Structural Analysis Report

Prepared for:

KGI
805 Las Cimas Parkway, Building Three, Suite 370
Austin, TX 78746

ATTN: Ms. Jacquie Cossey

Structure	:	**139 ft Monopole**
Site ID	:	**28493**
Proposed Carrier	:	**Dish Wireless**
Site Name	:	**Bethel West 2**
Site Location	:	**15 Great Pasture Road** **Danbury, CT** **41.383, -73.4222**
County	:	**Fairfield**
Date	:	**December 13, 2022**
Max Structure Usage	:	**48%**
Max Foundation Usage	:	**78%**
Result	:	**Pass**

12 13.22

EXP. 01/31/2023
COA: PEC.0001536
EXP. 08/04/2023

Thomas L. Taylor

Digitally signed by Thomas L. Taylor
Date: 2022.12.13 12:30:10 -06'00'

Prepared By:
Nathan Wood, E.I.T.
Structural Engineer

Site ID 28493
December 13, 2022

Table of Contents

Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 139 ft Monopole to reflect the change in loading by Dish Wireless.

Supporting Documents

Tower Drawing	Sabre Job #16-7133-SCB, dated July 13, 2016
Foundation Drawing	Centek Engineering Job #14216.000, dated July 28, 2016
Geotechnical Report	DET Job #2015.13, dated February 19, 2016
Foundation Analysis	Centek Engineering Project #14216.00, dated March 12, 2020
Mount Analysis	Tectonic Site #NJJER01120B, date September 17, 2021
Modifications	SES Monopole Extension Package, dated September 2, 2020 TEP PMI Site #28493, dated August 30, 2021
Tower Inventory	KGI TLF Site #28493, dated December 29, 2021

Analysis

The tower was analyzed using TNX tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

Basic Wind Speed	115 mph (3-Second Gust) Vult
Basic Wind Speed w/Ice	50 mph (3-Second Gust) w/ 1" radial ice concurrent
Code	ANSI/TIA-222-H / 2021 IBC / 2022 Connecticut State Building Code
Risk Category	II
Exposure Category	B
Topographic Category	1
Crest Height	0 ft
Spectral Response	Ss = 0.223 , S1 = 0.056
Site Class	C - Very Dense Soil
Ground Elevation	386.01 ft

Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact Semaan Engineering Solutions at 402-289-1888.

Existing and Reserved Equipment

This loading **is** included in the analysis.

Centerline Elevation (ft)		Qty.	Antenna	Mount Type	Coax (in)	Carrier
Mount	Equip.					
140.0	140.0	9	TPA65R-BU6DA-K	(1) Sabre C10-855-721C Platform w/Rail	(2) 1/2" (6) 7/8" DC Cable (2) 3/8" Fiber	AT&T
		3	4478 B14 RRU			
		3	8843 B2/B66A RRU			
		3	4415 B30 RRU			
		3	4449 B5/B12 RRU			
		3	DC6-48-60-18-8F			
		2	GPS			
120.0	120.0	8	NHH-33B-R2B	(1) Platform w/Rail	(12) 1 5/8" (3) Hybrid	Verizon
		3	MT6407-77A w/RRU			
		12	RRUS A2 Module			
		4	B2/B66A RRH-BR049			
		4	B5/B13 RRH BR04C			
		12	10"x7"x2" TMA			
		3	OVP Junction Box			

Equipment to be Removed

This loading **is not** included in the analysis.

Centerline Elevation (ft)		Qty.	Antenna	Mount Type	Coax (in)	Carrier
Mount	Equip.					
No loading considered as to be removed						

Proposed Equipment

This loading **is** included in the analysis.

Centerline Elevation (ft)		Qty.	Antenna	Mount Type	Coax (in)	Carrier
Mount	Equip.					
110.0	110.0	3	MX08FRO665-21	(1) Commscope MC-PK8-DSH Snub Nose Platform w/Rail	(3) 51.2mm Hybrid Cable	Dish Wireless
		3	TA08025-B604			
		3	TA08025-B605			
		1	RDIDC-9181-PF-48			

Install proposed coax inside the pole shaft.

Structure Usages

Structural Component	Controlling Usage	Pass/Fail
Shaft	48%	Pass
Anchor Bolts	42%	Pass
Baseplate	38%	Pass
Flange	46%	Pass

Foundations

Reaction Component	Original Design Reactions	Analysis Reactions	% of Usage
Moment (Kips-Ft)	4,952.3	2,326.1	47%
Axial (Kips)	57.2	44.4	78%
Shear (Kips)	48.9	22.3	46%

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.

Standard Conditions

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessary limited, to:

-- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.

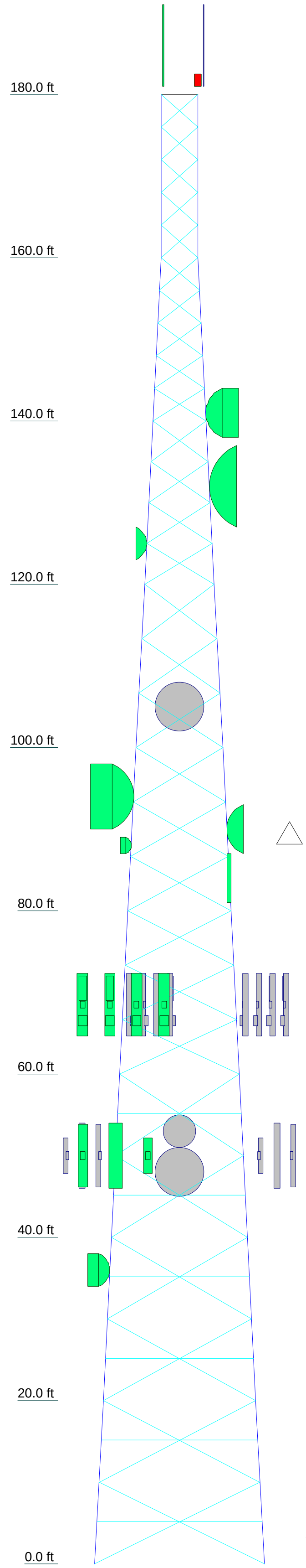
-- Information from drawings in the possession of Semaan Engineering Solutions, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to Semaan Engineering Solutions Holdings and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and Semaan Engineering Solutions, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Semaan Engineering Solutions Holdings is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Sec. Horizontals	Face Width (ft)	# Panels @ (ft)	Weight (K)
T1	ROHN 2 STD	A572-50	L1 1/2x1 1/2x1/8	A36	L1 1/2x1 1/2x1/8	N.A.	4.5208	10 @ 4	0.5
T2	ROHN 2 STD	A572-50	L1 1/2x1 1/2x1/8	A36	N.A.	N.A.		10 @ 4	0.5
T3	ROHN 2.5 STD	A572-50	L1 3/4x1 3/4x1/8	A36	N.A.	N.A.	6.5625	4 @ 5	0.7
T4	ROHN 2.5 X-STR	A572-50	L3x3x3/8	A36	N.A.	N.A.	8.5625	9 @ 6.66667	2.0
T5	ROHN 3 STD	A572-50	L2 1/2x2 1/2x3/16	A36	N.A.	N.A.	10.6042	9 @ 6.66667	1.2
T6	ROHN 3 X-STR	A572-50	L2 1/2x2 1/2x1/4	A36	N.A.	N.A.	12.6042	9 @ 6.66667	1.7
T7	ROHN 3.5 X-STR	A572-50	L3x3x3/8	A36	N.A.	L3x3x3/8	14.6563	6 @ 10	3.0
T8	ROHN 4 X-STR	A572-50	L3x3x3/8	A36	N.A.	L3x3x3/8	16.6979	6 @ 10	3.4
T9	ROHN 4 X-STR	A572-50	L3 1/2x3 1/2x1/4	A36	N.A.	L3x3x3/8	18.6979	6 @ 10	3.3
							20.7813		16.2



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Pima County, Arizona.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 103 mph basic wind in accordance with the TIA-222-H Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. CCISeismic Note: Seismic loads generated by CCISeismic 3.2.3
12. CCISeismic Note: Seismic calculations are in accordance with TIA-222-H
13. TOWER RATING: 62.9%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 115 K
SHEAR: 15 K

UPLIFT: -89 K
SHEAR: 12 K

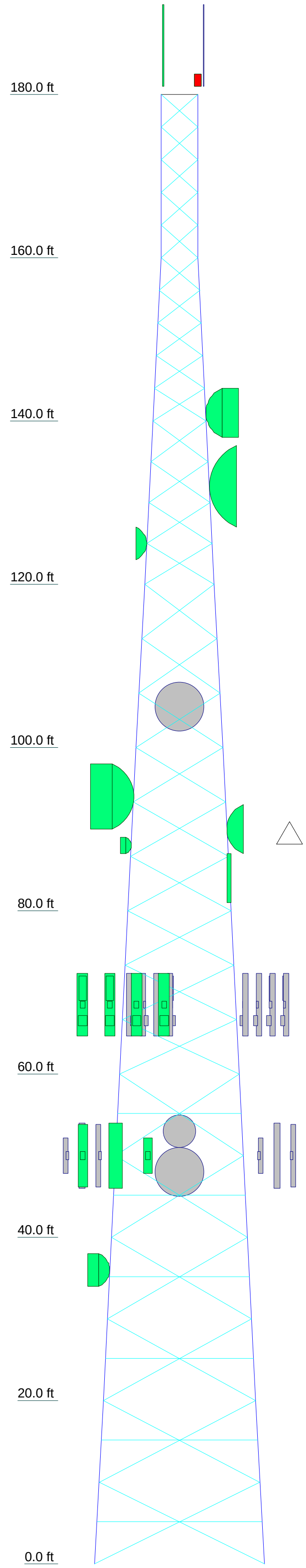
AXIAL 39 K
SHEAR 2 K
MOMENT 235 kip-ft
SEISMIC

AXIAL 37 K
SHEAR 24 K
MOMENT 1839 kip-ft
TORQUE 26 kip-ft
REACTIONS - 103 mph WIND

Semaan Engineering Solutions 1047 N 205th Street Elkhorn, NE 68022 Phone: 402.289.1888 FAX:	Job: **REV02**		
	Project: ***21751_Tuscon MTSO- Tuscon- AZ***		
	Client: KGI	Drawn by: NathanW	App'd:
	Code: TIA-222-H	Date: 03/23/20	Scale: NTS
	Path: C:\Users\NathanW\Desktop\New folder\21751 CCISeismic 3.2.3 Wind And Seismic Analysis.eri		Dwg No. E-1

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9
Legs	ROHN 2 STD	ROHN 2 STD	ROHN 2.5 STD	ROHN 2.5 X-STR	ROHN 3 STD	ROHN 3 X-STR	ROHN 3.5 X-STR	ROHN 4 X-STR	ROHN 4 X-STR
Leg Grade	A572-50								
Diagonals	L1 1/2x1 1/2x1/8	L1 1/2x1 1/2x1/8	L1 3/4x1 3/4x1/8	L3x3x3/8	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x1/4	L3x3x3/8	L3x3x3/8	L3 1/2x3 1/2x1/4
Diagonal Grade	A36								
Top Girts	L1 1/2x1 1/2x1/8	N.A.							
Sec. Horizontals	N.A.						L3x3x3/8		
Face Width (ft)	4.5208		6.5625	8.5625	10.6042	12.6042	14.6563	16.6979	18.6979
# Panels @ (ft)	10 @ 4		4 @ 5	9 @ 6.66667			6 @ 10		
Weight (K)	0.5	0.5	0.7	2.0	1.2	1.7	3.0	3.4	3.3

Face Width at base: 20.7813; Total Weight (K): 16.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Small Beacon	180	RRH 4x30-4T4R B13 (Verizon)	68.5
Small Beacon	180	RRH 4x30-4T4R B13 (Verizon)	68.5
12' Upright Omni (Verizon)	180	RRH 4x30-4T4R B13 (Verizon)	68.5
12' Upright Omni (Verizon)	180	RRH 4x30-4T4R B13 (Verizon)	68.5
Face Frame (Verizon)	177.5	RRH 4x30-4T4R B13 (Verizon)	68.5
Face Frame (Verizon)	177.5	RRH 4x30-4T4R B13 (Verizon)	68.5
Face Frame (Verizon)	177.5	RRH 4x30-4T4R B25 (Verizon)	68.5
UHX6-59-P3A (Verizon)	141	RRH 4x30-4T4R B25 (Verizon)	68.5
10 ft Grid Dish (Verizon)	132	RRH 4x30-4T4R B25 (Verizon)	68.5
SP4-5.2NS (Verizon)	125	RRH 4x30-4T4R B25 (Verizon)	68.5
HP6-180E (Verizon)	105	RRH 4x30-4T4R B25 (Verizon)	68.5
UHX8-65-P3A (Verizon)	94	RRH 4x30-4T4R B25 (Verizon)	68.5
6 ft Grid Dish (Verizon)	90	RHSDC-3315-PF-48 (Verizon)	68.5
2 ft HP Dish (Verizon)	88	RHSDC-3315-PF-48 (Verizon)	68.5
2960.004 (Verizon)	84	RHSDC-3315-PF-48 (Verizon)	68.5
2960.004 (Verizon)	84	HEX458CW0000G (Verizon)	68.5
6' Panel Antenna (Verizon)	84	HEX458CW0000G (Verizon)	68.5
HEX458CW0000G (Verizon)	68.5	HEX458CW0000G (Verizon)	68.5
HEX458CW0000G (Verizon)	68.5	Sector Frame (Verizon)	68.5
HEX458CW0000G (Verizon)	68.5	Sector Frame (Verizon)	68.5
HEX458CW0000G (Verizon)	68.5	Sector Frame (Verizon)	68.5
HEX458CW0000G (Verizon)	68.5	HEX458CW0000G (Verizon)	68.5
HEX458CW0000G (Verizon)	68.5	HP4-107-P3A (Verizon)	53
HEX458CW0000G (Verizon)	68.5	RA11.7760.00 (ATT)	50
HEX458CW0000G (Verizon)	68.5	RRH 4x25-WCS-4R (ATT)	50
RRUS A2 Modules (Verizon)	68.5	RRH 4x25-WCS-4R (ATT)	50
RRUS A2 Modules (Verizon)	68.5	RRH 4x25-WCS-4R (ATT)	50
RRUS A2 Modules (Verizon)	68.5	RRH 2x40-AWS-RDEM (ATT)	50
RRUS A2 Modules (Verizon)	68.5	RRH 2x40-AWS-RDEM (ATT)	50
RRUS A2 Modules (Verizon)	68.5	RRH 2x40-AWS-RDEM (ATT)	50
RRUS A2 Modules (Verizon)	68.5	WCS-IMFT-AMT Filter (ATT)	50
RRUS A2 Modules (Verizon)	68.5	DC6-48-60-18-8F (ATT)	50
RRUS A2 Modules (Verizon)	68.5	LGP18601 TMA (ATT)	50
RRUS A2 Modules (Verizon)	68.5	LGP18601 TMA (ATT)	50
RRUS A2 Modules (Verizon)	68.5	LGP18601 TMA (ATT)	50
RRUS A2 Modules (Verizon)	68.5	LGP18601 TMA (ATT)	50
RRUS A2 Modules (Verizon)	68.5	LGP18601 TMA (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	LGP18601 TMA (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	XXQLH-654L8H8-iVT (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	XXQLH-654L8H8-iVT (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	XXQLH-654L8H8-iVT (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	RRH 4T4R B12/14 320W AHLBA (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	RRH 4T4R B12/14 320W AHLBA (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	RRH 4T4R B12/14 320W AHLBA (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	RRH 4T4R B25/66 320W (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	RRH 4T4R B25/66 320W (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	RRH 4T4R B25/66 320W (ATT)	50
TMA 10"x7"x2" (Verizon)	68.5	DC6-48-60-0-8C-EV (ATT)	50
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	68.5	VFA10-RRU (ATT)	50
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	68.5	VFA10-RRU (ATT)	50
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	68.5	VFA10-RRU (ATT)	50
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	68.5	DPA-65R-BUUUU-H8 (ATT)	50
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	68.5	DPA-65R-BUUUU-H8 (ATT)	50
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	68.5	DPA-65R-BUUUU-H8 (ATT)	50
		RA11.7760.00 (ATT)	50
		RA11.7760.00 (ATT)	50
		UXA6-107BC (Verizon)	48
		HP4-180E (Verizon)	36

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Pima County, Arizona.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 103 mph basic wind in accordance with the TIA-222-H Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10.

Semaan Engineering Solutions
1047 N 205th Street
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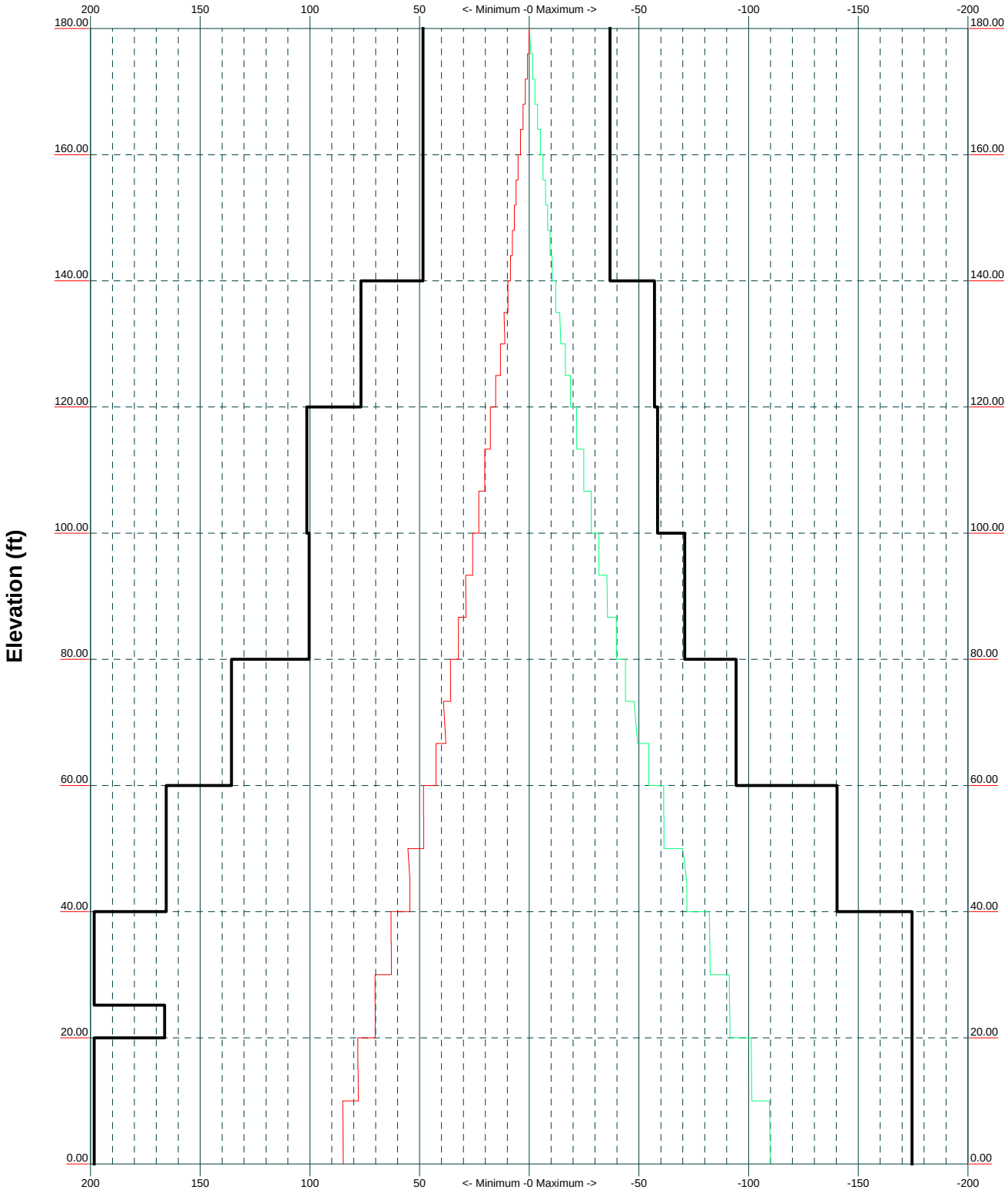
Phone: 402.289.1888
FAX:

Job: **REV02**			
Project: **21751_Tuscon MTSO- Tuscon- AZ**			
Client: KGI	Drawn by: NathanW	App'd:	
Code: TIA-222-H	Date: 03/23/20	Scale: NTS	
Path: C:\Users\NathanW\Desktop\21751_Newest Edit\21751.eri		Dwg No. E-1	

TIA-222-H - 103 mph Exposure B

Leg Capacity ——— **Leg Compression (K)**



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Path: C:\Users\NathanW\Desktop\New folder\21751 CCISeismic 3.2.3 Wind And Seismic Analysis.er		Dwg No. E-3

TIA-222-H - 103 mph Exposure B

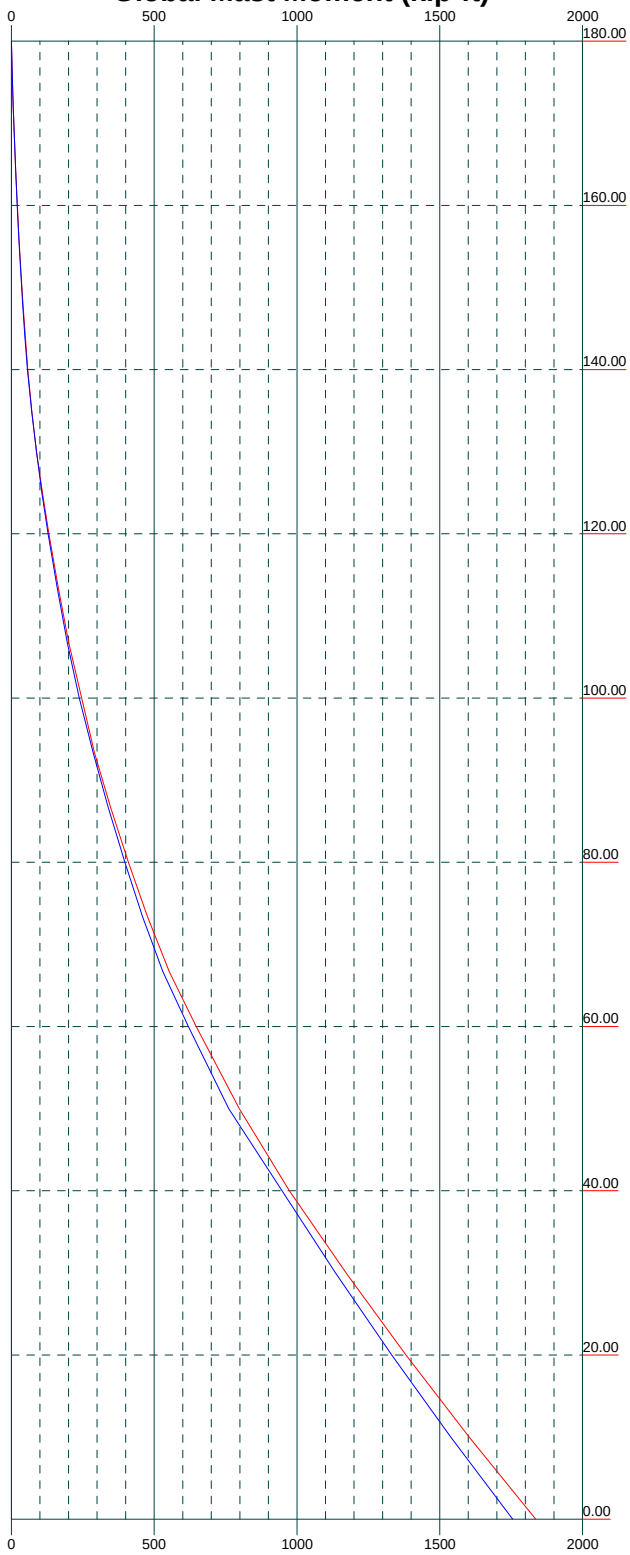
Vx Vz

Maximum Values

Mx Mz

Global Mast Shear (K)

Global Mast Moment (kip-ft)



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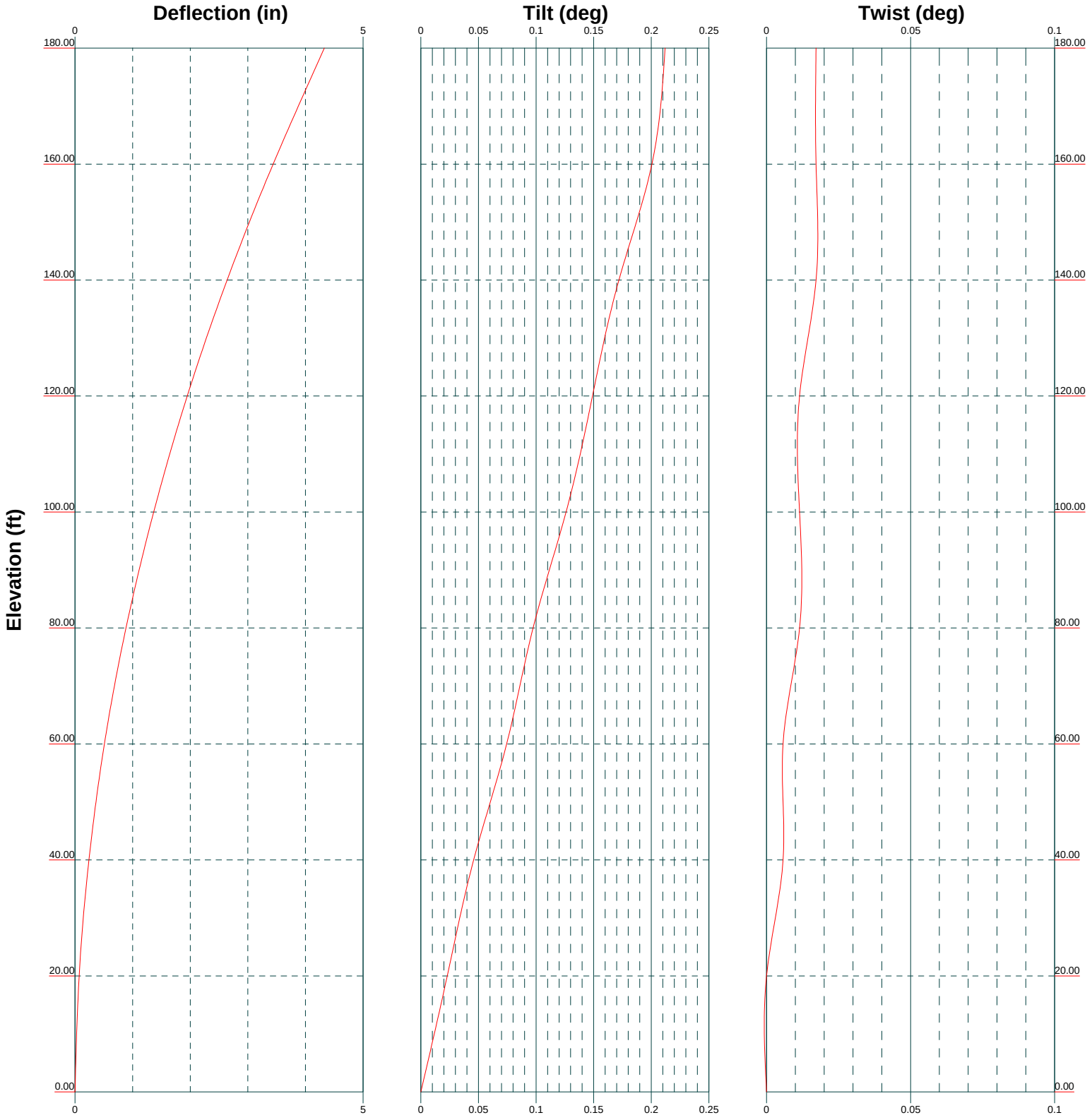
TIA-222-H - Service - 60 mph

Maximum Values



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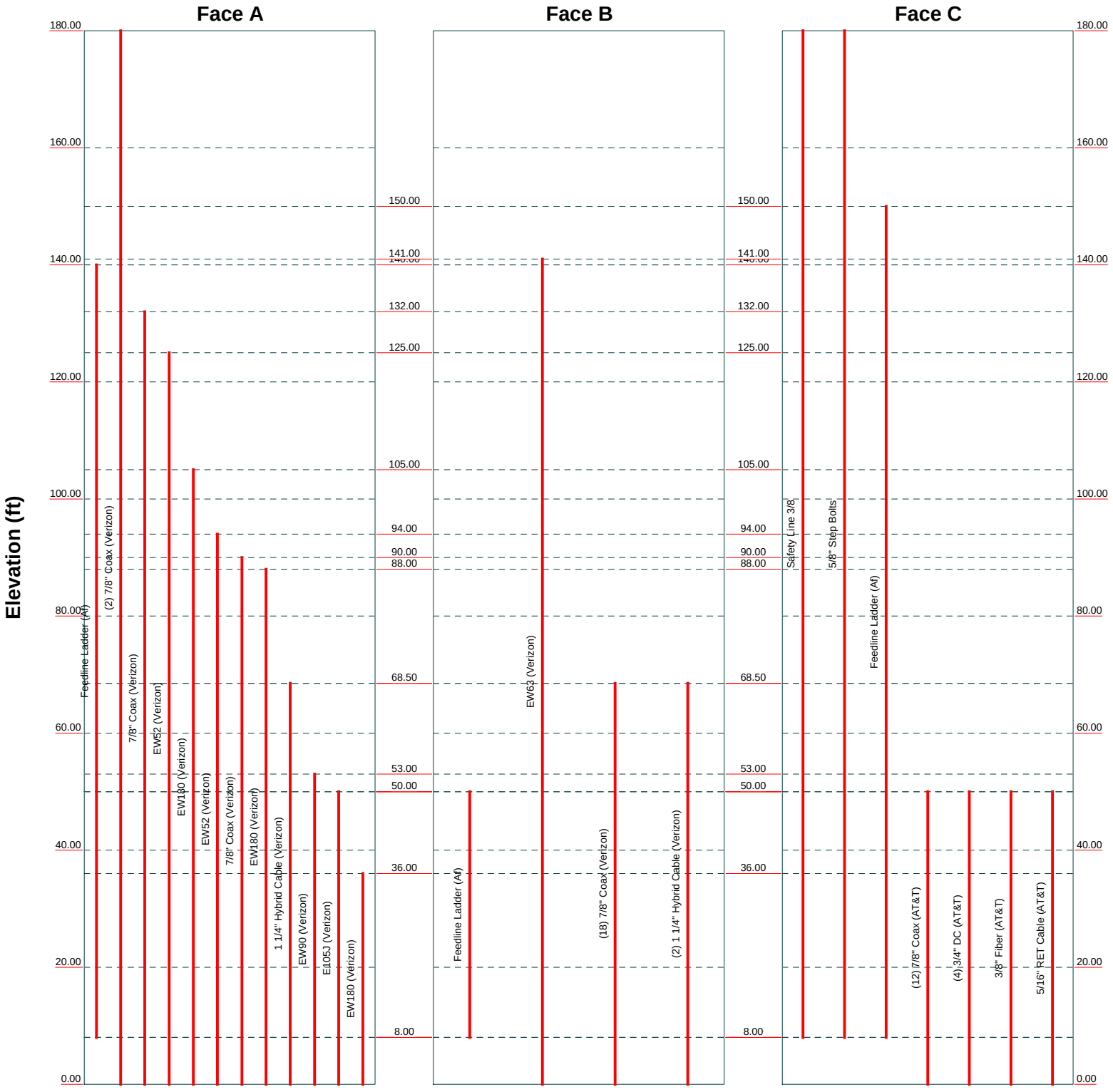
Feed Line Distribution Chart
0' - 180'

