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November 8, 2016

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-138-160829 – Cellco Partnership d/b/a Verizon Wireless**
630 James Farm Road, Stratford, Connecticut

Dear Ms. Bachman:

On September 19, 2016, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its existing telecommunications facility at 630 James Farm Road in Stratford, Connecticut. The modifications involved the replacement of antennas and the installation of remote radio heads at the above-referenced facility.

As a condition of the Council's acknowledgement, Cellco was required to provide a copy of the Structural Analysis Report referencing the Rev. G of the Connecticut State Building Code (Structural Standards). The updated Structural Analysis Report referencing Rev. G is attached.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks

15529478-v1

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

110-ft Existing ROHN Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Stratford North

630 James Farm Road
Stratford, CT

Centek Project No. 15001.096

~~Date: October 27, 2015~~
~~Rev 1: October 28, 2015~~
~~Rev 2: August 24, 2016~~
Rev 3: November 7, 2016

Prepared for:

Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

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 Wireless on the existing lattice tower located in Stratford, CT.

The host tower is a 110-ft, three legged, tapered lattice tower originally designed and manufactured by ROHN eng. file no. 15348PM dated March 9, 1982. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry, structure member sizes and prior tower reinforcements were all obtained from a structural analysis report prepared by Centek Engineering, job no. 13001.027 dated July 10, 2013.

Antenna and appurtenance information were obtained from a combination of the aforementioned Centek structural report and a RF data sheet provided by Verizon Wireless.

The tower is made of six (6) tapered vertical sections consisting of ASTM A572-50 structural steel pipe legs. Diagonal lateral support bracing consists of ASTM A36 structural steel angle shapes. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted gusset connections. The width of the tower face is 1.55-ft at the top and 12.64-ft at the base.

Verizon proposes the removal of six (6) panel antennas and three (3) remote radio heads and the installation of six (6) panel antennas, nine (9) remote radio heads and one (1) main distribution box on the existing T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- CLEARWIRE (Existing):
  Antennas: Three (3) Argus LLX310R panel antennas, one (1) Dragonwave A-Ant-23G-2 microwave dish, one (1) Dragonwave A-Ant-18G-2 microwave dish and three (3) RRUs mounted on three (3) existing 12' boom gates with a RAD center elevation of ±108-ft above the existing tower base.
  Coax Cables: Two (2) 2" ∅ inner ducts running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
  Antennas: Six (6) RFS APL868013 and three (3) RYMSA MG D3-800T0 panel antennas and one (1) GPS antenna mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±98-ft above the existing tower base.
  Appurtenances: One (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±98-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables, two (2) 1/2" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- VERIZON (Existing to Remove):
  Antennas: Two (2) Andrew LNX-6514DS-T4M, one (1) Powerwave P65-16-XL-2 and three (3) Antel BXA-171063-8BF panel antennas mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±98-ft above the existing tower base.
  Appurtenances: Three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±98-ft above the existing tower base.
  Coax Cables: Three (3) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON (PROPOSED):**
  Antennas: Six (6) Andrew SBNHH-1D85B panel antennas mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±98-ft above the existing tower base.
  Appurtenances: Three (3) Alcatel-Lucent B13 RRH4x30-LTE remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z distribution box mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±98-ft above the existing tower base.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable running on the exterior of the existing 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 or reinforcement drawings.
- 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 existing coax cables to be installed as indicated in 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 (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", 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-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Fairfield; v = 90-110 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Stratford; v = 97 mph (3 second gust)	*[Appendix N of the 2016 CT Building Code]*
Load Cases:	Load Case 1; 97 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2016 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 0.75" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 4-8 of the TIA code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **68.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T6)	0.00'-20.00'	68.0%	**PASS**
Diagonal (T2)	80.00'-100.00'	66.1%	**PASS**
Top Girt (T6)	0.00'-20.00'	23.6%	**PASS**

Foundation

The existing foundation consists of three (3) reinforced concrete piers together with a reinforced concrete mat. Tower legs are connected to the three (3) piers by means of one stub angle per leg embedded into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	**20 kips**
	Compression	**16 kips**
	Moment	**1334 kip-ft**
Leg	Shear	**13 kips**
	Uplift	**113 kips**
	Compression	**127 kips**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Piers w/ Mat	OTM[2]	1.0	2.41	**PASS**

Note 1: FS denotes Factor of Safety.
Note 2: OTM denotes Overturning Moment

Conclusion

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

The analysis is based, in part, on the information provided to this office by Verizon Wireless. 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:

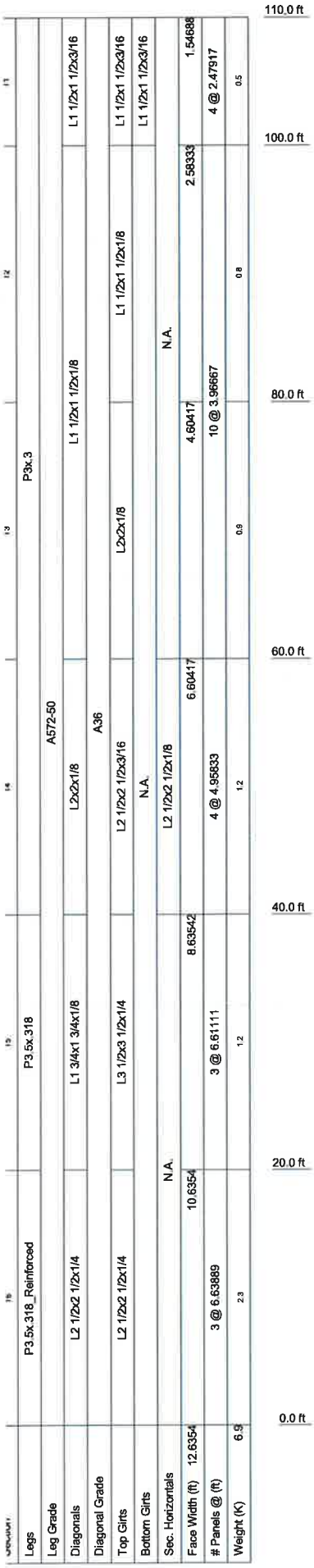
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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 ERITower, 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-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition 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.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ANT-18G-2-C (Clearwire Existing)	109	RRH4x45/2x90-AWS (Verizon Proposed)	98
A-ANT-23G-2 (Clearwire Existing)	109	RRH4x45/2x90-AWS (Verizon Proposed)	98
LLPX310R (Clearwire Existing)	108	RRH4x45/2x90-AWS (Verizon Proposed)	98
RRU (Clearwire Existing)	108	RRH2x60-PCS (Verizon Proposed)	98
RRU (Clearwire Existing)	108	RRH2x60-PCS (Verizon Proposed)	98
RRU (Clearwire Existing)	108	RRH2x60-PCS (Verizon Proposed)	98
Filter Box (Clearwire Existing)	108	RRH4x30-B13 (Verizon Proposed)	98
Rohn 6'x12' Boom Gate (3) (Sprint Existing)	108	RRH4x30-B13 (Verizon Proposed)	98
LLPX310R (Clearwire Existing)	108	RRH4x30-B13 (Verizon Proposed)	98
LLPX310R (Clearwire Existing)	108	DB-T1-6Z-8AB-0Z (Verizon Existing)	98
SBNHH-1D85B (Verizon Proposed)	98	DB-T1-6Z-8AB-0Z (Verizon Proposed)	98
SBNHH-1D85B (Verizon Proposed)	98	Pirod 15' T-Frame Sector Mount (1) (Verizon Existing)	98
APL868013 (Verizon Existing)	98	Pirod 15' T-Frame Sector Mount (1) (Verizon Existing)	98
APL868013 (Verizon Existing)	98	Pirod 15' T-Frame Sector Mount (1) (Verizon Existing)	98
MG D3-800T0 (Verizon Existing)	98	GPS (Verizon Existing)	98
SBNHH-1D85B (Verizon Proposed)	98	APL868013 (Verizon Existing)	98
SBNHH-1D85B (Verizon Proposed)	98	MG D3-800T0 (Verizon Existing)	98
APL868013 (Verizon Existing)	98		
APL868013 (Verizon Existing)	98		
MG D3-800T0 (Verizon Existing)	98		
SBNHH-1D85B (Verizon Proposed)	98		
SBNHH-1D85B (Verizon Proposed)	98		
APL868013 (Verizon Existing)	98		

MATERIAL STRENGTH

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

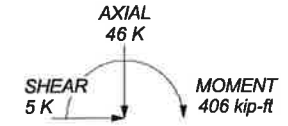
TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 68%

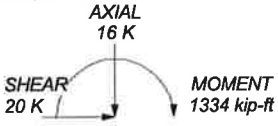
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 127 K
SHEAR: 13 K

UPLIFT: -113 K
SHEAR: 11 K



TORQUE 1 kip-ft
50 mph WIND - 0.7500 in ICE

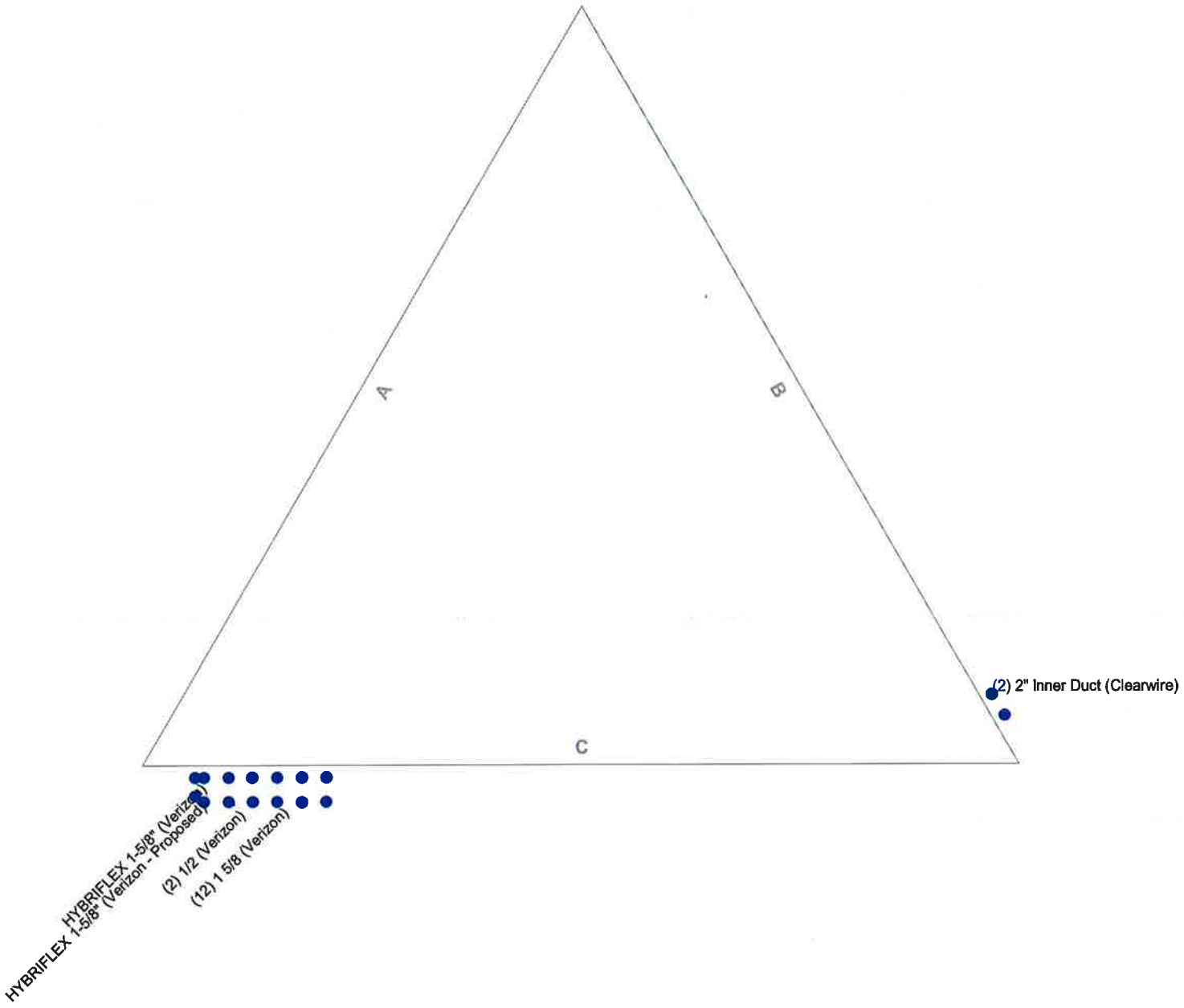


TORQUE 5 kip-ft
REACTIONS - 97 mph WIND

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

Job: *15001.096 - Stratford North*			
Project: *110-ft Lattice Tower - 630 James Farm Rd. Stratford,*			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 11/07/16	Scale: N	
Path:		Dwg No.	

