COHEN and WOLF P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

PLEASE REPLY TO: Bridgeport
WRITER'S DIRECT DIAL: (203) 337-4157
E-Mail: jkohler@cohenandwolf.com

April 30, 2015

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: Notice of Exempt Modification
Eversource Energy /T-Mobile equipment upgrade
Site ID CT11029I
135 New Road, Madison, Connecticut

Dear Attorney Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, the Eversource Energy ("Eversource") owns the existing guyed lattice tower and related facility located at 135 New Road, Madison, Connecticut (Latitude: 41.293436/ Longitude: -72.578406). T-Mobile intends to add three antennas and related equipment at this existing telecommunications facility in Madison ("Madison Facility"). Please accept this letter as notification, pursuant to R.C.S.A. § 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to the First Selectman, Filmore McPherson. Eversource is also the property owner.

The existing Madison Facility consists of a 180 foot tall guyed lattice tower.[1] T-Mobile plans to add three antennas and three remote radio units (RRUs) mounted on three (3) lightweight T-frames at a centerline of 159 feet. (See the plans revised to January 12, 2015, attached hereto as **Exhibit A**). T-Mobile will also mount a compact 2416 cabinet to the proposed H-frame, as well as reuse existing coax, bundle, and hybrid cable. The existing Madison Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated November 13, 2014 and attached hereto as **Exhibit B**. The planned modifications to the Madison Facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

[1] While the online docket for the Connecticut Siting Council does not provide a docket or petition number for the approval of this structure, it does reference this structure in connection with notices of intent captioned EM-OCI-076-980825, EM-CING-076-110419, EM-METRICOM-076-001226, EM-AT&T-076-020927, EM-T-MOBILE-076-140508, and EM- SPRINT-076-110329, and EM-CING-076-110419.

1 . The proposed modification will not increase the height of the tower. T-Mobile's additional antennas will be installed at a centerline of 159 feet as the existing antennas located at the same 159 foot elevation. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2 . The proposed modifications will not require an extension of the site boundaries. T-Mobile's equipment will be located entirely within the existing compound and equipment pad as shown on Page 2 of Exhibit A.

3 . The proposed modification to the Madison Facility will not increase the noise levels at the existing facility by six decibels or more.

4 . The operation of the additional antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated January 12, 2015, T-Mobile's operations would add 5.16% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 49.37% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as **Exhibit C.**

Eversource has authorized the filing of this exempt modification as evidenced by the letter of authorization dated April 16, 2015 attached hereto as **Exhibit D.**

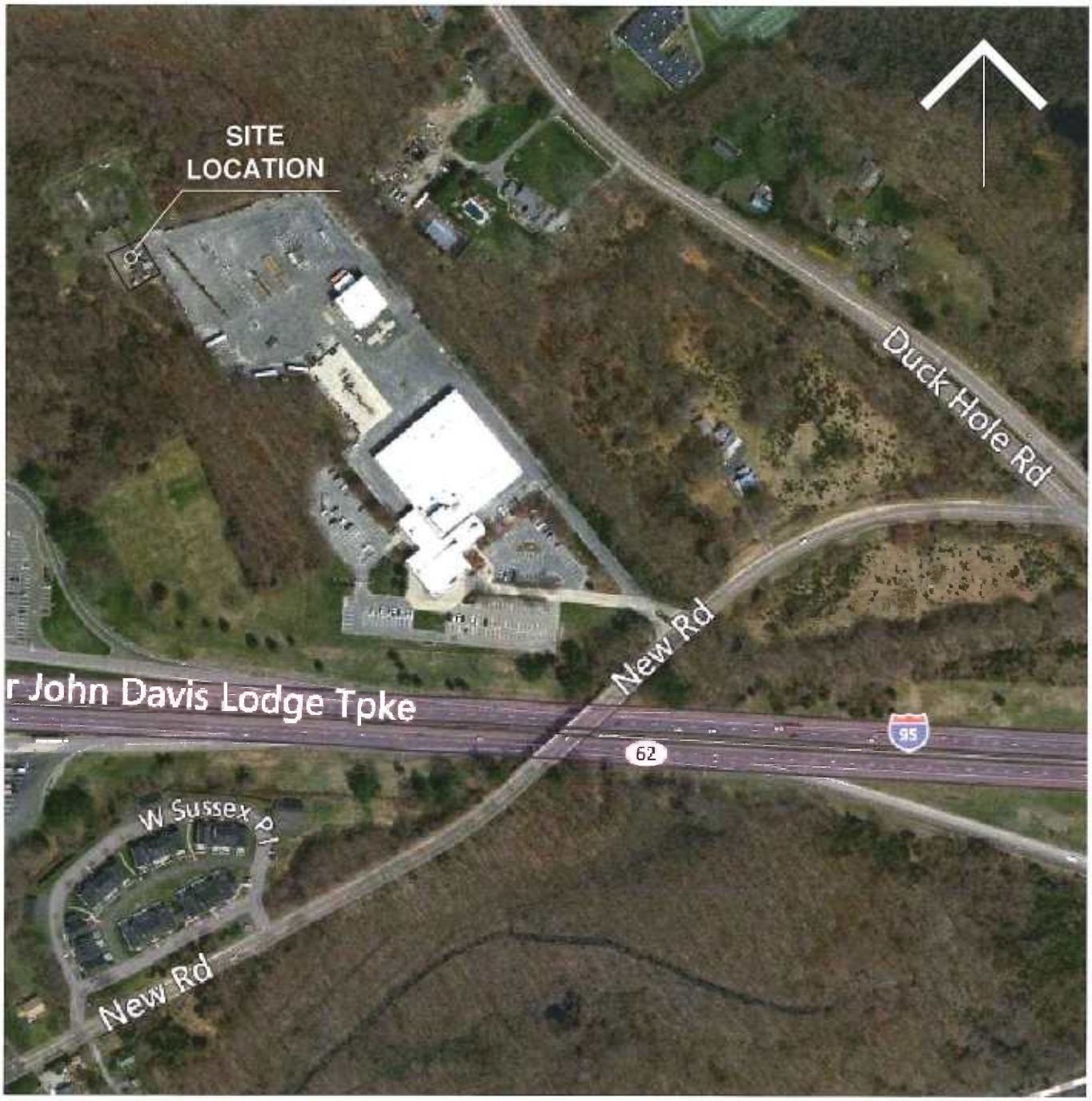
For the foregoing reasons, T-Mobile respectfully submits that the proposed additional antennas and equipment at the Madison Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement by the Council of this proposed exempt modification, T-Mobile shall commence construction approximately sixty days from the date of the Council's notice of acknowledgement.

Sincerely,

Julie D. Kohler, Esq.

cc: Town of Madison, First Selectman Filmore McPherson
Eversource Energy
Northeast Site Solutions, Sheldon Freincle

EXHIBIT A



OVERALL SITE PLAN (1 / LE1)
N.T.S.