Round | Flat | App In Face | App Out Face | Truss Leg



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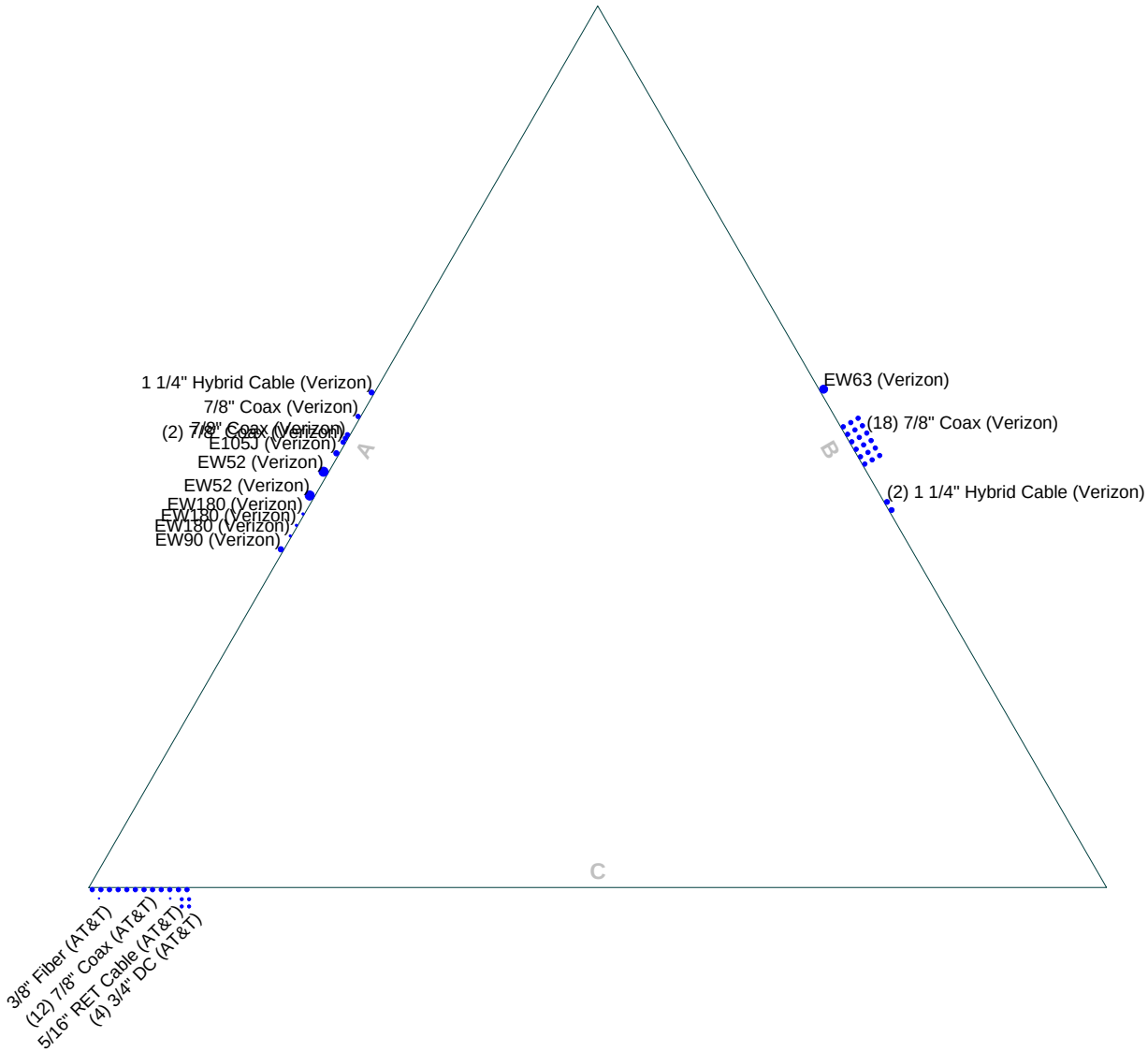
Path: C:\Users\NathanW\Desktop\New folder\21751 CC\Seismic 3.2.3 Wind And Seismic Analysis.er		Dwg No. E-7

Feed Line Plan

Round Flat App In Face App Out Face



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Client: KGI	Drawn by: NathanW	App'd:
Code: TIA-222-H	Date: 03/23/20	Scale: NTS
Path: C:\Users\NathanW\Desktop\New folder\21751 CC\Seismic 3.2.3 Wind And Seismic Analysis.er		Dwg No. E-7

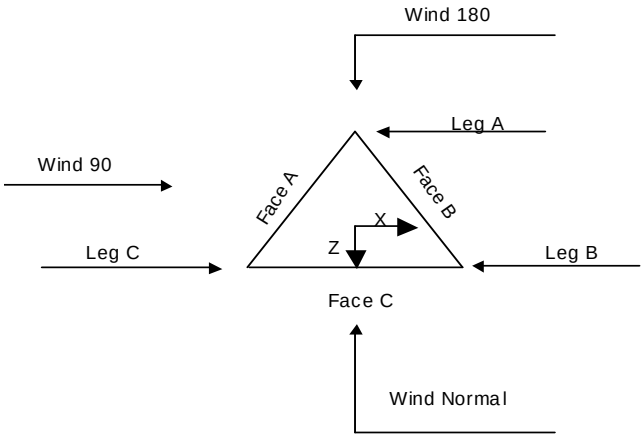
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.52 ft at the top and 20.78 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Pima County, Arizona.
Tower base elevation above sea level: 2443.81 ft.
Basic wind speed of 103 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Deflections calculated using a wind speed of 60 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
CCISeismic Note: Seismic loads generated by CCISeismic 3.2.3.
CCISeismic Note: Seismic calculations are in accordance with TIA-222-H.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member 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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.00-160.00			4.52	1	20.00
T2	160.00-140.00			4.52	1	20.00
T3	140.00-120.00			6.56	1	20.00
T4	120.00-100.00			8.56	1	20.00
T5	100.00-80.00			10.60	1	20.00
T6	80.00-60.00			12.60	1	20.00
T7	60.00-40.00			14.66	1	20.00
T8	40.00-20.00			16.70	1	20.00
T9	20.00-0.00			18.70	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.00-160.00	4.00	X Brace	No	No	0.0000	0.0000
T2	160.00-140.00	4.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T7	60.00-40.00	10.00	X Brace	No	Yes	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	Yes	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T3 140.00-120.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x1/8	A36 (36 ksi)
T4 120.00-100.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Equal Angle	L3x3x3/8	A36 (36 ksi)
T5 100.00-80.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 80.00-60.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T7 60.00-40.00	Pipe	ROHN 3.5 X-STR	A572-50 (50 ksi)	Equal Angle	L3x3x3/8	A36 (36 ksi)
T8 40.00-20.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Equal Angle	L3x3x3/8	A36 (36 ksi)
T9 20.00-0.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T7 60.00-40.00	Single Angle	L3x3x3/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T8 40.00-20.00	Single Angle	L3x3x3/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T9 20.00-0.00	Single Angle	L3x3x3/8	A36	Single Angle		A36

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
			(36 ksi)			(36 ksi)

Tower Section Geometry *(cont'd)*

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
T1 180.00-160.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T2 160.00-140.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T3 140.00-120.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T4 120.00-100.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T5 100.00-80.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T6 80.00-60.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T7 60.00-40.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T8 40.00-20.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt
T9 20.00-0.00	0.07	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	No	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	0.5	1
60.00-40.00				1	1	1	1	1	0.5	1
T8	Yes	No	1	1	1	1	1	1	0.5	1
40.00-20.00				1	1	1	1	1	0.5	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T9 20.00-0.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	0.5 0.5	1 1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 180.00-160.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T2 160.00-140.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T3 140.00-120.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T4 120.00-100.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T5 100.00-80.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T6 80.00-60.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T7 60.00-40.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T8 40.00-20.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T9 20.00-0.00	Flange	1.0000 A449	4	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	C	No	No	Ar (CaAa)	180.00 - 8.00	0.0000	0	1	1	0.3750	0.3750		0.22
5/8" Step Bolts	C	No	No	Ar (CaAa)	180.00 - 8.00	0.0000	0	1	1	0.3750	0.3750		0.22
Feedline Ladder (Af)	A	No	No	Af (CaAa)	140.00 - 8.00	0.0000	0	1	1	1.5000	3.0000		8.40
Feedline Ladder (Af)	B	No	No	Af (CaAa)	50.00 - 8.00	0.0000	0	1	1	1.5000	3.0000		8.40
Feedline Ladder (Af) ***	C	No	No	Af (CaAa)	150.00 - 8.00	0.0000	0.45	1	1	1.5000	3.0000		8.40
7/8" Coax (Verizon)	A	No	No	Ar (CaAa)	180.00 - 0.00	0.0000	0.008	2	2	1.0000	1.1100		0.52
EW63 (Verizon)	B	No	No	Ar (CaAa)	141.00 - 0.00	0.0000	-0.0628	1	1	1.0000	2.0100		0.51
7/8" Coax (Verizon)	A	No	No	Ar (CaAa)	132.00 - 0.00	0.0000	0.033	1	1	1.0000	1.1100		0.52
EW52 (Verizon)	A	No	No	Ar (CaAa)	125.00 - 0.00	0.0000	-0.031	1	1	1.0000	2.2500		0.59
EW180 (Verizon)	A	No	No	Ar (CaAa)	105.00 - 0.00	0.0000	-0.077	1	1	1.0000	0.5899		0.15
EW52 (Verizon)	A	No	No	Ar (CaAa)	94.00 - 0.00	0.0000	-0.058	1	1	1.0000	2.2500		0.59
7/8" Coax (Verizon)	A	No	No	Ar (CaAa)	90.00 - 0.00	0.0000	0.0082	1	1	1.0000	1.1100		0.52
EW180 (Verizon)	A	No	No	Ar (CaAa)	88.00 - 0.00	0.0000	-0.09	1	1	1.0000	0.5899		0.15
7/8" Coax (Verizon)	B	No	No	Ar (CaAa)	68.50 - 0.00	0.0000	0	18	6	1.0000	1.1100		0.52
1 1/4" Hybrid Cable (Verizon)	A	No	No	Ar (CaAa)	68.50 - 0.00	0.0000	0.06	1	1	1.0000	1.2500		0.95
1 1/4" Hybrid Cable (Verizon)	B	No	No	Ar (CaAa)	68.50 - 0.00	0.0000	0.0688	2	2	1.0000	1.2500		0.95
EW90 (Verizon)	A	No	No	Ar (CaAa)	53.00 - 0.00	0.0000	-0.118	1	1	1.0000	1.3200		0.32
7/8" Coax (AT&T)	C	No	No	Ar (CaAa)	50.00 - 0.00	0.0000	0.45	12	12	1.0000	1.1100		0.52
3/4" DC (AT&T)	C	No	No	Ar (CaAa)	50.00 - 0.00	2.5000	0.405	4	2	1.0000	0.7800		0.60
3/8" Fiber (AT&T)	C	No	No	Ar (CaAa)	50.00 - 0.00	2.5000	0.49	1	1	1.0000	0.3900		0.06

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
5/16" RET Cable (AT&T)	C	No	No	Ar (CaAa)	50.00 - 0.00	2.5000	0.42	1	1	1.0000	0.4400		0.08
E105J (Verizon)	A	No	No	Ar (CaAa)	50.00 - 0.00	0.0000	-0.009	1	1	1.0000	1.3000		0.40
EW180 (Verizon)	A	No	No	Ar (CaAa)	36.00 - 0.00	0.0000	-0.102	1	1	1.0000	0.5899		0.15

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 K
T1	180.00-160.00	A	0.000	0.000	4.440	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.500	0.000	0.01
T2	160.00-140.00	A	0.000	0.000	4.440	0.000	0.02
		B	0.000	0.000	0.201	0.000	0.00
		C	0.000	0.000	6.500	0.000	0.09
T3	140.00-120.00	A	0.000	0.000	16.897	0.000	0.20
		B	0.000	0.000	4.020	0.000	0.01
		C	0.000	0.000	11.500	0.000	0.18
T4	120.00-100.00	A	0.000	0.000	21.455	0.000	0.21
		B	0.000	0.000	4.020	0.000	0.01
		C	0.000	0.000	11.500	0.000	0.18
T5	100.00-80.00	A	0.000	0.000	27.072	0.000	0.23
		B	0.000	0.000	4.020	0.000	0.01
		C	0.000	0.000	11.500	0.000	0.18
T6	80.00-60.00	A	0.000	0.000	31.302	0.000	0.25
		B	0.000	0.000	23.128	0.000	0.11
		C	0.000	0.000	11.500	0.000	0.18
T7	60.00-40.00	A	0.000	0.000	35.755	0.000	0.27
		B	0.000	0.000	53.980	0.000	0.32
		C	0.000	0.000	28.770	0.000	0.26
T8	40.00-20.00	A	0.000	0.000	38.923	0.000	0.28
		B	0.000	0.000	58.980	0.000	0.40
		C	0.000	0.000	46.040	0.000	0.35
T9	20.00-0.00	A	0.000	0.000	35.159	0.000	0.21
		B	0.000	0.000	54.980	0.000	0.34
		C	0.000	0.000	41.440	0.000	0.28

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	-0.9230	-0.2465	-0.9230	-0.2465
T2	160.00-140.00	-2.7069	1.0043	-2.7069	1.0043
T3	140.00-120.00	-5.4627	-0.3099	-5.4627	-0.3099
T4	120.00-100.00	-6.0892	-0.8176	-6.0892	-0.8176
T5	100.00-80.00	-8.3581	-1.5204	-8.3581	-1.5204
T6	80.00-60.00	-6.9143	-3.9179	-6.9143	-3.9179
T7	60.00-40.00	-9.2005	-4.7376	-9.2005	-4.7376

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T8	40.00-20.00	-14.2517	-4.1160	-14.2517	-4.1160
T9	20.00-0.00	-13.8534	-4.4800	-13.8534	-4.4800

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Safety Line 3/8	160.00 - 180.00	0.6000	0.6000
T1	2	5/8" Step Bolts	160.00 - 180.00	0.6000	0.6000
T1	7	7/8" Coax	160.00 - 180.00	0.6000	0.6000
T2	1	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T2	2	5/8" Step Bolts	140.00 - 160.00	0.6000	0.6000
T2	5	Feedline Ladder (Af)	140.00 - 150.00	0.6000	0.6000
T2	7	7/8" Coax	140.00 - 160.00	0.6000	0.6000
T2	8	EW63	140.00 - 141.00	0.6000	0.6000
T3	1	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T3	2	5/8" Step Bolts	120.00 - 140.00	0.6000	0.6000
T3	3	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	5	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	7	7/8" Coax	120.00 - 140.00	0.6000	0.6000
T3	8	EW63	120.00 - 140.00	0.6000	0.6000
T3	9	7/8" Coax	120.00 - 132.00	0.6000	0.6000
T3	10	EW52	120.00 - 125.00	0.6000	0.6000
T4	1	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T4	2	5/8" Step Bolts	100.00 - 120.00	0.6000	0.6000
T4	3	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	5	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	7	7/8" Coax	100.00 - 120.00	0.6000	0.6000
T4	8	EW63	100.00 - 120.00	0.6000	0.6000
T4	9	7/8" Coax	100.00 - 120.00	0.6000	0.6000
T4	10	EW52	100.00 - 120.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	11	EW180	100.00 - 105.00	0.6000	0.6000
T5	1	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T5	2	5/8" Step Bolts	80.00 - 100.00	0.6000	0.6000
T5	3	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	5	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	7	7/8" Coax	80.00 - 100.00	0.6000	0.6000
T5	8	EW63	80.00 - 100.00	0.6000	0.6000
T5	9	7/8" Coax	80.00 - 100.00	0.6000	0.6000
T5	10	EW52	80.00 - 100.00	0.6000	0.6000
T5	11	EW180	80.00 - 100.00	0.6000	0.6000
T5	12	EW52	80.00 - 94.00	0.6000	0.6000
T5	13	7/8" Coax	80.00 - 90.00	0.6000	0.6000
T5	14	EW180	80.00 - 88.00	0.6000	0.6000
T6	1	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T6	2	5/8" Step Bolts	60.00 - 80.00	0.6000	0.6000
T6	3	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	5	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	7	7/8" Coax	60.00 - 80.00	0.6000	0.6000
T6	8	EW63	60.00 - 80.00	0.6000	0.6000
T6	9	7/8" Coax	60.00 - 80.00	0.6000	0.6000
T6	10	EW52	60.00 - 80.00	0.6000	0.6000
T6	11	EW180	60.00 - 80.00	0.6000	0.6000
T6	12	EW52	60.00 - 80.00	0.6000	0.6000
T6	13	7/8" Coax	60.00 - 80.00	0.6000	0.6000
T6	14	EW180	60.00 - 80.00	0.6000	0.6000
T6	15	7/8" Coax	60.00 - 68.50	0.6000	0.6000
T6	16	1 1/4" Hybrid Cable	60.00 - 68.50	0.6000	0.6000
T6	17	1 1/4" Hybrid Cable	60.00 - 68.50	0.6000	0.6000
T7	1	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T7	2	5/8" Step Bolts	40.00 - 60.00	0.6000	0.6000
T7	3	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	4	Feedline Ladder (Af)	40.00 - 50.00	0.6000	0.6000
T7	5	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	7	7/8" Coax	40.00 - 60.00	0.6000	0.6000
T7	8	EW63	40.00 - 60.00	0.6000	0.6000
T7	9	7/8" Coax	40.00 - 60.00	0.6000	0.6000
T7	10	EW52	40.00 - 60.00	0.6000	0.6000
T7	11	EW180	40.00 - 60.00	0.6000	0.6000
T7	12	EW52	40.00 - 60.00	0.6000	0.6000
T7	13	7/8" Coax	40.00 - 60.00	0.6000	0.6000
T7	14	EW180	40.00 - 60.00	0.6000	0.6000
T7	15	7/8" Coax	40.00 - 60.00	0.6000	0.6000
T7	16	1 1/4" Hybrid Cable	40.00 - 60.00	0.6000	0.6000
T7	17	1 1/4" Hybrid Cable	40.00 - 60.00	0.6000	0.6000
T7	18	EW90	40.00 - 53.00	0.6000	0.6000
T7	19	7/8" Coax	40.00 - 50.00	0.6000	0.6000
T7	20	3/4" DC	40.00 - 50.00	0.6000	0.6000
T7	21	3/8" Fiber	40.00 - 50.00	0.6000	0.6000
T7	22	5/16" RET Cable	40.00 - 50.00	0.6000	0.6000
T7	23	E105J	40.00 - 50.00	0.6000	0.6000
T8	1	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T8	2	5/8" Step Bolts	20.00 - 40.00	0.6000	0.6000
T8	3	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	4	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	5	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	7	7/8" Coax	20.00 - 40.00	0.6000	0.6000
T8	8	EW63	20.00 - 40.00	0.6000	0.6000
T8	9	7/8" Coax	20.00 - 40.00	0.6000	0.6000
T8	10	EW52	20.00 - 40.00	0.6000	0.6000
T8	11	EW180	20.00 - 40.00	0.6000	0.6000
T8	12	EW52	20.00 - 40.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	13	7/8" Coax	20.00 - 40.00	0.6000	0.6000
T8	14	EW180	20.00 - 40.00	0.6000	0.6000
T8	15	7/8" Coax	20.00 - 40.00	0.6000	0.6000
T8	16	1 1/4" Hybrid Cable	20.00 - 40.00	0.6000	0.6000
T8	17	1 1/4" Hybrid Cable	20.00 - 40.00	0.6000	0.6000
T8	18	EW90	20.00 - 40.00	0.6000	0.6000
T8	19	7/8" Coax	20.00 - 40.00	0.6000	0.6000
T8	20	3/4" DC	20.00 - 40.00	0.6000	0.6000
T8	21	3/8" Fiber	20.00 - 40.00	0.6000	0.6000
T8	22	5/16" RET Cable	20.00 - 40.00	0.6000	0.6000
T8	23	E105J	20.00 - 40.00	0.6000	0.6000
T8	24	EW180	20.00 - 36.00	0.6000	0.6000
T9	1	Safety Line 3/8	8.00 - 20.00	0.6000	0.6000
T9	2	5/8" Step Bolts	8.00 - 20.00	0.6000	0.6000
T9	3	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T9	4	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T9	5	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T9	7	7/8" Coax	0.00 - 20.00	0.6000	0.6000
T9	8	EW63	0.00 - 20.00	0.6000	0.6000
T9	9	7/8" Coax	0.00 - 20.00	0.6000	0.6000
T9	10	EW52	0.00 - 20.00	0.6000	0.6000
T9	11	EW180	0.00 - 20.00	0.6000	0.6000
T9	12	EW52	0.00 - 20.00	0.6000	0.6000
T9	13	7/8" Coax	0.00 - 20.00	0.6000	0.6000
T9	14	EW180	0.00 - 20.00	0.6000	0.6000
T9	15	7/8" Coax	0.00 - 20.00	0.6000	0.6000
T9	16	1 1/4" Hybrid Cable	0.00 - 20.00	0.6000	0.6000
T9	17	1 1/4" Hybrid Cable	0.00 - 20.00	0.6000	0.6000
T9	18	EW90	0.00 - 20.00	0.6000	0.6000
T9	19	7/8" Coax	0.00 - 20.00	0.6000	0.6000
T9	20	3/4" DC	0.00 - 20.00	0.6000	0.6000
T9	21	3/8" Fiber	0.00 - 20.00	0.6000	0.6000
T9	22	5/16" RET Cable	0.00 - 20.00	0.6000	0.6000
T9	23	E105J	0.00 - 20.00	0.6000	0.6000
T9	24	EW180	0.00 - 20.00	0.6000	0.6000

User Defined Loads - Seismic

Description	Elevation	Offset From Centroid	Azimuth Angle	E_v	E_{hx}	E_{hz}	E_h
	ft	ft	°	K	K	K	K
CCISeismic Tower Section 1	170.00	0.00	0.0000	0.03	0.00	0.00	0.09
CCISeismic Tower Section 2	150.00	0.00	0.0000	0.03	0.00	0.00	0.08
CCISeismic Tower Section 3	130.00	0.00	0.0000	0.04	0.00	0.00	0.10
CCISeismic Tower Section 4	110.00	0.00	0.0000	0.11	0.00	0.00	0.24
CCISeismic Tower Section 5	90.00	0.00	0.0000	0.07	0.00	0.00	0.12
CCISeismic Tower Section 6	70.00	0.00	0.0000	0.10	0.00	0.00	0.13
CCISeismic Tower Section 7	50.00	0.00	0.0000	0.17	0.00	0.00	0.16
CCISeismic Tower Section 8	30.00	0.00	0.0000	0.19	0.00	0.00	0.10
CCISeismic Tower Section 9	10.00	0.00	0.0000	0.19	0.00	0.00	0.03
CCISeismic miscl Small Beacon	180.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Small Beacon	180.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 12’ Upright Omni	180.00	0.00	0.0000	0.00	0.00	0.00	0.01
CCISeismic 12’ Upright Omni	180.00	0.00	0.0000	0.00	0.00	0.00	0.01

Description	Elevation	Offset From Centroid	Azimuth Angle	E_v	E_{hx}	E_{hz}	E_h
	ft	ft	°	K	K	K	K
CCISeismic Face Frame	177.50	0.00	0.0000	0.01	0.00	0.00	0.05
CCISeismic Face Frame	177.50	0.00	0.0000	0.01	0.00	0.00	0.05
CCISeismic Face Frame	177.50	0.00	0.0000	0.01	0.00	0.00	0.05
CCISeismic 2960.004	84.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 2960.004	84.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 6’ Panel Antenna	84.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic tower mounts Sector Frame	68.50	0.00	0.0000	0.03	0.00	0.00	0.04
CCISeismic tower mounts Sector Frame	68.50	0.00	0.0000	0.03	0.00	0.00	0.04
CCISeismic tower mounts Sector Frame	68.50	0.00	0.0000	0.03	0.00	0.00	0.04
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic amphenal HEX458CW0000G	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRUS A2 Modules	68.50	0.00	0.0000	0.00	0.00	0.00	0.00

Description	*Elevation* *ft*	*Offset From Centroid* *ft*	*Azimuth Angle* *°*	E_v *K*	E_{hx} *K*	E_{hz} *K*	E_h *K*
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan TMA 10"x7"x2"	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRH 3JR52709AA 2X60 (AWS 60W)	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRH 3JR52709AA 2X60 (AWS 60W)	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRH 3JR52709AA 2X60 (AWS 60W)	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRH 3JR52709AA 2X60 (AWS 60W)	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRH 3JR52709AA 2X60 (AWS 60W)	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic semaan RRH 3JR52709AA 2X60 (AWS 60W)	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B13	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B13	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B13	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B13	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B13	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B13	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B25	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B25	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B25	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B25	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B25	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x30-4T4R B25	68.50	0.00	0.0000	0.00	0.00	0.00	0.00

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °	E_v K	E_{hx} K	E_{hz} K	E_h K
CCISeismic RHSDC-3315-PF-48	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RHSDC-3315-PF-48	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RHSDC-3315-PF-48	68.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic VFA10-RRU	50.00	0.00	0.0000	0.03	0.00	0.00	0.03
CCISeismic VFA10-RRU	50.00	0.00	0.0000	0.03	0.00	0.00	0.03
CCISeismic VFA10-RRU	50.00	0.00	0.0000	0.03	0.00	0.00	0.03
CCISeismic cci DPA-65R-BUUUU-H8	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic cci DPA-65R-BUUUU-H8	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic cci DPA-65R-BUUUU-H8	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave RA11.7760.00	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave RA11.7760.00	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave RA11.7760.00	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x25-WCS-4R	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x25-WCS-4R	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4x25-WCS-4R	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 2x40-AWS-RDEM	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 2x40-AWS-RDEM	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 2x40-AWS-RDEM	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic commscope WCS-IMFT-AMT Filter	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic raycap DC6-48-60-18-8F	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave LGP18601 TMA	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave LGP18601 TMA	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave LGP18601 TMA	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave LGP18601 TMA	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave LGP18601 TMA	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic powerwave LGP18601 TMA	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic ace XXQLH-654L8H8-iVT	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic ace XXQLH-654L8H8-iVT	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic ace XXQLH-654L8H8-iVT	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic RRH 4T4R B12/14 320W AHLBA	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic RRH 4T4R B12/14 320W AHLBA	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic RRH 4T4R	50.00	0.00	0.0000	0.01	0.00	0.00	0.01

Description	*Elevation*	*Offset From Centroid*	*Azimuth Angle*	E_v	E_{hx}	E_{hz}	E_h
	ft	*ft*	°	*K*	*K*	*K*	*K*
B12/14 320W AHLBA CCISeismic RRH 4T4R B25/66 320W	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4T4R B25/66 320W	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic RRH 4T4R B25/66 320W	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic DC6-48-60-0-8C-EV	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic UHX6-59-P3A	141.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic general 10 ft Grid Dish	132.00	0.00	0.0000	0.02	0.00	0.00	0.06
CCISeismic SP4-5.2NS	125.00	0.00	0.0000	0.00	0.00	0.00	0.01
CCISeismic HP6-180E	105.00	0.00	0.0000	0.02	0.00	0.00	0.04
CCISeismic andrew UHX8-65-P3A	94.00	0.00	0.0000	0.03	0.00	0.00	0.05
CCISeismic general 6 ft Grid Dish	90.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic general 2 ft HP Dish	88.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic HP4-107-P3A	53.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic UXA6-107BC	48.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic HP4-180E	36.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (160ft to180ft)	170.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (140ft to160ft)	150.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (120ft to140ft)	130.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (100ft to120ft)	110.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Safety Line 3/8 From 8 to 180 (8ft to20ft)	14.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (160ft to180ft)	170.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (140ft to160ft)	150.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (120ft to140ft)	130.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (100ft to120ft)	110.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/8" Step Bolts From 8 to 180 (8ft to20ft)	14.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Feedline Ladder (Af) From 8 to 140	130.00	0.00	0.0000	0.01	0.00	0.00	0.02

Description	Elevation	Offset From Centroid	Azimuth Angle	E_v	E_{hx}	E_{hz}	E_h
	ft	ft	°	K	K	K	K
(120ft to140ft)							
CCISeismic miscl Feedline Ladder (Af) From 8 to 140 (100ft to120ft)	110.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic miscl Feedline Ladder (Af) From 8 to 140 (80ft to100ft)	90.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic miscl Feedline Ladder (Af) From 8 to 140 (60ft to80ft)	70.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 140 (40ft to60ft)	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 140 (20ft to40ft)	30.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 140 (8ft to20ft)	14.00	0.00	0.0000	0.01	0.00	0.00	0.00
CCISeismic miscl Feedline Ladder (Af) From 8 to 50 (40ft to50ft)	45.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic miscl Feedline Ladder (Af) From 8 to 50 (20ft to40ft)	30.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 50 (8ft to20ft)	14.00	0.00	0.0000	0.01	0.00	0.00	0.00
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (140ft to150ft)	145.00	0.00	0.0000	0.00	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (120ft to140ft)	130.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (100ft to120ft)	110.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (80ft to100ft)	90.00	0.00	0.0000	0.01	0.00	0.00	0.02
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (60ft to80ft)	70.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (40ft to60ft)	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (20ft to40ft)	30.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (8ft to20ft)	14.00	0.00	0.0000	0.01	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (160ft to180ft)	170.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (140ft to160ft)	150.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (120ft	130.00	0.00	0.0000	0.00	0.00	0.00	0.00

Description	Elevation	Offset From Centroid	Azimuth Angle	E_v	E_{hx}	E_{hz}	E_h
	ft	ft	°	K	K	K	K
to140ft)							
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (100ft to120ft)	110.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 7/8" Coax From 0 to 180 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (140ft to141ft)	140.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (120ft to140ft)	130.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (100ft to120ft)	110.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW63 From 0 to 141 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (120ft to132ft)	126.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (100ft to120ft)	110.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 132 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 125 (120ft to125ft)	122.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 125 (100ft to120ft)	110.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 125 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 125 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00