Round Flat App In Face App Out Face



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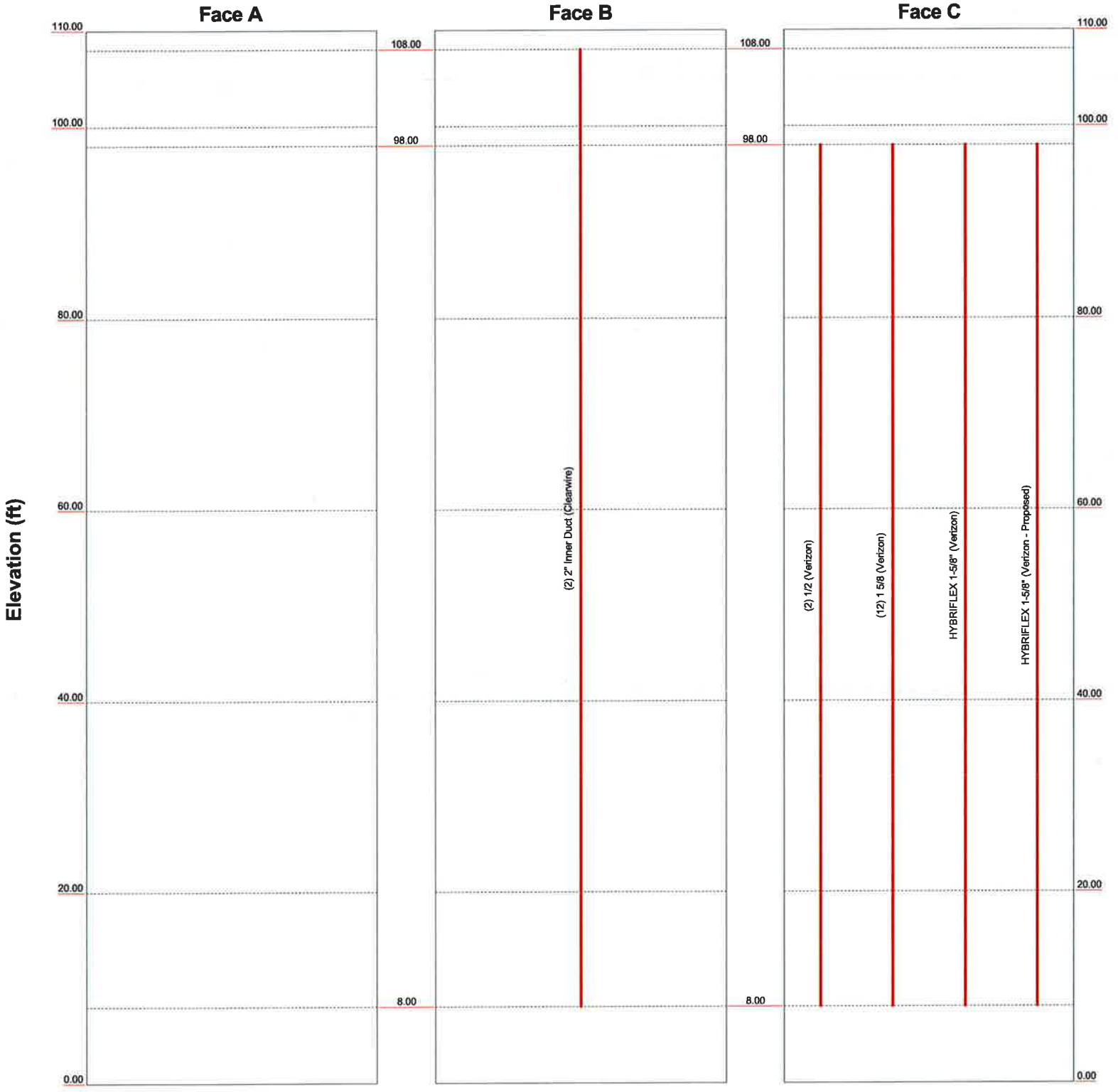
Code: TIA-222-G	Date: 11/07/16	Scale: N
Path:		Dwg No.

0' - 110'

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



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Code: TIA-222-G	Date: 11/07/16	Scale: N	
Path:		Dwg No.	

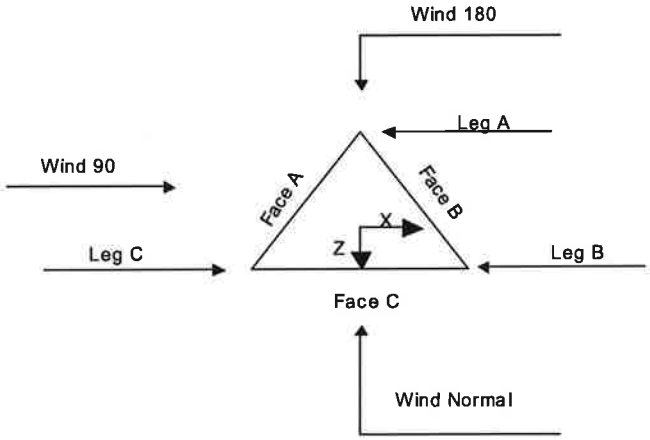
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 110.00 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 1.55 ft at the top and 12.64 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 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-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G 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				



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	110.00-100.00			1.55	1	10.00
T2	100.00-80.00			2.58	1	20.00
T3	80.00-60.00			4.60	1	20.00
T4	60.00-40.00			6.60	1	20.00
T5	40.00-20.00			8.64	1	20.00
T6	20.00-0.00			10.64	1	20.00

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	110.00-100.00	2.48	X Brace	No	Yes	0.0000	1.0000
T2	100.00-80.00	3.97	X Brace	No	Yes	1.0000	1.0000
T3	80.00-60.00	3.97	X Brace	No	Yes	1.0000	1.0000
T4	60.00-40.00	4.96	X Brace	No	Yes	1.0000	1.0000
T5	40.00-20.00	6.61	X Brace	No	Yes	1.0000	1.0000
T6	20.00-0.00	6.64	X Brace	No	Yes	1.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 110.00-100.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 100.00-80.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T3 80.00-60.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T4 60.00-40.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 40.00-20.00	Pipe	P3.5x.318	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x1/8	A36 (36 ksi)
T6 20.00-0.00	Pipe	P3.5x.318_Reinforced	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 110.00-100.00	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 100.00-80.00	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T3 80.00-60.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T4 60.00-40.00	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T5 40.00-20.00	Single Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T6 20.00-0.00	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 60.00-40.00	Single Angle	L2 1/2x2 1/2x1/8	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	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 110.00-100.00	0.11	0.1875	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 100.00-80.00	0.11	0.1875	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 80.00-60.00	0.11	0.1875	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 60.00-40.00	0.11	0.1875	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 40.00-20.00	0.11	0.1875	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 20.00-0.00	0.11	0.1875	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1	Yes	Yes	1	1	1	1		1		1		1		1	
110.00-100.00				1	1	1		1		1		1		1	
T2	Yes	Yes	1	1	1	1		1		1		1		1	
100.00-80.00				1	1	1		1		1		1		1	
T3	Yes	Yes	1	1	1	1		1		1		1		1	
80.00-60.00				1	1	1		1		1		1		1	
T4	Yes	Yes	1	1	1	1		1		1		1		1	
60.00-40.00				1	1	1		1		1		1		1	
T5	No	No	0.5	0.3	1	1		1		1		1		1	
40.00-20.00				1	1	1		1		1		1		1	
T6 20.00-0.00	Yes	Yes	1	1	1	1		1		1		1		1	
				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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
110.00-100.00														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-80.00														
T3 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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
T5 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		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 110.00-100.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T2 100.00-80.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T3 80.00-60.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T4 60.00-40.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T5 40.00-20.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T6 20.00-0.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.7500 A325X	2

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1/2 (Verizon)	C	No	Ar (CaAa)	98.00 - 8.00	6.0000	0.4	2	2	0.5800	0.5800		0.25
1 5/8 (Verizon)	C	No	Ar (CaAa)	98.00 - 8.00	1.0000	0.36	12	6	1.9800	1.9800		1.04
2" Inner Duct (Clearwire)	B	No	Ar (CaAa)	108.00 - 8.00	1.0000	0.43	2	2	2.0000 1.5000	2.0000		1.00
HYBRIFLEX 1-5/8" (Verizon)	C	No	Ar (CaAa)	98.00 - 8.00	1.0000	0.44	1	1	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (Verizon - Proposed)	C	No	Ar (CaAa)	98.00 - 8.00	4.0000	0.44	1	1	1.9800	1.9800		1.90

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	110.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	3.200	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.00
T2	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.000	0.000	0.04
		C	0.000	0.000	51.984	0.000	0.30
T3	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.000	0.000	0.04
		C	0.000	0.000	57.760	0.000	0.34
T4	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.000	0.000	0.04
		C	0.000	0.000	57.760	0.000	0.34
T5	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.000	0.000	0.04
		C	0.000	0.000	57.760	0.000	0.34
T6	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	4.800	0.000	0.02
		C	0.000	0.000	34.656	0.000	0.20

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	110.00-100.00	A	1.684	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	10.797	0.000	0.13
		C		0.000	0.000	0.000	0.000	0.00
T2	100.00-80.00	A	1.658	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	26.817	0.000	0.33
		C		0.000	0.000	93.617	0.000	2.00
T3	80.00-60.00	A	1.617	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	26.537	0.000	0.32
		C		0.000	0.000	103.137	0.000	2.19
T4	60.00-40.00	A	1.564	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	26.172	0.000	0.31
		C		0.000	0.000	101.991	0.000	2.15
T5	40.00-20.00	A	1.486	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	25.642	0.000	0.30
		C		0.000	0.000	100.324	0.000	2.08
T6	20.00-0.00	A	1.331	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	14.756	0.000	0.16
		C		0.000	0.000	58.211	0.000	1.17

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	110.00-100.00	0.7531	0.2687	0.1211	0.0432
T2	100.00-80.00	-2.0659	2.8488	-1.2828	1.6778
T3	80.00-60.00	-3.2284	4.0025	-2.1585	2.5511
T4	60.00-40.00	-3.8645	4.5843	-2.5765	2.9240
T5	40.00-20.00	-5.2148	6.0247	-3.6262	4.0259
T6	20.00-0.00	-4.1930	4.7745	-3.0743	3.3927

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	3	2" Inner Duct	100.00 - 108.00	0.6000	0.1593
T2	1	1/2	80.00 - 98.00	0.6000	0.4745
T2	2	1 5/8	80.00 - 98.00	0.6000	0.4745
T2	3	2" Inner Duct	80.00 - 100.00	0.6000	0.4745
T2	4	HYBRIFLEX 1-5/8"	80.00 - 98.00	0.6000	0.4745
T2	5	HYBRIFLEX 1-5/8"	80.00 - 98.00	0.6000	0.4745
T3	1	1/2	60.00 - 80.00	0.6000	0.5917
T3	2	1 5/8	60.00 - 80.00	0.6000	0.5917
T3	3	2" Inner Duct	60.00 - 80.00	0.6000	0.5917
T3	4	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.5917
T3	5	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.5917
T4	1	1/2	40.00 - 60.00	0.6000	0.5779
T4	2	1 5/8	40.00 - 60.00	0.6000	0.5779
T4	3	2" Inner Duct	40.00 - 60.00	0.6000	0.5779
T4	4	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.5779
T4	5	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.5779
T5	1	1/2	20.00 - 40.00	0.6000	0.6000
T5	2	1 5/8	20.00 - 40.00	0.6000	0.6000
T5	3	2" Inner Duct	20.00 - 40.00	0.6000	0.6000
T5	4	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T5	5	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T6	1	1/2	8.00 - 20.00	0.6000	0.6000
T6	2	1 5/8	8.00 - 20.00	0.6000	0.6000
T6	3	2" Inner Duct	8.00 - 20.00	0.6000	0.6000
T6	4	HYBRIFLEX 1-5/8"	8.00 - 20.00	0.6000	0.6000
T6	5	HYBRIFLEX 1-5/8"	8.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

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
LLPX310R	A	From Face	4.00	0.0000	108.00	No Ice	4.30	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	4.60	2.21	0.05
			0.00			1" Ice	4.90	2.49	0.08
LLPX310R	B	From Face	4.00	0.0000	108.00	No Ice	4.30	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	4.60	2.21	0.05
			0.00			1" Ice	4.90	2.49	0.08
LLPX310R	C	From Face	4.00	0.0000	108.00	No Ice	4.30	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	4.60	2.21	0.05
			0.00			1" Ice	4.90	2.49	0.08
RRU	A	None		0.0000	108.00	No Ice	0.00	0.78	0.03

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
(Clearwire Existing)						1/2" Ice	0.00	0.92	0.04
						1" Ice	0.00	1.06	0.06
RRU	B	None		0.0000	108.00	No Ice	0.00	0.78	0.03
(Clearwire Existing)						1/2" Ice	0.00	0.92	0.04
						1" Ice	0.00	1.06	0.06
RRU	C	None		0.0000	108.00	No Ice	0.00	0.78	0.03
(Clearwire Existing)						1/2" Ice	0.00	0.92	0.04
						1" Ice	0.00	1.06	0.06
Filter Box	A	From Leg	2.00	0.0000	108.00	No Ice	0.92	0.64	0.02
(Clearwire Existing)			0.00			1/2" Ice	1.05	0.77	0.02
			0.00			1" Ice	1.19	0.90	0.03
Rohn 6'x12' Boom Gate (3)	C	None		0.0000	108.00	No Ice	49.80	49.80	1.68
(Sprint Existing)						1/2" Ice	59.30	59.30	2.10
						1" Ice	68.80	68.80	2.52
APL868013	A	From Face	4.00	0.0000	98.00	No Ice	2.87	3.61	0.01
(Verizon Existing)			-6.00			1/2" Ice	3.18	3.92	0.03
			0.00			1" Ice	3.49	4.23	0.06
MG D3-800T0	A	From Face	4.00	0.0000	98.00	No Ice	3.46	2.24	0.03
(Verizon Existing)			-4.00			1/2" Ice	3.80	2.57	0.05
			0.00			1" Ice	4.16	2.91	0.07
SBNHH-1D85B	A	From Face	4.00	0.0000	98.00	No Ice	8.20	5.42	0.04
(Verizon Proposed)			0.00			1/2" Ice	8.66	5.88	0.09
			0.00			1" Ice	9.13	6.35	0.15
SBNHH-1D85B	A	From Face	4.00	0.0000	98.00	No Ice	8.20	5.42	0.04
(Verizon Proposed)			4.00			1/2" Ice	8.66	5.88	0.09
			0.00			1" Ice	9.13	6.35	0.15
APL868013	A	From Face	4.00	0.0000	98.00	No Ice	2.87	3.61	0.01
(Verizon Existing)			6.00			1/2" Ice	3.18	3.92	0.03
			0.00			1" Ice	3.49	4.23	0.06
APL868013	B	From Face	4.00	0.0000	98.00	No Ice	2.87	3.61	0.01
(Verizon Existing)			-6.00			1/2" Ice	3.18	3.92	0.03
			0.00			1" Ice	3.49	4.23	0.06
MG D3-800T0	B	From Face	4.00	0.0000	98.00	No Ice	3.46	2.24	0.03
(Verizon Existing)			-4.00			1/2" Ice	3.80	2.57	0.05
			0.00			1" Ice	4.16	2.91	0.07
SBNHH-1D85B	B	From Face	4.00	0.0000	98.00	No Ice	8.20	5.42	0.04
(Verizon Proposed)			0.00			1/2" Ice	8.66	5.88	0.09
			0.00			1" Ice	9.13	6.35	0.15
SBNHH-1D85B	B	From Face	4.00	0.0000	98.00	No Ice	8.20	5.42	0.04
(Verizon Proposed)			4.00			1/2" Ice	8.66	5.88	0.09
			0.00			1" Ice	9.13	6.35	0.15
APL868013	B	From Face	4.00	0.0000	98.00	No Ice	2.87	3.61	0.01
(Verizon Existing)			6.00			1/2" Ice	3.18	3.92	0.03
			0.00			1" Ice	3.49	4.23	0.06
APL868013	C	From Face	4.00	0.0000	98.00	No Ice	2.87	3.61	0.01
(Verizon Existing)			-6.00			1/2" Ice	3.18	3.92	0.03
			0.00			1" Ice	3.49	4.23	0.06
MG D3-800T0	C	From Face	4.00	0.0000	98.00	No Ice	3.46	2.24	0.03
(Verizon Existing)			-4.00			1/2" Ice	3.80	2.57	0.05
			0.00			1" Ice	4.16	2.91	0.07
SBNHH-1D85B	C	From Face	4.00	0.0000	98.00	No Ice	8.20	5.42	0.04
(Verizon Proposed)			0.00			1/2" Ice	8.66	5.88	0.09
			0.00			1" Ice	9.13	6.35	0.15
SBNHH-1D85B	C	From Face	4.00	0.0000	98.00	No Ice	8.20	5.42	0.04
(Verizon Proposed)			4.00			1/2" Ice	8.66	5.88	0.09
			0.00			1" Ice	9.13	6.35	0.15
APL868013	C	From Face	4.00	0.0000	98.00	No Ice	2.87	3.61	0.01