CONFIGURATION
702CU

SUBMITTALS	
LE REV A	07.30.14
LE REV 0	01.12.15

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

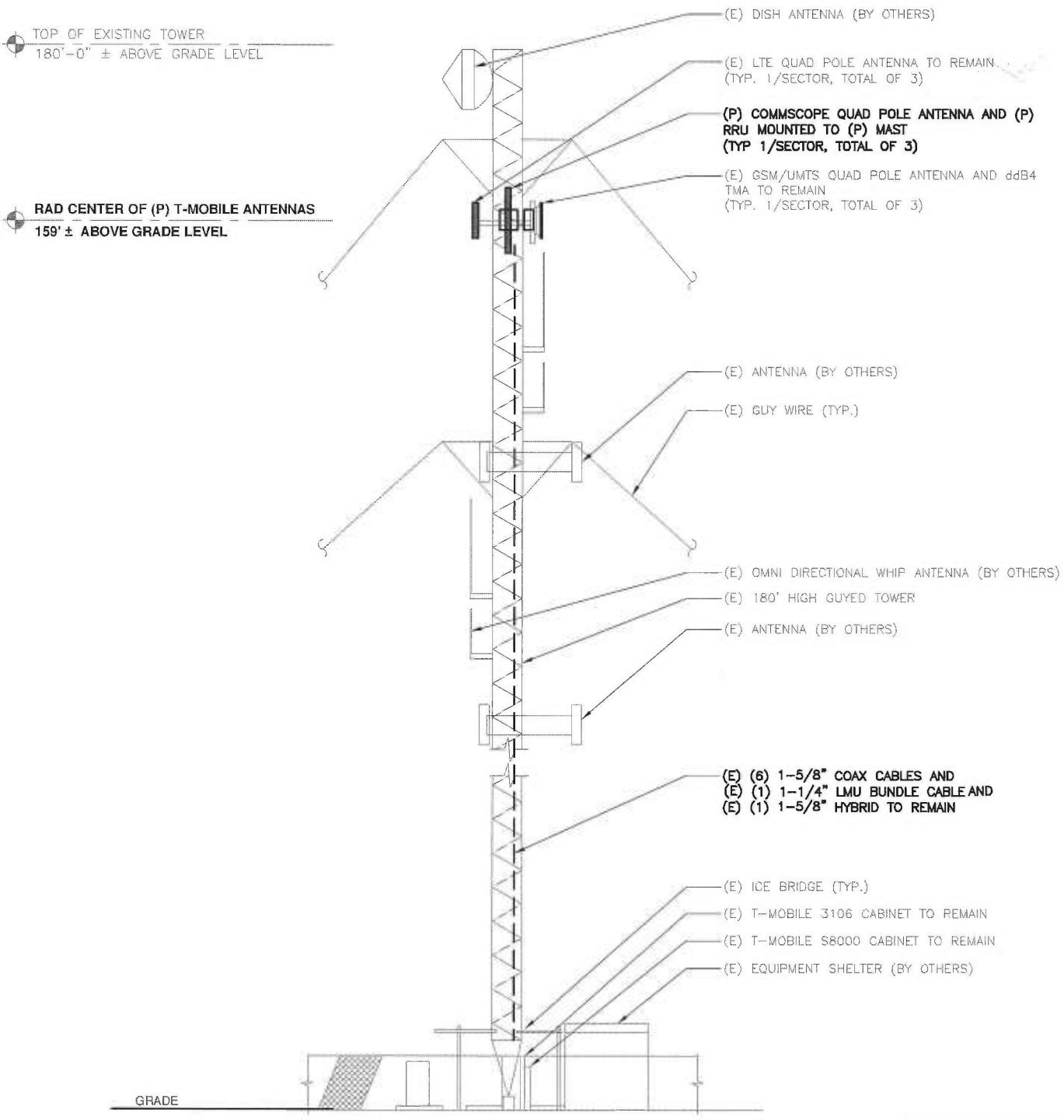
SITE NUMBER:
CT11029I

SITE NAME:
MADISON/ I-95/ X61/ JCT_1

SITE ADDRESS:
135 NEW ROAD
MADISON, CT, 06443

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237
FOR
T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MB | CHECKED BY: SM



ELEVATION VIEW

1
LE3

N.T.S.

CONFIGURATION

702CU

SUBMITTALS	
LE REV A	07.30.14
LE REV 0	01.12.15

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CT11029I

SITE NAME:
MADISON/ I-95/ X61/ JCT_1

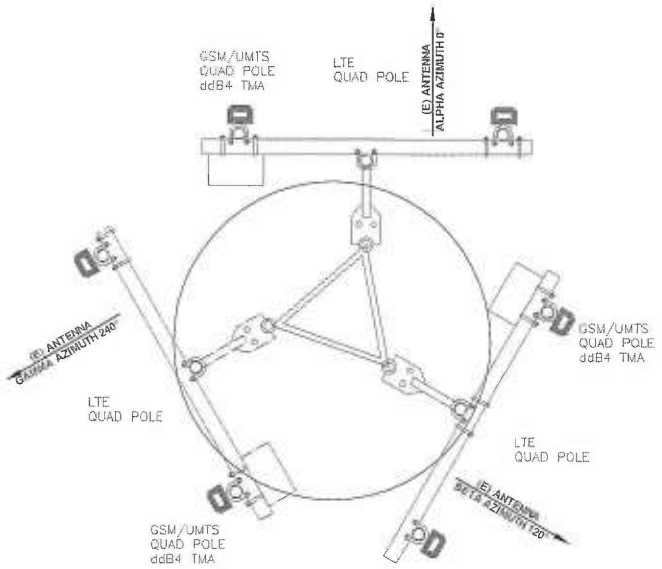
SITE ADDRESS:
135 NEW ROAD
MADISON, CT, 06443