Description	*Elevation*	*Offset From Centroid*	*Azimuth Angle*	E_v	E_{hx}	E_{hz}	E_h
	ft	*ft*	°	*K*	*K*	*K*	*K*
CCISeismic general cable EW52 From 0 to 125 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 125 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 125 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 105 (100ft to105ft)	102.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 105 (80ft to100ft)	90.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 105 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 105 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 105 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 105 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 94 (80ft to94ft)	87.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 94 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 94 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 94 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW52 From 0 to 94 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 90 (80ft to90ft)	85.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 90 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 90 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 90 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable 7/8" Coax From 0 to 90 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 88 (80ft to88ft)	84.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 88 (60ft to80ft)	70.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 88 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 88 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 88 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (18) general cable 7/8" Coax From 0 to 68.5 (60ft to68.5ft)	64.25	0.00	0.0000	0.00	0.00	0.00	0.01
CCISeismic (18) general cable 7/8" Coax From 0 to 68.5 (40ft to60ft)	50.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic (18) general cable 7/8" Coax From 0 to 68.5 (20ft to40ft)	30.00	0.00	0.0000	0.01	0.00	0.00	0.01
CCISeismic (18) general cable 7/8" Coax From 0 to 68.5 (0ft to20ft)	10.00	0.00	0.0000	0.01	0.00	0.00	0.00

Description	Elevation	Offset From Centroid	Azimuth Angle	E_v	E_{hx}	E_{hz}	E_h
	ft	ft	°	K	K	K	K
CCISeismic 1 1/4" Hybrid Cable From 0 to 68.5 (60ft to68.5ft)	64.25	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 1 1/4" Hybrid Cable From 0 to 68.5 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 1 1/4" Hybrid Cable From 0 to 68.5 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 1 1/4" Hybrid Cable From 0 to 68.5 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 1 1/4" Hybrid Cable From 0 to 68.5 (60ft to68.5ft)	64.25	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 1 1/4" Hybrid Cable From 0 to 68.5 (40ft to60ft)	50.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 1 1/4" Hybrid Cable From 0 to 68.5 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (2) general cable 1 1/4" Hybrid Cable From 0 to 68.5 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW90 From 0 to 53 (40ft to53ft)	46.50	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW90 From 0 to 53 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic general cable EW90 From 0 to 53 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (12) general cable 7/8" Coax From 0 to 50 (40ft to50ft)	45.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (12) general cable 7/8" Coax From 0 to 50 (20ft to40ft)	30.00	0.00	0.0000	0.01	0.00	0.00	0.00
CCISeismic (12) general cable 7/8" Coax From 0 to 50 (0ft to20ft)	10.00	0.00	0.0000	0.01	0.00	0.00	0.00
CCISeismic (4) general cable 3/4" DC From 0 to 50 (40ft to50ft)	45.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (4) general cable 3/4" DC From 0 to 50 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic (4) general cable 3/4" DC From 0 to 50 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 3/8" Fiber From 0 to 50 (40ft to50ft)	45.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 3/8" Fiber From 0 to 50 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 3/8" Fiber From 0 to 50 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/16" RET Cable From 0 to 50 (40ft to50ft)	45.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/16" RET Cable From 0 to 50 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic 5/16" RET Cable From 0 to 50 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic E105J From 0 to 50 (40ft to50ft)	45.00	0.00	0.0000	0.00	0.00	0.00	0.00

Description	Elevation	Offset From Centroid	Azimuth Angle	E_v	E_{hx}	E_{hz}	E_h
	ft	ft	°	K	K	K	K
CCISeismic E105J From 0 to 50 (20ft to40ft)	30.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic E105J From 0 to 50 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 36 (20ft to36ft)	28.00	0.00	0.0000	0.00	0.00	0.00	0.00
CCISeismic andrew EW180 From 0 to 36 (0ft to20ft)	10.00	0.00	0.0000	0.00	0.00	0.00	0.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Small Beacon	B	From Leg	0.00 0.00 1.00	0.0000	180.00	No Ice	0.78	0.78	0.01
Small Beacon	B	From Leg	0.00 0.00 1.00	0.0000	180.00	No Ice	0.78	0.78	0.01
***									
12' Upright Omni (Verizon)	B	From Face	1.00 2.00 6.00	0.0000	180.00	No Ice	3.60	3.60	0.05
12' Upright Omni (Verizon)	C	From Face	1.00 2.00 6.00	0.0000	180.00	No Ice	3.60	3.60	0.05
Face Frame (Verizon)	A	From Face	0.00 0.00 0.00	0.0000	177.50	No Ice	7.50	7.50	0.25
Face Frame (Verizon)	B	From Face	0.00 0.00 0.00	0.0000	177.50	No Ice	7.50	7.50	0.25
Face Frame (Verizon)	C	From Face	0.00 0.00 0.00	0.0000	177.50	No Ice	7.50	7.50	0.25
***									
2960.004 (Verizon)	A	From Leg	0.00 0.00 0.00	0.0000	84.00	No Ice	7.47	3.70	0.02
2960.004 (Verizon)	C	From Leg	0.00 0.00 0.00	0.0000	84.00	No Ice	7.47	3.70	0.02
6' Panel Antenna (Verizon)	B	From Leg	0.00 0.00 0.00	0.0000	84.00	No Ice	4.70	2.95	0.03
***									
Sector Frame (Verizon)	A	From Face	0.00 6.90 0.00	0.0000	68.50	No Ice	15.00	15.00	0.50
Sector Frame	B	From Face	0.00	0.0000	68.50	No Ice	15.00	15.00	0.50

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 K
(Verizon)			6.90 0.00						
Sector Frame (Verizon)	C	From Face	0.00 6.90 0.00	0.0000	68.50	No Ice	15.00	15.00	0.50
*									
HEX458CW0000G (Verizon)	A	From Face	4.25 1.90 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	B	From Face	4.25 1.90 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	C	From Face	4.25 1.90 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	A	From Face	4.25 5.25 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	B	From Face	4.25 5.25 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	C	From Face	4.25 5.25 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	A	From Face	4.25 8.55 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	B	From Face	4.25 8.55 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	C	From Face	4.25 8.55 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	A	From Face	4.25 11.90 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	B	From Face	4.25 11.90 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
HEX458CW0000G (Verizon)	C	From Face	4.25 11.90 0.00	0.0000	68.50	No Ice	13.41	7.44	0.06
*									
RRUS A2 Modules (Verizon)	A	From Face	3.75 1.90 -2.00	0.0000	68.50	No Ice	1.60	0.46	0.02
RRUS A2 Modules (Verizon)	B	From Face	3.75 1.90 -2.00	0.0000	68.50	No Ice	1.60	0.46	0.02
RRUS A2 Modules (Verizon)	C	From Face	3.75 1.90 -2.00	0.0000	68.50	No Ice	1.60	0.46	0.02
RRUS A2 Modules (Verizon)	A	From Face	3.75 5.25 -2.00	0.0000	68.50	No Ice	1.60	0.46	0.02
RRUS A2 Modules (Verizon)	B	From Face	3.75 5.25	0.0000	68.50	No Ice	1.60	0.46	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			-2.00						
RRUS A2 Modules (Verizon)	C	From Face	3.75 5.25	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
RRUS A2 Modules (Verizon)	A	From Face	3.75 8.55	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
RRUS A2 Modules (Verizon)	B	From Face	3.75 8.55	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
RRUS A2 Modules (Verizon)	C	From Face	3.75 8.55	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
RRUS A2 Modules (Verizon)	A	From Face	3.75 11.90	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
RRUS A2 Modules (Verizon)	B	From Face	3.75 11.90	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
RRUS A2 Modules (Verizon)	C	From Face	3.75 11.90	0.0000	68.50	No Ice	1.60	0.46	0.02
			-2.00						
*									
TMA 10"x7"x2" (Verizon)	A	From Face	4.00 1.90	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	B	From Face	4.00 1.90	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	C	From Face	4.00 1.90	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	A	From Face	4.00 5.25	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	B	From Face	4.00 5.25	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	C	From Face	4.00 5.25	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	A	From Face	4.00 8.55	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	B	From Face	4.00 8.55	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	C	From Face	4.00 8.55	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	A	From Face	4.00 11.90	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2" (Verizon)	B	From Face	4.00 11.90	0.0000	68.50	No Ice	0.58	0.18	0.01
			0.00						
TMA 10"x7"x2"	C	From Face	4.00	0.0000	68.50	No Ice	0.58	0.18	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Verizon)			11.90 0.00						
*									
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	A	From Face	4.00 8.55 2.00	0.0000	68.50	No Ice	3.36	2.00	0.06
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	A	From Face	4.00 11.90 2.00	0.0000	68.50	No Ice	3.36	2.00	0.06
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	B	From Face	4.00 8.55 2.00	0.0000	68.50	No Ice	3.36	2.00	0.06
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	B	From Face	4.00 11.90 2.00	0.0000	68.50	No Ice	3.36	2.00	0.06
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	C	From Face	4.00 8.55 2.00	0.0000	68.50	No Ice	3.36	2.00	0.06
RRH 3JR52709AA 2X60 (AWS 60W) (Verizon)	C	From Face	4.00 11.90 2.00	0.0000	68.50	No Ice	3.36	2.00	0.06
*									
RRH 4x30-4T4R B13 (Verizon)	A	From Face	3.75 8.55 2.00	0.0000	68.50	No Ice	2.16	1.62	0.06
RRH 4x30-4T4R B13 (Verizon)	A	From Face	3.75 11.90 2.00	0.0000	68.50	No Ice	2.16	1.62	0.06
RRH 4x30-4T4R B13 (Verizon)	B	From Face	3.75 8.55 2.00	0.0000	68.50	No Ice	2.16	1.62	0.06
RRH 4x30-4T4R B13 (Verizon)	B	From Face	3.75 11.90 2.00	0.0000	68.50	No Ice	2.16	1.62	0.06
RRH 4x30-4T4R B13 (Verizon)	C	From Face	3.75 8.55 2.00	0.0000	68.50	No Ice	2.16	1.62	0.06
RRH 4x30-4T4R B13 (Verizon)	C	From Face	3.75 11.90 2.00	0.0000	68.50	No Ice	2.16	1.62	0.06
*									
RRH 4x30-4T4R B25 (Verizon)	A	From Face	3.75 8.55 0.00	0.0000	68.50	No Ice	2.14	1.30	0.05
RRH 4x30-4T4R B25 (Verizon)	A	From Face	3.75 11.90 0.00	0.0000	68.50	No Ice	2.14	1.30	0.05
RRH 4x30-4T4R B25 (Verizon)	B	From Face	3.75 8.55 0.00	0.0000	68.50	No Ice	2.14	1.30	0.05
RRH 4x30-4T4R B25 (Verizon)	B	From Face	3.75 11.90 0.00	0.0000	68.50	No Ice	2.14	1.30	0.05
RRH 4x30-4T4R B25 (Verizon)	C	From Face	3.75 8.55 0.00	0.0000	68.50	No Ice	2.14	1.30	0.05
RRH 4x30-4T4R B25	C	From Face	3.75	0.0000	68.50	No Ice	2.14	1.30	0.05

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 K
(Verizon)			11.90 0.00						
*									
RHSDC-3315-PF-48 (Verizon)	A	From Leg	1.00 0.00 0.00	0.0000	68.50	No Ice	3.79	2.51	0.03
RHSDC-3315-PF-48 (Verizon)	B	From Leg	1.00 0.00 0.00	0.0000	68.50	No Ice	3.79	2.51	0.03
RHSDC-3315-PF-48 (Verizon)	C	From Leg	1.00 0.00 0.00	0.0000	68.50	No Ice	3.79	2.51	0.03
***									
VFA10-RRU (AT&T)	A	From Face	0.00 -7.85 0.00	-60.0000	50.00	No Ice	15.00	15.00	0.50
VFA10-RRU (AT&T)	B	From Face	0.00 7.85 0.00	60.0000	50.00	No Ice	15.00	15.00	0.50
VFA10-RRU (AT&T)	C	From Face	0.00 7.85 0.00	-60.0000	50.00	No Ice	15.00	15.00	0.50
*									
DPA-65R-BUUUU-H8 (AT&T)	A	From Face	4.75 -3.85 0.00	0.0000	50.00	No Ice	12.75	7.47	0.06
DPA-65R-BUUUU-H8 (AT&T)	B	From Face	4.75 11.85 0.00	0.0000	50.00	No Ice	12.75	7.47	0.06
DPA-65R-BUUUU-H8 (AT&T)	C	From Face	4.75 11.85 0.00	0.0000	50.00	No Ice	12.75	7.47	0.06
*									
RA11.7760.00 (AT&T)	A	From Face	4.75 -11.85 0.00	0.0000	50.00	No Ice	5.95	1.89	0.04
RA11.7760.00 (AT&T)	B	From Face	4.75 3.85 0.00	0.0000	50.00	No Ice	5.95	1.89	0.04
RA11.7760.00 (AT&T)	C	From Face	4.75 3.85 0.00	0.0000	50.00	No Ice	5.95	1.89	0.04
*									
RRH 4x25-WCS-4R (AT&T)	A	From Face	4.50 -3.85 2.00	0.0000	50.00	No Ice	3.17	2.38	0.07
RRH 4x25-WCS-4R (AT&T)	B	From Face	4.50 11.85 2.00	0.0000	50.00	No Ice	3.17	2.38	0.07
RRH 4x25-WCS-4R (AT&T)	C	From Face	4.50 11.85 2.00	0.0000	50.00	No Ice	3.17	2.38	0.07
*									
RRH 2x40-AWS-RDEM (AT&T)	A	From Face	4.25 -11.85 2.00	0.0000	50.00	No Ice	2.50	1.89	0.05
RRH 2x40-AWS-RDEM	B	From Face	4.25	0.0000	50.00	No Ice	2.50	1.89	0.05

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 K
(AT&T)			3.85 2.00						
RRH 2x40-AWS-RDEM (AT&T)	C	From Face	4.25 3.85 2.00	0.0000	50.00	No Ice	2.50	1.89	0.05
*									
WCS-IMFT-AMT Filter (AT&T)	C	From Leg	0.00 0.00 0.00	0.0000	50.00	No Ice	0.64	0.47	0.02
*									
DC6-48-60-18-8F (AT&T)	C	From Leg	0.00 0.00 0.00	0.0000	50.00	No Ice	0.92	0.92	0.03
*									
LGP18601 TMA (AT&T)	A	From Face	4.50 -11.85 0.00	0.0000	50.00	No Ice	0.64	0.29	0.01
LGP18601 TMA (AT&T)	A	From Face	4.50 -3.85 0.00	0.0000	50.00	No Ice	0.64	0.29	0.01
LGP18601 TMA (AT&T)	B	From Face	4.50 3.85 0.00	0.0000	50.00	No Ice	0.64	0.29	0.01
LGP18601 TMA (AT&T)	B	From Face	4.50 11.85 0.00	0.0000	50.00	No Ice	0.64	0.29	0.01
LGP18601 TMA (AT&T)	C	From Face	4.50 3.85 0.00	0.0000	50.00	No Ice	0.64	0.29	0.01
LGP18601 TMA (AT&T)	C	From Face	4.50 11.85 0.00	0.0000	50.00	No Ice	0.64	0.29	0.01
*									
XXQLH-654L8H8-iVT (AT&T)	A	From Face	4.75 -7.85 0.00	0.0000	50.00	No Ice	17.15	7.97	0.11
XXQLH-654L8H8-iVT (AT&T)	B	From Face	4.75 7.85 0.00	0.0000	50.00	No Ice	17.15	7.97	0.11
XXQLH-654L8H8-iVT (AT&T)	C	From Face	4.75 7.85 0.00	0.0000	50.00	No Ice	17.15	7.97	0.11
*									
RRH 4T4R B12/14 320W AHLBA (AT&T)	A	From Face	4.25 -7.85 2.00	0.0000	50.00	No Ice	3.68	2.31	0.10
RRH 4T4R B12/14 320W AHLBA (AT&T)	B	From Face	4.25 7.85 2.00	0.0000	50.00	No Ice	3.68	2.31	0.10
RRH 4T4R B12/14 320W AHLBA (AT&T)	C	From Face	4.25 7.85 2.00	0.0000	50.00	No Ice	3.68	2.31	0.10
*									
RRH 4T4R B25/66 320W (AT&T)	A	From Face	4.25 -7.85 -2.00	0.0000	50.00	No Ice	2.86	1.53	0.07
RRH 4T4R B25/66 320W	B	From Face	4.25	0.0000	50.00	No Ice	2.86	1.53	0.07

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 K
(AT&T)			7.85 -2.00						
RRH 4T4R B25/66 320W (AT&T)	C	From Face	4.25 7.85 -2.00	0.0000	50.00	No Ice	2.86	1.53	0.07
*									
DC6-48-60-0-8C-EV (AT&T)	C	From Leg	0.00 0.00 0.00	0.0000	50.00	No Ice	0.55	0.55	0.03

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 K
UHX6-59-P3A (Verizon)	B	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	-8.0000		141.00	6.00	No Ice	28.27	0.14
10 ft Grid Dish (Verizon)	B	Grid	From Leg	0.00 0.00 0.00	47.0000		132.00	10.00	No Ice	78.54	0.42
SP4-5.2NS (Verizon)	C	Paraboloid w/o Radome	From Leg	0.00 0.00 0.00	45.0000		125.00	4.00	No Ice	12.57	0.06
HP6-180E (Verizon)	A	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	52.0000		105.00	6.00	No Ice	28.27	0.38
UHX8-65-P3A (Verizon)	C	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	-70.0000		94.00	8.00	No Ice	50.27	0.50
6 ft Grid Dish (Verizon)	B	Grid	From Leg	0.00 0.00 0.00	-1.0000		90.00	6.00	No Ice	28.27	0.20
2 ft HP Dish (Verizon)	C	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	10.0000		88.00	2.00	No Ice	3.14	0.09
HP4-107-P3A (Verizon)	A	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	-15.0000		53.00	4.00	No Ice	12.57	0.08
UXA6-107BC (Verizon)	A	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	-15.0000		48.00	6.00	No Ice	28.30	0.24
HP4-180E (Verizon)	C	Paraboloid w/Shroud (HP)	From Leg	0.00 0.00 0.00	0.0000		36.00	4.00	No Ice	12.57	0.08

Tower Pressures - No Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.15	24	94.374	A	7.828	7.917	7.917	50.28	4.440	0.000
180.00-160.00					B	7.828	7.917		50.28	0.000	0.000
					C	7.828	7.917		50.28	1.500	0.000
T2	150.00	1.11	23	114.796	A	8.321	7.930	7.930	48.80	4.440	0.000
160.00-140.00					B	8.321	7.930		48.80	0.201	0.000
					C	8.321	7.930		48.80	6.500	0.000
T3	130.00	1.065	23	156.048	A	10.329	9.599	9.599	48.17	16.897	0.000
140.00-120.00					B	10.329	9.599		48.17	4.020	0.000
					C	10.329	9.599		48.17	11.500	0.000
T4	110.00	1.016	21	196.465	A	17.155	9.600	9.600	35.88	21.455	0.000
120.00-100.00					B	17.155	9.600		35.88	4.020	0.000
					C	17.155	9.600		35.88	11.500	0.000
T5	90.00	0.959	20	237.925	A	16.399	11.686	11.686	41.61	27.072	0.000
100.00-80.00					B	16.399	11.686		41.61	4.020	0.000
					C	16.399	11.686		41.61	11.500	0.000
T6 80.00-60.00	70.00	0.892	19	278.446	A	18.638	11.687	11.687	38.54	31.302	0.000
					B	18.638	11.687		38.54	23.128	0.000
					C	18.638	11.687		38.54	11.500	0.000
T7 60.00-40.00	50.00	0.811	17	320.217	A	25.953	13.356	13.356	33.98	35.755	0.000
					B	25.953	13.356		33.98	53.980	0.000
					C	25.953	13.356		33.98	28.770	0.000
T8 40.00-20.00	30.00	0.701	15	361.467	A	28.640	15.025	15.025	34.41	38.923	0.000
					B	28.640	15.025		34.41	58.980	0.000
					C	28.640	15.025		34.41	46.040	0.000
T9 20.00-0.00	10.00	0.7	15	402.302	A	35.078	15.027	15.027	29.99	35.159	0.000
					B	35.078	15.027		29.99	54.980	0.000
					C	35.078	15.027		29.99	41.440	0.000

Tower Pressure - Service

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.15	8	94.374	A	7.828	7.917	7.917	50.28	4.440	0.000
180.00-160.00					B	7.828	7.917		50.28	0.000	0.000
					C	7.828	7.917		50.28	1.500	0.000
T2	150.00	1.11	8	114.796	A	8.321	7.930	7.930	48.80	4.440	0.000
160.00-140.00					B	8.321	7.930		48.80	0.201	0.000
					C	8.321	7.930		48.80	6.500	0.000
T3	130.00	1.065	8	156.048	A	10.329	9.599	9.599	48.17	16.897	0.000
140.00-120.00					B	10.329	9.599		48.17	4.020	0.000
					C	10.329	9.599		48.17	11.500	0.000
T4	110.00	1.016	7	196.465	A	17.155	9.600	9.600	35.88	21.455	0.000
120.00-100.00					B	17.155	9.600		35.88	4.020	0.000
					C	17.155	9.600		35.88	11.500	0.000
T5	90.00	0.959	7	237.925	A	16.399	11.686	11.686	41.61	27.072	0.000
100.00-80.00					B	16.399	11.686		41.61	4.020	0.000
					C	16.399	11.686		41.61	11.500	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T6 80.00-60.00	70.00	0.892	6	278.446	A	18.638	11.687	11.687	38.54	31.302	0.000
					B	18.638	11.687		38.54	23.128	0.000
					C	18.638	11.687		38.54	11.500	0.000
T7 60.00-40.00	50.00	0.811	6	320.217	A	25.953	13.356	13.356	33.98	35.755	0.000
					B	25.953	13.356		33.98	53.980	0.000
					C	25.953	13.356		33.98	28.770	0.000
T8 40.00-20.00	30.00	0.701	5	361.467	A	28.640	15.025	15.025	34.41	38.923	0.000
					B	28.640	15.025		34.41	58.980	0.000
					C	28.640	15.025		34.41	46.040	0.000
T9 20.00-0.00	10.00	0.7	5	402.302	A	35.078	15.027	15.027	29.99	35.159	0.000
					B	35.078	15.027		29.99	54.980	0.000
					C	35.078	15.027		29.99	41.440	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.46	A	0.167	2.711	24	1	1	12.337	0.76	38.22	A
180.00-160.00			B	0.167	2.711		1	1	12.337			
			C	0.167	2.711		1	1	12.337			
T2	0.12	0.47	A	0.142	2.803	23	1	1	12.816	0.83	41.71	A
160.00-140.00			B	0.142	2.803		1	1	12.816			
			C	0.142	2.803		1	1	12.816			
T3	0.39	0.66	A	0.128	2.855	23	1	1	15.759	1.18	58.78	A
140.00-120.00			B	0.128	2.855		1	1	15.759			
			C	0.128	2.855		1	1	15.759			
T4	0.40	1.97	A	0.136	2.823	21	1	1	22.591	1.51	75.66	A
120.00-100.00			B	0.136	2.823		1	1	22.591			
			C	0.136	2.823		1	1	22.591			
T5	0.42	1.20	A	0.118	2.893	20	1	1	23.002	1.53	76.72	A
100.00-80.00			B	0.118	2.893		1	1	23.002			
			C	0.118	2.893		1	1	23.002			
T6	0.53	1.72	A	0.109	2.928	19	1	1	25.237	1.72	86.16	B
80.00-60.00			B	0.109	2.928		1	1	25.237			
			C	0.109	2.928		1	1	25.237			
T7	0.85	3.03	A	0.123	2.874	17	1	1	33.504	2.24	112.23	B
60.00-40.00			B	0.123	2.874		1	1	33.504			
			C	0.123	2.874		1	1	33.504			
T8	1.04	3.41	A	0.121	2.882	15	1	1	37.132	2.22	111.09	B
40.00-20.00			B	0.121	2.882		1	1	37.132			
			C	0.121	2.882		1	1	37.132			
T9 20.00-0.00	0.83	3.28	A	0.125	2.867	15	1	1	43.575	2.37	118.74	B
			B	0.125	2.867		1	1	43.575			
			C	0.125	2.867		1	1	43.575			
Sum Weight:	4.62	16.24						OTM	1035.67 kip-ft	14.39		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.46	A	0.167	2.711	24	0.8	1	10.771	0.68	33.83	B
180.00-160.00			B	0.167	2.711		0.8	1	10.771			
			C	0.167	2.711		0.8	1	10.771			
T2	0.12	0.47	A	0.142	2.803	23	0.8	1	11.151	0.74	37.06	B
160.00-140.00			B	0.142	2.803		0.8	1	11.151			
			C	0.142	2.803		0.8	1	11.151			
T3	0.39	0.66	A	0.128	2.855	23	0.8	1	13.693	1.06	53.13	B
140.00-120.00			B	0.128	2.855		0.8	1	13.693			
			C	0.128	2.855		0.8	1	13.693			
T4	0.40	1.97	A	0.136	2.823	21	0.8	1	19.160	1.34	66.82	B
120.00-100.00			B	0.136	2.823		0.8	1	19.160			
			C	0.136	2.823		0.8	1	19.160			
T5	0.42	1.20	A	0.118	2.893	20	0.8	1	19.722	1.37	68.55	B
100.00-80.00			B	0.118	2.893		0.8	1	19.722			
			C	0.118	2.893		0.8	1	19.722			
T6	0.53	1.72	A	0.109	2.928	19	0.8	1	21.509	1.55	77.41	C
80.00-60.00			B	0.109	2.928		0.8	1	21.509			
			C	0.109	2.928		0.8	1	21.509			
T7	0.85	3.03	A	0.123	2.874	17	0.8	1	28.313	2.03	101.37	C
60.00-40.00			B	0.123	2.874		0.8	1	28.313			
			C	0.123	2.874		0.8	1	28.313			
T8	1.04	3.41	A	0.121	2.882	15	0.8	1	31.404	2.01	100.70	C
40.00-20.00			B	0.121	2.882		0.8	1	31.404			
			C	0.121	2.882		0.8	1	31.404			
T9 20.00-0.00	0.83	3.28	A	0.125	2.867	15	0.8	1	36.559	2.12	106.09	C
			B	0.125	2.867		0.8	1	36.559			
			C	0.125	2.867		0.8	1	36.559			
Sum Weight:	4.62	16.24						OTM	926.14 kip-ft	12.90		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.46	A	0.167	2.711	24	0.85	1	11.162	0.70	34.93	C
180.00-160.00			B	0.167	2.711		0.85	1	11.162			
			C	0.167	2.711		0.85	1	11.162			
T2	0.12	0.47	A	0.142	2.803	23	0.85	1	11.567	0.76	38.22	C
160.00-140.00			B	0.142	2.803		0.85	1	11.567			
			C	0.142	2.803		0.85	1	11.567			
T3	0.39	0.66	A	0.128	2.855	23	0.85	1	14.209	1.09	54.54	C
140.00-120.00			B	0.128	2.855		0.85	1	14.209			
			C	0.128	2.855		0.85	1	14.209			
T4	0.40	1.97	A	0.136	2.823	21	0.85	1	20.018	1.38	69.03	C
120.00-100.00			B	0.136	2.823		0.85	1	20.018			
			C	0.136	2.823		0.85	1	20.018			
T5	0.42	1.20	A	0.118	2.893	20	0.85	1	20.542	1.41	70.59	C
100.00-80.00			B	0.118	2.893		0.85	1	20.542			
			C	0.118	2.893		0.85	1	20.542			
T6	0.53	1.72	A	0.109	2.928	19	0.85	1	22.441	1.58	78.96	C
80.00-60.00			B	0.109	2.928		0.85	1	22.441			
			C	0.109	2.928		0.85	1	22.441			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T7	0.85	3.03	A	0.123	2.874	17	0.85	1	29.611	2.08	103.82	A
60.00-40.00			B	0.123	2.874		0.85	1	29.611			
			C	0.123	2.874		0.85	1	29.611			
T8	1.04	3.41	A	0.121	2.882	15	0.85	1	32.836	2.10	104.84	A
40.00-20.00			B	0.121	2.882		0.85	1	32.836			
			C	0.121	2.882		0.85	1	32.836			
T9 20.00-0.00	0.83	3.28	A	0.125	2.867	15	0.85	1	38.313	2.22	110.80	A
			B	0.125	2.867		0.85	1	38.313			
			C	0.125	2.867		0.85	1	38.313			
Sum Weight:	4.62	16.24						OTM	953.60 kip-ft	13.31		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.46	A	0.167	2.711	8	1	1	12.337	0.26	12.97	A
180.00-160.00			B	0.167	2.711		1	1	12.337			
			C	0.167	2.711		1	1	12.337			
T2	0.12	0.47	A	0.142	2.803	8	1	1	12.816	0.28	14.15	A
160.00-140.00			B	0.142	2.803		1	1	12.816			
			C	0.142	2.803		1	1	12.816			
T3	0.39	0.66	A	0.128	2.855	8	1	1	15.759	0.40	19.94	A
140.00-120.00			B	0.128	2.855		1	1	15.759			
			C	0.128	2.855		1	1	15.759			
T4	0.40	1.97	A	0.136	2.823	7	1	1	22.591	0.51	25.67	A
120.00-100.00			B	0.136	2.823		1	1	22.591			
			C	0.136	2.823		1	1	22.591			
T5	0.42	1.20	A	0.118	2.893	7	1	1	23.002	0.52	26.03	A
100.00-80.00			B	0.118	2.893		1	1	23.002			
			C	0.118	2.893		1	1	23.002			
T6	0.53	1.72	A	0.109	2.928	6	1	1	25.237	0.58	29.24	B
80.00-60.00			B	0.109	2.928		1	1	25.237			
			C	0.109	2.928		1	1	25.237			
T7	0.85	3.03	A	0.123	2.874	6	1	1	33.504	0.76	38.08	B
60.00-40.00			B	0.123	2.874		1	1	33.504			
			C	0.123	2.874		1	1	33.504			
T8	1.04	3.41	A	0.121	2.882	5	1	1	37.132	0.75	37.70	B
40.00-20.00			B	0.121	2.882		1	1	37.132			
			C	0.121	2.882		1	1	37.132			
T9 20.00-0.00	0.83	3.28	A	0.125	2.867	5	1	1	43.575	0.81	40.29	B
			B	0.125	2.867		1	1	43.575			
			C	0.125	2.867		1	1	43.575			
Sum Weight:	4.62	16.24						OTM	351.44 kip-ft	4.88		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.46	A	0.167	2.711	8	0.8	1	10.771	0.23	11.48	B
180.00-160.00			B	0.167	2.711		0.8	1	10.771			
			C	0.167	2.711		0.8	1	10.771			
T2	0.12	0.47	A	0.142	2.803	8	0.8	1	11.151	0.25	12.58	B
160.00-140.00			B	0.142	2.803		0.8	1	11.151			
			C	0.142	2.803		0.8	1	11.151			
T3	0.39	0.66	A	0.128	2.855	8	0.8	1	13.693	0.36	18.03	B
140.00-120.00			B	0.128	2.855		0.8	1	13.693			
			C	0.128	2.855		0.8	1	13.693			
T4	0.40	1.97	A	0.136	2.823	7	0.8	1	19.160	0.45	22.68	B
120.00-100.00			B	0.136	2.823		0.8	1	19.160			
			C	0.136	2.823		0.8	1	19.160			
T5	0.42	1.20	A	0.118	2.893	7	0.8	1	19.722	0.47	23.26	B
100.00-80.00			B	0.118	2.893		0.8	1	19.722			
			C	0.118	2.893		0.8	1	19.722			
T6	0.53	1.72	A	0.109	2.928	6	0.8	1	21.509	0.53	26.27	C
80.00-60.00			B	0.109	2.928		0.8	1	21.509			
			C	0.109	2.928		0.8	1	21.509			
T7	0.85	3.03	A	0.123	2.874	6	0.8	1	28.313	0.69	34.40	C
60.00-40.00			B	0.123	2.874		0.8	1	28.313			
			C	0.123	2.874		0.8	1	28.313			
T8	1.04	3.41	A	0.121	2.882	5	0.8	1	31.404	0.68	34.17	C
40.00-20.00			B	0.121	2.882		0.8	1	31.404			
			C	0.121	2.882		0.8	1	31.404			
T9 20.00-0.00	0.83	3.28	A	0.125	2.867	5	0.8	1	36.559	0.72	36.00	C
			B	0.125	2.867		0.8	1	36.559			
			C	0.125	2.867		0.8	1	36.559			
Sum Weight:	4.62	16.24						OTM	314.27 kip-ft	4.38		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.46	A	0.167	2.711	8	0.85	1	11.162	0.24	11.85	C
180.00-160.00			B	0.167	2.711		0.85	1	11.162			
			C	0.167	2.711		0.85	1	11.162			
T2	0.12	0.47	A	0.142	2.803	8	0.85	1	11.567	0.26	12.97	C
160.00-140.00			B	0.142	2.803		0.85	1	11.567			
			C	0.142	2.803		0.85	1	11.567			
T3	0.39	0.66	A	0.128	2.855	8	0.85	1	14.209	0.37	18.51	C
140.00-120.00			B	0.128	2.855		0.85	1	14.209			
			C	0.128	2.855		0.85	1	14.209			
T4	0.40	1.97	A	0.136	2.823	7	0.85	1	20.018	0.47	23.43	C
120.00-100.00			B	0.136	2.823		0.85	1	20.018			
			C	0.136	2.823		0.85	1	20.018			
T5	0.42	1.20	A	0.118	2.893	7	0.85	1	20.542	0.48	23.96	C
100.00-80.00			B	0.118	2.893		0.85	1	20.542			
			C	0.118	2.893		0.85	1	20.542			
T6	0.53	1.72	A	0.109	2.928	6	0.85	1	22.441	0.54	26.79	C
80.00-60.00			B	0.109	2.928		0.85	1	22.441			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.109	2.928		0.85	1	22.441			
T7	0.85	3.03	A	0.123	2.874	6	0.85	1	29.611	0.70	35.23	A
60.00-40.00			B	0.123	2.874		0.85	1	29.611			
			C	0.123	2.874		0.85	1	29.611			
T8	1.04	3.41	A	0.121	2.882	5	0.85	1	32.836	0.71	35.58	A
40.00-20.00			B	0.121	2.882		0.85	1	32.836			
			C	0.121	2.882		0.85	1	32.836			
T9 20.00-0.00	0.83	3.28	A	0.125	2.867	5	0.85	1	38.313	0.75	37.60	A
			B	0.125	2.867		0.85	1	38.313			
			C	0.125	2.867		0.85	1	38.313			
Sum Weight:	4.62	16.24						OTM	323.59 kip-ft	4.52		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	4.88					
Bracing Weight	11.32					
Total Member Self-Weight	16.20			14.31	20.39	
Gusset Weight	0.04					
Total Weight	30.78			14.31	20.39	
Wind 0 deg - No Ice		-0.19	-23.88	-1829.42	53.71	-20.84
Wind 30 deg - No Ice		11.10	-19.75	-1492.21	-840.49	-9.88
Wind 60 deg - No Ice		18.94	-11.04	-810.87	-1443.80	-0.02
Wind 90 deg - No Ice		22.06	0.46	64.13	-1699.61	10.83
Wind 120 deg - No Ice		20.25	12.19	960.36	-1559.60	19.81
Wind 150 deg - No Ice		11.50	19.70	1540.35	-897.91	24.09
Wind 180 deg - No Ice		0.25	22.50	1756.86	-15.21	19.52
Wind 210 deg - No Ice		-10.85	19.80	1523.97	853.41	9.02
Wind 240 deg - No Ice		-20.20	11.96	918.37	1579.43	0.06
Wind 270 deg - No Ice		-22.06	-0.17	-2.78	1744.48	-8.88
Wind 300 deg - No Ice		-18.92	-11.54	-892.82	1508.10	-20.44
Wind 330 deg - No Ice		-11.34	-19.84	-1534.03	921.22	-25.59
Total Weight	30.78			14.31	20.39	
Wind 0 deg - Service		-0.06	-8.10	-612.14	20.84	-7.07
Wind 30 deg - Service		3.77	-6.70	-497.71	-282.60	-3.35
Wind 60 deg - Service		6.43	-3.75	-266.51	-487.32	-0.01
Wind 90 deg - Service		7.49	0.16	30.41	-574.12	3.67
Wind 120 deg - Service		6.87	4.14	334.53	-526.62	6.72
Wind 150 deg - Service		3.90	6.69	531.35	-302.08	8.17
Wind 180 deg - Service		0.08	7.63	604.81	-2.55	6.62
Wind 210 deg - Service		-3.68	6.72	525.79	292.20	3.06
Wind 240 deg - Service		-6.85	4.06	320.29	538.57	0.02
Wind 270 deg - Service		-7.49	-0.06	7.71	594.57	-3.01
Wind 300 deg - Service		-6.42	-3.92	-294.31	514.36	-6.94
Wind 330 deg - Service		-3.85	-6.73	-511.90	315.21	-8.68
Seismic Vertical	1.75					
Seismic Horizontal 0 deg		0.00	-2.16	-203.73	0.00	0.00
Seismic Horizontal 30 deg		1.08	-1.87	-176.43	-101.86	0.00
Seismic Horizontal 60 deg		1.87	-1.08	-101.86	-176.43	0.00
Seismic Horizontal 90 deg		2.16	0.00	0.00	-203.73	0.00

