Structural Components
Bringing It All Together.

Structural Components, LLC
1870 West 64th Lane, Unit A
Denver, CO 80221

Voice:866-386-7622

September 21, 2020

InSite Towers, LLC
1199 N Fairfax St.
Suite 700
Alexandria, VA 22314

Re: Rigorous Structural Analysis Report

Structure:	150ft Sabre Monopole
Site Address:	900 SW Blue Pkwy, Lee Summit, MO 64063 (Jackson County) Latitude: 38.9102°N, Longitude: 94.3912°W
Site Name:	InSite Towers, LLC – Lee's Summit T-Mobile – N/A
Site Number:	InSite Towers, LLC – MO016 T-Mobile – A5C0198A
SC Number:	200314
Status:	**Structure Passes (76% Capacity)** **Foundation Passes (75% Capacity)**

Per your request, Structural Components, LLC has completed a structural analysis for the above referenced project to verify the tower's compliance to the following design criteria:

Standard:	TIA-222-H *Structural Standard for Antenna Supporting Structures and Antennas*
Building Code:	2018 International Building Code Lee's Summit City Council Ordinance #8536
Design Basic Wind Speed without Ice:	109 mph 3-second gust V_{ULT}
Design Basic Wind Speed with Ice:	40 mph 3-second gust
Ice Thickness:	1-1/2" radial
Serviceability Basic Wind Speed:	60 mph 3-second gust
Exposure Category:	C
Topographic Category:	1
Ground Elevation:	1018ft
Risk Category:	II
Seismic Site Class:	C, S_s=0.100, S_1=0.068
Seismic Design Category:	B

Please refer to the following structural analysis report, which gives complete details of the tower loading, results, information provided, and necessary assumptions.

We trust you find this report satisfactory. Please do not hesitate to contact us if you should have any questions or concerns.

Best Regards,
Structural Components LLC

STATE OF MISSOURI
WESLEY P. CULVER
NUMBER PE-2013001896
PROFESSIONAL ENGINEER
9/21/20

Wesley Culver, P.E.
Missouri P.E. # 2013001896

/TR

1 LOADING CONFIGURATION

The following antennas, mounts, transmission lines, and other appurtenances were considered for the structural analysis.

Elevation (ft)		Equipment	Feedlines	Notes
Mount	**Equip**			
150.0	150.0	(1) 5/8" x 6' Lightning Rod	---	Existing
150.0	150.0	(6) Antel BXA-171063-12CF-EDIN-2 Panels w/ Pipe Mounts (6) Andrew LNX-6515DS-A1M Panels w/ Pipe Mounts (3) Ericsson LTE AWS RRUS13-A2(3) (3) Ericsson AS1613492/RRUS12 (Band 4)(3) (6) Clear Gain CG-1900DD TMAs (3) Commscope CBC78-DF-2X Diplexers (1) RFS DB-B1-6C-2AB-0Z SSD (1) Raycap RRFDC-3315-PF-48 SSD (1) 14' Low Profile Platform	(18) 1-5/8" TX (2) 1-5/8" Hybrid(4)	Verizon Existing
129.0	129.0	(3) RFS APXVSPP18-C Panels w/ Pipe Mounts (3) Ericsson AIR 6468 Panels w/ Pipe Mounts (3) Ericsson RRUS 11 (3) Ericsson RRUS 31 (1) Andrew VHLP800-11-DWI Dish w/ Pipe Mount (1) Andrew VHLP1-23 Dish w/ Pipe Mount (2) Dragonwave Horizon DUO ODUs(3) (3) T-Arm Mounts	(2) 1/2" TX (3) 1.619" Hybrid	Clear Wireless Existing
100.0	**100.0**	**(3) CommScope FFHH-65C-R3 Panels w/ Pipe Mounts** **(3) Nokia AEHC Panel w/ Pipe Mounts** **(3) Andrew TMBXX-6517-A2M Panels w/ Pipe Mounts** **(1) Andrew TMBX-6517-A1MPanel w/ Pipe Mount** **(3) Nokia AHLOA RRUS(3)** **(3) Nokia AHFIG RRUS(3)** **(2) HCS 2.0 Integrated cable Breakout Box(3)** **(1) 12' Low Profile Platform w/ Handrails**	**(2) 1.48" Hybrid**	**T-Mobile Final**
91.0	91.0	(3) RFS APXVERR18-C Panels (3) Ericsson RRUS 11 (800 MHz) (3) Ericsson RRUS 31 B25 (3) Ericsson ESMR Filters (9) RFS ACU-A20-N RETs (1) 12' Low Profile Platform w/ Handrails	(3) 1-1/4" Hybrid	Sprint Existing

1) Elevations reference centerline of panel, yagi, mounts, and dish antennas, and base of whip antennas, in relation to the base of the tower.
2) Refer to the feed line diagram and analysis output in Appendix A for the location and orientation of feedlines and equipment.
3) Secondary appurtenances such as TMAs, Diplexers, and RRUs are considered to be installed directly behind panel antennas for frontal area shielding. See analysis output for magnitude of individual shielding.
4) Feedlines are located on the exterior of the tower.

2 RESULTS

The analysis was performed using tnxTower v8.0.4.0, a structural analysis program developed by Tower Numerics, Inc. specifically for the communication tower industry.

2.1 TOWER MEMBER STRESS LEVELS

The tower has the following stress ratios in its structural members.

Elev. (ft)	Member	Stress Ratio*
0 – 150.0	Monopole Shaft	0.52
0.0	Base Plate	0.73
0.0	Anchor Rods	0.76

Stress ratio (SR) criteria:
SR $\leq$ 1.00 is completely within code limits.
SR $\leq$ 1.05 is considered within acceptable tolerance of code limits.
SR > 1.05 is outside acceptable tolerance of code limits and requires structural modifications.
* Seismic analysis for similar analysis scenario has been previously shown to produce significantly lower stress ratios than wind and ice. Therefore seismic analysis has not been included in the current analysis.

2.2 FOUNDATION REACTIONS

The reactions listed below are for the design wind speed listed. Reactions are factored loads.

Reaction Type	Current Wind Reactions	Current Iced Reactions	Foundation Status
Moment (ft-kips)	2,777.0	603.0	Passes*
Shear (kips)	28.2	6.1	
Axial (kips)	47.1	80.2	

* See Appendix A for foundation calculations.

2.3 TOWER DEFLECTION

The tower deflections have been reviewed and are believed to be acceptable for the proposed equipment. The carrier(s) should review the deflections for the service wind condition included in Appendix A for compatibility with their equipment.

3 PROVIDED INFORMATION AND ASSUMPTIONS

The following information was directly used to generate this report, and can be found in Appendix B.

Document	Author	Date	Reference
Client Email	InSite Towers, LLC	09/14/2020	MO016
Customer Application	Verizon	09/23/2015	MO016
Customer Application	T-Mobile	09/01/2020	MO016
Structural Analysis Report – Clear Wireless	Structural Components, LLC	05/17/2018	180320

The following assumptions were made in order to complete the analysis. These assumptions must be checked. If they do not accurately represent the existing or proposed tower, foundation, soil, and loading conditions, we must be notified so that we can make the appropriate changes to our analysis, conclusions, and recommendations.

1. Tower and structures were built per manufacturers specifications.
2. The tower and foundation are in good condition with no corrosion, damage or fatiguing issues which could reduce the carrying capacity of the tower.
3. All welds and connections are assumed to develop at least the member capacity, unless determined otherwise and explicitly stated in this report.
4. All prior structural modifications, if any, are assumed to be as per date supplied/ available, to be properly installed and to be fully effective.
5. The feedline and appurtenance configuration is as stated in the report. All antennas, coax, cables and waveguide cables are assumed to be properly installed and supported as per manufacturer requirement.
6. The support mounts and/or platforms are not analyzed and are considered adequate to support the loading.
7. All mounting systems connect at tower bracing points. Local stresses are not considered unless noted otherwise in analysis.
8. Some assumptions are made regarding antenna and mount sizes and their projected areas based on a best interpretation of the data supplied and a best knowledge of antenna type and industry practice.
9. The soil parameters are as per data supplied, or as assumed, and stated in the calculations.

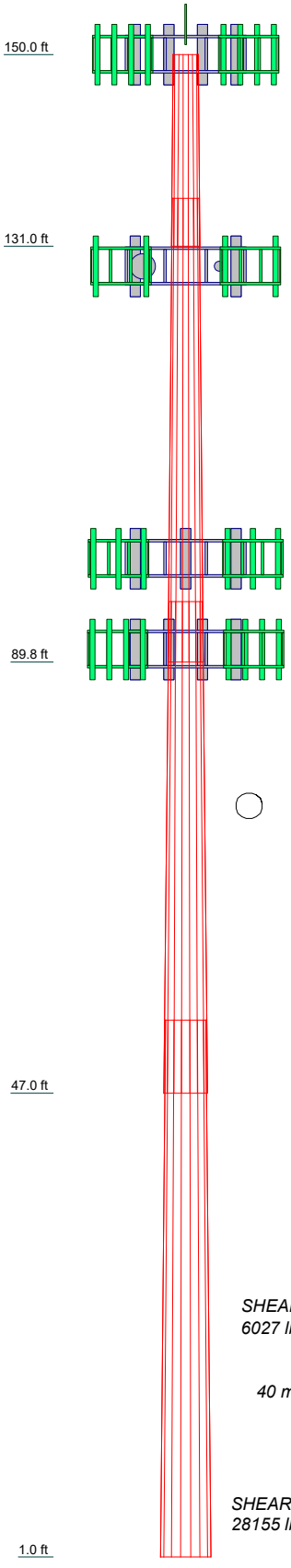
4 CONCLUSIONS

To the best of our knowledge and belief the tower and foundations satisfy the requirements of the applicable codes and standards having jurisdiction over the work for the loadings and conditions as outlined in this report. **Structural modifications are not required at this time.**

APPENDIX A

Tower Profile and Calculations

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	19.00	18	0.2500	4.75	29.9900	34.0800	A572-65	1630.6
2	46.00	18	0.2500	6.00	32.5575	42.4500		4627.1
3	48.75	18	0.3125	7.25	40.6597	51.1400		7500.9
4	53.25	18	0.3750		48.9564	60.4100		11712.7
								25471.4



ALL REACTIONS ARE FACTORED

AXIAL 80145 lb

SHEAR 6027 lb

MOMENT 602914 lb-ft

TORQUE 200 lb-ft
40 mph WIND - 1.5000 in ICE

AXIAL 47080 lb

SHEAR 28155 lb

MOMENT 2776995 lb-ft

TORQUE 775 lb-ft
REACTIONS - 109 mph WIND

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Jackson County, Missouri.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 109 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 51.7%

Structural Components, LLC
1870 West 64th Lane, Unit A
Denver, CO 80221
Phone: (866) 386-7622
FAX:

Job: ***180320***			
Project: ***Lee's Summit (MO016)***			
Client: InSite Towers, LLC	Drawn by: treed	App'd:	
Code: TIA-222-H	Date: 09/21/20	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Jackson County, Missouri.
Tower base elevation above sea level: 1019.00 ft.
Basic wind speed of 109 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.5000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification		Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.00-131.00	19.00	4.75	18	29.9900	34.0800	0.2500	1.0000	A572-65 (65 ksi)
L2	131.00-89.75	46.00	6.00	18	32.5575	42.4500	0.2500	1.0000	A572-65 (65 ksi)
L3	89.75-47.00	48.75	7.25	18	40.6597	51.1400	0.3125	1.2500	A572-65 (65 ksi)
L4	47.00-1.00	53.25		18	48.9564	60.4100	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	30.4141	23.5987	2636.9827	10.5577	15.2349	173.0881	5277.4351	11.8016	4.8382	19.353
	34.5672	26.8441	3881.4176	12.0096	17.3126	224.1956	7767.9425	13.4246	5.5581	22.232
L2	34.0585	25.6360	3380.6051	11.4692	16.5392	204.3994	6765.6585	12.8204	5.2901	21.16
	43.0663	33.4857	7533.9327	14.9810	21.5646	349.3658	15077.7787	16.7460	7.0312	28.125
L3	42.5485	40.0194	8230.6429	14.3232	20.6551	398.4797	16472.1158	20.0135	6.6061	21.14
	51.8807	50.4145	16454.7255	18.0438	25.9791	633.3827	32931.1025	25.2121	8.4506	27.042
L4	51.2372	57.8240	17241.9098	17.2464	24.8698	693.2858	34506.5070	28.9175	7.9563	21.217
	61.2841	71.4567	32537.8749	21.3124	30.6883	1060.2704	65118.5640	35.7351	9.9722	26.592

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.00-131.00				1	1	1			
L2 131.00-89.75				1	1	1			
L3 89.75-47.00				1	1	1			
L4 47.00-1.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
1-5/8" Hybrid (Verizon) ***	C	No	Surface Ar (CaAa)	150.00 - 4.00	2	2	0.000 0.000	1.9800		0.82
Safety Line 3/8	C	No	Surface Ar (CaAa)	150.00 - 1.00	1	1	0.000 0.000	0.3750		0.22

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A (1-5/8 FOAM) (Verizon)	C	No	No	Inside Pole	150.00 - 4.00	18	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
***									
***									
LDF4P-50A (1/2 FOAM) (Clearwire)	B	No	No	Inside Pole	129.00 - 4.00	2	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
1.619" Hybrid (Clearwire)	B	No	No	Inside Pole	129.00 - 4.00	3	No Ice	0.00	2.48
							1/2" Ice	0.00	2.48
							1" Ice	0.00	2.48
							2" Ice	0.00	2.48
***									
1.48" Hybrid (T-Mobile)	B	No	No	Inside Pole	100.00 - 4.00	2	No Ice	0.00	1.63
							1/2" Ice	0.00	1.63
							1" Ice	0.00	1.63
							2" Ice	0.00	1.63
**									
1-1/4" Hybrid (Sprint)	A	No	No	Inside Pole	91.00 - 4.00	3	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	150.00-131.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	8.236	0.000	315.78
L2	131.00-89.75	A	0.000	0.000	0.000	0.000	3.08
		B	0.000	0.000	0.000	0.000	337.15
		C	0.000	0.000	17.882	0.000	685.58
L3	89.75-47.00	A	0.000	0.000	0.000	0.000	105.17
		B	0.000	0.000	0.000	0.000	469.99
		C	0.000	0.000	18.532	0.000	710.51
L4	47.00-1.00	A	0.000	0.000	0.000	0.000	105.78
		B	0.000	0.000	0.000	0.000	472.74
		C	0.000	0.000	18.753	0.000	715.32

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	150.00-131.00	A	1.734	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	24.940	0.000	607.01

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L2	131.00-89.75	A	1.692	0.000	0.000	0.000	0.000	3.08
		B		0.000	0.000	0.000	0.000	337.15
		C		0.000	0.000	54.145	0.000	1317.86
L3	89.75-47.00	A	1.613	0.000	0.000	0.000	0.000	105.17
		B		0.000	0.000	0.000	0.000	469.99
		C		0.000	0.000	55.306	0.000	1342.82
L4	47.00-1.00	A	1.455	0.000	0.000	0.000	0.000	105.78
		B		0.000	0.000	0.000	0.000	472.74
		C		0.000	0.000	55.180	0.000	1320.62

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.00-131.00	0.0000	3.0467	0.0000	3.9390
L2	131.00-89.75	0.0000	3.1081	0.0000	4.1920
L3	89.75-47.00	0.0000	3.1726	0.0000	4.4359
L4	47.00-1.00	0.0000	3.0336	0.0000	4.4051

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	2	1-5/8" Hybrid	131.00 - 150.00	1.0000	1.0000
L1	18	Safety Line 3/8	131.00 - 150.00	1.0000	1.0000
L2	2	1-5/8" Hybrid	89.75 - 131.00	1.0000	1.0000
L2	18	Safety Line 3/8	89.75 - 131.00	1.0000	1.0000
L3	2	1-5/8" Hybrid	47.00 - 89.75	1.0000	1.0000
L3	18	Safety Line 3/8	47.00 - 89.75	1.0000	1.0000
L4	2	1-5/8" Hybrid	4.00 - 47.00	1.0000	1.0000
L4	18	Safety Line 3/8	1.00 - 47.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount (Verizon)	A	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.26 5.92 6.54 7.72	5.53 6.79 7.91 9.82	44.20 92.79 149.01 288.36
(2) BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount (Verizon)	B	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.26 5.92 6.54 7.72	5.53 6.79 7.91 9.82	44.20 92.79 149.01 288.36
(2) BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount (Verizon)	C	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.26 5.92 6.54 7.72	5.53 6.79 7.91 9.82	44.20 92.79 149.01 288.36
(2) LNX-6515DS-A1M w/ Mount Pipe (Verizon)	A	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.45 12.06 12.69 13.94	9.60 11.02 12.29 14.51	78.20 165.17 261.89 488.59
(2) LNX-6515DS-A1M w/ Mount Pipe (Verizon)	B	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.45 12.06 12.69 13.94	9.60 11.02 12.29 14.51	78.20 165.17 261.89 488.59
(2) LNX-6515DS-A1M w/ Mount Pipe (Verizon)	C	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.45 12.06 12.69 13.94	9.60 11.02 12.29 14.51	78.20 165.17 261.89 488.59
LTE AWS RRUS13-A2 (30%frontally shielded) (Verizon)	A	From Face	3.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.28 2.44 2.62 2.99	2.01 2.21 2.42 2.86	74.00 98.90 127.06 193.91
LTE AWS RRUS13-A2 (30%frontally shielded) (Verizon)	B	From Face	3.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.28 2.44 2.62 2.99	2.01 2.21 2.42 2.86	74.00 98.90 127.06 193.91
LTE AWS RRUS13-A2 (30%frontally shielded) (Verizon)	C	From Face	3.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.28 2.44 2.62 2.99	2.01 2.21 2.42 2.86	74.00 98.90 127.06 193.91
AS1613492/RRUS12 (Band 4)(30% frontally shielded) (Verizon)	A	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.45 2.63 2.81 3.17	3.00 3.21 3.44 3.90	57.00 92.68 132.19 223.44
AS1613492/RRUS12 (Band 4)(30% frontally shielded) (Verizon)	B	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.45 2.63 2.81 3.17	3.00 3.21 3.44 3.90	57.00 92.68 132.19 223.44
AS1613492/RRUS12 (Band 4)(30% frontally shielded) (Verizon)	C	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.45 2.63 2.81 3.17	3.00 3.21 3.44 3.90	57.00 92.68 132.19 223.44
(2) Clear Gain CG-1900DD TMAs (Verizon)	A	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.06 1.19 1.33 1.63	0.38 0.47 0.57 0.78	13.90 21.35 30.68 55.78
(2) Clear Gain CG-1900DD TMAs (Verizon)	B	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.06 1.19 1.33 1.63	0.38 0.47 0.57 0.78	13.90 21.35 30.68 55.78
(2) Clear Gain CG-1900DD	C	From Face	3.00	0.0000	150.00	No Ice	1.06	0.38	13.90