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
(Verizon Existing)			6.00			1/2" Ice	3.18	3.92	0.03
			0.00			1" Ice	3.49	4.23	0.06
RRH4x45/2x90-AWS	A	From Face	4.00	0.0000	98.00	No Ice	2.58	1.69	0.08
(Verizon Proposed)			4.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	B	From Face	4.00	0.0000	98.00	No Ice	2.58	1.69	0.08
(Verizon Proposed)			4.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	C	From Face	4.00	0.0000	98.00	No Ice	2.58	1.69	0.08
(Verizon Proposed)			4.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH2x60-PCS	A	From Face	4.00	0.0000	98.00	No Ice	2.15	1.35	0.06
(Verizon Proposed)			-4.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	B	From Face	4.00	0.0000	98.00	No Ice	2.15	1.35	0.06
(Verizon Proposed)			-4.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	C	From Face	4.00	0.0000	98.00	No Ice	2.15	1.35	0.06
(Verizon Proposed)			-4.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH4x30-B13	A	From Face	4.00	0.0000	98.00	No Ice	2.16	1.62	0.06
(Verizon Proposed)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
RRH4x30-B13	B	From Face	4.00	0.0000	98.00	No Ice	2.16	1.62	0.06
(Verizon Proposed)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
RRH4x30-B13	C	From Face	4.00	0.0000	98.00	No Ice	2.16	1.62	0.06
(Verizon Proposed)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
DB-T1-6Z-8AB-0Z	C	From Face	4.00	0.0000	98.00	No Ice	4.80	2.00	0.04
(Verizon Existing)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	B	From Face	4.00	0.0000	98.00	No Ice	4.80	2.00	0.04
(Verizon Proposed)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
Pirod 15' T-Frame Sector	A	From Leg	2.00	0.0000	98.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Existing)			0.00			1" Ice	26.20	26.20	0.80
Pirod 15' T-Frame Sector	B	From Leg	2.00	0.0000	98.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Existing)			0.00			1" Ice	26.20	26.20	0.80
Pirod 15' T-Frame Sector	C	From Leg	2.00	0.0000	98.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Existing)			0.00			1" Ice	26.20	26.20	0.80
GPS	A	From Face	1.00	0.0000	98.00	No Ice	1.00	1.00	0.01
(Verizon Existing)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02

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 ft²	Weight K
ANT-18G-2-C	A	Paraboloid	From	4.00	Worst		109.00	2.50	No Ice	4.91	0.04
(Clearwire Existing)		w/Radome	Leg	0.00					1/2" Ice	5.24	0.07
				0.00					1" Ice	5.57	0.10
A-ANT-23G-2	A	Paraboloid	From	4.00	Worst		109.00	2.50	No Ice	4.91	0.04
(Clearwire Existing)		w/Radome	Leg	0.00					1/2" Ice	5.24	0.07
				0.00					1" Ice	5.57	0.10

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	105.00	1.279	26	23.572	A	3.317	5.844	5.844	63.79	0.000	0.000
110.00-100.00					B	3.317	5.844		63.79	3.200	0.000
					C	3.317	5.844		63.79	0.000	0.000
T2	90.00	1.238	25	77.716	A	6.553	11.687	11.687	64.07	0.000	0.000
100.00-80.00					B	6.553	11.687		64.07	8.000	0.000
					C	6.553	11.687		64.07	51.984	0.000
T3 80.00-60.00	70.00	1.174	24	117.924	A	8.970	11.686	11.686	56.58	0.000	0.000
					B	8.970	11.686		56.58	8.000	0.000
					C	8.970	11.686		56.58	57.760	0.000
T4 60.00-40.00	50.00	1.094	22	158.237	A	19.187	11.687	11.687	37.85	0.000	0.000
					B	19.187	11.687		37.85	8.000	0.000
					C	19.187	11.687		37.85	57.760	0.000
T5 40.00-20.00	30.00	0.982	20	199.383	A	12.404	13.356	13.356	51.85	0.000	0.000
					B	12.404	13.356		51.85	8.000	0.000
					C	12.404	13.356		51.85	57.760	0.000
T6 20.00-0.00	10.00	0.85	17	241.886	A	18.322	18.364	18.364	50.06	0.000	0.000
					B	18.322	18.364		50.06	4.800	0.000
					C	18.322	18.364		50.06	34.656	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	105.00	1.279	7	1.6841	26.382	A	3.317	18.861	11.467	51.71	0.000	0.000
110.00-100.00						B	3.317	18.861		51.71	10.797	0.000
						C	3.317	18.861		51.71	0.000	0.000
T2 100.00-80.00	90.00	1.238	7	1.6583	83.251	A	6.553	37.197	22.761	52.02	0.000	0.000
						B	6.553	37.197		52.02	26.817	0.000
						C	6.553	37.197		52.02	93.617	0.000
T3 80.00-60.00	70.00	1.174	6	1.6171	123.321	A	8.970	41.386	22.485	44.65	0.000	0.000
						B	8.970	41.386		44.65	26.537	0.000
						C	8.970	41.386		44.65	103.137	0.000
T4 60.00-40.00	50.00	1.094	6	1.5636	163.456	A	19.187	49.815	22.129	32.07	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	19.187	49.815		32.07	26.172	0.000
						C	19.187	49.815		32.07	101.991	0.000
T5 40.00-20.00	30.00	0.982	5	1.4858	204.342	A	12.404	42.264	23.277	42.58	0.000	0.000
						B	12.404	42.264		42.58	25.642	0.000
						C	12.404	42.264		42.58	100.324	0.000
T6 20.00-0.00	10.00	0.85	5	1.3312	246.329	A	18.322	46.797	27.253	41.85	0.000	0.000
						B	18.322	46.797		41.85	14.756	0.000
						C	18.322	46.797		41.85	58.211	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	105.00	1.279	10	23.572	A	3.317	5.844	5.844	63.79	0.000	0.000
110.00-100.00					B	3.317	5.844		63.79	3.200	0.000
					C	3.317	5.844		63.79	0.000	0.000
T2	90.00	1.238	10	77.716	A	6.553	11.687	11.687	64.07	0.000	0.000
100.00-80.00					B	6.553	11.687		64.07	8.000	0.000
					C	6.553	11.687		64.07	51.984	0.000
T3 80.00-60.00	70.00	1.174	9	117.924	A	8.970	11.686	11.686	56.58	0.000	0.000
					B	8.970	11.686		56.58	8.000	0.000
					C	8.970	11.686		56.58	57.760	0.000
T4 60.00-40.00	50.00	1.094	9	158.237	A	19.187	11.687	11.687	37.85	0.000	0.000
					B	19.187	11.687		37.85	8.000	0.000
					C	19.187	11.687		37.85	57.760	0.000
T5 40.00-20.00	30.00	0.982	8	199.383	A	12.404	13.356	13.356	51.85	0.000	0.000
					B	12.404	13.356		51.85	8.000	0.000
					C	12.404	13.356		51.85	57.760	0.000
T6 20.00-0.00	10.00	0.85	7	241.886	A	18.322	18.364	18.364	50.06	0.000	0.000
					B	18.322	18.364		50.06	4.800	0.000
					C	18.322	18.364		50.06	34.656	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.47	A	0.389	2.087	26	1	1	7.007	0.37	36.81	C
110.00-100.00			B	0.389	2.087		1	1	7.007			
			C	0.389	2.087		1	1	7.007			
T2	0.34	0.82	A	0.235	2.484	25	1	1	13.348	1.49	74.48	C
100.00-80.00			B	0.235	2.484		1	1	13.348			
			C	0.235	2.484		1	1	13.348			
T3	0.38	0.89	A	0.175	2.681	24	1	1	15.637	1.66	83.14	C
80.00-60.00			B	0.175	2.681		1	1	15.637			
			C	0.175	2.681		1	1	15.637			
T4	0.38	1.23	A	0.195	2.612	22	1	1	25.890	2.04	101.92	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
60.00-40.00			B	0.195	2.612		1	1	25.890			
			C	0.195	2.612		1	1	25.890			
T5	0.38	1.20	A	0.129	2.85	20	1	1	19.957	1.65	82.33	C
40.00-20.00			B	0.129	2.85		1	1	19.957			
			C	0.129	2.85		1	1	19.957			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	17	1	1	27.983	1.49	74.74	C
			B	0.152	2.765		1	1	27.983			
			C	0.152	2.765		1	1	27.983			
Sum Weight:	1.72	6.92						OTM	455.38 kip-ft	8.70		

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 ft²	F K	w plf	Ctrl. Face
T1	0.02	0.47	A	0.389	2.087	26	0.825	1	6.426	0.34	34.12	C
110.00-100.00			B	0.389	2.087		0.825	1	6.426			
			C	0.389	2.087		0.825	1	6.426			
T2	0.34	0.82	A	0.235	2.484	25	0.825	1	12.201	1.43	71.41	C
100.00-80.00			B	0.235	2.484		0.825	1	12.201			
			C	0.235	2.484		0.825	1	12.201			
T3	0.38	0.89	A	0.175	2.681	24	0.825	1	14.068	1.58	78.84	C
80.00-60.00			B	0.175	2.681		0.825	1	14.068			
			C	0.175	2.681		0.825	1	14.068			
T4	0.38	1.23	A	0.195	2.612	22	0.825	1	22.533	1.87	93.58	C
60.00-40.00			B	0.195	2.612		0.825	1	22.533			
			C	0.195	2.612		0.825	1	22.533			
T5	0.38	1.20	A	0.129	2.85	20	0.825	1	17.786	1.54	77.04	C
40.00-20.00			B	0.129	2.85		0.825	1	17.786			
			C	0.129	2.85		0.825	1	17.786			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	17	0.825	1	24.777	1.36	68.19	C
			B	0.152	2.765		0.825	1	24.777			
			C	0.152	2.765		0.825	1	24.777			
Sum Weight:	1.72	6.92						OTM	428.18 kip-ft	8.12		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.47	A	0.389	2.087	26	0.8	1	6.343	0.34	33.73	C
110.00-100.00			B	0.389	2.087		0.8	1	6.343			
			C	0.389	2.087		0.8	1	6.343			
T2	0.34	0.82	A	0.235	2.484	25	0.8	1	12.037	1.42	70.97	C
100.00-80.00			B	0.235	2.484		0.8	1	12.037			

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	0.235	2.484		0.8	1	12.037			
T3	0.38	0.89	A	0.175	2.681	24	0.8	1	13.844	1.56	78.23	C
80.00-60.00			B	0.175	2.681		0.8	1	13.844			
			C	0.175	2.681		0.8	1	13.844			
T4	0.38	1.23	A	0.195	2.612	22	0.8	1	22.053	1.85	92.38	C
60.00-40.00			B	0.195	2.612		0.8	1	22.053			
			C	0.195	2.612		0.8	1	22.053			
T5	0.38	1.20	A	0.129	2.85	20	0.8	1	17.476	1.53	76.29	C
40.00-20.00			B	0.129	2.85		0.8	1	17.476			
			C	0.129	2.85		0.8	1	17.476			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	17	0.8	1	24.319	1.34	67.25	C
			B	0.152	2.765		0.8	1	24.319			
			C	0.152	2.765		0.8	1	24.319			
Sum Weight:	1.72	6.92						OTM	424.29 kip-ft	8.04		

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	0.02	0.47	A	0.389	2.087	26	0.85	1	6.509	0.35	34.50	C
110.00-100.00			B	0.389	2.087		0.85	1	6.509			
			C	0.389	2.087		0.85	1	6.509			
T2	0.34	0.82	A	0.235	2.484	25	0.85	1	12.365	1.44	71.85	C
100.00-80.00			B	0.235	2.484		0.85	1	12.365			
			C	0.235	2.484		0.85	1	12.365			
T3	0.38	0.89	A	0.175	2.681	24	0.85	1	14.292	1.59	79.45	C
80.00-60.00			B	0.175	2.681		0.85	1	14.292			
			C	0.175	2.681		0.85	1	14.292			
T4	0.38	1.23	A	0.195	2.612	22	0.85	1	23.013	1.90	94.77	C
60.00-40.00			B	0.195	2.612		0.85	1	23.013			
			C	0.195	2.612		0.85	1	23.013			
T5	0.38	1.20	A	0.129	2.85	20	0.85	1	18.097	1.56	77.80	C
40.00-20.00			B	0.129	2.85		0.85	1	18.097			
			C	0.129	2.85		0.85	1	18.097			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	17	0.85	1	25.235	1.38	69.12	C
			B	0.152	2.765		0.85	1	25.235			
			C	0.152	2.765		0.85	1	25.235			
Sum Weight:	1.72	6.92						OTM	432.07 kip-ft	8.20		

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

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	0.14	1.49	A	0.841	1.852	7	1	1	20.455	0.23	23.41	C
110.00-100.00			B	0.841	1.852		1	1	20.455			
			C	0.841	1.852		1	1	20.455			
T2	2.34	2.74	A	0.526	1.869	7	1	1	32.432	0.67	33.70	C
100.00-80.00			B	0.526	1.869		1	1	32.432			
			C	0.526	1.869		1	1	32.432			
T3	2.52	3.14	A	0.408	2.048	6	1	1	35.340	0.81	40.47	C
80.00-60.00			B	0.408	2.048		1	1	35.340			
			C	0.408	2.048		1	1	35.340			
T4	2.47	4.72	A	0.422	2.022	6	1	1	51.263	0.90	44.94	C
60.00-40.00			B	0.422	2.022		1	1	51.263			
			C	0.422	2.022		1	1	51.263			
T5	2.38	3.62	A	0.268	2.386	5	1	1	37.225	0.75	37.33	C
40.00-20.00			B	0.268	2.386		1	1	37.225			
			C	0.268	2.386		1	1	37.225			
T6 20.00-0.00	1.34	5.12	A	0.264	2.395	5	1	1	45.784	0.60	30.15	C
			B	0.264	2.395		1	1	45.784			
			C	0.264	2.395		1	1	45.784			
Sum Weight:	11.20	20.86						OTM	215.27 kip-ft	3.97		

