00	0.3	0.2	0.3	0.0	0.23
12.00	0.2	0.2	0.3	0.0	0.20
12.00	0.2	0.2	0.3	0.0	0.20
9.00	0.1	0.1	0.1	0.0	0.15
4.00	0.0	0.0	0.0	0.0	0.07
0.00	0.0	0.0	0.0	0.0	0.00

Loading Case T+S

Distance From Base (ft)	Nominal Axial Strength (lbs)	Nominal Flexural Strength (in-kips)	Nominal Shear Strength (lbs)	Nominal Torsional Strength (in-kips)	Axial Interaction Term	Flexural Interaction Term	Shear Interaction Term	Torsion Interaction Term	Combined Stress Interaction
49.00	689,018	3,837	206,706	3,666	0.00	0.00	0.00	0.00	0.01
48.25	692,571	3,877	207,771	3,704	0.00	0.00	0.00	0.00	0.01
46.00	703,228	3,998	210,968	3,819	0.00	0.00	0.01	0.00	0.01
44.00	712,701	4,107	213,810	3,922	0.00	0.01	0.01	0.00	0.01
42.00	722,174	4,217	216,652	4,027	0.00	0.02	0.01	0.00	0.02
39.00	736,384	4,368	220,915	4,187	0.00	0.03	0.01	0.00	0.03
36.00	750,593	4,516	225,178	4,350	0.01	0.04	0.01	0.00	0.04
34.00	760,066	4,616	228,020	4,461	0.01	0.04	0.01	0.00	0.05
30.75	775,460	4,780	232,638	4,643	0.01	0.05	0.01	0.00	0.06
29.00	783,749	4,869	235,125	4,743	0.01	0.06	0.01	0.00	0.06
24.50	805,064	5,100	241,519	5,005	0.01	0.07	0.01	0.00	0.08
24.00	807,432	5,126	242,230	5,034	0.01	0.07	0.01	0.00	0.08
19.00	831,114	5,386	249,334	5,334	0.01	0.09	0.01	0.00	0.09
18.25	834,667	5,426	250,400	5,379	0.01	0.09	0.01	0.00	0.09
14.00	854,797	5,650	256,439	5,642	0.01	0.10	0.01	0.00	0.11
12.00	864,270	5,757	259,281	5,768	0.01	0.11	0.01	0.00	0.11
9.00	878,480	5,918	263,544	5,959	0.01	0.11	0.01	0.00	0.12
4.00	902,163	6,189	270,649	6,285	0.01	0.12	0.01	0.00	0.13
0.00	921,109	6,407	276,333	6,551	0.01	0.13	0.01	0.00	0.14

Forces and Moments for Pole in the Local Element Coordinate System

Loading Case Seismic

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)
49.00	0	0	0	0	5	4	6	18
48.25	0	0	0	0	14	11	18	53
48.25	0	0	0	0	14	12	18	54
46.00	1	-1	1	0	39	33	51	159
46.00	2	-2	3	0	858	720	1120	3617
44.00	20	-23	30	0	879	738	1148	3712
42.00	37	-45	58	0	900	755	1175	3808
42.00	37	-45	58	0	900	755	1175	3811
39.00	65	-78	101	0	929	780	1213	3957
39.00	65	-78	101	0	982	824	1281	4233
36.00	95	-113	148	0	1009	846	1317	4382
36.00	95	-113	148	0	1009	847	1317	4390
34.00	116	-138	180	0	1025	860	1338	4492
30.75	150	-178	233	0	1050	881	1371	4659
30.75	150	-178	233	0	1050	881	1370	4665
29.00	168	-201	262	0	1060	889	1384	4757
24.50	217	-259	337	0	1089	913	1421	4996
24.50	217	-259	337	0	1087	912	1419	4999
24.00	222	-265	346	0	1088	913	1420	5027
19.00	278	-331	432	0	1110	931	1449	5302
18.25	286	-341	445	0	1113	934	1453	5344
18.25	286	-341	445	0	1110	932	1450	5348
14.00	334	-398	520	0	1122	942	1465	5589
12.00	357	-425	555	0	1128	946	1472	5705
12.00	357	-425	555	0	1125	944	1468	5710
9.00	391	-466	608	0	1126	945	1470	5887
4.00	448	-533	696	0	1126	945	1469	6187
0.00	493	-587	767	0	1127	945	1471	6432