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
TMAs			0.00				1/2" Ice	1.19	0.47	21.35
(Verizon)			0.00				1" Ice	1.33	0.57	30.68
							2" Ice	1.63	0.78	55.78
CBC78-DF-2X Diplexers	A	From Face	1.00		0.0000	150.00	No Ice	0.39	0.38	13.90
(Verizon)			0.00				1/2" Ice	0.47	0.45	18.62
			0.00				1" Ice	0.56	0.54	24.81
							2" Ice	0.75	0.74	42.32
CBC78-DF-2X Diplexers	B	From Face	1.00		0.0000	150.00	No Ice	0.39	0.38	13.90
(Verizon)			0.00				1/2" Ice	0.47	0.45	18.62
			0.00				1" Ice	0.56	0.54	24.81
							2" Ice	0.75	0.74	42.32
CBC78-DF-2X Diplexers	C	From Face	1.00		0.0000	150.00	No Ice	0.39	0.38	13.90
(Verizon)			0.00				1/2" Ice	0.47	0.45	18.62
			0.00				1" Ice	0.56	0.54	24.81
							2" Ice	0.75	0.74	42.32
DB-B1-6C-2AB-0Z Surge	A	From Face	1.25		0.0000	150.00	No Ice	2.93	1.92	26.90
Suppressors			0.00				1/2" Ice	3.16	2.12	49.82
(Verizon)			0.00				1" Ice	3.40	2.32	75.86
							2" Ice	3.90	2.76	138.08
Raycap RRFDC-3315-PF-48	B	From Face	1.25		0.0000	150.00	No Ice	2.93	1.92	26.90
SSD			0.00				1/2" Ice	3.16	2.12	49.82
(Verizon)			0.00				1" Ice	3.40	2.32	75.86
							2" Ice	3.90	2.76	138.08
14' Low Profile Platform	C	None			0.0000	150.00	No Ice	19.00	19.00	1275.00
(Verizon)							1/2" Ice	24.00	24.00	1580.00
							1" Ice	29.00	29.00	1900.00
							2" Ice	39.00	39.00	2500.00
***										
***										
RRUS-31	A	From Face	2.50		0.0000	129.00	No Ice	1.62	1.28	60.00
(Clear Wireless)			0.00				1/2" Ice	1.78	1.43	76.09
			0.00				1" Ice	1.95	1.58	94.81
							2" Ice	2.31	1.91	140.93
RRUS-31	B	From Face	2.50		0.0000	129.00	No Ice	1.62	1.28	60.00
(Clear Wireless)			0.00				1/2" Ice	1.78	1.43	76.09
			0.00				1" Ice	1.95	1.58	94.81
							2" Ice	2.31	1.91	140.93
RRUS-31	C	From Face	2.50		0.0000	129.00	No Ice	1.62	1.28	60.00
(Clear Wireless)			0.00				1/2" Ice	1.78	1.43	76.09
			0.00				1" Ice	1.95	1.58	94.81
							2" Ice	2.31	1.91	140.93
RRUS-11	A	From Face	2.50		0.0000	129.00	No Ice	2.52	1.36	51.00
(Clear Wireless)			0.00				1/2" Ice	2.72	1.52	72.64
			0.00				1" Ice	2.92	1.68	97.33
							2" Ice	3.35	2.02	156.62
RRUS-11	B	From Face	2.50		0.0000	129.00	No Ice	2.52	1.36	51.00
(Clear Wireless)			0.00				1/2" Ice	2.72	1.52	72.64
			0.00				1" Ice	2.92	1.68	97.33
							2" Ice	3.35	2.02	156.62
RRUS-11	C	From Face	2.50		0.0000	129.00	No Ice	2.52	1.36	51.00
(Clear Wireless)			0.00				1/2" Ice	2.72	1.52	72.64
			0.00				1" Ice	2.92	1.68	97.33
							2" Ice	3.35	2.02	156.62
Ericsson AIR 6468 Panels w/	A	From Face	3.50		-30.0000	129.00	No Ice	6.97	3.44	151.25
Pipe Mount			0.00				1/2" Ice	7.41	3.99	203.93
(Clear Wireless)			0.00				1" Ice	7.86	4.55	262.49
							2" Ice	8.80	5.72	400.18

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Ericsson AIR 6468 Panels w/ Pipe Mount (Clear Wireless)	B	From Face	3.50 0.00 0.00	-30.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.97 7.41 7.86 8.80	3.44 3.99 4.55 5.72	151.25 203.93 262.49 400.18
Ericsson AIR 6468 Panels w/ Pipe Mount (Clear Wireless)	C	From Face	3.50 0.00 0.00	30.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.97 7.41 7.86 8.80	3.44 3.99 4.55 5.72	151.25 203.93 262.49 400.18
APXVERR18-C Panels w/ Pipe Mount (Clear Wireless)	A	From Face	3.50 0.00 0.00	-30.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.50 9.16 9.79 10.99	7.18 8.46 9.60 11.53	86.20 156.82 235.60 421.63
APXVERR18-C Panels w/ Pipe Mount (Clear Wireless)	B	From Face	3.50 0.00 0.00	-30.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.50 9.16 9.79 10.99	7.18 8.46 9.60 11.53	86.20 156.82 235.60 421.63
APXVERR18-C Panels w/ Pipe Mount (Clear Wireless)	C	From Face	3.50 0.00 0.00	30.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.50 9.16 9.79 10.99	7.18 8.46 9.60 11.53	86.20 156.82 235.60 421.63
Horizon Duo Radio (Full frontal shielding) (Clear Wireless)	A	From Face	2.00 0.00 0.00	-90.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.30 0.38 0.46 0.65	9.00 11.00 15.17 29.30
Horizon Duo Radio (Full frontal shielding) (Clear Wireless)	B	From Face	2.00 0.00 0.00	-45.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.30 0.38 0.46 0.65	9.00 11.00 15.17 29.30
Pipe Mount (Clear Wireless)	A	From Face	1.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	22.50 33.33 48.21 90.78
Pipe Mount (Clear Wireless)	B	From Face	1.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.11 1.37 1.90	0.87 1.11 1.37 1.90	15.00 22.33 32.49 61.95
(3) T Arm's (Clear Wireless)	C	None		0.0000	129.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.33 10.67 12.00 14.67	9.33 10.67 12.00 14.67	666.60 733.33 800.00 933.33
***									
TMBXX-6517-A2M w pipe (T-Mobile)	A	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.14 9.75 10.34 11.54	8.04 9.11 10.08 12.05	101.64 182.32 273.28 478.11
TMBXX-6517-A2M w pipe (T-Mobile)	B	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.14 9.75 10.34 11.54	8.04 9.11 10.08 12.05	101.64 182.32 273.28 478.11
TMBXX-6517-A2M w pipe (T-Mobile)	C	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.14 9.75 10.34 11.54	8.04 9.11 10.08 12.05	101.64 182.32 273.28 478.11
TMBX-6517-A1M w pipe (T-Mobile)	C	From Face	4.00 0.00 0.00	60.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.44 7.04 7.63 8.83	6.63 7.75 8.74 10.78	76.04 136.78 207.81 372.76

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
FFHH-65C-R3 w/ 8' Mount Pipe (T-Mobile)	A	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.11 21.77 22.43 23.77	11.25 12.68 13.97 16.20	156.80 296.97 447.87 785.85
FFHH-65C-R3 w/ 8' Mount Pipe (T-Mobile)	B	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.11 21.77 22.43 23.77	11.25 12.68 13.97 16.20	156.80 296.97 447.87 785.85
FFHH-65C-R3 w/ 8' Mount Pipe (T-Mobile)	C	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.11 21.77 22.43 23.77	11.25 12.68 13.97 16.20	156.80 296.97 447.87 785.85
AEHC SRAN19B LTE (T-Mobile)	A	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.84 7.18 7.52 8.23	2.15 2.40 2.64 3.16	108.00 148.19 192.83 296.21
AEHC SRAN19B LTE (T-Mobile)	B	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.84 7.18 7.52 8.23	2.15 2.40 2.64 3.16	108.00 148.19 192.83 296.21
AEHC SRAN19B LTE (T-Mobile)	C	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.84 7.18 7.52 8.23	2.15 2.40 2.64 3.16	108.00 148.19 192.83 296.21
AHLOA RRU (Full Frontal Shielding) (T-Mobile)	A	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.38 1.54 1.71 2.07	84.00 102.08 123.04 174.38
AHLOA RRU (Full Frontal Shielding) (T-Mobile)	B	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.38 1.54 1.71 2.07	84.00 102.08 123.04 174.38
AHLOA RRU (Full Frontal Shielding) (T-Mobile)	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.38 1.54 1.71 2.07	84.00 102.08 123.04 174.38
AHFIG RRU (Full Frontal Shielding) (T-Mobile)	A	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.31 1.49 1.67 2.07	79.30 98.18 120.16 174.16
AHFIG RRU (Full Frontal Shielding) (T-Mobile)	B	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.31 1.49 1.67 2.07	79.30 98.18 120.16 174.16
AHFIG RRU (Full Frontal Shielding) (T-Mobile)	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.31 1.49 1.67 2.07	79.30 98.18 120.16 174.16
(2) HCS 2.0 Integrated cable Breakout Box (Full Frontal Shielding) (T-Mobile)	A	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.45 0.55 0.64 0.82	1.61 1.93 2.25 2.90
Low Profile Platform w/ Rails (T-Mobile)	C	None		0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	30.00 35.00 40.00 50.00	30.00 35.00 40.00 50.00	1600.00 2000.00 2400.00 3200.00

***

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
APXVERR18-C	A	From Face	4.00	0.0000	91.00	No Ice	8.13	5.28	57.00
(Sprint)			0.00			1/2" Ice	8.59	5.74	107.04
			-30.00			1" Ice	9.05	6.20	163.17
						2" Ice	10.00	7.14	294.48
APXVERR18-C	B	From Face	4.00	0.0000	91.00	No Ice	8.13	5.28	57.00
(Sprint)			0.00			1/2" Ice	8.59	5.74	107.04
			0.00			1" Ice	9.05	6.20	163.17
						2" Ice	10.00	7.14	294.48
APXVERR18-C	C	From Face	4.00	0.0000	91.00	No Ice	8.13	5.28	57.00
(Sprint)			0.00			1/2" Ice	8.59	5.74	107.04
			-5.00			1" Ice	9.05	6.20	163.17
						2" Ice	10.00	7.14	294.48
Ericsson RRUS-11 800 MHz	A	From Face	3.00	0.0000	91.00	No Ice	2.52	1.36	54.00
(Sprint)			0.00			1/2" Ice	2.72	1.52	75.64
			0.00			1" Ice	2.92	1.68	100.33
						2" Ice	3.35	2.02	159.62
Ericsson RRUS-11 800 MHz	B	From Face	3.00	0.0000	91.00	No Ice	2.52	1.36	54.00
(Sprint)			0.00			1/2" Ice	2.72	1.52	75.64
			0.00			1" Ice	2.92	1.68	100.33
						2" Ice	3.35	2.02	159.62
Ericsson RRUS-11 800 MHz	C	From Face	3.00	0.0000	91.00	No Ice	2.52	1.36	54.00
(Sprint)			0.00			1/2" Ice	2.72	1.52	75.64
			0.00			1" Ice	2.92	1.68	100.33
						2" Ice	3.35	2.02	159.62
Ericsson RRUS 31 B25	A	From Face	3.00	0.0000	91.00	No Ice	1.62	1.28	59.50
(Sprint)			0.00			1/2" Ice	1.78	1.43	75.59
			0.00			1" Ice	1.95	1.58	94.31
						2" Ice	2.31	1.91	140.43
Ericsson RRUS 31 B25	B	From Face	3.00	0.0000	91.00	No Ice	1.62	1.28	59.50
(Sprint)			0.00			1/2" Ice	1.78	1.43	75.59
			0.00			1" Ice	1.95	1.58	94.31
						2" Ice	2.31	1.91	140.43
Ericsson RRUS 31 B25	C	From Face	3.00	0.0000	91.00	No Ice	1.62	1.28	59.50
(Sprint)			0.00			1/2" Ice	1.78	1.43	75.59
			0.00			1" Ice	1.95	1.58	94.31
						2" Ice	2.31	1.91	140.43
(3) ACU-A20-N RET	A	From Face	4.00	0.0000	91.00	No Ice	0.07	0.12	1.04
(Sprint)			0.00			1/2" Ice	0.10	0.16	2.32
			0.00			1" Ice	0.15	0.21	4.41
						2" Ice	0.26	0.34	11.80
(3) ACU-A20-N RET	B	From Face	4.00	0.0000	91.00	No Ice	0.07	0.12	1.04
(Sprint)			0.00			1/2" Ice	0.10	0.16	2.32
			0.00			1" Ice	0.15	0.21	4.41
						2" Ice	0.26	0.34	11.80
(3) ACU-A20-N RET	C	From Face	4.00	0.0000	91.00	No Ice	0.07	0.12	1.04
(Sprint)			0.00			1/2" Ice	0.10	0.16	2.32
			0.00			1" Ice	0.15	0.21	4.41
						2" Ice	0.26	0.34	11.80
Low Profile Platform w/ Rails	C	None		0.0000	91.00	No Ice	30.00	30.00	1600.00
(Sprint)						1/2" Ice	35.00	35.00	2000.00
						1" Ice	40.00	40.00	2400.00
						2" Ice	50.00	50.00	3200.00
Ericsson ESMR Filters	A	From Face	3.00	0.0000	91.00	No Ice	0.42	0.41	10.00
(Sprint)			0.00			1/2" Ice	0.51	0.50	14.60
			0.00			1" Ice	0.61	0.60	20.69
						2" Ice	0.83	0.82	38.16
Ericsson ESMR Filters	B	From Face	3.00	0.0000	91.00	No Ice	0.42	0.41	10.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Sprint)			0.00			1/2" Ice	0.51	0.50	14.60
			0.00			1" Ice	0.61	0.60	20.69
						2" Ice	0.83	0.82	38.16
Ericsson ESMR Filters	C	From Face	3.00	0.0000	91.00	No Ice	0.42	0.41	10.00
(Sprint)			0.00			1/2" Ice	0.51	0.50	14.60
			0.00			1" Ice	0.61	0.60	20.69
						2" Ice	0.83	0.82	38.16
***									
6' x 5/8" Lighting Rod	C	From Face	0.00	0.0000	150.00	No Ice	0.38	0.38	10.00
			0.00			1/2" Ice	0.99	0.99	14.19
			3.00			1" Ice	1.62	1.62	22.26
						2" Ice	2.46	2.46	50.66

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
VHLP 800-11	A	Paraboloid	From	3.50	-90.0000		129.00	2.60	No Ice	5.31	49.00
(Clearwire)		w/Shroud (HP)	Face	0.00					1/2" Ice	5.66	78.05
				0.00					1" Ice	6.00	107.11
									2" Ice	6.69	165.22
VHLP1-23	B	Paraboloid	From	2.50	-45.0000		129.00	1.00	No Ice	0.90	14.00
(Clearwire)		w/Shroud (HP)	Face	0.00					1/2" Ice	1.04	25.00
				0.00					1" Ice	1.19	30.40
									2" Ice	1.48	41.20

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	25471.36					
Bracing Weight	0.00					
Total Member Self-Weight	25471.36			667.87	187.58	
Total Weight	39233.53			667.87	187.58	
Wind 0 deg - No Ice		237.41	-28001.39	-2686282.69	-30749.26	-554.67
Wind 30 deg - No Ice		14146.26	-24342.93	-2338480.07	-1362712.46	-338.54
Wind 60 deg - No Ice		24289.69	-14213.17	-1370478.93	-2332695.67	-259.54
Wind 90 deg - No Ice		27935.92	-293.22	-37413.21	-2679018.39	-217.40
Wind 120 deg - No Ice		24070.92	13840.73	1323193.06	-2304144.73	475.69
Wind 150 deg - No Ice		13749.18	24150.69	2314659.90	-1310937.08	566.87
Wind 180 deg - No Ice		-222.96	27957.05	2681942.68	29274.43	321.19
Wind 210 deg - No Ice		-14122.60	24306.16	2335109.37	1360059.86	46.83
Wind 240 deg - No Ice		-24253.99	14179.55	1367511.77	2328502.03	-101.18