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

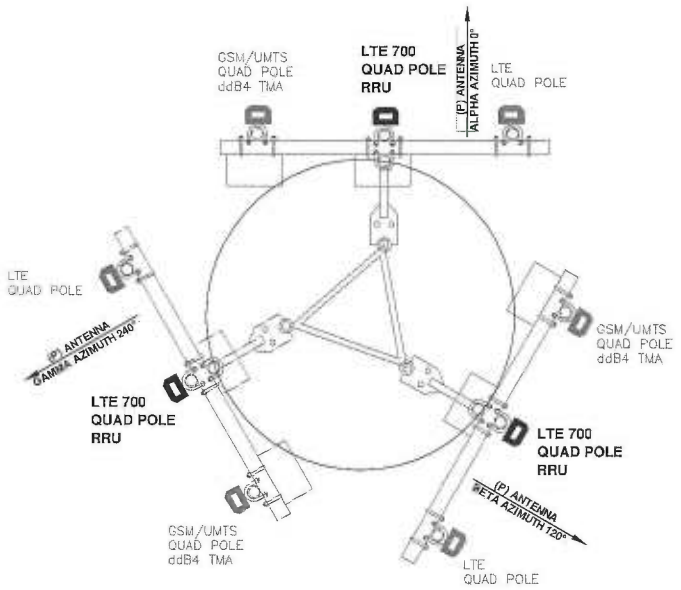
FOR

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MB | CHECKED BY: SM



EXISTING ANTENNA CONFIGURATION 1 LE4



PROPOSED ANTENNA CONFIGURATION 2 LE4

CONFIGURATION

702CU

SUBMITTALS	
LE REV A	07.30.14
LE REV 0	01.12.15

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CT11029I

SITE NAME:
MADISON/ I-95/ X61/ JCT_1

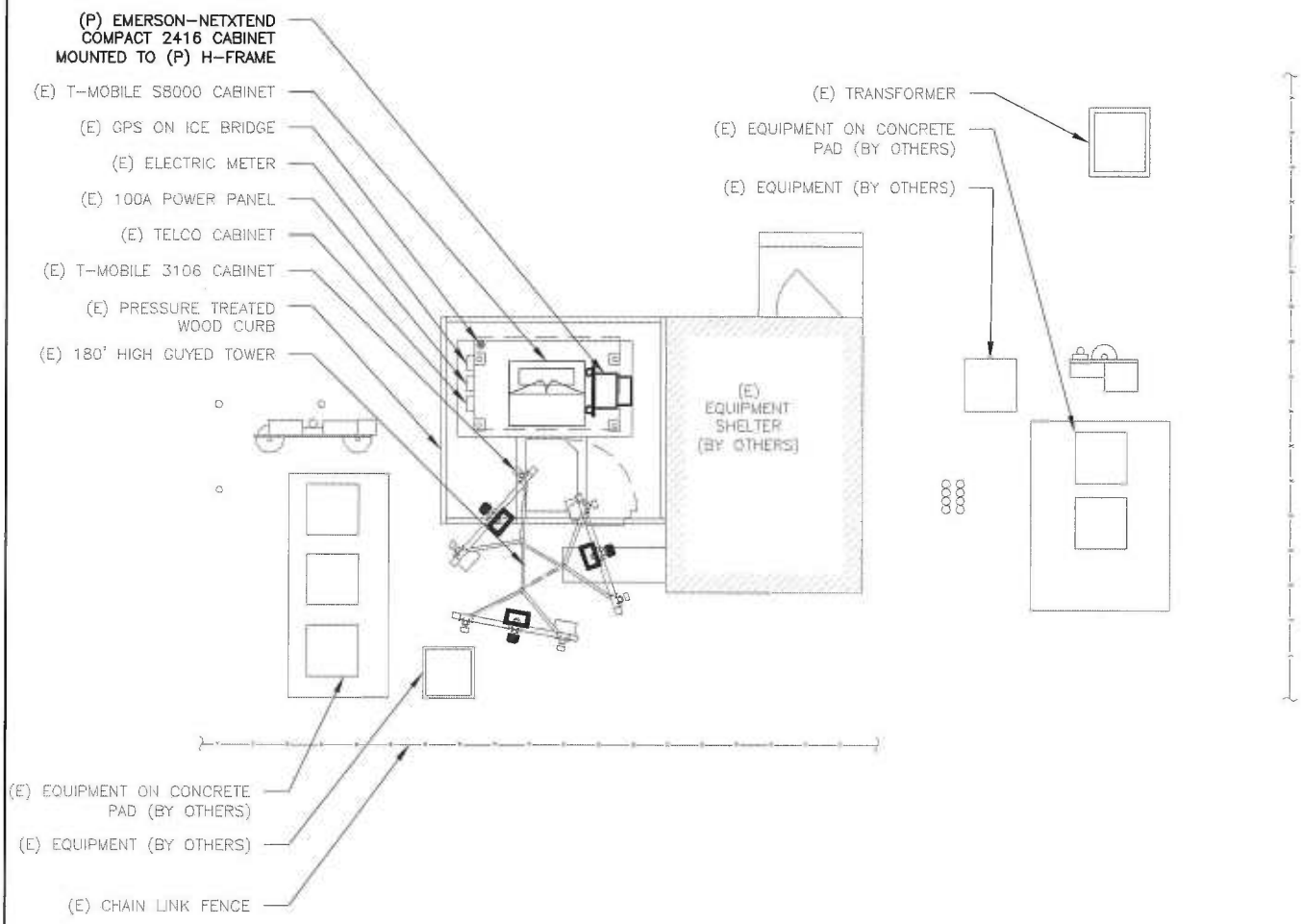
SITE ADDRESS:
135 NEW ROAD
MADISON, CT, 06443

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MB | CHECKED BY: SM



SITE PLAN

SCALE = 1:10

1 / LE2

CONFIGURATION

702CU

SUBMITTALS	
LE REV A	07.30.14
LE REV 0	01.12.15

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CT11029I

SITE NAME:
MADISON/ I-95/ X61/ JCT_1

SITE ADDRESS:
135 NEW ROAD
MADISON, CT, 06443

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MB | CHECKED BY: SM

EXHIBIT B

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Existing ROHN Guyed Lattice Tower

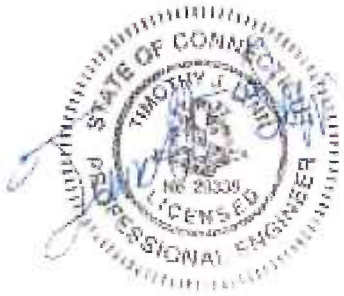
Proposed T-Mobile
Antenna Upgrade

T-Mobile Site Ref: CT11029I

135 New Road
Madison, CT 06443

CENTEK Project No. 14025.012

Date: November 13, 2014



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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

Table of Contents

SECTION 1 - REPORT

- INTRODUCTION.
- ANTENNA AND APPURTENANCE SUMMARY.
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS.
- ANALYSIS.
- TOWER LOADING.
- TOWER CAPACITY.
- FOUNDATION AND ANCHORS.
- CONCLUSION.

SECTION 2 – CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS.
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM.

SECTION 3 – CALCULATIONS

- tnxTower INPUT/OUTPUT SUMMARY.
- tnxTower FEED LINE PLAN.
- tnxTower FEED LINE DISTRIBUTION.
- tnxTower LEG COMPRESSION DIAGRAM.
- tnxTower GLOBAL MAST SHEAR AND MOMENT DIAGRAMS.
- tnxTower DEFLECTION DIAGRAMS.
- tnxTower STRESS DISTRIBUTION.
- tnxTower GUY TENSION AND ANCHOR REACTIONS.
- tnxTower DETAILED OUTPUT.
- GUY ANCHOR FOUNDATION ANALYSIS.
- BASE FOUNDATION ANALYSIS.

SECTION 4 – REFERENCE MATERIALS

- RF DATA SHEET.
- EQUIPMENT CUT SHEETS.

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 T-Mobile on the existing guyed lattice tower located in Madison, Connecticut.

The host tower is a 180-ft, three legged, Model 80 guyed lattice tower originally designed and manufactured by UNR-ROHN. The tower geometry and structure member size information were obtained from a previous structural analysis report prepared by Centek Engineering, Inc., project no. 14025.001 dated March 3, 2014.

Antenna and appurtenance inventory were obtained from the aforementioned structural analysis report prepared by Centek Engineering and a Verizon RF data sheet.

The tower consists of nine (9) vertical sections consisting of ROHN steel pipe legs conforming to ASTM A572-50. Diagonal and horizontal lateral support bracing consists of a combination of steel angle and pipe construction conforming to ASTM A36 and A53 Gr. B 35ksi. All connections are bolted. The width of the tower face is 3.41-ft at the top and bottom with a 5-ft tall tapered base section.

T-Mobile proposes the installation of three (3) panel antennas and three (3) remote radio heads mounted on three proposed mounts. 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 tower supports several communication antennas. The existing and proposed loads considered in the analysis consist of the following:

- NEU (Reserved):
  Antenna: One (1) 20-ft Omni-directional whip antenna and one (1) TTA mounted to a leg of the existing tower with an elevation of ±180-ft above grade level.
  Coax Cable: Two (2) 1-1/4" ∅ and one (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: One (1) 20-ft and one (1) 14-ft Omni-directional whip antennas mounted to a leg of the existing tower with an elevation of ±180-ft above grade level.
  Coax Cable: One (1) 1-5/8" ∅ and one (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: One (1) 8.5-ft ∅ Microwave dish antenna with radome mounted to the leg of the existing tower with a RAD center elevation of ±175-ft above grade level.
  Coax Cable: One (1) Elliptical coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- NEU (Existing):
  Antenna: One (1) 20-ft Omni-directional whip antenna pipe mounted with RAD center elevation of ±147-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: Two (2) 2-ft Omni-directional whip antennas mounted on a 2-ft stand-off with RAD center elevations of ±143-ft and 141-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: One (1) filter box mounted on a 2-ft stand-off with an elevation of ±142-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- SPRINT (Existing/Reserved):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) 1900MHz 4X45 Remote Radio Heads (RRH's) and three (3) 800MHz 2X50W Remote Radio Heads (RRH's) mounted to three (3) existing 6-ft x 12-ft ROHN boom gates with a RAD center elevation of ±126-ft above grade level.
  Coax Cables: Three (3) 1-1/4" ∅ Hybriflex cables running on the face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: One (1) 10-ft Omni-Directional whip antenna mounted on a 2-ft side arm to a leg of the existing tower with an elevation of ±105-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Reserved):
  Antennas: Two (2) Andrew LNX-6515DS panel antennas, four (4) Andrew LNX-6514DS panel antennas, six (6) Andrew HBXX-6517DS panel antennas, three (3) Alcatel-Lucent RRH2x60-AWS Remote Radio Heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads and two (2) RFS DB-T1-6Z-8AB-0Z main distribution boxes mounted to three (3) 12ft-6in. lightweight T-frames (Site PRO1 P/N LTF12) with a RAD center elevation of 95-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅ Hybriflex fiber lines running on the East face of the existing tower as specified in Section 3 of this report.
- SPRINT (Existing):
  Antenna: One (1) GPS antenna mounted on a 2-ft stand-off with a RAD center elevation of ±88-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- AT&T (Existing):
  Antennas: Three (3) Powerwave 7770 panel antennas, three (3) KMW AM-X-CD-14-65-00T panel antennas and six (6) TMA's mounted to three (3) 10-ft T-Arms with a RAD center elevation of 77-ft above grade level.
  Radios: Six (6) Ericsson Remote Radio Units, P/N: RRUS-11 attached to three (3) unistrut frames independently mounted to three (3) faces of the existing tower at a RAD center elevation of 73-ft above grade level.
  Surge Arrestor: One (1) Raycap DC6-48-60-18-8F Surge Arrestor mounted to the leg of the existing tower with a RAD center elevation of 72-ft above grade level.
  Coax Cables: Six (6) 7/8" ∅ coax cables, one (1) 5/8" ∅ fiber optic cable and two (2) #8 DC control cables running on the face of the existing tower as specified in Section 3 of this report.
- T-MOBILE (Reserved):
  Antennas: Six (6) Ericsson AIR 21 panel antennas and three (3) Ericsson KRY 112 144/1 TMA's mounted on three (3) Site Pro Compact Tower Mounts p/n CWT8 with a RAD center elevation of 159-ft above grade level.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables, one (1) 1-1/4" ∅ lmu bundle and one (1) 1-5/8" ∅ fiber cable running on the face of the existing tower as specified in Section 3 of this report.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) Andrew LNX-6515DS panel antennas and three (3) Ericsson RRUS-11 remote radio heads mounted on three (3) Site Pro 12ft-6in. lightweight T-frames (Site PRO1 P/N LTF12) with a RAD center elevation of 159-ft above grade level (in place of compact tower mount above).

Primary Assumptions Used in the Analysis

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

Analysis

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

The existing tower was analyzed for 85mph basic wind speed (fastest mile) with no ice and 85mph with ½ inch accumulative ice to determine stresses in members as per guidelines of Northeast Utilities Substation Standard (NU SUB-090), TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice tower structure and its components.

Basic Wind Speed:	New Haven; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	NU SUB-090; v = 85 mph (fastest mile)	*[Northeast Utilities Substation Standard 090]*
	Madison; v = 115 mph (3 second gust) equivalent to v = 95 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	NU–SUB-090 wind speed controls	
Load Cases:	Load Case 1; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	*[Northeast Utilities Substation Standard 090]*
	Load Case 2; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	*[Northeast Utilities Substation Standard 090]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

The tower deflection was evaluated with a wind velocity of 85 mph concurrent with 0.5" ice to determine twist (rotation) and sway (deflection) in accordance with NU SUB-90 requirements.

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **93.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	20'-0"-40'-0"	93.3%	**PASS**
Diagonal (T6) (Bolts)	60'-0"-80'-0"	78.0%	**PASS**
Guy A @ 90-ft radius (T5)	90'-0"	79.1%	**PASS**

- The tower deflection (sway) was found to be within allowable limits as prescribed by Northeast Utilities. The combined tower deflection is **0.5122 degrees**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.2469	0.5	**PASS**
Twist	0.4488	0.5	**PASS**
Combined	0.5039	0.5	**PASS** (1)

Note 1: Under the proposed Load Case 2 above the tower marginally exceeds NU-SUB-90 limitation of 0.5 degrees. Tower deflection is subject to NEU approval.

Foundations and Anchorage

The existing guy anchorage foundation system consists of three (3) inner and three (3) outer reinforced concrete guy anchor foundations and one pad and pier type base foundation, located below existing grade. The properties used in the analysis of the existing anchor foundations were obtained from the aforementioned structural analysis report prepared by Centek Engineering, Inc.

- The worst case tower base and guy anchor reactions developed from the governing Load Case 2 were used in the verification of the anchorage foundations:

Tower Guy Reactions		
Vector	**Proposed Reactions Guy Anchor A at Radius of 150-ft** [2]	**Proposed Reactions Guy Anchor A at Radius of 184-ft** [2]
Horizontal (In Plane of GW)	**23.7 kips**	**45.4 kips**
Horizontal (Out of Plane of GW)	**0.6 kips**	**2.1 kips**
Vertical	**10.7 kips**	**34.7 kips**
Resultant Force at end of Guy Wire	**26.0 kips**	**57.1 kips**
Tower Base Reactions		
Vector	**Proposed Reaction**	
Horizontal Shear	**2.0 kips**	
Axial Compression	**118.5 kips**	

Note 2: Obtained from tnxTower Analysis Load Case No. 2 - Guy Anchor A.

Foundation	**Design Limit**	**IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)**[3]	**Proposed Loading (FS)**[3]	**Result**
Reinf. Conc. Anchor Block (A) at 150-ft radius.	Uplift	2.0	4.6	**PASS**
	Sliding	2.0	2.1	**PASS**
Reinf. Conc. Anchor Block (A) at 184-ft radius.	Uplift	2.0	2.4	**PASS**
	Sliding	2.0	2.0	**PASS**
		Allowable	**Proposed**	
Base Foundation	Bearing	8.0 ksf [4]	5.19 ksf	**PASS**

Note 3: FS denotes 'Factor of Safety'.
Note 4: Based on soil boring prepared by Clarence Welti dated 6/16/97 which indicated weathered rock.

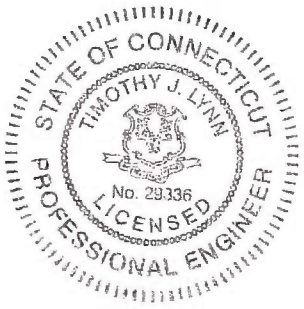
Conclusion

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

The analysis is based, in part, on the information provided to this office by T-Mobile and Northeast Utilities. 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:

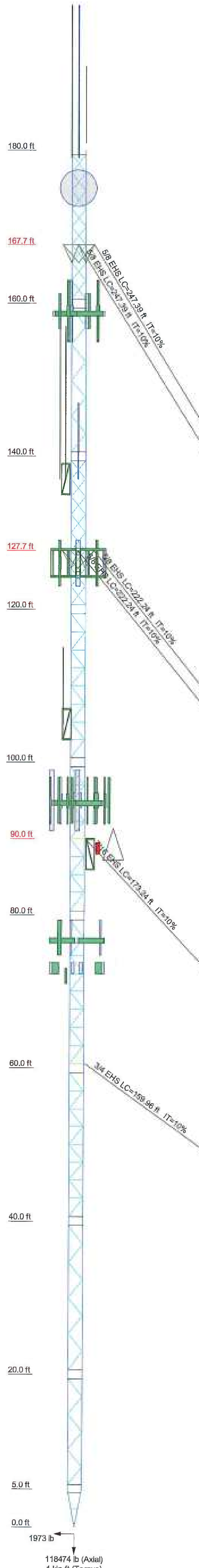
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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