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	0.14	1.49	A	0.841	1.852	7	0.825	1	19.875	0.23	22.78	C
110.00-100.00			B	0.841	1.852		0.825	1	19.875			
			C	0.841	1.852		0.825	1	19.875			
T2	2.34	2.74	A	0.526	1.869	7	0.825	1	31.286	0.66	33.09	C
100.00-80.00			B	0.526	1.869		0.825	1	31.286			
			C	0.526	1.869		0.825	1	31.286			
T3	2.52	3.14	A	0.408	2.048	6	0.825	1	33.770	0.79	39.60	C
80.00-60.00			B	0.408	2.048		0.825	1	33.770			
			C	0.408	2.048		0.825	1	33.770			
T4	2.47	4.72	A	0.422	2.022	6	0.825	1	47.905	0.86	43.22	C
60.00-40.00			B	0.422	2.022		0.825	1	47.905			
			C	0.422	2.022		0.825	1	47.905			
T5	2.38	3.62	A	0.268	2.386	5	0.825	1	35.054	0.72	36.16	C
40.00-20.00			B	0.268	2.386		0.825	1	35.054			
			C	0.268	2.386		0.825	1	35.054			
T6 20.00-0.00	1.34	5.12	A	0.264	2.395	5	0.825	1	42.578	0.57	28.64	C
			B	0.264	2.395		0.825	1	42.578			
			C	0.264	2.395		0.825	1	42.578			
Sum Weight:	11.20	20.86						OTM	209.56 kip-ft	3.84		

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 ft²	F K	w plf	Ctrl. Face
T1	0.14	1.49	A	0.841	1.852	7	0.8	1	19.792	0.23	22.69	C
110.00-100.00			B	0.841	1.852		0.8	1	19.792			
			C	0.841	1.852		0.8	1	19.792			
T2	2.34	2.74	A	0.526	1.869	7	0.8	1	31.122	0.66	33.00	C
100.00-80.00			B	0.526	1.869		0.8	1	31.122			
			C	0.526	1.869		0.8	1	31.122			
T3	2.52	3.14	A	0.408	2.048	6	0.8	1	33.546	0.79	39.47	C
80.00-60.00			B	0.408	2.048		0.8	1	33.546			
			C	0.408	2.048		0.8	1	33.546			
T4	2.47	4.72	A	0.422	2.022	6	0.8	1	47.426	0.86	42.98	C
60.00-40.00			B	0.422	2.022		0.8	1	47.426			
			C	0.422	2.022		0.8	1	47.426			
T5	2.38	3.62	A	0.268	2.386	5	0.8	1	34.744	0.72	35.99	C
40.00-20.00			B	0.268	2.386		0.8	1	34.744			
			C	0.268	2.386		0.8	1	34.744			
T6 20.00-0.00	1.34	5.12	A	0.264	2.395	5	0.8	1	42.120	0.57	28.43	C
			B	0.264	2.395		0.8	1	42.120			
			C	0.264	2.395		0.8	1	42.120			
Sum Weight:	11.20	20.86						OTM	208.74 kip-ft	3.82		

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 ft²	F K	w plf	Ctrl. Face
T1	0.14	1.49	A	0.841	1.852	7	0.85	1	19.958	0.23	22.87	C
110.00-100.00			B	0.841	1.852		0.85	1	19.958			
			C	0.841	1.852		0.85	1	19.958			
T2	2.34	2.74	A	0.526	1.869	7	0.85	1	31.449	0.66	33.18	C
100.00-80.00			B	0.526	1.869		0.85	1	31.449			
			C	0.526	1.869		0.85	1	31.449			
T3	2.52	3.14	A	0.408	2.048	6	0.85	1	33.994	0.79	39.72	C
80.00-60.00			B	0.408	2.048		0.85	1	33.994			
			C	0.408	2.048		0.85	1	33.994			
T4	2.47	4.72	A	0.422	2.022	6	0.85	1	48.385	0.87	43.47	C
60.00-40.00			B	0.422	2.022		0.85	1	48.385			
			C	0.422	2.022		0.85	1	48.385			
T5	2.38	3.62	A	0.268	2.386	5	0.85	1	35.364	0.73	36.33	C
40.00-20.00			B	0.268	2.386		0.85	1	35.364			
			C	0.268	2.386		0.85	1	35.364			
T6 20.00-0.00	1.34	5.12	A	0.264	2.395	5	0.85	1	43.036	0.58	28.86	C
			B	0.264	2.395		0.85	1	43.036			
			C	0.264	2.395		0.85	1	43.036			
Sum Weight:	11.20	20.86						OTM	210.37 kip-ft	3.86		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.47	A	0.389	2.087	10	1	1	7.007	0.14	14.08	C
110.00-100.00			B	0.389	2.087		1	1	7.007			
			C	0.389	2.087		1	1	7.007			
T2	0.34	0.82	A	0.235	2.484	10	1	1	13.348	0.57	28.50	C
100.00-80.00			B	0.235	2.484		1	1	13.348			
			C	0.235	2.484		1	1	13.348			
T3	0.38	0.89	A	0.175	2.681	9	1	1	15.637	0.64	31.81	C
80.00-60.00			B	0.175	2.681		1	1	15.637			
			C	0.175	2.681		1	1	15.637			
T4	0.38	1.23	A	0.195	2.612	9	1	1	25.890	0.78	39.00	C
60.00-40.00			B	0.195	2.612		1	1	25.890			
			C	0.195	2.612		1	1	25.890			
T5	0.38	1.20	A	0.129	2.85	8	1	1	19.957	0.63	31.50	C
40.00-20.00			B	0.129	2.85		1	1	19.957			
			C	0.129	2.85		1	1	19.957			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	7	1	1	27.983	0.57	28.60	C
			B	0.152	2.765		1	1	27.983			
			C	0.152	2.765		1	1	27.983			
Sum Weight:	1.72	6.92						OTM	174.24 kip-ft	3.33		

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	0.02	0.47	A	0.389	2.087	10	0.825	1	6.426	0.13	13.05	C
110.00-100.00			B	0.389	2.087		0.825	1	6.426			
			C	0.389	2.087		0.825	1	6.426			
T2	0.34	0.82	A	0.235	2.484	10	0.825	1	12.201	0.55	27.32	C
100.00-80.00			B	0.235	2.484		0.825	1	12.201			
			C	0.235	2.484		0.825	1	12.201			
T3	0.38	0.89	A	0.175	2.681	9	0.825	1	14.068	0.60	30.17	C
80.00-60.00			B	0.175	2.681		0.825	1	14.068			
			C	0.175	2.681		0.825	1	14.068			
T4	0.38	1.23	A	0.195	2.612	9	0.825	1	22.533	0.72	35.80	C
60.00-40.00			B	0.195	2.612		0.825	1	22.533			
			C	0.195	2.612		0.825	1	22.533			
T5	0.38	1.20	A	0.129	2.85	8	0.825	1	17.786	0.59	29.48	C
40.00-20.00			B	0.129	2.85		0.825	1	17.786			
			C	0.129	2.85		0.825	1	17.786			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	7	0.825	1	24.777	0.52	26.09	C
			B	0.152	2.765		0.825	1	24.777			
			C	0.152	2.765		0.825	1	24.777			
Sum Weight:	1.72	6.92						OTM	163.83 kip-ft	3.11		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.47	A	0.389	2.087	10	0.8	1	6.343	0.13	12.91	C
110.00-100.00			B	0.389	2.087		0.8	1	6.343			
			C	0.389	2.087		0.8	1	6.343			
T2	0.34	0.82	A	0.235	2.484	10	0.8	1	12.037	0.54	27.16	C
100.00-80.00			B	0.235	2.484		0.8	1	12.037			
			C	0.235	2.484		0.8	1	12.037			
T3	0.38	0.89	A	0.175	2.681	9	0.8	1	13.844	0.60	29.93	C
80.00-60.00			B	0.175	2.681		0.8	1	13.844			
			C	0.175	2.681		0.8	1	13.844			
T4	0.38	1.23	A	0.195	2.612	9	0.8	1	22.053	0.71	35.35	C
60.00-40.00			B	0.195	2.612		0.8	1	22.053			
			C	0.195	2.612		0.8	1	22.053			
T5	0.38	1.20	A	0.129	2.85	8	0.8	1	17.476	0.58	29.19	C
40.00-20.00			B	0.129	2.85		0.8	1	17.476			
			C	0.129	2.85		0.8	1	17.476			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	7	0.8	1	24.319	0.51	25.73	C
			B	0.152	2.765		0.8	1	24.319			
			C	0.152	2.765		0.8	1	24.319			
Sum Weight:	1.72	6.92						OTM	162.34 kip-ft	3.08		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.47	A	0.389	2.087	10	0.85	1	6.509	0.13	13.20	C
110.00-100.00			B	0.389	2.087		0.85	1	6.509			
			C	0.389	2.087		0.85	1	6.509			
T2	0.34	0.82	A	0.235	2.484	10	0.85	1	12.365	0.55	27.49	C
100.00-80.00			B	0.235	2.484		0.85	1	12.365			
			C	0.235	2.484		0.85	1	12.365			
T3	0.38	0.89	A	0.175	2.681	9	0.85	1	14.292	0.61	30.40	C
80.00-60.00			B	0.175	2.681		0.85	1	14.292			
			C	0.175	2.681		0.85	1	14.292			
T4	0.38	1.23	A	0.195	2.612	9	0.85	1	23.013	0.73	36.26	C
60.00-40.00			B	0.195	2.612		0.85	1	23.013			
			C	0.195	2.612		0.85	1	23.013			
T5	0.38	1.20	A	0.129	2.85	8	0.85	1	18.097	0.60	29.77	C
40.00-20.00			B	0.129	2.85		0.85	1	18.097			
			C	0.129	2.85		0.85	1	18.097			
T6 20.00-0.00	0.23	2.29	A	0.152	2.765	7	0.85	1	25.235	0.53	26.45	C
			B	0.152	2.765		0.85	1	25.235			
			C	0.152	2.765		0.85	1	25.235			
Sum Weight:	1.72	6.92						OTM	165.31 kip-ft	3.14		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	4.09					
Bracing Weight	2.81					
Total Member Self-Weight	6.90			3.61	3.38	
Gusset Weight	0.01					
Total Weight	13.16			3.61	3.38	
Wind 0 deg - No Ice		0.02	-12.36	-822.98	1.29	-2.46
Wind 30 deg - No Ice		5.94	-10.28	-693.08	-398.60	-0.99
Wind 45 deg - No Ice		8.32	-8.35	-563.11	-561.27	-0.21
Wind 60 deg - No Ice		10.12	-5.87	-395.94	-684.04	0.57
Wind 90 deg - No Ice		11.83	-0.02	1.52	-796.96	2.02
Wind 120 deg - No Ice		10.67	6.16	415.10	-708.88	3.14
Wind 135 deg - No Ice		8.63	8.65	583.32	-574.26	3.25
Wind 150 deg - No Ice		5.90	10.26	698.22	-394.98	3.01
Wind 180 deg - No Ice		-0.02	11.70	799.11	5.46	2.26
Wind 210 deg - No Ice		-5.94	10.28	700.30	405.35	0.99
Wind 225 deg - No Ice		-8.32	8.35	570.33	568.03	0.21
Wind 240 deg - No Ice		-10.69	6.20	418.71	717.73	-0.68
Wind 270 deg - No Ice		-11.83	0.02	5.69	803.71	-2.02
Wind 300 deg - No Ice		-10.09	-5.83	-392.33	688.72	-2.83
Wind 315 deg - No Ice		-8.63	-8.65	-576.10	581.02	-3.25
Wind 330 deg - No Ice		-5.90	-10.26	-691.00	401.74	-3.01
Member Ice	13.94					
Gusset Ice	0.04					
Total Weight Ice	43.20			24.29	20.22	
Wind 0 deg - Ice		0.01	-5.50	-346.05	19.61	-0.76
Wind 30 deg - Ice		2.70	-4.67	-292.49	-162.59	-0.35
Wind 45 deg - Ice		3.80	-3.80	-233.96	-237.43	-0.12
Wind 60 deg - Ice		4.63	-2.68	-158.14	-294.40	0.12
Wind 90 deg - Ice		5.38	-0.01	23.68	-344.36	0.57
Wind 120 deg - Ice		4.75	2.74	208.93	-299.46	0.90
Wind 135 deg - Ice		3.86	3.87	285.04	-239.92	0.96
Wind 150 deg - Ice		2.68	4.66	340.46	-161.55	0.93
Wind 180 deg - Ice		-0.01	5.35	388.09	20.82	0.73
Wind 210 deg - Ice		-2.70	4.67	341.07	203.03	0.35
Wind 225 deg - Ice		-3.80	3.80	282.54	277.87	0.12
Wind 240 deg - Ice		-4.75	2.75	209.98	340.50	-0.14
Wind 270 deg - Ice		-5.38	0.01	24.89	384.80	-0.57
Wind 300 deg - Ice		-4.63	-2.67	-157.09	334.24	-0.85
Wind 315 deg - Ice		-3.86	-3.87	-236.46	280.36	-0.96
Wind 330 deg - Ice		-2.68	-4.66	-291.89	201.98	-0.93
Total Weight	13.16			3.61	3.38	
Wind 0 deg - Service		0.01	-4.73	-316.63	-0.95	-0.94
Wind 30 deg - Service		2.27	-3.93	-266.93	-153.95	-0.38
Wind 45 deg - Service		3.18	-3.19	-217.20	-216.19	-0.08
Wind 60 deg - Service		3.87	-2.24	-153.24	-263.17	0.22
Wind 90 deg - Service		4.53	-0.01	-1.17	-306.37	0.77
Wind 120 deg - Service		4.08	2.36	157.07	-272.67	1.20
Wind 135 deg - Service		3.30	3.31	221.44	-221.16	1.24
Wind 150 deg - Service		2.26	3.93	265.40	-152.57	1.15
Wind 180 deg - Service		-0.01	4.48	304.00	0.65	0.86
Wind 210 deg - Service		-2.27	3.93	266.19	153.65	0.38
Wind 225 deg - Service		-3.18	3.19	216.47	215.89	0.08
Wind 240 deg - Service		-4.09	2.37	158.45	273.17	-0.26
Wind 270 deg - Service		-4.53	0.01	0.43	306.07	-0.77

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
Wind 300 deg - Service		-3.86	-2.23	-151.86	262.07	-1.08
Wind 315 deg - Service		-3.30	-3.31	-222.18	220.86	-1.24
Wind 330 deg - Service		-2.26	-3.93	-266.14	152.27	-1.15

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 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