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 270 deg - No Ice		-27922.67	242.96	32315.65	2677697.56	-105.90
Wind 300 deg - No Ice		-24096.29	-13798.83	-1316493.23	2307767.88	-238.98
Wind 330 deg - No Ice		-13711.88	-24178.95	-2316941.47	1306537.20	-774.12
Member Ice	13592.79					
Total Weight Ice	70588.71			5525.45	537.94	
Wind 0 deg - Ice		24.71	-6015.14	-560591.40	-2738.15	-168.20
Wind 30 deg - Ice		3017.29	-5217.38	-485842.48	-283980.42	-116.95
Wind 60 deg - Ice		5205.50	-3030.41	-280554.19	-489511.18	-70.81
Wind 90 deg - Ice		6001.03	-34.14	1042.16	-564007.41	-24.79
Wind 120 deg - Ice		5183.91	2994.05	286755.31	-486634.59	124.89
Wind 150 deg - Ice		2976.58	5200.73	494648.51	-278573.57	163.85
Wind 180 deg - Ice		-22.42	6008.27	570762.96	3521.21	128.55
Wind 210 deg - Ice		-3013.53	5211.75	496172.25	284574.98	67.61
Wind 240 deg - Ice		-5199.74	3025.21	290940.52	489850.90	10.25
Wind 270 deg - Ice		-5998.80	25.93	8957.19	564798.05	-28.89
Wind 300 deg - Ice		-5188.16	-2987.11	-274816.35	488254.80	-85.76
Wind 330 deg - Ice		-2970.50	-5205.02	-484146.89	278870.60	-198.91
Total Weight	39233.53			667.87	187.58	
Wind 0 deg - Service		64.36	-7591.44	-728318.69	-8199.70	-150.38
Wind 30 deg - Service		3835.19	-6599.60	-634026.07	-369307.65	-91.78
Wind 60 deg - Service		6585.17	-3853.33	-371591.71	-632279.36	-70.37
Wind 90 deg - Service		7573.69	-79.50	-10184.86	-726170.76	-58.94
Wind 120 deg - Service		6525.86	3752.36	358688.50	-624538.93	128.96
Wind 150 deg - Service		3727.53	6547.48	627484.64	-355270.85	153.68
Wind 180 deg - Service		-60.45	7579.42	727058.51	8073.30	87.08
Wind 210 deg - Service		-3828.77	6589.63	633028.68	368861.95	12.70
Wind 240 deg - Service		-6575.49	3844.21	370703.73	631415.87	-27.43
Wind 270 deg - Service		-7570.10	65.87	8719.30	726086.12	-28.71
Wind 300 deg - Service		-6532.73	-3740.99	-356955.68	625794.65	-64.79
Wind 330 deg - Service		-3717.42	-6555.14	-628186.75	354351.44	-209.87

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice

Comb. No.	Description
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	26	80145.46	-0.19	0.73
	Max. H_x	21	35310.13	27920.96	-242.94
	Max. H_z	3	35310.13	-237.39	27999.68
	Max. M_x	2	2755839.13	-237.38	27998.98
	Max. M_z	8	2748686.63	-27935.08	293.21
	Max. Torsion	24	775.23	13711.83	24178.87
	Min. Vert	3	35310.13	-237.39	27999.68
	Min. H_x	9	35310.16	-27935.33	293.22
	Min. H_z	15	35310.13	222.94	-27955.34
	Min. M_x	14	-2751652.65	222.93	-27954.64
	Min. M_z	20	-2747211.08	27920.26	-242.93
	Min. Torsion	12	-566.88	-13749.14	-24150.61

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	39233.53	-0.00	0.00	667.87	187.58	0.00
1.2 Dead+1.0 Wind 0 deg - No	47080.17	237.38	-27998.98	-2755839.13	-31598.43	-563.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Ice						
0.9 Dead+1.0 Wind 0 deg - No Ice	35310.13	237.39	-27999.68	-2737985.51	-31426.71	-560.76
1.2 Dead+1.0 Wind 30 deg - No Ice	47080.24	14146.21	-24342.85	-2399297.86	-1398239.37	-351.00
0.9 Dead+1.0 Wind 30 deg - No Ice	35310.18	14146.22	-24342.88	-2383692.98	-1389072.78	-347.60
1.2 Dead+1.0 Wind 60 deg - No Ice	47080.24	24289.61	-14213.12	-1406125.50	-2393457.63	-271.91
0.9 Dead+1.0 Wind 60 deg - No Ice	35310.18	24289.63	-14213.14	-1397049.46	-2377745.78	-268.26
1.2 Dead+1.0 Wind 90 deg - No Ice	47080.21	27935.08	-293.21	-38360.99	-2748686.63	-226.31
0.9 Dead+1.0 Wind 90 deg - No Ice	35310.16	27935.33	-293.22	-38285.12	-2730675.13	-223.39
1.2 Dead+1.0 Wind 120 deg - No Ice	47080.24	24070.84	13840.69	1357758.22	-2364109.25	469.71
0.9 Dead+1.0 Wind 120 deg - No Ice	35310.18	24070.86	13840.70	1348627.38	-2348612.38	471.14
1.2 Dead+1.0 Wind 150 deg - No Ice	47080.24	13749.14	24150.61	2375091.73	-1344975.71	566.88
0.9 Dead+1.0 Wind 150 deg - No Ice	35310.18	13749.15	24150.63	2359254.64	-1336199.95	566.42
1.2 Dead+1.0 Wind 180 deg - No Ice	47080.17	-222.93	27954.64	2751652.65	30165.50	328.12
0.9 Dead+1.0 Wind 180 deg - No Ice	35310.13	-222.94	27955.34	2733420.13	29885.79	325.89
1.2 Dead+1.0 Wind 210 deg - No Ice	47080.24	-14122.56	24306.09	2396108.50	1395596.70	59.28
0.9 Dead+1.0 Wind 210 deg - No Ice	35310.18	-14122.57	24306.11	2380117.33	1386330.90	55.87
1.2 Dead+1.0 Wind 240 deg - No Ice	47080.24	-24253.91	14179.51	1403351.01	2389231.65	-86.56
0.9 Dead+1.0 Wind 240 deg - No Ice	35310.18	-24253.94	14179.52	1393885.40	2373432.03	-90.24
1.2 Dead+1.0 Wind 270 deg - No Ice	47080.17	-27920.26	242.93	33389.97	2747211.08	-93.71
0.9 Dead+1.0 Wind 270 deg - No Ice	35310.13	-27920.96	242.94	32941.21	2729151.38	-96.66
1.2 Dead+1.0 Wind 300 deg - No Ice	47080.24	-24096.21	-13798.78	-1350589.50	2367923.54	-232.82
0.9 Dead+1.0 Wind 300 deg - No Ice	35310.18	-24096.24	-13798.80	-1341920.51	2352279.81	-234.26
1.2 Dead+1.0 Wind 330 deg - No Ice	47080.24	-13711.83	-24178.87	-2377165.67	1340532.20	-775.23
0.9 Dead+1.0 Wind 330 deg - No Ice	35310.18	-13711.85	-24178.89	-2361722.48	1331670.49	-774.76
1.2 Dead+1.0 Ice+1.0 Temp	80145.46	0.19	-0.73	5679.50	579.97	0.06
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	80145.46	24.71	-6014.75	-590483.00	-2838.74	-173.41
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	80145.46	3017.10	-5217.05	-511729.80	-299172.12	-124.99
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	80145.46	5205.16	-3030.21	-295434.87	-515728.26	-79.49
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	80145.46	6000.64	-34.14	1268.10	-594214.82	-31.78
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	80145.46	5183.57	2993.85	302336.95	-512675.40	121.49
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	80145.46	2976.39	5200.39	521395.71	-293434.33	164.95
1.2 Dead+1.0 Wind 180	80145.46	-22.42	6007.87	601599.15	3803.65	133.89

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	80145.46	-3013.34	5211.41	523013.94	299937.06	75.79
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	80145.46	-5199.41	3025.01	306779.26	516223.08	19.13
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	80145.46	-5998.41	25.92	9666.01	595188.07	-21.67
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	80145.46	-5187.82	-2986.92	-289346.45	514528.45	-82.14
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	80145.46	-2970.31	-5204.69	-509929.64	293884.08	-199.89
Dead+Wind 0 deg - Service	39233.53	64.36	-7590.91	-743635.99	-8396.11	-152.40
Dead+Wind 30 deg - Service	39233.53	3834.92	-6599.14	-647298.38	-377361.46	-94.79
Dead+Wind 60 deg - Service	39233.53	6584.70	-3853.05	-379160.17	-646051.53	-73.51
Dead+Wind 90 deg - Service	39233.53	7573.16	-79.49	-9890.73	-741978.79	-61.40
Dead+Wind 120 deg - Service	39233.53	6525.40	3752.09	367026.65	-638123.30	127.73
Dead+Wind 150 deg - Service	39233.53	3727.28	6547.02	641681.63	-362983.38	154.04
Dead+Wind 180 deg - Service	39233.53	-60.44	7578.89	743428.75	8272.97	88.96
Dead+Wind 210 deg - Service	39233.53	-3828.50	6589.17	647360.33	376911.32	15.65
Dead+Wind 240 deg - Service	39233.53	-6575.03	3843.94	379334.20	645173.54	-24.17
Dead+Wind 270 deg - Service	39233.53	-7569.57	65.86	9473.19	741898.52	-26.05
Dead+Wind 300 deg - Service	39233.53	-6532.28	-3740.73	-364168.41	639415.87	-63.49
Dead+Wind 330 deg - Service	39233.53	-3717.16	-6554.69	-641317.41	362048.00	-210.34

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-39233.53	0.00	0.00	39233.53	-0.00	0.000%
2	237.41	-47080.24	-28001.39	-237.38	47080.17	27998.98	0.004%
3	237.41	-35310.18	-28001.39	-237.39	35310.13	27999.68	0.004%
4	14146.26	-47080.24	-24342.93	-14146.21	47080.24	24342.85	0.000%
5	14146.26	-35310.18	-24342.93	-14146.22	35310.18	24342.88	0.000%
6	24289.69	-47080.24	-14213.17	-24289.61	47080.24	14213.12	0.000%
7	24289.69	-35310.18	-14213.17	-24289.63	35310.18	14213.14	0.000%
8	27935.92	-47080.24	-293.22	-27935.08	47080.21	293.21	0.002%
9	27935.92	-35310.18	-293.22	-27935.33	35310.16	293.22	0.001%
10	24070.92	-47080.24	13840.73	-24070.84	47080.24	-13840.69	0.000%
11	24070.92	-35310.18	13840.73	-24070.86	35310.18	-13840.70	0.000%
12	13749.18	-47080.24	24150.69	-13749.14	47080.24	-24150.61	0.000%
13	13749.18	-35310.18	24150.69	-13749.15	35310.18	-24150.63	0.000%
14	-222.96	-47080.24	27957.05	222.93	47080.17	-27954.64	0.004%
15	-222.96	-35310.18	27957.05	222.94	35310.13	-27955.34	0.004%
16	-14122.60	-47080.24	24306.16	14122.56	47080.24	-24306.09	0.000%
17	-14122.60	-35310.18	24306.16	14122.57	35310.18	-24306.11	0.000%
18	-24253.99	-47080.24	14179.55	24253.91	47080.24	-14179.51	0.000%
19	-24253.99	-35310.18	14179.55	24253.94	35310.18	-14179.52	0.000%
20	-27922.67	-47080.24	242.96	27920.26	47080.17	-242.93	0.004%
21	-27922.67	-35310.18	242.96	27920.96	35310.13	-242.94	0.004%
22	-24096.29	-47080.24	-13798.83	24096.21	47080.24	13798.78	0.000%
23	-24096.29	-35310.18	-13798.83	24096.24	35310.18	13798.80	0.000%
24	-13711.88	-47080.24	-24178.95	13711.83	47080.24	24178.87	0.000%
25	-13711.88	-35310.18	-24178.95	13711.85	35310.18	24178.89	0.000%
26	0.00	-80145.46	0.00	-0.19	80145.46	0.73	0.001%
27	24.71	-80145.46	-6015.14	-24.71	80145.46	6014.75	0.000%
28	3017.29	-80145.46	-5217.38	-3017.10	80145.46	5217.05	0.000%
29	5205.50	-80145.46	-3030.41	-5205.16	80145.46	3030.21	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
30	6001.03	-80145.46	-34.14	-6000.64	80145.46	34.14	0.000%
31	5183.91	-80145.46	2994.05	-5183.57	80145.46	-2993.85	0.000%
32	2976.58	-80145.46	5200.73	-2976.39	80145.46	-5200.39	0.000%
33	-22.42	-80145.46	6008.27	22.42	80145.46	-6007.87	0.000%
34	-3013.53	-80145.46	5211.75	3013.34	80145.46	-5211.41	0.000%
35	-5199.74	-80145.46	3025.21	5199.41	80145.46	-3025.01	0.000%
36	-5998.80	-80145.46	25.93	5998.41	80145.46	-25.92	0.000%
37	-5188.16	-80145.46	-2987.11	5187.82	80145.46	2986.92	0.000%
38	-2970.50	-80145.46	-5205.02	2970.31	80145.46	5204.69	0.000%
39	64.36	-39233.53	-7591.44	-64.36	39233.53	7590.91	0.001%
40	3835.19	-39233.53	-6599.60	-3834.92	39233.53	6599.14	0.001%
41	6585.17	-39233.53	-3853.33	-6584.70	39233.53	3853.05	0.001%
42	7573.69	-39233.53	-79.50	-7573.16	39233.53	79.49	0.001%
43	6525.86	-39233.53	3752.36	-6525.40	39233.53	-3752.09	0.001%
44	3727.53	-39233.53	6547.48	-3727.28	39233.53	-6547.02	0.001%
45	-60.45	-39233.53	7579.42	60.44	39233.53	-7578.89	0.001%
46	-3828.77	-39233.53	6589.63	3828.50	39233.53	-6589.17	0.001%
47	-6575.49	-39233.53	3844.21	6575.03	39233.53	-3843.94	0.001%
48	-7570.10	-39233.53	65.87	7569.57	39233.53	-65.86	0.001%
49	-6532.73	-39233.53	-3740.99	6532.28	39233.53	3740.73	0.001%
50	-3717.42	-39233.53	-6555.14	3717.16	39233.53	6554.69	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	12	0.00008200	0.00009501
3	Yes	12	0.00005758	0.00008456
4	Yes	15	0.00000001	0.00009707
5	Yes	15	0.00000001	0.00007776
6	Yes	15	0.00000001	0.00010276
7	Yes	15	0.00000001	0.00008241
8	Yes	13	0.00000001	0.00007641
9	Yes	13	0.00000001	0.00006481
10	Yes	15	0.00000001	0.00009330
11	Yes	15	0.00000001	0.00007495
12	Yes	15	0.00000001	0.00009164
13	Yes	15	0.00000001	0.00007358
14	Yes	12	0.00008200	0.00012905
15	Yes	12	0.00005758	0.00011212
16	Yes	15	0.00000001	0.00010023
17	Yes	15	0.00000001	0.00008033
18	Yes	15	0.00000001	0.00009785
19	Yes	15	0.00000001	0.00007839
20	Yes	12	0.00008200	0.00009430
21	Yes	12	0.00005758	0.00008396
22	Yes	15	0.00000001	0.00009396
23	Yes	15	0.00000001	0.00007549
24	Yes	15	0.00000001	0.00009475
25	Yes	15	0.00000001	0.00007614
26	Yes	6	0.00000001	0.00001007
27	Yes	13	0.00000001	0.00009811
28	Yes	13	0.00000001	0.00010810
29	Yes	13	0.00000001	0.00010864
30	Yes	13	0.00000001	0.00009881

31	Yes	13	0.00000001	0.00010906
32	Yes	13	0.00000001	0.00010919
33	Yes	13	0.00000001	0.00010036
34	Yes	13	0.00000001	0.00011104
35	Yes	13	0.00000001	0.00011061
36	Yes	13	0.00000001	0.00009923
37	Yes	13	0.00000001	0.00010749
38	Yes	13	0.00000001	0.00010743
39	Yes	12	0.00000001	0.00003066
40	Yes	12	0.00000001	0.00003947
41	Yes	12	0.00000001	0.00004704
42	Yes	12	0.00000001	0.00003189
43	Yes	12	0.00000001	0.00004029
44	Yes	12	0.00000001	0.00003868
45	Yes	12	0.00000001	0.00003058
46	Yes	12	0.00000001	0.00004417
47	Yes	12	0.00000001	0.00004053
48	Yes	12	0.00000001	0.00003044
49	Yes	12	0.00000001	0.00004160
50	Yes	12	0.00000001	0.00004327

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 131	13.611	40	0.7333	0.0006
L2	135.75 - 89.75	11.437	40	0.7197	0.0006
L3	95.75 - 47	5.921	46	0.5669	0.0003
L4	54.25 - 1	1.927	40	0.3243	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(2) BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount	40	13.611	0.7333	0.0010	76654
129.00	VHLP 800-11	46	10.432	0.7055	0.0008	22319
100.00	TMBXX-6517-A2M w pipe	46	6.446	0.5890	0.0005	12793
91.00	APXVERR18-C	46	5.354	0.5412	0.0004	11162

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 131	50.487	4	2.7209	0.0023
L2	135.75 - 89.75	42.424	4	2.6709	0.0021
L3	95.75 - 47	21.961	4	2.1034	0.0011
L4	54.25 - 1	7.145	4	1.2028	0.0004

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(2) BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount	4	50.487	2.7209	0.0038	20819
129.00	VHLP 800-11	4	38.696	2.6183	0.0031	6047
100.00	TMBXX-6517-A2M w pipe	4	23.912	2.1857	0.0017	3456
91.00	APXVERR18-C	4	19.860	2.0082	0.0015	3014

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 148.982	TP34.08x29.99x0.25	19.00	0.00	0.0	23.7726	-8993.69	1390690.00	0.006
	148.982 - 147.964					23.9464	-3098.39	1400870.00	0.002
	147.964 - 146.946					24.1203	-3214.76	1411040.00	0.002
	146.946 - 145.929					24.2941	-3334.28	1421210.00	0.002
	145.929 - 144.911					24.4680	-3452.19	1431380.00	0.002
	144.911 - 143.893					24.6419	-3570.86	1441550.00	0.002
	143.893 - 142.875					24.8157	-3690.28	1451720.00	0.003
	142.875 - 141.857					24.9896	-3810.46	1461890.00	0.003
	141.857 - 140.839					25.1634	-3931.39	1472060.00	0.003
	140.839 - 139.821					25.3373	-4053.08	1482230.00	0.003
	139.821 - 138.804					25.5112	-4175.52	1492400.00	0.003
	138.804 - 137.786					25.6850	-4298.73	1502570.00	0.003
	137.786 - 136.768					25.8589	-4422.69	1512750.00	0.003
	136.768 - 135.75					26.0328	-4547.41	1522920.00	0.003
	135.75 - 131					26.8441	-2860.81	1570380.00	0.002
L2	135.75 - 131	TP42.45x32.5575x0.25	46.00	0.00	0.0	26.4466	-2780.57	1547120.00	0.002
	131 - 129.042					26.7807	-5906.96	1566670.00	0.004
	129.042 -					27.1149	-8251.59	1586220.00	0.005