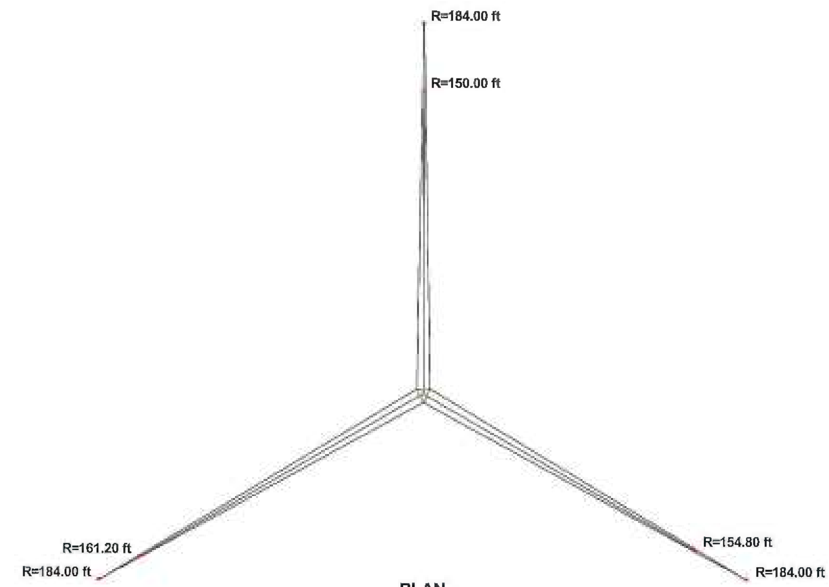
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, RISATower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

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.



Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Legs					P2.5x.203					
Leg Grade					A572-50					
Diagonals	L1 3/4x1 3/4x3/16	ROHN TS1.5x16 ga	L2x2x3/16	L2 1/2x2 1/2x1/2	L2 1/2x2 1/2x1/4		L2 1/2x2 1/2x1/2	ROHN TS1.5x16 ga	L2 1/2x2 1/2x1/2	N.A.
Diagonal Grade	A36	A53-B-35		A36	A53-B-35		A36	A53-B-35	A36	N.A.
Top Girts	L1 3/4x1 3/4x3/16	ROHN TS1.5x16 ga	L2x2x3/16	L2 1/2x2 1/2x1/2	ROHN TS1.5x16 ga	L2 1/2x2 1/2x1/2		ROHN TS1.5x16 ga	L2 1/2x2 1/2x1/2	C12x20.7
Bottom Girts	L1 3/4x1 3/4x3/16	ROHN TS1.5x16 ga	L2x2x3/16	L2 1/2x2 1/2x1/2	ROHN TS1.5x16 ga	L2 1/2x2 1/2x1/2		ROHN TS1.5x16 ga	L2 1/2x2 1/2x1/2	C12x20.7
Horizontals		N.A.		L2 1/2x2 1/2x1/2			SR 1	N.A.		C12x20.7
Top Guy Pull-Offs			N.A.		4 1/2x3/8			N.A.		
Face Width (ft)	3.41									
# Panels @ (ft)					72 @ 2.34635				7 @ 2.29514	3 @ 2
Weight (lb) 11136.0	1369.0	455.0	1439.1	1613.4	1375.5	1515.3	1318.2	455.0	984.1	411.5



PLAN

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' x 2" Dia Omni (NEU)	179	HBX-6517DS (Verizon - Proposed)	95
14' x 3" Dia Omni (NEU)	179	LNX-6515DS (Verizon - Proposed)	95
20' x 2" Dia Omni (NEU)	179	HBX-6517DS (Verizon - Proposed)	95
8.5 Dishw/radome (NU)	175	LNX-6514DS-VTM (Verizon - Proposed)	95
AIR21 (T-Mobile - Existing)	159	HBX-6517DS (Verizon - Proposed)	95
AIR21 (T-Mobile - Existing)	159	LNX-6514DS-VTM (Verizon - Proposed)	95
AIR21 (T-Mobile - Existing)	159	HBX-6517DS (Verizon - Proposed)	95
AIR21 (T-Mobile - Existing)	159	LNX-6514DS-VTM (Verizon - Proposed)	95
AIR21 (T-Mobile - Existing)	159	HBX-6517DS (Verizon - Proposed)	95
AIR21 (T-Mobile - Existing)	159	LNX-6514DS-VTM (Verizon - Proposed)	95
KRY 112 TMA (T-Mobile - Existing)	159	HBX-6517DS (Verizon - Proposed)	95
KRY 112 TMA (T-Mobile - Existing)	159	RRH2x40-07-U (Verizon - Proposed)	95
KRY 112 TMA (T-Mobile - Existing)	159	RRH2x40-07-U (Verizon - Proposed)	95
Pirod 12' T-Frame Sector Mount (1) (T-Mobile - Proposed)	159	RRH2x40-07-U (Verizon - Proposed)	95
		RRH2x60-AWS (Verizon - Proposed)	95
Pirod 12' T-Frame Sector Mount (1) (T-Mobile - Proposed)	159	RRH2x60-AWS (Verizon - Proposed)	95
		RRH2x60-AWS (Verizon - Proposed)	95
Pirod 12' T-Frame Sector Mount (1) (T-Mobile - Proposed)	159	RRH2x60-PCS (Verizon - Proposed)	95
		RRH2x60-PCS (Verizon - Proposed)	95
LNX-6515DS (T-Mobile - Proposed)	159	RRH2x60-PCS (Verizon - Proposed)	95
LNX-6515DS (T-Mobile - Proposed)	159	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	95
LNX-6515DS (T-Mobile - Proposed)	159	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	95
RRUS-11 (T-Mobile - Proposed)	159	Pirod 12' T-Frame Sector Mount (1) (Verizon - Proposed)	95
RRUS-11 (T-Mobile - Proposed)	159		
RRUS-11 (T-Mobile - Proposed)	159	Pirod 12' T-Frame Sector Mount (1) (Verizon - Proposed)	95
3"x20-ft Omni (NEU)	147		
20-ft x 1.9in Support Pipe (NEU)	147	Pirod 12' T-Frame Sector Mount (1) (Verizon - Proposed)	95
1.5"x2'omni (NEU)	143		
2-ft Stand Off (NEU)	142	GPS (Sprint)	88
1.5"x2'omni (NEU)	141	3' GPS Stand-off Mount (Sprint)	88
3-ft Side Arm (NEU)	137	(2) LPG21401 TMA (ATI)	77
APXVSPP18-C-A20 w/ Mount (Sprint)	126	7770.00 (ATI)	77
FD-RRH 2x50 800 (Sprint)	126	7770.00 (ATI)	77
FD-RRH 2x50 800 (Sprint)	126	Valmont T-Arm (1) (ATI)	77
FD-RRH 2x50 800 (Sprint)	126	7770.00 (ATI)	77
FD-RRH 4x45 1900 (Sprint)	126	Valmont T-Arm (1) (ATI)	77
FD-RRH 4x45 1900 (Sprint)	126	AM-X-CD-14-65-00TT-RET (ATI)	77
FD-RRH 4x45 1900 (Sprint)	126	AM-X-CD-14-65-00TT-RET (ATI)	77
Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	126	(2) LPG21401 TMA (ATI)	77
Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	126	AM-X-CD-14-65-00TT-RET (ATI)	77
Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	126	(2) LPG21401 TMA (ATI)	77
APXVSPP18-C-A20 w/ Mount (Sprint)	126	Valmont T-Arm (1) (ATI)	77
APXVSPP18-C-A20 w/ Mount (Sprint)	126	(2) RRUS-11 (ATI)	73
10' x 3" Dia Omni (NEU)	105	(2) RRUS-11 (ATI)	73
Sabre 2' Sidearm (NEU)	105	(2) RRUS-11 (ATI)	73
LNX-6515DS (Verizon - Proposed)	95	DC6-48-60-18-8F Surge Arrestor (ATI)	72

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A53-B-35	35 ksi	63 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