Comb. No.	Description
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
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	110 - 100	Leg	Max Tension	9	7.53	-0.31	-0.07
			Max. Compression	2	-9.54	0.37	-0.00
			Max. Mx	8	7.35	-0.39	-0.05
			Max. My	26	-1.15	-0.01	0.47
			Max. Vy	18	0.95	-0.38	0.00
			Max. Vx	26	0.78	-0.01	-0.07
		Diagonal	Max Tension	29	1.75	0.00	0.00
			Max. Compression	12	-1.84	0.00	0.00
			Max. Mx	35	0.12	0.01	0.00
			Max. My	26	-1.15	0.00	-0.01
			Max. Vy	35	-0.01	0.01	0.00
			Max. Vx	26	0.01	0.00	0.00
		Top Girt	Max Tension	6	0.01	0.00	0.00
			Max. Compression	35	-0.01	0.00	0.00
			Max. Mx	34	0.00	-0.00	0.00
			Max. My	47	-0.01	0.00	0.00
			Max. Vy	34	0.01	0.00	0.00
			Max. Vx	47	-0.00	0.00	0.00
		Bottom Girt	Max Tension	24	0.08	0.00	0.00
			Max. Compression	19	-0.04	0.00	0.00
			Max. Mx	38	0.05	-0.01	0.00
			Max. My	46	0.04	0.00	0.00
			Max. Vy	38	0.01	0.00	0.00
			Max. Vx	46	-0.00	0.00	0.00
T2	100 - 80	Leg	Max Tension	19	39.36	0.04	-0.00
			Max. Compression	24	-44.35	0.22	0.00
			Max. Mx	8	9.08	0.89	0.00
			Max. My	20	-0.81	-0.02	-0.97
			Max. Vy	2	-2.85	0.22	0.00
			Max. Vx	10	-0.80	0.02	-0.01
		Diagonal	Max Tension	30	3.30	0.00	0.00
			Max. Compression	14	-3.31	0.00	0.00
			Max. Mx	45	0.35	0.01	-0.00
			Max. My	28	-2.86	-0.00	-0.00
			Max. Vy	44	0.01	0.01	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. Vx	28	0.00	0.00	0.00
		Top Girt	Max Tension	25	0.14	0.00	0.00
			Max. Compression	18	-0.15	0.00	0.00
			Max. Mx	38	-0.05	-0.01	0.00
			Max. My	46	-0.04	0.00	0.00
			Max. Vy	38	-0.01	0.00	0.00
			Max. Vx	46	-0.00	0.00	0.00
T3	80 - 60	Leg	Max Tension	19	61.63	0.11	-0.00
			Max. Compression	24	-68.28	0.14	-0.00
			Max. Mx	2	-44.30	0.46	0.01
			Max. My	16	-3.35	-0.01	-0.28
			Max. Vy	2	-3.20	0.14	0.01
			Max. Vx	32	-0.87	0.00	0.08
		Diagonal	Max Tension	7	2.40	0.00	0.00
			Max. Compression	22	-2.48	0.00	0.00
			Max. Mx	45	0.36	0.02	-0.00
			Max. My	6	-2.31	-0.00	0.00
			Max. Vy	44	0.02	0.02	0.00
			Max. Vx	44	0.00	0.00	0.00
		Top Girt	Max Tension	18	0.54	0.00	0.00
			Max. Compression	25	-0.47	0.00	0.00
			Max. Mx	38	0.25	-0.03	0.00
			Max. My	35	0.18	0.00	0.00
			Max. Vy	38	0.02	0.00	0.00
			Max. Vx	35	-0.00	0.00	0.00
T4	60 - 40	Leg	Max Tension	19	80.38	0.29	0.01
			Max. Compression	24	-89.21	0.01	0.00
			Max. Mx	24	-75.74	0.75	0.00
			Max. My	16	-3.73	-0.06	-0.54
			Max. Vy	2	-4.02	0.01	0.00
			Max. Vx	32	-1.03	-0.00	0.00
		Diagonal	Max Tension	5	2.96	0.01	-0.00
			Max. Compression	2	-3.15	0.00	0.00
			Max. Mx	46	0.49	0.03	-0.00
			Max. My	2	-2.77	-0.01	0.01
			Max. Vy	44	0.03	0.03	0.00
			Max. Vx	2	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	24	1.49	0.00	0.00
			Max. Compression	24	-1.49	0.01	-0.00
			Max. Mx	42	0.22	0.03	0.01
			Max. My	44	-0.07	0.03	0.01
			Max. Vy	42	0.03	0.03	0.01
			Max. Vx	45	-0.00	0.00	0.00
		Top Girt	Max Tension	18	0.60	0.00	0.00
			Max. Compression	25	-0.59	0.00	0.00
			Max. Mx	34	0.08	-0.07	0.00
			Max. My	50	0.08	0.00	0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	50	-0.00	0.00	0.00
T5	40 - 20	Leg	Max Tension	19	97.74	-0.32	-0.02
			Max. Compression	24	-108.88	0.72	0.01
			Max. Mx	2	-108.08	0.73	0.04
			Max. My	16	-4.70	-0.01	-0.36
			Max. Vy	2	-4.58	0.73	0.04
			Max. Vx	33	-1.25	0.00	0.32
		Diagonal	Max Tension	11	3.21	0.00	0.00
			Max. Compression	12	-3.42	0.00	0.00
			Max. Mx	44	0.59	0.04	0.01
			Max. My	44	0.00	0.04	-0.01
			Max. Vy	44	0.03	0.04	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. Vx	44	-0.00	0.00	0.00
		Top Girt	Max Tension	18	0.88	0.00	0.00
			Max. Compression	25	-0.84	0.00	0.00
			Max. Mx	34	0.20	-0.17	0.00
			Max. My	41	0.26	0.00	0.01
			Max. Vy	34	0.08	0.00	0.00
			Max. Vx	41	-0.00	0.00	0.00
T6	20 - 0	Leg	Max Tension	19	110.39	-0.49	-0.01
			Max. Compression	24	-123.88	0.00	0.00
			Max. Mx	2	-110.43	1.11	0.05
			Max. My	16	-5.81	-0.02	-0.72
			Max. Vy	2	-4.58	1.11	0.05
			Max. Vx	33	-1.25	0.01	0.43
		Diagonal	Max Tension	12	3.54	0.00	0.00
			Max. Compression	12	-3.94	0.00	0.00
			Max. Mx	43	-0.57	0.09	-0.01
			Max. My	42	-1.73	0.08	-0.01
			Max. Vy	43	0.05	0.09	-0.01
			Max. Vx	42	0.00	0.00	0.00
		Top Girt	Max Tension	18	1.17	0.00	0.00
			Max. Compression	25	-1.07	0.00	0.00
			Max. Mx	34	-0.53	-0.18	0.00
			Max. My	41	-0.49	0.00	0.01
			Max. Vy	34	-0.07	0.00	0.00
			Max. Vx	41	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	127.19	11.05	-6.32
	Max. H_x	24	127.19	11.05	-6.32
	Max. H_z	7	-109.02	-9.42	5.71
	Min. Vert	9	-112.36	-9.83	5.63
	Min. H_x	9	-112.36	-9.83	5.63
	Min. H_z	24	127.19	11.05	-6.32
Leg B	Max. Vert	12	126.02	-11.10	-6.13
	Max. H_x	29	-112.31	9.88	5.47
	Max. H_z	29	-112.31	9.88	5.47
	Min. Vert	29	-112.31	9.88	5.47
	Min. H_x	12	126.02	-11.10	-6.13
	Min. H_z	12	126.02	-11.10	-6.13
Leg A	Max. Vert	2	126.33	-0.19	12.72
	Max. H_x	25	-57.27	0.73	-5.83
	Max. H_z	2	126.33	-0.19	12.72
	Min. Vert	19	-113.10	0.16	-11.34
	Min. H_x	11	3.96	-0.69	0.36
	Min. H_z	19	-113.10	0.16	-11.34

Tower Mast Reaction Summary

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 Only	13.16	0.00	0.00	3.61	3.38	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	15.79	0.03	-19.77	-1324.78	0.73	-3.96
0.9 Dead+1.6 Wind 0 deg - No Ice	11.84	0.03	-19.77	-1324.19	-0.29	-3.96
1.2 Dead+1.6 Wind 30 deg - No Ice	15.79	9.50	-16.45	-1115.97	-642.32	-1.59
0.9 Dead+1.6 Wind 30 deg - No Ice	11.84	9.50	-16.45	-1115.63	-642.51	-1.59
1.2 Dead+1.6 Wind 45 deg - No Ice	15.79	13.32	-13.35	-906.98	-903.91	-0.33
0.9 Dead+1.6 Wind 45 deg - No Ice	11.84	13.32	-13.35	-906.90	-903.78	-0.33
1.2 Dead+1.6 Wind 60 deg - No Ice	15.79	16.19	-9.39	-638.16	-1101.35	0.92
0.9 Dead+1.6 Wind 60 deg - No Ice	11.84	16.19	-9.39	-638.43	-1100.96	0.92
1.2 Dead+1.6 Wind 90 deg - No Ice	15.79	18.93	-0.03	1.00	-1282.90	3.26
0.9 Dead+1.6 Wind 90 deg - No Ice	11.84	18.93	-0.03	-0.09	-1282.28	3.25
1.2 Dead+1.6 Wind 120 deg - No Ice	15.79	17.07	9.86	666.02	-1141.22	5.06
0.9 Dead+1.6 Wind 120 deg - No Ice	11.84	17.07	9.86	664.09	-1140.79	5.05
1.2 Dead+1.6 Wind 135 deg - No Ice	15.79	13.27	13.30	910.94	-899.16	5.24
0.9 Dead+1.6 Wind 135 deg - No Ice	11.84	13.27	13.30	908.69	-899.03	5.23
1.2 Dead+1.6 Wind 150 deg - No Ice	15.79	9.44	16.42	1121.32	-636.50	4.85
0.9 Dead+1.6 Wind 150 deg - No Ice	11.84	9.44	16.42	1118.80	-636.70	4.85
1.2 Dead+1.6 Wind 180 deg - No Ice	15.79	-0.03	18.72	1283.56	7.44	3.64
0.9 Dead+1.6 Wind 180 deg - No Ice	11.84	-0.03	18.72	1280.84	6.41	3.63
1.2 Dead+1.6 Wind 210 deg - No Ice	15.79	-9.50	16.45	1124.66	650.47	1.59
0.9 Dead+1.6 Wind 210 deg - No Ice	11.84	-9.50	16.45	1122.14	648.62	1.59
1.2 Dead+1.6 Wind 225 deg - No Ice	15.79	-13.32	13.35	915.67	912.06	0.33
0.9 Dead+1.6 Wind 225 deg - No Ice	11.84	-13.32	13.35	913.42	909.88	0.33
1.2 Dead+1.6 Wind 240 deg - No Ice	15.79	-17.10	9.92	671.82	1152.72	-1.09
0.9 Dead+1.6 Wind 240 deg - No Ice	11.84	-17.10	9.92	669.89	1150.25	-1.09
1.2 Dead+1.6 Wind 270 deg - No Ice	15.79	-18.93	0.03	7.71	1291.04	-3.26
0.9 Dead+1.6 Wind 270 deg - No Ice	11.84	-18.93	0.03	6.61	1288.38	-3.25
1.2 Dead+1.6 Wind 300 deg - No Ice	15.79	-16.15	-9.33	-632.34	1106.14	-4.56
0.9 Dead+1.6 Wind 300 deg - No Ice	11.84	-16.15	-9.33	-632.62	1103.71	-4.55
1.2 Dead+1.6 Wind 315 deg - No Ice	15.79	-13.27	-13.30	-902.22	907.32	-5.24
0.9 Dead+1.6 Wind 315 deg - No Ice	11.84	-13.27	-13.30	-902.16	905.15	-5.23

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 330 deg - No Ice	15.79	-9.44	-16.42	-1112.60	644.66	-4.85
0.9 Dead+1.6 Wind 330 deg - No Ice	11.84	-9.44	-16.42	-1112.27	642.83	-4.85
1.2 Dead+1.0 Ice+1.0 Temp	45.83	0.00	-0.00	25.31	21.14	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	45.83	0.01	-5.50	-349.97	20.54	-0.79
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	45.83	2.70	-4.67	-295.71	-164.12	-0.36
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	45.83	3.80	-3.80	-236.40	-239.95	-0.11
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	45.83	4.63	-2.68	-159.55	-297.70	0.14
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	45.83	5.38	-0.01	24.72	-348.33	0.62
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	45.83	4.75	2.74	212.45	-302.80	0.95
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	45.83	3.79	3.79	286.20	-239.09	1.01
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	45.83	2.68	4.66	345.76	-163.05	0.98
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	45.83	-0.01	5.35	394.04	21.77	0.76
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	45.83	-2.70	4.67	346.38	206.43	0.36
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	45.83	-3.80	3.80	287.06	282.27	0.11
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	45.83	-4.75	2.75	213.52	345.73	-0.16
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	45.83	-5.38	0.01	25.95	390.64	-0.62
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	45.83	-4.63	-2.67	-158.48	339.40	-0.91
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	45.83	-3.79	-3.79	-235.53	281.40	-1.01
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	45.83	-2.68	-4.66	-295.09	205.37	-0.98
Dead+Wind 0 deg - Service	13.16	0.01	-4.73	-313.97	2.59	-0.95
Dead+Wind 30 deg - Service	13.16	2.27	-3.93	-264.06	-151.05	-0.38
Dead+Wind 45 deg - Service	13.16	3.18	-3.19	-214.12	-213.55	-0.08
Dead+Wind 60 deg - Service	13.16	3.87	-2.24	-149.90	-260.73	0.22
Dead+Wind 90 deg - Service	13.16	4.53	-0.01	2.82	-304.11	0.78
Dead+Wind 120 deg - Service	13.16	4.08	2.36	161.72	-270.27	1.21
Dead+Wind 135 deg - Service	13.16	3.17	3.18	220.25	-212.43	1.25
Dead+Wind 150 deg - Service	13.16	2.26	3.93	270.50	-149.67	1.16
Dead+Wind 180 deg - Service	13.16	-0.01	4.48	309.26	4.20	0.87
Dead+Wind 210 deg - Service	13.16	-2.27	3.93	271.30	157.84	0.38
Dead+Wind 225 deg - Service	13.16	-3.18	3.19	221.37	220.34	0.08
Dead+Wind 240 deg - Service	13.16	-4.09	2.37	163.11	277.86	-0.26
Dead+Wind 270 deg - Service	13.16	-4.53	0.01	4.42	310.89	-0.78
Dead+Wind 300 deg - Service	13.16	-3.86	-2.23	-148.50	266.71	-1.09
Dead+Wind 315 deg - Service	13.16	-3.17	-3.18	-212.99	219.20	-1.25
Dead+Wind 330 deg - Service	13.16	-2.26	-3.93	-263.26	156.45	-1.16

