Robinson+Cole

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Also admitted in Massachusetts
and New York

April 4, 2023

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-081-220914 – Cellco Partnership d/b/a Verizon Wireless – Interstate 84 and South Street, Middlebury, Connecticut**

Dear Attorney Bachman:

Pursuant to Condition No. 1 of the Council's approval of the above referenced filing, enclosed is a revised Structural Analysis Report, prepared by Centek Engineering, referencing the recently revised Connecticut State Building Code, effective October 1, 2022.

The updated structural report passes without the need for modifications previously described in the July 2, 2021 AECOM Structural Analysis submitted with Cellco's September 13, 2022 exempt modification filing. The requirement imposed by Condition No. 2 of the Council's approval is therefore no longer necessary. For the same reason, it is no longer necessary for Cellco to provide a certified letter by as required under Condition No. 3 of the Council's approval.

Please note, Cellco also intends to install different model remote radio heads ("RRH") because the approved model RRH is no longer available. The specification sheet for the new RRH model is attached.

Please contact me if you have any questions.

Sincerely,

Kenneth C. Baldwin

Attachments

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

160' Existing Lattice Tower

Proposed Verizon
Antenna Upgrade

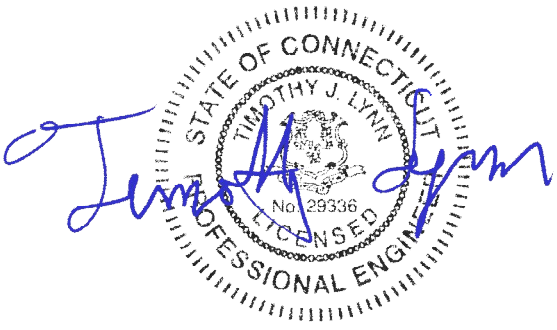
CSP Tower Ref: #20

South Street/I-84
Middlebury, CT

CENTEK Project No. 23032.02

Date: April 3, 2023

Max Stress Ratio = 77%



Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon 0n the existing lattice tower located in Middlebury, Connecticut.

The host tower is a 160-ft, three legged, lattice tower originally designed and manufactured by Stainless, Inc. project no. 358807 dated December 14, 1993. The tower geometry, structure member sizes and foundation information were taken from a previous structural analysis report prepared by AECOM job no. 60656990 / 60657751 dated July 2, 2021. The tower has been previously reinforced multiple times.

Antenna and appurtenance inventory was taken from the aforementioned structural analysis and a information provided by Verizon.

The tower consists of seven (7) vertical sections consisting of steel pipe legs and steel angle lateral bracing. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 10.2-ft at the top and 23-ft at the bottom.

Antenna and Appurtenance Summary

The existing and proposed loads considered in the analysis consist of the following:

- Tower:
  Antenna: One (1) lightning rod pipe mounted to the top of the tower.
- CSP (Existing):
  Antenna: Four (4) DdSpectra DS7C09P36D-D whips and one (1) bird TTA mounted one two (2) 12-ft V-frames with an elevation of 160-ft AGL.
  Cables: Seven (7) 1-5/8”∅ and one (1) 1/2”∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- FBI (Existing):
  Antenna: One (1) 20-ft dipole leg mounted with an elevation of 158-ft AGL.
  Cables: One (1) 7/8”∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- ATF (Existing):
  Antenna: One (1) 20-ft dipole mounted on one (1) 10-ft frame with an elevation of 155-ft AGL.
  Cables: One (1) 7/8”∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) TTA leg mounted with an elevation of 155-ft AGL.
  Cables: Two (2) 1-5/8”∅ and one (1) 1/2”∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- Norwich Public Safety (Existing):
  Antenna: One (1) HPD2-4.7 microwave dish pipe mounted with an elevation of 150-ft AGL.
  Cables: Two (2) 7/8”∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- AT&T (Existing/Reserved):
  Antenna: Three (3) Powerwave 7770 panel antennas, three (3) CCI DMP65R-BU8D panel antennas, three (3) CCI OPA65R-BU8D panel antennas, two (2) CCI TPA-65R-LCUUUU-H8panel antennas, one (1) Quintel QS66512 panel antenna, three (3) Ericsson RRUS-12 remote radio heads, three (3) 4449 remote radio heads, three (3) RRUS-32 remote radio heads, three (3) 4478 remote radio heads and three (3) surge arrestors mounted on three (3) 14-ft V-Frames with a RAD center elevation of +/- 140-ft AGL.
  Coax Cable: Six (6) 1-5/8" ∅ cables, three (3) fiber trunks and six (6) DC trunks running on a leg/face of the existing tower as specified in Section 3 of this report
- T-MOBILE (EXISTING):
  Antennas: Three (3) EMS RR90-17 panel antennas, three (3) Andrew LNX-6515DS panel antennas and three (3) Ericsson 4416 B25 remote radio units mounted on three (3) dual mounts with a RAD center elevation of +/- 125-ft AGL.
  Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) fiber cables routed along the exterior of the tower
- DOT (Existing):
  Antenna: One (1) Celwave PD1142 Whip mounted on a 6-ft standoff with an elevation of 124-ft AGL.
  Cables: One (1) 7/8"∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: Two (2) 6-ft microwave dishes pipe mounted with an elevation of 110-ft AGL.
  Cables: Two (2) EW63 cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- SPRINT (EXISTING):
  Antennas: Three (3) RFS APXVSPP18-C panel antennas, three (3) Andrew DT465B-2XR panel antennas, six (6) 800mhz remote radio units, three (3) 1900mhz remote radio units and three (3) 2500mhz remote radio units pipe mounted with a RAD center elevation of +/- 97-ft AGL.
  Cables: Four (4) fiber cables routed along the exterior of the tower
- CSP (Existing):
  Antenna: One (1) Celwave PD10054 antenna pipe mounted with an elevation of 85-ft AGL.
  Cables: One (1) 7/8"∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) 6-ft yagi antenna leg mounted with an elevation of 21-ft AGL.
  Cables: One (1) 1/2"∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Final Configuration):**
  Antennas: Four (4) JMA MX06FRO660 panel antennas, two (2) Samsung MT6407-77A panel antennas, two (2) Samsung RF4439d-25A (B2/B66A) RRHs, two (2) Samsung RF4440d-13A (B5/B13) RRHs and one (1) main distribution box mounted on two (2) 5-ft T-Arms with a RAD center elevation of +/- 77.5-ft AGL.
  Cables: One (1) hybrid cable routed along the exterior of the tower

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables should be routed as specified in section 3 of this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-H entitled "Structural Standard for Antenna Support Structures, Antennas and Small Wind Turbine Support Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-H Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.0" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 130 mph (Risk Cat III) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix P of the 2022 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*
	Load Case 3; 90 mph wind speed w/ 0.5" radial ice plus gravity load – used in calculation of tower twist and sway.	*[TIA-222-F used for calculation of tower twist and sway per the requirements of the CSP]*

[1] The 2021 International Building Code as amended by the 2022 Connecticut State Building Code (CSBC).

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower.

- Calculated stresses **were found to be within allowable limits**.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	37.5' - 50.0'	69.3%	**PASS**
Diagonal (T4)	75.0' – 100.0'	66.3%	**PASS**
Horizontal (T10)	0.0' - 25.0'	51.4%	**PASS**

- The tower combined deflection **was found to be within allowable limits**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.4983	n/a	**n/a**
Twist	0.1953	n/a	**n/a**
Combined	0.6936	0.75	**PASS**

TIA-222-F standard used for calculation of tower twist and sway per the requirements of the CSP.

Foundation and Anchors

The existing foundation consists of a (3) 3.5-ft diameter x 3.75-ft long reinforced concrete piers supported on a 34-ft square x 2.25-ft thick mat. The base of the tower is connected to the foundation by means of (6) 1.75"∅ anchor bolts per leg embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case were used in the verification of the foundation and anchor bolts:

Load Effect	Proposed Tower Reactions
Leg Shear	41 kips
Leg Compression	342 kips
Leg Tension	288 kips
Base Moment	6,426 ft-kips
Base Shear	74 kips

- The anchor bolts **were found** to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Compression and Shear	77%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	(percentage of capacity)	Result
Reinforced Concrete Pad and Piers	Overturning	50%	**PASS**
	Bearing	28%	**PASS**

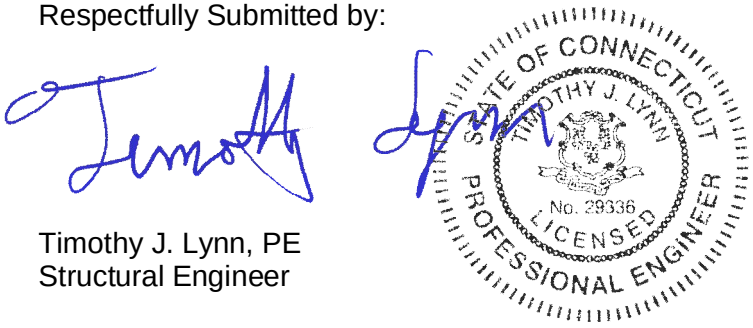
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. 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 are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. 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. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

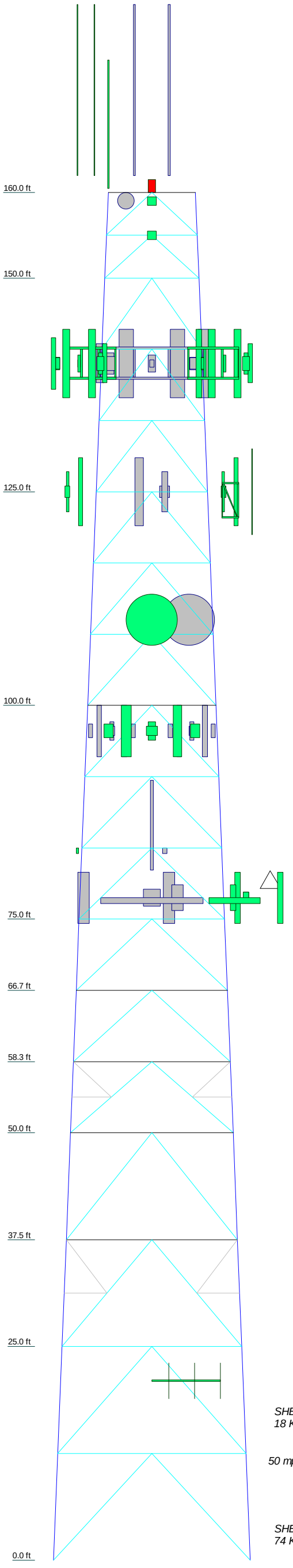
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISA Tower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-H standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Legs	P5x0.25			P5x0.3 w/ (3) 1.5x5/8 PL		P5x0.4 w/ (3) 1.5x5/8 PL	P5x.400	P6.875x.400		P6.875x0.5 w/ (3) 2x5/8 PL
Leg Grade	A500-50							A514-60		A500-50
Diagonals	2L2 1/2x2x3/16			2L3x2 1/2x1/4	2L3x2 1/2x5/16x3/8		2L3x3x5/16	2L3 1/2x3x3/8	2L3 1/2x3 1/2x5/16	2L4x3x3/8
Diagonal Grade			A36		A529-50		A36			A529-50
Top Girts	L3x3x1/4			L3x3x1/4	N.A.		L3x3x1/2	L4x4x1/4	L4x4x5/16	N.A.
Horizontals	L3x3x1/4	L2 1/2x2 1/2x3/16	L3x3x5/16	L3x3x1/2			N.A.			L4x4x1/2
Red. Horizontals			N.A.	N.A.		L2x2x5/16	N.A.	N.A.	L2x2x5/16	N.A.
Red. Diagonals		N.A.	N.A.	L2 1/2x2x3/16		L2x2x5/16			L2x2x5/16	N.A.
Inner Bracing	N.A.									L2 1/2x2 1/2x3/16
Face Width (ft)	10.2	11	13	15	17	17.6667	18.3333	19	20	21
# Panels @ (ft)	2 @ 5	24		12 @ 8.33333						4 @ 12.5
Weight (K)	1.2		3.9	5.1	2.1	2.2	2.3	3.1	3.4	9.0
	34.6									



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
15' Lighting Rod	160	RR90-17 (T-Mobile)	125
Flash Beacon Lighting	160	RR90-17 (T-Mobile)	125
DS7C09P36D-D (CSP)	160	RR90-17 (T-Mobile)	125
DS7C09P36D-D (CSP)	160	LNX-6515DS (T-Mobile)	125
DS7C09P36D-D (CSP)	160	LNX-6515DS (T-Mobile)	125
DS7C09P36D-D (CSP)	160	LNX-6515DS (T-Mobile)	125
Commscope SFG23HD-12-496 (CSP)	160	4415 B25 (T-Mobile)	125
Commscope SFG23HD-12-496 (CSP)	160	4415 B25 (T-Mobile)	125
TX/RX 432E-83I-01T	159	4415 B25 (T-Mobile)	125
HPD2-4.7	159	SitePro Dual Antenna Mount R5 (T-Mobile)	125
DB304-A	158	SitePro Dual Antenna Mount R5 (T-Mobile)	125
DB228-A	155	SitePro Dual Antenna Mount R5 (T-Mobile)	125
Pirod 10' PCS Frame (1)	155	Pirod 6' Side Mount Standoff (1)	124
TX/RX 432E-83I-01T	155	10' x 2" Dia Omni	124
7770.00 (ATI)	140	6' Dish Ice Shield	115
DMP65R-BU8DA (ATI)	140	6' Dish Ice Shield	115
OPA65R-BU8D (ATI)	140	Andrew 6' w/Radome	110
TPA-65R-LCUUUU-H8 (ATI)	140	Andrew 6' w/Radome	110
7770.00 (ATI)	140	APXVSPP18-C-A20 (Sprint)	97
DMP65R-BU8DA (ATI)	140	APXVSPP18-C-A20 (Sprint)	97
OPA65R-BU8D (ATI)	140	APXVSPP18-C-A20 (Sprint)	97
TPA-65R-LCUUUU-H8 (ATI)	140	DT465B-2XR (Sprint)	97
7770.00 (ATI)	140	DT465B-2XR (Sprint)	97
DMP65R-BU8DA (ATI)	140	DT465B-2XR (Sprint)	97
OPA65R-BU8D (ATI)	140	(2) FD-RRH 2x50 800 (Sprint)	97
QS66512 (ATI)	140	(2) FD-RRH 2x50 800 (Sprint)	97
TT19-08BP111-001 TMA (ATI)	140	(2) FD-RRH 2x50 800 (Sprint)	97
TT19-08BP111-001 TMA (ATI)	140	FD-RRH 4x40 1900 (Sprint)	97
TT19-08BP111-001 TMA (ATI)	140	FD-RRH 4x40 1900 (Sprint)	97
(2) LGP21401 TMA (ATI)	140	FD-RRH 4x40 1900 (Sprint)	97
(2) LGP21401 TMA (ATI)	140	TD-RRH 4x20 2500 (Sprint)	97
(2) LGP21401 TMA (ATI)	140	TD-RRH 4x20 2500 (Sprint)	97
RRUS-32 (ATI)	140	TD-RRH 4x20 2500 (Sprint)	97
RRUS-12 (ATI)	140	10'6"x4" Pipe Mount	85
4449 B5/B12 (ATI)	140	PD10054	85
4478 B14 (ATI)	140	Beacon	83
RRUS-32 (ATI)	140	Beacon	83
RRUS-12 (ATI)	140	(2) MX06FRO660 (Verizon)	77.5
4449 B5/B12 (ATI)	140	MT6407-77A (Verizon)	77.5
4478 B14 (ATI)	140	RF4439d-25A (B2/B66A RRH) (Verizon)	77.5
RRUS-32 (ATI)	140	RF4440d-13A (B5/B13 RRH) (Verizon)	77.5
RRUS-12 (ATI)	140	RF4439d-25A (B2/B66A RRH) (Verizon)	77.5
4449 B5/B12 (ATI)	140	RF4440d-13A (B5/B13 RRH) (Verizon)	77.5
4478 B14 (ATI)	140	DB-T1-6Z-8AB-0Z (Verizon)	77.5
DC6-48-60-18-8F Surge Arrestor (ATI)	140	6-ft T-Frame (Verizon)	77.5
DC6-48-60-18-8F Surge Arrestor (ATI)	140	6-ft T-Frame (Verizon)	77.5
DC6-48-60-18-8F Surge Arrestor (ATI)	140	(2) MX06FRO660 (Verizon)	77.5
14' V-Boom (ATI)	140	MT6407-77A (Verizon)	77.5
14' V-Boom (ATI)	140	6' Yagi	21
14' V-Boom (ATI)	140		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A529-50	50 ksi	65 ksi
A36	36 ksi	58 ksi	A514-60	60 ksi	80 ksi

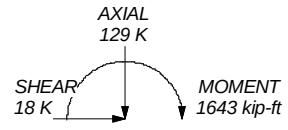
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 69.3%

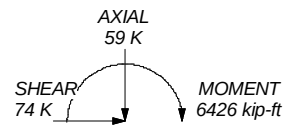
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 342 K
SHEAR: 41 K

UPLIFT: -288 K
SHEAR: 36 K



TORQUE 28 kip-ft
50 mph WIND - 1.0000 in ICE



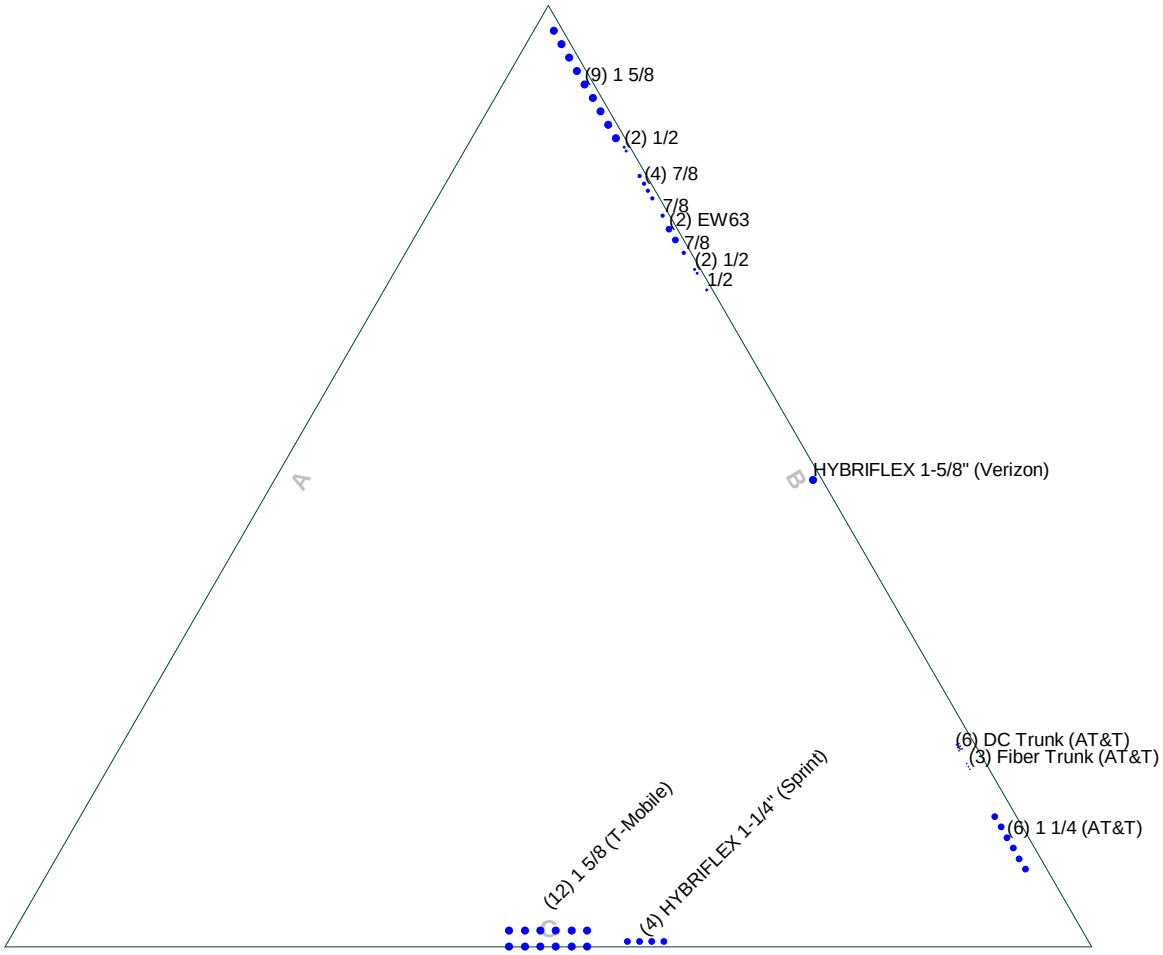
TORQUE 65 kip-ft
REACTIONS - 130 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 23032.02 - Middlebury I84		
Project: 160-ft Lattice Tower #20 Middlebury		
Client: Verizon	Drawn by: TJL	App'd:
Code: TIA-222-H	Date: 04/03/23	Scale: NTS
Path:		Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face



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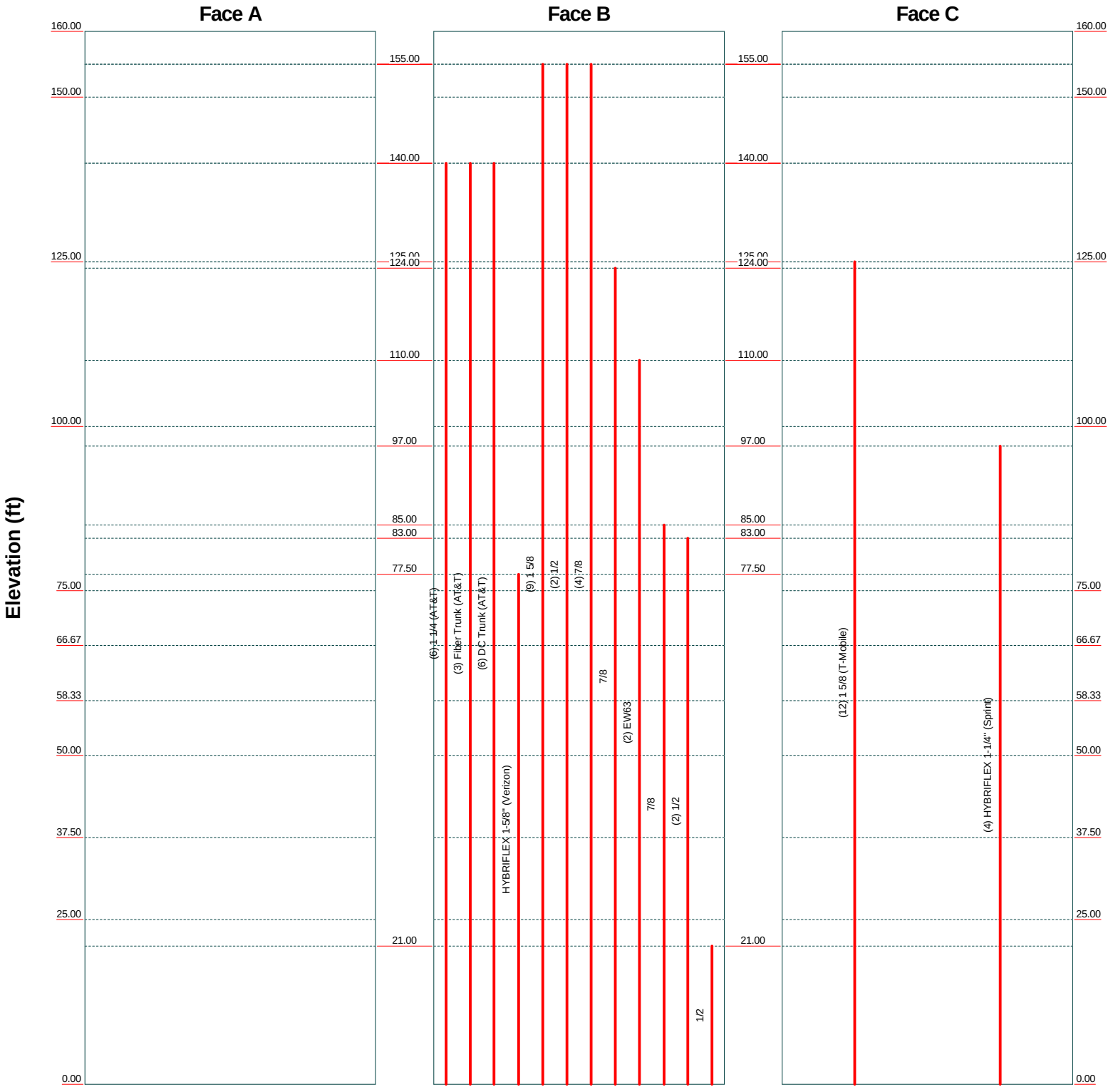
Project:	***160-ft Lattice Tower #20 Middlebury***		
Client: Verizon		Drawn by: TJL	App'd:
Code: TIA-222-H		Date: 03/31/23	Scale: NTS
Path:			Dwg No. E-7

Feed Line Distribution Chart
0' - 160'

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



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Job: 23032.02 - Middlebury I84			
Project: 160-ft Lattice Tower #20 Middlebury			
Client: Verizon	Drawn by: TJL	App'd:	
Code: TIA-222-H	Date: 03/31/23	Scale: NTS	
Path:		Dwg No. E-7	