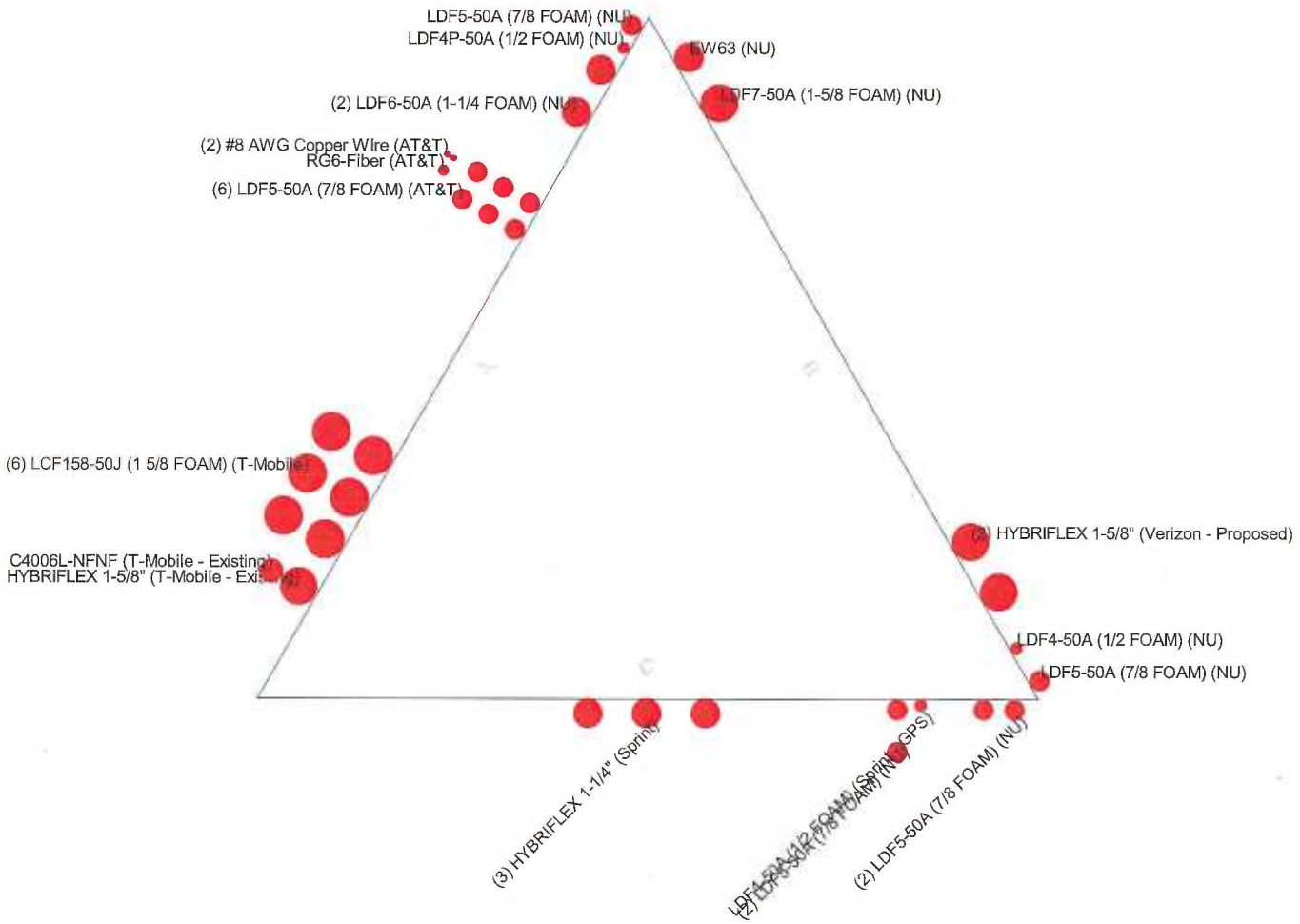
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 85 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 85 mph wind.
5. Weld together tower sections have flange connections.
6. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.
9. TOWER RATING: 93.3%

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

Job: **14234.000 - CT11029I**		
Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
Path: J:\Jobs\1402500.WI\012 - CT11029I\Backup Documentation\ERI\180-ft Guyed Lattice Tower_Madison_CT.eri		Dwg No. E-1

Feedline Plan

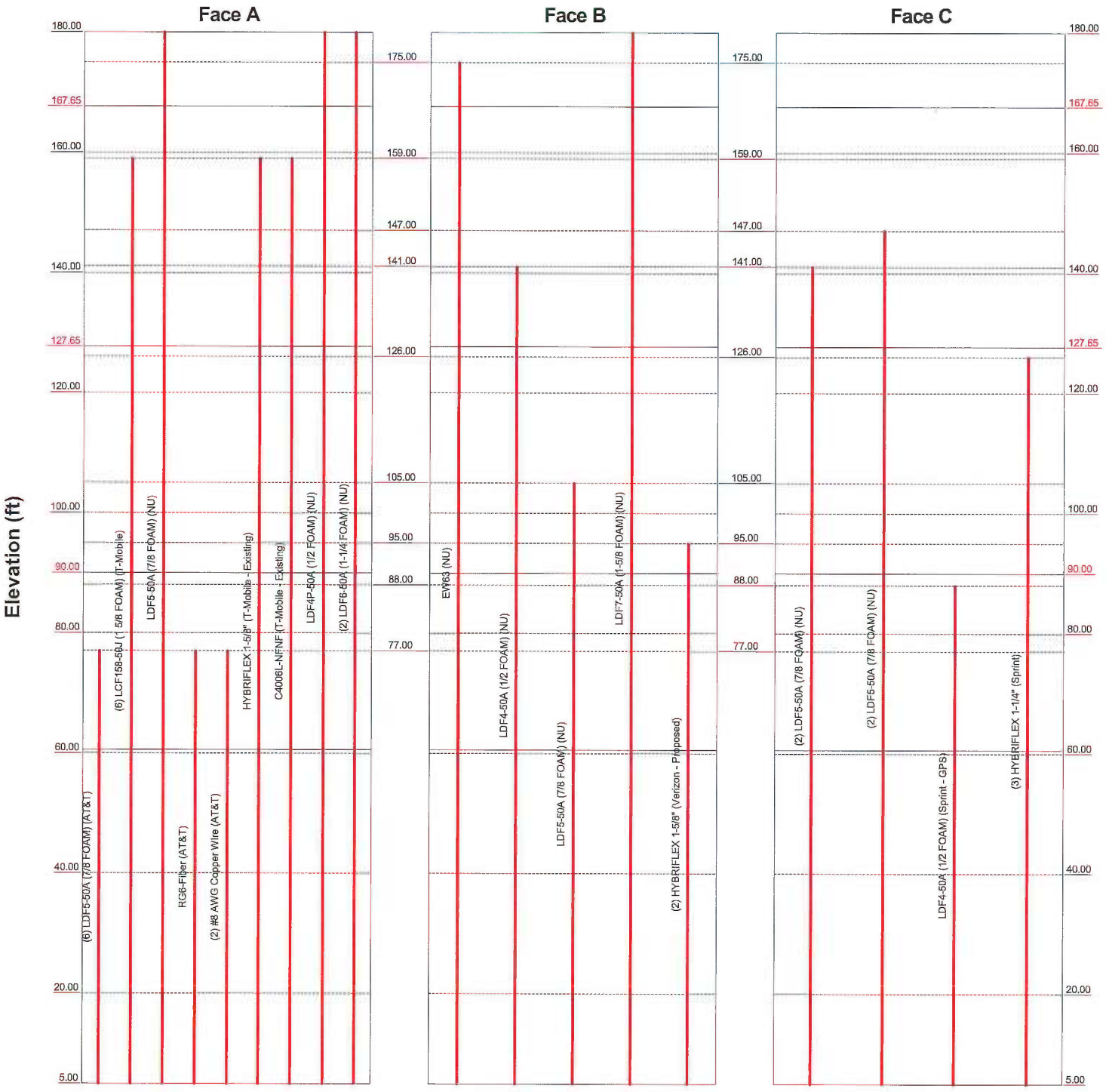
Round Flat App In Face App Out Face



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: **14234.000 - CT11029I**		
	Project: **180' Guyed Lattice Tower - 125 New Rd., Madison, CT**		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
	Path: J:\Jobs\14000s\14029\CT11029I\Backup Documentation\SR\1604-Guyed Lattice Tower_Madison, CT.ar		Dwg No. E-7