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	127.083								
	127.083 - 125.125					27.4491	-8523.69	1605770.00	0.005
	125.125 - 123.167					27.7833	-8798.85	1625320.00	0.005
	123.167 - 121.208					28.1175	-9077.07	1644870.00	0.006
	121.208 - 119.25					28.4517	-9358.35	1664420.00	0.006
	119.25 - 117.292					28.7858	-9642.70	1683970.00	0.006
	117.292 - 115.333					29.1200	-9930.11	1703520.00	0.006
	115.333 - 113.375					29.4542	-10220.60	1723070.00	0.006
	113.375 - 111.417					29.7884	-10514.10	1742620.00	0.006
	111.417 - 109.458					30.1226	-10810.70	1762170.00	0.006
	109.458 - 107.5					30.4567	-11110.40	1781720.00	0.006
	107.5 - 105.542					30.7909	-11413.10	1801270.00	0.006
	105.542 - 103.583					31.1251	-11718.90	1820820.00	0.006
	103.583 - 101.625					31.4593	-12027.80	1840370.00	0.007
	101.625 - 99.6667					31.7935	-16094.90	1859920.00	0.009
	99.6667 - 97.7083					32.1276	-16412.90	1879470.00	0.009
	97.7083 - 95.75					32.4618	-16734.30	1899020.00	0.009
	95.75 - 89.75					33.4857	-10614.30	1958910.00	0.005
L3	95.75 - 89.75	TP51.14x40.6597x0.3125	48.75	0.00	0.0	41.2988	-10599.40	2415980.00	0.004
	89.75 - 87.7778					41.7193	-21628.40	2440580.00	0.009
	87.7778 - 85.8056					42.1399	-22044.30	2465180.00	0.009
	85.8056 - 83.8333					42.5604	-22464.30	2489780.00	0.009
	83.8333 - 81.8611					42.9809	-22888.30	2514390.00	0.009
	81.8611 - 79.8889					43.4015	-23316.40	2538990.00	0.009
	79.8889 - 77.9167					43.8220	-23748.50	2563590.00	0.009
	77.9167 - 75.9444					44.2426	-24184.50	2588190.00	0.009
	75.9444 - 73.9722					44.6631	-24624.60	2612790.00	0.009
	73.9722 - 72					45.0837	-25068.70	2637390.00	0.010
	72 - 70.0278					45.5042	-25516.70	2662000.00	0.010
	70.0278 - 68.0556					45.9248	-25968.70	2686600.00	0.010
	68.0556 - 66.0833					46.3453	-26424.70	2711200.00	0.010
	66.0833 - 64.1111					46.7659	-26884.60	2735800.00	0.010
	64.1111 -					47.1864	-27348.40	2760400.00	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	62.1389								
	62.1389 - 60.1667					47.6069	-27816.20	2785010.00	0.010
	60.1667 - 58.1944					48.0275	-28287.90	2809610.00	0.010
	58.1944 - 56.2222					48.4480	-28763.60	2834210.00	0.010
	56.2222 - 54.25					48.8686	-29243.10	2858810.00	0.010
	54.25 - 47					50.4145	-15054.40	2949250.00	0.005
L4	54.25 - 47	TP60.41x48.9564x0.375	53.25	0.00	0.0	59.6801	-17671.90	3491290.00	0.005
	47 - 44.5789					60.2999	-33427.80	3527540.00	0.009
	44.5789 - 42.1579					60.9197	-34128.70	3563800.00	0.010
	42.1579 - 39.7368					61.5395	-34836.40	3600060.00	0.010
	39.7368 - 37.3158					62.1594	-35550.90	3636320.00	0.010
	37.3158 - 34.8947					62.7792	-36272.00	3672580.00	0.010
	34.8947 - 32.4737					63.3990	-36999.90	3708840.00	0.010
	32.4737 - 30.0526					64.0188	-37734.50	3745100.00	0.010
	30.0526 - 27.6316					64.6386	-38475.70	3781360.00	0.010
	27.6316 - 25.2105					65.2585	-39223.60	3817620.00	0.010
	25.2105 - 22.7895					65.8783	-39978.20	3853880.00	0.010
	22.7895 - 20.3684					66.4981	-40739.30	3890140.00	0.010
	20.3684 - 17.9474					67.1179	-41507.10	3926400.00	0.011
	17.9474 - 15.5263					67.7377	-42281.50	3962660.00	0.011
	15.5263 - 13.1053					68.3576	-43062.50	3998920.00	0.011
	13.1053 - 10.6842					68.9774	-43850.10	4035180.00	0.011
	10.6842 - 8.26316					69.5972	-44644.20	4071440.00	0.011
	8.26316 - 5.84211					70.2170	-45444.80	4107700.00	0.011
	5.84211 - 3.42105					70.8368	-46252.00	4143960.00	0.011
	3.42105 - 1					71.4567	-47065.70	4180210.00	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	150 - 148.982	TP34.08x29.99x0.25	1396.47	1019983.33	0.001	0.00	1019983.33	0.000
	148.982 - 147.964		10754.33	1032591.67	0.010	0.00	1032591.67	0.000

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		lb-ft	lb-ft		lb-ft	lb-ft	
	147.964 - 146.946		16220.25	1045241.67	0.016	0.00	1045241.67	0.000
	146.946 - 145.929		21773.58	1057933.33	0.021	0.00	1057933.33	0.000
	145.929 - 144.911		27422.75	1070658.33	0.026	0.00	1070658.33	0.000
	144.911 - 143.893		33160.17	1083416.67	0.031	0.00	1083416.67	0.000
	143.893 - 142.875		38986.50	1096216.67	0.036	0.00	1096216.67	0.000
	142.875 - 141.857		44902.17	1109050.00	0.040	0.00	1109050.00	0.000
	141.857 - 140.839		50907.83	1121916.67	0.045	0.00	1121916.67	0.000
	140.839 - 139.821		57004.08	1134816.67	0.050	0.00	1134816.67	0.000
	139.821 - 138.804		63191.42	1147758.33	0.055	0.00	1147758.33	0.000
	138.804 - 137.786		69470.42	1160725.00	0.060	0.00	1160725.00	0.000
	137.786 - 136.768		75841.67	1173716.67	0.065	0.00	1173716.67	0.000
	136.768 - 135.75		82305.67	1186750.00	0.069	0.00	1186750.00	0.000
	135.75 - 131		58256.58	1247925.00	0.047	0.00	1247925.00	0.000
L2	135.75 - 131	TP42.45x32.5575x0.25	55516.25	1217875.00	0.046	0.00	1217875.00	0.000
	131 - 129.042		127370.00	1243125.00	0.102	0.00	1243125.00	0.000
	129.042 - 127.083		146109.17	1268475.00	0.115	0.00	1268475.00	0.000
	127.083 - 125.125		165480.00	1293925.00	0.128	0.00	1293925.00	0.000
	125.125 - 123.167		185202.50	1319450.00	0.140	0.00	1319450.00	0.000
	123.167 - 121.208		205278.33	1345058.33	0.153	0.00	1345058.33	0.000
	121.208 - 119.25		225709.17	1370750.00	0.165	0.00	1370750.00	0.000
	119.25 - 117.292		246498.33	1396500.00	0.177	0.00	1396500.00	0.000
	117.292 - 115.333		267647.50	1422325.00	0.188	0.00	1422325.00	0.000
	115.333 - 113.375		289158.33	1448208.33	0.200	0.00	1448208.33	0.000
	113.375 - 111.417		311032.50	1474141.67	0.211	0.00	1474141.67	0.000
	111.417 - 109.458		333273.33	1500125.00	0.222	0.00	1500125.00	0.000
	109.458 - 107.5		355881.67	1526150.00	0.233	0.00	1526150.00	0.000
	107.5 - 105.542		378860.83	1552208.33	0.244	0.00	1552208.33	0.000
	105.542 - 103.583		402211.67	1578300.00	0.255	0.00	1578300.00	0.000
	103.583 - 101.625		425936.67	1604425.00	0.265	0.00	1604425.00	0.000
	101.625 - 99.6667		451243.33	1630566.67	0.277	0.00	1630566.67	0.000
	99.6667 - 97.7083		484369.17	1656725.00	0.292	0.00	1656725.00	0.000
	97.7083 -		517869.17	1682883.33	0.308	0.00	1682883.33	0.000

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		lb-ft	lb-ft		lb-ft	lb-ft	
	95.75							
	95.75 - 89.75		281980.00	1763058.33	0.160	0.00	1763058.33	0.000
L3	95.75 - 89.75	TP51.14x40.6597x0.3125	337991.67	2376400.00	0.142	0.00	2376400.00	0.000
	89.75 - 87.7778		659722.50	2416100.00	0.273	0.00	2416100.00	0.000
	87.7778 - 85.8056		699855.00	2455925.00	0.285	0.00	2455925.00	0.000
	85.8056 - 83.8333		740365.83	2495875.00	0.297	0.00	2495875.00	0.000
	83.8333 - 81.8611		781255.83	2535933.33	0.308	0.00	2535933.33	0.000
	81.8611 - 79.8889		822524.17	2576100.00	0.319	0.00	2576100.00	0.000
	79.8889 - 77.9167		864175.00	2616375.00	0.330	0.00	2616375.00	0.000
	77.9167 - 75.9444		906200.00	2656750.00	0.341	0.00	2656750.00	0.000
	75.9444 - 73.9722		948600.00	2697208.33	0.352	0.00	2697208.33	0.000
	73.9722 - 72		991383.33	2737758.33	0.362	0.00	2737758.33	0.000
	72 - 70.0278		1034550.00	2778383.33	0.372	0.00	2778383.33	0.000
	70.0278 - 68.0556		1078083.33	2819083.33	0.382	0.00	2819083.33	0.000
	68.0556 - 66.0833		1122008.33	2859858.33	0.392	0.00	2859858.33	0.000
	66.0833 - 64.1111		1166300.00	2900700.00	0.402	0.00	2900700.00	0.000
	64.1111 - 62.1389		1210975.00	2941591.67	0.412	0.00	2941591.67	0.000
	62.1389 - 60.1667		1256033.33	2982541.67	0.421	0.00	2982541.67	0.000
	60.1667 - 58.1944		1301458.33	3023533.33	0.430	0.00	3023533.33	0.000
	58.1944 - 56.2222		1347275.00	3064566.67	0.440	0.00	3064566.67	0.000
	56.2222 - 54.25		1393458.33	3105641.67	0.449	0.00	3105641.67	0.000
	54.25 - 47		728570.83	3256833.33	0.224	0.00	3256833.33	0.000
L4	54.25 - 47	TP60.41x48.9564x0.375	838250.00	4130166.67	0.203	0.00	4130166.67	0.000
	47 - 44.5789		1625941.67	4200466.67	0.387	0.00	4200466.67	0.000
	44.5789 - 42.1579		1685608.33	4270983.33	0.395	0.00	4270983.33	0.000
	42.1579 - 39.7368		1745816.67	4341716.67	0.402	0.00	4341716.67	0.000
	39.7368 - 37.3158		1806550.00	4412650.00	0.409	0.00	4412650.00	0.000
	37.3158 - 34.8947		1867808.33	4483783.33	0.417	0.00	4483783.33	0.000
	34.8947 - 32.4737		1929591.67	4555091.67	0.424	0.00	4555091.67	0.000
	32.4737 - 30.0526		1991883.33	4626575.00	0.431	0.00	4626575.00	0.000
	30.0526 - 27.6316		2054675.00	4698216.67	0.437	0.00	4698216.67	0.000
	27.6316 - 25.2105		2117975.00	4770008.33	0.444	0.00	4770008.33	0.000
	25.2105 - 22.7895		2181758.33	4841941.67	0.451	0.00	4841941.67	0.000
	22.7895 - 20.3684		2246033.33	4914000.00	0.457	0.00	4914000.00	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	20.3684 - 17.9474		2310791.67	4986183.33	0.463	0.00	4986183.33	0.000
	17.9474 - 15.5263		2376025.00	5058475.00	0.470	0.00	5058475.00	0.000
	15.5263 - 13.1053		2441716.67	5130866.67	0.476	0.00	5130866.67	0.000
	13.1053 - 10.6842		2507875.00	5203341.67	0.482	0.00	5203341.67	0.000
	10.6842 - 8.26316		2574491.67	5275900.00	0.488	0.00	5275900.00	0.000
	8.26316 - 5.84211		2641550.00	5348516.67	0.494	0.00	5348516.67	0.000
	5.84211 - 3.42105		2709058.33	5421200.00	0.500	0.00	5421200.00	0.000
	3.42105 - 1		2776991.67	5493925.00	0.505	0.00	5493925.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	150 - 148.982	TP34.08x29.99x0.25	1114.32	414157.00	0.003	0.01	1094616.67	0.000
	148.982 - 147.964		5331.57	420260.00	0.013	125.92	1110683.33	0.000
	147.964 - 146.946		5417.02	423311.00	0.013	125.92	1126875.00	0.000
	146.946 - 145.929		5507.10	426362.00	0.013	145.37	1143175.00	0.000
	145.929 - 144.911		5593.55	429413.00	0.013	145.37	1159600.00	0.000
	144.911 - 143.893		5680.58	432465.00	0.013	145.37	1176133.33	0.000
	143.893 - 142.875		5768.16	435516.00	0.013	145.37	1192791.67	0.000
	142.875 - 141.857		5856.31	438567.00	0.013	145.37	1209558.33	0.000
	141.857 - 140.839		5945.01	441618.00	0.013	145.36	1226450.00	0.000
	140.839 - 139.821		6034.28	444670.00	0.014	145.36	1243458.33	0.000
	139.821 - 138.804		6124.09	447721.00	0.014	145.36	1260583.33	0.000
	138.804 - 137.786		6214.46	450772.00	0.014	145.36	1277825.00	0.000
	137.786 - 136.768		6305.38	453824.00	0.014	145.36	1295183.33	0.000
	136.768 - 135.75		6396.84	456875.00	0.014	145.36	1312658.33	0.000
	135.75 - 131		3607.24	471114.00	0.008	74.27	1395750.00	0.000
L2	135.75 - 131	TP42.45x32.5575x0.25	3248.75	464137.00	0.007	71.08	1354716.67	0.000
	131 - 129.042		7032.77	470002.00	0.015	145.35	1389166.67	0.000
	129.042 - 127.083		9807.40	475867.00	0.021	1230.81	1424058.33	0.001
	127.083 - 125.125		9986.23	481732.00	0.021	1230.79	1459375.00	0.001
	125.125 -		10166.20	487597.00	0.021	1230.77	1495125.00	0.001