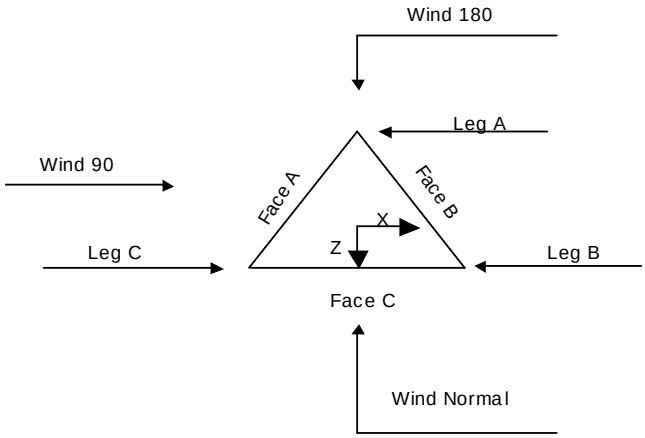
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 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 10.20 ft at the top and 23.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower base elevation above sea level: 0.00 ft.
Basic wind speed of 130 mph.
Risk Category III.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in 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	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	160.00-150.00			10.20	1	10.00
T2	150.00-125.00			11.00	1	25.00
T3	125.00-100.00			13.00	1	25.00
T4	100.00-75.00			15.00	1	25.00
T5	75.00-66.67			17.00	1	8.33
T6	66.67-58.33			17.67	1	8.33
T7	58.33-50.00			18.33	1	8.33
T8	50.00-37.50			19.00	1	12.50
T9	37.50-25.00			20.00	1	12.50
T10	25.00-0.00			21.00	1	25.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	160.00-150.00	5.00	K Brace Down	No	Yes	0.0000	0.0000
T2	150.00-125.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T3	125.00-100.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T4	100.00-75.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T5	75.00-66.67	8.33	K Brace Down	No	Yes	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
T6	66.67-58.33	8.33	K Brace Down	No	Yes	0.0000	0.0000
T7	58.33-50.00	8.33	K1 Down	No	Yes	0.0000	0.0000
T8	50.00-37.50	12.50	K Brace Down	No	Yes	0.0000	0.0000
T9	37.50-25.00	12.50	K1 Down	No	Yes	0.0000	0.0000
T10	25.00-0.00	12.50	K Brace Down	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 160.00-150.00	Pipe	P5x0.25	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T2 150.00-125.00	Pipe	P5x0.25	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T3 125.00-100.00	Pipe	P5x0.25	A500-50 (50 ksi)	Double Angle	2L2 1/2x2 1/2x5/16	A36 (36 ksi)
T4 100.00-75.00	Arbitrary Shape	P5x0.3 w/ (3) 1.5x5/8 PL	A500-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T5 75.00-66.67	Arbitrary Shape	P5x0.4 w/ (3) 1.5x5/8 PL	A500-50 (50 ksi)	Double Angle	2L3x2 1/2x5/16x3/8	A529-50 (50 ksi)
T6 66.67-58.33	Arbitrary Shape	P5x0.4 w/ (3) 1.5x5/8 PL	A500-50 (50 ksi)	Double Angle	2L3x2 1/2x5/16x3/8	A529-50 (50 ksi)
T7 58.33-50.00	Pipe	P5x.400	A514-60 (60 ksi)	Double Angle	2L3x3x5/16	A36 (36 ksi)
T8 50.00-37.50	Pipe	P6.875x.400	A514-60 (60 ksi)	Double Angle	2L3 1/2x3x3/8	A36 (36 ksi)
T9 37.50-25.00	Pipe	P6.875x.400	A514-60 (60 ksi)	Double Angle	2L3 1/2x3 1/2x5/16	A529-50 (50 ksi)
T10 25.00-0.00	Arbitrary Shape	P6.875x0.5 w/ (3) 2x5/8 PL	A500-50 (50 ksi)	Double Angle	2L4x3x3/8	A529-50 (50 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 160.00-150.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T4 100.00-75.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T6 66.67-58.33	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T7 58.33-50.00	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T8 50.00-37.50	Single Angle	L4x4x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T9 37.50-25.00	Single Angle	L4x4x5/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 160.00-150.00	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T2 150.00-125.00	None	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 125.00-100.00	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T4 100.00-75.00	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T5 75.00-66.67	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T6 66.67-58.33	None	Single Angle		A36 (36 ksi)	Single Angle	L1x1x1/8	A36 (36 ksi)
T7 58.33-50.00	None	Single Angle		A36 (36 ksi)	Single Angle	L1x1x1/8	A36 (36 ksi)
T8 50.00-37.50	None	Single Angle		A36 (36 ksi)	Single Angle	L1x1x1/8	A36 (36 ksi)
T9 37.50-25.00	None	Single Angle		A36 (36 ksi)	Single Angle	L1x1x1/8	A36 (36 ksi)
T10 25.00-0.00	None	Single Angle		A36 (36 ksi)	Single Angle	L4x4x1/2	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
T3 125.00-100.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T4 100.00-75.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T5 75.00-66.67	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 66.67-58.33	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T7 58.33-50.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T8 50.00-37.50	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 37.50-25.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T10 25.00-0.00	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T7	A36	Horizontal (1)	Single Angle	L2x2x5/16	1
58.33-50.00	(36 ksi)	Diagonal (1)	Single Angle	L2x2x5/16	1
T9	A36	Horizontal (1)	Single Angle	L2x2x5/16	1
37.50-25.00	(36 ksi)	Diagonal (1)	Single Angle	L2x2x5/16	1

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	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
160.00-150.00			(36 ksi)						
T2	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
150.00-125.00			(36 ksi)						
T3	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
125.00-100.00			(36 ksi)						
T4	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
100.00-75.00			(36 ksi)						
T5 75.00-66.67	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
			(36 ksi)						
T6 66.67-58.33	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
			(36 ksi)						
T7 58.33-50.00	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
			(36 ksi)						
T8 50.00-37.50	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
			(36 ksi)						
T9 37.50-25.00	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
			(36 ksi)						
T10 25.00-0.00	0.00	0.0000	A36	1	1	1.02	24.0000	24.0000	36.0000
			(36 ksi)						

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
160.00-150.00				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
150.00-125.00				1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1
125.00-100.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
100.00-75.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
75.00-66.67				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
66.67-58.33				1	1	1	1	1	1	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
T7	Yes	No	1	1	1	1	1	1	1	1
58.33-50.00				1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1
50.00-37.50				1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1
37.50-25.00				1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1
25.00-0.00				1	1	1	1	1	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		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
160.00-150.00														
T2	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
150.00-125.00														
T3	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
125.00-100.00														
T4	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
100.00-75.00														
T5 75.00-66.67	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
T6 66.67-58.33	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
T7 58.33-50.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
T8 50.00-37.50	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
T9 37.50-25.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75
T10 25.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.6250	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
160.00-150.00														
T2	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
150.00-125.00														
T3	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
125.00-100.00														
T4	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-75.00														
T5 75.00-66.67	0.0000	0.75	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 66.67-58.33	0.0000	0.75	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 Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T7 58.33-50.00	0.0000	0.75	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 50.00-37.50	0.0000	0.75	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 37.50-25.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 25.00-0.00	0.0000	0.75	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	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 160.00-150.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T2 150.00-125.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T3 125.00-100.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T4 100.00-75.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 75.00-66.67	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T6 66.67-58.33	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T7 58.33-50.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T8 50.00-37.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T9 37.50-25.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T10 25.00-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry *(cont'd)*

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.
T1 160.00-150.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325X	2	0.6250 A325X	2
T2 150.00-125.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T3 125.00-100.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T4 100.00-75.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T5 75.00-66.67	Flange	0.8750 A325X	6	0.7500 A325X	1	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T6 66.67-58.33	Flange	0.8750 A325X	0	0.7500 A325X	1	0.6250 A325X	2	0.0000 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0

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.
T7 58.33-50.00	Flange	0.8750 A325X	0	0.7500 A325X	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T8 50.00-37.50	Flange	1.0000 A325X	8	1.0000 A325X	1	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T9 37.50-25.00	Flange	1.0000 A325X	0	1.0000 A325X	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0
T10 25.00-0.00	Flange	1.0000 A325X	8	1.0000 A325X	1	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325X	2	0.6250 A325X	0

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
1 1/4 (AT&T)	B	No	No	Ar (CaAa)	140.00 - 0.00	-4.0000	0.38	6	6	1.5500	1.5500		0.66
Fiber Trunk (AT&T)	B	No	No	Ar (CaAa)	140.00 - 0.00	-4.0000	0.3	3	3	0.4000	0.4000		1.00
DC Trunk (AT&T)	B	No	No	Ar (CaAa)	140.00 - 0.00	-4.0000	0.28	6	3	0.4000	0.4000		0.11
1 5/8 (T-Mobile)	C	No	No	Ar (CaAa)	125.00 - 0.00	-3.0000	0	12	6	1.9800	1.9800		1.04
HYBRIFLEX 1-1/4" (Sprint)	C	No	No	Ar (CaAa)	97.00 - 0.00	-0.5000	-0.09	4	4	1.5400	1.5400		1.30
HYBRIFLEX 1-5/8" (Verizon)	B	No	No	Ar (CaAa)	77.50 - 0.00	-1.0000	0	1	1	1.9800	1.9800		1.90
1 5/8	B	No	No	Ar (CaAa)	155.00 - 0.00	-1.0000	-0.42	9	9	1.9800	1.9800		1.04
1/2	B	No	No	Ar (CaAa)	155.00 - 0.00	-1.0000	-0.35	2	2	0.5800	0.5800		0.25
7/8	B	No	No	Ar (CaAa)	155.00 - 0.00	-1.0000	-0.31	4	4	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	124.00 - 0.00	-1.0000	-0.28	1	1	1.1100	1.1100		0.54
EW63	B	No	No	Ar (CaAa)	110.00 - 0.00	-1.0000	-0.26	2	2	1.5742	1.5742		0.51
7/8	B	No	No	Ar (CaAa)	85.00 - 0.00	-1.0000	-0.24	1	1	1.1100	1.1100		0.54
1/2	B	No	No	Ar (CaAa)	83.00 - 0.00	-1.0000	-0.22	2	2	0.5800	0.5800		0.25
1/2	B	No	No	Ar (CaAa)	21.00 - 0.00	-1.0000	-0.2	1	1	0.5800	0.5800		0.25

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	160.00-150.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	11.710	0.000	0.06

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
		C	0.000	0.000	0.000	0.000	0.00
T2	150.00-125.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	77.900	0.000	0.41
		C	0.000	0.000	0.000	0.000	0.00
T3	125.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	96.612	0.000	0.51
		C	0.000	0.000	59.400	0.000	0.31
T4	100.00-75.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	103.979	0.000	0.54
		C	0.000	0.000	72.952	0.000	0.43
T5	75.00-66.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	37.357	0.000	0.20
		C	0.000	0.000	24.933	0.000	0.15
T6	66.67-58.33	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	37.357	0.000	0.20
		C	0.000	0.000	24.933	0.000	0.15
T7	58.33-50.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	37.357	0.000	0.20
		C	0.000	0.000	24.933	0.000	0.15
T8	50.00-37.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	56.036	0.000	0.30
		C	0.000	0.000	37.400	0.000	0.22
T9	37.50-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	56.036	0.000	0.30
		C	0.000	0.000	37.400	0.000	0.22
T10	25.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	113.289	0.000	0.61
		C	0.000	0.000	74.800	0.000	0.44

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	160.00-150.00	A	1.342	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	33.290	0.000	0.41
		C		0.000	0.000	0.000	0.000	0.00
T2	150.00-125.00	A	1.326	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	225.605	0.000	2.71
		C		0.000	0.000	0.000	0.000	0.00
T3	125.00-100.00	A	1.300	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	283.455	0.000	3.31
		C		0.000	0.000	80.727	0.000	1.93
T4	100.00-75.00	A	1.268	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	307.693	0.000	3.50
		C		0.000	0.000	118.765	0.000	2.40
T5	75.00-66.67	A	1.241	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	110.808	0.000	1.24
		C		0.000	0.000	41.190	0.000	0.81
T6	66.67-58.33	A	1.226	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	110.392	0.000	1.23
		C		0.000	0.000	41.109	0.000	0.81
T7	58.33-50.00	A	1.208	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	109.924	0.000	1.22
		C		0.000	0.000	41.017	0.000	0.80
T8	50.00-37.50	A	1.183	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	163.856	0.000	1.79
		C		0.000	0.000	61.325	0.000	1.19

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T9	37.50-25.00	A	1.144	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	162.279	0.000	1.75
		C		0.000	0.000	61.018	0.000	1.18
T10	25.00-0.00	A	1.044	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	322.104	0.000	3.31
		C		0.000	0.000	120.468	0.000	2.26

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	160.00-150.00	0.7675	-10.2428	1.4398	-16.7488
T2	150.00-125.00	6.9016	-17.4266	10.5228	-23.3356
T3	125.00-100.00	8.6149	-4.6798	13.8386	-13.6356
T4	100.00-75.00	7.8761	-3.2702	14.0642	-12.0252
T5	75.00-66.67	8.9487	-4.0334	15.6834	-13.7561
T6	66.67-58.33	9.2106	-4.1459	16.1550	-14.1611
T7	58.33-50.00	10.4725	-4.5920	17.0597	-14.6078
T8	50.00-37.50	12.2278	-5.2800	19.1952	-16.3258
T9	37.50-25.00	11.6275	-5.0553	18.7530	-16.0107
T10	25.00-0.00	9.9768	-4.6517	18.2384	-16.4373

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	7	1 5/8	150.00 - 155.00	0.6000	0.6000
T1	8	1/2	150.00 - 155.00	0.6000	0.6000
T1	9	7/8	150.00 - 155.00	0.6000	0.6000
T2	1	1 1/4	125.00 - 140.00	0.6000	0.6000
T2	2	Fiber Trunk	125.00 - 140.00	0.6000	0.6000
T2	3	DC Trunk	125.00 - 140.00	0.6000	0.6000
T2	7	1 5/8	125.00 - 150.00	0.6000	0.6000
T2	8	1/2	125.00 - 150.00	0.6000	0.6000
T2	9	7/8	125.00 - 150.00	0.6000	0.6000
T3	1	1 1/4	100.00 - 125.00	0.6000	0.6000
T3	2	Fiber Trunk	100.00 - 125.00	0.6000	0.6000
T3	3	DC Trunk	100.00 - 125.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	4	1 5/8	100.00 - 125.00	0.6000	0.6000
T3	7	1 5/8	100.00 - 125.00	0.6000	0.6000
T3	8	1/2	100.00 - 125.00	0.6000	0.6000
T3	9	7/8	100.00 - 125.00	0.6000	0.6000
T3	10	7/8	100.00 - 124.00	0.6000	0.6000
T3	11	EW63	100.00 - 110.00	0.6000	0.6000
T4	1	1 1/4	75.00 - 100.00	0.6000	0.6000
T4	2	Fiber Trunk	75.00 - 100.00	0.6000	0.6000
T4	3	DC Trunk	75.00 - 100.00	0.6000	0.6000
T4	4	1 5/8	75.00 - 100.00	0.6000	0.6000
T4	5	HYBRIFLEX 1-1/4"	75.00 - 97.00	0.6000	0.6000
T4	6	HYBRIFLEX 1-5/8"	75.00 - 77.50	0.6000	0.6000
T4	7	1 5/8	75.00 - 100.00	0.6000	0.6000
T4	8	1/2	75.00 - 100.00	0.6000	0.6000
T4	9	7/8	75.00 - 100.00	0.6000	0.6000
T4	10	7/8	75.00 - 100.00	0.6000	0.6000
T4	11	EW63	75.00 - 100.00	0.6000	0.6000
T4	12	7/8	75.00 - 85.00	0.6000	0.6000
T4	13	1/2	75.00 - 83.00	0.6000	0.6000
T5	1	1 1/4	66.67 - 75.00	0.6000	0.6000
T5	2	Fiber Trunk	66.67 - 75.00	0.6000	0.6000
T5	3	DC Trunk	66.67 - 75.00	0.6000	0.6000
T5	4	1 5/8	66.67 - 75.00	0.6000	0.6000
T5	5	HYBRIFLEX 1-1/4"	66.67 - 75.00	0.6000	0.6000
T5	6	HYBRIFLEX 1-5/8"	66.67 - 75.00	0.6000	0.6000
T5	7	1 5/8	66.67 - 75.00	0.6000	0.6000
T5	8	1/2	66.67 - 75.00	0.6000	0.6000
T5	9	7/8	66.67 - 75.00	0.6000	0.6000
T5	10	7/8	66.67 - 75.00	0.6000	0.6000
T5	11	EW63	66.67 - 75.00	0.6000	0.6000
T5	12	7/8	66.67 - 75.00	0.6000	0.6000
T5	13	1/2	66.67 - 75.00	0.6000	0.6000
T6	1	1 1/4	58.33 - 66.67	0.6000	0.6000
T6	2	Fiber Trunk	58.33 - 66.67	0.6000	0.6000
T6	3	DC Trunk	58.33 - 66.67	0.6000	0.6000
T6	4	1 5/8	58.33 - 66.67	0.6000	0.6000
T6	5	HYBRIFLEX 1-1/4"	58.33 - 66.67	0.6000	0.6000
T6	6	HYBRIFLEX 1-5/8"	58.33 - 66.67	0.6000	0.6000
T6	7	1 5/8	58.33 - 66.67	0.6000	0.6000
T6	8	1/2	58.33 - 66.67	0.6000	0.6000
T6	9	7/8	58.33 - 66.67	0.6000	0.6000
T6	10	7/8	58.33 - 66.67	0.6000	0.6000
T6	11	EW63	58.33 - 66.67	0.6000	0.6000
T6	12	7/8	58.33 - 66.67	0.6000	0.6000
T6	13	1/2	58.33 - 66.67	0.6000	0.6000
T7	1	1 1/4	50.00 - 58.33	0.6000	0.6000
T7	2	Fiber Trunk	50.00 - 58.33	0.6000	0.6000
T7	3	DC Trunk	50.00 - 58.33	0.6000	0.6000
T7	4	1 5/8	50.00 - 58.33	0.6000	0.6000
T7	5	HYBRIFLEX 1-1/4"	50.00 - 58.33	0.6000	0.6000
T7	6	HYBRIFLEX 1-5/8"	50.00 - 58.33	0.6000	0.6000
T7	7	1 5/8	50.00 - 58.33	0.6000	0.6000
T7	8	1/2	50.00 - 58.33	0.6000	0.6000
T7	9	7/8	50.00 - 58.33	0.6000	0.6000
T7	10	7/8	50.00 - 58.33	0.6000	0.6000
T7	11	EW63	50.00 - 58.33	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	12	7/8	50.00 - 58.33	0.6000	0.6000
T7	13	1/2	50.00 - 58.33	0.6000	0.6000
T8	1	1 1/4	37.50 - 50.00	0.6000	0.6000
T8	2	Fiber Trunk	37.50 - 50.00	0.6000	0.6000
T8	3	DC Trunk	37.50 - 50.00	0.6000	0.6000
T8	4	1 5/8	37.50 - 50.00	0.6000	0.6000
T8	5	HYBRIFLEX 1-1/4"	37.50 - 50.00	0.6000	0.6000
T8	6	HYBRIFLEX 1-5/8"	37.50 - 50.00	0.6000	0.6000
T8	7	1 5/8	37.50 - 50.00	0.6000	0.6000
T8	8	1/2	37.50 - 50.00	0.6000	0.6000
T8	9	7/8	37.50 - 50.00	0.6000	0.6000
T8	10	7/8	37.50 - 50.00	0.6000	0.6000
T8	11	EW63	37.50 - 50.00	0.6000	0.6000
T8	12	7/8	37.50 - 50.00	0.6000	0.6000
T8	13	1/2	37.50 - 50.00	0.6000	0.6000
T9	1	1 1/4	25.00 - 37.50	0.6000	0.6000
T9	2	Fiber Trunk	25.00 - 37.50	0.6000	0.6000
T9	3	DC Trunk	25.00 - 37.50	0.6000	0.6000
T9	4	1 5/8	25.00 - 37.50	0.6000	0.6000
T9	5	HYBRIFLEX 1-1/4"	25.00 - 37.50	0.6000	0.6000
T9	6	HYBRIFLEX 1-5/8"	25.00 - 37.50	0.6000	0.6000
T9	7	1 5/8	25.00 - 37.50	0.6000	0.6000
T9	8	1/2	25.00 - 37.50	0.6000	0.6000
T9	9	7/8	25.00 - 37.50	0.6000	0.6000
T9	10	7/8	25.00 - 37.50	0.6000	0.6000
T9	11	EW63	25.00 - 37.50	0.6000	0.6000
T9	12	7/8	25.00 - 37.50	0.6000	0.6000
T9	13	1/2	25.00 - 37.50	0.6000	0.6000
T10	1	1 1/4	0.00 - 25.00	0.6000	0.6000
T10	2	Fiber Trunk	0.00 - 25.00	0.6000	0.6000
T10	3	DC Trunk	0.00 - 25.00	0.6000	0.6000
T10	4	1 5/8	0.00 - 25.00	0.6000	0.6000
T10	5	HYBRIFLEX 1-1/4"	0.00 - 25.00	0.6000	0.6000
T10	6	HYBRIFLEX 1-5/8"	0.00 - 25.00	0.6000	0.6000
T10	7	1 5/8	0.00 - 25.00	0.6000	0.6000
T10	8	1/2	0.00 - 25.00	0.6000	0.6000
T10	9	7/8	0.00 - 25.00	0.6000	0.6000
T10	10	7/8	0.00 - 25.00	0.6000	0.6000
T10	11	EW63	0.00 - 25.00	0.6000	0.6000
T10	12	7/8	0.00 - 25.00	0.6000	0.6000
T10	13	1/2	0.00 - 25.00	0.6000	0.6000
T10	14	1/2	0.00 - 21.00	0.6000	0.6000

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
15' Lighting Rod	C	From Leg	0.00 0.00 8.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	4.50 6.03 7.58	4.50 6.03 7.58	0.05 0.08 0.12

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
Flash Beacon Lighting	A	From Leg	0.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	2.70 3.10 3.50	2.70 3.10 3.50	0.05 0.07 0.09
DS7C09P36D-D (CSP)	A	From Leg	3.00 -2.00 12.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.08 0.13 0.18
DS7C09P36D-D (CSP)	A	From Leg	3.00 2.00 12.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.08 0.13 0.18
DS7C09P36D-D (CSP)	C	From Leg	3.00 -2.00 12.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.08 0.13 0.18
DS7C09P36D-D (CSP)	C	From Leg	3.00 2.00 12.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.08 0.13 0.18
Commscope SFG23HD-12-496 (CSP)	A	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.85 0.95 1.09
Commscope SFG23HD-12-496 (CSP)	C	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.85 0.95 1.09
TX/RX 432E-83I-01T	C	From Face	0.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice 1" Ice	1.20 1.34 1.48	0.75 0.86 0.98	0.03 0.04 0.05
DB304-A	B	From Leg	2.50 0.00 0.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice	4.85 8.73 12.61	4.85 8.73 12.61	0.04 0.06 0.07
TX/RX 432E-83I-01T	C	From Face	0.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	1.20 1.34 1.48	0.75 0.86 0.98	0.03 0.04 0.05
DB228-A	B	From Leg	1.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	7.30 13.14 18.98	7.30 13.14 18.98	0.07 0.09 0.12
Pirod 10' PCS Frame (1)	B	From Leg	1.50 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	9.00 13.20 17.40	9.00 13.20 17.40	0.25 0.35 0.45
10' x 2" Dia Omni	B	From Leg	6.00 0.00 1.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	2.00 3.02 4.07	2.00 3.02 4.07	0.02 0.03 0.05
Pirod 6' Side Mount Standoff (1)	B	From Leg	3.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	4.97 6.12 7.27	4.97 6.12 7.27	0.07 0.13 0.19
6' Dish Ice Shield	A	From Leg	3.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	5.00 7.00 9.00	5.00 7.00 9.00	0.03 0.05 0.07
6' Dish Ice Shield	C	From Leg	3.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	5.00 7.00 9.00	5.00 7.00 9.00	0.03 0.05 0.07
10'6"x4" Pipe Mount	A	From Leg	0.25 0.00 1.00	0.0000	85.00	No Ice 1/2" Ice 1" Ice	3.42 5.62 6.25	3.42 5.62 6.25	0.11 0.15 0.19
PD10054	A	From Leg	1.00 0.00 1.00	0.0000	85.00	No Ice 1/2" Ice 1" Ice	5.62 5.90 6.18	5.62 5.90 6.18	0.02 0.02 0.02
Beacon	A	From Leg	1.50 1.50 0.00	0.0000	83.00	No Ice 1/2" Ice 1" Ice	0.17 0.31 0.39	0.17 0.31 0.39	0.01 0.01 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
Beacon	C	From Leg	1.50	0.0000	83.00	No Ice	0.17	0.17	0.01
			-1.50			1/2" Ice	0.31	0.31	0.01
			0.00			1" Ice	0.39	0.39	0.02
6' Yagi	C	From Face	0.00	0.0000	21.00	No Ice	5.00	5.00	0.04
			0.00			1/2" Ice	6.50	6.50	0.06
			0.00			1" Ice	8.00	8.00	0.08
RR90-17	A	From Leg	3.00	0.0000	125.00	No Ice	4.36	1.97	0.02
(T-Mobile)			1.50			1/2" Ice	4.70	2.31	0.04
			0.00			1" Ice	5.06	2.66	0.07
RR90-17	B	From Leg	3.00	0.0000	125.00	No Ice	4.36	1.97	0.02
(T-Mobile)			1.50			1/2" Ice	4.70	2.31	0.04
			0.00			1" Ice	5.06	2.66	0.07
RR90-17	C	From Leg	3.00	0.0000	125.00	No Ice	4.36	1.97	0.02
(T-Mobile)			1.50			1/2" Ice	4.70	2.31	0.04
			0.00			1" Ice	5.06	2.66	0.07
LNX-6515DS	A	From Leg	3.00	0.0000	125.00	No Ice	11.45	7.70	0.06
(T-Mobile)			-1.50			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS	B	From Leg	3.00	0.0000	125.00	No Ice	11.45	7.70	0.06
(T-Mobile)			-1.50			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS	C	From Leg	3.00	0.0000	125.00	No Ice	11.45	7.70	0.06
(T-Mobile)			-1.50			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
4415 B25	A	From Leg	3.00	0.0000	125.00	No Ice	1.84	0.82	0.05
(T-Mobile)			1.50			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4415 B25	B	From Leg	3.00	0.0000	125.00	No Ice	1.84	0.82	0.05
(T-Mobile)			1.50			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4415 B25	C	From Leg	3.00	0.0000	125.00	No Ice	1.84	0.82	0.05
(T-Mobile)			1.50			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
SitePro Dual Antenna Mount	A	From Leg	0.00	0.0000	125.00	No Ice	6.00	6.00	0.30
R5			0.00			1/2" Ice	8.50	8.50	0.40
(T-Mobile)			0.00			1" Ice	11.00	11.00	0.50
SitePro Dual Antenna Mount	B	From Leg	0.00	0.0000	125.00	No Ice	6.00	6.00	0.30
R5			0.00			1/2" Ice	8.50	8.50	0.40
(T-Mobile)			0.00			1" Ice	11.00	11.00	0.50
SitePro Dual Antenna Mount	C	From Leg	0.00	0.0000	125.00	No Ice	6.00	6.00	0.30
R5			0.00			1/2" Ice	8.50	8.50	0.40
(T-Mobile)			0.00			1" Ice	11.00	11.00	0.50
APXVSPP18-C-A20	A	From Face	1.00	0.0000	97.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVSPP18-C-A20	B	From Face	1.00	0.0000	97.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVSPP18-C-A20	C	From Face	1.00	0.0000	97.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
DT465B-2XR	A	From Face	1.00	0.0000	97.00	No Ice	9.10	5.97	0.06
(Sprint)			3.00			1/2" Ice	9.56	6.43	0.12
			0.00			1" Ice	10.04	6.90	0.18
DT465B-2XR	B	From Face	1.00	0.0000	97.00	No Ice	9.10	5.97	0.06
(Sprint)			3.00			1/2" Ice	9.56	6.43	0.12
			0.00			1" Ice	10.04	6.90	0.18