Feedline Distribution Chart
5' - 180'

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

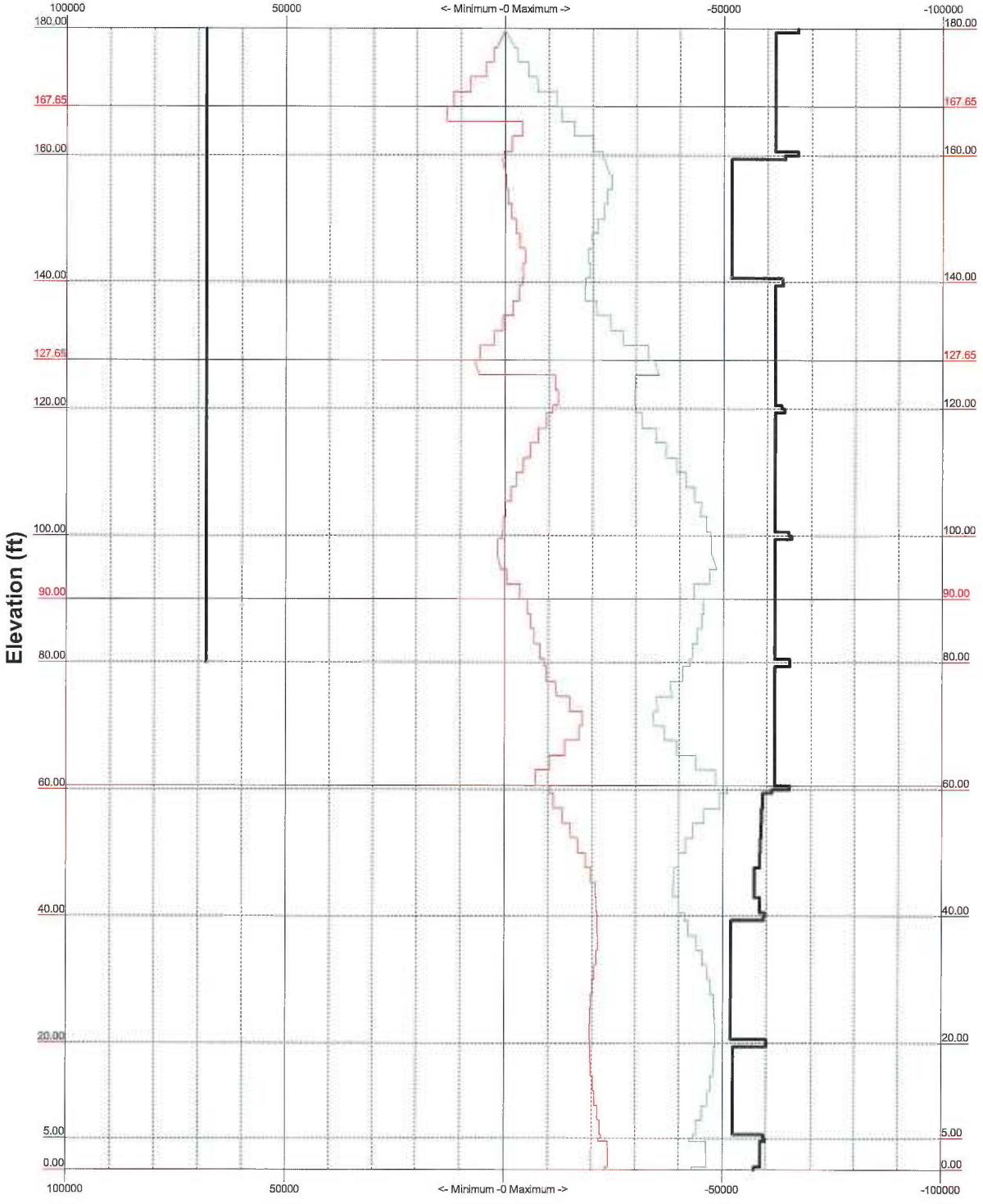


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: *14234.000 - CT11029I*			
Project: *180' Guyed Lattice Tower - 125 New Rd., Madison, CT*			
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS	
Path: J:\Jobs\1402900.W\0t2 - CT11029I\Backup Documentation\ER\180-ft Guyed Lattice Tower_Madison, CT.ec		Dwg No. E-7	

TIA/EIA-222-F - 85 mph/85 mph 0.5000 in Ice

Leg Capacity ——— Leg Compression (lb)



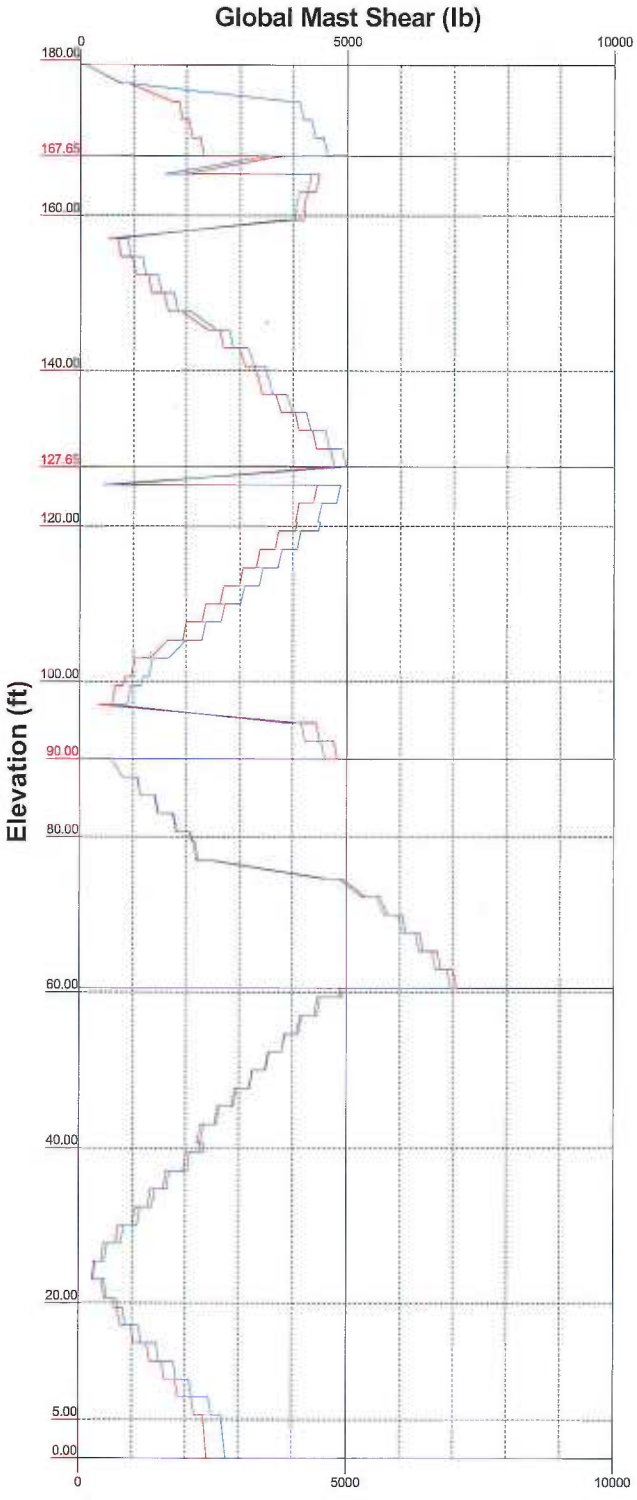
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***14234.000 - CT11029I***		
	Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
	Path: J:\Jobs\14000s\14029.00\WIP\2 - CT11029I\Backup Documentation\ERI\180-ft Guyed Lattice Tower_Madison_CT.eri		Dwg No. E-3