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	123.167							
	123.167 - 121.208		10347.30	493462.00	0.021	1230.75	1531308.33	0.001
	121.208 - 119.25		10529.50	499327.00	0.021	1230.73	1567925.00	0.001
	119.25 - 117.292		10712.80	505191.00	0.021	1230.71	1604975.00	0.001
	117.292 - 115.333		10897.20	511056.00	0.021	1230.68	1642458.33	0.001
	115.333 - 113.375		11082.70	516921.00	0.021	1230.66	1680366.67	0.001
	113.375 - 111.417		11269.20	522786.00	0.022	1230.63	1718716.67	0.001
	111.417 - 109.458		11456.80	528651.00	0.022	1230.60	1757491.67	0.001
	109.458 - 107.5		11645.50	534516.00	0.022	1230.58	1796708.33	0.001
	107.5 - 105.542		11835.20	540381.00	0.022	1230.55	1836350.00	0.001
	105.542 - 103.583		12025.90	546246.00	0.022	1230.52	1876425.00	0.001
	103.583 - 101.625		12217.60	552110.00	0.022	1230.50	1916933.33	0.001
	101.625 - 99.6667		16828.00	557975.00	0.030	1230.47	1957883.33	0.001
	99.6667 - 97.7083		17019.20	563840.00	0.030	327.68	1999250.00	0.000
	97.7083 - 95.75		17211.00	569705.00	0.030	327.67	2041058.33	0.000
	95.75 - 89.75		10852.50	587674.00	0.018	197.87	2171841.67	0.000
L3	95.75 - 89.75	TP51.14x40.6597x0.3125	9185.27	724793.00	0.013	167.48	2642858.33	0.000
	89.75 - 87.7778		20265.10	732174.00	0.028	351.46	2696958.33	0.000
	87.7778 - 85.8056		20457.50	739554.00	0.028	351.44	2751608.33	0.000
	85.8056 - 83.8333		20649.80	746935.00	0.028	351.43	2806800.00	0.000
	83.8333 - 81.8611		20842.20	754316.00	0.028	351.41	2862541.67	0.000
	81.8611 - 79.8889		21034.50	761696.00	0.028	351.40	2918833.33	0.000
	79.8889 - 77.9167		21226.80	769077.00	0.028	351.38	2975675.00	0.000
	77.9167 - 75.9444		21419.20	776457.00	0.028	351.37	3033058.33	0.000
	75.9444 - 73.9722		21611.50	783838.00	0.028	351.35	3090991.67	0.000
	73.9722 - 72		21803.70	791218.00	0.028	351.34	3149475.00	0.000
	72 - 70.0278		21995.90	798599.00	0.028	351.32	3208508.33	0.000
	70.0278 - 68.0556		22188.10	805980.00	0.028	351.31	3268091.67	0.000
	68.0556 - 66.0833		22380.30	813360.00	0.028	351.29	3328216.67	0.000
	66.0833 - 64.1111		22572.40	820741.00	0.028	351.27	3388891.67	0.000
	64.1111 - 62.1389		22764.50	828121.00	0.027	351.26	3450116.67	0.000
	62.1389 - 60.1667		22956.50	835502.00	0.027	351.24	3511891.67	0.000
	60.1667 -		23148.40	842882.00	0.027	351.23	3574208.33	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	58.1944							
	58.1944 - 56.2222		23340.30	850263.00	0.027	351.22	3637075.00	0.000
	56.2222 - 54.25		23532.10	857644.00	0.027	351.20	3700491.67	0.000
	54.25 - 47		11523.90	884775.00	0.013	163.29	3938325.00	0.000
L4	54.25 - 47	TP60.41x48.9564x0.375	12814.30	1047390.00	0.012	187.94	4599150.00	0.000
	47 - 44.5789		24554.60	1058260.00	0.023	351.16	4695183.33	0.000
	44.5789 - 42.1579		24778.10	1069140.00	0.023	351.15	4792200.00	0.000
	42.1579 - 39.7368		24999.10	1080020.00	0.023	351.14	4890208.33	0.000
	39.7368 - 37.3158		25217.60	1090900.00	0.023	351.12	4989216.67	0.000
	37.3158 - 34.8947		25433.40	1101770.00	0.023	351.11	5089208.33	0.000
	34.8947 - 32.4737		25646.60	1112650.00	0.023	351.10	5190200.00	0.000
	32.4737 - 30.0526		25857.30	1123530.00	0.023	351.09	5292175.00	0.000
	30.0526 - 27.6316		26065.30	1134410.00	0.023	351.08	5395150.00	0.000
	27.6316 - 25.2105		26270.70	1145290.00	0.023	351.07	5499116.67	0.000
	25.2105 - 22.7895		26473.40	1156160.00	0.023	351.06	5604066.67	0.000
	22.7895 - 20.3684		26673.60	1167040.00	0.023	351.05	5710016.67	0.000
	20.3684 - 17.9474		26871.10	1177920.00	0.023	351.04	5816958.00	0.000
	17.9474 - 15.5263		27065.90	1188800.00	0.023	351.04	5924891.33	0.000
	15.5263 - 13.1053		27258.10	1199680.00	0.023	351.03	6033816.67	0.000
	13.1053 - 10.6842		27447.60	1210550.00	0.023	351.03	6143733.33	0.000
	10.6842 - 8.26316		27634.50	1221430.00	0.023	351.02	6254641.33	0.000
	8.26316 - 5.84211		27818.70	1232310.00	0.023	351.02	6366541.33	0.000
	5.84211 - 3.42105		28000.20	1243190.00	0.023	351.02	6479433.33	0.000
	3.42105 - 1		28179.00	1254060.00	0.022	351.02	6593324.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 148.982	0.006	0.001	0.000	0.003	0.000	0.008 ✔	1.000	4.8.2 ✔
	148.982 - 147.964	0.002	0.010	0.000	0.013	0.000	0.013 ✔	1.000	4.8.2 ✔
	147.964 -	0.002	0.016	0.000	0.013	0.000	0.018	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	146.946						✔		
	146.946 - 145.929	0.002	0.021	0.000	0.013	0.000	0.023 ✔	1.000	4.8.2 ✔
	145.929 - 144.911	0.002	0.026	0.000	0.013	0.000	0.028 ✔	1.000	4.8.2 ✔
	144.911 - 143.893	0.002	0.031	0.000	0.013	0.000	0.033 ✔	1.000	4.8.2 ✔
	143.893 - 142.875	0.003	0.036	0.000	0.013	0.000	0.038 ✔	1.000	4.8.2 ✔
	142.875 - 141.857	0.003	0.040	0.000	0.013	0.000	0.043 ✔	1.000	4.8.2 ✔
	141.857 - 140.839	0.003	0.045	0.000	0.013	0.000	0.048 ✔	1.000	4.8.2 ✔
	140.839 - 139.821	0.003	0.050	0.000	0.014	0.000	0.053 ✔	1.000	4.8.2 ✔
	139.821 - 138.804	0.003	0.055	0.000	0.014	0.000	0.058 ✔	1.000	4.8.2 ✔
	138.804 - 137.786	0.003	0.060	0.000	0.014	0.000	0.063 ✔	1.000	4.8.2 ✔
	137.786 - 136.768	0.003	0.065	0.000	0.014	0.000	0.068 ✔	1.000	4.8.2 ✔
	136.768 - 135.75	0.003	0.069	0.000	0.014	0.000	0.073 ✔	1.000	4.8.2 ✔
	135.75 - 131	0.002	0.047	0.000	0.008	0.000	0.049 ✔	1.000	4.8.2 ✔
L2	135.75 - 131	0.002	0.046	0.000	0.007	0.000	0.047 ✔	1.000	4.8.2 ✔
	131 - 129.042	0.004	0.102	0.000	0.015	0.000	0.106 ✔	1.000	4.8.2 ✔
	129.042 - 127.083	0.005	0.115	0.000	0.021	0.001	0.121 ✔	1.000	4.8.2 ✔
	127.083 - 125.125	0.005	0.128	0.000	0.021	0.001	0.134 ✔	1.000	4.8.2 ✔
	125.125 - 123.167	0.005	0.140	0.000	0.021	0.001	0.146 ✔	1.000	4.8.2 ✔
	123.167 - 121.208	0.006	0.153	0.000	0.021	0.001	0.159 ✔	1.000	4.8.2 ✔
	121.208 - 119.25	0.006	0.165	0.000	0.021	0.001	0.171 ✔	1.000	4.8.2 ✔
	119.25 - 117.292	0.006	0.177	0.000	0.021	0.001	0.183 ✔	1.000	4.8.2 ✔
	117.292 - 115.333	0.006	0.188	0.000	0.021	0.001	0.194 ✔	1.000	4.8.2 ✔
	115.333 - 113.375	0.006	0.200	0.000	0.021	0.001	0.206 ✔	1.000	4.8.2 ✔
	113.375 - 111.417	0.006	0.211	0.000	0.022	0.001	0.218 ✔	1.000	4.8.2 ✔
	111.417 - 109.458	0.006	0.222	0.000	0.022	0.001	0.229 ✔	1.000	4.8.2 ✔
	109.458 - 107.5	0.006	0.233	0.000	0.022	0.001	0.240 ✔	1.000	4.8.2 ✔
	107.5 -	0.006	0.244	0.000	0.022	0.001	0.251	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	105.542						✔		
	105.542 - 103.583	0.006	0.255	0.000	0.022	0.001	0.262 ✔	1.000	4.8.2 ✔
	103.583 - 101.625	0.007	0.265	0.000	0.022	0.001	0.273 ✔	1.000	4.8.2 ✔
	101.625 - 99.6667	0.009	0.277	0.000	0.030	0.001	0.286 ✔	1.000	4.8.2 ✔
	99.6667 - 97.7083	0.009	0.292	0.000	0.030	0.000	0.302 ✔	1.000	4.8.2 ✔
	97.7083 - 95.75	0.009	0.308	0.000	0.030	0.000	0.317 ✔	1.000	4.8.2 ✔
	95.75 - 89.75	0.005	0.160	0.000	0.018	0.000	0.166 ✔	1.000	4.8.2 ✔
L3	95.75 - 89.75	0.004	0.142	0.000	0.013	0.000	0.147 ✔	1.000	4.8.2 ✔
	89.75 - 87.7778	0.009	0.273	0.000	0.028	0.000	0.283 ✔	1.000	4.8.2 ✔
	87.7778 - 85.8056	0.009	0.285	0.000	0.028	0.000	0.295 ✔	1.000	4.8.2 ✔
	85.8056 - 83.8333	0.009	0.297	0.000	0.028	0.000	0.306 ✔	1.000	4.8.2 ✔
	83.8333 - 81.8611	0.009	0.308	0.000	0.028	0.000	0.318 ✔	1.000	4.8.2 ✔
	81.8611 - 79.8889	0.009	0.319	0.000	0.028	0.000	0.329 ✔	1.000	4.8.2 ✔
	79.8889 - 77.9167	0.009	0.330	0.000	0.028	0.000	0.340 ✔	1.000	4.8.2 ✔
	77.9167 - 75.9444	0.009	0.341	0.000	0.028	0.000	0.351 ✔	1.000	4.8.2 ✔
	75.9444 - 73.9722	0.009	0.352	0.000	0.028	0.000	0.362 ✔	1.000	4.8.2 ✔
	73.9722 - 72	0.010	0.362	0.000	0.028	0.000	0.372 ✔	1.000	4.8.2 ✔
	72 - 70.0278	0.010	0.372	0.000	0.028	0.000	0.383 ✔	1.000	4.8.2 ✔
	70.0278 - 68.0556	0.010	0.382	0.000	0.028	0.000	0.393 ✔	1.000	4.8.2 ✔
	68.0556 - 66.0833	0.010	0.392	0.000	0.028	0.000	0.403 ✔	1.000	4.8.2 ✔
	66.0833 - 64.1111	0.010	0.402	0.000	0.028	0.000	0.413 ✔	1.000	4.8.2 ✔
	64.1111 - 62.1389	0.010	0.412	0.000	0.027	0.000	0.422 ✔	1.000	4.8.2 ✔
	62.1389 - 60.1667	0.010	0.421	0.000	0.027	0.000	0.432 ✔	1.000	4.8.2 ✔
	60.1667 - 58.1944	0.010	0.430	0.000	0.027	0.000	0.441 ✔	1.000	4.8.2 ✔
	58.1944 - 56.2222	0.010	0.440	0.000	0.027	0.000	0.451 ✔	1.000	4.8.2 ✔
	56.2222 - 54.25	0.010	0.449	0.000	0.027	0.000	0.460 ✔	1.000	4.8.2 ✔
	54.25 - 47	0.005	0.224	0.000	0.013	0.000	0.229	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L4	54.25 - 47	0.005	0.203	0.000	0.012	0.000	0.208	1.000	4.8.2
	47 - 44.5789	0.009	0.387	0.000	0.023	0.000	0.397	1.000	4.8.2
	44.5789 - 42.1579	0.010	0.395	0.000	0.023	0.000	0.405	1.000	4.8.2
	42.1579 - 39.7368	0.010	0.402	0.000	0.023	0.000	0.412	1.000	4.8.2
	39.7368 - 37.3158	0.010	0.409	0.000	0.023	0.000	0.420	1.000	4.8.2
	37.3158 - 34.8947	0.010	0.417	0.000	0.023	0.000	0.427	1.000	4.8.2
	34.8947 - 32.4737	0.010	0.424	0.000	0.023	0.000	0.434	1.000	4.8.2
	32.4737 - 30.0526	0.010	0.431	0.000	0.023	0.000	0.441	1.000	4.8.2
	30.0526 - 27.6316	0.010	0.437	0.000	0.023	0.000	0.448	1.000	4.8.2
	27.6316 - 25.2105	0.010	0.444	0.000	0.023	0.000	0.455	1.000	4.8.2
	25.2105 - 22.7895	0.010	0.451	0.000	0.023	0.000	0.461	1.000	4.8.2
	22.7895 - 20.3684	0.010	0.457	0.000	0.023	0.000	0.468	1.000	4.8.2
	20.3684 - 17.9474	0.011	0.463	0.000	0.023	0.000	0.475	1.000	4.8.2
	17.9474 - 15.5263	0.011	0.470	0.000	0.023	0.000	0.481	1.000	4.8.2
	15.5263 - 13.1053	0.011	0.476	0.000	0.023	0.000	0.487	1.000	4.8.2
	13.1053 - 10.6842	0.011	0.482	0.000	0.023	0.000	0.493	1.000	4.8.2
	10.6842 - 8.26316	0.011	0.488	0.000	0.023	0.000	0.499	1.000	4.8.2
	8.26316 - 5.84211	0.011	0.494	0.000	0.023	0.000	0.505	1.000	4.8.2
	5.84211 - 3.42105	0.011	0.500	0.000	0.023	0.000	0.511	1.000	4.8.2
	3.42105 - 1	0.011	0.505	0.000	0.022	0.000	0.517	1.000	4.8.2

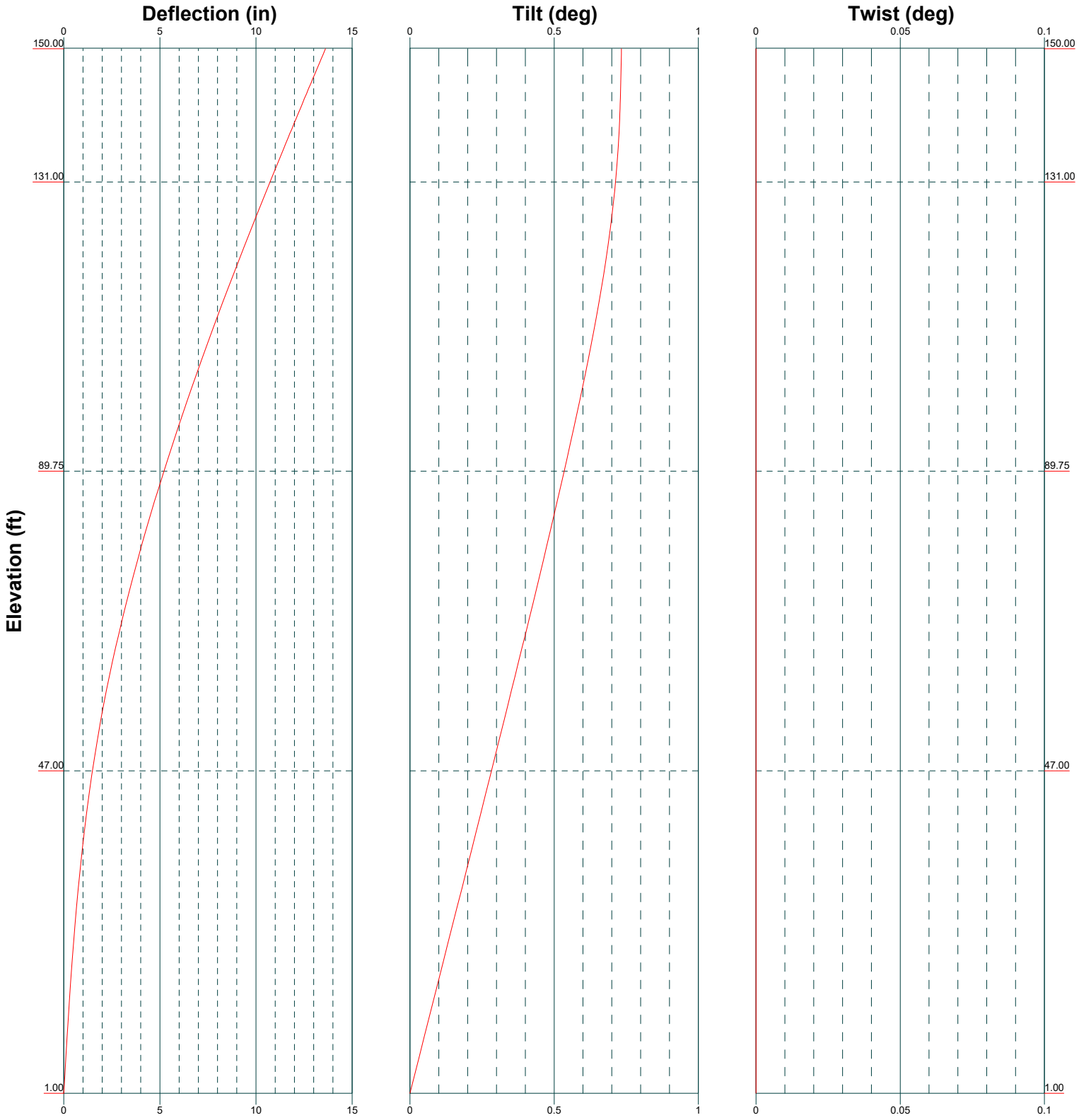
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	150 - 131	Pole	TP34.08x29.99x0.25	1	-4547.41	1522920.00	7.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L2	131 - 89.75	Pole	TP42.45x32.5575x0.25	2	-16734.30	1899020.00	31.7	Pass
L3	89.75 - 47	Pole	TP51.14x40.6597x0.3125	3	-29243.10	2858810.00	46.0	Pass
L4	47 - 1	Pole	TP60.41x48.9564x0.375	4	-47065.70	4180210.00	51.7	Pass
							Summary	
						Pole (L4)	51.7	Pass
						RATING =	**51.7**	**Pass**

TIA-222-H - Service - 60 mph

Maximum Values



Structural Components, LLC
1870 West 64th Lane, Unit A
Denver, CO 80221
Phone: (866) 386-7622
FAX:

Job: ***180320***			
Project: ***Lee's Summit (MO016)***			
Client: InSite Towers, LLC	Drawn by: treed	App'd:	
Code: TIA-222-H	Date: 09/21/20	Scale: NTS	
Path:		Dwg No. E-5	

Base/Splice Plate & Anchor/Splice Bolt

Template = "Plate&Connection.xmcd"
Version = 1.08

Structural Components
Bringing It All Together.