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-13.16	0.00	0.00	13.16	0.00	0.000%
2	0.03	-15.79	-19.77	-0.03	15.79	19.77	0.000%
3	0.03	-11.84	-19.77	-0.03	11.84	19.77	0.000%
4	9.50	-15.79	-16.45	-9.50	15.79	16.45	0.000%
5	9.50	-11.84	-16.45	-9.50	11.84	16.45	0.000%
6	13.32	-15.79	-13.35	-13.32	15.79	13.35	0.000%
7	13.32	-11.84	-13.35	-13.32	11.84	13.35	0.000%
8	16.19	-15.79	-9.39	-16.19	15.79	9.39	0.000%
9	16.19	-11.84	-9.39	-16.19	11.84	9.39	0.000%
10	18.93	-15.79	-0.03	-18.93	15.79	0.03	0.000%
11	18.93	-11.84	-0.03	-18.93	11.84	0.03	0.000%
12	17.07	-15.79	9.86	-17.07	15.79	-9.86	0.000%
13	17.07	-11.84	9.86	-17.07	11.84	-9.86	0.000%
14	13.27	-15.79	13.30	-13.27	15.79	-13.30	0.001%
15	13.27	-11.84	13.30	-13.27	11.84	-13.30	0.000%
16	9.44	-15.79	16.42	-9.44	15.79	-16.42	0.000%
17	9.44	-11.84	16.42	-9.44	11.84	-16.42	0.000%
18	-0.03	-15.79	18.72	0.03	15.79	-18.72	0.000%
19	-0.03	-11.84	18.72	0.03	11.84	-18.72	0.000%
20	-9.50	-15.79	16.45	9.50	15.79	-16.45	0.000%
21	-9.50	-11.84	16.45	9.50	11.84	-16.45	0.000%
22	-13.32	-15.79	13.35	13.32	15.79	-13.35	0.001%
23	-13.32	-11.84	13.35	13.32	11.84	-13.35	0.000%
24	-17.10	-15.79	9.92	17.10	15.79	-9.92	0.000%
25	-17.10	-11.84	9.92	17.10	11.84	-9.92	0.000%
26	-18.93	-15.79	0.03	18.93	15.79	-0.03	0.000%
27	-18.93	-11.84	0.03	18.93	11.84	-0.03	0.000%
28	-16.15	-15.79	-9.33	16.15	15.79	9.33	0.000%
29	-16.15	-11.84	-9.33	16.15	11.84	9.33	0.000%
30	-13.27	-15.79	-13.30	13.27	15.79	13.30	0.001%
31	-13.27	-11.84	-13.30	13.27	11.84	13.30	0.000%
32	-9.44	-15.79	-16.42	9.44	15.79	16.42	0.000%
33	-9.44	-11.84	-16.42	9.44	11.84	16.42	0.000%
34	0.00	-45.83	0.00	-0.00	45.83	0.00	0.000%
35	0.01	-45.83	-5.50	-0.01	45.83	5.50	0.000%
36	2.70	-45.83	-4.67	-2.70	45.83	4.67	0.000%
37	3.80	-45.83	-3.80	-3.80	45.83	3.80	0.000%
38	4.63	-45.83	-2.68	-4.63	45.83	2.68	0.000%
39	5.38	-45.83	-0.01	-5.38	45.83	0.01	0.000%
40	4.75	-45.83	2.74	-4.75	45.83	-2.74	0.000%
41	3.79	-45.83	3.79	-3.79	45.83	-3.79	0.000%
42	2.68	-45.83	4.66	-2.68	45.83	-4.66	0.000%
43	-0.01	-45.83	5.35	0.01	45.83	-5.35	0.000%
44	-2.70	-45.83	4.67	2.70	45.83	-4.67	0.000%
45	-3.80	-45.83	3.80	3.80	45.83	-3.80	0.000%
46	-4.75	-45.83	2.75	4.75	45.83	-2.75	0.000%
47	-5.38	-45.83	0.01	5.38	45.83	-0.01	0.000%
48	-4.63	-45.83	-2.67	4.63	45.83	2.67	0.000%
49	-3.79	-45.83	-3.79	3.79	45.83	3.79	0.000%
50	-2.68	-45.83	-4.66	2.68	45.83	4.66	0.000%
51	0.01	-13.16	-4.73	-0.01	13.16	4.73	0.000%
52	2.27	-13.16	-3.93	-2.27	13.16	3.93	0.000%
53	3.18	-13.16	-3.19	-3.18	13.16	3.19	0.000%
54	3.87	-13.16	-2.24	-3.87	13.16	2.24	0.000%
55	4.53	-13.16	-0.01	-4.53	13.16	0.01	0.000%
56	4.08	-13.16	2.36	-4.08	13.16	-2.36	0.000%
57	3.17	-13.16	3.18	-3.17	13.16	-3.18	0.000%
58	2.26	-13.16	3.93	-2.26	13.16	-3.93	0.000%
59	-0.01	-13.16	4.48	0.01	13.16	-4.48	0.000%
60	-2.27	-13.16	3.93	2.27	13.16	-3.93	0.000%
61	-3.18	-13.16	3.19	3.18	13.16	-3.19	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
62	-4.09	-13.16	2.37	4.09	13.16	-2.37	0.000%
63	-4.53	-13.16	0.01	4.53	13.16	-0.01	0.000%
64	-3.86	-13.16	-2.23	3.86	13.16	2.23	0.000%
65	-3.17	-13.16	-3.18	3.17	13.16	3.18	0.000%
66	-2.26	-13.16	-3.93	2.26	13.16	3.93	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	0.00000209
3	Yes	4	0.00000001	0.00000143
4	Yes	4	0.00000001	0.00000271
5	Yes	4	0.00000001	0.00000202
6	Yes	4	0.00000001	0.00000273
7	Yes	4	0.00000001	0.00000166
8	Yes	4	0.00000001	0.00000263
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000270
11	Yes	4	0.00000001	0.00000193
12	Yes	4	0.00000001	0.00000215
13	Yes	4	0.00000001	0.00000147
14	Yes	4	0.00000001	0.00000260
15	Yes	4	0.00000001	0.00000199
16	Yes	4	0.00000001	0.00000296
17	Yes	4	0.00000001	0.00000235
18	Yes	4	0.00000001	0.00000259
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000273
21	Yes	4	0.00000001	0.00000206
22	Yes	4	0.00000001	0.00000240
23	Yes	4	0.00000001	0.00000174
24	Yes	4	0.00000001	0.00000206
25	Yes	4	0.00000001	0.00000138
26	Yes	4	0.00000001	0.00000270
27	Yes	4	0.00000001	0.00000196
28	Yes	4	0.00000001	0.00000267
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000295
31	Yes	4	0.00000001	0.00000192
32	Yes	4	0.00000001	0.00000296
33	Yes	4	0.00000001	0.00000234
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00002695
36	Yes	4	0.00000001	0.00002692
37	Yes	4	0.00000001	0.00002710
38	Yes	4	0.00000001	0.00002723
39	Yes	4	0.00000001	0.00002725
40	Yes	4	0.00000001	0.00002750
41	Yes	4	0.00000001	0.00002773
42	Yes	4	0.00000001	0.00002812
43	Yes	4	0.00000001	0.00002861
44	Yes	4	0.00000001	0.00002841
45	Yes	4	0.00000001	0.00002822
46	Yes	4	0.00000001	0.00002816

47	Yes	4	0.00000001	0.00002819
48	Yes	4	0.00000001	0.00002816
49	Yes	4	0.00000001	0.00002795
50	Yes	4	0.00000001	0.00002757
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	110 - 100	2.652	62	0.2091	0.0363
T2	100 - 80	2.213	62	0.2058	0.0186
T3	80 - 60	1.379	62	0.1729	0.0091
T4	60 - 40	0.732	62	0.1227	0.0078
T5	40 - 20	0.305	62	0.0702	0.0053
T6	20 - 0	0.069	62	0.0274	0.0015

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
109.00	ANT-18G-2-C	62	2.608	0.2089	0.0341	318731
108.00	LLPX310R	62	2.564	0.2088	0.0320	318731
98.00	APL868013	62	2.125	0.2041	0.0160	96715

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	110 - 100	11.005	24	0.8710	0.1517
T2	100 - 80	9.177	24	0.8556	0.0778
T3	80 - 60	5.716	24	0.7165	0.0380
T4	60 - 40	3.033	24	0.5081	0.0326

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T5	40 - 20	1.265	24	0.2904	0.0223
T6	20 - 0	0.289	24	0.1132	0.0062

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
109.00	ANT-18G-2-C	24	10.822	0.8703	0.1429	95216
108.00	LLPX310R	24	10.639	0.8695	0.1341	95216
98.00	APL868013	24	8.814	0.8482	0.0668	25737

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	110	Leg	A325N	0.8750	4	1.88	40.59	0.046 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.75	6.20	0.283 ✓	1	Gusset Bearing
		Top Girt	A325N	0.5000	1	0.01	6.20	0.001 ✓	1	Gusset Bearing
		Bottom Girt	A325N	0.5000	1	0.08	6.20	0.013 ✓	1	Gusset Bearing
T2	100	Leg	A325N	0.8750	4	9.84	40.59	0.242 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3.30	5.00	0.661 ✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.14	5.00	0.028 ✓	1	Member Bearing
T3	80	Leg	A325N	0.8750	4	15.41	40.59	0.380 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.40	5.00	0.479 ✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.54	5.00	0.107 ✓	1	Member Bearing
T4	60	Leg	A325N	0.8750	4	20.09	40.59	0.495 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.96	5.00	0.592 ✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.60	6.20	0.097 ✓	1	Gusset Bearing
T5	40	Leg	A325N	0.8750	4	24.43	40.59	0.602 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3.21	5.00	0.641 ✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.88	6.20	0.141 ✓	1	Gusset Bearing
T6	20	Leg	A325N	0.8750	4	27.60	40.59	0.680 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3.54	6.20	0.572 ✓	1	Gusset Bearing
		Top Girt	A325N	0.5000	1	1.17	6.20	0.189 ✓	1	Gusset Bearing

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	110 - 100	P3x.3	10.02	0.08	0.9 K=1.00	3.0159	-9.54	135.71	0.070 [1] ✔
T2	100 - 80	P3x.3	20.03	3.97	42.0 K=1.00	3.0159	-41.09	119.32	0.344 [1] ✔
T3	80 - 60	P3x.3	20.03	3.97	42.0 K=1.00	3.0159	-65.73	119.32	0.551 [1] ✔
T4	60 - 40	P3x.3	20.03	2.56	27.0 K=1.00	3.0159	-85.89	128.66	0.668 [1] ✔
T5	40 - 20	P3.5x.318	20.03	6.62	30.4 K=0.50	3.6784	-105.16	154.71	0.680 [1] ✔
T6	20 - 0	P3.5x.318_Reinforced	20.03	6.65	43.8 K=1.00	5.7832	-123.88	226.20	0.548 [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	110 - 100	L1 1/2x1 1/2x3/16	3.14	1.35	71.6 K=1.29	0.5273	-1.84	13.05	0.141 [1] ✔
T2	100 - 80	L1 1/2x1 1/2x1/8	5.09	2.40	102.8 K=1.06	0.3594	-3.31	6.68	0.496 [1] ✔
T3	80 - 60	L1 1/2x1 1/2x1/8	7.53	3.59	145.6 K=1.00	0.3594	-2.47	3.83	0.645 [1] ✔
T4	60 - 40	L2x2x1/8	9.73	4.73	142.8 K=1.00	0.4844	-3.15	5.37	0.586 [1] ✔
T5	40 - 20	L1 3/4x1 3/4x1/8	12.24	6.12	134.5 K=1.00	0.4219	-3.42	5.27	0.649 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x1/4	13.98	6.80	166.3 K=1.00	1.1900	-3.94	9.72	0.405 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

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

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	60 - 40	L2 1/2x2 1/2x1/8	8.37	8.08	121.9 K=0.99	0.6094	-1.49	8.57	0.174 [1] ✔

[1] $P_u / \phi P_n$ 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	110 - 100	L1 1/2x1 1/2x3/16	1.55	1.03	81.0 K=1.93	0.5273	-0.01	12.10	0.001 [1] ✔
T2	100 - 80	L1 1/2x1 1/2x1/8	2.59	2.07	102.0 K=1.22	0.3594	-0.15	6.74	0.022 [1] ✔
T3	80 - 60	L2x2x1/8	4.61	4.09	123.5 K=1.00	0.4844	-0.47	6.98	0.068 [1] ✔
T4	60 - 40	L2 1/2x2 1/2x3/16	6.61	6.09	147.7 K=1.00	0.9020	-0.59	9.34	0.063 [1] ✔
T5	40 - 20	L3 1/2x3 1/2x1/4	8.64	8.31	143.7 K=1.00	1.6900	-0.84	18.49	0.046 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x1/4	10.64	9.96	243.3 K=1.00	1.1900	-1.07	4.54	0.236 [1] ✔
		KL/R > 200 (C) - 176							

[1] $P_u / \phi P_n$ controls

Bottom 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	110 - 100	L1 1/2x1 1/2x3/16	2.57	2.05	102.0 K=1.21	0.5273	-0.04	9.88	0.004 [1] ✔

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

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	
T1	110 - 100	P3x.3	10.02	0.08	0.9	3.0159	7.53	135.72	0.055 [1] ✔
T2	100 - 80	P3x.3	20.03	0.08	0.9	3.0159	39.36	135.72	0.290 [1] ✔
T3	80 - 60	P3x.3	20.03	0.08	0.9	3.0159	61.63	135.72	0.454 [1] ✔
T4	60 - 40	P3x.3	20.03	0.08	0.9	3.0159	80.38	135.72	0.592 [1] ✔
T5	40 - 20	P3.5x.318	20.03	0.08	0.8	3.6784	97.74	165.53	0.590 [1] ✔
T6	20 - 0	P3.5x.318_Reinforced	20.03	6.65	43.8	5.7832	110.39	260.24	0.424 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

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	
T1	110 - 100	L1 1/2x1 1/2x3/16	3.14	1.35	38.6	0.3076	1.75	13.38	0.131 [1] ✔
T2	100 - 80	L1 1/2x1 1/2x1/8	5.09	2.40	64.8	0.2109	3.30	9.18	0.360 [1] ✔
T3	80 - 60	L1 1/2x1 1/2x1/8	6.24	2.96	79.3	0.2109	2.40	9.18	0.261 [1] ✔
T4	60 - 40	L2x2x1/8	9.73	4.73	92.8	0.3047	2.96	13.25	0.223 [1] ✔
T5	40 - 20	L1 3/4x1 3/4x1/8	12.24	6.12	134.5	0.2578	3.21	11.21	0.286 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x1/4	13.40	6.52	103.5	0.7753	3.54	33.73	0.105 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