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Seismic Horizontal 120 deg		1.87	1.08	101.86	-176.43	0.00
Seismic Horizontal 150 deg		1.08	1.87	176.43	-101.86	0.00
Seismic Horizontal 180 deg		0.00	2.16	203.73	0.00	0.00
Seismic Horizontal 210 deg		-1.08	1.87	176.43	101.86	0.00
Seismic Horizontal 240 deg		-1.87	1.08	101.86	176.43	0.00
Seismic Horizontal 270 deg		-2.16	0.00	0.00	203.73	0.00
Seismic Horizontal 300 deg		-1.87	-1.08	-101.86	176.43	0.00
Seismic Horizontal 330 deg		-1.08	-1.87	-176.43	101.86	0.00

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
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	Dead+Wind 0 deg - Service
27	Dead+Wind 30 deg - Service
28	Dead+Wind 60 deg - Service
29	Dead+Wind 90 deg - Service
30	Dead+Wind 120 deg - Service
31	Dead+Wind 150 deg - Service
32	Dead+Wind 180 deg - Service
33	Dead+Wind 210 deg - Service
34	Dead+Wind 240 deg - Service
35	Dead+Wind 270 deg - Service
36	Dead+Wind 300 deg - Service
37	Dead+Wind 330 deg - Service
38	1.2 Dead+1.0 Ev+1.0 Eh 0 deg
39	0.9 Dead-1.0 Ev+1.0 Eh 0 deg
40	1.2 Dead+1.0 Ev+1.0 Eh 30 deg
41	0.9 Dead-1.0 Ev+1.0 Eh 30 deg
42	1.2 Dead+1.0 Ev+1.0 Eh 60 deg
43	0.9 Dead-1.0 Ev+1.0 Eh 60 deg

Comb. No.	Description
44	1.2 Dead+1.0 Ev+1.0 Eh 90 deg
45	0.9 Dead-1.0 Ev+1.0 Eh 90 deg
46	1.2 Dead+1.0 Ev+1.0 Eh 120 deg
47	0.9 Dead-1.0 Ev+1.0 Eh 120 deg
48	1.2 Dead+1.0 Ev+1.0 Eh 150 deg
49	0.9 Dead-1.0 Ev+1.0 Eh 150 deg
50	1.2 Dead+1.0 Ev+1.0 Eh 180 deg
51	0.9 Dead-1.0 Ev+1.0 Eh 180 deg
52	1.2 Dead+1.0 Ev+1.0 Eh 210 deg
53	0.9 Dead-1.0 Ev+1.0 Eh 210 deg
54	1.2 Dead+1.0 Ev+1.0 Eh 240 deg
55	0.9 Dead-1.0 Ev+1.0 Eh 240 deg
56	1.2 Dead+1.0 Ev+1.0 Eh 270 deg
57	0.9 Dead-1.0 Ev+1.0 Eh 270 deg
58	1.2 Dead+1.0 Ev+1.0 Eh 300 deg
59	0.9 Dead-1.0 Ev+1.0 Eh 300 deg
60	1.2 Dead+1.0 Ev+1.0 Eh 330 deg
61	0.9 Dead-1.0 Ev+1.0 Eh 330 deg

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	15	4.03	0.00	-0.01
			Max. Compression	10	-5.13	-0.03	-0.01
			Max. Mx	20	-0.32	-0.12	0.00
			Max. My	2	-0.19	-0.00	-0.12
			Max. Vy	8	-0.13	0.00	-0.00
			Max. Vx	14	-0.13	-0.00	0.00
		Diagonal	Max Tension	8	0.62	0.00	0.00
			Max. Compression	20	-0.64	0.00	0.00
			Max. Mx	10	0.46	0.00	-0.00
			Max. My	8	-0.55	0.00	-0.00
			Max. Vy	10	-0.00	0.00	-0.00
			Max. Vx	8	0.00	0.00	-0.00
		Top Girt	Max Tension	14	0.01	0.00	0.00
			Max. Compression	10	-0.01	0.00	0.00
			Max. Mx	42	0.01	-0.00	0.00
			Max. My	8	0.00	0.00	-0.00
			Max. Vy	42	0.00	0.00	0.00
			Max. Vx	8	0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	15	8.55	-0.05	0.05
			Max. Compression	10	-10.61	0.08	-0.01
			Max. Mx	22	8.19	-0.10	0.02
			Max. My	4	-0.92	0.02	0.13
			Max. Vy	22	0.21	-0.10	0.02
			Max. Vx	4	0.22	0.02	-0.09
		Diagonal	Max Tension	20	0.60	0.00	0.00
			Max. Compression	8	-0.61	0.00	0.00
			Max. Mx	18	0.34	0.01	0.00
			Max. My	8	-0.47	-0.00	-0.00
			Max. Vy	18	-0.00	0.01	0.00
			Max. Vx	8	0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	23	15.27	-0.07	0.01
			Max. Compression	10	-18.84	0.09	-0.01
			Max. Mx	14	10.94	0.23	0.12
			Max. My	4	-1.68	-0.02	0.44
			Max. Vy	15	0.20	-0.16	0.12

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	4	0.34	-0.02	-0.22
		Diagonal	Max Tension	14	1.46	0.00	0.00
			Max. Compression	8	-1.49	0.00	0.00
			Max. Mx	10	1.25	0.01	0.00
			Max. My	14	-1.43	0.00	0.00
			Max. Vy	10	-0.01	0.01	0.00
			Max. Vx	14	-0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	23	22.98	-0.11	-0.02
			Max. Compression	10	-28.31	0.07	0.03
			Max. Mx	18	-23.92	0.18	-0.08
			Max. My	20	-3.11	-0.05	0.29
			Max. Vy	18	0.19	0.18	-0.08
			Max. Vx	20	-0.29	-0.04	-0.18
		Diagonal	Max Tension	8	1.75	0.00	0.00
			Max. Compression	20	-1.75	0.00	0.00
			Max. Mx	10	1.46	0.09	0.01
			Max. My	24	-1.65	-0.01	-0.01
			Max. Vy	10	-0.04	0.09	0.01
			Max. Vx	14	-0.00	0.00	0.00
T5	100 - 80	Leg	Max Tension	23	32.31	-0.14	-0.02
			Max. Compression	10	-39.78	0.09	-0.02
			Max. Mx	2	-31.01	0.23	0.05
			Max. My	2	10.31	-0.09	-0.27
			Max. Vy	2	-0.38	0.23	0.05
			Max. Vx	24	-0.67	-0.01	0.18
		Diagonal	Max Tension	8	2.55	0.00	0.00
			Max. Compression	8	-2.51	0.00	0.00
			Max. Mx	10	2.35	0.04	0.00
			Max. My	14	-2.07	0.01	-0.01
			Max. Vy	10	-0.02	0.04	0.00
			Max. Vx	14	0.00	0.00	0.00
T6	80 - 60	Leg	Max Tension	23	42.52	-0.70	0.01
			Max. Compression	10	-54.52	-0.23	0.01
			Max. Mx	6	33.12	0.86	-0.00
			Max. My	12	-2.65	-0.05	0.92
			Max. Vy	14	0.86	-0.71	-0.01
			Max. Vx	8	-0.74	-0.04	0.43
		Diagonal	Max Tension	8	3.71	0.00	0.00
			Max. Compression	4	-3.83	0.00	0.00
			Max. Mx	24	2.07	0.05	-0.00
			Max. My	16	-3.64	0.02	-0.01
			Max. Vy	24	0.02	0.05	-0.00
			Max. Vx	14	0.00	0.00	0.00
T7	60 - 40	Leg	Max Tension	23	55.31	0.13	-0.08
			Max. Compression	18	-71.86	-0.41	-0.01
			Max. Mx	10	-71.34	0.59	0.04
			Max. My	12	-8.25	-0.09	-0.37
			Max. Vy	6	-0.83	0.10	0.06
			Max. Vx	12	-1.29	-0.06	-0.26
		Diagonal	Max Tension	8	5.28	0.00	0.00
			Max. Compression	10	-5.84	0.00	0.00
			Max. Mx	18	3.73	0.13	0.01
			Max. My	10	-5.80	0.05	-0.02
			Max. Vy	14	0.05	0.12	-0.00
			Max. Vx	10	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	1.25	0.00	0.00
			Max. Compression	18	-1.25	0.07	0.00
			Max. Mx	16	-0.15	0.08	0.02
			Max. My	14	-0.22	0.08	0.02
			Max. Vy	16	0.04	0.08	0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	24	-0.00	0.00	0.00
T8	40 - 20	Leg	Max Tension	23	70.32	0.30	0.01
			Max. Compression	18	-91.49	-0.49	-0.01
			Max. Mx	18	-82.32	0.77	-0.00
			Max. My	24	-12.23	-0.14	0.44
			Max. Vy	18	-0.30	0.77	-0.00
			Max. Vx	12	-0.15	-0.09	-0.37
		Diagonal	Max Tension	8	5.49	0.00	0.00
			Max. Compression	2	-6.11	0.00	0.00
			Max. Mx	18	4.03	0.14	0.02
			Max. My	10	-5.17	0.06	-0.02
			Max. Vy	14	0.05	0.14	-0.01
			Max. Vx	10	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	1.59	0.00	0.00
			Max. Compression	18	-1.59	0.09	0.01
			Max. Mx	24	-0.22	0.10	0.01
			Max. My	22	-0.29	0.08	0.02
			Max. Vy	24	-0.05	0.10	0.01
			Max. Vx	22	-0.00	0.00	0.00
T9	20 - 0	Leg	Max Tension	15	84.99	0.35	-0.00
			Max. Compression	18	-109.83	0.00	0.00
			Max. Mx	18	-101.33	0.84	0.00
			Max. My	24	-13.45	-0.17	0.65
			Max. Vy	10	0.31	0.84	-0.01
			Max. Vx	24	-0.20	-0.17	0.65
		Diagonal	Max Tension	4	5.49	0.00	0.00
			Max. Compression	2	-6.18	0.00	0.00
			Max. Mx	2	4.86	0.15	-0.02
			Max. My	2	-5.29	0.04	0.03
			Max. Vy	2	-0.05	0.15	-0.02
			Max. Vx	2	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	1.90	0.00	0.00
			Max. Compression	18	-1.90	0.12	0.01
			Max. Mx	24	-0.24	0.13	0.01
			Max. My	14	-0.28	0.10	0.02
			Max. Vy	24	-0.06	0.13	0.01
			Max. Vx	22	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	114.50	12.93	-7.50
	Max. H_x	18	114.50	12.93	-7.50
	Max. H_z	5	-73.05	-8.50	6.31
	Min. Vert	7	-83.18	-10.33	6.00
	Min. H_x	7	-83.18	-10.33	6.00
	Min. H_z	18	114.50	12.93	-7.50
Leg B	Max. Vert	10	114.33	-13.29	-7.03
	Max. H_x	23	-88.37	10.80	5.64
	Max. H_z	23	-88.37	10.80	5.64
	Min. Vert	23	-88.37	10.80	5.64
	Min. H_x	10	114.33	-13.29	-7.03
	Min. H_z	10	114.33	-13.29	-7.03

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg A	Max. Vert	2	114.20	-0.61	15.15
	Max. H_x	19	-41.86	1.61	-6.15
	Max. H_z	2	114.20	-0.61	15.15
	Min. Vert	15	-88.59	0.53	-12.35
	Min. H_x	6	57.38	-1.55	7.59
	Min. H_z	15	-88.59	0.53	-12.35

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	30.78	0.00	-0.00	14.32	20.40	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	36.93	-0.19	-23.88	-1833.75	58.11	-20.92
0.9 Dead+1.0 Wind 0 deg - No Ice	27.70	-0.19	-23.88	-1836.26	51.90	-20.90
1.2 Dead+1.0 Wind 30 deg - No Ice	36.93	11.10	-19.75	-1495.16	-839.73	-9.92
0.9 Dead+1.0 Wind 30 deg - No Ice	27.70	11.10	-19.75	-1498.01	-845.03	-9.91
1.2 Dead+1.0 Wind 60 deg - No Ice	36.93	18.94	-11.04	-811.09	-1445.42	-0.01
0.9 Dead+1.0 Wind 60 deg - No Ice	27.70	18.94	-11.04	-814.62	-1450.13	-0.01
1.2 Dead+1.0 Wind 90 deg - No Ice	36.93	22.06	0.46	67.33	-1702.24	10.89
0.9 Dead+1.0 Wind 90 deg - No Ice	27.70	22.06	0.46	62.94	-1706.69	10.87
1.2 Dead+1.0 Wind 120 deg - No Ice	36.93	20.25	12.19	967.06	-1561.70	19.91
0.9 Dead+1.0 Wind 120 deg - No Ice	27.70	20.25	12.19	961.80	-1566.28	19.89
1.2 Dead+1.0 Wind 150 deg - No Ice	36.93	11.50	19.70	1549.32	-897.41	24.19
0.9 Dead+1.0 Wind 150 deg - No Ice	27.70	11.50	19.70	1543.48	-902.64	24.15
1.2 Dead+1.0 Wind 180 deg - No Ice	36.93	0.25	22.50	1766.65	-11.20	19.59
0.9 Dead+1.0 Wind 180 deg - No Ice	27.70	0.25	22.50	1760.60	-17.31	19.57
1.2 Dead+1.0 Wind 210 deg - No Ice	36.93	-10.85	19.80	1532.79	860.89	9.05
0.9 Dead+1.0 Wind 210 deg - No Ice	27.70	-10.85	19.80	1526.98	853.90	9.05
1.2 Dead+1.0 Wind 240 deg - No Ice	36.93	-20.20	11.95	924.81	1589.79	0.05
0.9 Dead+1.0 Wind 240 deg - No Ice	27.70	-20.20	11.95	919.61	1582.07	0.05
1.2 Dead+1.0 Wind 270 deg - No Ice	36.93	-22.06	-0.17	0.10	1755.49	-8.94
0.9 Dead+1.0 Wind 270 deg - No Ice	27.70	-22.06	-0.17	-4.20	1747.61	-8.92
1.2 Dead+1.0 Wind 300 deg - No Ice	36.93	-18.92	-11.54	-893.43	1518.23	-20.53
0.9 Dead+1.0 Wind 300 deg - No Ice	27.70	-18.92	-11.54	-896.86	1510.58	-20.50

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 330 deg - No Ice	36.93	-11.34	-19.84	-1537.19	929.06	-25.69
0.9 Dead+1.0 Wind 330 deg - No Ice	27.70	-11.34	-19.84	-1539.98	921.99	-25.66
Dead+Wind 0 deg - Service	30.78	-0.06	-8.10	-613.32	31.83	-7.10
Dead+Wind 30 deg - Service	30.78	3.77	-6.70	-498.51	-272.62	-3.36
Dead+Wind 60 deg - Service	30.78	6.43	-3.75	-266.54	-478.02	-0.00
Dead+Wind 90 deg - Service	30.78	7.49	0.16	31.34	-565.11	3.69
Dead+Wind 120 deg - Service	30.78	6.87	4.14	336.45	-517.45	6.75
Dead+Wind 150 deg - Service	30.78	3.90	6.69	533.90	-292.19	8.20
Dead+Wind 180 deg - Service	30.78	0.08	7.63	607.61	8.33	6.64
Dead+Wind 210 deg - Service	30.78	-3.68	6.72	528.30	304.06	3.07
Dead+Wind 240 deg - Service	30.78	-6.85	4.06	322.13	551.24	0.02
Dead+Wind 270 deg - Service	30.78	-7.49	-0.06	8.55	607.43	-3.03
Dead+Wind 300 deg - Service	30.78	-6.42	-3.92	-294.46	526.98	-6.96
Dead+Wind 330 deg - Service	30.78	-3.85	-6.73	-512.76	327.18	-8.71
1.2 Dead+1.0 Ev+1.0 Eh 0 deg	38.68	0.00	-2.16	-187.38	24.57	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 0 deg	25.95	0.00	-2.16	-191.41	18.40	-0.01
1.2 Dead+1.0 Ev+1.0 Eh 30 deg	38.68	1.08	-1.87	-159.97	-77.73	-0.00
0.9 Dead-1.0 Ev+1.0 Eh 30 deg	25.95	1.08	-1.87	-164.04	-83.76	-0.00
1.2 Dead+1.0 Ev+1.0 Eh 60 deg	38.68	1.87	-1.08	-85.06	-152.64	0.00
0.9 Dead-1.0 Ev+1.0 Eh 60 deg	25.95	1.87	-1.08	-89.25	-158.55	0.00
1.2 Dead+1.0 Ev+1.0 Eh 90 deg	38.68	2.16	-0.00	17.26	-180.06	0.01
0.9 Dead-1.0 Ev+1.0 Eh 90 deg	25.95	2.16	-0.00	12.93	-185.93	0.01
1.2 Dead+1.0 Ev+1.0 Eh 120 deg	38.68	1.87	1.08	119.57	-152.65	0.01
0.9 Dead-1.0 Ev+1.0 Eh 120 deg	25.95	1.87	1.08	115.09	-158.55	0.01
1.2 Dead+1.0 Ev+1.0 Eh 150 deg	38.68	1.08	1.87	194.46	-77.75	0.01
0.9 Dead-1.0 Ev+1.0 Eh 150 deg	25.95	1.08	1.87	189.87	-83.77	0.01
1.2 Dead+1.0 Ev+1.0 Eh 180 deg	38.68	0.00	2.16	221.89	24.57	0.01
0.9 Dead-1.0 Ev+1.0 Eh 180 deg	25.95	0.00	2.16	217.26	18.40	0.01
1.2 Dead+1.0 Ev+1.0 Eh 210 deg	38.68	-1.08	1.87	194.46	126.90	0.00
0.9 Dead-1.0 Ev+1.0 Eh 210 deg	25.95	-1.08	1.87	189.87	120.58	0.00
1.2 Dead+1.0 Ev+1.0 Eh 240 deg	38.68	-1.87	1.08	119.57	201.79	-0.00
0.9 Dead-1.0 Ev+1.0 Eh 240 deg	25.95	-1.87	1.08	115.09	195.36	-0.00
1.2 Dead+1.0 Ev+1.0 Eh 270 deg	38.68	-2.16	-0.00	17.27	229.20	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 270 deg	25.95	-2.16	-0.00	12.93	222.73	-0.01
1.2 Dead+1.0 Ev+1.0 Eh 300 deg	38.68	-1.87	-1.08	-85.06	201.79	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 300 deg	25.95	-1.87	-1.08	-89.25	195.36	-0.01
1.2 Dead+1.0 Ev+1.0 Eh 330 deg	38.68	-1.08	-1.87	-159.97	126.88	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 330 deg	25.95	-1.08	-1.87	-164.04	120.56	-0.01

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-30.78	0.00	-0.00	30.78	0.00	0.000%
2	-0.19	-36.93	-23.88	0.19	36.93	23.88	0.002%
3	-0.19	-27.70	-23.88	0.19	27.70	23.88	0.002%
4	11.10	-36.93	-19.75	-11.10	36.93	19.75	0.002%
5	11.10	-27.70	-19.75	-11.10	27.70	19.75	0.002%
6	18.94	-36.93	-11.04	-18.94	36.93	11.04	0.002%
7	18.94	-27.70	-11.04	-18.94	27.70	11.04	0.002%
8	22.06	-36.93	0.46	-22.06	36.93	-0.46	0.002%
9	22.06	-27.70	0.46	-22.06	27.70	-0.46	0.002%
10	20.25	-36.93	12.19	-20.25	36.93	-12.19	0.002%
11	20.25	-27.70	12.19	-20.25	27.70	-12.19	0.002%
12	11.50	-36.93	19.70	-11.50	36.93	-19.70	0.002%
13	11.50	-27.70	19.70	-11.50	27.70	-19.70	0.002%
14	0.25	-36.93	22.50	-0.25	36.93	-22.50	0.002%
15	0.25	-27.70	22.50	-0.25	27.70	-22.50	0.002%
16	-10.85	-36.93	19.80	10.85	36.93	-19.80	0.002%
17	-10.85	-27.70	19.80	10.85	27.70	-19.80	0.002%
18	-20.20	-36.93	11.96	20.20	36.93	-11.95	0.002%
19	-20.20	-27.70	11.96	20.20	27.70	-11.95	0.002%
20	-22.06	-36.93	-0.17	22.06	36.93	0.17	0.002%
21	-22.06	-27.70	-0.17	22.06	27.70	0.17	0.002%
22	-18.92	-36.93	-11.54	18.92	36.93	11.54	0.002%
23	-18.92	-27.70	-11.54	18.92	27.70	11.54	0.002%
24	-11.34	-36.93	-19.84	11.34	36.93	19.84	0.002%
25	-11.34	-27.70	-19.84	11.34	27.70	19.84	0.002%
26	-0.06	-30.78	-8.10	0.06	30.78	8.10	0.001%
27	3.77	-30.78	-6.70	-3.77	30.78	6.70	0.001%
28	6.43	-30.78	-3.75	-6.43	30.78	3.75	0.001%
29	7.49	-30.78	0.16	-7.49	30.78	-0.16	0.001%
30	6.87	-30.78	4.14	-6.87	30.78	-4.14	0.001%
31	3.90	-30.78	6.69	-3.90	30.78	-6.69	0.001%
32	0.08	-30.78	7.63	-0.08	30.78	-7.63	0.001%
33	-3.68	-30.78	6.72	3.68	30.78	-6.72	0.001%
34	-6.85	-30.78	4.06	6.85	30.78	-4.06	0.001%
35	-7.49	-30.78	-0.06	7.49	30.78	0.06	0.001%
36	-6.42	-30.78	-3.92	6.42	30.78	3.92	0.001%
37	-3.85	-30.78	-6.73	3.85	30.78	6.73	0.001%
38	0.00	-38.68	-2.16	-0.00	38.68	2.16	0.001%
39	0.00	-25.95	-2.16	-0.00	25.95	2.16	0.001%
40	1.08	-38.68	-1.87	-1.08	38.68	1.87	0.001%
41	1.08	-25.95	-1.87	-1.08	25.95	1.87	0.001%
42	1.87	-38.68	-1.08	-1.87	38.68	1.08	0.001%
43	1.87	-25.95	-1.08	-1.87	25.95	1.08	0.001%
44	2.16	-38.68	0.00	-2.16	38.68	0.00	0.001%
45	2.16	-25.95	0.00	-2.16	25.95	0.00	0.001%
46	1.87	-38.68	1.08	-1.87	38.68	-1.08	0.001%
47	1.87	-25.95	1.08	-1.87	25.95	-1.08	0.001%
48	1.08	-38.68	1.87	-1.08	38.68	-1.87	0.001%
49	1.08	-25.95	1.87	-1.08	25.95	-1.87	0.001%
50	0.00	-38.68	2.16	-0.00	38.68	-2.16	0.001%
51	0.00	-25.95	2.16	-0.00	25.95	-2.16	0.001%
52	-1.08	-38.68	1.87	1.08	38.68	-1.87	0.001%
53	-1.08	-25.95	1.87	1.08	25.95	-1.87	0.001%
54	-1.87	-38.68	1.08	1.87	38.68	-1.08	0.001%
55	-1.87	-25.95	1.08	1.87	25.95	-1.08	0.001%
56	-2.16	-38.68	0.00	2.16	38.68	0.00	0.001%
57	-2.16	-25.95	0.00	2.16	25.95	0.00	0.001%
58	-1.87	-38.68	-1.08	1.87	38.68	1.08	0.001%
59	-1.87	-25.95	-1.08	1.87	25.95	1.08	0.001%
60	-1.08	-38.68	-1.87	1.08	38.68	1.87	0.001%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
61	-1.08	-25.95	-1.87	1.08	25.95	1.87	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00003179
2	Yes	12	0.00000001	0.00011163
3	Yes	12	0.00000001	0.00008303
4	Yes	12	0.00000001	0.00011432
5	Yes	12	0.00000001	0.00008589
6	Yes	12	0.00000001	0.00011741
7	Yes	12	0.00000001	0.00008887
8	Yes	12	0.00000001	0.00011491
9	Yes	12	0.00000001	0.00008622
10	Yes	12	0.00000001	0.00011235
11	Yes	12	0.00000001	0.00008352
12	Yes	12	0.00000001	0.00011492
13	Yes	12	0.00000001	0.00008621
14	Yes	12	0.00000001	0.00011736
15	Yes	12	0.00000001	0.00008883
16	Yes	12	0.00000001	0.00011407
17	Yes	12	0.00000001	0.00008573
18	Yes	12	0.00000001	0.00011166
19	Yes	12	0.00000001	0.00008312
20	Yes	12	0.00000001	0.00011503
21	Yes	12	0.00000001	0.00008647
22	Yes	12	0.00000001	0.00011807
23	Yes	12	0.00000001	0.00008940
24	Yes	12	0.00000001	0.00011525
25	Yes	12	0.00000001	0.00008659
26	Yes	12	0.00000001	0.00008800
27	Yes	12	0.00000001	0.00008773
28	Yes	12	0.00000001	0.00008853
29	Yes	12	0.00000001	0.00008858
30	Yes	12	0.00000001	0.00008890
31	Yes	12	0.00000001	0.00008931
32	Yes	12	0.00000001	0.00008958
33	Yes	12	0.00000001	0.00008819
34	Yes	12	0.00000001	0.00008826
35	Yes	12	0.00000001	0.00008888
36	Yes	12	0.00000001	0.00008993
37	Yes	12	0.00000001	0.00008915
38	Yes	11	0.00000001	0.00013256
39	Yes	11	0.00000001	0.00011452
40	Yes	11	0.00000001	0.00012915
41	Yes	11	0.00000001	0.00011362
42	Yes	11	0.00000001	0.00012934
43	Yes	11	0.00000001	0.00011431
44	Yes	11	0.00000001	0.00013194
45	Yes	11	0.00000001	0.00011497
46	Yes	11	0.00000001	0.00013699
47	Yes	11	0.00000001	0.00011671
48	Yes	11	0.00000001	0.00014303
49	Yes	11	0.00000001	0.00011956
50	Yes	11	0.00000001	0.00014797