1870 West 64th Lane, UnitA
Denver, CO 80221
866-386-7622

PROJECT DATA

Job = 200314.0

Client = "InSite Towers, LLC"

Site = "Lee's Summit (MO016)"

Model = "150' Monopole"

DESIGN CODES AND STANDARDS

$$\text{Code} = \begin{pmatrix} \text{"ANSI/TIA-222-H, "Structural Standard for Antenna Supporting Structures and Antennas" 2017."} \\ \text{"ANSI/AISC 360-16, "Specifications for Structural Steel Buildings" 2016."} \end{pmatrix}$$

FACTORED FOUNDATION DESIGN REACTIONS

Overdesign Factor: $\alpha = 1.00$

Percentage for Passing: $(PP) = 100 \cdot \%$

	Load Comb. #1	Load Comb. #2	Load Comb. #3
Load Combination:	$Comb_1$ = "1.2D + 1.0W"	$Comb_2$ = "0.9D + 1.0W"	$Comb_3$ = "1.2D + 1.0Di + 1.0W"
Moment Reaction:	$M_1 = 2777.0 \cdot kip \cdot ft$	$M_2 = 2758.9 \cdot kip \cdot ft$	$M_3 = 603.0 \cdot kip \cdot ft$
Axial Reactions:	$P_1 = 47.1 \cdot kip$ $P'_1 = 35.3 \cdot kip$	$P_2 = 35.4 \cdot kip$ $P'_2 = 47.2 \cdot kip$	$P_3 = 80.2 \cdot kip$ $P'_3 = 80.2 \cdot kip$
Shear Reaction:	$V_1 = 28.2 \cdot kip$	$V_2 = 28.2 \cdot kip$	$V_3 = 6.1 \cdot kip$

TOWER BASE DETAILS

Plate Geometry:	$geom_{PL}$ = "Square"	Pole Diameter @ Plate:	$\phi_{pole} = 60.4 \cdot in$
Plate Thickness:	$t_{PL} = 2.5 \cdot in$	Plate OD or Width:	$\phi_{PL} = 64.5 \cdot in$
Plate Yield Strength:	$fy_{PL} = 50 \cdot ksi$	Face Width of Clipped Plate:	$W_{PL} = 40.5 \cdot in$
Plate Ultimate Strength:	$fu_{PL} = 65 \cdot ksi$	Inner Plate Diameter:	$ID_{PL} = 48.3 \cdot in$
Gussets?	gus = "No"	Qty. Bolts Between Gussets:	$BB_{gus} = 0.00$
Gusset Height:	$h_{gus} = 0.0 \cdot in$	Gusset Thickness:	$t_{gus} = 0.0 \cdot in$
Base Detail Type: (per TIA Figure 4-4)	Type = "D"		

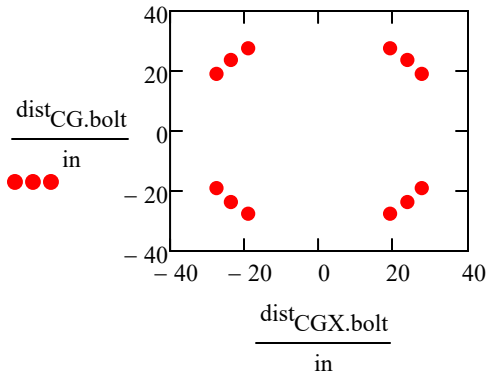
BOLT DETAILS

Bolt Diameter:	$\phi_{bolt} = 2.250 \cdot in$	Bolt Circle Diameter:	$\phi_{BC} = 67.0 \cdot in$
Threads per Inch:	$tpi_{bolt} = 4.5$	Quantity of Bolts:	$qty_{bolt} = 12$
Bolt Yield:	$f_{y.bolt} = 75 \cdot ksi$	Bolt Ult. Tens. Strength:	$f_{u.bolt} = 100 \cdot ksi$

Distance From Top of Concrete to Bottom Face of Leveling Nut (for baseplates): $Y_{bolt} = 2.3 \cdot in$

Bolt Layout: $lay_{bolt} =$ "Case C - Bolts are grouped in the plate corners"

Nominal Bolt Area:	$A_{bolt.nom} = 3.98 \cdot in^2$	Tensile Root Diameter:	$\phi'_{bolt} = 2.033 \cdot in$
Area of All Bolts:	$A_{bolt.nom.T} = 47.71 \cdot in^2$	Tensile Root Area of Bolt:	$A_{bolt.tra} = 3.25 \cdot in^2$
		Area of All Bolts:	$A_{bolt.tra.T} = 38.97 \cdot in^2$
		Moment of Inertia of Bolt:	$I_{bolt.each} = 0.84 \cdot in^4$
		Plastic Section Modulus:	$Z_{bolt.tra} = 1.40 \cdot in^3$
		Moment of Inertia All Bolts:	$I_{bolt.T} = 21878.3 \cdot in^4$



BOLT CAPACITIES

	Per AISC	Per TIA
Nominal axial strength of bolt:	$Rnt_{bolt.AISC} = 298.2 \cdot kip$	$Rnt_{bolt.TIA} = 324.8 \cdot kip$
Nominal shear strength of bolt:	$Rnv_{bolt.AISC} = 159.0 \cdot kip$	$Rnv_{bolt.TIA} = 178.9 \cdot kip$
Nominal bending strength of bolt:	$Rnm_{bolt.AISC} = 8.8\,ft \cdot kip$	$Rnm_{bolt.TIA} = 8.8\,ft \cdot kip$

FACTORED LOADS

	Bolts
Compression:	$Pu_{bolt} = 169.6 \cdot kip$
Tension:	$Tu_{bolt} = 169.6 \cdot kip$
Shear:	$Vu_{bolt} = 2.4 \cdot kip$
Moment:	$Mu_{bolt} = 0.0 \cdot ft \cdot kip$

STRESS RATIOS

	Bolts	Base Plate
	$Bolt_{SR'} = 0.76$	$Check_{PL'} = 0.73$
	$Check'_{Bolt.SR} =$ "OK"	$Ratio'_{PL} =$ "OK"

****
****
*
*
* CAISSON - Pier Foundations Analysis and Design - Copyright Power Line Systems, Inc. 1993-2011 *
*
*
****
****

Project Title: 200314.LeeSummit.MO016
Project Notes: 8' x 24.5' Caisson

Calculation Method: Full 8CD

******* I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
8.00	0.50	4.00	60.00

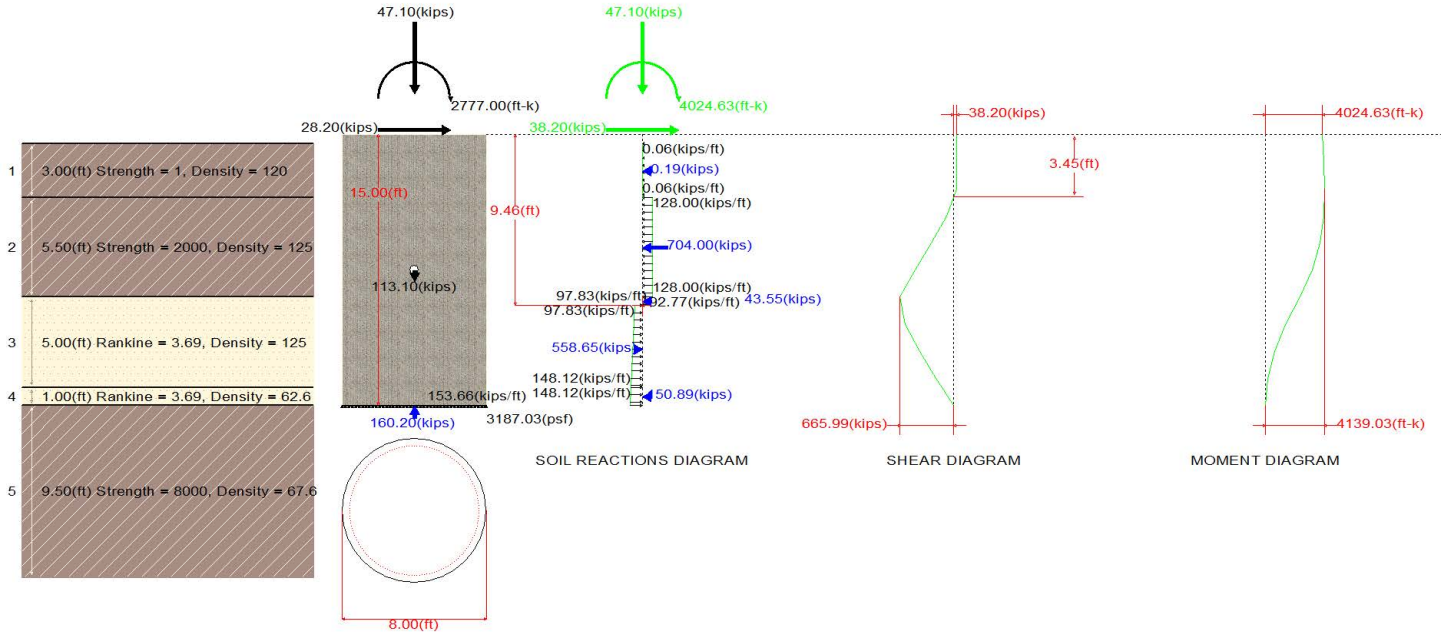
Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	3.00	0.00	120.0	1.0		
2	Clay	5.50	3.00	125.0	2000.0		
3	Sand	5.00	8.50	125.0		3.690	35.00
4	Sand	1.00	13.50	62.6		3.690	35.00
5	Clay	9.50	14.50	67.6	8000.0		

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
2777.0	47.1	28.20	1.33

******* R E S U L T S



Calculated Pier Properties

Length (ft)	Weight (kips)	Pressure Due To Axial Load (psf)	Pressure Due To Weight (psf)	Total End-Bearing Pressure (psf)
15.000	113.097	937.0	2250.0	3187.0

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.50	3.00	120.0	1.0		0.19	2.00
Clay	3.50	5.50	125.0	2000.0		704.00	6.25
Sand	9.00	0.46	125.0		3.690	43.55	9.23
Sand	9.46	4.54	125.0		3.690	- 558.65	11.88
Sand	14.00	1.00	62.6		3.690	- 150.89	14.50
Clay	15.00	0.00	67.6	8000.0		- 0.00	15.00

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)
0.00	38.2	4024.6	28.7	3026.0
1.50	38.1	4081.9	28.7	3069.1
3.00	38.0	4139.0	28.6	3112.1
4.50	-90.0	4132.1	-67.7	3106.8
6.00	-282.0	3853.1	-212.0	2897.0
7.50	-474.0	3286.1	-356.4	2470.7
9.00	-666.0	2431.1	-500.7	1827.9
10.50	-601.5	1432.1	-452.3	1076.8
12.00	-425.0	659.2	-319.5	495.6
13.50	-223.6	169.6	-168.1	127.5
15.00	-0.0	0.0	-0.0	0.0

Reinforcement and Capacity

Total Reinforcement Percent	Reinforcement Area (in^2)	Usable Axial Capacity (kips)	Usable Moment Capacity (ft-k)
0.44	31.85	47.1	5766.4

DRILLED SHAFT FOUNDATION

Template = "DrilledShaft.xmcd"

Version = 3.01

Structural Components
Bringing It All Together.

1870 West 64th Lane, UnitA
Denver, CO 80221
866-386-7622

PROJECT DATA

Job = 200314

Client = "InSite Towers, LLC"

Site = "Lee's Summit (MO016)"

Model = "150ft Monopole"

DESIGN CODES AND STANDARD

$$\text{Code} = \begin{pmatrix} \text{"TIA-222-H, "Structural Standard for Antenna Supporting Structures and Antennas" 2017."} \\ \text{"ACI 318-14, "Building Code Requirements for Structural Concrete and Commentary," 2014."} \end{pmatrix}$$

FOUNDATION DESIGN LOADS

	Load Comb. #1	Load Comb. #2	Load Comb. #3
Load Combination:	$Comb_1$ = "1.2D + 1.0W"	$Comb_2$ = "0.9D + 1.0W"	$Comb_3$ = "1.2D + 1.0Di + 1.0W
Design Axial Loads:	$Pmax_1 = 47.1 \cdot kip$	$Pmax_2 = 35.4 \cdot kip$	$Pmax_3 = 80.2 \cdot kip$
	$Pmin_1 = 47.1 \cdot kip$	$Pmin_2 = 35.4 \cdot kip$	$Pmin_3 = 80.2 \cdot kip$

GEOMETRY

Diameter of Drilled Shaft: $D = 8 \cdot ft$

Length of Drilled Shaft (below grade): $L_{bg} = 24 \cdot ft$

Length of Drilled Shaft (above grade): $L_e = 0.5 \cdot ft$

SITE & GEOTECHNICAL DATA

Geotechnical Resource: Geo = "Terracon Consultants, 07/11/2011, 02115104"

Water Table: $D_w = 13.5\ ft$

Ultimate Bearing Capacity: $B_c = 20 \cdot ksf$

Ultimate Skin Friction:

	Layer Thickness	Ultimate Uplift Skin Friction	Ultimate Compession Skin Friction
Top (Grade)	3	0	0
	5.5	1000	1000
	6	4000	4000
Bottom (Depth of Boring)	9.5	2000	2000
	thick = ft	$f_{s.up} = \cdot psf$	$f_{s.dn} = \cdot psf$

Uplift = "Both Skin Friction and Shaft Weight" $Ratio_{up} = 0$ $Check_{up}$ = "OK"

Compression = "Both Skin Friction and End Bearing" $Ratio_{dn} = 0.054$ $Check_{dn}$ = "OK"

REINFORCEMENT

Gross Area: $A_{shaft} = 50.3 \cdot ft^2$

Effective Gross Area: $A'_{shaft} = 25.1 \cdot ft^2$

Design Pier Area Factor: $P_{Ag} = 50 \cdot \%$

Check of Area Factor: $Check_{PAg} = \text{"OK"}$

LONGITUDINAL SHAFT REINFORCING

Bar Quantity: $n_c = 38$

Bar Size: $s_c = 9$

Bar Weight: $Wt_{tc} = 3101\ lbf$ (per shaft)

TIES

Tie Size: $s_t = 4$

Tie Weight: $Wt_{tt} = 434 \cdot lbf$ (per shaft)

Check of Tie Size: $Check_{st} = \text{"No Good"}$

Maximum Crosstie Spacing (hx): $h_x = 0.0 \cdot in$
(0 for none)

$Note_{SDCt1} = \text{""}$

Tie Levels: (0 if none)	Qty. Spaces	Spacing	
	$qsp_{t1} = 1$	$sp_{t1} = 2.5 \cdot in$	(top)
	$qsp_{t2} = 24$	$sp_{t2} = 12.0 \cdot in$	(mid.)
	$qsp_{t3} = 0$	$sp_{t3} = 0.0 \cdot in$	(bot.)

Tie Quantity: $n_t = 26$

Maximum Required Tie Spacing (top, mid., bot.): $sp_{t.max} = 18.0 \cdot in$

$Check_{tie} = \text{"OK"}$

$Note_{SDCt3} = \text{"This condition does not apply"}$

$Check_{sp.cl} = \text{"OK"}$

Required Lap Splice Length: $Lap = 24 \cdot in$

$Note_{SDCt2} = \text{"Normal lap splice allowed"}$

MINIMUM LONGITUDINAL REINFORCEMENT

Shaft Area of Steel: $A_{tc} = 38.0 \cdot in^2$

Minimum Steel Area Required: $A_{min.c} = 36.2 \cdot in^2$

Maximum Steel Area Allowed: $A_{max.c} = 289.5 \cdot in^2$

Ratio of Steel: $Ratio_{min.c} = 1.0 \cdot \%$ (based on effective shaft gross area)

Check of Steel Area: $Check_{min.c} = \text{"OK"}$

SHAFT COMPRESSIVE STRENGTH

Design Strength	Factored Compression	Check	Ratio
$\phi P_n = 6399 \cdot kip$	$\max(P_u) = 260 \cdot kip$	$Check'_{comp2} = "OK"$	$Ratio'_{comp2} = 0.04$

SHAFT SHEAR STRENGTH

Design Strength	Factored Shear	Check	Ratio
$\phi V_{npM} = 987 \cdot kip$	$\max(S) = 28.2 \cdot kip$	$Check'_{shear.p} = "OK"$ $Check'_{shrrnfp} = "OK"$	$Ratio'_{shear.p} = 0.51$

SHAFT MOMENT CAPACITY

Design Strength	Factored Moment	Check	Ratio
$\phi Mn_{cm} = 4195\,ft \cdot kip$	$Mmax = 3112\,ft \cdot kip$	$Check'_{shaft} = "OK"$	$Ratio'_{shaft} = 0.74$

DEVELOPMENT LENGTH IN TENSION

Required Length	Length Available	Check	Ratio
$l_{dc} = 18.8 \cdot in$	$l_{ac} = 36.0 \cdot in$	$Check_{dev} = "OK"$	$Ratio_{dev} = 0.52$

Notes:
1 - Minimum pier tie size requirements of ACI 318-14 are not met by this foundation. However, transverse pier reinforcement is exempted from requirements of TIA-222-H for existing structures as detailed by TIA-222-H 15.7.12 when structures are originally designed in accordance with previous versions of the TIA-222 standard.

Controlling Foundation: $CFP = 74.2 \cdot \%$

APPENDIX B

Data Provided for Analysis

---------- Forwarded message ---------
From: **Mikala Charron** <mikala.charron@insitewireless.com>
Date: Mon, Sep 14, 2020 at 2:26 PM
Subject: STRUCTURAL REQUEST: MO016 Lee's Summit - T-Mobile 4th Amendment
To: wculver <wculver@structuralcomponents.net>
Cc: Tracy Lee <Tracy.Lee@insitewireless.com>

Wes,

Please find the following docs and info attached for a *Re-analysis* at *MO016 Lee's Summit:*

- Most recent SA dated 5/14/18. Use this for existing loading.
- We need to revert the Verizon equipment back to their previous rights. Please change the Verizon loading back to the attached from 2015.
- Proposed loading for T-Mobile dated 9/1/2020. This replaces their existing loading at 99'.
- Please verify the SA Fee via return email or POR. We will provide a PO for the Fee.
- Upon completion of the Loading Table, please send for review and approval prior to sealing the report.
- In addition to the standard information, please ensure the report shows the Capacity Ratio for *both* the Tower and the Foundation on the Cover page.
- Please provide an ETA for receipt of the sealed report.

*In the event of a failing Structural Analysis please provide the following information:

- Brief Scope of Mod work and any remediation options for consideration: _____
- Will a Pre-Mod Install be possible here? _____

  If so, please provide the Fee to complete a sealed Pre-Mod Install Letter:
  _____

- Fee for MOD Drawings with passing SA: _____
- Is a Pre-Construction Inspection Required? _____

  If so, please provide the required Fee: _____

- Engineers ESTIMATED timeline for completion Mod Drawings: _____
- Engineers ESTIMATED costs for the MOD work (Including PMI & Permits): _____

  (Estimate may follow the above information.)

Please let us know if you need any additional information.

Thanks,

Mikala Charron | **Collocation Coordinator**

InSite Wireless Group LLC | mobile: 401-486-3946

Mikala.charron@insitewireless.com | www.insitewireless.com

InSite News: http://www.insitewireless.com/news.html

Attachments:

MO016Structural Analysis PASS 051418.pdf 8.5 MB

MO016 Lee's Summit TMobile 4th Amendment EXHIBIT 9.1.2020.xlsx	59.3 KB
MO016 Cust Verizon Wireless Second Amendment fe 092315.pdf	148 KB

EXHIBIT B-1 (Second Amendment)

Lessee's Equipment and Premises
Site Name and Number: MO016 Lee's Summit

LESSEE: Verizon Wireless (VAW) LLC d/b/a Verizon Wireless

The mounting method and exact location of the space and equipment listed herein shall be subject to LESSOR's approval.