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
DT465B-2XR	C	From Face	1.00	0.0000	97.00	No Ice	9.10	5.97	0.06
(Sprint)			3.00			1/2" Ice	9.56	6.43	0.12
			0.00			1" Ice	10.04	6.90	0.18
(2) FD-RRH 2x50 800	A	From Face	1.00	0.0000	97.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
(2) FD-RRH 2x50 800	B	From Face	1.00	0.0000	97.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
(2) FD-RRH 2x50 800	C	From Face	1.00	0.0000	97.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 4x40 1900	A	From Face	1.00	0.0000	97.00	No Ice	2.24	2.32	0.06
(Sprint)			0.00			1/2" Ice	2.44	2.53	0.08
			0.00			1" Ice	2.65	2.74	0.11
FD-RRH 4x40 1900	B	From Face	1.00	0.0000	97.00	No Ice	2.24	2.32	0.06
(Sprint)			0.00			1/2" Ice	2.44	2.53	0.08
			0.00			1" Ice	2.65	2.74	0.11
FD-RRH 4x40 1900	C	From Face	1.00	0.0000	97.00	No Ice	2.24	2.32	0.06
(Sprint)			0.00			1/2" Ice	2.44	2.53	0.08
			0.00			1" Ice	2.65	2.74	0.11
TD-RRH 4x20 2500	A	From Face	1.00	0.0000	97.00	No Ice	1.69	1.06	0.03
(Sprint)			0.00			1/2" Ice	1.85	1.19	0.04
			0.00			1" Ice	2.02	1.33	0.06
TD-RRH 4x20 2500	B	From Face	1.00	0.0000	97.00	No Ice	1.69	1.06	0.03
(Sprint)			0.00			1/2" Ice	1.85	1.19	0.04
			0.00			1" Ice	2.02	1.33	0.06
TD-RRH 4x20 2500	C	From Face	1.00	0.0000	97.00	No Ice	1.69	1.06	0.03
(Sprint)			0.00			1/2" Ice	1.85	1.19	0.04
			0.00			1" Ice	2.02	1.33	0.06
7770.00	A	From Leg	3.00	0.0000	140.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
DMP65R-BU8DA	A	From Leg	3.00	0.0000	140.00	No Ice	17.87	8.12	0.12
(AT&T)			-3.00			1/2" Ice	18.50	8.72	0.22
			0.00			1" Ice	19.14	9.32	0.32
OPA65R-BU8D	A	From Leg	3.00	0.0000	140.00	No Ice	17.87	8.12	0.08
(AT&T)			3.00			1/2" Ice	18.50	8.72	0.18
			0.00			1" Ice	19.14	9.32	0.28
TPA-65R-LCUUUU-H8	A	From Leg	3.00	0.0000	140.00	No Ice	13.30	8.82	0.08
(AT&T)			6.00			1/2" Ice	13.90	9.42	0.15
			0.00			1" Ice	14.50	10.03	0.24
7770.00	B	From Leg	3.00	0.0000	140.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
DMP65R-BU8DA	B	From Leg	3.00	0.0000	140.00	No Ice	17.87	8.12	0.12
(AT&T)			-3.00			1/2" Ice	18.50	8.72	0.22
			0.00			1" Ice	19.14	9.32	0.32
OPA65R-BU8D	B	From Leg	3.00	0.0000	140.00	No Ice	17.87	8.12	0.08
(AT&T)			3.00			1/2" Ice	18.50	8.72	0.18
			0.00			1" Ice	19.14	9.32	0.28
TPA-65R-LCUUUU-H8	B	From Leg	3.00	0.0000	140.00	No Ice	13.30	8.82	0.08
(AT&T)			6.00			1/2" Ice	13.90	9.42	0.15
			0.00			1" Ice	14.50	10.03	0.24
7770.00	C	From Leg	3.00	0.0000	140.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11

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
DMP65R-BU8DA	C	From Leg	3.00	0.0000	140.00	No Ice	17.87	8.12	0.12
(AT&T)			-3.00			1/2" Ice	18.50	8.72	0.22
			0.00			1" Ice	19.14	9.32	0.32
OPA65R-BU8D	C	From Leg	3.00	0.0000	140.00	No Ice	17.87	8.12	0.08
(AT&T)			3.00			1/2" Ice	18.50	8.72	0.18
			0.00			1" Ice	19.14	9.32	0.28
QS66512	C	From Leg	3.00	0.0000	140.00	No Ice	8.13	6.80	0.11
(AT&T)			6.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
TT19-08BP111-001 TMA	A	From Leg	3.00	0.0000	140.00	No Ice	0.55	0.45	0.02
(AT&T)			0.00			1/2" Ice	0.65	0.53	0.02
			0.00			1" Ice	0.75	0.63	0.03
TT19-08BP111-001 TMA	B	From Leg	3.00	0.0000	140.00	No Ice	0.55	0.45	0.02
(AT&T)			0.00			1/2" Ice	0.65	0.53	0.02
			0.00			1" Ice	0.75	0.63	0.03
TT19-08BP111-001 TMA	C	From Leg	3.00	0.0000	140.00	No Ice	0.55	0.45	0.02
(AT&T)			0.00			1/2" Ice	0.65	0.53	0.02
			0.00			1" Ice	0.75	0.63	0.03
(2) LGP21401 TMA	A	From Leg	3.00	0.0000	140.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	B	From Leg	3.00	0.0000	140.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	C	From Leg	3.00	0.0000	140.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
RRUS-32	A	From Leg	3.00	0.0000	140.00	No Ice	3.31	2.42	0.08
(AT&T)			-5.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-12	A	From Leg	3.00	0.0000	140.00	No Ice	3.15	1.29	0.06
(AT&T)			-5.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
4449 B5/B12	A	From Leg	3.00	0.0000	140.00	No Ice	1.97	1.41	0.07
(AT&T)			5.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
4478 B14	A	From Leg	3.00	0.0000	140.00	No Ice	1.84	1.06	0.06
(AT&T)			5.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
RRUS-32	B	From Leg	3.00	0.0000	140.00	No Ice	3.31	2.42	0.08
(AT&T)			-5.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-12	B	From Leg	3.00	0.0000	140.00	No Ice	3.15	1.29	0.06
(AT&T)			-5.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
4449 B5/B12	B	From Leg	3.00	0.0000	140.00	No Ice	1.97	1.41	0.07
(AT&T)			5.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
4478 B14	B	From Leg	3.00	0.0000	140.00	No Ice	1.84	1.06	0.06
(AT&T)			5.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
RRUS-32	C	From Leg	3.00	0.0000	140.00	No Ice	3.31	2.42	0.08
(AT&T)			-5.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-12	C	From Leg	3.00	0.0000	140.00	No Ice	3.15	1.29	0.06
(AT&T)			-5.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11

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
4449 B5/B12	C	From Leg	3.00	0.0000	140.00	No Ice	1.97	1.41	0.07
(AT&T)			5.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
4478 B14	C	From Leg	3.00	0.0000	140.00	No Ice	1.84	1.06	0.06
(AT&T)			5.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
DC6-48-60-18-8F Surge	A	From Leg	3.00	0.0000	140.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	B	From Leg	3.00	0.0000	140.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	C	From Leg	3.00	0.0000	140.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
14' V-Boom	A	From Leg	1.50	0.0000	140.00	No Ice	13.00	13.00	0.04
(AT&T)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	B	From Leg	1.50	0.0000	140.00	No Ice	13.00	13.00	0.04
(AT&T)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	C	From Leg	1.50	0.0000	140.00	No Ice	13.00	13.00	0.04
(AT&T)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
(2) MX06FRO660	A	From Leg	3.00	0.0000	77.50	No Ice	9.87	7.34	0.06
(Verizon)			-3.00			1/2" Ice	10.34	7.78	0.13
			0.00			1" Ice	10.82	8.24	0.20
MT6407-77A	A	From Leg	3.00	0.0000	77.50	No Ice	4.71	1.84	0.09
(Verizon)			3.00			1/2" Ice	5.00	2.06	0.12
			0.00			1" Ice	5.29	2.29	0.15
(2) MX06FRO660	B	From Leg	3.00	0.0000	77.50	No Ice	9.87	7.34	0.06
(Verizon)			-3.00			1/2" Ice	10.34	7.78	0.13
			0.00			1" Ice	10.82	8.24	0.20
MT6407-77A	B	From Leg	3.00	0.0000	77.50	No Ice	4.71	1.84	0.09
(Verizon)			3.00			1/2" Ice	5.00	2.06	0.12
			0.00			1" Ice	5.29	2.29	0.15
RF4439d-25A (B2/B66A	A	From Leg	3.00	0.0000	77.50	No Ice	1.88	1.25	0.08
RRH)			0.00			1/2" Ice	2.05	1.39	0.09
(Verizon)			0.00			1" Ice	2.22	1.54	0.11
RF4440d-13A (B5/B13 RRH)	A	From Leg	3.00	0.0000	77.50	No Ice	1.88	1.13	0.08
(Verizon)			0.00			1/2" Ice	2.05	1.26	0.09
			0.00			1" Ice	2.22	1.41	0.11
RF4439d-25A (B2/B66A	B	From Leg	3.00	0.0000	77.50	No Ice	1.88	1.25	0.08
RRH)			0.00			1/2" Ice	2.05	1.39	0.09
(Verizon)			0.00			1" Ice	2.22	1.54	0.11
RF4440d-13A (B5/B13 RRH)	B	From Leg	3.00	0.0000	77.50	No Ice	1.88	1.13	0.08
(Verizon)			0.00			1/2" Ice	2.05	1.26	0.09
			0.00			1" Ice	2.22	1.41	0.11
DB-T1-6Z-8AB-0Z	A	From Leg	3.00	0.0000	77.50	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
6-ft T-Frame	A	From Leg	1.50	0.0000	77.50	No Ice	15.10	15.10	0.29
(Verizon)			0.00			1/2" Ice	19.50	19.50	0.40
			0.00			1" Ice	23.90	23.90	0.52
6-ft T-Frame	B	From Leg	1.50	0.0000	77.50	No Ice	15.10	15.10	0.29
(Verizon)			0.00			1/2" Ice	19.50	19.50	0.40
			0.00			1" Ice	23.90	23.90	0.52

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HPD2-4.7	A	Paraboloid w/Shroud (HP)	From Face	0.50 0.00 0.00	Worst		159.00	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68	0.03 0.04 0.06
Andrew 6' w/Radome	B	Paraboloid w/Radome	From Face	1.00 0.00 0.00	Worst		110.00	6.00	No Ice 1/2" Ice 1" Ice	28.27 29.07 29.86	0.38 0.45 0.52
Andrew 6' w/Radome	C	Paraboloid w/Radome	From Face	1.00 0.00 0.00	Worst		110.00	6.00	No Ice 1/2" Ice 1" Ice	28.27 29.07 29.86	0.38 0.45 0.52

222-H Verification Constants

Constant	Value
K_d	0.85
Ice Thickness Importance Factor	1.15
Z_g	900
α	9.5
K_{zmin}	0.85
K_c	n/a
K_t	1
f	1
K_e	1

222-H Section Verification ArRr By Element

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft^2	A_r w/Ice ft^2	A_rR_r ft^2	A_rR_r w/Ice ft^2
T1 160.00-150.00	1	P5x0.25	63.814	37.723	C	0.175	0.307	4.171	6.411	2.011	3.854
	1	P5x0.25	63.814	37.723	A	0.175	0.307	4.171	6.411	2.011	3.854
	2	P5x0.25	63.814	37.723	C	0.175	0.307	4.171	6.411	2.011	3.854
	2	P5x0.25	63.814	37.723	B	0.175	0.307	4.171	6.411	2.011	3.854
	3	P5x0.25	63.814	37.723	B	0.175	0.307	4.171	6.411	2.011	3.854
	3	P5x0.25	63.814	37.723	A	0.175	0.307	4.171	6.411	2.011	3.854
					A		Sum:	8.342	12.822	4.022	7.708
					B			8.342	12.822	4.022	7.708
					C			8.342	12.822	4.022	7.708
T2 150.00-125.00	22	P5x0.25	63.015	37.095	C	0.13	0.229	10.428	15.960	4.893	9.258
	22	P5x0.25	63.015	37.095	A	0.13	0.229	10.428	15.960	4.893	9.258
	23	P5x0.25	63.015	37.095	C	0.13	0.229	10.428	15.960	4.893	9.258
	23	P5x0.25	63.015	37.095	B	0.13	0.229	10.428	15.960	4.893	9.258

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft^2	A_r w/Ice ft^2	A_rR_r ft^2	A_rR_r w/Ice ft^2
	24	P5x0.25	63.015	37.095	B	0.13	0.229	10.428	15.960	4.893	9.258
	24	P5x0.25	63.015	37.095	A	0.13	0.229	10.428	15.960	4.893	9.258
					A		Sum:	20.856	31.921	9.785	18.516
					B			20.856	31.921	9.785	18.516
					C			20.856	31.921	9.785	18.516
T3	52	P5x0.25	61.698	36.07	C	0.122	0.212	10.428	15.850	4.923	9.140
125.00-100.00											
	52	P5x0.25	61.698	36.07	A	0.122	0.212	10.428	15.850	4.923	9.140
	53	P5x0.25	61.698	36.07	C	0.122	0.212	10.428	15.850	4.923	9.140
	53	P5x0.25	61.698	36.07	B	0.122	0.212	10.428	15.850	4.923	9.140
	54	P5x0.25	61.698	36.07	B	0.122	0.212	10.428	15.850	4.923	9.140
	54	P5x0.25	61.698	36.07	A	0.122	0.212	10.428	15.850	4.923	9.140
					A		Sum:	20.856	31.701	9.847	18.280
					B			20.856	31.701	9.847	18.280
					C			20.856	31.701	9.847	18.280
T4 100.00-75.00					A		Sum:	0.000	0.000	0.000	0.000
					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T5 75.00-66.67					A		Sum:	0.000	0.000	0.000	0.000
					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T6 66.67-58.33					A		Sum:	0.000	0.000	0.000	0.000
					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T7 58.33-50.00	160	P5x.400	57.129	32.594	C	0.132	0.23	3.476	5.156	1.715	2.993
	160	P5x.400	57.129	32.594	A	0.132	0.23	3.476	5.156	1.715	2.993
	161	P5x.400	57.129	32.594	C	0.132	0.23	3.476	5.156	1.715	2.993
	161	P5x.400	57.129	32.594	B	0.132	0.23	3.476	5.156	1.715	2.993
	162	P5x.400	57.129	32.594	B	0.132	0.23	3.476	5.156	1.715	2.993
	162	P5x.400	57.129	32.594	A	0.132	0.23	3.476	5.156	1.715	2.993
					A		Sum:	6.952	10.312	3.430	5.986
					B			6.952	10.312	3.430	5.986
					C			6.952	10.312	3.430	5.986
T8 50.00-37.50	187	P6.875x.400	76.806	39.706	C	0.118	0.175	7.169	9.636	2.925	5.497
	187	P6.875x.400	76.806	39.706	A	0.118	0.175	7.169	9.636	2.925	5.497
	188	P6.875x.400	76.806	39.706	C	0.118	0.175	7.169	9.636	2.925	5.497
	188	P6.875x.400	76.806	39.706	B	0.118	0.175	7.169	9.636	2.925	5.497
	189	P6.875x.400	76.806	39.706	B	0.118	0.175	7.169	9.636	2.925	5.497
	189	P6.875x.400	76.806	39.706	A	0.118	0.175	7.169	9.636	2.925	5.497
					A		Sum:	14.338	19.272	5.850	10.995
					B			14.338	19.272	5.850	10.995
					C			14.338	19.272	5.850	10.995
T9 37.50-25.00	202	P6.875x.400	74.133	38	C	0.129	0.2	7.169	9.554	3.041	5.489
	202	P6.875x.400	74.133	38	A	0.129	0.2	7.169	9.554	3.041	5.489
	203	P6.875x.400	74.133	38	C	0.129	0.2	7.169	9.554	3.041	5.489
	203	P6.875x.400	74.133	38	B	0.129	0.2	7.169	9.554	3.041	5.489
	204	P6.875x.400	74.133	38	B	0.129	0.2	7.169	9.554	3.041	5.489
	204	P6.875x.400	74.133	38	A	0.129	0.2	7.169	9.554	3.041	5.489
					A		Sum:	14.338	19.109	6.082	10.979
					B			14.338	19.109	6.082	10.979
					C			14.338	19.109	6.082	10.979
T10 25.00-0.00					A		Sum:	0.000	0.000	0.000	0.000
					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000

222-H Section Verification Tables - No Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft^2
T1 160.00-150.00	155.00		1.388	1	1		51	A	0.175	4.022
								B	0.175	4.022
								C	0.175	4.022
T2 150.00-125.00	137.50		1.353	1	1		50	A	0.13	9.785
								B	0.13	9.785
								C	0.13	9.785
T3 125.00-100.00	112.50		1.297	1	1		48	A	0.122	9.847
								B	0.122	9.847
								C	0.122	9.847
T4 100.00-75.00	87.50		1.231	1	1		45	A	0.14	0.000
								B	0.14	0.000
								C	0.14	0.000
T5 75.00-66.67	70.83		1.177	1	1		43	A	0.134	0.000
								B	0.134	0.000
								C	0.134	0.000
T6 66.67-58.33	62.50		1.146	1	1		42	A	0.131	0.000
								B	0.131	0.000
								C	0.131	0.000
T7 58.33-50.00	54.17		1.112	1	1		41	A	0.132	3.430
								B	0.132	3.430
								C	0.132	3.430
T8 50.00-37.50	43.75		1.063	1	1		39	A	0.118	5.850
								B	0.118	5.850
								C	0.118	5.850
T9 37.50-25.00	31.25		0.991	1	1		36	A	0.129	6.082
								B	0.129	6.082
								C	0.129	6.082
T10 25.00-0.00	12.50		0.85	1	1		31	A	0.133	0.000
								B	0.133	0.000
								C	0.133	0.000

222-H Section Verification Tables - Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft^2
T1 160.00-150.00	155.00	155.00	1.388	1	1	1.3424	8	A	0.307	14.200
								B	0.307	14.200
								C	0.307	14.200
T2 150.00-125.00	137.50	137.50	1.353	1	1	1.3264	7	A	0.229	30.554
								B	0.229	30.554
								C	0.229	30.554
T3 125.00-100.00	112.50	112.50	1.297	1	1	1.3001	7	A	0.212	31.249
								B	0.212	31.249
								C	0.212	31.249
T4 100.00-75.00	87.50	87.50	1.231	1	1	1.2678	7	A	0.211	13.721
								B	0.211	13.721
								C	0.211	13.721
T5 75.00-66.67	70.83	70.83	1.177	1	1	1.2413	6	A	0.202	4.739
								B	0.202	4.739
								C	0.202	4.739
T6 66.67-58.33	62.50	62.50	1.146	1	1	1.2258	6	A	0.197	4.811
								B	0.197	4.811

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft^2
								C	0.197	4.811
T7 58.33-50.00	54.17	54.17	1.112	1	1	1.2084	6	A	0.23	13.347
								B	0.23	13.347
								C	0.23	13.347
T8 50.00-37.50	43.75	43.75	1.063	1	1	1.1829	6	A	0.175	16.566
								B	0.175	16.566
								C	0.175	16.566
T9 37.50-25.00	31.25	31.25	0.991	1	1	1.1438	5	A	0.2	19.234
								B	0.2	19.234
								C	0.2	19.234
T10 25.00-0.00	12.50	12.50	0.85	1	1	1.0436	5	A	0.174	10.540
								B	0.174	10.540
								C	0.174	10.540

222-H Section Verification Tables - Service

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft^2
T1 160.00-150.00	155.00		1.388	1	1		11	A	0.175	4.759
								B	0.175	4.759
								C	0.175	4.759
T2 150.00-125.00	137.50		1.353	1	1		11	A	0.13	11.800
								B	0.13	11.800
								C	0.13	11.800
T3 125.00-100.00	112.50		1.297	1	1		10	A	0.122	11.790
								B	0.122	11.790
								C	0.122	11.790
T4 100.00-75.00	87.50		1.231	1	1		10	A	0.14	0.000
								B	0.14	0.000
								C	0.14	0.000
T5 75.00-66.67	70.83		1.177	1	1		9	A	0.134	0.000
								B	0.134	0.000
								C	0.134	0.000
T6 66.67-58.33	62.50		1.146	1	1		9	A	0.131	0.000
								B	0.131	0.000
								C	0.131	0.000
T7 58.33-50.00	54.17		1.112	1	1		9	A	0.132	3.934
								B	0.132	3.934
								C	0.132	3.934
T8 50.00-37.50	43.75		1.063	1	1		8	A	0.118	8.102
								B	0.118	8.102
								C	0.118	8.102
T9 37.50-25.00	31.25		0.991	1	1		8	A	0.129	8.112
								B	0.129	8.112
								C	0.129	8.112
T10 25.00-0.00	12.50		0.85	1	1		7	A	0.133	0.000
								B	0.133	0.000
								C	0.133	0.000

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	155.00	1.388	51	110.170	A	10.889	8.342	8.342	43.38	0.000	0.000
160.00-150.00					B	10.889	8.342		43.38	11.710	0.000
					C	10.889	8.342		43.38	0.000	0.000
T2	137.50	1.353	50	310.425	A	19.557	20.856	20.856	51.61	0.000	0.000
150.00-125.00					B	19.557	20.856		51.61	77.900	0.000
					C	19.557	20.856		51.61	0.000	0.000
T3	112.50	1.297	48	360.425	A	23.281	20.856	20.856	47.25	0.000	0.000
125.00-100.00					B	23.281	20.856		47.25	96.612	0.000
					C	23.281	20.856		47.25	59.400	0.000
T4	87.50	1.231	45	416.680	A	58.356	0.000	30.199	51.75	0.000	0.000
100.00-75.00					B	58.356	0.000		51.75	103.979	0.000
					C	58.356	0.000		51.75	72.952	0.000
T5 75.00-66.67	70.83	1.177	43	150.004	A	20.031	0.000	10.066	50.25	0.000	0.000
					B	20.031	0.000		50.25	37.357	0.000
					C	20.031	0.000		50.25	24.933	0.000
T6 66.67-58.33	62.50	1.146	42	155.560	A	20.323	0.000	10.066	49.53	0.000	0.000
					B	20.323	0.000		49.53	37.357	0.000
					C	20.323	0.000		49.53	24.933	0.000
T7 58.33-50.00	54.17	1.112	41	159.031	A	14.047	6.952	6.952	33.11	0.000	0.000
					B	14.047	6.952		33.11	37.357	0.000
					C	14.047	6.952		33.11	24.933	0.000
T8 50.00-37.50	43.75	1.063	39	250.917	A	15.214	14.338	14.338	48.52	0.000	0.000
					B	15.214	14.338		48.52	56.036	0.000
					C	15.214	14.338		48.52	37.400	0.000
T9 37.50-25.00	31.25	0.991	36	263.417	A	19.771	14.338	14.338	42.04	0.000	0.000
					B	19.771	14.338		42.04	56.036	0.000
					C	19.771	14.338		42.04	37.400	0.000
T10 25.00-0.00	12.50	0.85	31	572.680	A	75.997	0.000	40.585	53.40	0.000	0.000
					B	75.997	0.000		53.40	113.289	0.000
					C	75.997	0.000		53.40	74.800	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	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	155.00	1.388	8	1.3424	112.409	A	10.889	23.622	12.822	37.15	0.000	0.000
160.00-150.00						B	10.889	23.622		37.15	33.290	0.000
						C	10.889	23.622		37.15	0.000	0.000
T2	137.50	1.353	7	1.3264	315.956	A	19.557	52.673	31.921	44.19	0.000	0.000
150.00-125.00						B	19.557	52.673		44.19	225.605	0.000
						C	19.557	52.673		44.19	0.000	0.000
T3	112.50	1.297	7	1.3001	365.846	A	23.281	54.192	31.701	40.92	0.000	0.000
125.00-100.00						B	23.281	54.192		40.92	283.455	0.000
						C	23.281	54.192		40.92	80.727	0.000
T4 100.00-75.00	87.50	1.231	7	1.2678	421.967	A	65.407	23.798	37.250	41.76	0.000	0.000
						B	65.407	23.798		41.76	307.693	0.000
						C	65.407	23.798		41.76	118.765	0.000
T5 75.00-66.67	70.83	1.177	6	1.2413	151.730	A	22.332	8.246	12.367	40.45	0.000	0.000
						B	22.332	8.246		40.45	110.808	0.000
						C	22.332	8.246		40.45	41.190	0.000
T6 66.67-58.33	62.50	1.146	6	1.2258	157.264	A	22.596	8.382	12.339	39.83	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	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
						B	22.596	8.382		39.83	110.392	0.000
						C	22.596	8.382		39.83	41.109	0.000
T7 58.33-50.00	54.17	1.112	6	1.2084	160.710	A	14.047	22.993	10.312	27.84	0.000	0.000
						B	14.047	22.993		27.84	109.924	0.000
						C	14.047	22.993		27.84	41.017	0.000
T8 50.00-37.50	43.75	1.063	6	1.1829	253.384	A	15.214	29.037	19.272	43.55	0.000	0.000
						B	15.214	29.037		43.55	163.856	0.000
						C	15.214	29.037		43.55	61.325	0.000
T9 37.50-25.00	31.25	0.991	5	1.1438	265.802	A	19.771	33.477	19.109	35.89	0.000	0.000
						B	19.771	33.477		35.89	162.279	0.000
						C	19.771	33.477		35.89	61.018	0.000
T10 25.00-0.00	12.50	0.85	5	1.0436	577.032	A	81.801	18.478	46.389	46.26	0.000	0.000
						B	81.801	18.478		46.26	322.104	0.000
						C	81.801	18.478		46.26	120.468	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	155.00	1.388	11	110.170	A	10.889	8.342	8.342	43.38	0.000	0.000
160.00-150.00					B	10.889	8.342		43.38	11.710	0.000
					C	10.889	8.342		43.38	0.000	0.000
T2	137.50	1.353	11	310.425	A	19.557	20.856	20.856	51.61	0.000	0.000
150.00-125.00					B	19.557	20.856		51.61	77.900	0.000
					C	19.557	20.856		51.61	0.000	0.000
T3	112.50	1.297	10	360.425	A	23.281	20.856	20.856	47.25	0.000	0.000
125.00-100.00					B	23.281	20.856		47.25	96.612	0.000
					C	23.281	20.856		47.25	59.400	0.000
T4	87.50	1.231	10	416.680	A	58.356	0.000	30.199	51.75	0.000	0.000
100.00-75.00					B	58.356	0.000		51.75	103.979	0.000
					C	58.356	0.000		51.75	72.952	0.000
T5 75.00-66.67	70.83	1.177	9	150.004	A	20.031	0.000	10.066	50.25	0.000	0.000
					B	20.031	0.000		50.25	37.357	0.000
					C	20.031	0.000		50.25	24.933	0.000
T6 66.67-58.33	62.50	1.146	9	155.560	A	20.323	0.000	10.066	49.53	0.000	0.000
					B	20.323	0.000		49.53	37.357	0.000
					C	20.323	0.000		49.53	24.933	0.000
T7 58.33-50.00	54.17	1.112	9	159.031	A	14.047	6.952	6.952	33.11	0.000	0.000
					B	14.047	6.952		33.11	37.357	0.000
					C	14.047	6.952		33.11	24.933	0.000
T8 50.00-37.50	43.75	1.063	8	250.917	A	15.214	14.338	14.338	48.52	0.000	0.000
					B	15.214	14.338		48.52	56.036	0.000
					C	15.214	14.338		48.52	37.400	0.000
T9 37.50-25.00	31.25	0.991	8	263.417	A	19.771	14.338	14.338	42.04	0.000	0.000
					B	19.771	14.338		42.04	56.036	0.000
					C	19.771	14.338		42.04	37.400	0.000
T10 25.00-0.00	12.50	0.85	7	572.680	A	75.997	0.000	40.585	53.40	0.000	0.000
					B	75.997	0.000		53.40	113.289	0.000
					C	75.997	0.000		53.40	74.800	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 ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.20	A	0.175	2.683	51	1	1	14.911	2.04	204.06	C
160.00-150.00			B	0.175	2.683		1	1	14.911			
			C	0.175	2.683		1	1	14.911			
T2	0.41	2.35	A	0.13	2.846	50	1	1	29.342	5.51	220.39	C
150.00-125.00			B	0.13	2.846		1	1	29.342			
			C	0.13	2.846		1	1	29.342			
T3	0.83	3.92	A	0.122	2.875	48	1	1	33.128	7.66	306.37	C
125.00-100.00			B	0.122	2.875		1	1	33.128			
			C	0.122	2.875		1	1	33.128			
T4	0.97	5.15	A	0.14	2.808	45	1	1	58.356	10.39	415.49	C
100.00-75.00			B	0.14	2.808		1	1	58.356			
			C	0.14	2.808		1	1	58.356			
T5	0.35	2.13	A	0.134	2.833	43	1	1	20.031	3.46	415.54	C
75.00-66.67			B	0.134	2.833		1	1	20.031			
			C	0.134	2.833		1	1	20.031			
T6	0.35	2.16	A	0.131	2.844	42	1	1	20.323	3.41	409.25	C
66.67-58.33			B	0.131	2.844		1	1	20.323			
			C	0.131	2.844		1	1	20.323			
T7	0.35	2.29	A	0.132	2.839	41	1	1	17.477	3.02	362.94	C
58.33-50.00			B	0.132	2.839		1	1	17.477			
			C	0.132	2.839		1	1	17.477			
T8	0.52	3.06	A	0.118	2.894	39	1	1	21.064	3.89	311.18	C
50.00-37.50			B	0.118	2.894		1	1	21.064			
			C	0.118	2.894		1	1	21.064			
T9	0.52	3.38	A	0.129	2.848	36	1	1	25.852	4.02	321.33	C
37.50-25.00			B	0.129	2.848		1	1	25.852			
			C	0.129	2.848		1	1	25.852			
T10	1.05	8.95	A	0.133	2.836	31	1	1	75.997	8.73	349.01	C
25.00-0.00			B	0.133	2.836		1	1	75.997			
			C	0.133	2.836		1	1	75.997			
Sum Weight:	5.41	34.60						OTM	3871.45 kip-ft	52.13		