Loading Case Seismic

Distance From Base (ft)	Defl. X-Dir (in)	Defl. Y-Dir (in)	Defl. Resultant X & Y (in)	Defl. Z-Dir (in)	Rotation (deg.)
49.00	2.7	2.2	3.5	0.0	0.52
48.25	2.6	2.2	3.4	0.0	0.52
48.25	2.6	2.2	3.4	0.0	0.52
46.00	2.4	2.0	3.1	0.0	0.52
46.00	2.4	2.0	3.1	0.0	0.52
44.00	2.2	1.9	2.9	0.0	0.52
42.00	2.1	1.7	2.7	0.0	0.51
42.00	2.1	1.7	2.7	0.0	0.51
39.00	1.8	1.5	2.4	0.0	0.50
39.00	1.8	1.5	2.4	0.0	0.50
36.00	1.6	1.3	2.1	0.0	0.48
36.00	1.6	1.3	2.1	0.0	0.48
34.00	1.4	1.2	1.9	0.0	0.47
30.75	1.2	1.0	1.6	0.0	0.44
30.75	1.2	1.0	1.6	0.0	0.44
29.00	1.1	0.9	1.4	0.0	0.43
24.50	0.8	0.7	1.0	0.0	0.38
24.50	0.8	0.7	1.0	0.0	0.38
24.00	0.8	0.6	1.0	0.0	0.37
19.00	0.5	0.4	0.6	0.0	0.31
18.25	0.5	0.4	0.6	0.0	0.30
18.25	0.5	0.4	0.6	0.0	0.30
14.00	0.3	0.2	0.4	0.0	0.23
12.00	0.2	0.2	0.3	0.0	0.20
12.00	0.2	0.2	0.3	0.0	0.20
9.00	0.1	0.1	0.1	0.0	0.15
4.00	0.0	0.0	0.0	0.0	0.07
0.00	0.0	0.0	0.0	0.0	0.00

Loading Case Seismic

Distance From Base (ft)	Nominal Axial Strength (lbs)	Nominal Flexural Strength (in-kips)	Nominal Shear Strength (lbs)	Nominal Torsional Strength (in-kips)	Axial Interaction Term	Flexural Interaction Term	Shear Interaction Term	Torsion Interaction Term	Combined Stress Interaction
49.00	689,018	3,837	206,706	3,666	0.00	0.00	0.00	0.00	0.01
48.25	692,571	3,877	207,771	3,704	0.00	0.00	0.00	0.00	0.01
46.00	703,228	3,998	210,968	3,819	0.01	0.00	0.01	0.00	0.01
44.00	712,701	4,107	213,810	3,922	0.01	0.01	0.01	0.00	0.01
42.00	722,174	4,217	216,652	4,027	0.01	0.02	0.01	0.00	0.02
39.00	736,384	4,368	220,915	4,187	0.01	0.03	0.01	0.00	0.03
36.00	750,593	4,516	225,178	4,350	0.01	0.04	0.01	0.00	0.04
34.00	760,066	4,616	228,020	4,461	0.01	0.04	0.01	0.00	0.05
30.75	775,460	4,780	232,638	4,643	0.01	0.05	0.01	0.00	0.06
29.00	783,749	4,869	235,125	4,743	0.01	0.06	0.01	0.00	0.07
24.50	805,064	5,100	241,519	5,005	0.01	0.07	0.01	0.00	0.08
24.00	807,432	5,126	242,230	5,034	0.01	0.08	0.01	0.00	0.08
19.00	831,114	5,386	249,334	5,334	0.01	0.09	0.01	0.00	0.10
18.25	834,667	5,426	250,400	5,379	0.01	0.09	0.01	0.00	0.10
14.00	854,797	5,650	256,439	5,642	0.01	0.10	0.01	0.00	0.11
12.00	864,270	5,757	259,281	5,768	0.01	0.11	0.01	0.00	0.11
9.00	878,480	5,918	263,544	5,959	0.01	0.11	0.01	0.00	0.12
4.00	902,163	6,189	270,649	6,285	0.01	0.13	0.01	0.00	0.13
0.00	921,109	6,407	276,333	6,551	0.01	0.13	0.01	0.00	0.14