SYSTEM REQUIREMENTS										
POWER provided by:	Utility Company Direct					TELCO provided by:	T1			
Power Requirements:	Amps:	200	Volts:	120/240		No. of Outlets:	N/A			
Generator Provided by:	Licensee	Make:	unknown	Model:	unknown		Fuel Type:	Diesel	Capacity:	unknown
Batteries:	Quantity:	N/A	Make:	N/A		Model:	N/A			
SPACE REQUIREMENTS & RADIO INVENTORY										
Type of Space Required:	Ground:	Yes	Floor:	No		Total Square Feet:	696 sq ft			
Dimensions of Equipment Floor/Ground Space:	18' x 36'					Equipment Height:	N/A			
Dimensions of Generator Ground Space:	6' x 8'					Dimensions of Fuel Tank Ground Space:	included			
No. of Transmitters (Tx):	N/A	Transmitter Make/Model:	N/A			Transmitter Power Output:	N/A			
No. of Receivers (Rx):	N/A	Receiver Make/Model:	N/A			Transmitter ERP:	N/A			

EQUIPMENT LOADING DESCRIPTION (FINAL CONFIGURATION)					
	Sector 1	Sector 2	Sector 3	DISH(ES)	OTHER
Antenna Type (1):	Panel	Panel	Panel	N/A	N/A
# of Antennas (1)/ Sector:	Two (2)	Two (2)	Two (2)	None	None
Tx, Rx or Both:	Both	Both	Both	N/A	N/A
Antenna Manufacturer (1):	Antel	Antel	Antel	N/A	N/A
Antenna Model (1):	BXA-171063-12-CF	BXA-171063-12-CF	BXA-171063-12-CF	N/A	N/A
Antenna Dimensions (1):	72.5"x6.1"x4.1"	72.5"x6.1"x4.1"	72.5"x6.1"x4.1"	N/A	N/A
Antenna Weight (1):	12.8 lbs	12.8 lbs	12.8 lbs	N/A	N/A
Antenna RAD Ctr (1):	150 ft	150 ft.	150 ft.	N/A	N/A
Antenna Type (2):	Panel	Panel	Panel	N/A	N/A
# of Antennas (2)/ Sector:	Two (2)	Two (2)	Two (2)	None	None
Tx, Rx or Both:	Both	Both	Both	N/A	N/A
Antenna Manufacturer (2):	Andrew	Andrew	Andrew	N/A	N/A
Antenna Model (2):	LNX-6515DS-A1M	LNX-6515DS-A1M	LNX-6515DS-A1M	N/A	N/A
Antenna Dimensions (2):	96.4"x11.9"x7.1"	96.4"x11.9"x7.1"	96"x11.9"x7.1"	N/A	N/A
Antenna Weight (2):	49 lbs	49 lbs	49 lbs	N/A	N/A
Antenna RAD Ctr (2):	150 ft	150 ft	150 ft	N/A	N/A
# of RRU/RRHs/ Sector (1):	One (1)	One (1)	One (1)		
RRU/RRH Manufacturer (1):	Ericsson	Ericsson	Ericsson		
RRU/RRH Model (1):	LTE AWS RRU13-A2	LTE AWS RRU13-A2	LTE AWS RRU13-A2		
RRU/RRH Dimensions (1):	19.7"x17"x10.5"	19.7"x17"x10.5"	19.7"x17"x10.5"		
RRU/RRH Weight (1):	74 lbs	74 lbs	74 lbs		
RRU/RRH RAD Ctr (1):	150 ft.	150 ft.	150 ft.		
# of RRU/RRHs/ Sector (2):	One (1)	One (1)	One (1)		
RRU/RRH Manufacturer (2):	Ericsson	Ericsson	Ericsson		
RRU/RRH Model (2):	AS1613492/RRUS12	AS1613492/RRUS12	AS1613492/RRUS12		
RRU/RRH Dimension (2):	20"x18"	20"x18"	20"x18"		
RRU/RRH Weight (2):	57 lbs	57 lbs	57 lbs		
RRU/RRH RAD Ctr (2):	150 ft.	150 ft.	150 ft.		
# of TMAs/ Sector:	Two (2)	Two (2)	Two (2)		
TMA Manufacturer:	Clear Gain	Clear Gain	Clear Gain		
TMA Model:	CG-1900DD	CG-1900DD	CG-1900DD		
TMA Dimensions:	13"x9.8"x3.3"	13"x9.8"x3.3"	13"x9.8"x3.3"		
TMA Weight:	13.9 lbs	13.9 lbs	13.9 lbs		
TMA RAD Ctr:	150 ft.	150 ft.	150 ft.		
# of Diplexers/ Sector:	One (1)	One (1)	One (1)		
Diplexer Manufacturer:	Commscope	Commscope	Commscope		
Diplexer Model:	CBC78-DF-2X	CBC78-DF-2X	CBC78-DF-2X		
Diplexer Dimensions:	7.9"x5.9"x5.7"	7.9"x5.9"x5.7"	7.9"x5.9"x5.7"		
Diplexer Weight:	13.9 lbs	13.9 lbs	13.9 lbs		
Diplexer RAD Ctr:	150 ft.	150 ft.	150 ft.		
# of Surge Suppressors/Sctr:	One (1)	One (1)	None		
Surge Suppressor Make:	RFS	Raycap	N/A		
Surge Suppressor Model:	DB-B1-6C-2AB-0Z	RRFDC-3315-PF-48	N/A		
Surge Supressor Dimensions:	19.2"x15.7"x10.3"	19.2"x15.7"x10.3"	N/A		
Surge Supressor Weight:	26.9 lbs	32 lbs	N/A		
Surge Supressors RAD Ctr:	150 ft.	150 ft.	N/A	Please include microwave dish frequencies below:	Please include microwave dish frequencies below:
OTHER:	None	None	None		
Transmit Frequencies:	870-880, 746-757, 1945-1950, 2120-2130, 2145-2155 MHz			N/A	N/A
Receive Frequencies:	825-835, 776-787, 1865-1870, 1720-1730, 1745-1755 MHz			N/A	N/A
# of Lines:	Six (6)	Six (6)	Six (6)	None	None
Line Size:	1-5/8"	1-5/8"	1-5/8"	N/A	N/A
# of Lines:	One (1) on Outside	One (1) on Outside	None	None	None
Line Size:	1-5/8" Hybrid	1-1/4" Hybrid	N/A	N/A	N/A
Mount Type:	Platform	Platform	Platform	N/A	N/A
Mount Size:	Fourteen Feet (14')	Fourteen Feet (14')	Fourteen Feet (14')	N/A	N/A

***NOTE*: ANY (i) CHANGE IN THE NUMBER, SIZE, PLACEMENT, ARRAY, OR LOCATION OF THE EQUIPMENT LISTED ABOVE IN THIS EXHIBIT B-1 (SECOND AMENDMENT), (II) CHANGE IN FREQUENCY FROM THAT LISTED ABOVE IN THIS EXHIBIT B-1 (SECOND AMENDMENT), OR (III) INCREASE IN THE SIZE OR FOOTPRINT OF THE LEASED PREMISES SHALL REQUIRE THE WRITTEN CONSENT OF THE LESSOR AND A WRITTEN AMENDMENT TO THIS AGREEMENT.**

***NOTE:* AUDIBLE ALARMS RELATED TO GENERATOR AND HVAC EQUIPMENT SHALL BE PERMANENTLY DISABLED AT UNMANNED SITES.**

WORKSHEET 1 OF 2 (COMPLETE BOTH WORKSHEET TABS)

InSite Towers, LLC

CUSTOMER APPLICATION

DATE SUBMITTED:

A Site Application Fee to be paid upon submission of this Customer Application.

CUSTOMER INFORMATION

COMPANY NAME:	T-Mobile Central LLC	PHONE:	
ENTITY Type: i.e. Inc., LLP	LLC	FAX:	
STATE of Inc.	Delaware	SERVICE (PCS, SMR):	

CUSTOMER ADDRESSES

COMPANY Address:	12980 Foster St, Suite 200	CITY/STATE:	Overland Park, KS	ZIP :	66213
BILLING Address:	12980 Foster St, Suite 200	CITY/STATE:	Overland Park, KS	ZIP :	66213
NOTICE Address 1:	12980 Foster St, Suite 200	CITY/STATE:	Overland Park, KS	ZIP :	66213
NOTICE Address 2:		CITY/STATE:		ZIP :	

CUSTOMER CONTACTS

PRIMARY CONTACT:	Ryan Jordan	PHONE:	913-438-7700
TITLE:	Site Acquisition Specialist	E-MAIL Address:	rjordan@ssc.us.com
SIGNATORY NAME:	Ken Bush	PHONE:	
TITLE:	Sr. Director, Network Engineering &	E-MAIL Address:	ken.bush@t-mobile.com
EMERGENCY CONTACT:		PHONE:	
TITLE:		E-MAIL Address:	
TECHNICAL/OPS:	Aaron Steinke	PHONE:	
TITLE:	Engineering - Field Manager	E-MAIL Address:	aaron.steinke1@t-mobile.com
RF ENGINEER:	Russell Pope	PHONE:	
TITLE:	RF Manager	E-MAIL Address:	Russell.pope@t-mobile.com
BILLING CONTACT:		PHONE:	
TITLE:		E-MAIL Address:	
LEGAL CONTACT:		PHONE:	
TITLE:		E-MAIL Address:	

SITE INFORMATION

CUSTOMER Site # / Name:	A5C0198A	INSITE Site # and Name:	MO016 Lee's Summit
SITE LATITUDE:	38.910264	SITE LONGITUDE:	-94.391258
SITE ADDRESS:	900 SW Blue Parkway	CITY:	Lee's Summit
STATE:	MO ZIP: 64063	STRUCTURE TYPE:	Monopole

USE THIS SECTION TO PROVIDE A DESCRIPTION OF COLOCATION OR MODIFICATION REQUEST

Install (3) AHLOAs
Install (3) AHFIGs
Install (3) Nokia AEHC (3) FFHH
Remove the existing (4) TMAs.
Retain (3) Andrew - TMBXX-6517-A2M antennas idle and keep the 4th sector idle (1) TMBX-6517-A1M. May remove but may just keep on tower as idle.
Remove the existing Low Cap hybrid cable and COVPs
Install (2) HCS 2.0 Hybrid Trunk with breakout feature (Nokia NWS model)
Install (2) HCS 2.0 COVP at the BTS. Raycap RTMDC-5634-PF-48

USE THIS SECTION TO LIST EQUIPMENT TO BE REMOVED

Remove the existing Coax, Low Cap hybrid cable and COVPs.Remove the existing TMAs. Insite scoping remove: (3) TMBXX-6516-A2M antennas (3) Andrew SBNHH-1D65C antennas (3) FRIJ RRU (3) FHFB RRU (1) COVP (3) ETW190VS12UB TMA (1) ETW200VS12UB TMA (14) 7/8" coax (1) 1 1/4" Hybrid

APPLICATION PREPARED BY

NAME:	Ryan Jordan	PHONE:	913-438-7700
COMPANY:	Selective Site Consultants	ADDRESS:	7171 W 9th St, Suite 600, Overland Park, KS 66212
TITLE:	Site Acquisition Specialist	E-MAIL Address:	rjordan@ssc.us.com

EXHIBIT
Equipment

Site Name and #: **MO016 Lee's Summit** **Licensee Name:** **T-Mobile Central LLC**

The mounting method and exact location of the space and equipment listed herein shall be subject to InSite's approval

SYSTEM REQUIREMENTS												
POWER provided by:	Utility Company direct						TELCO provided by:	T1				
Power Requirements:	Amps:	200	Volts:	120/240			No. of Outlets:	N/A				
Generator Provided by:	N/A	Make:	N/A	Model:	N/A			Fuel Type:	N/A	Capacity:	N/A	
Batteries:	Quantity:	N/A	Make:	N/A			Model:	N/A				
SPACE REQUIREMENTS & RADIO INVENTORY												
Type of Space Required:	Ground:	Yes	Floor:	No			Total Square Feet:	224 sq. ft.				
Dimensions of Equipment Floor/Ground Space:			approx. 14.9' x 15'				Equipment Height:	N/A				
Dimensions of Generator Ground Space:			N/A				Dimensions of Fuel Tank Ground Space:			N/A		
No. of Transmitters (Tx):	N/A	Transmitter Make/Model:	N/A					Transmitter Power Output		200 Watts		
No. of Receivers (Rx):	N/A	Receiver Make/Model:	N/A					Transmitter ERP:		N/A		
Ground also contains:	(2) Raycap RTMDC-5634-PF-48 COVP at BTS											

EQUIPMENT LOADING DESCRIPTION (FINAL CONFIGURATION)						
	Sector 1	**Sector 2**	**Sector 3**	**Sector 4**	**DISH(ES)**	**OTHER**
Antenna Type (1):	Panel	Panel	Panel	N/A	N/A	N/A
# of Antennas (1)/ Sector:	One (1)	One (1)	One (1)	None	None	None
Tx, Rx or Both:	Both	Both	Both	N/A	N/A	N/A
Antenna Manufacturer (1):	Commscope	Commscope	Commscope	N/A	N/A	N/A
Antenna Model (1):	FFHH-65C-R3	FFHH-65C-R3	FFHH-65C-R3	N/A	N/A	N/A
Antenna Dimensions (1):	95.9" x 25.2" x 9.3"	95.9" x 25.2" x 9.3"	95.9" x 25.2" x 9.3"	N/A	N/A	N/A
Antenna Weight (1):	127.6 lbs	127.6 lbs	127.6 lbs	N/A	N/A	N/A
Antenna RAD Ctr / Azimuth (1):	99' / 0°	99' / 120°	99' / 240°	N/A	N/A	N/A
Antenna Type (2):	Panel	Panel	Panel	N/A	N/A	N/A
# of Antennas (2)/ Sector:	One (1)	One (1)	One (1)	None	None	None
Tx, Rx or Both:	Both	Both	Both	N/A	N/A	N/A
Antenna Manufacturer (2):	Nokia	Nokia	Nokia	N/A	N/A	N/A
Antenna Model (2):	AEHC	AEHC	AEHC	N/A	N/A	N/A
Antenna Dimensions (2):	35.4" x 22.8" x 8.3"	35.4" x 22.8" x 8.3"	35.4" x 22.8" x 8.3"	N/A	N/A	N/A
Antenna Weight (2):	103.617 lbs	103.617 lbs	103.617 lbs	N/A	N/A	N/A
Antenna RAD Ctr / Azimuth (2):	99' / 0°	99' / 120°	99' / 240°	N/A	N/A	N/A
Antenna Type (3):	Panel	Panel	Panel	Panel	N/A	N/A
# of Antennas (3)/ Sector:	One (1)	One (1)	One (1)	One (1)	N/A	N/A
Tx, Rx or Both:	Both	Both	Both	Both	N/A	N/A
Antenna Manufacturer (3):	Andrew	Andrew	Andrew	Andrew	N/A	N/A
Antenna Model (3):	TMBXX-6517-A2M	TMBXX-6517-A2M	TMBXX-6517-A2M	TMBX-6517-A1M	N/A	N/A
Antenna Dimensions (3):	74.9" x 12" x 6.5"	74.9" x 12" x 6.5"	74.9" x 12" x 6.5"	74.9" x 6.5" x 3.3"	N/A	N/A
Antenna Weight (3):	40.8 lbs	40.8 lbs	40.8 lbs	19.8 lbs	N/A	N/A
Antenna RAD Ctr / Azimuth (3):	99' / 0° (Idle)	99' / 120° (Idle)	99' / 240° (Idle)	99' / 300° (Idle)	N/A	N/A
# of RRU/RRHs/ Sector (1):	One (1)	One (1)	One (1)	None		
RRU/RRH Manufacturer (1):	Nokia	Nokia	Nokia	N/A		
RRU/RRH Model (1):	AHLOA	AHLOA	AHLOA	N/A		
RRU/RRH Dimensions (1):	22" x 12.1" x 7.4"	22" x 12.1" x 7.4"	22" x 12.1" x 7.4"	N/A		
RRU/RRH Weight (1):	83 lbs	83 lbs	83 lbs	N/A		
RRU/RRH RAD Ctr (1):	99'	99'	99'	N/A		
# of RRU/RRHs/ Sector (2):	One (1)	One (1)	One (1)	None		
RRU/RRH Manufacturer (2):	Nokia	Nokia	Nokia	N/A		
RRU/RRH Model (2):	AHFIG	AHFIG	AHFIG	N/A		
RRU/RRH Dimension (2):	27.4" x 12.1" x 5.2"	27.4" x 12.1" x 5.2"	27.4" x 12.1" x 5.2"	N/A		
RRU/RRH Weight (2):	79 lbs	79 lbs	79 lbs	N/A		
RRU/RRH RAD Ctr (2):	99'	99'	99'	N/A		
# of TMAs/ Sector (1):	None	None	None	None		
# of Diplexers/ Sector:	None	None	None	None		
# of Surge Suppressors/Sctr:	None	None	None	None		
OTHER:	Two (2)	None	None	None		
OTHER:	NWS	N/A	N/A	N/A		
OTHER:	HCS 2.0 Integrated cable Breakout Box	N/A	N/A	N/A		
OTHER:	15.95" x 10.2" x 3.21"	N/A	N/A	N/A		
OTHER:	1.61 lbs	N/A	N/A	N/A	**Please include microwave dish frequencies below:**	**Please include microwave dish frequencies below:**
OTHER:	99'	N/A	N/A	N/A		
Transmit Frequencies:	2496-2690, 622-637, 728-734, 1950-1970, 2120-2135, 2165-2170 MHz				N/A	N/A
Receive Frequencies:	2496-2690, 668-683, 698-704, 1870-1890, 1720-1735, 1765-1770 MHz				N/A	N/A
# of Lines:	Two (2)	None	None	None	N/A	N/A
Line Size:	1.48" Hybrid (2.0)	N/A	N/A	N/A	N/A	N/A
Mount Type:	LP Platform w/Handrail	LP Platform w/Handrail	LP Platform w/Handrail	N/A	N/A	N/A
Mount Size:	Twelve Feet (12')	Twelve Feet (12')	Twelve Feet (12')	N/A	N/A	N/A

Structural Components
Bringing It All Together.