51	Yes	11	0.00000001	0.00012195
52	Yes	11	0.00000001	0.00014978
53	Yes	11	0.00000001	0.00012211
54	Yes	11	0.00000001	0.00014958
55	Yes	11	0.00000001	0.00012160
56	Yes	11	0.00000001	0.00014786
57	Yes	11	0.00000001	0.00012112
58	Yes	11	0.00000001	0.00014438
59	Yes	11	0.00000001	0.00012016
60	Yes	11	0.00000001	0.00013847
61	Yes	11	0.00000001	0.00011729

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	4.327	34	0.2138	0.0190
T2	160 - 140	3.439	34	0.2029	0.0165
T3	140 - 120	2.640	34	0.1732	0.0146
T4	120 - 100	1.948	34	0.1494	0.0123
T5	100 - 80	1.366	34	0.1257	0.0122
T6	80 - 60	0.885	34	0.0972	0.0094
T7	60 - 40	0.510	34	0.0726	0.0069
T8	40 - 20	0.242	34	0.0486	0.0051
T9	20 - 0	0.072	34	0.0253	0.0028

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Small Beacon	34	4.327	0.2138	0.0190	172997
177.50	Face Frame	34	4.214	0.2131	0.0186	172997
170.00	CCISeismic Tower Section 1	34	3.876	0.2104	0.0176	86498
150.00	CCISeismic Tower Section 2	34	3.026	0.1890	0.0159	45096
145.00	CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (140ft to150ft)	34	2.830	0.1810	0.0154	45862
141.00	UHX6-59-P3A	34	2.678	0.1747	0.0148	46177
140.50	CCISeismic general cable EW63 From 0 to 141 (140ft to141ft)	34	2.659	0.1740	0.0147	46167
132.00	10 ft Grid Dish	34	2.351	0.1627	0.0129	43166
130.00	CCISeismic Tower Section 3	34	2.281	0.1603	0.0126	42282
126.00	CCISeismic general cable 7/8" Coax From 0 to 132 (120ft to132ft)	34	2.144	0.1558	0.0121	40617
125.00	SP4-5.2NS	34	2.111	0.1548	0.0121	40222
122.50	CCISeismic general cable EW52 From 0 to 125 (120ft to125ft)	34	2.029	0.1520	0.0122	39353
110.00	CCISeismic Tower Section 4	34	1.644	0.1382	0.0125	43479
105.00	HP6-180E	34	1.502	0.1322	0.0125	46593
102.50	CCISeismic andrew EW180 From 0 to 105 (100ft to105ft)	34	1.433	0.1290	0.0124	48222
94.00	UHX8-65-P3A	34	1.211	0.1173	0.0116	48604
90.00	6 ft Grid Dish	34	1.113	0.1115	0.0110	47305
88.00	2 ft HP Dish	34	1.065	0.1085	0.0107	46660
87.00	CCISeismic general cable EW52	34	1.042	0.1071	0.0105	46343

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	From 0 to 94 (80ft to94ft)					
85.00	CCISeismic general cable 7/8" Coax From 0 to 90 (80ft to90ft)	34	0.995	0.1042	0.0102	45723
84.00	2960.004	34	0.973	0.1028	0.0101	45421
70.00	CCISeismic Tower Section 6	34	0.683	0.0845	0.0080	43510
68.50	Sector Frame	34	0.655	0.0827	0.0078	43402
64.25	CCISeismic (18) general cable 7/8" Coax From 0 to 68.5 (60ft to68.5ft)	34	0.580	0.0777	0.0073	43100
53.00	HP4-107-P3A	34	0.404	0.0642	0.0062	46320
50.00	VFA10-RRU	34	0.363	0.0606	0.0060	48013
48.00	UXA6-107BC	34	0.337	0.0582	0.0058	49212
46.50	CCISeismic general cable EW90 From 0 to 53 (40ft to53ft)	34	0.318	0.0564	0.0057	50152
45.00	CCISeismic miscl Feedline Ladder (Af) From 8 to 50 (40ft to50ft)	34	0.300	0.0546	0.0055	51128
36.00	HP4-180E	34	0.200	0.0439	0.0047	50497
30.00	CCISeismic Tower Section 8	34	0.144	0.0370	0.0040	45327
28.00	CCISeismic andrew EW180 From 0 to 36 (20ft to36ft)	34	0.127	0.0347	0.0038	43828
14.00	CCISeismic miscl Safety Line 3/8 From 8 to 180 (8ft to20ft)	34	0.043	0.0179	0.0020	55299
10.00	CCISeismic Tower Section 9	34	0.028	0.0129	0.0014	77419

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	12.640	10	0.6298	0.0561
T2	160 - 140	10.025	10	0.5968	0.0487
T3	140 - 120	7.676	10	0.5099	0.0429
T4	120 - 100	5.641	11	0.4373	0.0363
T5	100 - 80	3.943	11	0.3647	0.0360
T6	80 - 60	2.547	11	0.2802	0.0278
T7	60 - 40	1.466	11	0.2080	0.0202
T8	40 - 20	0.700	11	0.1391	0.0150
T9	20 - 0	0.212	3	0.0726	0.0081

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Small Beacon	10	12.640	0.6298	0.0561	59326
177.50	Face Frame	10	12.306	0.6276	0.0550	59326
170.00	CCISeismic Tower Section 1	10	11.312	0.6191	0.0518	29663
150.00	CCISeismic Tower Section 2	10	8.812	0.5562	0.0470	15421
145.00	CCISeismic miscl Feedline Ladder (Af) From 8 to 150 (140ft to150ft)	10	8.235	0.5327	0.0455	15629
141.00	UHX6-59-P3A	10	7.786	0.5143	0.0436	15738
140.50	CCISeismic general cable EW63 From 0 to 141 (140ft to141ft)	10	7.731	0.5120	0.0433	15734

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
132.00	10 ft Grid Dish	11	6.823	0.4782	0.0381	14858
130.00	CCISeismic Tower Section 3	11	6.618	0.4710	0.0370	14568
126.00	CCISeismic general cable 7/8" Coax From 0 to 132 (120ft to132ft)	11	6.217	0.4573	0.0357	14022
125.00	SP4-5.2NS	11	6.119	0.4539	0.0358	13892
122.50	CCISeismic general cable EW52 From 0 to 125 (120ft to125ft)	11	5.877	0.4456	0.0360	13605
110.00	CCISeismic Tower Section 4	11	4.752	0.4027	0.0370	14851
105.00	HP6-180E	11	4.338	0.3843	0.0368	15787
102.50	CCISeismic andrew EW180 From 0 to 105 (100ft to105ft)	11	4.138	0.3747	0.0364	16270
94.00	UHX8-65-P3A	11	3.493	0.3396	0.0341	16298
90.00	6 ft Grid Dish	11	3.207	0.3224	0.0324	15949
88.00	2 ft HP Dish	11	3.069	0.3137	0.0315	15781
87.00	CCISeismic general cable EW52 From 0 to 94 (80ft to94ft)	11	3.001	0.3094	0.0311	15697
85.00	CCISeismic general cable 7/8" Coax From 0 to 90 (80ft to90ft)	11	2.868	0.3009	0.0301	15532
84.00	2960.004	11	2.802	0.2967	0.0297	15452
70.00	CCISeismic Tower Section 6	11	1.966	0.2427	0.0236	14766
68.50	Sector Frame	11	1.886	0.2374	0.0231	14712
64.25	CCISeismic (18) general cable 7/8" Coax From 0 to 68.5 (60ft to68.5ft)	11	1.668	0.2226	0.0216	14560
53.00	HP4-107-P3A	11	1.164	0.1838	0.0183	15907
50.00	VFA10-RRU	11	1.047	0.1734	0.0176	16646
48.00	UXA6-107BC	11	0.972	0.1664	0.0171	17178
46.50	CCISeismic general cable EW90 From 0 to 53 (40ft to53ft)	11	0.918	0.1613	0.0167	17599
45.00	CCISeismic miscl Feedline Ladder (Af) From 8 to 50 (40ft to50ft)	11	0.865	0.1561	0.0163	18005
36.00	HP4-180E	3	0.579	0.1258	0.0138	17883
30.00	CCISeismic Tower Section 8	3	0.419	0.1061	0.0118	15952
28.00	CCISeismic andrew EW180 From 0 to 36 (20ft to36ft)	3	0.371	0.0995	0.0111	15397
14.00	CCISeismic miscl Safety Line 3/8 From 8 to 180 (8ft to20ft)	3	0.127	0.0515	0.0058	19303
10.00	CCISeismic Tower Section 9	3	0.084	0.0370	0.0041	27025

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.6250	4	1.01	20.34	0.049 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	0.62	3.13	0.197 ✔	1	Member Block Shear
		Top Girt	A325N	0.5000	1	0.01	3.13	0.003 ✔	1	Member Block Shear
T2	160	Leg	A325N	0.6250	4	2.14	20.34	0.105 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	0.60	3.13	0.193 ✔	1	Member Block Shear
T3	140	Leg	A325N	0.6250	4	3.82	20.34	0.188 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.46	3.81	0.383 ✔	1	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T4	120	Leg	A325N	0.7500	4	5.75	30.10	0.191 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	1.75	13.81	0.127 ✔	1	Bolt Shear
T5	100	Leg	A325N	0.8750	4	8.08	41.56	0.194 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.55	6.20	0.411 ✔	1	Member Bearing
T6	80	Leg	A325N	0.8750	4	10.63	41.56	0.256 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3.71	8.27	0.449 ✔	1	Member Bearing
T7	60	Leg	A325N	0.8750	4	13.60	41.56	0.327 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.84	13.81	0.423 ✔	1	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	1.25	13.81	0.090 ✔	1	Bolt Shear
T8	40	Leg	A325N	0.8750	4	17.55	41.56	0.422 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6.11	13.81	0.442 ✔	1	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	1.59	13.81	0.115 ✔	1	Bolt Shear
T9	20	Leg	A449	1.0000	4	21.21	54.52	0.389 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5.49	10.44	0.526 ✔	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	1.90	13.81	0.138 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 2 STD	20.00	4.00	61.0 K=1.00	1.0745	-5.13	36.84	0.139 [1] ✔
T2	160 - 140	ROHN 2 STD	20.03	4.01	61.1 K=1.00	1.0745	-10.61	36.81	0.288 [1] ✔
T3	140 - 120	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	1.7040	-18.84	57.14	0.330 [1] ✔
T4	120 - 100	ROHN 2.5 X-STR	20.03	6.68	86.7 K=1.00	2.2535	-28.31	58.51	0.484 [1] ✔
T5	100 - 80	ROHN 3 STD	20.03	6.68	68.9 K=1.00	2.2285	-39.78	70.89	0.561 [1] ✔
T6	80 - 60	ROHN 3 X-STR	20.04	6.68	70.5 K=1.00	3.0159	-54.52	94.34	0.578 [1] ✔
T7	60 - 40	ROHN 3.5 X-STR	20.03	5.18	47.5 K=1.00	3.6784	-71.86	140.31	0.512 [1] ✔
T8	40 - 20	ROHN 4 X-STR	20.03	5.15	41.9 K=1.00	4.4074	-91.49	174.46	0.524 [1] ✔
T9	20 - 0	ROHN 4 X-STR	20.04	5.14	41.8	4.4074	-109.83	174.54	0.629 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 1/2x1 1/2x1/8	6.04	2.78	114.5 K=1.02	0.3594	-0.64	7.60	0.084 [1] ✔
T2	160 - 140	L1 1/2x1 1/2x1/8	7.51	3.66	148.1 K=1.00	0.3594	-0.61	4.69	0.131 [1] ✔
T3	140 - 120	L1 3/4x1 3/4x1/8	9.70	4.75	164.4 K=1.00	0.4219	-1.49	4.47	0.334 [1] ✔
T4	120 - 100	L3x3x3/8	12.24	6.06	123.9 K=1.00	2.1100	-1.75	39.30	0.045 [1] ✔
T5	100 - 80	L2 1/2x2 1/2x3/16	13.97	6.90	167.3 K=1.00	0.9020	-2.51	9.22	0.272 [1] ✔
T6	80 - 60	L2 1/2x2 1/2x1/4	15.79	7.82	191.1 K=1.00	1.1900	-3.83	9.33	0.411 [1] ✔
T7	60 - 40	L3x3x3/8	19.03	9.50	194.2 K=1.00	2.1100	-5.84	16.02	0.365 [1] ✔
T8	40 - 20	L3x3x3/8	20.77	10.33	211.3 K=1.00	2.1100	-6.11	13.53	0.451 [1] ✔
T9	20 - 0	KL/R > 200 (C) - 188 L3 1/2x3 1/2x1/4	22.60	11.26	194.7 K=1.00	1.6900	-6.18	12.76	0.484 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	60 - 40	L3x3x3/8	16.17	15.84	112.0 K=0.54	2.1100	-1.25	45.98	0.027 [1] ✔
T8	40 - 20	L3x3x3/8	18.18	17.81	118.5 K=0.51	2.1100	-1.59	42.41	0.037 [1] ✔
T9	20 - 0	L3x3x3/8	20.25	19.87	130.6 K=0.50	2.1100	-1.90	35.41	0.054 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 1/2x1 1/2x1/8	4.52	4.11	166.7 K=1.00	0.3594	-0.01	3.70	0.003 [1] ✔

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 2 STD	20.00	4.00	61.0	1.0745	4.03	48.35	0.083 [1] ✔
T2	160 - 140	ROHN 2 STD	20.03	4.01	61.1	1.0745	8.55	48.35	0.177 [1] ✔
T3	140 - 120	ROHN 2.5 STD	20.03	5.01	63.4	1.7040	15.27	76.68	0.199 [1] ✔
T4	120 - 100	ROHN 2.5 X-STR	20.03	6.68	86.7	2.2535	22.98	101.41	0.227 [1] ✔
T5	100 - 80	ROHN 3 STD	20.03	6.68	68.9	2.2285	32.31	100.28	0.322 [1] ✔
T6	80 - 60	ROHN 3 X-STR	20.04	6.68	70.5	3.0159	42.52	135.72	0.313 [1] ✔
T7	60 - 40	ROHN 3.5 X-STR	20.03	5.18	47.5	3.6784	54.47	165.53	0.329 [1] ✔
T8	40 - 20	ROHN 4 X-STR	20.03	5.15	41.9	4.4074	70.32	198.34	0.355 [1] ✔
T9	20 - 0	ROHN 4 X-STR	20.04	5.14	41.8	4.4074	84.99	198.34	0.429 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 1/2x1 1/2x1/8	6.04	2.78	74.5	0.2109	0.62	9.18	0.067 [1] ✔
T2	160 - 140	L1 1/2x1 1/2x1/8	7.51	3.66	97.0	0.2109	0.60	9.18	0.066 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	140 - 120	L1 3/4x1 3/4x1/8	9.28	4.54	102.2	0.2578	1.46	11.21	0.130 [1]
T4	120 - 100	L3x3x3/8	12.24	6.06	81.2	1.3716	1.75	59.66	0.029 [1]
T5	100 - 80	L2 1/2x2 1/2x3/16	13.97	6.90	108.1	0.5886	2.55	25.60	0.099 [1]
T6	80 - 60	L2 1/2x2 1/2x1/4	15.79	7.82	123.6	0.7753	3.71	33.73	0.110 [1]
T7	60 - 40	L3x3x3/8	19.03	9.50	126.4	1.3716	5.28	59.66	0.089 [1]
T8	40 - 20	L3x3x3/8	19.90	9.90	131.7	1.3716	5.49	59.66	0.092 [1]
T9	20 - 0	L3 1/2x3 1/2x1/4	21.67	10.80	120.2	1.1269	5.49	49.02	0.112 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	60 - 40	L3x3x3/8	16.17	15.84	208.2	1.3716	1.25	59.66	0.021 [1]
T8	40 - 20	L3x3x3/8	18.18	17.81	234.1	1.3716	1.59	59.66	0.027 [1]
T9	20 - 0	L3x3x3/8	20.25	19.87	261.2	1.3716	1.90	59.66	0.032 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 1/2x1 1/2x1/8	4.52	4.11	111.5	0.2109	0.01	9.18	0.001 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

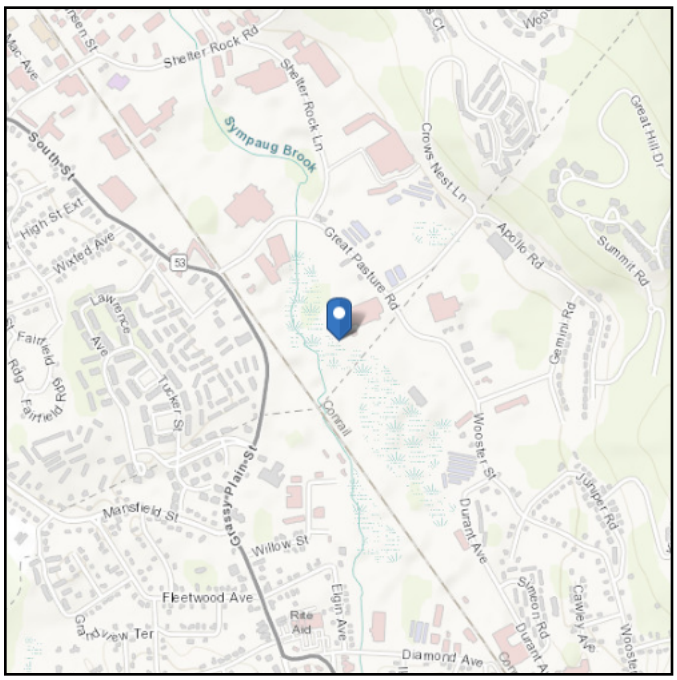
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 2 STD	2	-5.13	36.84	13.9	Pass
		Diagonal	L1 1/2x1 1/2x1/8	7	-0.64	7.60	8.4	Pass
		Top Girt	L1 1/2x1 1/2x1/8	6	-0.01	3.70	0.3	Pass
T2	160 - 140	Leg	ROHN 2 STD	38	-10.61	36.81	28.8	Pass
		Diagonal	L1 1/2x1 1/2x1/8	41	-0.61	4.69	13.1	Pass
T3	140 - 120	Leg	ROHN 2.5 STD	71	-18.84	57.14	33.0	Pass
		Diagonal	L1 3/4x1 3/4x1/8	74	-1.49	4.47	33.4	Pass
T4	120 - 100	Leg	ROHN 2.5 X-STR	98	-28.31	58.51	48.4	Pass
		Diagonal	L3x3x3/8	100	-1.75	39.30	4.5	Pass
T5	100 - 80	Leg	ROHN 3 STD	119	-39.78	70.89	56.1	Pass
		Diagonal	L2 1/2x2 1/2x3/16	122	-2.51	9.22	27.2	Pass
T6	80 - 60	Leg	ROHN 3 X-STR	140	-54.52	94.34	57.8	Pass
		Diagonal	L2 1/2x2 1/2x1/4	146	-3.83	9.33	41.1	Pass
T7	60 - 40	Leg	ROHN 3.5 X-STR	160	-71.86	140.31	51.2	Pass
		Diagonal	L3x3x3/8	164	-5.84	16.02	36.5	Pass
		Secondary Horizontal	L3x3x3/8	169	-1.25	45.98	2.7	Pass
T8	40 - 20	Leg	ROHN 4 X-STR	181	-91.49	174.46	52.4	Pass
		Diagonal	L3x3x3/8	188	-6.11	13.53	45.1	Pass
		Secondary Horizontal	L3x3x3/8	190	-1.59	42.41	3.7	Pass
T9	20 - 0	Leg	ROHN 4 X-STR	202	-109.83	174.54	62.9	Pass
		Diagonal	L3 1/2x3 1/2x1/4	209	-6.18	12.76	48.4	Pass
		Secondary Horizontal	L3x3x3/8	211	-1.90	35.41	5.4	Pass
							Summary	
						Leg (T9)	62.9	Pass
						Diagonal (T9)	48.4	Pass
						Secondary Horizontal (T9)	5.4	Pass
						Top Girt (T1)	0.3	Pass
						Bolt Checks	52.6	Pass
						RATING =	**62.9**	**Pass**

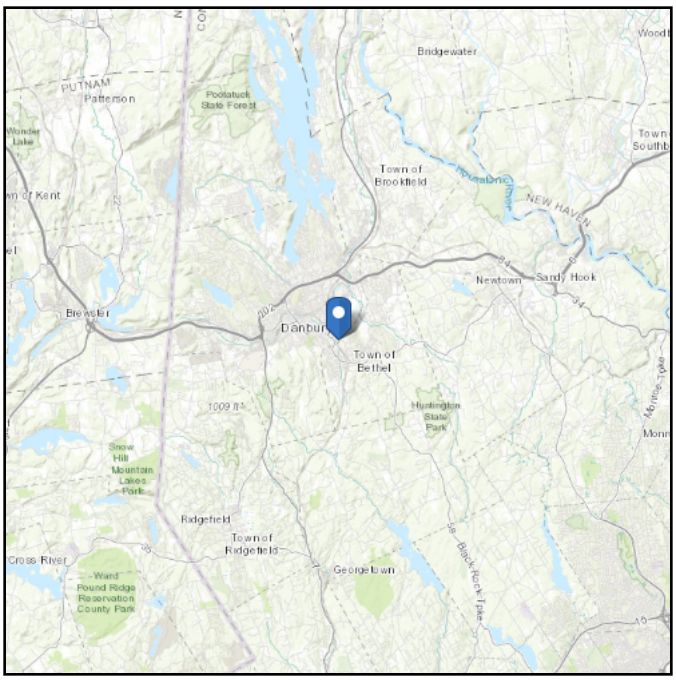
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: C - Very Dense Soil and Soft Rock

Elevation: 386.01 ft (NAVD 88)
Latitude: 41.383
Longitude: -73.4222





Wind

Results:

Wind Speed	115 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Jan 14 2022

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

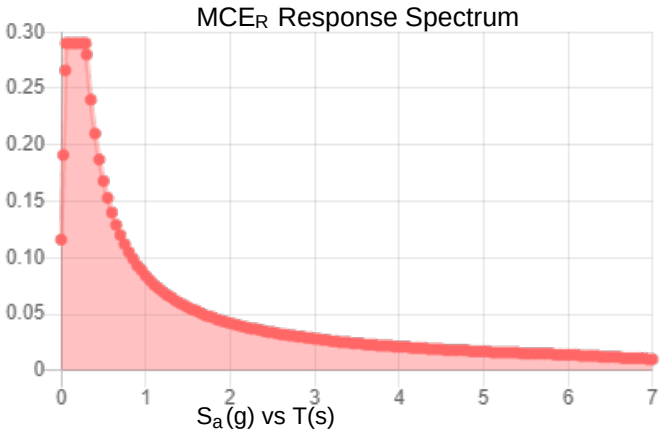
Seismic

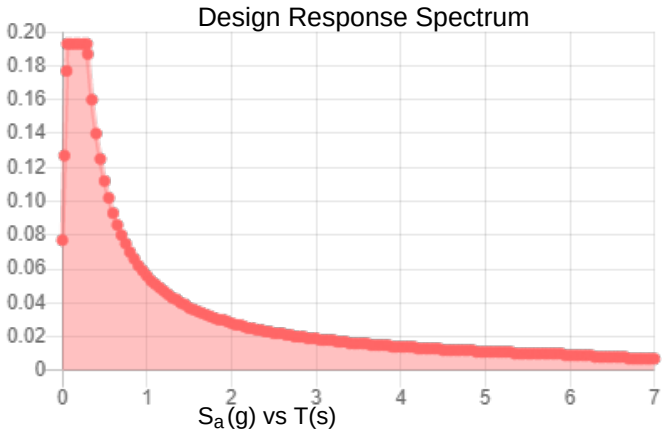
Site Soil Class: C - Very Dense Soil and Soft Rock

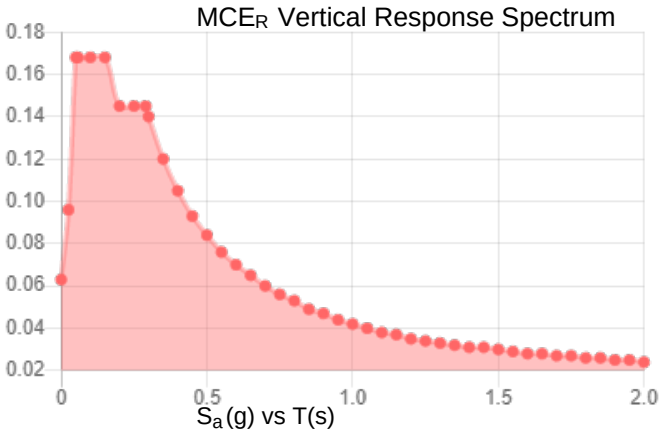
Results:

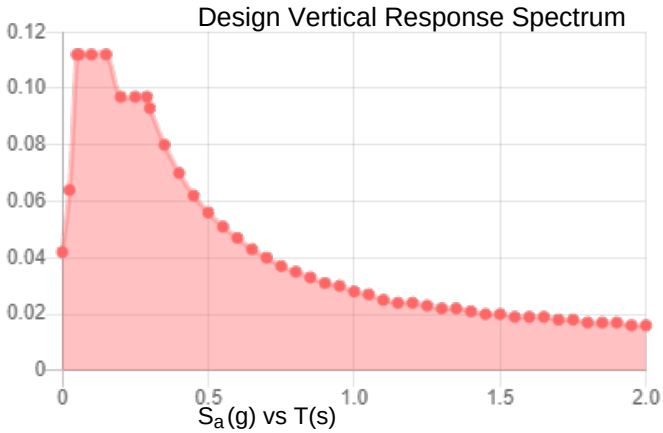
S_S :	0.223	S_{D1} :	0.056
S_1 :	0.056	T_L :	6
F_a :	1.3	PGA :	0.128
F_v :	1.5	PGA_M :	0.163
S_{MS} :	0.29	F_{PGA} :	1.272
S_{M1} :	0.084	I_e :	1
S_{DS} :	0.193	C_v :	0.723

Seismic Design Category B









Data Accessed: **Fri Jan 14 2022**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Fri Jan 14 2022

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

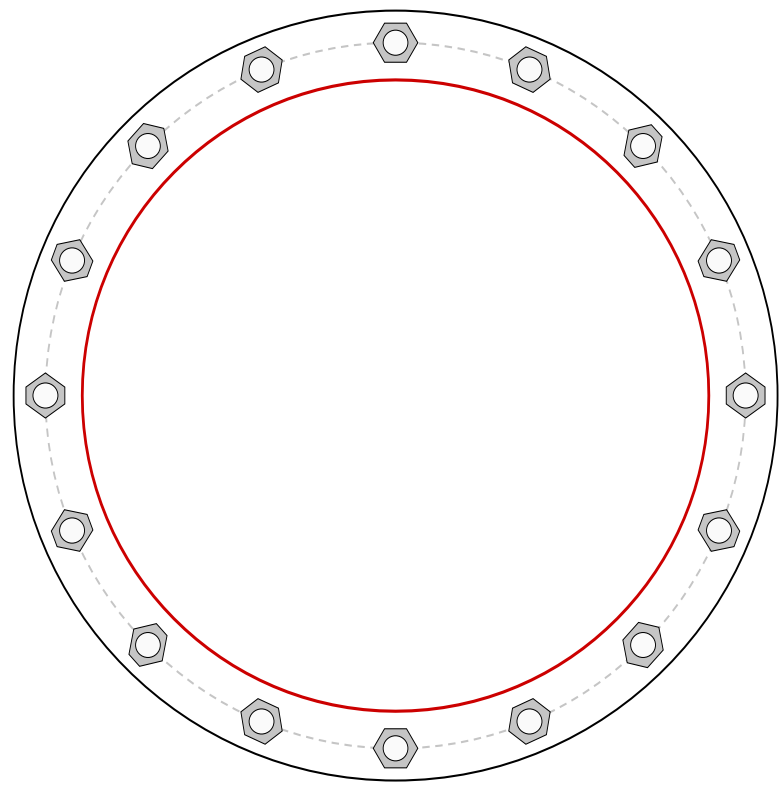
Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Monopole Base Plate Connection

Site Info	
BU #	28493
Site Name	Bethel West 2
Order #	REV05

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2.25

Applied Loads	
Moment (kip-ft)	2326.10
Axial Force (kips)	44.38
Shear Force (kips)	22.29



Connection Properties

Anchor Rod Data

(16) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 63.25" BC

Base Plate Data

69" OD x 2.25" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

56.590004" x 0.375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 113.05	ϕPn_c = 268.39	**Stress Rating**
Vu = 1.39	ϕVn = 120.77	**42.1%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	16.89	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	**37.5%**	**Pass**

Monopole Flange Plate Connection

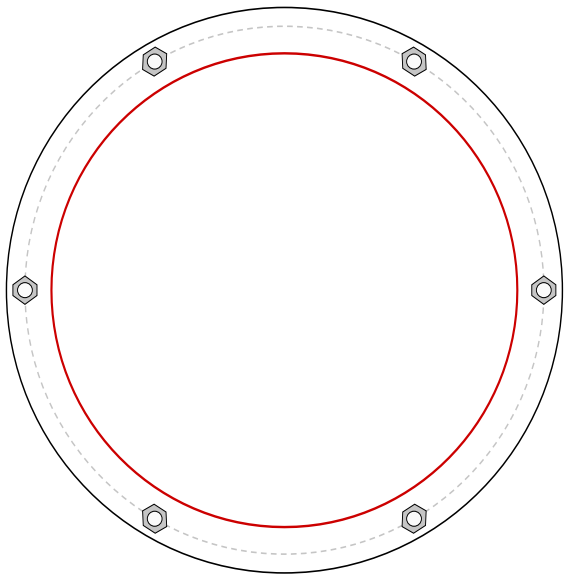
Elevation = 119 ft.