Tower Forces - No Ice - Wind 45 To Face

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
T1	0.06	1.20	A	0.175	2.683	51	0.825	1	13.005	1.82	181.87	C
160.00-150.00			B	0.175	2.683		0.825	1	13.005			
			C	0.175	2.683		0.825	1	13.005			
T2	0.41	2.35	A	0.13	2.846	50	0.825	1	25.920	5.10	203.91	C
150.00-125.00			B	0.13	2.846		0.825	1	25.920			
			C	0.13	2.846		0.825	1	25.920			
T3	0.83	3.92	A	0.122	2.875	48	0.825	1	29.054	7.18	287.37	C
125.00-100.00			B	0.122	2.875		0.825	1	29.054			
			C	0.122	2.875		0.825	1	29.054			
T4	0.97	5.15	A	0.14	2.808	45	0.825	1	48.144	9.28	371.36	C
100.00-75.00			B	0.14	2.808		0.825	1	48.144			

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	0.14	2.808		0.825	1	48.144			
T5	0.35	2.13	A	0.134	2.833	43	0.825	1	16.525	3.10	371.69	C
75.00-66.67			B	0.134	2.833		0.825	1	16.525			
			C	0.134	2.833		0.825	1	16.525			
T6	0.35	2.16	A	0.131	2.844	42	0.825	1	16.767	3.05	365.76	C
66.67-58.33			B	0.131	2.844		0.825	1	16.767			
			C	0.131	2.844		0.825	1	16.767			
T7	0.35	2.29	A	0.132	2.839	41	0.825	1	15.019	2.78	333.83	C
58.33-50.00			B	0.132	2.839		0.825	1	15.019			
			C	0.132	2.839		0.825	1	15.019			
T8	0.52	3.06	A	0.118	2.894	39	0.825	1	18.402	3.63	290.69	C
50.00-37.50			B	0.118	2.894		0.825	1	18.402			
			C	0.118	2.894		0.825	1	18.402			
T9	0.52	3.38	A	0.129	2.848	36	0.825	1	22.392	3.71	296.91	C
37.50-25.00			B	0.129	2.848		0.825	1	22.392			
			C	0.129	2.848		0.825	1	22.392			
T10	1.05	8.95	A	0.133	2.836	31	0.825	1	62.697	7.72	308.92	C
25.00-0.00			B	0.133	2.836		0.825	1	62.697			
			C	0.133	2.836		0.825	1	62.697			
Sum Weight:	5.41	34.60						OTM	3535.49 kip-ft	47.38		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.20	A	0.175	2.683	51	0.8	1	12.733	1.79	178.71	C
160.00-150.00			B	0.175	2.683		0.8	1	12.733			
			C	0.175	2.683		0.8	1	12.733			
T2	0.41	2.35	A	0.13	2.846	50	0.8	1	25.431	5.04	201.55	C
150.00-125.00			B	0.13	2.846		0.8	1	25.431			
			C	0.13	2.846		0.8	1	25.431			
T3	0.83	3.92	A	0.122	2.875	48	0.8	1	28.472	7.12	284.65	C
125.00-100.00			B	0.122	2.875		0.8	1	28.472			
			C	0.122	2.875		0.8	1	28.472			
T4	0.97	5.15	A	0.14	2.808	45	0.8	1	46.685	9.13	365.06	C
100.00-75.00			B	0.14	2.808		0.8	1	46.685			
			C	0.14	2.808		0.8	1	46.685			
T5	0.35	2.13	A	0.134	2.833	43	0.8	1	16.025	3.05	365.43	C
75.00-66.67			B	0.134	2.833		0.8	1	16.025			
			C	0.134	2.833		0.8	1	16.025			
T6	0.35	2.16	A	0.131	2.844	42	0.8	1	16.259	3.00	359.54	C
66.67-58.33			B	0.131	2.844		0.8	1	16.259			
			C	0.131	2.844		0.8	1	16.259			
T7	0.35	2.29	A	0.132	2.839	41	0.8	1	14.667	2.75	329.67	C
58.33-50.00			B	0.132	2.839		0.8	1	14.667			
			C	0.132	2.839		0.8	1	14.667			
T8	0.52	3.06	A	0.118	2.894	39	0.8	1	18.022	3.60	287.76	C
50.00-37.50			B	0.118	2.894		0.8	1	18.022			
			C	0.118	2.894		0.8	1	18.022			
T9	0.52	3.38	A	0.129	2.848	36	0.8	1	21.898	3.67	293.42	C
37.50-25.00			B	0.129	2.848		0.8	1	21.898			

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
			C	0.129	2.848		0.8	1	21.898			
T10	1.05	8.95	A	0.133	2.836	31	0.8	1	60.797	7.58	303.20	C
25.00-0.00			B	0.133	2.836		0.8	1	60.797			
			C	0.133	2.836		0.8	1	60.797			
Sum Weight:	5.41	34.60						OTM	3487.50 kip-ft	46.70		

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	0.06	1.20	A	0.175	2.683	51	0.85	1	13.277	1.85	185.04	C
160.00-150.00			B	0.175	2.683		0.85	1	13.277			
			C	0.175	2.683		0.85	1	13.277			
T2	0.41	2.35	A	0.13	2.846	50	0.85	1	26.408	5.16	206.26	C
150.00-125.00			B	0.13	2.846		0.85	1	26.408			
			C	0.13	2.846		0.85	1	26.408			
T3	0.83	3.92	A	0.122	2.875	48	0.85	1	29.636	7.25	290.08	C
125.00-100.00			B	0.122	2.875		0.85	1	29.636			
			C	0.122	2.875		0.85	1	29.636			
T4	0.97	5.15	A	0.14	2.808	45	0.85	1	49.603	9.44	377.67	C
100.00-75.00			B	0.14	2.808		0.85	1	49.603			
			C	0.14	2.808		0.85	1	49.603			
T5	0.35	2.13	A	0.134	2.833	43	0.85	1	17.026	3.15	377.96	C
75.00-66.67			B	0.134	2.833		0.85	1	17.026			
			C	0.134	2.833		0.85	1	17.026			
T6	0.35	2.16	A	0.131	2.844	42	0.85	1	17.275	3.10	371.97	C
66.67-58.33			B	0.131	2.844		0.85	1	17.275			
			C	0.131	2.844		0.85	1	17.275			
T7	0.35	2.29	A	0.132	2.839	41	0.85	1	15.370	2.82	337.99	C
58.33-50.00			B	0.132	2.839		0.85	1	15.370			
			C	0.132	2.839		0.85	1	15.370			
T8	0.52	3.06	A	0.118	2.894	39	0.85	1	18.782	3.67	293.62	C
50.00-37.50			B	0.118	2.894		0.85	1	18.782			
			C	0.118	2.894		0.85	1	18.782			
T9	0.52	3.38	A	0.129	2.848	36	0.85	1	22.887	3.76	300.40	C
37.50-25.00			B	0.129	2.848		0.85	1	22.887			
			C	0.129	2.848		0.85	1	22.887			
T10	1.05	8.95	A	0.133	2.836	31	0.85	1	64.597	7.87	314.65	C
25.00-0.00			B	0.133	2.836		0.85	1	64.597			
			C	0.133	2.836		0.85	1	64.597			
Sum Weight:	5.41	34.60						OTM	3583.49 kip-ft	48.06		

Tower Forces - With 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	0.41	3.00	A	0.307	2.278	8	1	1	25.089	0.49	49.49	C
160.00-150.00			B	0.307	2.278		1	1	25.089			
			C	0.307	2.278		1	1	25.089			
T2	2.71	5.86	A	0.229	2.503	7	1	1	50.111	1.63	65.28	C
150.00-125.00			B	0.229	2.503		1	1	50.111			
			C	0.229	2.503		1	1	50.111			
T3	5.25	8.17	A	0.212	2.557	7	1	1	54.530	2.15	85.90	C
125.00-100.00			B	0.212	2.557		1	1	54.530			
			C	0.212	2.557		1	1	54.530			
T4	5.90	10.63	A	0.211	2.558	7	1	1	79.128	2.61	104.31	C
100.00-75.00			B	0.211	2.558		1	1	79.128			
			C	0.211	2.558		1	1	79.128			
T5	2.06	4.02	A	0.202	2.591	6	1	1	27.071	0.88	105.37	C
75.00-66.67			B	0.202	2.591		1	1	27.071			
			C	0.202	2.591		1	1	27.071			
T6	2.04	4.07	A	0.197	2.606	6	1	1	27.407	0.86	103.26	C
66.67-58.33			B	0.197	2.606		1	1	27.407			
			C	0.197	2.606		1	1	27.407			
T7	2.02	4.33	A	0.23	2.497	6	1	1	27.394	0.82	98.13	C
58.33-50.00			B	0.23	2.497		1	1	27.394			
			C	0.23	2.497		1	1	27.394			
T8	2.99	5.39	A	0.175	2.683	6	1	1	31.780	1.08	86.69	C
50.00-37.50			B	0.175	2.683		1	1	31.780			
			C	0.175	2.683		1	1	31.780			
T9	2.92	6.11	A	0.2	2.595	5	1	1	39.005	1.08	86.20	C
37.50-25.00			B	0.2	2.595		1	1	39.005			
			C	0.2	2.595		1	1	39.005			
T10	5.57	14.35	A	0.174	2.686	5	1	1	92.340	2.02	80.74	C
25.00-0.00			B	0.174	2.686		1	1	92.340			
			C	0.174	2.686		1	1	92.340			
Sum Weight:	31.88	65.95						OTM	1037.47 kip-ft	13.62		

Tower Forces - With Ice - Wind 45 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	0.41	3.00	A	0.307	2.278	8	0.825	1	23.183	0.47	46.71	C
160.00-150.00			B	0.307	2.278		0.825	1	23.183			
			C	0.307	2.278		0.825	1	23.183			
T2	2.71	5.86	A	0.229	2.503	7	0.825	1	46.688	1.58	63.14	C
150.00-125.00			B	0.229	2.503		0.825	1	46.688			
			C	0.229	2.503		0.825	1	46.688			
T3	5.25	8.17	A	0.212	2.557	7	0.825	1	50.456	2.08	83.40	C
125.00-100.00			B	0.212	2.557		0.825	1	50.456			
			C	0.212	2.557		0.825	1	50.456			
T4	5.90	10.63	A	0.211	2.558	7	0.825	1	67.682	2.44	97.65	C
100.00-75.00			B	0.211	2.558		0.825	1	67.682			
			C	0.211	2.558		0.825	1	67.682			
T5	2.06	4.02	A	0.202	2.591	6	0.825	1	23.163	0.82	98.75	C
75.00-66.67			B	0.202	2.591		0.825	1	23.163			
			C	0.202	2.591		0.825	1	23.163			

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
T6	2.04	4.07	A	0.197	2.606	6	0.825	1	23.453	0.81	96.70	C
66.67-58.33			B	0.197	2.606		0.825	1	23.453			
			C	0.197	2.606		0.825	1	23.453			
T7	2.02	4.33	A	0.23	2.497	6	0.825	1	24.936	0.79	94.34	C
58.33-50.00			B	0.23	2.497		0.825	1	24.936			
			C	0.23	2.497		0.825	1	24.936			
T8	2.99	5.39	A	0.175	2.683	6	0.825	1	29.118	1.05	83.88	C
50.00-37.50			B	0.175	2.683		0.825	1	29.118			
			C	0.175	2.683		0.825	1	29.118			
T9	2.92	6.11	A	0.2	2.595	5	0.825	1	35.545	1.04	82.91	C
37.50-25.00			B	0.2	2.595		0.825	1	35.545			
			C	0.2	2.595		0.825	1	35.545			
T10	5.57	14.35	A	0.174	2.686	5	0.825	1	78.025	1.87	74.70	C
25.00-0.00			B	0.174	2.686		0.825	1	78.025			
			C	0.174	2.686		0.825	1	78.025			
Sum Weight:	31.88	65.95						OTM	990.43 kip-ft	12.94		

Tower Forces - With 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 ft^2	F K	w plf	Ctrl. Face
T1	0.41	3.00	A	0.307	2.278	8	0.8	1	22.911	0.46	46.31	C
160.00-150.00			B	0.307	2.278		0.8	1	22.911			
			C	0.307	2.278		0.8	1	22.911			
T2	2.71	5.86	A	0.229	2.503	7	0.8	1	46.199	1.57	62.83	C
150.00-125.00			B	0.229	2.503		0.8	1	46.199			
			C	0.229	2.503		0.8	1	46.199			
T3	5.25	8.17	A	0.212	2.557	7	0.8	1	49.874	2.08	83.04	C
125.00-100.00			B	0.212	2.557		0.8	1	49.874			
			C	0.212	2.557		0.8	1	49.874			
T4	5.90	10.63	A	0.211	2.558	7	0.8	1	66.047	2.42	96.69	C
100.00-75.00			B	0.211	2.558		0.8	1	66.047			
			C	0.211	2.558		0.8	1	66.047			
T5	2.06	4.02	A	0.202	2.591	6	0.8	1	22.605	0.82	97.81	C
75.00-66.67			B	0.202	2.591		0.8	1	22.605			
			C	0.202	2.591		0.8	1	22.605			
T6	2.04	4.07	A	0.197	2.606	6	0.8	1	22.888	0.80	95.76	C
66.67-58.33			B	0.197	2.606		0.8	1	22.888			
			C	0.197	2.606		0.8	1	22.888			
T7	2.02	4.33	A	0.23	2.497	6	0.8	1	24.584	0.78	93.79	C
58.33-50.00			B	0.23	2.497		0.8	1	24.584			
			C	0.23	2.497		0.8	1	24.584			
T8	2.99	5.39	A	0.175	2.683	6	0.8	1	28.737	1.04	83.48	C
50.00-37.50			B	0.175	2.683		0.8	1	28.737			
			C	0.175	2.683		0.8	1	28.737			
T9	2.92	6.11	A	0.2	2.595	5	0.8	1	35.051	1.03	82.44	C
37.50-25.00			B	0.2	2.595		0.8	1	35.051			
			C	0.2	2.595		0.8	1	35.051			
T10	5.57	14.35	A	0.174	2.686	5	0.8	1	75.980	1.85	73.83	C
25.00-0.00			B	0.174	2.686		0.8	1	75.980			
			C	0.174	2.686		0.8	1	75.980			

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
Sum Weight:	31.88	65.95						OTM	983.71 kip-ft	12.84		

Tower Forces - With 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 ft^2	F K	w plf	Ctrl. Face
T1	0.41	3.00	A	0.307	2.278	8	0.85	1	23.455	0.47	47.10	C
160.00-150.00			B	0.307	2.278		0.85	1	23.455			
			C	0.307	2.278		0.85	1	23.455			
T2	2.71	5.86	A	0.229	2.503	7	0.85	1	47.177	1.59	63.45	C
150.00-125.00			B	0.229	2.503		0.85	1	47.177			
			C	0.229	2.503		0.85	1	47.177			
T3	5.25	8.17	A	0.212	2.557	7	0.85	1	51.038	2.09	83.75	C
125.00-100.00			B	0.212	2.557		0.85	1	51.038			
			C	0.212	2.557		0.85	1	51.038			
T4	5.90	10.63	A	0.211	2.558	7	0.85	1	69.317	2.46	98.60	C
100.00-75.00			B	0.211	2.558		0.85	1	69.317			
			C	0.211	2.558		0.85	1	69.317			
T5	2.06	4.02	A	0.202	2.591	6	0.85	1	23.721	0.83	99.70	C
75.00-66.67			B	0.202	2.591		0.85	1	23.721			
			C	0.202	2.591		0.85	1	23.721			
T6	2.04	4.07	A	0.197	2.606	6	0.85	1	24.017	0.81	97.64	C
66.67-58.33			B	0.197	2.606		0.85	1	24.017			
			C	0.197	2.606		0.85	1	24.017			
T7	2.02	4.33	A	0.23	2.497	6	0.85	1	25.287	0.79	94.88	C
58.33-50.00			B	0.23	2.497		0.85	1	25.287			
			C	0.23	2.497		0.85	1	25.287			
T8	2.99	5.39	A	0.175	2.683	6	0.85	1	29.498	1.05	84.28	C
50.00-37.50			B	0.175	2.683		0.85	1	29.498			
			C	0.175	2.683		0.85	1	29.498			
T9	2.92	6.11	A	0.2	2.595	5	0.85	1	36.039	1.04	83.38	C
37.50-25.00			B	0.2	2.595		0.85	1	36.039			
			C	0.2	2.595		0.85	1	36.039			
T10	5.57	14.35	A	0.174	2.686	5	0.85	1	80.070	1.89	75.56	C
25.00-0.00			B	0.174	2.686		0.85	1	80.070			
			C	0.174	2.686		0.85	1	80.070			
Sum Weight:	31.88	65.95						OTM	997.15 kip-ft	13.04		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.20	A	0.175	2.683	11	1	1	15.648	0.45	45.30	C

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
160.00-150.00			B	0.175	2.683		1	1	15.648			
			C	0.175	2.683		1	1	15.648			
T2	0.41	2.35	A	0.13	2.846	11	1	1	31.357	1.23	49.01	C
150.00-125.00			B	0.13	2.846		1	1	31.357			
			C	0.13	2.846		1	1	31.357			
T3	0.83	3.92	A	0.122	2.875	10	1	1	35.071	1.68	67.19	C
125.00-100.00			B	0.122	2.875		1	1	35.071			
			C	0.122	2.875		1	1	35.071			
T4	0.97	5.15	A	0.14	2.808	10	1	1	58.356	2.21	88.51	C
100.00-75.00			B	0.14	2.808		1	1	58.356			
			C	0.14	2.808		1	1	58.356			
T5	0.35	2.13	A	0.134	2.833	9	1	1	20.031	0.74	88.52	C
75.00-66.67			B	0.134	2.833		1	1	20.031			
			C	0.134	2.833		1	1	20.031			
T6	0.35	2.16	A	0.131	2.844	9	1	1	20.323	0.73	87.18	C
66.67-58.33			B	0.131	2.844		1	1	20.323			
			C	0.131	2.844		1	1	20.323			
T7	0.35	2.29	A	0.132	2.839	9	1	1	17.981	0.65	78.59	C
58.33-50.00			B	0.132	2.839		1	1	17.981			
			C	0.132	2.839		1	1	17.981			
T8	0.52	3.06	A	0.118	2.894	8	1	1	23.316	0.87	69.98	C
50.00-37.50			B	0.118	2.894		1	1	23.316			
			C	0.118	2.894		1	1	23.316			
T9	0.52	3.38	A	0.129	2.848	8	1	1	27.883	0.89	71.50	C
37.50-25.00			B	0.129	2.848		1	1	27.883			
			C	0.129	2.848		1	1	27.883			
T10	1.05	8.95	A	0.133	2.836	7	1	1	75.997	1.86	74.35	C
25.00-0.00			B	0.133	2.836		1	1	75.997			
			C	0.133	2.836		1	1	75.997			
Sum Weight:	5.41	34.60						OTM	843.84 kip-ft	11.32		

Tower Forces - Service - Wind 45 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	0.06	1.20	A	0.175	2.683	11	0.825	1	13.742	0.41	40.57	C
160.00-150.00			B	0.175	2.683		0.825	1	13.742			
			C	0.175	2.683		0.825	1	13.742			
T2	0.41	2.35	A	0.13	2.846	11	0.825	1	27.935	1.14	45.50	C
150.00-125.00			B	0.13	2.846		0.825	1	27.935			
			C	0.13	2.846		0.825	1	27.935			
T3	0.83	3.92	A	0.122	2.875	10	0.825	1	30.997	1.58	63.14	C
125.00-100.00			B	0.122	2.875		0.825	1	30.997			
			C	0.122	2.875		0.825	1	30.997			
T4	0.97	5.15	A	0.14	2.808	10	0.825	1	48.144	1.98	79.11	C
100.00-75.00			B	0.14	2.808		0.825	1	48.144			
			C	0.14	2.808		0.825	1	48.144			
T5	0.35	2.13	A	0.134	2.833	9	0.825	1	16.525	0.66	79.18	C
75.00-66.67			B	0.134	2.833		0.825	1	16.525			
			C	0.134	2.833		0.825	1	16.525			
T6	0.35	2.16	A	0.131	2.844	9	0.825	1	16.767	0.65	77.91	C

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
66.67-58.33			B	0.131	2.844		0.825	1	16.767			
			C	0.131	2.844		0.825	1	16.767			
T7	0.35	2.29	A	0.132	2.839	9	0.825	1	15.523	0.60	72.38	C
58.33-50.00			B	0.132	2.839		0.825	1	15.523			
			C	0.132	2.839		0.825	1	15.523			
T8	0.52	3.06	A	0.118	2.894	8	0.825	1	20.654	0.82	65.61	C
50.00-37.50			B	0.118	2.894		0.825	1	20.654			
			C	0.118	2.894		0.825	1	20.654			
T9	0.52	3.38	A	0.129	2.848	8	0.825	1	24.423	0.83	66.30	C
37.50-25.00			B	0.129	2.848		0.825	1	24.423			
			C	0.129	2.848		0.825	1	24.423			
T10	1.05	8.95	A	0.133	2.836	7	0.825	1	62.697	1.65	65.81	C
25.00-0.00			B	0.133	2.836		0.825	1	62.697			
			C	0.133	2.836		0.825	1	62.697			
Sum Weight:	5.41	34.60						OTM	772.28 kip-ft	10.31		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.20	A	0.175	2.683	11	0.8	1	13.470	0.40	39.90	C
160.00-150.00			B	0.175	2.683		0.8	1	13.470			
			C	0.175	2.683		0.8	1	13.470			
T2	0.41	2.35	A	0.13	2.846	11	0.8	1	27.446	1.13	45.00	C
150.00-125.00			B	0.13	2.846		0.8	1	27.446			
			C	0.13	2.846		0.8	1	27.446			
T3	0.83	3.92	A	0.122	2.875	10	0.8	1	30.415	1.56	62.57	C
125.00-100.00			B	0.122	2.875		0.8	1	30.415			
			C	0.122	2.875		0.8	1	30.415			
T4	0.97	5.15	A	0.14	2.808	10	0.8	1	46.685	1.94	77.76	C
100.00-75.00			B	0.14	2.808		0.8	1	46.685			
			C	0.14	2.808		0.8	1	46.685			
T5	0.35	2.13	A	0.134	2.833	9	0.8	1	16.025	0.65	77.84	C
75.00-66.67			B	0.134	2.833		0.8	1	16.025			
			C	0.134	2.833		0.8	1	16.025			
T6	0.35	2.16	A	0.131	2.844	9	0.8	1	16.259	0.64	76.59	C
66.67-58.33			B	0.131	2.844		0.8	1	16.259			
			C	0.131	2.844		0.8	1	16.259			
T7	0.35	2.29	A	0.132	2.839	9	0.8	1	15.172	0.60	71.50	C
58.33-50.00			B	0.132	2.839		0.8	1	15.172			
			C	0.132	2.839		0.8	1	15.172			
T8	0.52	3.06	A	0.118	2.894	8	0.8	1	20.273	0.81	64.99	C
50.00-37.50			B	0.118	2.894		0.8	1	20.273			
			C	0.118	2.894		0.8	1	20.273			
T9	0.52	3.38	A	0.129	2.848	8	0.8	1	23.929	0.82	65.56	C
37.50-25.00			B	0.129	2.848		0.8	1	23.929			
			C	0.129	2.848		0.8	1	23.929			
T10	1.05	8.95	A	0.133	2.836	7	0.8	1	60.797	1.61	64.59	C
25.00-0.00			B	0.133	2.836		0.8	1	60.797			
			C	0.133	2.836		0.8	1	60.797			
Sum Weight:	5.41	34.60						OTM	762.05	10.16		