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	
T4	60 - 40	L2 1/2x2 1/2x1/8	8.37	8.08	123.1	0.4570	1.49	22.28	0.067 [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	110 - 100	L1 1/2x1 1/2x3/16	1.55	1.03	33.0	0.3076	0.01	13.38	0.001 [1] ✔
T2	100 - 80	L1 1/2x1 1/2x1/8	2.59	2.07	59.3	0.2109	0.14	9.18	0.015 [1] ✔
T3	80 - 60	L2x2x1/8	4.61	4.09	82.8	0.3047	0.54	13.25	0.040 [1] ✔
T4	60 - 40	L2 1/2x2 1/2x3/16	6.61	6.09	97.5	0.5886	0.60	25.60	0.023 [1] ✔
T5	40 - 20	L3 1/2x3 1/2x1/4	8.64	8.31	91.5	1.1503	0.88	50.04	0.017 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x1/4	10.64	9.96	158.9	0.7753	1.17	33.73	0.035 [1] ✔

[1] P_u / ϕP_n controls

Bottom 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	110 - 100	L1 1/2x1 1/2x3/16	2.57	2.05	60.0	0.3076	0.08	13.38	0.006 [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	110 - 100	Leg	P3x.3	3	-9.54	135.71	7.0	Pass
T2	100 - 80	Leg	P3x.3	34	-41.09	119.32	34.4	Pass
T3	80 - 60	Leg	P3x.3	70	-65.73	119.32	55.1	Pass
T4	60 - 40	Leg	P3x.3	106	-85.89	128.66	66.8	Pass
T5	40 - 20	Leg	P3.5x.318	148	-105.16	154.71	68.0	Pass
T6	20 - 0	Leg	P3.5x.318_Reinforced	172	-123.88	226.20	54.8 68.0 (b)	Pass
T1	110 - 100	Diagonal	L1 1/2x1 1/2x3/16	24	-1.84	13.05	14.1 28.3 (b)	Pass
T2	100 - 80	Diagonal	L1 1/2x1 1/2x1/8	60	-3.31	6.68	49.6 66.1 (b)	Pass
T3	80 - 60	Diagonal	L1 1/2x1 1/2x1/8	80	-2.47	3.83	64.5	Pass
T4	60 - 40	Diagonal	L2x2x1/8	116	-3.15	5.37	58.6 59.2 (b)	Pass
T5	40 - 20	Diagonal	L1 3/4x1 3/4x1/8	155	-3.42	5.27	64.9	Pass
T6	20 - 0	Diagonal	L2 1/2x2 1/2x1/4	179	-3.94	9.72	40.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
							57.2 (b)	
T4	60 - 40	Secondary Horizontal	L2 1/2x2 1/2x1/8	118	-1.49	8.57	17.4	Pass
T1	110 - 100	Top Girt	L1 1/2x1 1/2x3/16	4	-0.01	12.10	0.1	Pass
T2	100 - 80	Top Girt	L1 1/2x1 1/2x1/8	37	-0.15	6.74	2.2	Pass
							2.8 (b)	
T3	80 - 60	Top Girt	L2x2x1/8	74	-0.47	6.98	6.8	Pass
							10.7 (b)	
T4	60 - 40	Top Girt	L2 1/2x2 1/2x3/16	110	-0.59	9.34	6.3	Pass
							9.7 (b)	
T5	40 - 20	Top Girt	L3 1/2x3 1/2x1/4	152	-0.84	18.49	4.6	Pass
							14.1 (b)	
T6	20 - 0	Top Girt	L2 1/2x2 1/2x1/4	176	-1.07	4.54	23.6	Pass
T1	110 - 100	Bottom Girt	L1 1/2x1 1/2x3/16	8	0.08	13.38	0.6	Pass
							1.3 (b)	
							Summary	
						Leg (T6)	68.0	Pass
						Diagonal (T2)	66.1	Pass
						Secondary Horizontal (T4)	17.4	Pass
						Top Girt (T6)	23.6	Pass
						Bottom Girt (T1)	1.3	Pass
						Bolt Checks	68.0	Pass
						RATING =	**68.0**	**Pass**

Element Map

Section No.	Section Elevation ft	Component Type	Element List
T1	110.00-100.00	Leg	1-3
		Diagonal	10-33
		Top Girt	4-6
		Bottom Girt	7-9
T2	100.00-80.00	Leg	34-36
		Diagonal	40-69
		Top Girt	37-39
T3	80.00-60.00	Leg	70-72
		Diagonal	76-105
		Top Girt	73-75
T4	60.00-40.00	Leg	106-108
		Diagonal	112-117,121-126,130-135,139-144
		Secondary Horizontal	118-120,127-129,136-138,145-147
		Top Girt	109-111
T5	40.00-20.00	Leg	148-150
		Diagonal	154-171
		Top Girt	151-153
T6	20.00-0.00	Leg	172-174
		Diagonal	178-195
		Top Girt	175-177
			Total number of elements: 195

Program Version 7.0.5.1 - 2/1/2016 File:J:/Jobs/1500100.WI/096 - Stratford North CT/Backup Documentation/Rev (3)/ERI Files/110-ft_Rohn_SSV_Lattice w_reinforcement.eri

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Subject:	Lattice Tower Pad and Pier w/ Mat Foundation Check
Location:	Stratford, CT
Rev. 3: 11/7/16	Prepared by: TJL. Checked by: C.F.C. Job No. 15001.096

(3) Pad and Pier w/ Mat Foundation:

Input Data:

Tower Data

Max Uplift Force =	$Uplift := 113 \cdot kips$	(User Input from RISATower)	(Leg)
Max Shear Force =	$Shear := 13 \cdot kips$	(User Input from RISATower)	(Leg)
Max Compressive Force =	$Compression := 127 \cdot kips$	(User Input from RISATower)	(Leg)
Base Shear =	$Shear_{tot} := 20 \cdot kips$	(User Input from RISATower)	(Tower)
Base Compression =	$Comp_{tot} := 16 \cdot kips$	(User Input from RISATower)	(Tower)
Base Moment =	$Moment := 1334 \cdot ft \cdot kips$	(User Input from RISATower)	(Tower)
Tower Height =	$H_t := 110 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 10.0ft$	(User Input)	
Length of Pier =	$L_p := 9ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.0ft$	(User Input)	
Diameter of Pier =	$d_p := 2.0ft$	(User Input)	
Thickness of Footing =	$T_f := 2.0ft$	(User Input)	
Width of Footing =	$W_f := 9.0 \cdot ft$	(User Input)	

Material Properties:

Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 110 \cdot pcf$	(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)	

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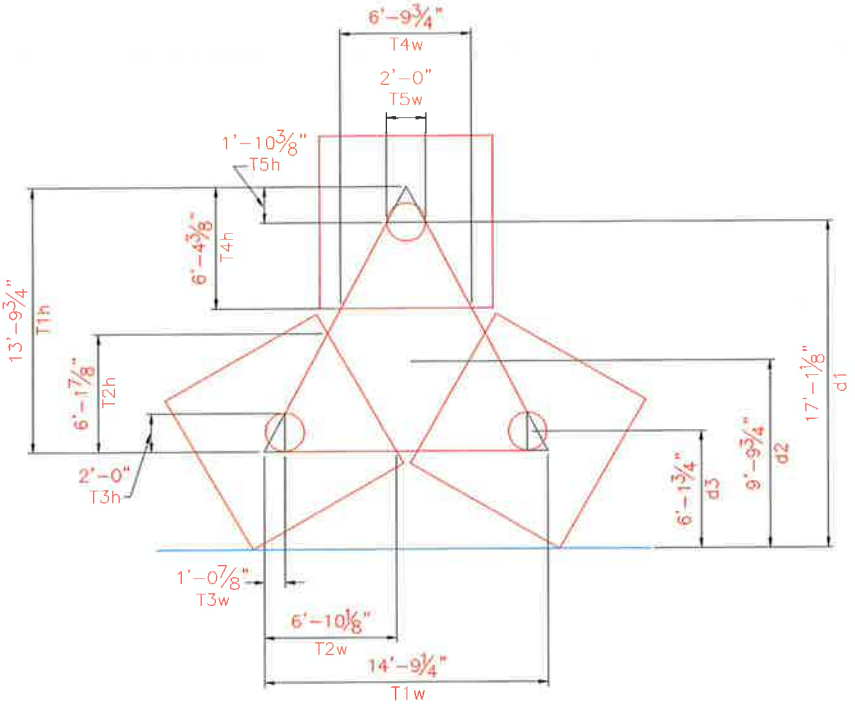
Proposed Concrete Mat Propperties:

Triangle One Width =	$T1_w := 14.77ft$	(User Input)
Triangle One Height =	$T1_h := 13.81ft$	(User Input)
Triangle Two Width =	$T2_w := 6.84ft$	(User Input)
Triangle Two Height =	$T2_h := 6.16ft$	(User Input)
Triangle Three Width =	$T3_w := 1.07ft$	(User Input)
Triangle Three Height =	$T3_h := 2.0ft$	(User Input)
Triangle Four Width =	$T4_w := 6.81ft$	(User Input)
Triangle Four Height =	$T4_h := 6.36ft$	(User Input)
Triangle Five Width =	$T5_w := 2.0ft$	(User Input)
Triangle Five Height =	$T5_h := 1.86ft$	(User Input)
Thickness of Mat =	$Mat_t := 2ft$	(User Input)

Distance To Centroids:	$d_1 := 17.09ft$	(User Input)
	$d_2 := 9.81ft$	(User Input)
	$d_3 := 6.15ft$	(User Input)



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Overturning Moment Check:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}\left(\text{Bouyancy} = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}\right) = 110 \cdot pcf$

Cross Sectional Area 1 of Resisting Pyramid = $B_1 := W_f^2 = 81\,ft^2$

Cross Sectional Area 2 of Resisting Pyramid = $B_2 := \left[2\left(L_p - L_{pag} - n\right)\cdot\tan\left(\Phi_s\right) + W_f\right]^2 = 332.6\,ft^2$

Volume of Concrete Pad and Pier = $V_{pp} := \left[\left(W_f^2 \cdot T_f\right) + \frac{d_p^2 \cdot \pi}{4} L_p\right] = 190.3 \cdot ft^3$

Volume of the Concrete Mat = $V_{mat} := \frac{1}{2}\cdot\left[T1_w \cdot T1_h - \left(T3_w \cdot T3_h\right)\cdot 2 - \left(T5_w \cdot T5_h\right) - \left(\frac{d_p^2 \cdot \pi}{4}\right)\cdot 3\right]\cdot Mat_t = 187 \cdot ft^3$

Volume of Soil = $V_{soil} := \left[\frac{\left(L_p - L_{pag} - n\right)}{3}\cdot\left(B_1 + B_2 + \sqrt{B_1 \cdot B_2}\right)\right]\cdot\frac{3}{4} - \frac{d_p^2 \cdot \pi}{4}\left(L_p - L_{pag}\right) = 1130 \cdot ft^3$

Note: 3/4 reduction taken for amount soil used due to the concrete mat.

Overturning Moment = $M_{ot} := \text{Moment} + \text{Shear}_{tot}\cdot\left(L_p + T_f\right) = 1554 \cdot kip \cdot ft$

Weight of Soil = $WT_s := V_{soil}\cdot\gamma_s = 124.3 \cdot kip$

Weight of Concrete Mat = $WT_{mat} := V_{mat}\cdot\gamma_c = 28 \cdot kips$

Weight of Concrete Pad and Pier = $WT_{pp} := V_{pp}\cdot\gamma_c = 28.5 \cdot kips$

Resisting Moment = $M_r := \left(0.9WT_{pp} + 0.75WT_s\right)\cdot d_1 + \left(0.9WT_{pp} + 0.75WT_s\right)\cdot d_3 \cdot 2 + 0.9WT_{mat}\cdot d_2 = 3742.8\,ft \cdot kips$

Factor of Safety = $\frac{M_r}{M_{ot}} = 2.41$

$\text{Overturning\_Moment} := \text{if}\left(\frac{M_r}{M_{ot}} > 1, \text{"OK"}, \text{"NG"}\right)$

Overturning_Moment = "OK"

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Bearing Pressure:

Area of the Pad = $A_{pad} := 64 \cdot ft^2$

Cross Sectional Area of Base = $A_{mat} := \frac{1}{2} \cdot \left[T1_w \cdot T1_h - \left(T2_w \cdot T2_h \right) \cdot 2 - T4_w \cdot T4_h \right] = 38.2 ft^2$

Cross Sectional Area of Base = $A := A_{pad} \cdot 3 + A_{mat} = 230.197 ft^2$

Section Modulus of Foundation = $S := \frac{A_{pad} \cdot d_1^{\,2} + A_{pad} \cdot d_3^{\,2} \cdot 2 + A_{mat} \cdot d_2^{\,2}}{d_2} = 2773.7 \cdot ft^3$

Weight of Soil Above Footing = $WT_{soil} := \left[\left(W_f^{\,2} - \frac{\pi d_p^{\,2}}{4} \right) \cdot \left(L_p - L_{pag} - n \right) \right] \cdot \frac{3}{4} \cdot \gamma_s = 51.387 \cdot kips$

Total Weight = $P := \left(WT_{pp} + WT_{soil} \right) \cdot 3 + WT_{mat} = 267.8 \cdot kips$

Max Pressure = $q_{max} := \frac{P}{A} + \frac{M_{ot}}{S} = 1.72 \cdot ksf$

$Max\_Pressure\_Check := if\left(q_{max} < 0.75 q_s, "OK", "NG" \right)$

$Max\_Pressure\_Check = "OK"$

Minimum Pressure in Mat = $P_{min} := \frac{P}{A} - \frac{M_{ot}}{S} = 0.603 \cdot ksf$