BU #	28493
Site Name	Bethel West 2
Order #	REV05

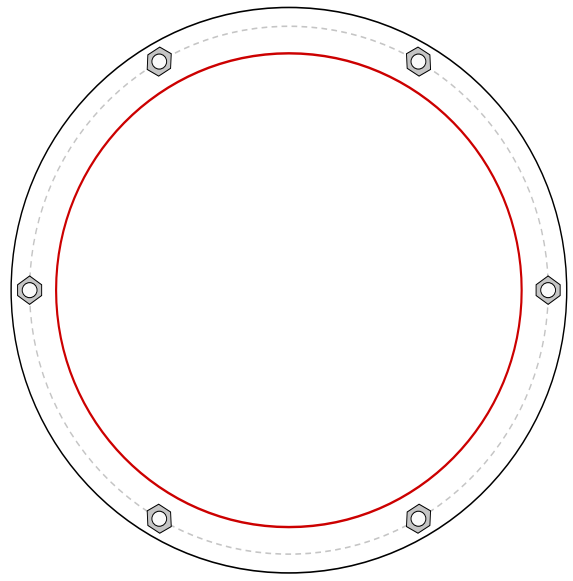
TIA-222 Revision	H

Applied Loads	
Moment (kip-ft)	118.12
Axial Force (kips)	13.08
Shear Force (kips)	11.92

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(6) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 35" BC

Top Plate Data

37.5" OD x 1.5" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Bottom Plate Data

37.5" OD x 1.5" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

31.419425" x 0.25" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Bottom Pole Data

31.419425" x 0.25" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	24.81	
Allowable (kips)	54.45	
Stress Rating:	**45.6%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	6.02	(Flexural)
Allowable Stress (ksi):	45.00	
Stress Rating:	**13.4%**	**Pass**
Tension Side Stress Rating:	**6.4%**	**Pass**

Bottom Plate Capacity

Max Stress (ksi):	6.02	(Flexural)
Allowable Stress (ksi):	45.00	
Stress Rating:	**13.4%**	**Pass**
Tension Side Stress Rating:	**6.4%**	**Pass**

CENTEK engineering

Centered on Solutions℠

Project

Tower Foundation
Structural Analysis Report

Bethel W 2

15 Great Pasture Road
Danbury, CT

Centek Project No. 14216.00

Prepared For

Verizon Wireless
99 East River Road
East Hartford, CT 06108

Attn: Joseph McCarty
CC: Scott Kisting, Shirley Rock

Prepared By

Centek Engineering, Inc.

63 North Branford Road
Branford, CT 06405
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March 12, 2020

TABLE OF CONTENTS

1.00 EXECUTIVE SUMMARY

1.01 INTRODUCTION

This report was prepared on behalf of our client, Verizon Wireless, for the purpose of verifying the structural adequacy of the existing (As-Built) micropile supported tower mat foundation.

The tower foundation was originally designed by Centek in 2017. Upon re-analysis of the foundation by Thomas Taylor of Semaan engineering, a design deficiency in the micropiles was discovered. The deficiency identified consists of an overload condition of the inner (4) piles. Due to the placement of the aforementioned piles they receive the full tower axial load, the weight of the thickened portion of the mat and the associated mat weight. This combined loading exceeds the micro-plie allowable capacity.

Our reanalysis assumes the subject (4) inner micropiles to be failed and re-evaluates the system with the reinforced concrete mat supported by the remaining (40) micropiles. The reinforced concrete mat was conservatively analyzed as a one-way slab for its ability to span to the middle row of piles (31'-4"). The max pile loading was recalculated and compared to the as-built micropile capacity.

1.02 REFERENCE MATERIALS

The following documents were referenced in the structural analysis of the tower foundation:

- Monopole Tower Design Report prepared by Sabre Industries project no. 16-7133-SCB dated 7/13/16.
- Foundation Design Drawings prepared by Centek Engineering, Inc. project no. 14216.00 dated 5/3/17 Rev.2.
- Geotechnical Report prepared by Design Earth Technology project no. 2015.13, dated 2/19/16.
- Drilled Micropile Design submittal prepared by Helical Drilling Inc. dated 3/21/17.
- Grout Compression Tests prepared by Materials Testing, Inc. S-1000A, S-1001A and S-1002A dated 5/3/17.
- 2015 International Building Code (Section 1810 Deep Foundations)
- ACI 318-14 "Building Code Requirements for Structural Concrete"

1.03 FOUNDATION ANALYSIS RESULTS

A structural check was made of the tower foundation. Calculations are provided in Section 2.00 of this report. Refer to the following tables for a summary of the analysis results:

i. Table 1

Component Capacity Check			
Component	Type	Stress Ratio	Result
Reinforced Concrete Mat	Bending	77.4%	PASS
	Shear	72.3%	PASS
Micropile	Compression	87.9%	PASS
	Rock Socket	99.2%	PASS

1.04 CONCLUSION

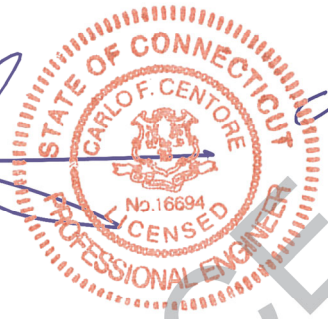
This analysis finds the micropile supported tower foundation in the as-built condition to be structurally adequate to accommodate the tower reactions from the Monopole Tower Design Report prepared by Sabre Industries project no. 16-7133-SCB dated 7/13/16 Sabre.

As discussed with Scott Kisting consultant to Verizon Wireless, the maintenance and condition assessment program that Verizon has in place would identify potential issues with the foundation should they present.

The analysis is based, in part, on the original foundation design documents, Helical micropile design documents and the tower installation field inspection documents, including material testing reports. The field inspection documents compiled during construction of the subject foundation alleviate any concerns with potential installation errors.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer

Prepared by:

Timothy J. Lynn, PE
Structural Engineer

Section 2.0

Calculations

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JOB BETHEL WEST 2
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

MICRO PILE CAPACITY

- **CHECK CASED PORTION**

AREA OF STEEL PIPE $= \frac{1}{4}\pi\left[(5.5)^2 - \left(5.5 - (2)(0.361)\right)^2\right] = 5.83\,in^2$

ALLOWABLE COMPRESSION STRESS $= 0.4F_y \leq 32{,}000$ (IBC 1810.3.2.6)
$0.4(80) = 32$ ksi

$P_{ALL} = (5.83\,in^2)(32\,ksi) = 186.6^k$ * ADDITIONAL STRENGTH PROVIDED BY GROUT/REBAR

- **CHECK UNCASED PORTION**

AREA OF REBAR $= 1.27\,in^2$ (#10 BAR)

ALLOWABLE COMP STRESS $= 0.5F_y \leq 32{,}000$ (IBC 1810.3.2.6)
$0.5(75) = 37.5$ ksi

AREA OF GROUT $= \frac{1}{4}\pi(4)^2 - 1.27\,in^2 = 11.3\,in^2$

ALLOWABLE COMP STRESS $= 0.33 f'_c$ (IBC 1810.3.2.6)
$= (0.33)(7210\,psi)$
$= 2379$ psi

$P_{ALL_{COMP}} = (1.27\,in^2)(32\,ksi) + (11.3\,in^2)(2.38\,ksi) = 67.5^k$

- **CHECK END BEARING / GROUT BOND (ROCK SOCKET)**

ALLOWABLE BOND LOAD $= \pi(4")(5'\times 12)(75\,psi) = 56.5^k$

ALLOWBLE END BEARING $= \frac{1}{4}\pi(5.5")^2\left(10\,tons/ft^2\right)\left(\frac{2000}{144}\right) = 3.3^k$

$P_{ALL_{RS}} = 56.5^k + 3.3^k = 59.8^k$ ← CONTROLS

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UNFACTORED TOWER BASE REACTIONS

SHEAR = 36^k
AXIAL = 47.6^k
MOMENT = $3941^{k\text{-}ft}$

FROM SABRE TOWER DESIGN CALCS, TIA-222-F LOADING

WEIGHT OF CONCRETE

PIER = $(8')^2(1')(0.15\,kcf) = 9.6^k$

THICKED HAUNCH = $\frac{1}{3}(4.5')\left[(8')^2 + (17')^2 + \sqrt{(8)(17)}\right](0.15) = 110^k$

TRIB AREA MAT INNER (16) PILES = $(39.15)^2 = 1533\ ft^2$

WEIGHT MAT INNER (16) = $(1533\ ft^2)(2.25)(0.15) = 517.5^k$

TRIB AREA MAT OUTTER (24) = $(50)^2 - 1533 = 967\ ft^2$

WEIGHT MAT OUTTER (24) = $(967\ ft^2)(2.25)(0.15) = 326.5^k$

$P_{CONC.}$ (INNER) = $(9.6^k + 110^k + 517.5^k)/16 = 39.8^k$ ←

$P_{CONC.}$ (OUTTER) = $326.5^k/24 = 13.6^k$ ←

LOADS FROM TOWER

PILE POLAR MOMENT OF INERTIA

$I_P = (23.5')^2(14) + (15.67')^2(14) + (7.83')^2(8) = 11660\ ft^2$

$M_{OT} = (36^k)(3.5') + 3941^{k\text{-}ft} = 4067^{k\text{-}ft}$

P_{TOWER} (INNER) = $\dfrac{4067^{k\text{-}ft}(15.67')}{11660\ ft^2} + \dfrac{47.6^k}{16} = 8.5^k$ ←

P_{TOWER} (OUTTER) = $\dfrac{4067^{k\text{-}ft}(23.5')}{11660\ ft^2} = 8.2^k$ ←

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JOB: BETHEL WEST 2
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE ____

EQUIPMENT DEAD LOAD

17,000# TOT. / 4 = 4,250# (COMMSCOPE VZWA-9-4x16-GLSP-3)

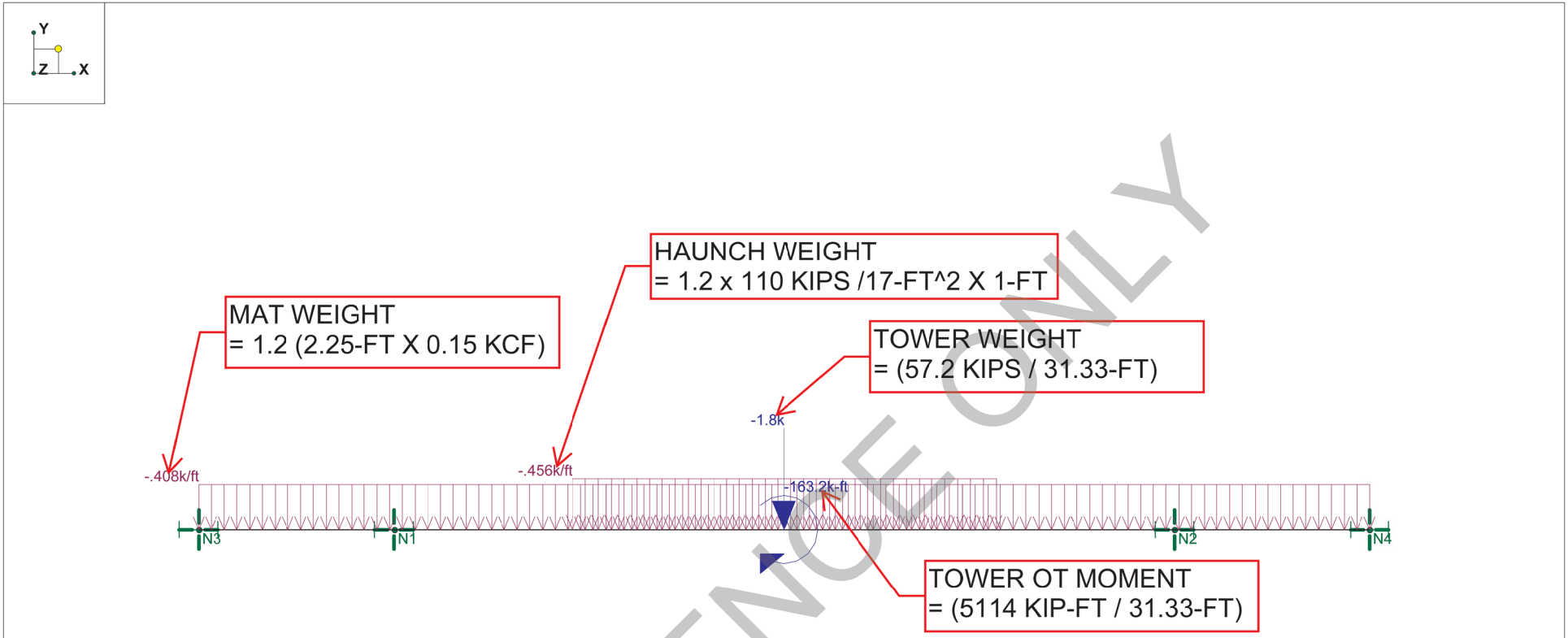
TOTAL LOADS ON PILES

P_{TOT} (INNER) = 39.8k + 8.5k + 4.3k + 6.7k = 59.3k < 59.8 (ok)

P_{TOT} (OUTTER) = 13.6k + 8.2k + 4.3k + 6.7k = 32.8k < 59.8 (ok)

$$\frac{P_{TOT}}{P_{ALL\,COMP}} = \frac{59.3^k}{59.8^k} = 99.2\%$$

$$\frac{P_{TOT}}{P_{ALL\,RS}} = \frac{59.3^k}{67.5^k} = 87.9\%$$



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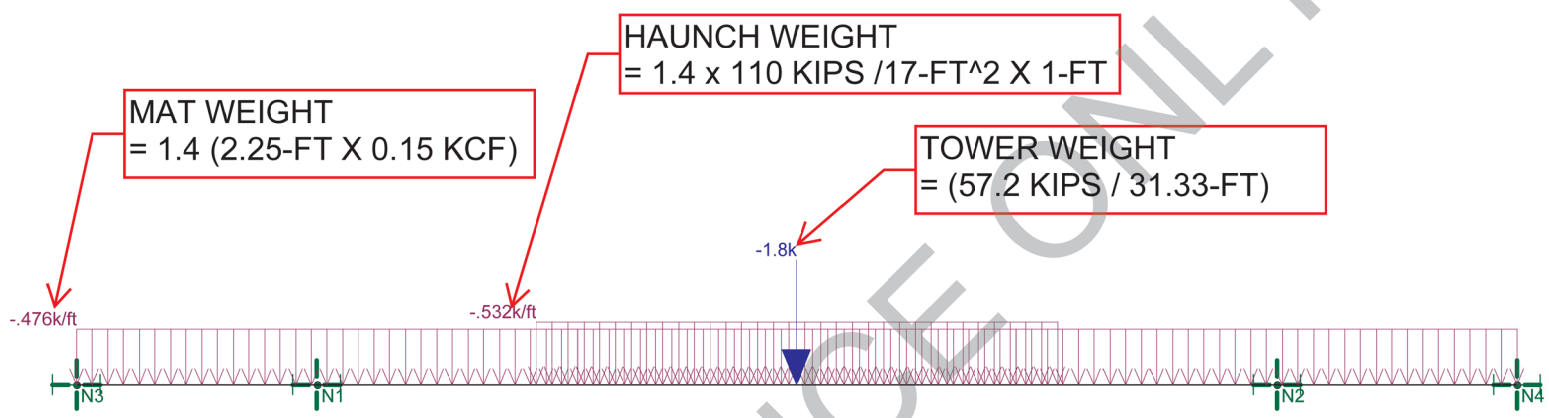

Loads: LC 1, IBC 16-1
Envelope Only Solution

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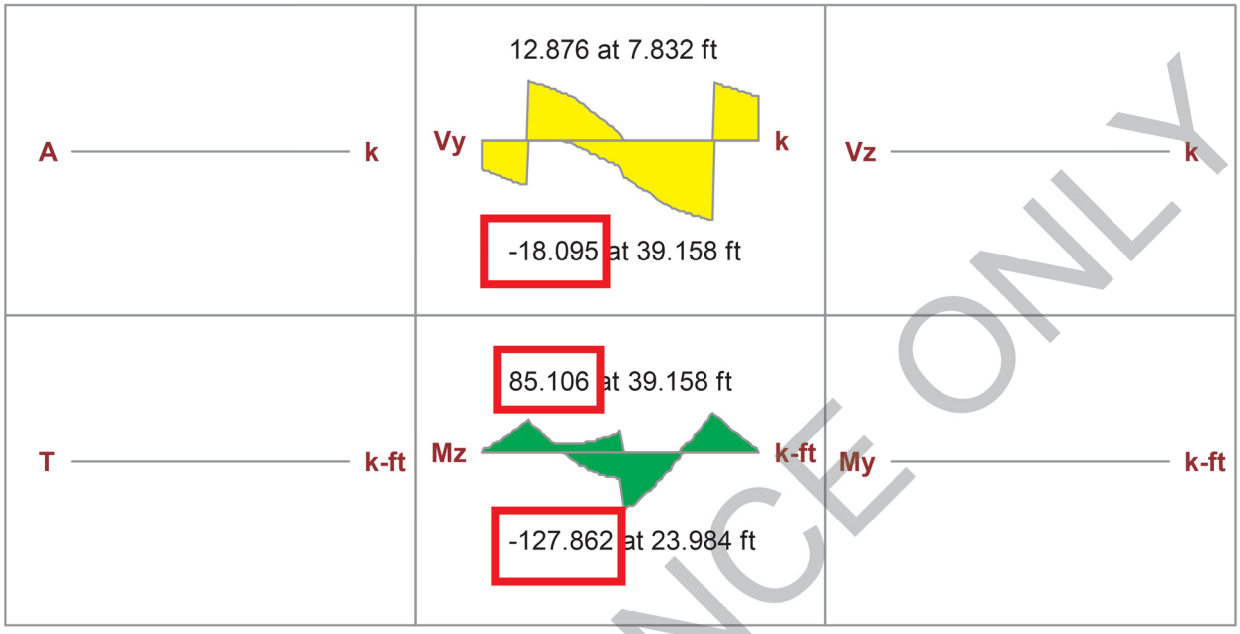
		Mar 10, 2020 at 3:43 PM
		12-in Strip.r3d

Beam: ***M1***

Shape: **CRECT24X12**
Material: **Conc4000NW**
Length: **46.99 ft**
I Joint: **N3**
J Joint: **N4**

Concrete Stress Block: **Rectangular**

Code Check: **No Calc**
Report Based On 97 Sections

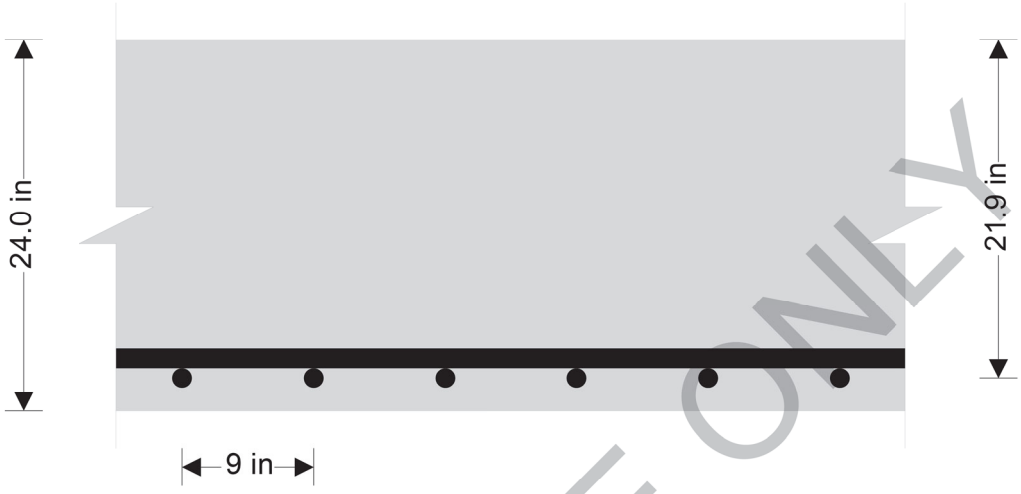


No Calc
- Concrete code check not calculated -

Centek Engineering, Inc, 63-2 North Branford Road Branford, CT 06405	Project				Job Ref.	
	Section				Sheet no./rev. 1	
	Calc. by T	Date 3/11/2020	Chk'd by	Date	App'd by	Date

RC ONE-WAY SLAB DESIGN (ACI318-11)

Tedds calculation version 1.1.04



Slab definition

Slab type	**One-way continuous**
Overall thickness of slab	h = **24.000** in
Clear shorter span of slab	l_n = **31.33** ft
Clear cover to tension reinforcement	c_c = **1.50** in

Materials

Specified compressive strength of concrete	f'_c = **4000** psi
Specified yield strength of reinforcement	f_y = **60000** psi
Modulus of elasticity	E_{SACI} = **29000000** psi
Concrete modification factor	λ = **1.00**

Maximum design moment and shear in span(per 12 in width of slab)

Maximum ultimate positive moment	M_{us} = **128.000** kip_ft/ft
Maximum ultimate shear force	V_u = **18.000** kips/ft

Reinforcement calculation - positive moments

Tension steel provided	**No. 10 @ 8.5 in o.c.**
Depth to tension steel	d = (h – c_c – D / 2) = **21.87** in
Stress block depth factor	β_1 = 0.85
Reinforcement ratio at strain of 0.004	ρ^b = 0.85 × β_1 × f'_c / f_y × (0.003 / (0.003 + 0.004)) = **0.021**
Maximum reinforcement ratio	ρ^{max} = ρ^b = **0.021**
Maximum area of tension steel	A_{s_max} = ρ^{max} × d = **5.416** in^2/ft
Min ratio of transverse reinforcement (cl. 7.12.2.1)	ρ^t =**0.0018**
Min area tension steel req'd (cl. 10.5.4 & 7.12.2.1)	A_{s_min} = ρ^t × h = **0.518** in^2/ft
Area of tension steel provided	A_{s_prov} = **1.788** in^2/ft

PASS - Area of steel provided - OK

Steel stress (cl. 10.6.4)	f_s = 2/3 × f_y = **40000** psi
Max allowable spacing (cl. 10.5.4 & 10.6.4)	s_{max} = min(3×h, 18in, 15in×(40000 psi/f_s) – 2.5×c_c, 12in×(40000 psi/f_s))

s_{max} = **11.250** in

Actual tensile bar spacing provided — s = **8.500** in

PASS - Spacing of bars (+ve moment steel) less than maximum allowable

Check for section - positive moments

Depth of equivalent rectangular stress block — $a = (A_{s\_prov} \times f_y) / (0.85 \times f'_c)$ = **2.63** in

Depth of neutral axis — $c = a / \beta_1$ = **3.094** in

Net tensile strain in long. steel at nominal strength — $\varepsilon_t = 0.003 \times [(d - c) / c]$ = **0.0182**

Section is tension controlled, design OK

Strength reduction factor — ϕ = 0.9

Revised required nominal flexural strength — $M_{ns} = M_{us} / \phi$ = **142.222** kip_ft/ft

Actual nominal flexural strength — $M_{ns\_prov} = A_{s\_prov} \times f_y \times (d - a / 2)$ = **183.756** kip_ft/ft

PASS - Actual flexural strength exceeds required nominal flexural strength

Transverse reinforcement - (for shrinkage and temperature)

Transverse reinforcement provided — **No. 10 @ 8.5 in o.c.**

Area of reinforcement provided — A_{t_prov} = **1.788** in^2/ft

Min ratio of transverse reinforcement (cl. 7.12.2.1) — ρ^t **=0.0018**

Minimum area of transverse reinforcement required — $A_{t\_req} = \rho^t \times h$ = **0.518** in^2/ft

PASS - Area of transverse steel provided OK

Maximum allowable spacing of bars — s_{max_t} = min (5 × h, 18 in) = **18.000** in

Actual transverse bar spacing provided — s_t = **8.500** in

PASS - Spacing of transverse bars is less than allowable

Check for shear

Nominal shear strength required — $V_n = abs(V_u) / 0.75$ = **24.000** kips/ft

Shear strength provided by concrete — $V_c = 2 \times \lambda \times \sqrt{(f'_c \times 1\ psi)} \times d$ = **33.189** kips/ft

Shear strength provided by shear steel (assumed) — V_s = 0 kips/ft

Shear capacity of section — $V = V_c + V_s$ = **33.189** kips/ft

PASS - One-way shear capacity

Check of clear cover (ACI 7.7.1)

Permissible min nominal cover to all reinforcement — c_{min} = 0.75 in

Clear cover to tension reinforcement (+ve mnt) — $c_c = h - d - D/2$ = **1.500** in

PASS - Cover to steel resisting positive moment exceeds allowable minimum cover

Deflection

Support condition — **Both ends continuous**

Basic span-to-thickness ratio (Table 9.5(a)) — $ratio_{basic}$ = **28**

Type of concrete — **Normal weight**

Concrete density factor (Table 9.5(a)) — $f_{density}$ = **1.00**

Allowable span-to-thickness ratio — $ratio_{allow} = ratio_{basic} / (f_{density} \times (0.4 + f_y / 100000\ psi))$ = **28.000**

Actual span-to-thickness ratio — $ratio_{actual} = l_n / h$ = **15.665**

PASS - The slab thickness is adequate to control deflection

Design summary

Slab is 24.0 in thick in 4000 psi concrete

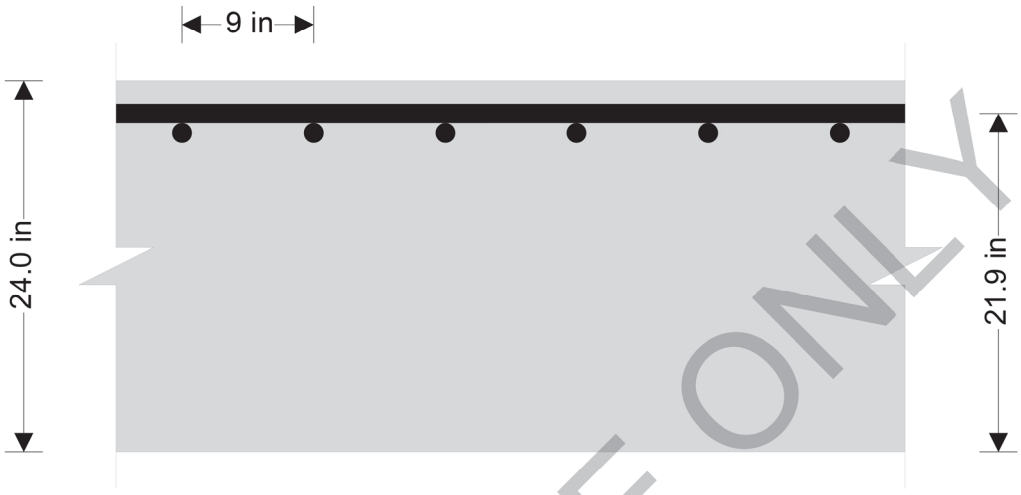
Tension steel provided - positive moment, No. 10 @ 8.5 in o.c. in 60000 psi steel

Transverse steel provided , No. 10 @ 8.5 in o.c. in 60000 psi steel

Centek Engineering, Inc, 63-2 North Branford Road Branford, CT 06405	Project				Job Ref.	
	Section				Sheet no./rev. 1	
	Calc. by T	Date 3/11/2020	Chk'd by	Date	App'd by	Date

RC ONE-WAY SLAB DESIGN (ACI318-11)

Tedds calculation version 1.1.04



Slab definition

Slab type	**One-way continuous**
Overall thickness of slab	h = **24.00** in
Clear shorter span of slab	l_n = **31.33** ft
Clear cover to tension reinforcement	c_{c_hog} = **1.50** in

Materials

Specified compressive strength of concrete	f'_c = **4000** psi
Specified yield strength of reinforcement	f_y = **60000** psi
Modulus of elasticity	E_{SACI} = **29000000** psi
Concrete modification factor	λ = **1.00**

Maximum design moment and shear in span(per 12 in width of slab)

Maximum ultimate negative moment	M_{uh} = **86.000** kip_ft/ft
Maximum ultimate shear force	V_u = **18.000** kips/ft

Reinforcement calculations - negative moment

Tension steel provided	**No. 10 @ 8.5 in o.c.**
Depth to tension steel	$d_{hog} = (h - c_{c\_hog} - D_{hog} / 2)$ = **21.87** in
Stress block depth factor	β_1 = 0.85
Reinforcement ratio at strain of 0.004	$\rho^b = 0.85 \times \beta_1 \times f'_c / f_y \times (0.003 / (0.003 + 0.004))$ = **0.021**
Maximum reinforcement ratio	$\rho^{max} = \rho^b$ = **0.021**
Maximum area of tension steel	$A_{s\_max\_hog} = \rho^{max} \times d_{hog}$ = **5.416** in^2/ft
Min ratio of transverse reinforcement (cl. 7.12.2.1)	ρ^t =**0.0018**
Min area tension steel req'd (cl. 10.5.4 & 7.12.2.1)	$A_{s\_min\_hog} = \rho^t \times h$ = **0.518** in^2/ft
Area of tension steel provided	$A_{s\_prov\_hog}$ = **1.788** in^2/ft
	PASS - Area of steel provided - OK
Steel stress (cl. 10.6.4)	$f_s = 2/3 \times f_y$ = **40000** psi
Max allowable spacing (cl. 10.5.4 & 10.6.4)	s_{max} = min(3×h,18in,15in$\times$(40000 psi/f_s) – 2.5$\times c_{c_hog}$,12in$\times$(40000psi/f_s))

	s_{max} = **11.250** in
Actual tensile bar spacing provided	s_{hog} = **8.500** in
	PASS - Spacing of bars (-ve mnt) less than maximum allowable

Check for section - negative moment

Depth of equivalent rectangular stress block	$a_{hog} = (A_{s\_prov\_hog} \times f_y) / (0.85 \times f'_c)$ = **2.63** in
Depth of neutral axis	$c_{hog} = a_{hog} / \beta_1$ = **3.094** in
Net tensile strain in long. steel at nominal strength	$\varepsilon t_{\_hog} = 0.003 \times [(d_{hog} - c_{hog}) / c_{hog}]$ = **0.0182**
	Section is tension controlled, Design OK
Strength reduction factor	ϕ_{hog} = 0.9
Revised required nominal flexural strength	$M_{nh} = M_{uh} / \phi_{hog}$ = **95.556** kip_ft/ft
Actual nominal flexural strength	$M_{nh\_prov} = A_{s\_prov\_hog} \times f_y \times (d_{hog} - a_{hog} / 2)$ = **183.756** kip_ft/ft
	PASS - Actual flexural strength exceeds required nominal flexural strength

Transverse reinforcement - (for shrinkage and temperature)

Transverse reinforcement provided	**No. 10 @ 8.5 in o.c.**
Area of reinforcement provided	A_{t_prov} = **1.788** in^2/ft
Min ratio of transverse reinforcement (cl. 7.12.2.1)	ρ^t =**0.0018**
Minimum area of transverse reinforcement required	$A_{t\_req} = \rho^t \times h$ = **0.518** in^2/ft
	PASS - Area of transverse steel provided OK
Maximum allowable spacing of bars	s_{max_t} = min (5 × h, 18 in) = **18.000** in
Actual transverse bar spacing provided	s_t = **8.500** in
	PASS - Spacing of transverse bars is less than allowable