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
									kip-ft			

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 ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.20	A	0.175	2.683	11	0.85	1	14.015	0.41	41.25	C
160.00-150.00			B	0.175	2.683		0.85	1	14.015			
			C	0.175	2.683		0.85	1	14.015			
T2	0.41	2.35	A	0.13	2.846	11	0.85	1	28.424	1.15	46.00	C
150.00-125.00			B	0.13	2.846		0.85	1	28.424			
			C	0.13	2.846		0.85	1	28.424			
T3	0.83	3.92	A	0.122	2.875	10	0.85	1	31.579	1.59	63.72	C
125.00-100.00			B	0.122	2.875		0.85	1	31.579			
			C	0.122	2.875		0.85	1	31.579			
T4	0.97	5.15	A	0.14	2.808	10	0.85	1	49.603	2.01	80.45	C
100.00-75.00			B	0.14	2.808		0.85	1	49.603			
			C	0.14	2.808		0.85	1	49.603			
T5	0.35	2.13	A	0.134	2.833	9	0.85	1	17.026	0.67	80.51	C
75.00-66.67			B	0.134	2.833		0.85	1	17.026			
			C	0.134	2.833		0.85	1	17.026			
T6	0.35	2.16	A	0.131	2.844	9	0.85	1	17.275	0.66	79.24	C
66.67-58.33			B	0.131	2.844		0.85	1	17.275			
			C	0.131	2.844		0.85	1	17.275			
T7	0.35	2.29	A	0.132	2.839	9	0.85	1	15.874	0.61	73.27	C
58.33-50.00			B	0.132	2.839		0.85	1	15.874			
			C	0.132	2.839		0.85	1	15.874			
T8	0.52	3.06	A	0.118	2.894	8	0.85	1	21.034	0.83	66.24	C
50.00-37.50			B	0.118	2.894		0.85	1	21.034			
			C	0.118	2.894		0.85	1	21.034			
T9	0.52	3.38	A	0.129	2.848	8	0.85	1	24.917	0.84	67.04	C
37.50-25.00			B	0.129	2.848		0.85	1	24.917			
			C	0.129	2.848		0.85	1	24.917			
T10	1.05	8.95	A	0.133	2.836	7	0.85	1	64.597	1.68	67.03	C
25.00-0.00			B	0.133	2.836		0.85	1	64.597			
			C	0.133	2.836		0.85	1	64.597			
Sum Weight:	5.41	34.60						OTM	782.50 kip-ft	10.45		

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	11.93					
Bracing Weight	22.66					

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
Total Member Self-Weight	34.60			-10.59	-15.05	
Total Weight	49.49			-10.59	-15.05	
Wind 0 deg - No Ice		-0.12	-74.10	-6583.78	-8.97	55.21
Wind 30 deg - No Ice		34.68	-60.59	-5450.71	-3127.76	31.03
Wind 45 deg - No Ice		48.63	-48.95	-4416.67	-4386.30	15.30
Wind 60 deg - No Ice		59.01	-34.23	-3099.94	-5329.38	-1.48
Wind 90 deg - No Ice		69.57	0.12	-4.51	-6251.01	-33.58
Wind 120 deg - No Ice		63.83	37.15	3281.27	-5667.98	-56.69
Wind 135 deg - No Ice		50.72	51.04	4539.84	-4530.65	-62.79
Wind 150 deg - No Ice		34.89	60.71	5435.61	-3138.30	-64.61
Wind 180 deg - No Ice		0.12	68.67	6178.64	-21.14	-55.21
Wind 210 deg - No Ice		-34.68	60.59	5429.52	3097.66	-31.03
Wind 225 deg - No Ice		-48.63	48.95	4395.49	4356.20	-15.30
Wind 240 deg - No Ice		-63.71	36.94	3270.73	5631.79	1.48
Wind 270 deg - No Ice		-69.57	-0.12	-16.68	6220.91	33.58
Wind 300 deg - No Ice		-59.14	-34.44	-3110.48	5305.36	56.69
Wind 315 deg - No Ice		-48.80	-49.13	-4425.28	4364.80	62.79
Wind 330 deg - No Ice		-34.89	-60.71	-5456.79	3108.20	64.61
Member Ice	31.36					
Total Weight Ice	118.84			-51.83	-72.51	
Wind 0 deg - Ice		-0.01	-18.32	-1683.25	-72.76	20.63
Wind 30 deg - Ice		8.82	-15.35	-1429.89	-863.76	8.56
Wind 45 deg - Ice		12.41	-12.46	-1172.33	-1186.63	1.43
Wind 60 deg - Ice		15.11	-8.76	-840.88	-1431.11	-5.80
Wind 90 deg - Ice		17.65	0.01	-52.08	-1654.59	-18.61
Wind 120 deg - Ice		15.80	9.17	763.66	-1477.42	-26.44
Wind 135 deg - Ice		12.70	12.75	1087.33	-1205.28	-27.75
Wind 150 deg - Ice		8.84	15.36	1325.98	-863.33	-27.18
Wind 180 deg - Ice		0.01	17.54	1525.83	-72.26	-20.63
Wind 210 deg - Ice		-8.82	15.35	1326.23	718.75	-8.56
Wind 225 deg - Ice		-12.41	12.46	1068.67	1041.62	-1.43
Wind 240 deg - Ice		-15.79	9.15	764.10	1332.66	5.80
Wind 270 deg - Ice		-17.65	-0.01	-51.58	1509.57	18.61
Wind 300 deg - Ice		-15.13	-8.78	-840.44	1285.85	26.44
Wind 315 deg - Ice		-12.42	-12.48	-1171.98	1041.26	27.75
Wind 330 deg - Ice		-8.84	-15.36	-1429.64	718.32	27.18
Total Weight	49.49			-10.59	-15.05	
Wind 0 deg - Service		-0.03	-16.01	-1427.11	-2.77	11.76
Wind 30 deg - Service		7.50	-13.10	-1183.04	-677.21	6.55
Wind 45 deg - Service		10.52	-10.59	-959.57	-949.47	3.18
Wind 60 deg - Service		12.77	-7.40	-674.91	-1153.57	-0.41
Wind 90 deg - Service		15.04	0.03	-5.45	-1352.59	-7.26
Wind 120 deg - Service		13.79	8.03	704.55	-1225.69	-12.16
Wind 135 deg - Service		10.96	11.03	976.82	-980.22	-13.45
Wind 150 deg - Service		7.54	13.13	1170.84	-679.45	-13.81
Wind 180 deg - Service		0.03	14.85	1331.82	-5.36	-11.76
Wind 210 deg - Service		-7.50	13.10	1169.54	669.07	-6.55
Wind 225 deg - Service		-10.52	10.59	946.07	941.34	-3.18
Wind 240 deg - Service		-13.77	7.98	702.31	1216.26	0.41
Wind 270 deg - Service		-15.04	-0.03	-8.05	1344.46	7.26
Wind 300 deg - Service		-12.79	-7.45	-677.16	1146.73	12.16
Wind 315 deg - Service		-10.55	-10.62	-961.41	943.17	13.45
Wind 330 deg - Service		-7.54	-13.13	-1184.34	671.32	13.81

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 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service

Comb. No.	Description
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

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	160 - 150	Leg	Max Tension	29	2.88	-0.18	-0.01
			Max. Compression	2	-4.83	-0.32	-0.01
			Max. Mx	18	1.35	0.34	0.01
			Max. My	16	-1.75	0.01	0.29
			Max. Vy	18	-0.91	0.00	0.00
			Max. Vx	18	-1.21	0.00	0.00
		Diagonal	Max Tension	21	2.32	0.00	0.00
			Max. Compression	20	-2.45	0.00	0.00
			Max. Mx	36	0.53	0.09	0.00
			Max. My	35	-0.09	0.00	-0.00
			Max. Vy	36	-0.05	0.00	0.00
			Max. Vx	35	0.00	0.00	0.00
		Horizontal	Max Tension	6	1.82	0.02	0.01
			Max. Compression	23	-1.75	0.02	0.00
			Max. Mx	48	-0.03	0.06	0.01
			Max. My	35	0.19	0.05	0.01
			Max. Vy	48	0.05	0.06	0.01
			Max. Vx	35	-0.00	0.00	0.00
		Top Girt	Max Tension	7	1.44	0.01	0.00
			Max. Compression	2	-1.51	0.02	0.00
			Max. Mx	48	-0.22	0.05	0.01
			Max. My	35	0.22	0.05	0.01
			Max. Vy	48	0.05	0.05	0.01
			Max. Vx	35	-0.00	0.00	0.00
T2	150 - 125	Leg	Max Tension	29	16.97	-0.79	-0.09
			Max. Compression	2	-23.63	0.10	-0.08
			Max. Mx	18	7.08	1.97	0.07
			Max. My	20	-1.29	-0.02	-2.04
			Max. Vy	18	-2.06	-1.44	0.07
			Max. Vx	4	-2.05	-0.04	-1.35
		Diagonal	Max Tension	16	8.56	0.00	0.00
			Max. Compression	16	-8.68	0.00	0.00
			Max. Mx	36	1.91	0.15	0.00
			Max. My	35	0.02	0.00	-0.01
			Max. Vy	36	-0.06	0.00	0.00
			Max. Vx	35	0.00	0.00	0.00
		Horizontal	Max Tension	16	5.30	0.02	0.01
			Max. Compression	14	-5.38	0.02	0.01
			Max. Mx	48	-0.27	0.06	0.02
			Max. My	35	0.15	0.06	0.02
			Max. Vy	48	0.05	0.06	0.02
			Max. Vx	35	-0.00	0.00	0.00
T3	125 - 100	Leg	Max Tension	19	52.53	-0.60	0.12
			Max. Compression	2	-65.29	0.35	-0.03
			Max. Mx	25	-48.26	0.61	0.07
			Max. My	4	-4.72	-0.01	-0.70
			Max. Vy	28	0.67	-0.61	-0.05
			Max. Vx	4	0.83	-0.01	-0.70
		Diagonal	Max Tension	17	12.78	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	16	-13.08	0.00	0.00
			Max. Mx	36	2.64	0.23	0.00
			Max. My	40	0.12	0.00	0.01
			Max. Vy	36	0.08	0.00	0.00
			Max. Vx	40	0.00	0.00	0.00
		Horizontal	Max Tension	16	8.66	0.05	-0.00
			Max. Compression	15	-8.60	0.05	0.00
			Max. Mx	38	0.05	0.13	0.00
			Max. My	2	1.42	0.01	-0.02
			Max. Vy	38	-0.08	0.13	0.00
			Max. Vx	2	0.00	0.01	-0.02
		Inner Bracing	Max Tension	25	0.01	0.00	0.00
			Max. Compression	30	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.07	0.00
			Max. My	2	0.01	0.00	-0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
T4	100 - 75	Leg	Max Tension	9	99.71	-0.74	0.09
			Max. Compression	2	-120.74	1.24	-0.37
			Max. Mx	28	64.90	1.38	-0.03
			Max. My	12	45.22	-0.72	1.52
			Max. Vy	18	0.98	-1.27	0.38
			Max. Vx	12	-1.22	-0.72	1.52
		Diagonal	Max Tension	17	16.72	0.00	0.00
			Max. Compression	16	-17.10	0.00	0.00
			Max. Mx	36	3.32	0.28	0.00
			Max. My	40	0.19	0.00	0.01
			Max. Vy	36	-0.09	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Horizontal	Max Tension	16	12.10	0.10	-0.00
			Max. Compression	15	-12.02	0.09	0.00
			Max. Mx	38	0.15	0.19	0.00
			Max. My	2	1.72	0.05	-0.03
			Max. Vy	38	-0.11	0.19	0.00
			Max. Vx	2	0.00	0.05	-0.03
		Top Girt	Max Tension	16	9.68	0.05	-0.00
			Max. Compression	15	-9.56	0.04	0.01
			Max. Mx	38	0.07	0.11	0.00
			Max. My	2	1.41	0.02	-0.02
			Max. Vy	38	-0.07	0.11	0.00
			Max. Vx	2	0.00	0.02	-0.02
		Inner Bracing	Max Tension	25	0.01	0.00	0.00
			Max. Compression	30	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.09	0.00
			Max. My	2	0.01	0.00	-0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
T5	75 - 66.6667	Leg	Max Tension	9	117.59	-1.16	0.05
			Max. Compression	2	-141.21	0.70	0.04
			Max. Mx	18	114.34	-1.27	0.38
			Max. My	12	54.41	-0.72	1.52
			Max. Vy	3	0.24	1.25	-0.37
			Max. Vx	2	-0.35	-0.72	-1.50
		Diagonal	Max Tension	17	19.19	0.00	0.00
			Max. Compression	16	-19.63	0.00	0.00
			Max. Mx	36	3.58	0.34	0.00
			Max. My	40	0.26	0.00	0.01
			Max. Vy	36	-0.11	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Horizontal	Max Tension	16	14.13	0.11	-0.00
			Max. Compression	15	-14.13	0.09	0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	38	0.07	0.20	0.00
			Max. My	2	2.46	0.07	-0.03
			Max. Vy	38	-0.11	0.20	0.00
			Max. Vx	2	0.00	0.07	-0.03
		Inner Bracing	Max Tension	25	0.01	0.00	0.00
			Max. Compression	30	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.09	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T6	66.6667 - 58.3333	Leg	Max Tension	9	136.85	-0.58	-0.02
			Max. Compression	2	-163.66	-0.66	-0.11
			Max. Mx	24	-160.81	0.70	0.02
			Max. My	4	-10.85	-0.14	-1.31
			Max. Vy	24	0.33	0.70	0.02
			Max. Vx	2	0.32	0.10	-1.25
		Diagonal	Max Tension	17	19.42	0.00	0.00
			Max. Compression	16	-19.89	0.00	0.00
			Max. Mx	36	3.68	0.35	0.00
			Max. My	40	0.25	0.00	0.01
			Max. Vy	36	-0.11	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Top Girt	Max Tension	16	14.60	0.12	-0.00
			Max. Compression	17	-14.40	0.09	-0.00
			Max. Mx	38	0.36	0.22	0.00
			Max. My	2	1.69	0.07	-0.03
			Max. Vy	38	-0.11	0.22	0.00
			Max. Vx	2	0.00	0.07	-0.03
		Inner Bracing	Max Tension	25	0.00	0.00	0.00
			Max. Compression	16	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.10	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T7	58.3333 - 50	Leg	Max Tension	9	155.25	0.38	0.01
			Max. Compression	2	-185.71	-0.09	-0.11
			Max. Mx	2	-185.63	2.31	0.09
			Max. My	4	-11.53	-0.14	-1.31
			Max. Vy	2	-0.76	2.31	0.09
			Max. Vx	4	-0.55	-0.14	-1.31
		Diagonal	Max Tension	17	19.87	-0.13	0.01
			Max. Compression	16	-20.37	0.00	0.00
			Max. Mx	30	11.02	-0.22	0.01
			Max. My	48	-4.98	-0.04	0.02
			Max. Vy	37	0.08	-0.10	-0.02
			Max. Vx	48	0.00	0.00	0.00
		Top Girt	Max Tension	16	14.99	0.13	-0.00
			Max. Compression	15	-15.14	0.11	0.00
			Max. Mx	38	-0.23	0.24	0.00
			Max. My	2	2.03	0.06	-0.03
			Max. Vy	38	-0.12	0.24	0.00
			Max. Vx	2	0.00	0.06	-0.03
		Redund Horz 1 Bracing	Max Tension	28	1.11	0.00	0.00
			Max. Compression	15	-1.14	0.00	0.00
			Max. Mx	34	0.22	-0.03	0.00
			Max. My	48	0.01	0.00	0.00
			Max. Vy	34	0.02	0.00	0.00
			Max. Vx	48	0.00	0.00	0.00
		Redund Diag 1	Max Tension	14	0.90	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Bracing					
			Max. Compression	29	-0.70	0.00	0.00
			Max. Mx	36	0.03	-0.04	0.00
			Max. My	40	0.26	0.00	-0.00
			Max. Vy	36	0.02	0.00	0.00
			Max. Vx	40	0.00	0.00	0.00
		Inner Bracing	Max Tension	25	0.00	0.00	0.00
			Max. Compression	16	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.10	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.05	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T8	50 - 37.5	Leg	Max Tension	9	175.29	-0.08	-0.00
			Max. Compression	2	-209.01	-0.86	-0.16
			Max. Mx	2	-209.01	-1.03	-0.16
			Max. My	4	-12.90	-0.18	-1.76
			Max. Vy	25	0.22	-0.06	0.00
			Max. Vx	2	0.25	0.13	-1.68
		Diagonal	Max Tension	17	24.84	0.00	0.00
			Max. Compression	16	-25.40	0.00	0.00
			Max. Mx	36	4.87	0.62	0.00
			Max. My	40	0.48	0.00	0.02
			Max. Vy	36	-0.15	0.00	0.00
			Max. Vx	40	-0.01	0.00	0.00
		Top Girt	Max Tension	16	15.67	0.10	-0.00
			Max. Compression	17	-15.57	0.08	-0.00
			Max. Mx	38	0.38	0.26	0.01
			Max. My	2	-0.47	-0.00	-0.05
			Max. Vy	38	-0.11	0.26	0.01
			Max. Vx	2	0.01	-0.00	-0.05
		Inner Bracing	Max Tension	25	0.01	0.00	0.00
			Max. Compression	30	-0.02	0.00	0.00
			Max. Mx	34	-0.01	-0.12	0.00
			Max. My	12	0.01	0.00	-0.00
			Max. Vy	34	0.05	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T9	37.5 - 25	Leg	Max Tension	19	201.99	0.47	0.16
			Max. Compression	2	-241.25	-2.66	-0.22
			Max. Mx	2	-241.09	5.93	0.18
			Max. My	4	-14.36	-0.33	-2.28
			Max. Vy	2	1.45	5.93	0.18
			Max. Vx	4	0.67	-0.33	-2.28
		Diagonal	Max Tension	17	25.55	-0.25	0.01
			Max. Compression	14	-26.04	0.00	0.00
			Max. Mx	30	14.56	-0.37	0.02
			Max. My	42	-7.62	-0.04	-0.03
			Max. Vy	37	0.10	-0.18	-0.03
			Max. Vx	42	-0.01	0.00	0.00
		Top Girt	Max Tension	16	16.10	0.14	-0.00
			Max. Compression	15	-16.37	0.14	0.01
			Max. Mx	38	-0.22	0.31	0.01
			Max. My	2	2.07	0.01	-0.05
			Max. Vy	38	-0.13	0.31	0.01
			Max. Vx	2	0.01	0.01	-0.05
		Redund Horz 1 Bracing	Max Tension	30	1.54	0.00	0.00
			Max. Compression	33	-1.70	0.00	0.00
			Max. Mx	34	0.32	-0.03	0.00
			Max. My	42	-0.09	0.00	0.00
			Max. Vy	34	0.03	0.00	0.00
			Max. Vx	42	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Redund Diag 1 Bracing	Max Tension	32	1.54	0.00	0.00
			Max. Compression	31	-1.16	0.00	0.00
			Max. Mx	41	-0.16	-0.05	0.00
			Max. My	40	0.32	0.00	-0.00
			Max. Vy	41	0.02	0.00	0.00
			Max. Vx	40	0.00	0.00	0.00
		Inner Bracing	Max Tension	25	0.01	0.00	0.00
			Max. Compression	16	-0.02	0.00	0.00
			Max. Mx	34	-0.01	-0.13	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	-0.05	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T10	25 - 0	Leg	Max Tension	19	259.93	-2.55	0.09
			Max. Compression	2	-309.55	0.00	-0.00
			Max. Mx	2	-276.28	2.89	-0.08
			Max. My	4	-15.30	-0.33	-2.28
			Max. Vy	2	-0.70	2.89	-0.08
			Max. Vx	2	-0.39	-1.39	-1.55
		Diagonal	Max Tension	17	25.88	0.00	0.00
			Max. Compression	16	-26.66	0.00	0.00
			Max. Mx	42	6.55	0.79	0.00
			Max. My	46	-0.65	0.00	0.03
			Max. Vy	42	-0.19	0.00	0.00
			Max. Vx	46	-0.01	0.00	0.00
		Horizontal	Max Tension	16	17.76	0.25	-0.01
			Max. Compression	15	-17.68	0.22	0.01
			Max. Mx	38	0.08	0.40	0.00
			Max. My	2	2.35	0.12	-0.05
			Max. Vy	38	-0.16	0.40	0.00
			Max. Vx	2	0.01	0.10	-0.05
		Inner Bracing	Max Tension	25	0.00	0.00	0.00
			Max. Compression	30	-0.02	0.00	0.00
			Max. Mx	34	-0.01	-0.15	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.05	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	24	338.51	35.62	-20.63
	Max. H_x	24	338.51	35.62	-20.63
	Max. H_z	7	-279.20	-29.66	19.27
	Min. Vert	9	-286.97	-31.35	18.16
	Min. H_x	9	-286.97	-31.35	18.16
	Min. H_z	24	338.51	35.62	-20.63
Leg B	Max. Vert	12	340.62	-35.04	-21.90
	Max. H_x	29	-286.32	30.73	19.43
	Max. H_z	33	-250.57	24.73	21.21
	Min. Vert	29	-286.32	30.73	19.43
	Min. H_x	12	340.62	-35.04	-21.90
	Min. H_z	14	323.26	-31.79	-22.81
Leg A	Max. Vert	2	342.39	1.40	41.43
	Max. H_x	27	15.64	9.42	1.07

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_z	2	342.39	1.40	41.43
	Min. Vert	19	-287.78	-1.41	-36.47
	Min. H_x	13	-145.81	-9.40	-19.20
	Min. H_z	19	-287.78	-1.41	-36.47

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	49.49	0.00	0.00	-10.59	-15.05	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	59.39	-0.12	-74.10	-6425.51	-12.12	55.26
0.9 Dead+1.0 Wind 0 deg - No Ice	44.54	-0.12	-74.10	-6418.52	-7.59	55.25
1.2 Dead+1.0 Wind 30 deg - No Ice	59.39	34.68	-60.59	-5321.91	-3055.19	31.04
0.9 Dead+1.0 Wind 30 deg - No Ice	44.54	34.68	-60.59	-5315.55	-3048.86	31.03
1.2 Dead+1.0 Wind 45 deg - No Ice	59.39	48.63	-48.95	-4313.00	-4283.45	15.29
0.9 Dead+1.0 Wind 45 deg - No Ice	44.54	48.63	-48.95	-4307.24	-4276.38	15.29
1.2 Dead+1.0 Wind 60 deg - No Ice	59.39	59.01	-34.23	-3028.05	-5204.04	-1.50
0.9 Dead+1.0 Wind 60 deg - No Ice	44.54	59.01	-34.23	-3023.06	-5196.43	-1.49
1.2 Dead+1.0 Wind 90 deg - No Ice	59.39	69.57	0.12	-6.74	-6102.74	-33.65
0.9 Dead+1.0 Wind 90 deg - No Ice	44.54	69.57	0.12	-3.54	-6094.60	-33.63
1.2 Dead+1.0 Wind 120 deg - No Ice	59.39	63.83	37.15	3198.78	-5532.04	-56.79
0.9 Dead+1.0 Wind 120 deg - No Ice	44.54	63.83	37.15	3200.08	-5524.25	-56.77
1.2 Dead+1.0 Wind 135 deg - No Ice	59.39	50.72	51.04	4427.41	-4423.54	-62.89
0.9 Dead+1.0 Wind 135 deg - No Ice	44.54	50.72	51.04	4427.98	-4416.40	-62.87
1.2 Dead+1.0 Wind 150 deg - No Ice	59.39	34.89	60.71	5302.44	-3065.82	-64.70
0.9 Dead+1.0 Wind 150 deg - No Ice	44.54	34.89	60.71	5302.49	-3059.47	-64.68
1.2 Dead+1.0 Wind 180 deg - No Ice	59.39	0.12	68.67	6028.36	-24.30	-55.26
0.9 Dead+1.0 Wind 180 deg - No Ice	44.54	0.12	68.67	6027.96	-19.77	-55.25
1.2 Dead+1.0 Wind 210 deg - No Ice	59.39	-34.68	60.59	5296.45	3018.89	-31.04
0.9 Dead+1.0 Wind 210 deg - No Ice	44.54	-34.68	60.59	5296.49	3021.62	-31.03
1.2 Dead+1.0 Wind 225 deg - No Ice	59.39	-48.63	48.95	4287.52	4247.22	-15.29
0.9 Dead+1.0 Wind 225 deg - No Ice	44.54	-48.63	48.95	4288.16	4249.21	-15.29
1.2 Dead+1.0 Wind 240 deg - No Ice	59.39	-63.71	36.94	3188.33	5489.69	1.50