Forces and Moments for Pole in the Local Element Coordinate System

Loading Case Seismic 2

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)
49.00	0	0	0	0	5	4	6	11
48.25	0	0	0	0	13	11	18	33
48.25	0	0	0	0	14	12	18	34
46.00	1	-1	1	0	39	33	51	100
46.00	2	-2	3	0	848	712	1107	2278
44.00	19	-23	30	0	870	730	1135	2337
42.00	37	-44	58	0	890	747	1162	2398
42.00	37	-44	58	0	890	747	1162	2399
39.00	64	-77	100	0	919	771	1200	2492
39.00	64	-77	100	0	971	815	1268	2666
36.00	94	-112	146	0	998	837	1303	2760
36.00	94	-112	146	0	999	838	1304	2765
34.00	114	-136	178	0	1015	851	1325	2829
30.75	148	-176	230	0	1040	872	1357	2934
30.75	148	-176	230	0	1039	872	1357	2938
29.00	166	-198	259	0	1050	881	1371	2996
24.50	215	-256	334	0	1079	905	1408	3147
24.50	215	-256	334	0	1078	904	1407	3149
24.00	220	-262	342	0	1079	905	1408	3167
19.00	275	-328	428	0	1102	924	1438	3341
18.25	283	-338	441	0	1105	927	1442	3368
18.25	283	-338	441	0	1103	926	1440	3370
14.00	331	-394	515	0	1116	936	1457	3523
12.00	353	-421	550	0	1121	941	1464	3596
12.00	353	-421	550	0	1120	940	1462	3599
9.00	387	-462	603	0	1123	942	1466	3711
4.00	444	-529	691	0	1125	944	1468	3902
0.00	489	-583	761	0	1126	945	1469	4056

Loading Case Seismic 2

Distance	Defl.	Defl.	Defl.	Defl.	Rotation
From	X-Dir	Y-Dir	Resultant	Z-Dir	
Base	(in)	(in)	X & Y	(in)	(deg.)
(ft)					
49.00	2.6	2.2	3.4	0.0	0.51
48.25	2.6	2.2	3.4	0.0	0.51
48.25	2.6	2.2	3.4	0.0	0.51
46.00	2.4	2.0	3.1	0.0	0.51
46.00	2.4	2.0	3.1	0.0	0.51
44.00	2.2	1.9	2.9	0.0	0.51
42.00	2.1	1.7	2.7	0.0	0.51
42.00	2.1	1.7	2.7	0.0	0.51
39.00	1.8	1.5	2.4	0.0	0.50
39.00	1.8	1.5	2.4	0.0	0.50
36.00	1.6	1.3	2.1	0.0	0.48
36.00	1.6	1.3	2.1	0.0	0.48
34.00	1.4	1.2	1.9	0.0	0.47
30.75	1.2	1.0	1.6	0.0	0.44
30.75	1.2	1.0	1.6	0.0	0.44
29.00	1.1	0.9	1.4	0.0	0.42
24.50	0.8	0.7	1.0	0.0	0.37
24.50	0.8	0.7	1.0	0.0	0.37
24.00	0.8	0.6	1.0	0.0	0.37
19.00	0.5	0.4	0.6	0.0	0.30
18.25	0.4	0.4	0.6	0.0	0.29
18.25	0.4	0.4	0.6	0.0	0.29
14.00	0.3	0.2	0.4	0.0	0.23
12.00	0.2	0.2	0.3	0.0	0.20
12.00	0.2	0.2	0.3	0.0	0.20
9.00	0.1	0.1	0.1	0.0	0.15
4.00	0.0	0.0	0.0	0.0	0.07
0.00	0.0	0.0	0.0	0.0	0.00

Loading Case Seismic 2

Distance From Base (ft)	Nominal Axial Strength (lbs)	Nominal Flexural Strength (in-kips)	Nominal Shear Strength (lbs)	Nominal Torsional Strength (in-kips)	Axial Interaction Term	Flexural Interaction Term	Shear Interaction Term	Torsion Interaction Term	Combined Stress Interaction
49.00	689,018	3,837	206,706	3,666	0.00	0.00	0.00	0.00	0.01
48.25	692,571	3,877	207,771	3,704	0.00	0.00	0.00	0.00	0.01
46.00	703,228	3,998	210,968	3,819	0.00	0.00	0.01	0.00	0.01
44.00	712,701	4,107	213,810	3,922	0.00	0.01	0.01	0.00	0.01
42.00	722,174	4,217	216,652	4,027	0.00	0.02	0.01	0.00	0.02
39.00	736,384	4,368	220,915	4,187	0.00	0.03	0.01	0.00	0.03
36.00	750,593	4,516	225,178	4,350	0.00	0.04	0.01	0.00	0.04
34.00	760,066	4,616	228,020	4,461	0.00	0.04	0.01	0.00	0.05
30.75	775,460	4,780	232,638	4,643	0.00	0.05	0.01	0.00	0.06
29.00	783,749	4,869	235,125	4,743	0.00	0.06	0.01	0.00	0.06
24.50	805,064	5,100	241,519	5,005	0.00	0.07	0.01	0.00	0.08
24.00	807,432	5,126	242,230	5,034	0.00	0.07	0.01	0.00	0.08
19.00	831,114	5,386	249,334	5,334	0.00	0.09	0.01	0.00	0.09
18.25	834,667	5,426	250,400	5,379	0.00	0.09	0.01	0.00	0.09
14.00	854,797	5,650	256,439	5,642	0.00	0.10	0.01	0.00	0.11
12.00	864,270	5,757	259,281	5,768	0.00	0.11	0.01	0.00	0.11
9.00	878,480	5,918	263,544	5,959	0.00	0.11	0.01	0.00	0.12
4.00	902,163	6,189	270,649	6,285	0.00	0.12	0.01	0.00	0.13
0.00	921,109	6,407	276,333	6,551	0.00	0.13	0.01	0.00	0.14