Check for shear

Nominal shear strength required	$V_n = abs(V_u) / 0.75$ = **24.000** kips/ft
Shear strength provided by concrete	$V_c = 2 \times \lambda \times \sqrt{(f'_c \times 1\ psi)} \times d_{hog}$ = **33.189** kips/ft
Shear strength provided by shear steel (assumed)	V_s = 0 kips/ft
Shear capacity of section	$V = V_c + V_s$ = **33.189** kips/ft
	PASS - One-way shear capacity

Check of clear cover (ACI 7.7.1)

Permissible min nominal cover to all reinforcement	c_{min} = 0.75 in
Clear cover to tension reinforcement (-ve mnt)	$c_{c\_hog} = h - d_{hog} - D_{hog}/2$ = **1.500** in
	PASS - Cover to steel resisting negative moment exceeds allowable minimum cover

Deflection

Support condition	**Both ends continuous**
Basic span-to-thickness ratio (Table 9.5(a))	$ratio_{basic}$ = **28**
Type of concrete	**Normal weight**
Concrete density factor (Table 9.5(a))	$f_{density}$ = **1.00**
Allowable span-to-thickness ratio	$ratio_{allow} = ratio_{basic} / (f_{density} \times (0.4 + f_y / 100000\ psi))$ = **28.000**
Actual span-to-thickness ratio	$ratio_{actual} = l_n / h$ = **15.665**
	PASS - The slab thickness is adequate to control deflection

Design summary

Slab is 24.0 in thick in 4000 psi concrete

Tension steel provided - negative moment, No. 10 @ 8.5 in o.c. in 60000 psi steel

Transverse steel provided , No. 10 @ 8.5 in o.c. in 60000 psi steel

Section 3.0

Supporting Documentation

Sabre Industries™
Towers and Poles

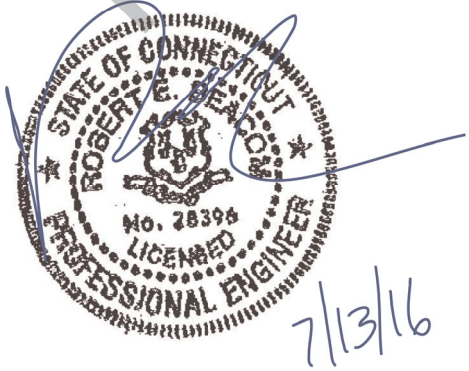
Structural Design Report

120' Extendible to 140' Monopole
Site: Bethel W2, CT
Site Number: 5-0157

Prepared for: VERIZON WIRELESS
by: Sabre Towers & Poles ™

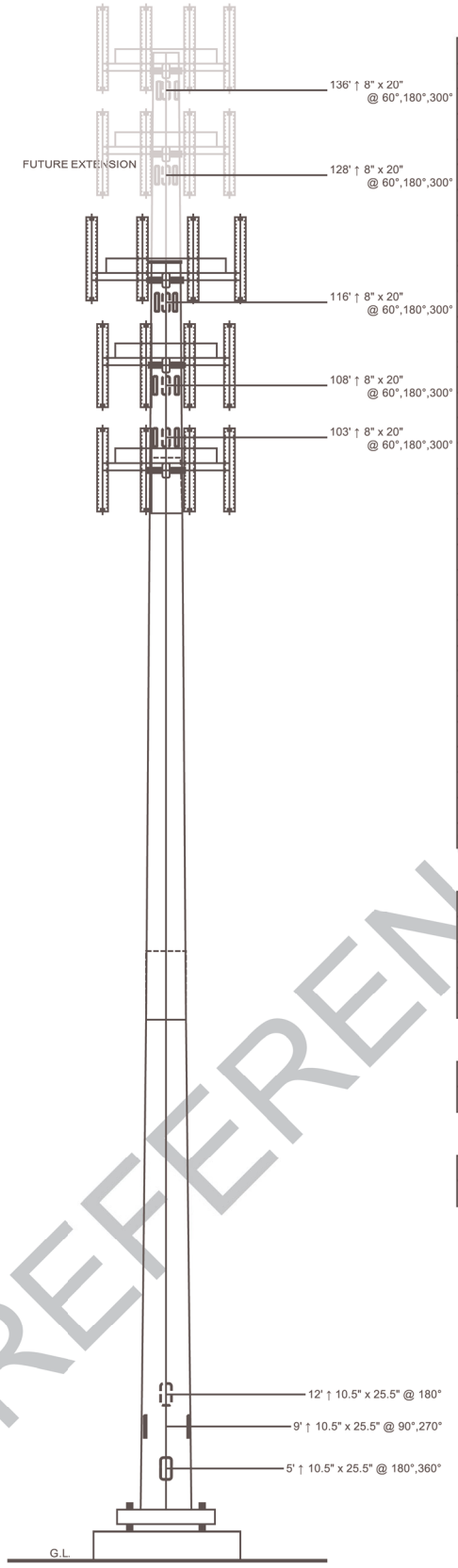
Job Number: 16-7133-SCB

July 13, 2016



7/13/16

Length (ft)	20' - 0"	24' - 0"	53' - 6"							53' - 3"
Number Of Sides			18							
Thickness (in)			1/4"			5/16"				3/8"
Lap Splice (ft)					5' - 3"			6' - 6"		
Top Diameter (in)	27"	31.42"				35.06"				44.83"
Bottom Diameter (in)	31.42"	36.72"				46.89"				56.59"
Taper (in/ft)						0.221				
Grade						A572-65				
Weight (lbs)	2331	3148				7793				13314
Overall Steel Height (ft)	20 (Extension)	119								



Designed Appurtenance Loading

Elev	Description	Tx-Line
140***	(3) 800 10510	(3) 1 5/8"
140***	(18) TMA	
140***	(2) DB-B1-6C-12AB-0Z	(2) DC/Fiber Trunks
140***	(12) RRH2x40-AWS	
140***	(9) 800 10766	(9) 1 5/8"
138***	L.P. Platform (Monopole Only) - 12' w/ Handrail	
130***	L.P. Platform (Monopole Only) - 12' w/ Handrail	
130***	(12) RRH2x40-AWS	
130***	(18) TMA	
130***	(3) 800 10510	(3) 1 5/8"
130***	(9) 800 10766	(9) 1 5/8"
130***	(2) DB-B1-6C-12AB-0Z	(2) DC/Fiber Trunks
120	(6) HBX-6517DS-VTM	(9) 1 5/8"
120	(3) RRH2x60-AWS	
120	(3) RRH2x60-1900A-4R	
120	(2) DB-B1-6C-12AB-0Z	(2) DC/Fiber Trunks
120	(6) 800 10766	(9) 1 5/8"
120	(3) RRH2x60-700	
118	L.P. Platform (Monopole Only) - 14' w/ Handrail	
110	L.P. Platform (Monopole Only) - 12' w/ Handrail	
110	(12) RRH2x40-AWS	
110	(18) TMA	
110	(3) 800 10510	(3) 1 5/8"
110	(9) 800 10766	(9) 1 5/8"
110	(2) DB-B1-6C-12AB-0Z	(2) DC/Fiber Trunks
100	L.P. Platform (Monopole Only) - 12' w/ Handrail	
100	(12) RRH2x40-AWS	
100	(18) TMA	
100	(3) 800 10510	(3) 1 5/8"
100	(9) 800 10766	(9) 1 5/8"
100	(2) DB-B1-6C-12AB-0Z	(2) DC/Fiber Trunks

Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	57.21	45.89	4952.27	9.02	6.45
3s Gusted Wind 0.9 Dead	42.95	45.76	4867.79	8.82	6.3
3s Gusted Wind&Ice	81.12	14.08	1566.09	2.91	2.07
Service Loads	47.65	9.22	988.59	1.81	1.29

Base Plate Dimensions

Shape	Diameter	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Round	69"	2.25"	63.25"	16	2.25"

Anchor Bolt Dimensions

Length	Diameter	Hole Diameter	Weight	Type	Finish
84"	2.25"	2.625"	1937.6	A615-75	Galv-18"

Notes

1) Antenna Feed Lines Run Inside Pole
2) All dimensions are above ground level, unless otherwise specified.
3) Weights shown are estimates. Final weights may vary.
4) The Monopole was designed for a basic wind speed of 100 mph with 0" of radial ice, and 50 mph with 3/4" of radial ice, in accordance with ANSI/TIA-222-G, Structure Class II, Exposure Category C, Topographic Category 1.
5) Full Height Step Bolts
6) The Monopole was designed for a basic wind speed of 85 mph with 1/2" radial ice with reduction, in accordance with EIA/TIA-222-F.
7) ANSI/TIA-222-G load case reactions are shown in the table above. EIA/TIA -222-F load case reactions can be found in the calcuations toward the end of this design report.

*** These Appurtenances cannot be installed until the Monopole has been extended.

Sabre Industries™ Towers and Poles

Sabre Communications Corporation
7101 Southbridge Drive
P.O. Box 658
Sioux City, IA 51102-0658
Phone: (712) 258-6690
Fax: (712) 279-0814

Job:	**16-7133-SCB**
Customer:	VERIZON WIRELESS
Site Name:	Bethel W2, CT 5-0157
Description:	120' ext. 140' Monopole
Date:	7/13/2016 By: REB

	0.02	0.54	0.55	180.0	0.04	0.00	0.04	90.0
95.00	.....							
	0.02	0.55	0.57	180.0	0.04	0.00	0.04	90.0
	0.02	0.74	0.75	180.0	0.04	0.00	0.04	90.0
81.08	.....							
	0.02	0.74	0.75	180.0	0.04	0.00	0.04	90.0
	0.02	0.87	0.89	180.0	0.03	0.00	0.03	90.0
67.17	.....							
	0.02	0.87	0.89	180.0	0.03	0.00	0.03	90.0
	0.02	0.97	0.98	180.0	0.03	0.00	0.03	90.0
53.25	.....							
	0.01	0.81	0.82	180.0	0.03	0.00	0.03	90.0
	0.01	0.84	0.85	180.0	0.03	0.00	0.03	90.0
46.75	.....							
	0.01	0.86	0.87	180.0	0.03	0.00	0.03	90.0
	0.01	0.90	0.92	180.0	0.03	0.00	0.03	90.0
35.06	.....							
	0.01	0.90	0.92	180.0	0.03	0.00	0.03	90.0
	0.01	0.94	0.95	180.0	0.03	0.00	0.03	90.0
23.37	.....							
	0.01	0.94	0.95	180.0	0.03	0.00	0.03	90.0
	0.01	0.96	0.97	180.0	0.03	0.00	0.03	90.0
11.69	.....							
	0.01	0.96	0.98	180.0	0.03	0.00	0.03	90.0
	0.01	0.98	0.99	180.0	0.02	0.00	0.02	90.0
0.00	.....							

EXTREME FIBRE STRESSES IN LAP SPLICE
==========

ELEV	CONTACT.PRESSURE MAX	CONTACT.PRESSURE AZI	HOOP.STRESSES MAX	HOOP.STRESSES AZI	BENDING.STRESSES MAX	BENDING.STRESSES AZI
ft	ksi	deg	ksi	deg	ksi	deg
100.25	0.30	0.0	21.55	90.0	29.57	180.0
95.00	0.29	180.0	21.56	90.0	28.76	180.0
53.25	0.54	0.0	39.05	90.0	50.24	180.0
46.75	0.52	180.0	39.06	90.0	44.78	180.0

LOADS ONTO FOUNDATION(w.r.t. NORTH-EAST-DOWN coordinates)
==========

TOTAL AXIAL	SHEAR NORTH	SHEAR EAST	MOMENT NORTH	MOMENT EAST	TORSION
kip	kip	kip	ft-kip	ft-kip	ft-kip
47.56	-36.16	0.00	3940.84	0.00	0.00

LOADS ONTO FOUNDATION(w.r.t. wind direction)
==========

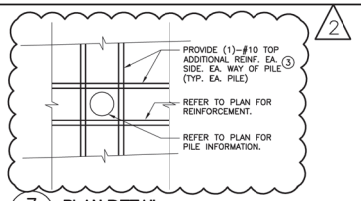
DOWN	SHEAR.w.r.t.WIND.DIR ALONG	SHEAR.w.r.t.WIND.DIR ACROSS	MOMENT.w.r.t.WIND.DIR ALONG	MOMENT.w.r.t.WIND.DIR ACROSS	TORSION
kip	kip	kip	ft-kip	ft-kip	ft-kip
47.56	36.16	0.00	-3940.84	0.00	0.00

LOADING CONDITION B ========== Iterations: Mast 5 ======

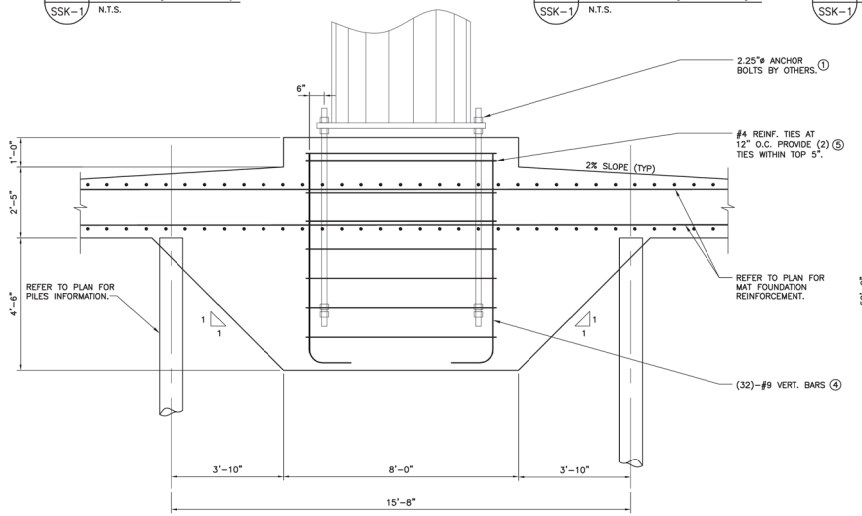
85 mph + 0.5" ice (Reduction Allowed)

5 SSK-1 **L BARS (ITEMS #4)** N.T.S.

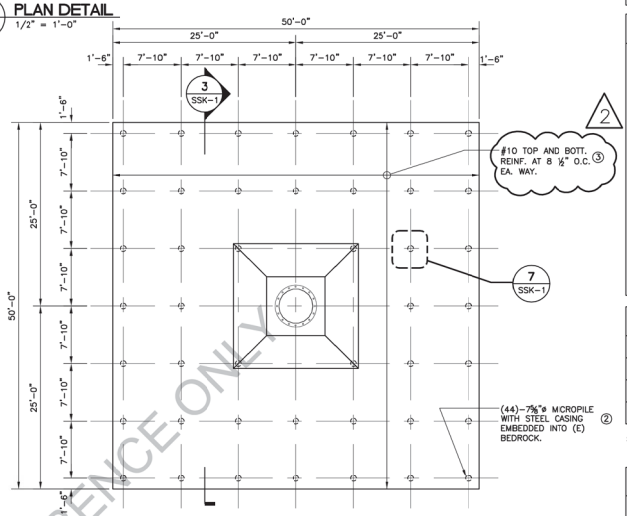
6 SSK-1 **HORZ. TIES (ITEMS #5)** N.T.S.



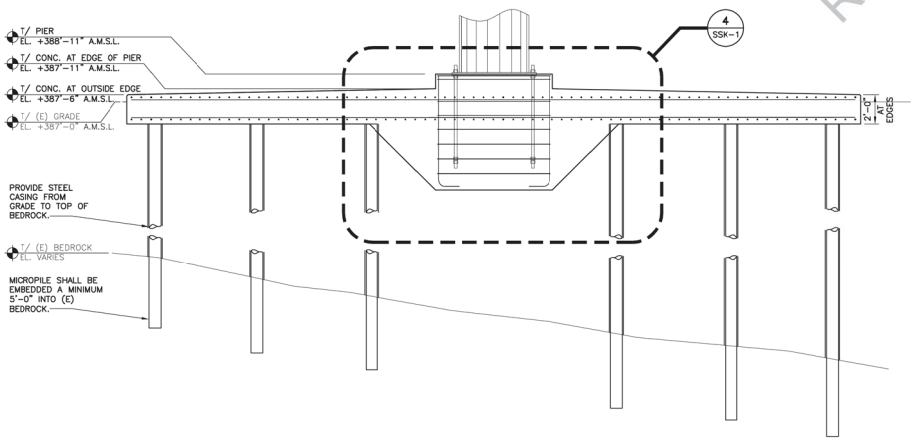
7 SSK-1 **PLAN DETAIL** 1/2" = 1'-0"



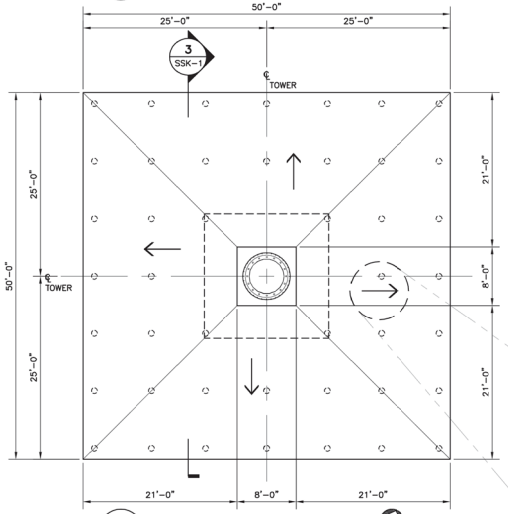
4 SSK-1 **MAT FOUNDATION REINF. PLAN** SCALE: 1/2" = 1'-0"



2 SSK-1 **MAT FOUNDATION REINF. PLAN** SCALE: 1/8" = 1'-0"



3 SSK-1 **MAT FOUNDATION REINF. PLAN** SCALE: 1/4" = 1'-0"



1 SSK-1 **MAT FOUNDATION PLAN** SCALE: 1/8" = 1'-0"

APPROXIMATE NORTH

DESIGN BASIS

GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.

1. DESIGN CRITERIA:
   - WIND SPEED OF 85 MPH (FASTEST MILE) AND 74 MPH (FASTEST MILE) CONCURRENT WITH 0.5" OF RADIAL ICE PER EIA/TIA 222 F-96.
   - WIND SPEED OF 100 MPH (3 SECOND GUST) AND 50 MPH (3 SECOND GUST) CONCURRENT WITH 0.75" OF RADIAL ICE PER TIA-222-G.
   - SEISMIC LOAD: PER ASCE 7-95 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES (DOES NOT GOVERN).

GENERAL NOTES

1. FOUNDATION DESIGN IS BASED ON TOWER STRUCTURE DESIGN CALCULATIONS PREPARED BY ENGINEERED SABRE INDUSTRIES, JOB No. 16-7133-SCB, FOR VERIZON WIRELESS, DATED JULY 13, 2016.
2. PILE DESIGN IS BASED ON GEOTECHNICAL REPORT PREPARED BY DESIGN EARTH TECHNOLOGIES, DATED FEBRUARY 19, 2016 WITH A MAXIMUM ALLOWABLE ROCK BEARING PRESSURE OF 10 TONS/SF (20KSF).
3. THE TOWER FOUNDATION MUST BEAR ON COMPETENT (SOUND) ROCK. BEDROCK BEARING SURFACE SHALL BE LEVEL, CLEANED OF ANY SOIL, LOOSE ROCK FRAGMENTS AND ANY UNSUITABLE BEARING MATERIAL. THE FINISHED BEARING SURFACE IS TO BE INSPECTED BY THE DESIGN ENGINEER FOR APPROVAL.
4. DRILLED HOLES SHALL BE CLEAR OF DEBRIS BEFORE GROUTING.
5. ALL WORK SHALL BE SUBJECT TO SPECIAL INSPECTION RETAINED BY THE OWNER/CONTRACTOR AS PER THE 2005 CONNECTICUT STATE BUILDING CODE WITH 2009 SUPPLEMENT.
6. MICROPILES SHALL BE DESIGNED AND INSTALLED BY A RESPONSIBLE PROFESSIONAL EXPERIENCED IN MICROPILE WORK.
7. AN INDEPENDENT QUALIFIED INPESTION/TESTING AGENCY SHALL BE RETAINED BY THE OWNER FOR THE PURPOSE OF INSPECTING, TESTING AND DOCUMENTING ALL FIELD WORK PREFORMED BY THE PILE CONTRACTOR. ALL INSPECTION REPORTS AND DOCUMENTS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD (CENTEK ENGINEERING INC.) FOR REVIEW.

FOUNDATION DESIGN REACTIONS

BASE REACTION TYPE	TIA/EIA-222-F	TIA-222-G
SHEAR (kips)	36.00	45.89
AXIAL (kips)	47.56	57.21
BASE MOMENT (ft-kips)	3940.84	4952.27

NOTE:
1. REACTIONS SHOWN TAKEN FROM TOWER DESIGN AS PREPARED BY ENGINEERED SABRE INDUSTRIES. REFER TO GENERAL NOTE #1.

MATERIAL LIST

ITEM	QTY.	LENGTH	DESCRIPTION
1	16	7'-0"	2.625"ø A615-GR.75 ANCHOR BOLTS w/ (4) H.H.N. AND ANCHOR PLATES (x2) AS PROVIDED BY OTHERS.
2	44	VARIES	7⅝"ø MICROPILES (TO RESIST 55 KIP MINIMUM AXIAL LOAD) OR ENGINEER APPROVED EQUAL. REFER TO GEOTECHNICAL REPORT (GENERAL NOTE #2) FOR PILE LENGTHS.
3	624 308	20'-0" 25'-0"	#10 (ASTM A615-GR.60) EA. WAY TOP & BOTT. PROVIDE ADDITIONAL BAR EA. SIDE OF PILE.
4	32	8'-6"	#9 (ASTM A615-GR.60) L SHAPE BAR. REFER TO 5/SSK-1.
5	10	21'-2"	#4 TIE (ASTM A615-GR.60). PROVIDE (2) TIES WITHIN TOP 5". REFER TO 6/SSK-1.

CONCRETE	(cu.yd)	217	4000psi TYPE II CEMENT

PILE LOAD CALCULATION

LOAD TYPE (PER PILE)	AXIAL FORCE (kips)
DEAD/EQUIPMENT LOAD	33.6
TOWER LOAD	10.0
DOWN DRAG LOAD	6.7
TOTAL REQUIRED LOAD	50.3
MINIMUM PILE CAPACITY	55.0

AS-BUILT PILE CAPACITY = 59.8 KIPS

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	06/03/17	MAM	LVP	REINFORCEMENT MODIFICATION
1	04/05/17	DMD	CFC	FOR CONSTRUCTION
0	08/03/16	LVP	CFC	FOR D&M APPROVAL

PROFESSIONAL ENGINEER SEAL

Cellco Partnership d.b.a. verizonwireless

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY
BETHEL W2
15 GREAT PASTURE ROAD
DANBURY, CT 06810

DATE: 07/28/16
SCALE: AS NOTED
JOB NO. 14216.000

MAT FOUNDATION AND PILE DETAILS

SSK-1

Sheet No. 1 of 2

NOTES:

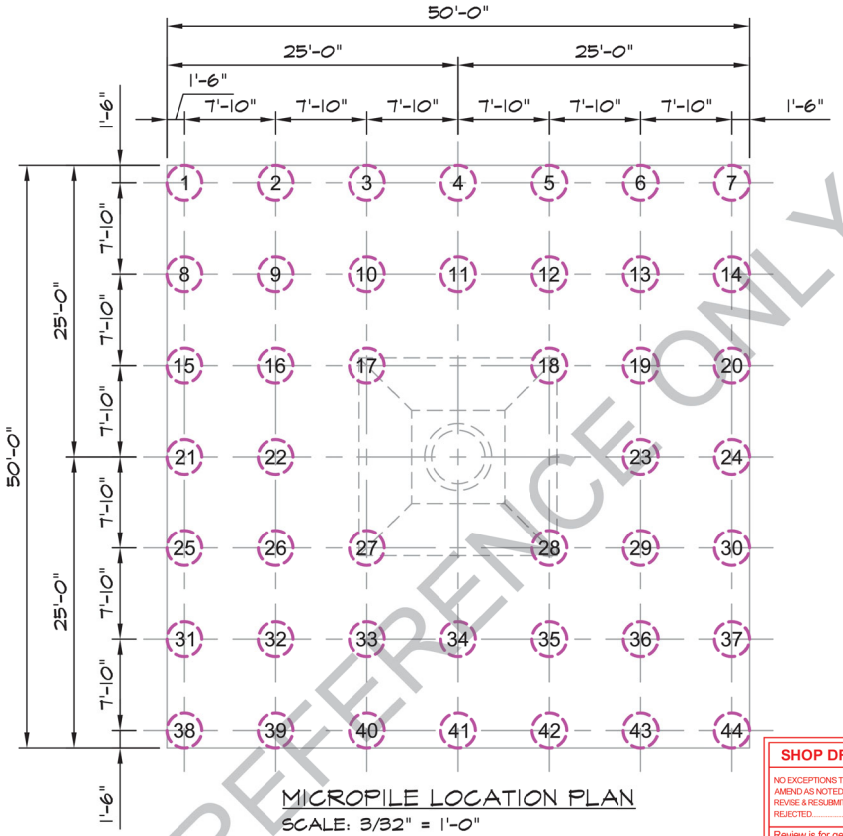
1. Micropiles shall be advanced through the fill soil and bonded into bedrock at an average maximum depth of 25.0' below working grade.

2. Micropiles shall consist of steel casing, with an outside diameter of 5.5" and a wall thickness of 0.361" as manufactured by PennDrill Manufacturing (Punxsutawney, PA) with N80 flush joint casing. The lead section of casing shall be fitted with carbide "J" teeth. Beyond that a 4.0" rock socket will be a drilled for the bond zone. The borehole will be filled with a minimum 4.0 ksi neat cement grout and a #10 (GR-75) thread bar. The thread bar will be centered using PVC centralizers. A minimum bond length of 5'-0" is required.

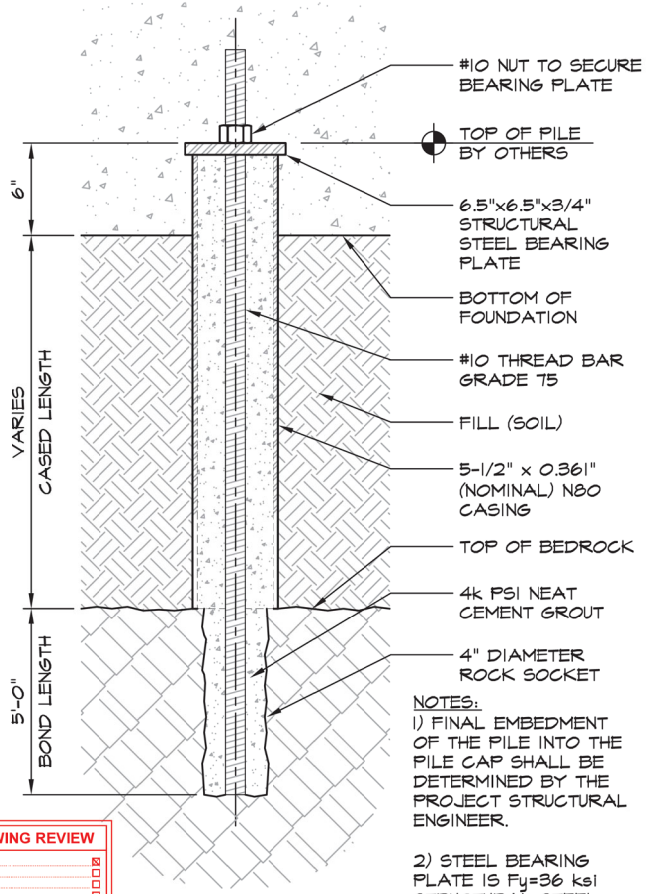
3. All Micropiles will be designed for 55 kips (allowable) axial compression.

4. Pile cap plates will be a minimum of 6.5" x 6.5" x .75" structural steel plates. Structural Engineer of Record to verify depth/height of bearing plates in pile cap.

5. Concrete pile caps and grade beams, including pile embedment into concrete, shall be sized and designed by the Structural Engineer of Record. We have schematically shown the pile caps. Pile layout will be the responsibility of others along with any as-built information. Minimum pile spacing shall be 3 times the pile diameter.



MICROPILE LOCATION PLAN
SCALE: 3/32" = 1'-0"



NOTES:
1) FINAL EMBEDMENT OF THE PILE INTO THE PILE CAP SHALL BE DETERMINED BY THE PROJECT STRUCTURAL ENGINEER.

2) STEEL BEARING PLATE IS Fy=36 ksi STRUCTURAL STEEL

MICROPILE DETAIL
SCALE: N.T.S.

SHOP DRAWING REVIEW
NO EXCEPTIONS TAKEN ☒
AMEND AS NOTED ☐
REVISE & RESUBMIT ☐
REJECTED ☐
Review is for general compliance with the Contract Documents. The contractor is responsible for construction methods, coordination of work, quantities and dimensions.
Centek Engineering, Inc.
Date 03/23/17 Checked By LVP
Centek Project # 17000.01

(#) Indicates Micropile location and designation as indicated on Sheet SSK-1, dated 8/3/16. Micropile layouts, survey locations, and any as-builts are the responsibility of others.

SCALE	DATE	SHEET	PLAN #
AS NOTED	3/21/17	1 of 1	
DRAWN BY	CHKD BY	APPD BY	DISK REF #
MJP	PJY	RMV	

HELICAL
Geotechnical Design/Build
639 GRANITE ST.
BRAINTREE, MA
02184
(781) 848-2110

MICROPILE LOCATION PLAN AND DETAILS

Bethel W2 Verizon
15 Great Pasture Road
Danbury, CT

SHEET NO.
MP-1.0

accomplished by rotary percussive methods, which can address obstructions (i.e. cobbles, boulders, wood/stumps, debris). It is estimated that these mini-piles would be about 30 to 40 feet deep. Static load tests would be required to verify load capacity. These rock-socketed mini-piles would achieve capacity through side friction in the rock socket and end bearing.

There are a few considerations when the mini-piles are designed by the structural engineer. The design load shall be distributed into the bedrock using the bond strength between the bedrock and the grout. This bond strength value can be estimated from the bedrock core samples at Ultimate Bond Strength of 150 psi. A minimum of 5' shall used as the uncased bond length into bedrock. Due to the relatively small cross sectional area of the mini-pile, load carrying capacity resulting from end bearing is generally considered to be negligible for mini-piles, the use of 10.0 tons/square foot net allowable bearing capacity could be used if end bearing is being considered. Corrosion of the mini-piles needs to be addressed in both the bonded and un-bonded zones. It is recommended in the un-bonded zone to have steel installation casing left in-place (from top of bedrock to within the upper horizontal foundation component). This produces a superior mini-pile that has a higher quality of installation. Mini-piles are very slender elements that can not resist lateral load effectively. The use of battered mini-piles is recommended for the lateral loads. The mini-piles shall not be designed to carry tensile or uplift loads. Because the fill material will continue to settle, the mini-pile design must address "negative" skin friction. Negative skin friction develops along the contact surface between pile and soil when the soil settles relative to the pile. The negative skin friction must be added into the dead load of the pile. A preliminary estimate of this negative skin friction load could be as much as 20 tons per pile.