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
0.9 Dead+1.0 Wind 240 deg - No Ice	44.54	-63.71	36.94	3189.64	5490.97	1.49
1.2 Dead+1.0 Wind 270 deg - No Ice	59.39	-69.57	-0.12	-18.92	6066.54	33.65
0.9 Dead+1.0 Wind 270 deg - No Ice	44.54	-69.57	-0.12	-15.72	6067.46	33.63
1.2 Dead+1.0 Wind 300 deg - No Ice	59.39	-59.14	-34.44	-3038.69	5173.88	56.79
0.9 Dead+1.0 Wind 300 deg - No Ice	44.54	-59.14	-34.44	-3033.69	5175.32	56.76
1.2 Dead+1.0 Wind 315 deg - No Ice	59.39	-48.80	-49.13	-4321.72	4255.75	62.89
0.9 Dead+1.0 Wind 315 deg - No Ice	44.54	-48.80	-49.13	-4315.96	4257.75	62.86
1.2 Dead+1.0 Wind 330 deg - No Ice	59.39	-34.89	-60.71	-5328.09	3029.38	64.69
0.9 Dead+1.0 Wind 330 deg - No Ice	44.54	-34.89	-60.71	-5321.74	3032.11	64.67
1.2 Dead+1.0 Ice+1.0 Temp	128.74	0.00	0.00	-54.24	-75.80	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	128.74	-0.01	-18.32	-1640.96	-76.20	20.70
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	128.74	8.82	-15.35	-1394.86	-845.48	8.58
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	128.74	12.41	-12.46	-1144.36	-1159.53	1.43
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	128.74	15.11	-8.76	-821.95	-1397.37	-5.83
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	128.74	17.65	0.01	-54.60	-1614.61	-18.68
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	128.74	15.80	9.17	738.72	-1442.02	-26.53
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	128.74	12.70	12.75	1053.64	-1177.52	-27.84
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	128.74	8.84	15.36	1285.92	-845.06	-27.26
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	128.74	0.01	17.54	1480.46	-75.69	-20.70
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	128.74	-8.82	15.35	1286.18	693.62	-8.59
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	128.74	-12.41	12.46	1035.68	1007.68	-1.43
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	128.74	-15.79	9.15	739.17	1290.39	5.83
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	128.74	-17.65	-0.01	-54.10	1462.75	18.67
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	128.74	-15.13	-8.78	-821.54	1245.26	26.52
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	128.74	-12.42	-12.48	-1144.02	1007.32	27.84
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	128.74	-8.84	-15.36	-1394.62	693.19	27.27
Dead+Wind 0 deg - Service	49.49	-0.03	-16.01	-1395.69	-13.81	11.77
Dead+Wind 30 deg - Service	49.49	7.50	-13.10	-1158.11	-671.58	6.55
Dead+Wind 45 deg - Service	49.49	10.52	-10.59	-940.18	-937.19	3.18
Dead+Wind 60 deg - Service	49.49	12.77	-7.40	-662.48	-1136.31	-0.41
Dead+Wind 90 deg - Service	49.49	15.04	0.03	-9.34	-1330.32	-7.27
Dead+Wind 120 deg - Service	49.49	13.79	8.03	683.01	-1206.13	-12.18
Dead+Wind 135 deg - Service	49.49	10.96	11.03	948.74	-967.02	-13.46
Dead+Wind 150 deg - Service	49.49	7.54	13.13	1138.17	-673.84	-13.83
Dead+Wind 180 deg - Service	49.49	0.03	14.85	1295.38	-16.39	-11.77
Dead+Wind 210 deg - Service	49.49	-7.50	13.10	1136.87	641.41	-6.56

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
Dead+Wind 225 deg - Service	49.49	-10.52	10.59	918.90	907.01	-3.18
Dead+Wind 240 deg - Service	49.49	-13.77	7.98	680.75	1174.62	0.41
Dead+Wind 270 deg - Service	49.49	-15.04	-0.03	-11.93	1300.16	7.27
Dead+Wind 300 deg - Service	49.49	-12.79	-7.45	-664.77	1107.49	12.18
Dead+Wind 315 deg - Service	49.49	-10.55	-10.62	-942.05	908.88	13.46
Dead+Wind 330 deg - Service	49.49	-7.54	-13.13	-1159.43	643.67	13.83

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-49.49	0.00	0.00	49.49	0.00	0.000%
2	-0.12	-59.39	-74.10	0.12	59.39	74.10	0.000%
3	-0.12	-44.54	-74.10	0.12	44.54	74.10	0.000%
4	34.68	-59.39	-60.59	-34.68	59.39	60.59	0.000%
5	34.68	-44.54	-60.59	-34.68	44.54	60.59	0.000%
6	48.63	-59.39	-48.95	-48.63	59.39	48.95	0.000%
7	48.63	-44.54	-48.95	-48.63	44.54	48.95	0.000%
8	59.01	-59.39	-34.23	-59.01	59.39	34.23	0.000%
9	59.01	-44.54	-34.23	-59.01	44.54	34.23	0.000%
10	69.57	-59.39	0.12	-69.57	59.39	-0.12	0.000%
11	69.57	-44.54	0.12	-69.57	44.54	-0.12	0.000%
12	63.83	-59.39	37.15	-63.83	59.39	-37.15	0.000%
13	63.83	-44.54	37.15	-63.83	44.54	-37.15	0.000%
14	50.72	-59.39	51.04	-50.72	59.39	-51.04	0.000%
15	50.72	-44.54	51.04	-50.72	44.54	-51.04	0.000%
16	34.89	-59.39	60.71	-34.89	59.39	-60.71	0.000%
17	34.89	-44.54	60.71	-34.89	44.54	-60.71	0.000%
18	0.12	-59.39	68.67	-0.12	59.39	-68.67	0.000%
19	0.12	-44.54	68.67	-0.12	44.54	-68.67	0.000%
20	-34.68	-59.39	60.59	34.68	59.39	-60.59	0.000%
21	-34.68	-44.54	60.59	34.68	44.54	-60.59	0.000%
22	-48.63	-59.39	48.95	48.63	59.39	-48.95	0.000%
23	-48.63	-44.54	48.95	48.63	44.54	-48.95	0.000%
24	-63.71	-59.39	36.94	63.71	59.39	-36.94	0.000%
25	-63.71	-44.54	36.94	63.71	44.54	-36.94	0.000%
26	-69.57	-59.39	-0.12	69.57	59.39	0.12	0.000%
27	-69.57	-44.54	-0.12	69.57	44.54	0.12	0.000%
28	-59.14	-59.39	-34.44	59.14	59.39	34.44	0.000%
29	-59.14	-44.54	-34.44	59.14	44.54	34.44	0.000%
30	-48.80	-59.39	-49.13	48.80	59.39	49.13	0.000%
31	-48.80	-44.54	-49.13	48.80	44.54	49.13	0.000%
32	-34.89	-59.39	-60.71	34.89	59.39	60.71	0.000%
33	-34.89	-44.54	-60.71	34.89	44.54	60.71	0.000%
34	0.00	-128.74	0.00	0.00	128.74	0.00	0.000%
35	-0.01	-128.74	-18.32	0.01	128.74	18.32	0.000%
36	8.82	-128.74	-15.35	-8.82	128.74	15.35	0.000%
37	12.41	-128.74	-12.46	-12.41	128.74	12.46	0.000%
38	15.11	-128.74	-8.76	-15.11	128.74	8.76	0.000%
39	17.65	-128.74	0.01	-17.65	128.74	-0.01	0.000%
40	15.80	-128.74	9.17	-15.80	128.74	-9.17	0.000%
41	12.70	-128.74	12.75	-12.70	128.74	-12.75	0.000%
42	8.84	-128.74	15.36	-8.84	128.74	-15.36	0.000%
43	0.01	-128.74	17.54	-0.01	128.74	-17.54	0.000%
44	-8.82	-128.74	15.35	8.82	128.74	-15.35	0.000%
45	-12.41	-128.74	12.46	12.41	128.74	-12.46	0.000%
46	-15.79	-128.74	9.15	15.79	128.74	-9.15	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
47	-17.65	-128.74	-0.01	17.65	128.74	0.01	0.000%
48	-15.13	-128.74	-8.78	15.13	128.74	8.78	0.000%
49	-12.42	-128.74	-12.48	12.42	128.74	12.48	0.000%
50	-8.84	-128.74	-15.36	8.84	128.74	15.36	0.000%
51	-0.03	-49.49	-16.01	0.03	49.49	16.01	0.000%
52	7.50	-49.49	-13.10	-7.50	49.49	13.10	0.000%
53	10.52	-49.49	-10.59	-10.52	49.49	10.59	0.000%
54	12.77	-49.49	-7.40	-12.77	49.49	7.40	0.000%
55	15.04	-49.49	0.03	-15.04	49.49	-0.03	0.000%
56	13.79	-49.49	8.03	-13.79	49.49	-8.03	0.000%
57	10.96	-49.49	11.03	-10.96	49.49	-11.03	0.000%
58	7.54	-49.49	13.13	-7.54	49.49	-13.13	0.000%
59	0.03	-49.49	14.85	-0.03	49.49	-14.85	0.000%
60	-7.50	-49.49	13.10	7.50	49.49	-13.10	0.000%
61	-10.52	-49.49	10.59	10.52	49.49	-10.59	0.000%
62	-13.77	-49.49	7.98	13.77	49.49	-7.98	0.000%
63	-15.04	-49.49	-0.03	15.04	49.49	0.03	0.000%
64	-12.79	-49.49	-7.45	12.79	49.49	7.45	0.000%
65	-10.55	-49.49	-10.62	10.55	49.49	10.62	0.000%
66	-7.54	-49.49	-13.13	7.54	49.49	13.13	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001

32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	2.084	51	0.0983	0.0153
T2	150 - 125	1.876	51	0.0976	0.0155
T3	125 - 100	1.355	51	0.0928	0.0139
T4	100 - 75	0.896	51	0.0767	0.0119
T5	75 - 66.6667	0.507	51	0.0622	0.0092
T6	66.6667 - 58.3333	0.396	51	0.0569	0.0079
T7	58.3333 - 50	0.295	51	0.0509	0.0067
T8	50 - 37.5	0.211	51	0.0409	0.0056
T9	37.5 - 25	0.116	51	0.0294	0.0039
T10	25 - 0	0.053	51	0.0168	0.0023

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	15' Lighting Rod	51	2.084	0.0983	0.0153	299538
159.00	HPD2-4.7	51	2.063	0.0982	0.0153	299538
158.00	DB304-A	51	2.042	0.0981	0.0154	299538
155.00	TX/RX 432E-83I-01T	51	1.980	0.0979	0.0155	299538
140.00	7770.00	51	1.665	0.0968	0.0151	498947
125.00	RR90-17	51	1.355	0.0928	0.0139	90941
124.00	10' x 2" Dia Omni	51	1.335	0.0923	0.0138	89477
115.00	6' Dish Ice Shield	51	1.163	0.0871	0.0131	98329
110.00	Andrew 6' w/Radome	51	1.071	0.0836	0.0127	106173
97.00	APXVSPP18-C-A20	51	0.846	0.0748	0.0117	117815
85.00	10'6"x4" Pipe Mount	51	0.653	0.0680	0.0105	93572
83.00	Beacon	51	0.623	0.0669	0.0103	90445
77.50	(2) MX06FRO660	51	0.542	0.0638	0.0096	83266
21.00	6' Yagi	51	0.040	0.0132	0.0019	72731

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	9.541	2	0.4458	0.0714
T2	150 - 125	8.598	2	0.4437	0.0726
T3	125 - 100	6.219	2	0.4238	0.0649
T4	100 - 75	4.118	2	0.3511	0.0558
T5	75 - 66.6667	2.334	2	0.2852	0.0431
T6	66.6667 - 58.3333	1.823	2	0.2608	0.0370
T7	58.3333 - 50	1.359	2	0.2333	0.0313
T8	50 - 37.5	0.974	2	0.1877	0.0260
T9	37.5 - 25	0.536	2	0.1351	0.0183
T10	25 - 0	0.247	2	0.0771	0.0109

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	15' Lighting Rod	2	9.541	0.4458	0.0714	74858
159.00	HPD2-4.7	2	9.447	0.4456	0.0716	74858
158.00	DB304-A	2	9.354	0.4454	0.0718	74858
155.00	TX/RX 432E-83I-01T	2	9.071	0.4448	0.0723	74858
140.00	7770.00	2	7.636	0.4408	0.0708	155230
125.00	RR90-17	2	6.219	0.4238	0.0649	20202
124.00	10' x 2" Dia Omni	2	6.128	0.4218	0.0646	19856
115.00	6' Dish Ice Shield	2	5.338	0.3981	0.0613	21740
110.00	Andrew 6' w/Radome	2	4.919	0.3825	0.0595	23428
97.00	APXVSPP18-C-A20	2	3.887	0.3425	0.0546	25890
85.00	10'6"x4" Pipe Mount	2	3.005	0.3116	0.0491	20622
83.00	Beacon	2	2.866	0.3066	0.0480	19941
77.50	(2) MX06FRO660	2	2.496	0.2921	0.0447	18374
21.00	6' Yagi	2	0.184	0.0608	0.0089	15824

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	160	Leg	A325X	0.7500	6	0.43	30.10	0.014 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	2.32	17.94	0.129 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	0.91	10.26	0.089 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	0.72	10.26	0.070 ✔	1	Member Block Shear
T2	150	Leg	A325X	0.7500	6	2.83	30.10	0.094 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	8.56	17.94	0.477 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	2.65	7.19	0.369 ✔	1	Member Block Shear
T3	125	Leg	A325X	0.7500	6	8.75	30.10	0.291 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	12.78	29.91	0.427 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	4.33	12.83	0.338 ✔	1	Member Block Shear
T4	100	Leg	A325X	0.7500	6	16.62	30.10	0.552 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	16.72	25.23	0.663 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	6.05	17.26	0.351 ✔	1	Bolt Shear
T5	75	Leg	A325X	0.8750	6	19.60	41.56	0.472 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	19.19	35.34	0.543 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	7.07	17.26	0.409 ✔	1	Bolt Shear
T6	66.6667	Diagonal	A325X	0.7500	1	19.42	35.34	0.550 ✔	1	Member Bearing
		Top Girt	A325X	0.6250	2	7.30	17.26	0.423 ✔	1	Bolt Shear
T7	58.3333	Diagonal	A325X	0.7500	1	19.87	31.54	0.630 ✔	1	Member Bearing
		Top Girt	A325X	0.6250	2	7.57	17.26	0.439 ✔	1	Bolt Shear
T8	50	Leg	A325X	1.0000	8	21.91	54.52	0.402 ✔	1	Bolt Tension
		Diagonal	A325X	1.0000	1	24.84	48.81	0.509 ✔	1	Member Block Shear
T9	37.5	Diagonal	A325X	1.0000	1	25.55	45.70	0.559 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	8.05	14.53	0.554 ✔	1	Member Block Shear
T10	25	Leg	A325X	1.0000	8	32.49	54.52	0.596 ✔	1	Bolt Tension
		Diagonal	A325X	1.0000	1	25.88	54.84	0.472 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	8.88	17.26	0.514 ✔	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	160 - 150	P5x0.25	10.01	5.01	35.7 K=1.00	3.7306	-4.83	152.93	0.032 [1] ✔
T2	150 - 125	P5x0.25	25.03	8.34	59.5 K=1.00	3.7306	-23.63	129.56	0.182 [1] ✔
T3	125 - 100	P5x0.25	25.03	8.34	59.5 K=1.00	3.7306	-65.29	129.56	0.504 [1] ✔
T4	100 - 75	P5x0.3 w/ (3) 1.5x5/8 PL	25.03	8.34	51.4 K=1.00	7.2544	-120.74	269.04	0.449 [1] ✔
T5	75 - 66.6667	P5x0.4 w/ (3) 1.5x5/8 PL	8.34	8.34	53.1 K=1.00	8.6053	-141.21	315.14	0.448 [1] ✔
T6	66.6667 - 58.3333	P5x0.4 w/ (3) 1.5x5/8 PL	8.34	8.34	53.1 K=1.00	8.6053	-163.66	315.14	0.519 [1] ✔
T7	58.3333 - 50	P5x.400	8.34	4.17	30.7 K=1.00	5.7805	-185.71	287.44	0.646 [1] ✔
T8	50 - 37.5	P6.875x.400	12.51	12.51	65.5 K=1.00	8.1367	-209.01	301.66	0.693 [1] ✔
T9	37.5 - 25	P6.875x.400	12.51	6.26	32.7 K=1.00	8.1367	-241.25	399.96	0.603 [1] ✔
T10	25 - 0	P6.875x0.5 w/ (3) 2x5/8 PL	25.03	12.51	59.1 K=1.00	13.7727	-309.55	479.99	0.645 [1] ✔

[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	160 - 150	2L2 1/2x2x3/16	7.43	6.88	104.5 K=1.00	1.6200	-2.45	38.28	0.064 [1] ✔
T2	150 - 125	2L2 1/2x2x3/16	10.57	9.96	151.3 K=1.00	1.6200	-8.68	20.25	0.429 [1] ✔
T3	125 - 100	2L2 1/2x2 1/2x5/16	11.21	10.63	167.6 K=1.00	2.9300	-13.08	29.84	0.438 [1] ✔
T4	100 - 75	2L3x2 1/2x1/4	11.91	11.21	142.4 K=1.00	2.6300	-17.10	37.14	0.460 [1] ✔
T5	75 - 66.6667	2L3x2 1/2x5/16x3/8	12.15	11.46	146.8 K=1.00	3.2422	-19.63	43.06	0.456 [1] ✔
T6	66.6667 - 58.3333	2L3x2 1/2x5/16x3/8	12.39	11.71	150.0 K=1.00	3.2422	-19.89	41.23	0.482 [1] ✔
T7	58.3333 - 50	2L3x3x5/16	12.64	12.09	115.1 K=1.00	3.5500	-20.37	74.52	0.273 [1] ✔
T8	50 - 37.5	2L3 1/2x3x3/8	16.01	15.22	167.5 K=1.00	4.5900	-25.40	46.80	0.543 [1] ✔
T9	37.5 - 25	2L3 1/2x3 1/2x5/16	16.33	15.55	126.9 K=1.00	4.1800	-26.04	74.26	0.351 [1] ✔
T10	25 - 0	2L4x3x3/8	16.99	16.06	163.3	4.9700	-26.66	53.36	0.500 [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

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 $\frac{P_u}{\phi P_n}$
T1	160 - 150	L3x3x1/4	10.60	4.89	109.6 K=1.10	1.4400	-1.75	32.26	0.054 [1] ✔
T2	150 - 125	L2 1/2x2 1/2x3/16	12.33	5.76	135.0 K=0.97	0.9020	-5.38	14.16	0.380 [1] ✔
T3	125 - 100	L3x3x5/16	14.33	6.76	133.6 K=0.97	1.7800	-8.60	28.56	0.301 [1] ✔
T4	100 - 75	L3x3x1/2	16.33	7.67	148.6 K=0.94	2.7500	-12.02	35.62	0.337 [1] ✔
T5	75 - 66.6667	L3x3x1/2	17.00	8.00	153.9 K=0.94	2.7500	-14.13	33.25	0.425 [1] ✔
T10	25 - 0	L4x4x1/2	22.00	10.40	150.2 K=0.94	3.7500	-17.68	47.60	0.371 [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	160 - 150	L3x3x1/4	10.20	4.69	107.6 K=1.13	1.4400	-1.51	32.98	0.046 [1] ✔
T4	100 - 75	L3x3x1/4	15.00	7.20	139.8 K=0.96	1.4400	-9.56	21.09	0.453 [1] ✔
T6	66.6667 - 58.3333	L3x3x1/2	17.67	8.33	159.1 K=0.93	2.7500	-14.40	31.10	0.463 [1] ✔
T7	58.3333 - 50	L3x3x1/2	18.33	8.76	165.8 K=0.92	2.7500	-15.14	28.64	0.529 [1] ✔
T8	50 - 37.5	L4x4x1/4	19.00	9.21	134.6 K=0.97	1.9400	-15.57	30.66	0.508 [1] ✔
T9	37.5 - 25	L4x4x5/16	20.00	9.52	138.6 K=0.96	2.4000	-16.37	35.76	0.458 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T7	58.3333 - 50	L2x2x5/16	4.58	4.38	134.6 K=1.00	1.1500	-3.22	18.16	0.177 [1] ✔
T9	37.5 - 25	L2x2x5/16	5.00	4.71	145.0 K=1.00	1.1500	-4.18	15.65	0.267 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T7	58.3333 - 50	L2x2x5/16	6.07	5.79	178.0 K=1.00	1.1500	-2.13	10.38	0.205 [1] ✔
T9	37.5 - 25	L2x2x5/16	7.85	7.38	227.0 K=1.00	1.1500	-3.28	6.39	0.514 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T3	125 - 100	L2 1/2x2x3/16	7.17	7.17	201.4 K=1.00	0.8090	-0.01	5.71	0.002 [1] ✔
T4	100 - 75	L2 1/2x2x3/16	8.17	8.17	229.5 K=1.00	0.8090	-0.01	4.40	0.003 [1] ✔
T5	75 - 66.6667	L2 1/2x2x3/16	8.50	8.50	238.9 K=1.00	0.8090	-0.01	4.06	0.003 [1] ✔
T6	66.6667 - 58.3333	L2 1/2x2x3/16	8.83	8.83	248.2 K=1.00	0.8090	-0.01	3.76	0.003 [1] ✔
T7	58.3333 - 50	L2 1/2x2x3/16 KL/R > 250 (C) - 185	9.17	9.17	257.6 K=1.00	0.8090	-0.01	3.49	0.004 [1] ✔
T8	50 - 37.5	L2 1/2x2 1/2x3/16	9.50	9.50	230.3 K=1.00	0.9020	-0.02	4.87	0.004 [1] ✔
T9	37.5 - 25	L2 1/2x2 1/2x3/16	10.00	10.00	242.4 K=1.00	0.9020	-0.02	4.39	0.004 [1] ✔
T10	25 - 0	L2 1/2x2 1/2x3/16 KL/R > 250 (C) - 242	11.00	11.00	266.7 K=1.00	0.9020	-0.02	3.63	0.005 [1] ✔

[1] P_u / ϕP_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	160 - 150	P5x0.25	10.01	5.01	35.7	3.7306	2.55	167.88	0.015 [1] ✔
T2	150 - 125	P5x0.25	25.03	8.34	59.5	3.7306	16.97	167.88	0.101 [1] ✔
T3	125 - 100	P5x0.25	25.03	8.34	59.5	3.7306	52.53	167.88	0.313 [1] ✔
T4	100 - 75	P5x0.3 w/ (3) 1.5x5/8 PL	25.03	8.34	51.4	7.2544	99.71	326.45	0.305 [1] ✔
T5	75 - 66.6667	P5x0.4 w/ (3) 1.5x5/8 PL	8.34	8.34	53.1	8.6053	117.59	387.24	0.304 [1] ✔
T6	66.6667 - 58.3333	P5x0.4 w/ (3) 1.5x5/8 PL	8.34	8.34	53.1	8.6053	136.85	387.24	0.353 [1] ✔
T7	58.3333 - 50	P5x.400	8.34	4.17	30.7	5.7805	155.25	312.15	0.497 [1] ✔
T8	50 - 37.5	P6.875x.400	12.51	12.51	65.5	8.1367	175.29	439.38	0.399 [1] ✔
T9	37.5 - 25	P6.875x.400	12.51	6.26	32.7	8.1367	201.99	439.38	0.460 [1] ✔
T10	25 - 0	P6.875x0.5 w/ (3) 2x5/8 PL	25.03	12.51	59.1	13.7727	259.93	619.77	0.419 [1] ✔

[1] P_u / ϕP_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	160 - 150	2L2 1/2x2x3/16	7.43	6.88	108.6	0.9689	2.32	42.15	0.055 [1] ✔
T2	150 - 125	2L2 1/2x2x3/16	10.57	9.96	155.4	0.9689	8.56	42.15	0.203 [1] ✔
T3	125 - 100	2L2 1/2x2 1/2x5/16	11.21	10.63	171.9	1.7873	12.78	77.75	0.164 [1] ✔
T4	100 - 75	2L3x2 1/2x1/4	11.91	11.21	145.8	1.6444	16.72	71.53	0.234 [1] ✔
T5	75 - 66.6667	2L3x2 1/2x5/16x3/8	12.15	11.46	150.3	2.0215	19.19	98.55	0.195 [1] ✔
T6	66.6667 - 58.3333	2L3x2 1/2x5/16x3/8	12.39	11.71	153.5	2.0215	19.42	98.55	0.197 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	58.3333 - 50	2L3x3x5/16	12.64	12.09	117.7	2.2523	19.87	97.98	0.203 [1] ✔
T8	50 - 37.5	2L3 1/2x3x3/8	16.01	15.22	171.2	2.8097	24.84	122.22	0.203 [1] ✔
T9	37.5 - 25	2L3 1/2x3 1/2x5/16	16.33	15.55	129.6	2.6077	25.55	127.12	0.201 [1] ✔
T10	25 - 0	2L4x3x3/8	16.99	16.06	166.7	3.0947	25.88	150.87	0.172 [1] ✔

[1] P_u / ϕP_n controls

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 $\frac{P_u}{\phi P_n}$
T1	160 - 150	L3x3x1/4	10.60	4.89	98.5	0.9394	1.82	40.86	0.045 [1] ✔
T2	150 - 125	L2 1/2x2 1/2x3/16	12.33	5.76	137.9	0.5710	5.30	24.84	0.213 [1] ✔
T3	125 - 100	L3x3x5/16	14.33	6.76	90.6	1.1592	8.66	50.43	0.172 [1] ✔
T4	100 - 75	L3x3x1/2	16.33	7.67	105.1	1.7813	12.10	77.48	0.156 [1] ✔
T5	75 - 66.6667	L3x3x1/2	17.00	8.00	109.6	1.7813	14.13	77.48	0.182 [1] ✔
T10	25 - 0	L4x4x1/2	22.00	10.40	104.2	2.5313	17.76	110.11	0.161 [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	160 - 150	L3x3x1/4	10.20	4.69	94.7	0.9394	1.44	40.86	0.035 [1] ✔
T4	100 - 75	L3x3x1/4	15.00	7.20	92.9	1.4400	9.68	46.66	0.207 [1] ✔
T6	66.6667 - 58.3333	L3x3x1/2	17.67	8.33	114.0	1.7813	14.60	77.48	0.188 [1] ✔
T7	58.3333 - 50	L3x3x1/2	18.33	8.76	119.7	1.7813	14.99	77.48	0.193 [1] ✔
T8	50 - 37.5	L4x4x1/4	19.00	9.21	88.4	1.9400	15.67	62.86	0.249 [1] ✔
T9	37.5 - 25	L4x4x5/16	20.00	9.52	94.0	1.6242	16.10	70.65	0.228 [1]

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

[1] P_u / ϕP_n controls

Redundant Horizontal (1) 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	58.3333 - 50	L2x2x5/16	4.58	4.38	87.4	1.1500	3.22	37.26	0.086 [1]
T9	37.5 - 25	L2x2x5/16	5.00	4.71	94.1	1.1500	4.18	37.26	0.112 [1]

[1] P_u / ϕP_n controls

Redundant Diagonal (1) 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	58.3333 - 50	L2x2x5/16	6.07	5.79	115.5	1.1500	2.13	37.26	0.057 [1]
T9	37.5 - 25	L2x2x5/16	7.85	7.38	147.3	1.1500	3.28	37.26	0.088 [1]