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

ANCHOR BOLTS GEOMETRY AND MATERIAL

Number of bolts	4	
Diameter	1.75	in
Length	66	in
Anchor bolt to baseplate nuts pattern	Three nuts	
Steel Spec.	S23	
Tensile Strength, Fu	100000	psi
Yield Strength, Fy	75000	psi
Factored Tensile Resistance, phi t Rnt	142500	lb
Factored Compression Resistance, phi c Rnc	162357	lb
Factored Shear Rupture Strength, phi v Rnv	90198	lb
Factored Shear Yield Strength, phi c Rnvc	73060	lb
Gross Area, Ag	2.41	in^2
Net Area, An	1.90	in^2

POLE SHAFT

Pole Shape	Eighteen	
Diameter	24.00	in
Wall Thickness	0.18750	in
Pole Material	S22	
Pole Yield	65000	psi

BASE PLATE

Governing Load Case	WIND	
Base Plate Shape	Match pole	
Drawing Number	SD18-99	
Overall Length	34.26	in
Overall Width	34.26	in
Side Width	6.04	in
Top Width	6.04	in

CAGE ASSEMBLY / BOLT PATTERN

Cage Weight	374	lb
Shipped As	Unassembled Threaded	
Projection Length	9.00	in
Bolt Pattern	Round multiple of 2	
Max Bolt Circle	29.99	in
Template Diameter	33.49	in
Bolt-bolt spacing - Actual	21.21	in
Bolt-bolt spacing - Min.	6.00	in
Bolt to shaft face spacing - Actual	2.94	in
Bolt to shaft face spacing - Min.	2.81	in
Edge distance - Actual	2.19	in
Edge distance - Min.	2.19	in
Design Code Concrete	ASCE SEI 48-11	
Concrete f'c	4500	psi
Maximum bolt tension	70018	lb
Configuration of Bottom End	Thrd w/Hvy hex head nut	
Max. allowable leveling	1.750	in

Thickness	1.75000	in
Valmont Spec	S56	
Other Spec	A572	
Actual Weight	340	lb
Critical Failure Mode	6	
Total length of Fail Line	24.69	in
Effective Length	24.69	in
Total moment along fail line	214694	in-lb
Bending Stress	17037	psi
Allowable Stress	67500	psi

ANALYSIS RESULTS

Design Code	TIA-222-H	
Governing Load Case	WIND	
Safety Factor	2.22	
Max. Axial Stress	38434	psi

Controlling Loads

Load Case	Axial force (lb)	Shear Force (lb)	Moment X (in-kip)	Moment Y (in-kip)	Moment Z (in-kip)	Component
WIND	6011	4363	1543	1490	0	Bolts
WIND	6011	4363	1543	1490	0	Plate

Bolt Coordinates and Forces for Controlling Load Case

Bolt Number	X-Coord (in)	Y-Coord (in)	Axial force (lb)	Shear Force (lb)	Axial Stress (ksi)	Shear Stress (ksi)	Bending Stress (ksi)	CSR	Loadcase Number
1	10.605	10.605	-52083	1091	21.65	0.45	0.00	0.321	WIND
2	-10.605	10.605	-73024	1091	30.36	0.45	0.00	0.450	WIND
3	-10.605	-10.605	-52083	1091	21.65	0.45	0.00	0.321	WIND
4	10.605	-10.605	70018	1091	36.85	0.45	0.00	0.242	WIND

Note: positive axial force indicates tension, negative axial force indicates compression.