At least one verification load test should be performed to confirm the ultimate bond stress. A minimum of one proof test should also be performed on one of the production pile.

Equipment Shelter

If the shelter is allowed to settle because of the deep fill material, a spread footing is considered appropriate, if minimal settlement is allowed for the shelter, a deep foundation with a mini-pile foundation system is to be used.

EARTHQUAKE DESIGN (SEISMIC)

Seismic design requirements for the State of Connecticut are based on the Connecticut State Building Code, which incorporates the Seismic design Category approach from the International Building Code. The seismic design Category determination is based on a few category factors. One such category is the "Site Classification (soil type)". From our test borings, we consider that the site subsurface conditions match the General Description of "Very Dense Soil and Soft Rock". The site classification is therefore "C".

The proposed deep foundation is to bear on bedrock. This bedrock will not liquefy during a seismic event and needs not be addressed in the foundation design.

MATERIALS TESTING, INC.

55 LAURA STREET • NEW HAVEN, CONNECTICUT 06512 • (203)468-5216
42 BOSTON POST ROAD • WILLIMANTIC, CONNECTICUT 06226 • (860)423-1972
materialstestinginc.com

COMPRESSION TESTS (MASONRY)

CLIENT: Centek Engineering
63-2 North Branford Road
Branford, CT 06405
Attn: Erik Armas

S-1001A

PROJECT: 17000.01 Bethel West 2

LOCATION: Pile #36

MATERIAL: Type II Portland Cement

DATE CAST: 04-18-17 **DATE RECEIVED:** 05-03-17

TEMPERATURE-AMBIENT: **MIX:**

SAMPLES CAST BY: Contractor **SAMPLING TIME:**

REQUIRED STRENGTH: 5000 PSI

SAMPLE TYPE:
- ☐ 3½" x 3½" x 7" GROUT - ASTM C1019
- ☐ 6" x 12" CYLINDERS - COARSE GROUT - ASTM C31
- ☐ 2" x 2" CUBES - MORTAR - ASTM C109 MODIFIED
- ☒ 2" x 2" CUBES - GROUT USED FOR SUPPORT - ASTM C1107
- ☐ OTHER:_____

SLUMP: _____

FLOW RATE: _____

SAMPLE NUMBER	AGE DAYS	DATE TESTED	LOAD LBS.	COMPRESSIVE STRENGTH- PSI
S-50746	21	05-09-17	31,660	7920
S-50747	28	05-16-17	32,510	8130
S-50748	28	05-16-17	28,840	7210

Materials Testing, Inc.

William J. Soucy

1cc: Client

sw

STATE OF CONNECTICUT
M. S. RAVI SHARMA
No. 28322
LICENSED PROFESSIONAL ENGINEER

5/22/17

MATERIALS TESTING, INC.

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42 BOSTON POST ROAD • WILLIMANTIC, CONNECTICUT 06226 • (860)423-1972
materialstestinginc.com

COMPRESSION TESTS (MASONRY)

CLIENT: Centek Engineering
63-2 North Branford Road
Branford, CT 06405
Attn: Erik Armas

S-1000A

PROJECT: 17000.01 Bethel West 2

LOCATION: Pile #3

MATERIAL: Type II Portland Cement

DATE CAST: 04-18-17 **DATE RECEIVED:** 05-03-17

TEMPERATURE-AMBIENT: **MIX:**

SAMPLES CAST BY: Contractor **SAMPLING TIME:**

REQUIRED STRENGTH: 5000 PSI

SAMPLE TYPE:
- ☐ 3½" x 3½" x 7" GROUT - ASTM C1019
- ☐ 6" x 12" CYLINDERS - COARSE GROUT - ASTM C31
- ☐ 2" x 2" CUBES - MORTAR - ASTM C109 MODIFIED
- ☒ 2" x 2" CUBES - GROUT USED FOR SUPPORT - ASTM C1107
- ☐ OTHER:_____

SLUMP: _____

FLOW RATE: _____

SAMPLE NUMBER	AGE DAYS	DATE TESTED	LOAD LBS.	COMPRESSIVE STRENGTH- PSI
S-50743	21	05-09-17	42,980	10,720
S-50744	28	05-16-17	39,580	9900
S-50745	28	05-16-17	45,380	11350

Materials Testing, Inc.

William J. Soucy

1cc: Client

SW

STATE OF CONNECTICUT
M.S. RAVI SHARMA
No. 28322
LICENSED PROFESSIONAL ENGINEER

5/24/17

MATERIALS TESTING, INC.

55 LAURA STREET • NEW HAVEN, CONNECTICUT 06512 • (203)468-5216
42 BOSTON POST ROAD • WILLIMANTIC, CONNECTICUT 06226 • (860)423-1972
materialstestinginc.com

COMPRESSION TESTS (MASONRY)

S-1002A

CLIENT: Centek Engineering
63-2 North Branford Road
Branford, CT 06405
Attn: Erik Armas

PROJECT: 17000.01 Bethel West 2

LOCATION: Pile #25

MATERIAL: Type II Portland Cement

DATE CAST: 04-18-17 **DATE RECEIVED:** 05-03-17

TEMPERATURE-AMBIENT: **MIX:**

SAMPLES CAST BY: Contractor **SAMPLING TIME:**

REQUIRED STRENGTH: 5000 PSI

SAMPLE TYPE:
- ☐ 3½" x 3½" x 7" GROUT - ASTM C1019
- ☐ 6" x 12" CYLINDERS - COARSE GROUT - ASTM C31
- ☐ 2" x 2" CUBES - MORTAR - ASTM C109 MODIFIED
- ☒ 2" x 2" CUBES - GROUT USED FOR SUPPORT - ASTM C1107
- ☐ OTHER:_____

SLUMP: _____

FLOW RATE: _____

SAMPLE NUMBER	AGE DAYS	DATE TESTED	LOAD LBS.	COMPRESSIVE STRENGTH- PSI
S-50749	21	05-09-17	28,840	7210
S-50750	28	05-16-17	30,750	7690
S-50751	28	05-16-17	30,690	7670

Materials Testing, Inc.

William J. Soucy

1cc: Client

sw

STATE OF CONNECTICUT
M. S. RAVI SHARMA
No. 28322
LICENSED
PROFESSIONAL ENGINEER

1810.3.2.6 Allowable stresses. The allowable stresses for materials used in deep foundation elements shall not exceed those specified in Table 1810.3.2.6.

❖ This section refers the code user to the table of allowable stresses in order to identify the correct values that apply to various types of deep foundations. Note that Section 1810.1.4 allows "special types of piles" using the allowable stresses for materials that are specified herein.

TABLE 1810.3.2.6. See below.

❖ This table provides a complete list of the relevant allowable stresses for deep foundation element materials including concrete, reinforcing steel and structural steel.

1810.3.2.7 Increased allowable compressive stress for cased cast-in-place elements. The allowable compressive stress in the concrete shall be permitted to be increased as specified in Table 1810.3.2.6 for those portions of permanently cased cast-in-place elements that satisfy all of the following conditions:

1. The design shall not use the casing to resist any portion of the axial load imposed.
2. The casing shall have a sealed tip and be mandrel driven.
3. The thickness of the casing shall not be less than manufacturer's standard gage No.14 (0.068 inch) (1.75 mm).
4. The casing shall be seamless or provided with seams of strength equal to the basic material and be of a configuration that will provide confinement to the cast-in-place concrete.
5. The ratio of steel yield strength (F_y) to specified compressive strength (f'_c) shall not be less than six.
6. The nominal diameter of the element shall not be greater than 16 inches (406 mm).

❖ For cased cast-in-place concrete elements formed by driving permanent steel casings, the allowable design compressive stress in Table 1810.3.2.6 is generally not to exceed $0.33f'_c$. When the permanent casing complies with the requirements of this section, the allowable concrete compressive stress may be increased to $0.40f'_c$. The basis for this increase in allowable concrete stress is the added strength given to the concrete by the confining action of the steel casing. The general formula for increased allowable stress caused by confinement is:

$$f_c 0.33 f'_c \left(\frac{1 + 7.5 t f_y}{D f'_c} \right)$$

where:

f_c = Allowable concrete stress.

f'_c = Specified concrete strength.

TABLE 1810.3.2.6
ALLOWABLE STRESSES FOR MATERIALS USED IN DEEP FOUNDATION ELEMENTS

MATERIAL TYPE AND CONDITION	MAXIMUM ALLOWABLE STRESS[a]
1. Concrete or grout in compression[b]	
Cast-in-place with a permanent casing in accordance with Section 1810.3.2.7	$0.4 f'_c$
Cast-in-place in a pipe, tube, other permanent casing or rock	$0.33 f'_c$
Cast-in-place without a permanent casing	$0.3 f'_c$
Precast nonprestressed	$0.33 f'_c$
Precast prestressed	$0.33 f'_c - 0.27 f_{pc}$
2. Nonprestressed reinforcement in compression	$0.4 f_y \le 30{,}000$ psi
3. Steel in compression	
Cores within concrete-filled pipes or tubes	$0.5 F_y \le 32{,}000$ psi
Pipes, tubes or H-piles, where justified in accordance with Section 1810.3.2.8	$0.5 F_y \le 32{,}000$ psi
Pipes or tubes for micropiles	$0.4 F_y \le 32{,}000$ psi
Other pipes, tubes or H-piles	$0.35 F_y \le 16{,}000$ psi
Helical piles	$0.6 F_y \le 0.5 F_u$
4. Nonprestressed reinforcement in tension	
Within micropiles	$0.6 f_y$
Other conditions	$0.5 f_y \le 24{,}000$ psi
5. Steel in tension	
Pipes, tubes or H-piles, where justified in accordance with Section 1810.3.2.8	$0.5 F_y \le 32{,}000$ psi
Other pipes, tubes or H-piles	$0.35 F_y \le 16{,}000$ psi
Helical piles	$0.6 F_y \le 0.5 F_u$
6. Timber	In accordance with the AWC NDS

a. f'_c is the specified compressive strength of the concrete or grout; f_{pc} is the compressive stress on the gross concrete section due to effective prestress forces only; f_y is the specified yield strength of reinforcement; F_y is the specified minimum yield stress of steel; F_u is the specified minimum tensile stress of structural steel.

b. The stresses specified apply to the gross cross-sectional area within the concrete surface. Where a temporary or permanent casing is used, the inside face of the casing shall be considered the concrete surface.

BU:	28493	Structure:	
WO:	Bethel West 2		
Order:	REV05	Rev:	H

Location

	Decimal Degrees		Deg	Min	Sec
Lat:	41.383000	+	41	22	58.80
Long:	-73.422200	-	73	25	19.92

Code and Site Parameters

Seismic Design Code:	TIA-222-H	
Site Soil:	C	Dense Soil/Soft Rock
Risk Category:	II	

USGS Seismic Reference			
	S_S:	0.2230	g
	S_1:	0.0560	g
	T_L:	6	s

Seismic Design Category Determination

Importance Factor, I_e:	1	
Acceleration-based site coefficient, F_a:	1.3000	
Velocity-based site coefficient, F_v:	1.5000	
Design spectral response acceleration short period, S_{DS}:	0.1933	g
Design spectral response acceleration 1 s period, S_{D1}:	0.0560	g
Seismic Design Category Based on S_{DS}:	B	
Seismic Design Category Based on S_{D1}:	A	
Seismic Design Category Based on S_1:	N/A	
Controlling Seismic Design Category:	B	

BU:	28493	Structure:	
WO:	Bethel West 2		
Order:	REV05	Rev:	H

Tower Details

Tower Type:	Tapered Monopole		
Height, h:	139	ft	
Effective Seismic Weight, W:	37.33	kips	
Amplification Factor, A_s:	1.0		2.7.8.1

Seismic Base Shear

Response Modification Factor, R:	1.5		
Discrete Appurtenance Weight in Top 1/3 of Structure, W_u:	11.562692	kips	
W_L:	25.76790771	kips	
E:	29000.0	ksi	
g:	386.088	in/s^2	
Average Moment of Inertia, I_{avg}:	10873.23494	in^4	
F_a:	0.336132657	hz	
Approximate Fundamental Period Monopole, T_a:	2.9750	s	2.7.7.1.3.3
Seismic Response Coefficient, C_s	0.1288		2.7.7.1.1
Seismic Response Coefficient Max 1, C_{smax}	0.0125		2.7.7.1.1
Seismic Response Coefficient Max 2, C_{smax}	N/A		2.7.7.1.1
Seismic Response Coefficient Min 1, C_{smin}	0.0300		2.7.7.1.1
Seismic Response Coefficient Min 2, C_{smin}	N/A		2.7.7.1.1
Controlling Seismic Response Coefficient, C_{sc}	0.0300		
Seismic Base Shear, V	1.120	kips	2.7.7.1.1

Vertical Distribution Factors

Period Related Exponent, k:	2.000	2.7.7.1.2
Sum of $w_i h_i^k$	303779.47	2.7.7.1.2

Tower Section Loads								
Section Number	**Length**	**Top Height**	**Mid Height, h_x**	**Section Weight, w_x**	**$w_x h_x^k$**	**C_{vx}**	**F_{xh}**	**F_{xv}**
1 - 1	10.00	139.00	134.00	0.7521	13504.40	0.0445	0.0498	0.0291
1 - 2	10.00	129.00	124.00	0.8117	12481.40	0.0411	0.0460	0.0314
2 - 1	4.00	119.00	117.00	0.3414	4673.47	0.0154	0.0172	0.0132
2 - 2	10.00	115.00	110.00	0.8953	10832.80	0.0357	0.0399	0.0346
2 - 3	10.00	105.00	100.00	0.9549	9549.35	0.0314	0.0352	0.0369
3 - 1	3.50	100.25	98.50	0.4151	4026.97	0.0133	0.0148	0.0160
3 - 2	10.00	96.75	91.75	1.2362	10406.50	0.0343	0.0384	0.0478
3 - 3	10.00	86.75	81.75	1.3108	8760.09	0.0288	0.0323	0.0507
3 - 4	10.00	76.75	71.75	1.3854	7131.96	0.0235	0.0263	0.0535
3 - 5	10.00	66.75	61.75	1.4599	5566.86	0.0183	0.0205	0.0564
3 - 6	10.00	56.75	51.75	1.5345	4109.55	0.0135	0.0152	0.0593
4 - 1	3.25	53.25	51.63	0.5898	1571.84	0.0052	0.0058	0.0228
4 - 2	10.00	50.00	45.00	1.8740	3794.83	0.0125	0.0140	0.0724
4 - 3	10.00	40.00	35.00	1.9635	2405.27	0.0079	0.0089	0.0759
4 - 4	10.00	30.00	25.00	2.0530	1283.11	0.0042	0.0047	0.0794
4 - 5	10.00	20.00	15.00	2.1425	482.06	0.0016	0.0018	0.0828
4 - 6	10.00	10.00	5.00	2.2320	55.80	0.0002	0.0002	0.0863
			Sum	21.9520	100636.27			

Discrete Loads						
Name	h_x	w_x	$w_x h_x^k$	C_{vx}	F_{xh}	F_{xv}
pole mounts Sabre C10-855-721C Platform w/Rail w/o Mount Pipe (SES)	139.00	2.2370	43221.08	0.1423	0.1593	0.0865
(3) cci TPA65R-BU6DA-K w/8' Mount Pipe	139.00	0.3460	6684.29	0.0220	0.0246	0.0134
(3) cci TPA65R-BU6DA-K w/8' Mount Pipe	139.00	0.3460	6684.29	0.0220	0.0246	0.0134
(3) cci TPA65R-BU6DA-K w/8' Mount Pipe	139.00	0.3460	6684.29	0.0220	0.0246	0.0134
tower mounts 8'x2 1/2" Pipe Mount	139.00	0.0463	895.41	0.0029	0.0033	0.0018
tower mounts 8'x2 1/2" Pipe Mount	139.00	0.0463	895.41	0.0029	0.0033	0.0018
tower mounts 8'x2 1/2" Pipe Mount	139.00	0.0463	895.41	0.0029	0.0033	0.0018
ericsson 4478 B14 RRU	139.00	0.0594	1147.67	0.0038	0.0042	0.0023
ericsson 4478 B14 RRU	139.00	0.0594	1147.67	0.0038	0.0042	0.0023
ericsson 4478 B14 RRU	139.00	0.0594	1147.67	0.0038	0.0042	0.0023
ericsson 8843 B2/B66A RRU	139.00	0.0720	1391.11	0.0046	0.0051	0.0028
ericsson 8843 B2/B66A RRU	139.00	0.0720	1391.11	0.0046	0.0051	0.0028
ericsson 8843 B2/B66A RRU	139.00	0.0720	1391.11	0.0046	0.0051	0.0028
ericsson 4415 B30 RRU	139.00	0.0460	888.77	0.0029	0.0033	0.0018
ericsson 4415 B30 RRU	139.00	0.0460	888.77	0.0029	0.0033	0.0018
ericsson 4415 B30 RRU	139.00	0.0460	888.77	0.0029	0.0033	0.0018
ericsson 4449 B5/B12 RRU	139.00	0.0710	1371.79	0.0045	0.0051	0.0027
ericsson 4449 B5/B12 RRU	139.00	0.0710	1371.79	0.0045	0.0051	0.0027
ericsson 4449 B5/B12 RRU	139.00	0.0710	1371.79	0.0045	0.0051	0.0027
raycap DC6-48-60-18-8F	139.00	0.0328	633.73	0.0021	0.0023	0.0013
raycap DC6-48-60-18-8F	139.00	0.0328	633.73	0.0021	0.0023	0.0013
raycap DC6-48-60-18-8F	139.00	0.0328	633.73	0.0021	0.0023	0.0013
(2) GPS	139.00	0.0300	579.63	0.0019	0.0021	0.0012
pole mounts Platform w/Rail	119.00	2.5000	35402.50	0.1165	0.1305	0.0966
tower mounts 8'x2 1/2" Pipe Mount	119.00	0.0463	656.28	0.0022	0.0024	0.0018
(2) commscope NHH-33B-R2B w/8' Mount Pipe	119.00	0.2822	3996.77	0.0132	0.0147	0.0109
(3) commscope NHH-33B-R2B w/8' Mount Pipe	119.00	0.4234	5995.16	0.0197	0.0221	0.0164
(3) commscope NHH-33B-R2B w/8' Mount Pipe	119.00	0.4234	5995.16	0.0197	0.0221	0.0164
samsung MT6407-77A w/8' Mount Pipe	119.00	0.1334	1889.36	0.0062	0.0070	0.0052
samsung MT6407-77A w/8' Mount Pipe	119.00	0.1334	1889.36	0.0062	0.0070	0.0052
samsung MT6407-77A w/8' Mount Pipe	119.00	0.1334	1889.36	0.0062	0.0070	0.0052
(4) ericsson RRUS A2 Module	119.00	0.0846	1198.59	0.0039	0.0044	0.0033
(4) ericsson RRUS A2 Module	119.00	0.0846	1198.59	0.0039	0.0044	0.0033
(4) ericsson RRUS A2 Module	119.00	0.0846	1198.59	0.0039	0.0044	0.0033
samsung B2/B66A RRH-BR049	119.00	0.0888	1257.21	0.0041	0.0046	0.0034
(2) samsung B2/B66A RRH-BR049	119.00	0.1776	2514.43	0.0083	0.0093	0.0069
samsung B2/B66A RRH-BR049	119.00	0.0888	1257.21	0.0041	0.0046	0.0034
samsung B5/B13 RRH BR04C	119.00	0.0703	995.94	0.0033	0.0037	0.0027
samsung B5/B13 RRH BR04C	119.00	0.0703	995.94	0.0033	0.0037	0.0027
(2) samsung B5/B13 RRH BR04C	119.00	0.1407	1991.89	0.0066	0.0073	0.0054
(4) miscl 10"x7"x2" TMA	119.00	0.0600	849.66	0.0028	0.0031	0.0023
(4) miscl 10"x7"x2" TMA	119.00	0.0600	849.66	0.0028	0.0031	0.0023
(4) miscl 10"x7"x2" TMA	119.00	0.0600	849.66	0.0028	0.0031	0.0023
OVP Junction Box	119.00	0.0320	453.15	0.0015	0.0017	0.0012
OVP Junction Box	119.00	0.0320	453.15	0.0015	0.0017	0.0012
OVP Junction Box	119.00	0.0320	453.15	0.0015	0.0017	0.0012
pole mounts Commscope MC-PK8-DSH Snub Nose Platform w/Rail w/o Mou	109.00	0.9839	11689.60	0.0385	0.0431	0.0380
jma MX08FRO665-21 w/8' Mount Pipe	109.00	0.1108	1316.65	0.0043	0.0049	0.0043
jma MX08FRO665-21 w/8' Mount Pipe	109.00	0.1108	1316.65	0.0043	0.0049	0.0043
jma MX08FRO665-21 w/8' Mount Pipe	109.00	0.1108	1316.65	0.0043	0.0049	0.0043
(2) tower mounts 8'x2 1/2" Pipe Mount	109.00	0.0927	1101.23	0.0036	0.0041	0.0036
(2) tower mounts 8'x2 1/2" Pipe Mount	109.00	0.0927	1101.23	0.0036	0.0041	0.0036
(2) tower mounts 8'x2 1/2" Pipe Mount	109.00	0.0927	1101.23	0.0036	0.0041	0.0036
fujitsu TA08025-B604	109.00	0.0640	760.38	0.0025	0.0028	0.0025
fujitsu TA08025-B604	109.00	0.0640	760.38	0.0025	0.0028	0.0025
fujitsu TA08025-B604	109.00	0.0640	760.38	0.0025	0.0028	0.0025
fujitsu TA08025-B605	109.00	0.0750	891.08	0.0029	0.0033	0.0029
fujitsu TA08025-B605	109.00	0.0750	891.08	0.0029	0.0033	0.0029
fujitsu TA08025-B605	109.00	0.0750	891.08	0.0029	0.0033	0.0029
raycap RDIDC-9181-PF-48	109.00	0.0219	259.60	0.0009	0.0010	0.0008
Sum		11.5627	181227.00			

Linear Loads								
Name	Start Height	End Height	h_x	w_x	$w_x h_x^k$	C_{vx}	F_{xh}	F_{xv}
(6) 7/8" DC Cable From 0 to 139	129.00	139.00	134.00	0.0354	635.64	0.0021	0.0023	0.0014
(6) 7/8" DC Cable From 0 to 139	119.00	129.00	124.00	0.0354	544.31	0.0018	0.0020	0.0014
(6) 7/8" DC Cable From 0 to 139	109.00	119.00	114.00	0.0354	460.06	0.0015	0.0017	0.0014
(6) 7/8" DC Cable From 0 to 139	99.00	109.00	104.00	0.0354	382.89	0.0013	0.0014	0.0014
(6) 7/8" DC Cable From 0 to 139	89.00	99.00	94.00	0.0354	312.79	0.0010	0.0012	0.0014
(6) 7/8" DC Cable From 0 to 139	79.00	89.00	84.00	0.0354	249.78	0.0008	0.0009	0.0014
(6) 7/8" DC Cable From 0 to 139	69.00	79.00	74.00	0.0354	193.85	0.0006	0.0007	0.0014
(6) 7/8" DC Cable From 0 to 139	59.00	69.00	64.00	0.0354	145.00	0.0005	0.0005	0.0014
(6) 7/8" DC Cable From 0 to 139	49.00	59.00	54.00	0.0354	103.23	0.0003	0.0004	0.0014
(6) 7/8" DC Cable From 0 to 139	39.00	49.00	44.00	0.0354	68.53	0.0002	0.0003	0.0014
(6) 7/8" DC Cable From 0 to 139	29.00	39.00	34.00	0.0354	40.92	0.0001	0.0002	0.0014
(6) 7/8" DC Cable From 0 to 139	19.00	29.00	24.00	0.0354	20.39	0.0001	0.0001	0.0014
(6) 7/8" DC Cable From 0 to 139	9.00	19.00	14.00	0.0354	6.94	0.0000	0.0000	0.0014
(6) 7/8" DC Cable From 0 to 139	0.00	9.00	4.50	0.0319	0.65	0.0000	0.0000	0.0012
(2) 3/8" Fiber From 0 to 139	129.00	139.00	134.00	0.0012	21.55	0.0001	0.0001	0.0000
(2) 3/8" Fiber From 0 to 139	119.00	129.00	124.00	0.0012	18.45	0.0001	0.0001	0.0000
(2) 3/8" Fiber From 0 to 139	109.00	119.00	114.00	0.0012	15.60	0.0001	0.0001	0.0000
(2) 3/8" Fiber From 0 to 139	99.00	109.00	104.00	0.0012	12.98	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	89.00	99.00	94.00	0.0012	10.60	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	79.00	89.00	84.00	0.0012	8.47	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	69.00	79.00	74.00	0.0012	6.57	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	59.00	69.00	64.00	0.0012	4.92	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	49.00	59.00	54.00	0.0012	3.50	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	39.00	49.00	44.00	0.0012	2.32	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	29.00	39.00	34.00	0.0012	1.39	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	19.00	29.00	24.00	0.0012	0.69	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	9.00	19.00	14.00	0.0012	0.24	0.0000	0.0000	0.0000
(2) 3/8" Fiber From 0 to 139	0.00	9.00	4.50	0.0011	0.02	0.0000	0.0000	0.0000
(2) general cable 1/2" Coax From 0 to 139	129.00	139.00	134.00	0.0032	57.46	0.0002	0.0002	0.0001
(2) general cable 1/2" Coax From 0 to 139	119.00	129.00	124.00	0.0032	49.20	0.0002	0.0002	0.0001
(2) general cable 1/2" Coax From 0 to 139	109.00	119.00	114.00	0.0032	41.59	0.0001	0.0002	0.0001
(2) general cable 1/2" Coax From 0 to 139	99.00	109.00	104.00	0.0032	34.61	0.0001	0.0001	0.0001
(2) general cable 1/2" Coax From 0 to 139	89.00	99.00	94.00	0.0032	28.28	0.0001	0.0001	0.0001
(2) general cable 1/2" Coax From 0 to 139	79.00	89.00	84.00	0.0032	22.58	0.0001	0.0001	0.0001
(2) general cable 1/2" Coax From 0 to 139	69.00	79.00	74.00	0.0032	17.52	0.0001	0.0001	0.0001
(2) general cable 1/2" Coax From 0 to 139	59.00	69.00	64.00	0.0032	13.11	0.0000	0.0000	0.0001
(2) general cable 1/2" Coax From 0 to 139	49.00	59.00	54.00	0.0032	9.33	0.0000	0.0000	0.0001
(2) general cable 1/2" Coax From 0 to 139	39.00	49.00	44.00	0.0032	6.20	0.0000	0.0000	0.0001
(2) general cable 1/2" Coax From 0 to 139	29.00	39.00	34.00	0.0032	3.70	0.0000	0.0000	0.0001
(2) general cable 1/2" Coax From 0 to 139	19.00	29.00	24.00	0.0032	1.84	0.0000	0.0000	0.0001
(2) general cable 1/2" Coax From 0 to 139	9.00	19.00	14.00	0.0032	0.63	0.0000	0.0000	0.0001
(2) general cable 1/2" Coax From 0 to 139	0.00	9.00	4.50	0.0029	0.06	0.0000	0.0000	0.0001
(12) general cable 1 5/8" Coax From 0 to 139	129.00	139.00	134.00	0.1248	2240.91	0.0074	0.0083	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	119.00	129.00	124.00	0.1248	1918.92	0.0063	0.0071	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	109.00	119.00	114.00	0.1248	1621.90	0.0053	0.0060	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	99.00	109.00	104.00	0.1248	1349.84	0.0044	0.0050	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	89.00	99.00	94.00	0.1248	1102.73	0.0036	0.0041	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	79.00	89.00	84.00	0.1248	880.59	0.0029	0.0032	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	69.00	79.00	74.00	0.1248	683.40	0.0022	0.0025	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	59.00	69.00	64.00	0.1248	511.18	0.0017	0.0019	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	49.00	59.00	54.00	0.1248	363.92	0.0012	0.0013	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	39.00	49.00	44.00	0.1248	241.61	0.0008	0.0009	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	29.00	39.00	34.00	0.1248	144.27	0.0005	0.0005	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	19.00	29.00	24.00	0.1248	71.88	0.0002	0.0003	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	9.00	19.00	14.00	0.1248	24.46	0.0001	0.0001	0.0048
(12) general cable 1 5/8" Coax From 0 to 139	0.00	9.00	4.50	0.1123	2.27	0.0000	0.0000	0.0043
(3) Hybrid From 0 to 119	109.00	119.00	114.00	0.0534	693.99	0.0023	0.0026	0.0021
(3) Hybrid From 0 to 119	99.00	109.00	104.00	0.0534	577.57	0.0019	0.0021	0.0021
(3) Hybrid From 0 to 119	89.00	99.00	94.00	0.0534	471.84	0.0016	0.0017	0.0021
(3) Hybrid From 0 to 119	79.00	89.00	84.00	0.0534	376.79	0.0012	0.0014	0.0021
(3) Hybrid From 0 to 119	69.00	79.00	74.00	0.0534	292.42	0.0010	0.0011	0.0021
(3) Hybrid From 0 to 119	59.00	69.00	64.00	0.0534	218.73	0.0007	0.0008	0.0021
(3) Hybrid From 0 to 119	49.00	59.00	54.00	0.0534	155.71	0.0005	0.0006	0.0021
(3) Hybrid From 0 to 119	39.00	49.00	44.00	0.0534	103.38	0.0003	0.0004	0.0021
(3) Hybrid From 0 to 119	29.00	39.00	34.00	0.0534	61.73	0.0002	0.0002	0.0021
(3) Hybrid From 0 to 119	19.00	29.00	24.00	0.0534	30.76	0.0001	0.0001	0.0021
(3) Hybrid From 0 to 119	9.00	19.00	14.00	0.0534	10.47	0.0000	0.0000	0.0021
(3) Hybrid From 0 to 119	0.00	9.00	4.50	0.0481	0.97	0.0000	0.0000	0.0019
(3) 51.2mm Hybrid Cable From 0 to 119	109.00	119.00	114.00	0.0750	974.70	0.0032	0.0036	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	99.00	109.00	104.00	0.0750	811.20	0.0027	0.0030	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	89.00	99.00	94.00	0.0750	662.70	0.0022	0.0024	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	79.00	89.00	84.00	0.0750	529.20	0.0017	0.0020	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	69.00	79.00	74.00	0.0750	410.70	0.0014	0.0015	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	59.00	69.00	64.00	0.0750	307.20	0.0010	0.0011	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	49.00	59.00	54.00	0.0750	218.70	0.0007	0.0008	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	39.00	49.00	44.00	0.0750	145.20	0.0005	0.0005	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	29.00	39.00	34.00	0.0750	86.70	0.0003	0.0003	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	19.00	29.00	24.00	0.0750	43.20	0.0001	0.0002	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	9.00	19.00	14.00	0.0750	14.70	0.0000	0.0001	0.0029
(3) 51.2mm Hybrid Cable From 0 to 119	0.00	9.00	4.50	0.0675	1.37	0.0000	0.0000	0.0026
			Sum	3.8159	21916.20			