[1] P_u / ϕP_n controls

Inner Bracing 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 $\frac{P_u}{\phi P_n}$
T3	125 - 100	L2 1/2x2x3/16	7.17	7.17	143.4	0.8090	0.01	26.21	0.000 [1]
T4	100 - 75	L2 1/2x2x3/16	7.50	7.50	150.1	0.8090	0.01	26.21	0.000 [1]
T5	75 - 66.6667	L2 1/2x2x3/16	8.50	8.50	170.1	0.8090	0.01	26.21	0.000 [1]
T6	66.6667 - 58.3333	L2 1/2x2x3/16	8.83	8.83	176.7	0.8090	0.00	26.21	0.000 [1]
T7	58.3333 - 50	L2 1/2x2x3/16	9.17	9.17	183.4	0.8090	0.00	26.21	0.000 [1]

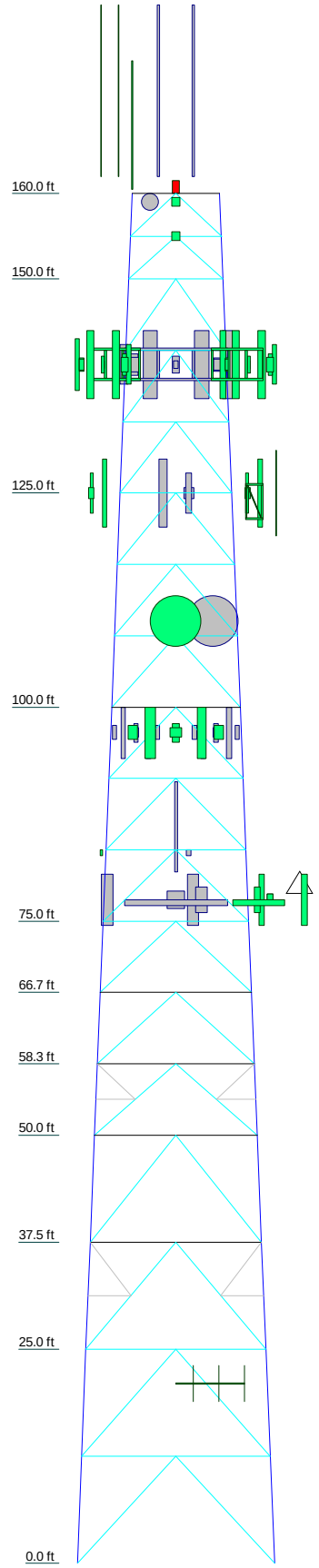
Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T8	50 - 37.5	L2 1/2x2 1/2x3/16	9.50	9.50	146.5	0.9020	0.01	29.22	0.000 [1] ✔
T9	37.5 - 25	L2 1/2x2 1/2x3/16	10.00	10.00	154.2	0.9020	0.01	29.22	0.000 [1] ✔
T10	25 - 0	L2 1/2x2 1/2x3/16	10.50	10.50	162.0	0.9020	0.00	29.22	0.000 [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	160 - 150	Leg	P5x0.25	3	-4.83	152.93	3.2	Pass
T2	150 - 125	Leg	P5x0.25	24	-23.63	129.56	18.2	Pass
T3	125 - 100	Leg	P5x0.25	54	-65.29	129.56	50.4	Pass
T4	100 - 75	Leg	P5x0.3 w/ (3) 1.5x5/8 PL	93	-120.74	269.04	44.9 55.2 (b)	Pass
T5	75 - 66.6667	Leg	P5x0.4 w/ (3) 1.5x5/8 PL	132	-141.21	315.14	44.8 47.2 (b)	Pass
T6	66.6667 - 58.3333	Leg	P5x0.4 w/ (3) 1.5x5/8 PL	147	-163.66	315.14	51.9	Pass
T7	58.3333 - 50	Leg	P5x.400	162	-185.71	287.44	64.6	Pass
T8	50 - 37.5	Leg	P6.875x.400	189	-209.01	301.66	69.3	Pass
T9	37.5 - 25	Leg	P6.875x.400	204	-241.25	399.96	60.3	Pass
T10	25 - 0	Leg	P6.875x0.5 w/ (3) 2x5/8 PL	231	-309.55	479.99	64.5	Pass
T1	160 - 150	Diagonal	2L2 1/2x2x3/16	15	-2.45	38.28	6.4 12.9 (b)	Pass
T2	150 - 125	Diagonal	2L2 1/2x2x3/16	29	-8.68	20.25	42.9 47.7 (b)	Pass
T3	125 - 100	Diagonal	2L2 1/2x2 1/2x5/16	59	-13.08	29.84	43.8	Pass
T4	100 - 75	Diagonal	2L3x2 1/2x1/4	101	-17.10	37.14	46.0 66.3 (b)	Pass
T5	75 - 66.6667	Diagonal	2L3x2 1/2x5/16x3/8	137	-19.63	43.06	45.6 54.3 (b)	Pass
T6	66.6667 - 58.3333	Diagonal	2L3x2 1/2x5/16x3/8	153	-19.89	41.23	48.2 55.0 (b)	Pass
T7	58.3333 - 50	Diagonal	2L3x3x5/16	172	-20.37	74.52	27.3 63.0 (b)	Pass
T8	50 - 37.5	Diagonal	2L3 1/2x3x3/8	195	-25.40	46.80	54.3	Pass
T9	37.5 - 25	Diagonal	2L3 1/2x3 1/2x5/16	214	-26.04	74.26	35.1 55.9 (b)	Pass
T10	25 - 0	Diagonal	2L4x3x3/8	236	-26.66	53.36	50.0	Pass
T1	160 - 150	Horizontal	L3x3x1/4	13	-1.75	32.26	5.4 8.9 (b)	Pass
T2	150 - 125	Horizontal	L2 1/2x2 1/2x3/16	28	-5.38	14.16	38.0	Pass
T3	125 - 100	Horizontal	L3x3x5/16	58	-8.60	28.56	30.1 33.8 (b)	Pass
T4	100 - 75	Horizontal	L3x3x1/2	100	-12.02	35.62	33.7 35.1 (b)	Pass
T5	75 - 66.6667	Horizontal	L3x3x1/2	136	-14.13	33.25	42.5	Pass
T10	25 - 0	Horizontal	L4x4x1/2	235	-17.68	47.60	37.1 51.4 (b)	Pass
T1	160 - 150	Top Girt	L3x3x1/4	6	-1.51	32.98	4.6 7.0 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T4	100 - 75	Top Girt	L3x3x1/4	95	-9.56	21.09	45.3	Pass
T6	66.6667 - 58.3333	Top Girt	L3x3x1/2	149	-14.40	31.10	46.3	Pass
T7	58.3333 - 50	Top Girt	L3x3x1/2	164	-15.14	28.64	52.9	Pass
T8	50 - 37.5	Top Girt	L4x4x1/4	191	-15.57	30.66	50.8	Pass
T9	37.5 - 25	Top Girt	L4x4x5/16	206	-16.37	35.76	45.8	Pass
							55.4 (b)	
T7	58.3333 - 50	Redund Horz 1 Bracing	L2x2x5/16	176	-3.22	18.16	17.7	Pass
T9	37.5 - 25	Redund Horz 1 Bracing	L2x2x5/16	218	-4.18	15.65	26.7	Pass
T7	58.3333 - 50	Redund Diag 1 Bracing	L2x2x5/16	180	-2.13	10.38	20.5	Pass
T9	37.5 - 25	Redund Diag 1 Bracing	L2x2x5/16	219	-3.28	6.39	51.4	Pass
T3	125 - 100	Inner Bracing	L2 1/2x2x3/16	64	-0.01	5.71	0.4	Pass
T4	100 - 75	Inner Bracing	L2 1/2x2x3/16	108	-0.01	4.40	0.5	Pass
T5	75 - 66.6667	Inner Bracing	L2 1/2x2x3/16	143	-0.01	4.06	0.5	Pass
T6	66.6667 - 58.3333	Inner Bracing	L2 1/2x2x3/16	158	-0.01	3.76	0.5	Pass
T7	58.3333 - 50	Inner Bracing	L2 1/2x2x3/16	184	-0.01	3.49	0.5	Pass
T8	50 - 37.5	Inner Bracing	L2 1/2x2 1/2x3/16	200	-0.02	4.87	0.6	Pass
T9	37.5 - 25	Inner Bracing	L2 1/2x2 1/2x3/16	226	-0.02	4.39	0.6	Pass
T10	25 - 0	Inner Bracing	L2 1/2x2 1/2x3/16	241	-0.02	3.63	0.6	Pass
							Summary	
						Leg (T8)	69.3	Pass
						Diagonal (T4)	66.3	Pass
						Horizontal (T10)	51.4	Pass
						Top Girt (T9)	55.4	Pass
						Redund Horz 1 Bracing (T9)	26.7	Pass
						Redund Diag 1 Bracing (T9)	51.4	Pass
						Inner Bracing (T10)	0.6	Pass
						Bolt Checks	66.3	Pass
						RATING =	**69.3**	**Pass**



Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Legs	P5x0.25			P5x0.3 w/ (3) 1.5x5/8 PL		A	P5x.400		P6.875x.400	P6.875x0.5 w/ (3) 2x5/8 PL
Leg Grade	A500-50							A514-60		A500-50
Diagonals	2L2 1/2x2x3/16			2L3x2 1/2x1/4	2L3x2 1/2x5/16x3/8		2L3x3x5/16	2L3 1/2x3x3/8	B	2L4x3x3/8
Diagonal Grade	A36				A529-50		A36			A529-50
Top Girts	N.A.		L3x3x1/4		N.A.		L3x3x1/2	L4x4x1/4	L4x4x5/16	N.A.
Horizontals	L3x3x1/4	L2 1/2x2 1/2x3/16	L3x3x5/16	L3x3x1/2				N.A.		L4x4x1/2
Red. Horizontals	L3x3x1/4		N.A.				L2x2x5/16	N.A.	L2x2x5/16	N.A.
Red. Diagonals	N.A.		N.A.	L2 1/2x2x3/16			L2x2x5/16	N.A.	L2x2x5/16	L2 1/2x2 1/2x3/16
Inner Bracing	N.A.									
Face Width (ft)	10.2	11	13	15	17	17.6667	18.3333	19	20	21
# Panels @ (ft)	2 @ 5			12 @ 8.33333					4 @ 12.5	
Weight (K)	1.2	2.4	3.9	5.1	2.1	2.2	2.3	3.1	3.4	9.0

34.6

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
15' Lighting Rod	160	RR90-17 (T-Mobile)	125
Flash Beacon Lighting	160	LNX-6515DS (T-Mobile)	125
DS7C09P36D-D (CSP)	160	LNX-6515DS (T-Mobile)	125
DS7C09P36D-D (CSP)	160	LNX-6515DS (T-Mobile)	125
DS7C09P36D-D (CSP)	160	4415 B25 (T-Mobile)	125
DS7C09P36D-D (CSP)	160	4415 B25 (T-Mobile)	125
Commscope SFG23HD-12-496 (CSP)	160	4415 B25 (T-Mobile)	125
Commscope SFG23HD-12-496 (CSP)	160	SitePro Dual Antenna Mount R5 (T-Mobile)	125
TX/RX 432E-83I-01T	159		
HPD2-4.7	159	SitePro Dual Antenna Mount R5 (T-Mobile)	125
DB304-A	158		
DB228-A	155	SitePro Dual Antenna Mount R5 (T-Mobile)	125
Pirod 10' PCS Frame (1)	155		
TX/RX 432E-83I-01T	155	Pirod 6' Side Mount Standoff (1)	124
7770.00 (ATI)	140	10' x 2" Dia Omni	124
DMP65R-BU8DA (ATI)	140	6' Dish Ice Shield	115
OPA65R-BU8D (ATI)	140	6' Dish Ice Shield	115
TPA-65R-LCUUUU-H8 (ATI)	140	Andrew 6' w/Radome	110
7770.00 (ATI)	140	Andrew 6' w/Radome	110
DMP65R-BU8DA (ATI)	140	APXVSPP18-C-A20 (Sprint)	97
OPA65R-BU8D (ATI)	140	APXVSPP18-C-A20 (Sprint)	97
TPA-65R-LCUUUU-H8 (ATI)	140	APXVSPP18-C-A20 (Sprint)	97
7770.00 (ATI)	140	DT465B-2XR (Sprint)	97
DMP65R-BU8DA (ATI)	140	DT465B-2XR (Sprint)	97
OPA65R-BU8D (ATI)	140	DT465B-2XR (Sprint)	97
QS66512 (ATI)	140	(2) FD-RRH 2x50 800 (Sprint)	97
TT19-08BP111-001 TMA (ATI)	140	(2) FD-RRH 2x50 800 (Sprint)	97
TT19-08BP111-001 TMA (ATI)	140	(2) FD-RRH 2x50 800 (Sprint)	97
TT19-08BP111-001 TMA (ATI)	140	FD-RRH 4x40 1900 (Sprint)	97
(2) LGP21401 TMA (ATI)	140	FD-RRH 4x40 1900 (Sprint)	97
(2) LGP21401 TMA (ATI)	140	FD-RRH 4x40 1900 (Sprint)	97
(2) LGP21401 TMA (ATI)	140	TD-RRH 4x20 2500 (Sprint)	97
RRUS-32 (ATI)	140	TD-RRH 4x20 2500 (Sprint)	97
RRUS-12 (ATI)	140	TD-RRH 4x20 2500 (Sprint)	97
4449 B5/B12 (ATI)	140	10'6"x4" Pipe Mount	85
4478 B14 (ATI)	140	PD10054	85
RRUS-32 (ATI)	140	Beacon	83
RRUS-12 (ATI)	140	Beacon	83
4449 B5/B12 (ATI)	140	(2) MX06FRO660 (Verizon)	77.5
4478 B14 (ATI)	140	MT6407-77A (Verizon)	77.5
RRUS-32 (ATI)	140	RF4439d-25A (B2/B66A RRH) (Verizon)	77.5
RRUS-12 (ATI)	140	RF4440d-13A (B5/B13 RRH) (Verizon)	77.5
4449 B5/B12 (ATI)	140	RF4439d-25A (B2/B66A RRH) (Verizon)	77.5
4478 B14 (ATI)	140		
DC6-48-60-18-8F Surge Arrestor (ATI)	140	RF4440d-13A (B5/B13 RRH) (Verizon)	77.5
DC6-48-60-18-8F Surge Arrestor (ATI)	140	DB-T1-6Z-8AB-0Z (Verizon)	77.5
DC6-48-60-18-8F Surge Arrestor (ATI)	140	6-ft T-Frame (Verizon)	77.5
14' V-Boom (ATI)	140	6-ft T-Frame (Verizon)	77.5
14' V-Boom (ATI)	140	(2) MX06FRO660 (Verizon)	77.5
14' V-Boom (ATI)	140	MT6407-77A (Verizon)	77.5
RR90-17 (T-Mobile)	125	6' Yagi	21
RR90-17 (T-Mobile)	125		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P5x0.4 w/ (3) 1.5x5/8 PL	B	2L3 1/2x3 1/2x5/16

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A529-50	50 ksi	65 ksi
A36	36 ksi	58 ksi	A514-60	60 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 90 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 90 mph wind.

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 23032.02 - Middlebury I84			
Project: 160-ft Lattice Tower #20 Middlebury			
Client: Verizon	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 04/03/23	Scale: NTS	
Path:		Dwg No. E-1	

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	8.344	35	0.3947	0.1187
T2	150 - 125	7.508	35	0.3930	0.1184
T3	125 - 100	5.394	35	0.3758	0.0997
T4	100 - 75	3.536	35	0.3084	0.0812
T5	75 - 66.6667	1.980	35	0.2480	0.0591
T6	66.6667 - 58.3333	1.539	35	0.2261	0.0510
T7	58.3333 - 50	1.141	35	0.2017	0.0432
T8	50 - 37.5	0.813	35	0.1615	0.0359
T9	37.5 - 25	0.442	35	0.1156	0.0253
T10	25 - 0	0.201	35	0.0657	0.0152

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	15' Lighting Rod	35	8.344	0.3947	0.1187	74071
159.00	HPD2-4.7	35	8.261	0.3945	0.1187	74071
158.00	DB304-A	35	8.178	0.3943	0.1188	74071
155.00	TX/RX 432E-83I-01T	35	7.928	0.3938	0.1190	74071
140.00	7770.00	35	6.654	0.3908	0.1130	221883
125.00	RR90-17	35	5.394	0.3758	0.0997	21759
124.00	10' x 2" Dia Omni	35	5.313	0.3739	0.0989	21349
115.00	6' Dish Ice Shield	35	4.612	0.3521	0.0919	23020
110.00	Andrew 6' w/Radome	35	4.241	0.3376	0.0884	24557
97.00	APXVSPP18-C-A20	35	3.333	0.3004	0.0789	26781
85.00	10'6"x4" Pipe Mount	35	2.563	0.2720	0.0686	22105
83.00	Beacon	35	2.442	0.2674	0.0668	21475
77.50	(2) MX06FRO660	35	2.120	0.2543	0.0616	20011
21.00	6' Yagi	35	0.149	0.0517	0.0124	18630

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	10.491	19	0.4983	0.1953
T2	150 - 125	9.436	19	0.4960	0.1950
T3	125 - 100	6.775	19	0.4729	0.1633
T4	100 - 75	4.441	19	0.3876	0.1314
T5	75 - 66.6667	2.488	19	0.3116	0.0939
T6	66.6667 - 58.3333	1.935	19	0.2840	0.0812
T7	58.3333 - 50	1.434	19	0.2534	0.0689
T8	50 - 37.5	1.022	19	0.2030	0.0573
T9	37.5 - 25	0.557	19	0.1453	0.0405
T10	25 - 0	0.253	19	0.0826	0.0244

Critical Deflections and Radius of Curvature - Design Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
160.00	15' Lighting Rod	19	10.491	0.4983	0.1953	64100
159.00	HPD2-4.7	19	10.386	0.4980	0.1955	64100
158.00	DB304-A	19	10.281	0.4978	0.1956	64100
155.00	TX/RX 432E-83I-01T	19	9.966	0.4971	0.1959	64100
140.00	7770.00	19	8.360	0.4927	0.1858	136087
125.00	RR90-17	19	6.775	0.4729	0.1633	17222
124.00	10' x 2" Dia Omni	19	6.673	0.4704	0.1618	16913
115.00	6' Dish Ice Shield	19	5.793	0.4427	0.1500	18266
110.00	Andrew 6' w/Radome	19	5.327	0.4244	0.1439	19497
97.00	APXVSPP18-C-A20	19	4.186	0.3776	0.1273	21276
85.00	10'6"x4" Pipe Mount	19	3.219	0.3417	0.1095	17517
83.00	Beacon	19	3.067	0.3360	0.1063	17013
77.50	(2) MX06FRO660	19	2.664	0.3195	0.0978	15843
21.00	6' Yagi	19	0.188	0.0650	0.0198	14792

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
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Subject:	Anchor Bolt Analysis
Location:	160-ft Lattice Tower Middlebury, CT
Rev. 0: 3/31/23	Prepared by: T.J.L. Checked by: C.F.C. Job No. 23032.00

Anchor Bolt Analysis:

Input Data:

Tower Reactions:

Tension Force =	Tension := 288·kips	(Input From tnxTower)
Compression Force =	Compression := 342·kips	(Input From tnxTower)
Shear Force =	Shear := 41·kips	(Input From tnxTower)

Anchor Bolt Data:

ASTMA36

Number of Anchor Bolts =	N := 6	(User Input)
Bolt Ultimate Strength =	F_u := 58·ksi	(User Input)
Bolt Yield Strength =	F_y := 36·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 1.75·in	(User Input)
Threads per Inch =	n := 5	(User Input)
Length from Top of Pier to Bottom of Leveling Nut =	L_{ar} := 1.5·in	(User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 2.405 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 1.899 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 1.555 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.389 \cdot in$

Elastic Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.369 \cdot in^3$

Plastic Section Modulus of Bolt = $Z_x := \frac{D_n^3}{6} = 0.627 \cdot in^3$

Anchor Bolt Design Strength:

Resistance Factor for Flexure = $\phi_f := 0.9$

Resistance Factor for Compression = $\phi_c := 0.9$

Resistance Factor for Tension = $\phi_t := 0.75$

Resistance Factor for Shear = $\phi_v := 0.75$

Design Tensile Strength = $\Phi R_{nt} := \phi_t \cdot F_u \cdot A_n = 82.6 \cdot k$

Design Compression Strength = $\Phi R_{nc} := \phi_c \cdot F_y \cdot A_g = 77.9 \cdot k$

Design Shear Strength (Tension) = $\Phi R_{nv} := \phi_v \cdot 0.5 F_u \cdot A_g = 52.3 \cdot k$

Design Shear Strength (Compression) = $\Phi R_{nvc} := \phi_c \cdot 0.6 F_y \cdot A_g \cdot 0.75 = 35.1 \cdot k$

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Subject: Anchor Bolt Analysis

Location: 160-ft Lattice Tower
Middlebury, CT

Rev. 0: 3/31/23

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 23032.00

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $P_{ut} := \frac{Tension}{N} = 48 \cdot kips$

Maximum Compressive Force = $P_{uc} := \frac{Compression}{N} = 57 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 6.8 \cdot kips$

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

Condition1 = "OK"

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

Condition2 = "OK"

Bolt % of Capacity = $\max\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2, \left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] = 76.9 \cdot \%$

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Subject: FOUNDATION ANALYSIS

Location: Middlebury, CT

Rev. 0: 4/3/23

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 23032.02

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 6426 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 74 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 59 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 342 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 288 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 160 \cdot ft$	(User Input)	
Tower Width =	$W_t := 23 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 3.75 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.5 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.25 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 34 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_s := 9000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 9$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.375 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 11$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.41 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 32$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 11$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.41 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 32$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 1.561 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.561 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$

Load Factor = $LF := 1$

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 120 \cdot pcf$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.167 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.167 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.122 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.645 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 2.25 \cdot ft$

$A_p := W_f \cdot T_p = 76.5 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 125.825 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (4) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 411.798 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (4) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 368.78 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_s = 34.4 \cdot kip$

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

$X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 10.36$

$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 0$ $X_{off2} := 0$

$X_{off} := if(Pos_t = 1, X_{off1}, X_{off2})$ $X_{off} = 0 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} + WT_t = 706.2 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) + 0.75WT_{s2} \cdot \left[W_f + \frac{(D_f - n) \cdot \tan(\Phi_s)}{3}\right] = 13885 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 6870 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.02$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 443.616 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 840 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 1.156 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 6550.67 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.775 \cdot ksf$

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

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.322 \cdot ksf$

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

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.591$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.667$

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

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 8.183$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.867 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.867 \cdot ksf$

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

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 2.296 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot C_t, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 22.59 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.296 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 67.675 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 858 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 16.9$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 22.8$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 335 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 853.6 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Maximum Moment in Pad = $M_{max} := 2000 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 2.222 \times 10^3 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 \text{ if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 \text{ if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] \text{ otherwise} \end{cases} = 0.85 \quad \text{(ACI-200810.2.7.3)}$$

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 281.023 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 19.674 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 1.647 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 20.419 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.0386 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 20.4 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 50 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 20.4 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 50 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 11.51 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 54.4 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 63 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No\ Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1385.44 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 6.93 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 8.99 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 13.533 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 36 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 3330 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips}\right)$

$(D \ N \ n \ P_u \ M_{xu}) = (42 \ \ 9 \ \ 9 \ \ 455.886 \ \ 3.33 \times 10^3)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (1.736 \times 10^3 \ \ 1.268 \times 10^4 \ \ -39.096 \ \ 6.496 \times 10^{-3})$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

Axial_Load_Check = "Okay"

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 42 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 24 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 34.85 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 17.299 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) = 34.846 \cdot in$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 24.713 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 24.713 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

Summers, Melissa - melissa.summers@verizonwireless.com - 5/24/2022 11:1:44

Project Details

FUZE Project ID:	16244626
Project Name:	850 ADD
Project Alt Name:	MIDDLEBURY I84 CT - MKT 64 - MODIFICATION
Project Type:	Modification
Modification Type:	RF
Designed Sector Carrier 4G:	10
Designed Sector Carrier 5G:	2
Additional Sector Carrier 4G:	N/A
Additional Sector Carrier 5G:	N/A
FP Solution Type & Tech Type:	MODIFICATION;4G_850,4G_PCS,4G_Radio Swap,5G_850,5G_L-Sub6
Carrier Aggregation:	false
MPT Id:	
eCIP-0:	false
Suffix:	REV5

Location Information

Site ID:	2954976
E-NodeB ID:	0649404,064367
PSLC:	468946
Switch Name:	Wallingford 1
Tower Owner:	
Tower Type:	Self Support (Lattice Tower)
Site Type:	MACRO
Site Sub Type:	SPOKE
Street Address:	2 Larkin Drive
City:	Middlebury
State:	CT
Zip Code:	06762
County:	New Haven
Latitude:	41.51361111 / 41° 30' 49.0" N
Longitude:	-73.12444444 / 73° 7' 28.0" W

RFDS Project Scope: RFDS SOW: 850A 5GNR/ PCS/ L-Sub6 carrier add, Samsung dual band RRH swap, antenna change

REV1 (11/20/20): Updates the existing OVP/ Hybriflex count. Note that there is confusion if (2) OVPs/ Hybriflex actually existing on site. (2) were released but the COP does not clearly show (2). Confirm the count prior to construction
REV2 (12/8/20): Confirms existing OVP count
REV3 (1/29/21): Correct the existing/ proposed C/L from 75' to 77.5' per mapping
REV4 (6/9/21): Adds 850 5GNR carrier (no material changes)
REV5 (5/24/22): Updates the LS6 Regulatory to get ISAs (no material changes)

1- Retain 700/ AWS carriers and add 850A 5GNR/ PCS/ L-Sub6 carrier
2- Replace (4) existing antennas with (4) new JMA MX06FRO660-03 antennas on new 91900314-02 side-by-side mounts to position 2
3- Add (2) L-Sub6 All-in-One antenna/ RRHs to position 1
4- Remove (4) existing Nokia RRHs from tower and add (2) new Samsung B5/B13 RRH-BR04C (RFV01U-D2A) and (2) new Samsung B2/B66A RRH-BR049 (RFV01U-D1A) to tower
5- Plumb 700/ 850/ PCS/ AWS/ L-Sub6 according to the plumbing diagram
6- Use RF ports on dual band RRHs to communicate with RETs via Smart bias-T built into the antenna
7- Cap and weatherproof unused ports/connectors

Antenna Summary

Added

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	LTE 5G	LTE	LTE		JMA WIRELESS	MX06FRO660-03	77.5	80.5	70(01) 245(02)	true	true	PHYSICAL	4	MX06FRO660-03
				5G	Samsung	MT6407-77A	77.5	79	70(0217) 245(0218)	false	false	PHYSICAL	2	

Removed

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE			LTE		ANDREW	SBNHH-1D65B	77.5	80.5	70(01) 245(02)	false	false	PHYSICAL	4	

Retained

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available.