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

$Min\_Pressure\_Check = "Okay"$

SITE NAME	STRATFORD NORTH, CT				ECP - CELL #	5	0145	
LATITUDE	41-14-43.20 N				LONGITUDE	73-07-12.00 W		
NOTE: **Please Order Appropriate RET Cables.** Install PCS LTE antennas and RRH's. Install 2x60W RRH's for 700Mhz and 4x45W for AWS. Install RET antennas.					SAVE BUTTON	PCS1		
					STRUCTURE TYPE	ROOFTOP		
700 Mhz - LTE Current Config	**ALPHA**		**BETA**			**GAMMA**		
EQUIPMENT TYPE	ALU 700 MHz TRDU		ALU 700 MHz TRDU			ALU 700 MHz TRDU		
ANTENNA TYPE	LNX-6514DS-T4M-750_4		LNX-6514DS-T4M-750_4			P65-16-XL-2_2_790_-2		
QTY OF ANTENNAS PER FACE	1		1			1		
ORIENTATION (DEG)	15		135			255		
DOWN TILT (ELEC+MECH)	4 Elec + 0 Mech		4 Elec + 0 Mech			2 Elec + 0 Mech		
RAD CTR (FT AGL)	98		98			98		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
RRH - QTY/MODEL	NA		NA			NA		
SECTOR DISTRIBUTION BOX								
MAIN DISTRIBUTION BOX								
700 Mhz - LTE Future Config	**ALPHA**		**BETA**			**GAMMA**		
EQUIPMENT TYPE	ALU 700 MHz RRH		ALU 700 MHz RRH			ALU 700 MHz RRH		
ANTENNA TYPE	SBNHH-1D85B		SBNHH-1D85B			SBNHH-1D85B		
QTY OF ANTENNAS PER FACE	1		1			1		
ORIENTATION (DEG)	15		135			225		
DOWN TILT (ELEC+MECH)	4 Elec + 0 Mech		6 Elec + 0 Mech			4 Elec + 0 Mech		
RAD CTR (FT AGL)	98		98			98		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
RRH - QTY/MODEL	1	ALU RRH_2X60-700U	1	ALU RRH_2X60-700U		1	ALU RRH_2X60-700U	
SECTOR DISTRIBUTION BOX								
MAIN DISTRIBUTION BOX	1					DB-T1-6Z-8AB-0Z		
1900 PCS - Current Config	**ALPHA**		**BETA**			**GAMMA**		
EQUIPMENT TYPE	PCS Modcell 4.0		PCS Modcell 4.0			PCS Modcell 4.0		
ANTENNA TYPE	MG D3-800T0		MG D3-800T0			MG D3-800T0		
QTY OF ANTENNAS PER FACE	1		1			1		
ORIENTATION (DEG)	15		135			255		
DOWN TILT (ELEC+MECH)	0 Elec + 0 Mech		0 Elec + 0 Mech			0 Elec + 0 Mech		
RAD CTR (FT AGL)	98		98			98		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
1900 PCS - Future Config	**ALPHA**		**BETA**			**GAMMA**		
EQUIPMENT TYPE	ALU 1900 MHz RRH		ALU 1900 MHz RRH			ALU 1900 MHz RRH		
ANTENNA TYPE	SBNHH-1D85B		SBNHH-1D85B			SBNHH-1D85B		
QTY OF ANTENNAS PER FACE	*(shared w/ LTE 700)*		*(shared w/ LTE 700)*			*(shared w/ LTE 700)*		
ORIENTATION (DEG)	15		135			225		
DOWN TILT (ELEC+MECH)	3 Elec + 0 Mech		4 Elec + 0 Mech			4 Elec + 0 Mech		
RAD CTR (FT AGL)	98		98			98		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
RRH - QTY/MODEL	1	ALU RRH_2X60-PCS	1	ALU RRH_2X60-PCS		1	ALU RRH_2X60-PCS	
SECTOR DISTRIBUTION BOX								
MAIN DISTRIBUTION BOX								
2100 AWS - Current Config	**ALPHA**		**BETA**			**GAMMA**		
EQUIPMENT TYPE	ALU 2100 MHz RRH		ALU 2100 MHz RRH			ALU 2100 MHz RRH		
ANTENNA TYPE	BXA-171063-8BF-EDIN-0		BXA-171063-8BF-EDIN-0			BXA-171063-8BF-EDIN-0		
QTY OF ANTENNAS PER FACE	1		1			1		
ORIENTATION (DEG)	15		135			255		
DOWN TILT (ELEC+MECH)	0 Elec + 0 Mech		0 Elec + 0 Mech			0 Elec + 0 Mech		
RAD CTR (FT AGL)	98		98			98		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
RRH - QTY/MODEL	1	ALU RRH_2X40-AWS	1	ALU RRH_2X40-AWS		1	ALU RRH_2X40-AWS	
SECTOR DISTRIBUTION BOX								
MAIN DISTRIBUTION BOX	1					DB-T1-6Z-8AB-0Z		
2100 AWS - Future Config	**ALPHA**		**BETA**			**GAMMA**		
EQUIPMENT TYPE	ALU 2100 MHz RRH		ALU 2100 MHz RRH			ALU 2100 MHz RRH		
ANTENNA TYPE	SBNHH-1D85B		SBNHH-1D85B			SBNHH-1D85B		
QTY OF ANTENNAS PER FACE	1		1			1		
ORIENTATION (DEG)	15		135			225		
DOWN TILT (ELEC+MECH)	3 Elec + 0 Mech		4 Elec + 0 Mech			4 Elec + 0 Mech		
RAD CTR (FT AGL)	98		98			98		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
RRH - QTY/MODEL	1	ALU RRH_4X45-AWS	1	ALU RRH_4X45-AWS		1	ALU RRH_4X45-AWS	
SECTOR DISTRIBUTION BOX								
MAIN DISTRIBUTION BOX	1					DB-T1-6Z-8AB-0Z		

850 Cellular - No Change	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0HD	Cellular Modcell 4.0HD	Cellular Modcell 4.0HD
ANTENNA TYPE	APL868013	APL868013	APL868013
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	15	135	255
DOWN TILT (ELEC+MECH)	0 Elec + 0 Mech	0 Elec + 0 Mech	0 Elec + 0 Mech
RAD CTR (FT AGL)	98	98	98
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES			12	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			12	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE #	12	+	0	TOP JUMPER #		+	0
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES			2	FIBER LINE MODEL #			HB158-1-08U8-S8J18
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS			9	TOP JUMPER MODEL #			HB058-1-08U1-S1J18
Fiber Cable Ordering		FIBER CABLE #	1	+	1	TOP JUMPER #	3	+	6

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F-Band	700 Mhz C - Block	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975	TX - 746-757	700 LTE RRH (Watts)	60
RX - 824-835,845-846.5 MHz	RX - 1890-1895	RX - 776-787	PCS/AWS LTE RRH (Watts)	60

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/ BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/ BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By : Ryan Ulanday	Alex Restrepo	RU	7/15/2016

Site Configuration

Product Specifications

COMMSCOPE®

SBNHH-1D85B

Multiband Antenna, 698–896 and 2x 1695–2360 MHz, 85° horizontal beamwidth, internal RETs.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Three internal RETs for independent tilt on all three bands

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.5	14.4	17.0	17.6	17.9	17.9
Beamwidth, Horizontal, degrees	83	86	81	79	79	79
Beamwidth, Vertical, degrees	12.3	11.1	5.7	5.3	5.0	4.6
Beam Tilt, degrees	0–12	0–12	0–8	0–8	0–8	0–8
USLS (First Lobe), dB	19	18	15	16	17	18
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	25	25	25	25
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.3	14.2	16.8	17.4	17.7	17.8
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.5	±0.3	±0.4	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.2	0 ° | 14.1	0 ° | 16.8	0 ° | 17.5	0 ° | 17.7	0 ° | 17.6
	6 ° | 14.3	6 ° | 14.3	4 ° | 16.8	4 ° | 17.5	4 ° | 17.8	4 ° | 18.0
	12 ° | 14.1	12 ° | 13.9	8 ° | 16.7	8 ° | 17.2	8 ° | 17.5	8 ° | 17.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±4.8	±3.2	±3.8	±1.9
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.9	±0.2	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	15	16	17	18
Front-to-Back Total Power at 180° ± 30°, dB	23	23	27	26	25	27
CPR at Boresight, dB	20	20	23	22	18	22
CPR at Sector, dB	15	16	12	13	10	6

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Type	Sector with internal RET
Band	Multiband
Brand	DualPol®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

Product Specifications

SBNHH-1D85B

Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight, without mounting kit	19.1 kg | 42.1 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (1)
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.2 kg | 68.8 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

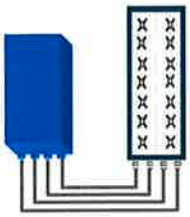
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

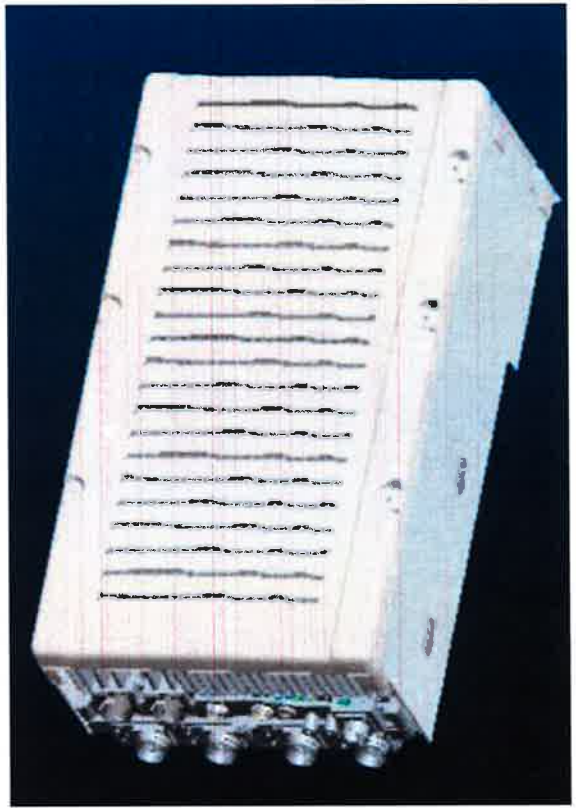
Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**



**- Includes solar shield but not mounting brackets (8 lbs.)

Alcatel·Lucent

VZW Network Equipment Reporting Form (NERF)

Vendor	Alcatel-Lucent		Model	B66a RRH 4Tx/4Rx 4x45W or 2x 90W (SW selectable)		Function	RRH for distributed architecture with a CPRI interface between digital and RF processing components. The RRH has 4 Tx ports and 4 Rx ports. Can be SW configured for 2 Tx with 90W rf per port or 4 Tx with 45W rf per port. The RRH has passive cooling only.		
*1)Equipment Configuration	*2)Heat Release @50°F Intake Temp [W]		*3)Airflow Rate @ 100% Activity Rate [cfm]		*4)Dimensions [in]		Non-Thermal Data		
	100% Activity	50% Activity	Nominal (70°F)	Max (95°F)	External (WxDxH)	Clear (F/R/S)	Installed Weight [lb]	*5)Sound @ Nominal [L_{WAd}]	*6)Name Plate [W]
Minimum			N/A Convection cooled	N/A Convection cooled	w/o Solar Shield W = 11.4in D = 6.7in H = 25.2in (W=290mm) (D=170mm) (H=640mm)	Front: 12" Rear: 7.5" Right: 12" Left: 12" Top: 12" Bottom: 24"			
Typical			N/A Convection cooled	N/A Convection cooled	with Solar Shield W = 12in D = 7.6in H = 25.8in (W=304mm) (D=193mm) (H=655mm)		62lb 72 lb(w mounting brackets)	N/A Convection cooled	
Full	825W (add 60W for AISG)	TBD	N/A Convection cooled	N/A Convection cooled	N/A			N/A Convection cooled	

*7)Equipment EC-Class	N/A Convection cooled	*10)Fan Speed	N/A Convection cooled	*13)Fan Hot-Swap	N/A Convection cooled	*16)Environ. Tests	N/A Convection cooled	*18)Temp. Rise [°F]	N/A Convection cooled
*8)Non-Optimal EC-Class	N/A Convection cooled	*11)Fan Logic	N/A Convection cooled	*14)Shut-Down	N/A Convection cooled	*17)Allow. Max [°F]	N/A Convection cooled	*19)Rec. Max [°F]	N/A Convection cooled
*9)Exhaust Openings	N/A Convection cooled	*12)Fan Alarm	N/A Convection cooled	*15)Temp. Access	N/A Convection cooled	*17)Allow. Min [°F]	N/A Convection cooled	*19)Rec. Min [°F]	N/A Convection cooled

Power Reporting					
Power Input	-48V	No. Power Supplies	N/A (Customer provided power plant)	Number of Inputs per Power Supply	1
*24)Maximum Demand (total system in Watts)	825W (add 60W for AISG)	Maximum Input (each power supply in Watts)	N/A (Customer provided power plant)	Maximum Output (each power supply in Watts)	58W (to AISG port, 29V/2A)
Power Supply Connection Type	DC entry via Conduit Box	Power Supply Make & Model	N/A (Customer provided power plant)		
Input Protection	no input fuse	Input Protection Make & Model	N/A (Customer provided power plant)		
Redundancy Scheme	N/A				
Nominal Voltage	-48VDC	Maximum Voltage	-57V	Minimum Voltage	-38V
*25)Max Current at Nominal Voltage	17.2A (add 1.2A if AISG port loaded 2A*29V)	*25)Max Current at Maximum Voltage	14.5A (add 1A if AISG port loaded 2A*29V)	*25)Max Current at Minimum Voltage	21.7A (add 1.5A if AISG port loaded 2A*29V)

Return completed forms to Engineering and Operations Support (EOS)
Richard.damiano@verizonwireless.com

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 6 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightening protection.

Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows **flexibility for indoor or outdoor installation** on a roof or tower top
- Weatherproof enclosure and ports – **improves system reliability**
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – **ideally suited for RRH technology** – won't shut down the RRH the way spark gap technology does (certain models only)

Technical Specifications

Mechanical Specifications

Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, 6 OVP's	Standard without OVP
Dimensions - H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum	
Fiber Connection Method	LC-LC Single- or Multi-mode duplex	
Environmental Rating	NEMA 4x	
Operating Temperature, °C (°F)	-40 to +80 (-40 to +176)	
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs	

Electrical Specifications

Nominal Operating Voltage	48 VDC	
Nominal Discharge Current (I_n) per UL 1449 3rd Ed	20 kA 8/20 µs	N/A
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 µs	N/A
Maximum Impulse (Lightning) Current (I_{imp}) per IEC 61643-1	5 kA 10/350 µs	N/A
Maximum Continuous Operating Voltage (U_c)	75 VDC	N/A
Voltage Protection Rating per UL1449 3rd Ed	400 V	N/A
Protection Class as per IEC 61643-1	Class 1	N/A
Strikesorb OVP Compliance	ANSI/UL 1449-3rd Ed	N/A
	IEEE C62.41	N/A
	NEMA LS-1	N/A
	IEC 61643-1	N/A
	IEC 61643-12	N/A
	EN 61643-11	N/A

* This data is provisional and subject to change.