Structural Components, LLC
4990 Nome Street, Unit C.
Denver, CO 80239

Voice: 866-386-7622
Fax: 303-962-3577

May 14, 2018

Tracy Lee
InSite Towers, LLC
1199 N Fairfax St.
Suite 700
Alexandria, VA 22314

Re: Structural Analysis Report

Structure:	150ft Sabre Monopole
Site Address:	900 SW Blue Pkwy, Lee's Summit, MO 64063 (Jackson County) Latitude: 38.9102°N, Longitude: 94.3912°W
Site Name:	InSite Towers, LLC – Lee's Summit Clear Wireless LLC – Colt and Garrett
Site Number:	InSite Towers, LLC – MO016 Clear Wireless LLC – KC82XC081
SC Number:	180320
Status:	**Structure Passes (83% Capacity)** **Foundation Passes (46% Capacity)**

Dear Ms. Lee:

Per your request, Structural Components, LLC has completed a structural analysis for the above referenced project to verify the tower's compliance to the following design criteria:

Standard:	TIA-222-G *Structural Standard for Antenna Supporting Structures and Antennas*
Building Code:	2012 International Building Code Lee's Summit City Council Ordinance No. 7369 Jackson County Building Code
Design Basic Wind Speed without Ice:	115 mph 3-second gust ultimate (Equivalent to 90 mph 3-second gust A.S.D)
Design Basic Wind Speed with Ice:	40 mph 3-second gust A.S.D
Ice Thickness:	1" radial
Serviceability Basic Wind Speed:	60 mph 3-second gust A.S.D
Exposure Category:	C
Topographic Category:	1
Structure Class:	II (Risk Category II)
Seismic Site Class:	C, S_s=0.114, S_1=0.067
Seismic Design Category:	B

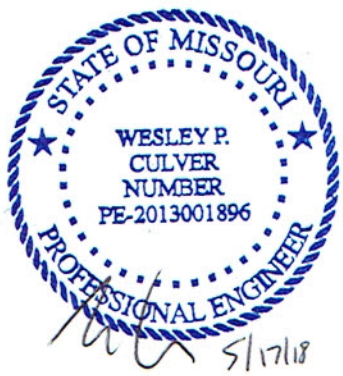
Please refer to the following structural analysis report, which gives complete details of the tower loading, results, information provided, and necessary assumptions.

We trust you find this report satisfactory. Please do not hesitate to contact us if you should have any questions or concerns.

Best Regards,
Structural Components LLC

Wesley Culver, P.E.
Missouri P.E. # 2013001896

/SM



1 LOADING CONFIGURATION

The following antennas, mounts, transmission lines, and other appurtenances were considered for the structural analysis.

Elev. (ft)[1]	Appurtenance	Line	I/O[2]	Notes
150.0	(1) 5/8" x 6' Lightning Rod	---	---	Existing
150.0	(3) Antel BXA-171063-12CF-EDIN-2 Panels w/ Pipe Mounts (6) Andrew LNX-6515DS-A1M Panels w/ Pipe Mounts (3) Kathrein 800 10510V01 Panels w/ Pipe Mounts (3) Ericsson RRUS32 B66A RRUs[3] (3) Ericsson RRUS11 B13+A2 RRUs[3] (6) ADC CG-1900DD TMAs (3) Commscope CBC78-DF-2X Diplexers (2) Raycap RRFDC-3315-PF-48 SSDs (1) 14' Low Profile Platform	(18) 1-5/8" TX (1) 1-5/8" Hybrid (1) 1 1/4" Hybrid	I O O	Verizon Existing
129.0	**(3) RFS APXVSPP18-C Panels w/ Pipe Mounts** **(3) Ericsson AIR 6468 Panels w/ Pipe Mounts** **(3) Ericsson RRUS 11** **(3) Ericsson RRUS 31** **(1) Andrew VHLP800-11-DWI Dish w/ Pipe Mount** **(1) Andrew VHLP1-23 Dish w/ Pipe Mount** **(2) Dragonwave Horizon DUO ODUs[3]** **(3) T-Arm Mounts**	**(2) 1/2" TX** **(3) 1.619" Hybrid**	**I**	**Clear Wireless Final**
100.0	(6) Andrew TMBXX 6517-A2M Panels w/ Pipe Mounts (1) Andrew TMBX- 6517-A1M Panel w/ Pipe Mount (3) Andrew SBNHH-1D65C Panels w/ Pipe Mounts (3) Nokia FRIJ RRUS[3] (3) Nokia FHFB RRUS[3] (3) Andrew ETW190VS12UB TMAs[3] (1) Andrew ETW200VS12UB TMA[3] (1) Raycap RNSNDC-7771-PF-48 SSDs (1) 12' Low Profile Platform	(3) 1-1/4" Hybrid (14) 7/8" TX	I	T-Mobile Existing
91.0	(3) RFS APXVERR18-C Panels (3) Ericsson RRUS 11 (800 MHz) (3) Ericsson RRUS 31 B25 (3) Ericsson ESMR Filters (9) RFS ACU-A20-N RETs (1) 12' Low Profile Platform w/ Handrails	(3) 1-1/4" Hybrid	I	Sprint Existing

1) Elevations reference centerline of panel, yagi, and dish antennas, and base of whip antennas, in relation to the base of the tower.
2) "I/O" designates whether the lines are placed inside or outside of the pole.
3) Secondary appurtenances are placed behind primary appurtenances such as panels allowing for full or partial shielding. See analysis output in Appendix A for magnitude of assumed shielding.

2 RESULTS

The analysis was performed using tnxTower v8.0.1.0, a structural analysis program developed by Tower Numeric Inc. specifically for the communication tower industry.

2.1 TOWER MEMBER STRESS LEVELS

The tower has the following stress ratios in its structural members.

Elev. (ft)	Member	Stress Ratio
0 – 150	Monopole Shaft	0.53
0	Base Plate	0.83
0	Anchor Rods	0.79

Stress ratio (SR) criteria:
SR ≤ 1.00 is completely within code limits.
SR ≤ 1.05 is considered within acceptable tolerance of code limits.
SR > 1.05 is outside acceptable tolerance of code limits and requires structural modifications.

2.2 FOUNDATION REACTIONS

The reactions listed below are for the design wind speed listed.

Reaction Type	Current No Ice Reactions	Current Iced Reactions	Foundation Status
Moment (ft-kips)	2,877.5	727.6	Passes*
Shear (kips)	29.1	7.3	
Axial (kips)	46.7	93.1	

* See Appendix A for foundation calculations. Seismic analysis is not governing and thus not included in the table.

2.3 TOWER DEFLECTION

The deflections are listed below for critical tower elevations using the serviceability wind speed listed.

Elev. (ft)	Displacement (in)	Sway (deg)	Twist (deg)
129.0	9.927	0.6716	0.0009

3 PROVIDED INFORMATION AND ASSUMPTIONS

Information about the tower was provided by InSite Towers, LLC. Structural Components, LLC visited this site for TIA Inspection on 01/20/2016.

Data	Document	Author	Date	File
Tower	Structural Analysis Report	Sabre Industries	01/08/2014	95368
	Tower Photos	InSite Towers, LLC	06/18/2015	---
	Original Tower Drawings	Sabre Industries	08/31/2011	47711
	Structural Analysis Report	Structural Components, LLC	05/11/2018	180300
Existing and Proposed Loads	Customer Application	InSite / Clear Wireless LLC	04/09/2018	MO016
	Structural Analysis Report	Sabre Industries	01/08/2014	95368
	Structural Analysis Report	Structural Components, LLC	05/11/2018	180300
Foundation	Original Foundation Drawings	Sabre Industries	08/31/2011	47711
Soil	Geotechnical Engineering Report	Terracon Consultants, Inc.	07/11/2011	02115104

The following assumptions were made in order to complete the analysis. These assumptions must be checked. If they do not accurately represent the existing or proposed tower, foundation, soil, and loading conditions, we must be notified so that we can make the appropriate changes to our analysis, conclusions, and recommendations.

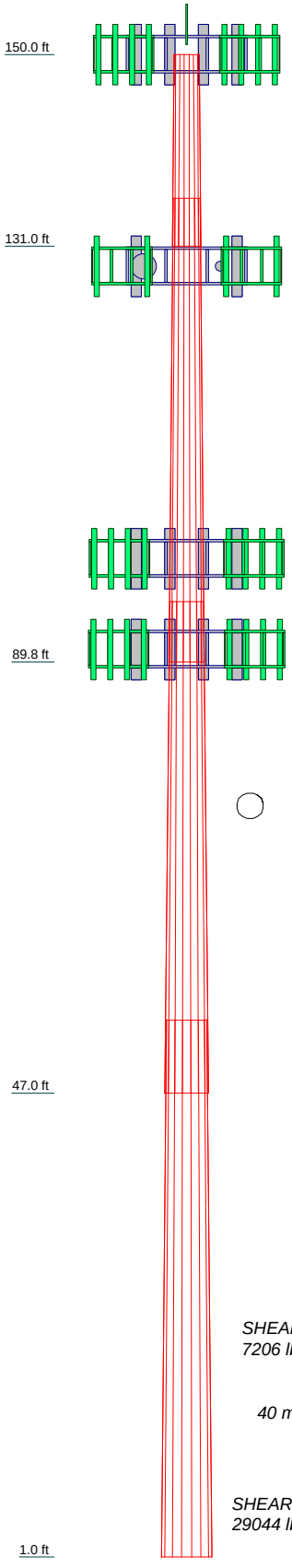
1. The tower and foundation are constructed as shown in the provided drawings, previous structural analysis reports, mapping reports, photos, and/or other documents.

2. The tower and foundation are in good condition with no corrosion, damage or fatiguing issues which could reduce the carrying capacity of the tower.
3. The tower has been properly maintained in accordance with industry standards.
4. The tower and foundation have not been modified except as indicated in the provided information or in this report.

4 CONCLUSIONS

To the best of our knowledge and belief the tower and foundation satisfy the requirements of the applicable codes and standards having jurisdiction over the work for the loadings and conditions as outlined in this report. **Structural modifications are not required at this time.**

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	19.00	18	0.2500	4.75	29.9900	34.0800		1630.6
2	46.00	18	0.2500	6.00	32.5575	42.4500		4627.1
3	48.75	18	0.3125	7.25	40.6597	51.1400		7500.9
4	53.25	18	0.3750		48.9564	60.4100		11712.7
							A572-65	25471.4



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Jackson County, Missouri.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 90 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 52.7%

ALL REACTIONS ARE FACTORED

AXIAL 93078 lb

SHEAR 7206 lb *MOMENT 727524 lb-ft*

TORQUE 239 lb-ft
40 mph WIND - 1.0000 in ICE

AXIAL 46634 lb

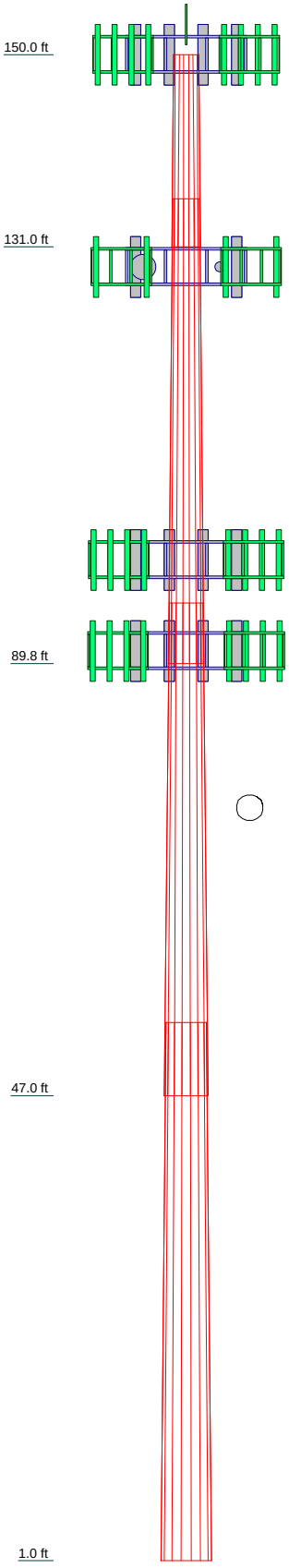
SHEAR 29044 lb *MOMENT 2877457 lb-ft*

TORQUE 886 lb-ft
REACTIONS - 90 mph WIND

Structural Components,LLC
4990 Nome Street, Unit C
Denver, CO 80239
sctower.net
Phone: 866-386-7622
FAX: 303-962-3577

Job: ***180320***			
Project: ***Lee's Summit (MO016)***			
Client: InSite Towers, LLC	Drawn by: S.Mukherjee	App'd:	
Code: TIA-222-G	Date: 05/14/18	Scale: NTS	
Path:		Dwg No. E-1	

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	19.00	18	0.2500	4.75	29.9900	34.0800		1630.6
2	46.00	18	0.2500	6.00	32.5575	42.4500		4627.1
3	48.75	18	0.3125	7.25	40.6597	51.1400	A572-65	7500.9
4	53.25	18	0.3750		48.9564	60.4100		11712.7
								25471.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount (Verizon)	150
BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount (Verizon)	150
BXA-171063-12CF-EDIN-2 Panel w/ Pipe Mount (Verizon)	150
(2) LNX-6515DS-A1M w/ Mount Pipe (Verizon)	150
(2) LNX-6515DS-A1M w/ Mount Pipe (Verizon)	150
(2) LNX-6515DS-A1M w/ Mount Pipe (Verizon)	150
800 10510V01 Panels w/ Pipe Mount (Verizon)	150
800 10510V01 Panels w/ Pipe Mount (Verizon)	150
800 10510V01 Panels w/ Pipe Mount (Verizon)	150
Ericsson RRUS-32 B66(Full frontal shielding) (Verizon)	150
Ericsson RRUS-32 B66(Full frontal shielding) (Verizon)	150
Ericsson RRUS-32 B66(Full frontal shielding) (Verizon)	150
Ericsson RRUS11 B13+A2 RRU(Full frontal shielding) (Verizon)	150
Ericsson RRUS11 B13+A2 RRU(Full frontal shielding) (Verizon)	150
Ericsson RRUS11 B13+A2 RRU(Full frontal shielding) (Verizon)	150
(2) ADC CG-1900DD TMA (Verizon)	150
(2) ADC CG-1900DD TMA (Verizon)	150
(2) ADC CG-1900DD TMA (Verizon)	150
CBC78-DF-2X Diplexers (Verizon)	150
CBC78-DF-2X Diplexers (Verizon)	150
CBC78-DF-2X Diplexers (Verizon)	150
Raycap RRFDC-3315-PF-48 SSD (Verizon)	150
Raycap RRFDC-3315-PF-48 SSD (Verizon)	150
14' Low Profile Platform (Verizon)	150
6' x 5/8" Lighting Rod	150
RRUS-31 (Clear Wireless)	129
RRUS-31 (Clear Wireless)	129
RRUS-11 (Clear Wireless)	129
RRUS-11 (Clear Wireless)	129
RRUS-11 (Clear Wireless)	129
Ericsson AIR 6468 Panels w/ Pipe Mount (Clear Wireless)	129
Ericsson AIR 6468 Panels w/ Pipe Mount (Clear Wireless)	129
Ericsson AIR 6468 Panels w/ Pipe Mount (Clear Wireless)	129
APXVERR18-C Panels w/ Pipe Mount (Clear Wireless)	129
APXVERR18-C Panels w/ Pipe Mount (Clear Wireless)	129
APXVERR18-C Panels w/ Pipe Mount (Clear Wireless)	129
Horizon Duo Radio (Full frontal shielding) (Clear Wireless)	129

TYPE	ELEVATION
Horizon Duo Radio (Full frontal shielding) (Clear Wireless)	129
Pipe Mount (Clear Wireless)	129
Pipe Mount (Clear Wireless)	129
(3) T Arm's (Clear Wireless)	129
RRUS-31 (Clear Wireless)	129
VHLP 800-11 (Clearwire)	129
VHLP1-23 (Clearwire)	129
TMBX-6517-A1M w pipe (T-Mobile)	100
SBNHH-1D65C Panels w/ Pipe Mount (T-Mobile)	100
SBNHH-1D65C Panels w/ Pipe Mount (T-Mobile)	100
SBNHH-1D65C Panels w/ Pipe Mount (T-Mobile)	100
ETW190 VS12UB (65% Frontally shielded) (T-Mobile)	100
ETW190 VS12UB (65% Frontally shielded) (T-Mobile)	100
ETW190 VS12UB (65% Frontally shielded) (T-Mobile)	100
ETW200 VS12UB (Laid on the p[latform) (T-Mobile)	100
Raycap RNSNDC-7771-PF-48 (T-Mobile)	100
Nokia FRIJ (Full frontal shielding) (T-Mobile)	100
Nokia FRIJ (Full frontal shielding) (T-Mobile)	100
Nokia FRIJ (Full frontal shielding) (T-Mobile)	100
Nokia FHFB RRU(Full frontal shielding) (T-Mobile)	100
Nokia FHFB RRU(Full frontal shielding) (T-Mobile)	100
Nokia FHFB RRU(Full frontal shielding) (T-Mobile)	100
Low Profile Platform (T-Mobile)	100
(2) TMBXX-6517-A2M w pipe (T-Mobile)	100
(2) TMBXX-6517-A2M w pipe (T-Mobile)	100
(2) TMBXX-6517-A2M w pipe (T-Mobile)	100
Ericsson RRUS-11 800 MHz (Sprint)	91
Ericsson RRUS-11 800 MHz (Sprint)	91
Ericsson RRUS-11 800 MHz (Sprint)	91
Ericsson RRUS 31 B25 (Sprint)	91
Ericsson RRUS 31 B25 (Sprint)	91
Ericsson RRUS 31 B25 (Sprint)	91
(3) ACU-A20-N RET (Sprint)	91
(3) ACU-A20-N RET (Sprint)	91
(3) ACU-A20-N RET (Sprint)	91
Low Profile Platform w/ Rails (Sprint)	91
Ericsson ESMR Filters (Sprint)	91
Ericsson ESMR Filters (Sprint)	91
Ericsson ESMR Filters (Sprint)	91
APXVERR18-C (Sprint)	91
APXVERR18-C (Sprint)	91
APXVERR18-C (Sprint)	91

Structural Components,LLC
4990 Nome Street, Unit C
Denver, CO 80239
Phone: 866-386-7622
FAX: 303-962-3577
sctower.net

Job:	***180320***		
Project:	***Lee's Summit (MO016)***		
Client:	InSite Towers, LLC	Drawn by: S.Mukherjee	App'd:
Code:	TIA-222-G	Date: 05/14/18	Scale: NTS
Path:			Dwg No. E-1