Added: 6 **Removed:** 4 **Retained:** 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Mount	Tower						JMA WIRELESS	91900314-02			PHYSICAL	2	
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH-BR049 (RFV01U-D1A)			PHYSICAL	2	SLS-BR0497EAEX
RRU	Tower	LTE	LTE 5G				Samsung	B5/B13 RRH-BR04C (RFV01U-D2A)			PHYSICAL	2	SLS-BR04C4ECEX
RRU	Tower					5G	Samsung	MT6407-77A			PHYSICAL	2	

Removed

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
RRU	Tower	LTE					Nokia	UHBA B13 RRH 4x30			PHYSICAL	2	
RRU	Tower				LTE		Nokia	UHIC B4 RRH 2x60-4R			PHYSICAL	2	

Retained

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Hybrid Cable	Tower	LTE	LTE 5G	LTE	LTE	5G	N/A	6x12 Hybriflex LI		1 5/8"	PHYSICAL	1	
OVP Box	Tower	LTE	LTE 5G	LTE	LTE	5G	Raycap	RRFDC-3315-PF-48			PHYSICAL	1	

Service Info

700 MHz LTE		0000		5GLS	
Sector	**01**	**02**		**01**	**02**
Azimuth	70	245		70	245
Cell / ENode B ID	064367	064367		064367	064367
Antenna Model	SBNHH-1D65B	SBNHH-1D65B		MX06FRO660-03	MX06FRO660-03
Antenna Make	ANDREW	ANDREW		JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)	77.5	77.5		77.5	77.5
Mechanical Down-Tilt(Deg.)	0	0		0	0
Electrical Down-Tilt	6	6		6	6
Tip Height	80.5	80.5		80.5	80.5
Regulatory Power	119.91	119.91		70.89	70.89
DLEARFCN	5230	5230		5230	5230
Channel Bandwidth(MHz)	10	10		10	10
Total ERP (W)	1079.2	1079.2		637.97	637.97
TMA Make					
TMA Model					
RRU Make	Nokia	Nokia		Samsung	Samsung
RRU Model	UHBA B13 RRH 4x30	UHBA B13 RRH 4x30		B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)
Number of Tx, Rx Lines	2,4	2,4		4,4	4,4
Position					
Transmitter Id	1964136	1964192		7842438	7842440
Source	ATOLL_API	ATOLL_API		ATOLL_API	ATOLL_API

850 MHz LTE				5GLS	
Sector				**01**	**02**
Azimuth				70	245
Cell / ENode B ID				064367	064367
Antenna Model				MX06FRO660-03	MX06FRO660-03
Antenna Make				JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)				77.5	77.5
Mechanical Down-Tilt(Deg.)				0	0
Electrical Down-Tilt				6	6
Tip Height				80.5	80.5
Regulatory Power				283.54	283.54
DLEARFCN				2450	2450
Channel Bandwidth(MHz)				10	10
Total ERP (W)				637.97	637.97
TMA Make					
TMA Model					
RRU Make				Samsung	Samsung
RRU Model				B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)
Number of Tx, Rx Lines				4,4	4,4
Position					
Transmitter Id				10307516	10307517
Source				ATOLL_API	ATOLL_API

850 MHz 5GNR

		5GLS	
Sector		0217	0218
Azimuth		70	245
Cell / ENode B ID		0649404	0649404
Antenna Model		MX06FRO660-03	MX06FRO660-03
Antenna Make		JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)		77.5	77.5
Mechanical Down-Tilt(Deg.)		0	0
Electrical Down-Tilt		6	6
Tip Height		80.5	80.5
Regulatory Power		283.54	283.54
DLEARFCN		2450	2450
Channel Bandwidth(MHz)		10	10
Total ERP (W)		637.97	637.97
TMA Make			
TMA Model			
RRU Make		Samsung	Samsung
RRU Model		B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)
Number of Tx, Rx Lines		4,4	4,4
Position			
Transmitter Id		10307516	10307517
Source		ATOLL_API	ATOLL_API

1900 MHz LTE

		5GLS	
Sector		01	02
Azimuth		70	245
Cell / ENode B ID		064367	064367
Antenna Model		MX06FRO660-03	MX06FRO660-03
Antenna Make		JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)		77.5	77.5
Mechanical Down-Tilt(Deg.)		0	0
Electrical Down-Tilt		2	2
Tip Height		80.5	80.5
Regulatory Power		272.62	272.62
DLEARFCN		1050	1050
Channel Bandwidth(MHz)		10	10
Total ERP (W)		1495.55	1495.55
TMA Make			
TMA Model			
RRU Make		Samsung	Samsung
RRU Model		B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)
Number of Tx, Rx Lines		4,4	4,4
Position			
Transmitter Id		9373391	9373392
Source		ATOLL_API	ATOLL_API

2100 MHz LTE

	0000		5GLS	
Sector	**01**	**02**	**01**	**02**
Azimuth	70	245	70	245
Cell / ENode B ID	064367	064367	064367	064367
Antenna Model	SBNHH-1D65B	SBNHH-1D65B	MX06FRO660-03	MX06FRO660-03
Antenna Make	ANDREW	ANDREW	JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)	77.5	77.5	77.5	77.5
Mechanical Down-Tilt(Deg.)	0	0	0	0
Electrical Down-Tilt	2	2	2	2
Tip Height	80.5	80.5	80.5	80.5
Regulatory Power	233.74	233.74	152.94	152.94
DLEARFCN	2050	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20	20
Total ERP (W)	2564.48	2564.48	1678.03	1678.03
TMA Make				
TMA Model				
RRU Make	Nokia	Nokia	Samsung	Samsung
RRU Model	UHIC B4 RRH 2x60-4R	UHIC B4 RRH 2x60-4R	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)
Number of Tx, Rx Lines	2,4	2,4	4,4	4,4
Position				
Transmitter Id	1964137	1964193	7842439	7842441
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

			5GLS	
Sector			**0217**	**0218**
Azimuth			70	245
Cell / ENode B ID			0649404	0649404
Antenna Model			MT6407-77A	MT6407-77A
Antenna Make			Samsung	Samsung
Antenna Centerline(Ft)			77.5	77.5
Mechanical Down-Tilt(Deg.)			0	0
Electrical Down-Tilt			6	6
Tip Height			79	79
Regulatory Power			767.64	767.64
DLEARFCN			648672	648672
Channel Bandwidth(MHz)			60	60
Total ERP (W)			13335.21	13335.21
TMA Make				
TMA Model				
RRU Make			Samsung	Samsung
RRU Model			MT6407-77A	MT6407-77A
Number of Tx, Rx Lines			2,2	2,2
Position				
Transmitter Id			7842496	7842497
Source			ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz

No data available.

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq Mi	Status	Action	Approved for Insvc
WQJQ689	Northeast	WU	REA001	C	CT	New Haven	Cellco Partnership	Yes	22.000	746.000-757.000	776.000-787.000	.000-.000	.000-.000	70.89	1000	1430.62	Active	added	Yes
KNKA313	New Haven-West Haven-Waterbury-Meriden, CT	CL	CMA049	A	CT	New Haven	Cellco Partnership	Yes	25.000	824.000-835.000	869.000-880.000	845.000-846.500	890.000-891.500	283.54	400	1430.62	Active	added	Yes
WQEM953	New Haven-Waterbury-Meriden, CT	CW	BTA318	C	CT	New Haven	Cellco Partnership	Yes	10.000	1895.000-1900.000	1975.000-1980.000	.000-.000	.000-.000	272.62	1640	1430.62	Active	added	Yes
KNLH262	New Haven-Waterbury-Meriden, CT	CW	BTA318	F	CT	New Haven	Cellco Partnership	Yes	10.000	1890.000-1895.000	1970.000-1975.000	.000-.000	.000-.000	272.62	1640	1430.62	Active	added	Yes
WQGB280	New Haven-West Haven-Waterbury-Meriden, CT	AW	CMA049	A	CT	New Haven	Cellco Partnership	Yes	20.000	1710.000-1720.000	2110.000-2120.000	.000-.000	.000-.000	152.94	1640	1430.62	Active	added	Yes
WRNE581	New York, NY	PM	PEA001	A1	CT	New Haven	Cellco Partnership	Yes	20.000	3700.000-3720.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	added	Yes
WRNE582	New York, NY	PM	PEA001	A2	CT	New Haven	Cellco Partnership	Yes	20.000	3720.000-3740.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	added	Yes
WRNE583	New York, NY	PM	PEA001	A3	CT	New Haven	Cellco Partnership	Yes	20.000	3740.000-3760.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	added	Yes
WRNE584	New York, NY	PM	PEA001	A4	CT	New Haven	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	N/A	No
WRNE585	New York, NY	PM	PEA001	A5	CT	New Haven	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	N/A	No
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	New Haven	Cellco Partnership	Yes	20.000	1720.000-1730.000	2120.000-2130.000	.000-.000	.000-.000	152.94	1640	1430.62	Active	added	Yes
WRNE586	New York, NY	PM	PEA001	B1	CT	New Haven	Cellco Partnership	Yes	20.000	3800.000-3820.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	N/A	No
WRNE587	New York, NY	PM	PEA001	B2	CT	New Haven	Cellco Partnership	Yes	20.000	3820.000-3840.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	N/A	No
WRNE588	New York, NY	PM	PEA001	B3	CT	New Haven	Cellco Partnership	Yes	20.000	3840.000-3860.000	.000-.000	.000-.000	.000-.000	767.64	1640	1430.62	Active	N/A	No
WQCS396	New Haven-Waterbury-Meriden, CT	CW	BTA318	C	CT	New Haven	Cellco Partnership	Yes	10.000	1905.000-1910.000	1985.000-1990.000	.000-.000	.000-.000		1640	1430.62	Active		Yes
WRBA734	New Haven-Waterbury-Meriden, CT	UU	BTA318	L1	CT	New Haven	Cellco Partnership	Yes	325.000	27600.000-27925.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRBA735	New Haven-Waterbury-Meriden, CT	UU	BTA318	L2	CT	New Haven	Cellco Partnership	Yes	325.000	27925.000-27950.000	28050.000-28350.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD609	New York, NY	UU	PEA001	M1	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes

WRHD610	New York, NY	UU	PEA001	M10	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD611	New York, NY	UU	PEA001	M2	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD612	New York, NY	UU	PEA001	M3	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	37800.000-37900.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD613	New York, NY	UU	PEA001	M4	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	37900.000-38000.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD614	New York, NY	UU	PEA001	M5	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38000.000-38100.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD615	New York, NY	UU	PEA001	M6	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD616	New York, NY	UU	PEA001	M7	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD617	New York, NY	UU	PEA001	M8	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38300.000-38400.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD618	New York, NY	UU	PEA001	M9	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000			1430.62	Active		Yes
WRHD619	New York, NY	UU	PEA001	N1	CT	New Haven	Straight Path Spectrum, LLC	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000			1430.62	Active	N/A	No
WRLD517	D09009 - New Haven, CT	PL	D09009	0	CT	New Haven	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	1430.62	Active		Yes
WRLD516	D09009 - New Haven, CT	PL	D09009	0	CT	New Haven	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	1430.62	Active		Yes
WRLD518	D09009 - New Haven, CT	PL	D09009	0	CT	New Haven	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	1430.62	Active		Yes

RET motors per antenna:	3		
850 Band:	A	6	
850 CDMA RET	N		
AWS Carriers:	1	2	
AWS3 Carriers:	N		
PCS Carriers:	1	4	
eNB ID:	064367		
Sector	**Antenna Desc**	**Base Station ID**	**Sector ID**
Alpha	700	064367_1_1	064367_1
Alpha	850	064367_1_6	064367_1_6
Alpha	AWS	064367_1_2	064367_1_2
Alpha	PCS	064367_1_4	064367_1_4
Beta	700	064367_2_1	064367_2
Beta	850	064367_2_6	064367_2_6
Beta	AWS	064367_2_2	064367_2_2
Beta	PCS	064367_2_4	064367_2_4
Gamma	700	064367_3_1	064367_3
Gamma	850	064367_3_6	064367_3_6
Gamma	AWS	064367_3_2	064367_3_2
Gamma	PCS	064367_3_4	064367_3_4

Band	Sector 1 (Alpha) Color Codes						
850 CDMA	R						
	R	R					
700	R	P					
	R	R	P				
	R	R	R	P			
	R	R	R	R	P		
850 LTE	R	P	P				
	R	R	P	P			
	R	R	R	P	P		
	R	R	R	R	P	P	
700 / 850	R	P	P	P			
	R	R	P	P	P		
	R	R	R	P	P	P	
	R	R	R	R	P	P	P
AWS	R	W					
	R	R	W				
	R	R	R	W			
	R	R	R	R	W		
PCS	R	W	W				
	R	R	W	W			
	R	R	R	W	W		
	R	R	R	R	W	W	
AWS / PCS	R	W	W	W			
	R	R	W	W	W		
	R	R	R	W	W	W	
	R	R	R	R	W	W	W
CBRS	R	Y					
	R	R	Y				
	R	R	R	Y			
	R	R	R	R	Y		
LAA	R	Y	Y				
	R	R	Y	Y			

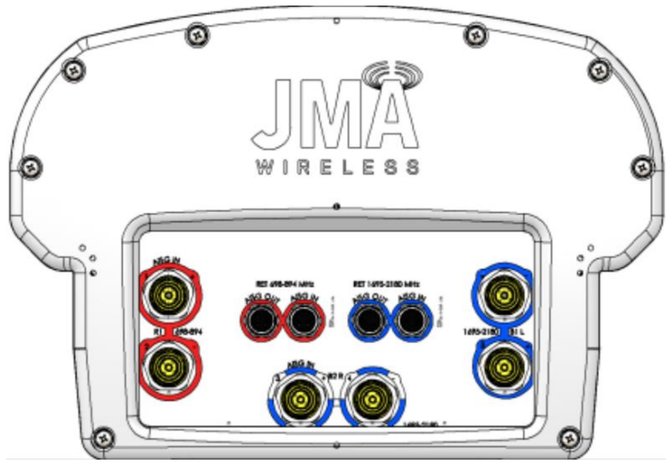
Band	Sector 2 (Beta) Color Codes						
850 CDMA	B						
	B	B					
700	B	P					
	B	B	P				
	B	B	B	P			
	B	B	B	B	P		
850 LTE	B	P	P				
	B	B	P	P			
	B	B	B	P	P		
	B	B	B	B	P	P	
700 / 850	B	P	P	P			
	B	B	P	P	P		
	B	B	B	P	P	P	
	B	B	B	B	P	P	P
AWS	B	W					
	B	B	W				
	B	B	B	W			
	B	B	B	B	W		
PCS	B	W	W				
	B	B	W	W			
	B	B	B	W	W		
	B	B	B	B	W	W	
AWS / PCS	B	W	W	W			
	B	B	W	W	W		
	B	B	B	W	W	W	
	B	B	B	B	W	W	W
CBRS	B	Y					
	B	B	Y				
	B	B	B	Y			
	B	B	B	B	Y		
LAA	B	Y	Y				
	B	B	Y	Y			

Band	Sector 3 (Gamma) Color Codes						
850 CDMA	G						
	G	G					
700	G	P					
	G	G	P				
	G	G	G	P			
	G	G	G	G	P		
850 LTE	G	P	P				
	G	G	P	P			
	G	G	G	P	P		
	G	G	G	G	P	P	
700 / 850	G	P	P	P			
	G	G	P	P	P		
	G	G	G	P	P	P	
	G	G	G	G	P	P	P
AWS	G	W					
	G	G	W				
	G	G	G	W			
	G	G	G	G	W		
PCS	G	W	W				
	G	G	W	W			
	G	G	G	W	W		
	G	G	G	G	W	W	
AWS / PCS	G	W	W	W			
	G	G	W	W	W		
	G	G	G	W	W	W	
	G	G	G	G	W	W	W
CBRS	G	Y					
	G	G	Y				
	G	G	G	Y			
	G	G	G	G	Y		
LAA	G	Y	Y				
	G	G	Y	Y			

	Sector 4 (Delta) Color Codes						
850 CDMA	Gray	R					
	Gray	R	R				
700	Gray	R	P				
	Gray	R	R	P			
	Gray	R	R	R	P		
	Gray	R	R	R	R	P	
850 LTE	Gray	R	P	P			
	Gray	R	R	P	P		
	Gray	R	R	R	P	P	
	Gray	R	R	R	R	P	P
700 / 850	Gray	R	P	P	P		
	Gray	R	R	P	P	P	
	Gray	R	R	R	P	P	P
	Gray	R	R	R	R	P	P	P
AWS	Gray	R	W				
	Gray	R	R	W			
	Gray	R	R	R	W		
	Gray	R	R	R	R	W	
PCS	Gray	R	W	W			
	Gray	R	R	W	W		
	Gray	R	R	R	W	W	
	Gray	R	R	R	R	W	W
AWS / PCS	Gray	R	W	W	W		
	Gray	R	R	W	W	W	
	Gray	R	R	R	W	W	W
	Gray	R	R	R	R	W	W	W
CBRS	Gray	R	Y				
	Gray	R	R	Y			
	Gray	R	R	R	Y		
	Gray	R	R	R	R	Y	
LAA	Gray	R	Y	Y			
	Gray	R	R	Y	Y		

	Sector 5 (Epsilon) Color Codes						
Gray	B						
Gray	B	B					
Gray	B	P					
Gray	B	B	P				
Gray	B	B	B	P			
Gray	B	B	B	B	P		
Gray	B	P	P				
Gray	B	B	P	P			
Gray	B	B	B	P	P		
Gray	B	B	B	B	P	P	
Gray	B	P	P	P			
Gray	B	B	P	P	P		
Gray	B	B	B	P	P	P	
Gray	B	B	B	B	P	P	P
Gray	B	W					
Gray	B	B	W				
Gray	B	B	B	W			
Gray	B	B	B	B	W		
Gray	B	W	W				
Gray	B	B	W	W			
Gray	B	B	B	W	W		
Gray	B	B	B	B	W	W	
Gray	B	W	W	W			
Gray	B	B	W	W	W		
Gray	B	B	B	W	W	W	
Gray	B	B	B	B	W	W	W
Gray	B	Y					
Gray	B	B	Y				
Gray	B	B	B	Y			
Gray	B	B	B	B	Y		
Gray	B	Y	Y				
Gray	B	B	Y	Y			

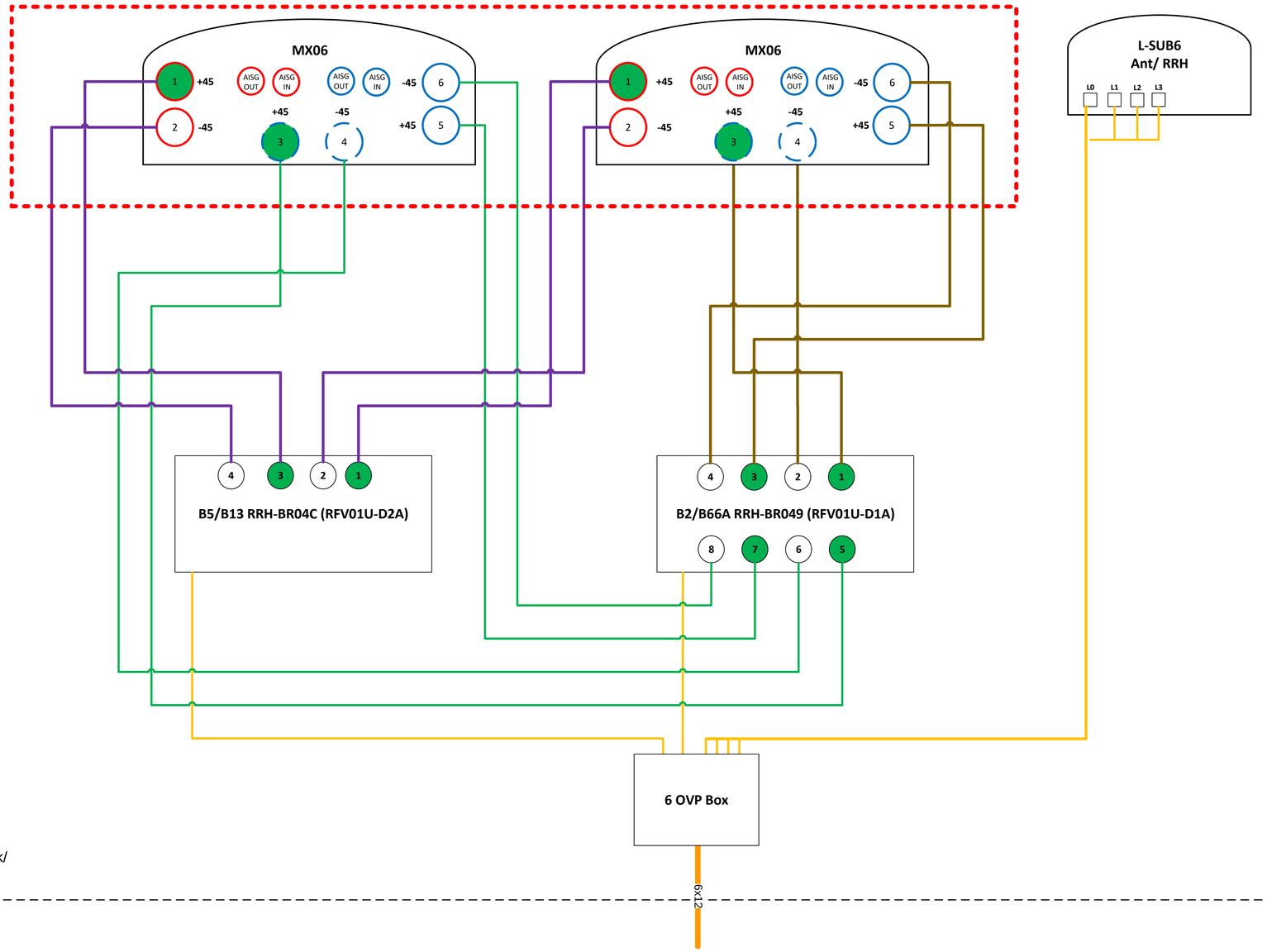
	Sector 6 (Zeta) Color Codes						
Gray	G						
Gray	G	G					
Gray	G	P					
Gray	G	G	P				
Gray	G	G	G	P			
Gray	G	G	G	G	P		
Gray	G	P	P				
Gray	G	G	P	P			
Gray	G	G	G	P	P		
Gray	G	G	G	G	P	P	
Gray	G	P	P	P			
Gray	G	G	P	P	P		
Gray	G	G	G	P	P	P	
Gray	G	G	G	G	P	P	P
Gray	G	W					
Gray	G	G	W				
Gray	G	G	G	W			
Gray	G	G	G	G	W		
Gray	G	W	W				
Gray	G	G	W	W			
Gray	G	G	G	W	W		
Gray	G	G	G	G	W	W	
Gray	G	W	W	W			
Gray	G	G	W	W	W		
Gray	G	G	G	W	W	W	
Gray	G	G	G	G	W	W	W
Gray	G	Y					
Gray	G	G	Y				
Gray	G	G	G	Y			
Gray	G	G	G	G	Y		
Gray	G	Y	Y				
Gray	G	G	Y	Y			



- **Port 1 & 2 are for low band (698-896 MHz).**
- **Port 3,4,5, & 6 are for high band (1695-2360 MHz).**
- **Smart Bias Tee (SBT) is through port 1 & 3 for low band and port 1 for high band.**
- **AISG cable is only needed when drawn in the diagrams below, if it is not drawn then SBT is enough to control all RET motors.**
- **Not all SBT ports are needed to control RET, only green port connection to green port will control RET.**

RET DC signal pass for RET
(Port that will control RET)

91900314-02



DC signal capable Port

AISG Cable

RET DC signal pass for RET
(Port that will control RET)

Hybriflex cables

Comments:

Diagram shows antenna port configuration as viewed from below antennas.

Antenna positions are indicated as viewed from IN FRONT of antennas.

Cap and weatherproof unused antenna ports.

All plumbing diagram colors are irrelevant except for AISG & Hybriflex cable. (For the coax colors follow Coax Colors guide above)

SAMSUNG

700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This 700/850MHz 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code	RF4440d-13A

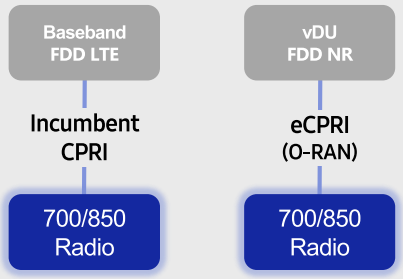
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

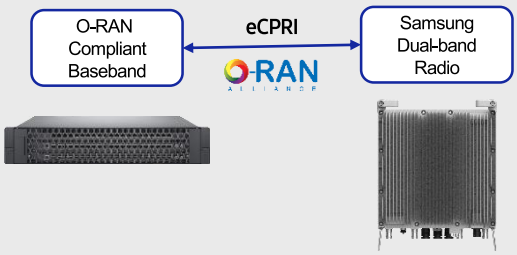
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help when implementing cost-effective networks because it is capable of sending more data without compromising additional investments.

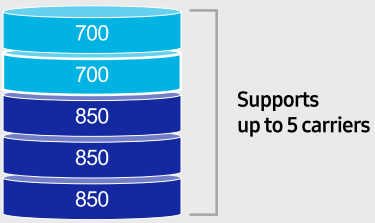
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

The number of required carriers varies according to site (region). The ability to support many carriers is essential for using all frequencies that the operator has available.

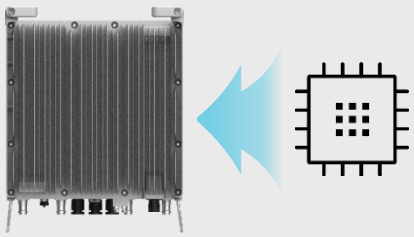
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



Secured Integrity

Access to sensitive data is allowed only to authorized software.

The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B13(700MHz), B5(850MHz)
Frequency Band	DL: 746 – 756MHz, UL: 777 – 787MHz DL: 869 – 894MHz, UL: 824 – 849MHz
RF Power	(B13) 4 × 40W or 2 × 60W (B5) 4 × 40W or 2 × 60W
IBW/OBW	(B13) 10MHz / 10MHz (B5) 25MHz / 25MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 9.05inch (33.2L) / 70.33 lb