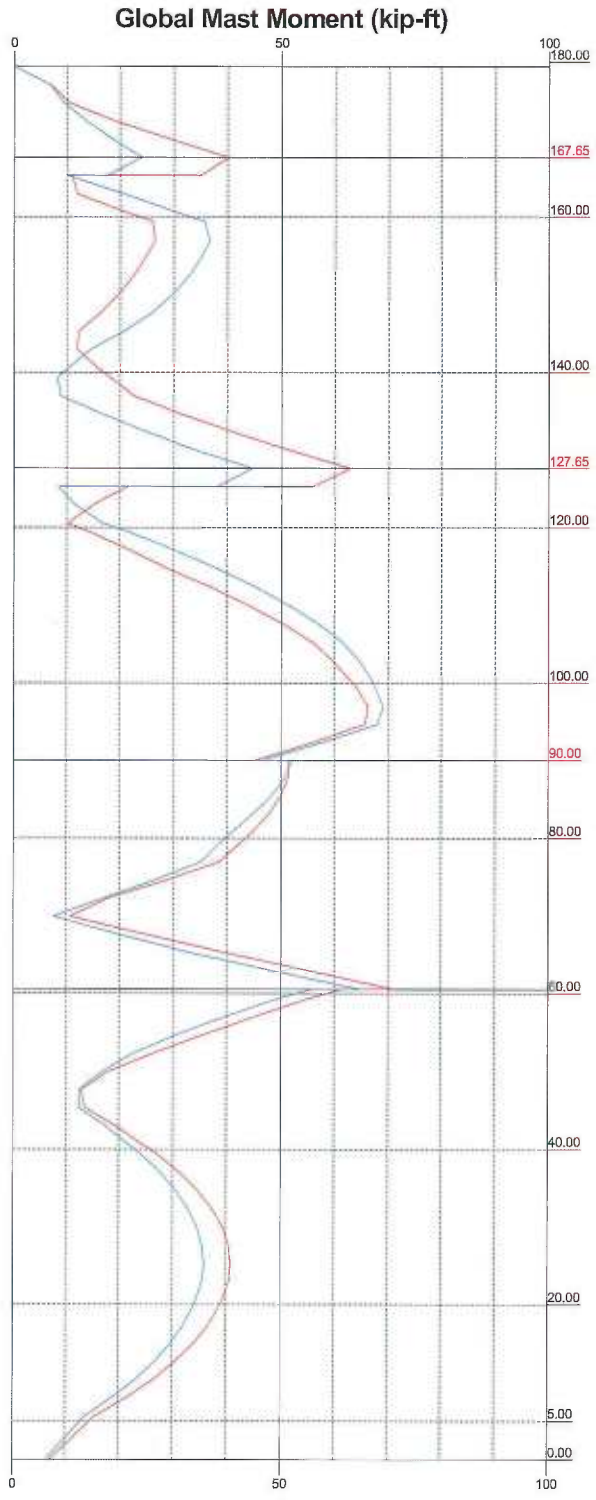
TIA/EIA-222-F - 85 mph/85 mph 0.5000 in Ice

Vx Vz

Maximum Values

Mx Mz

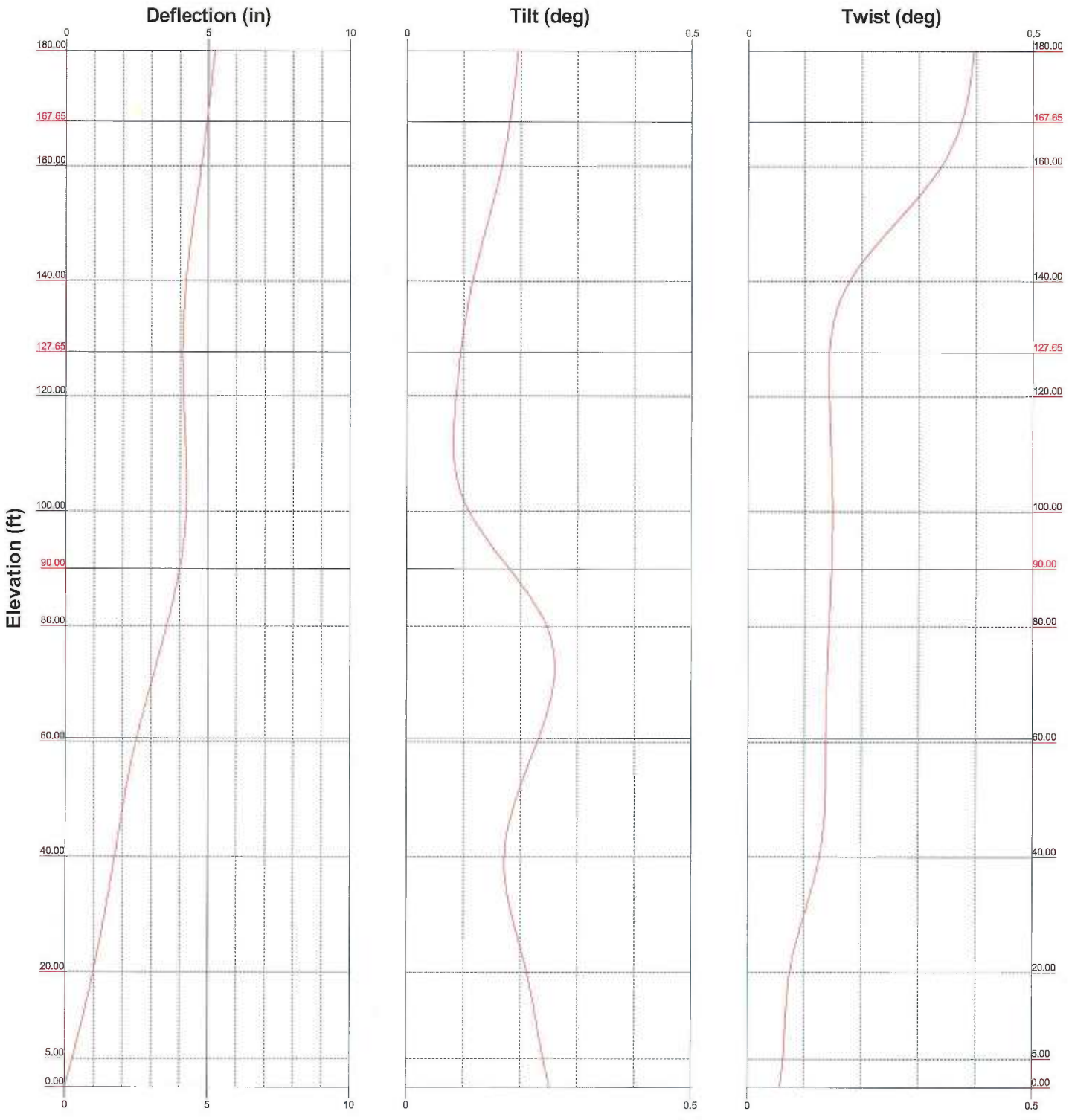




Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***14234.000 - CT11029I***	
	Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***	
	Client: T-Mobile	Drawn by: TJL / App'd:
	Code: TIA/EIA-222-F	Date: 11/13/14 / Scale: NTS
	Path:	Dwg No. E-4

TIA/EIA-222-F - Service - 85 mph

Maximum Values

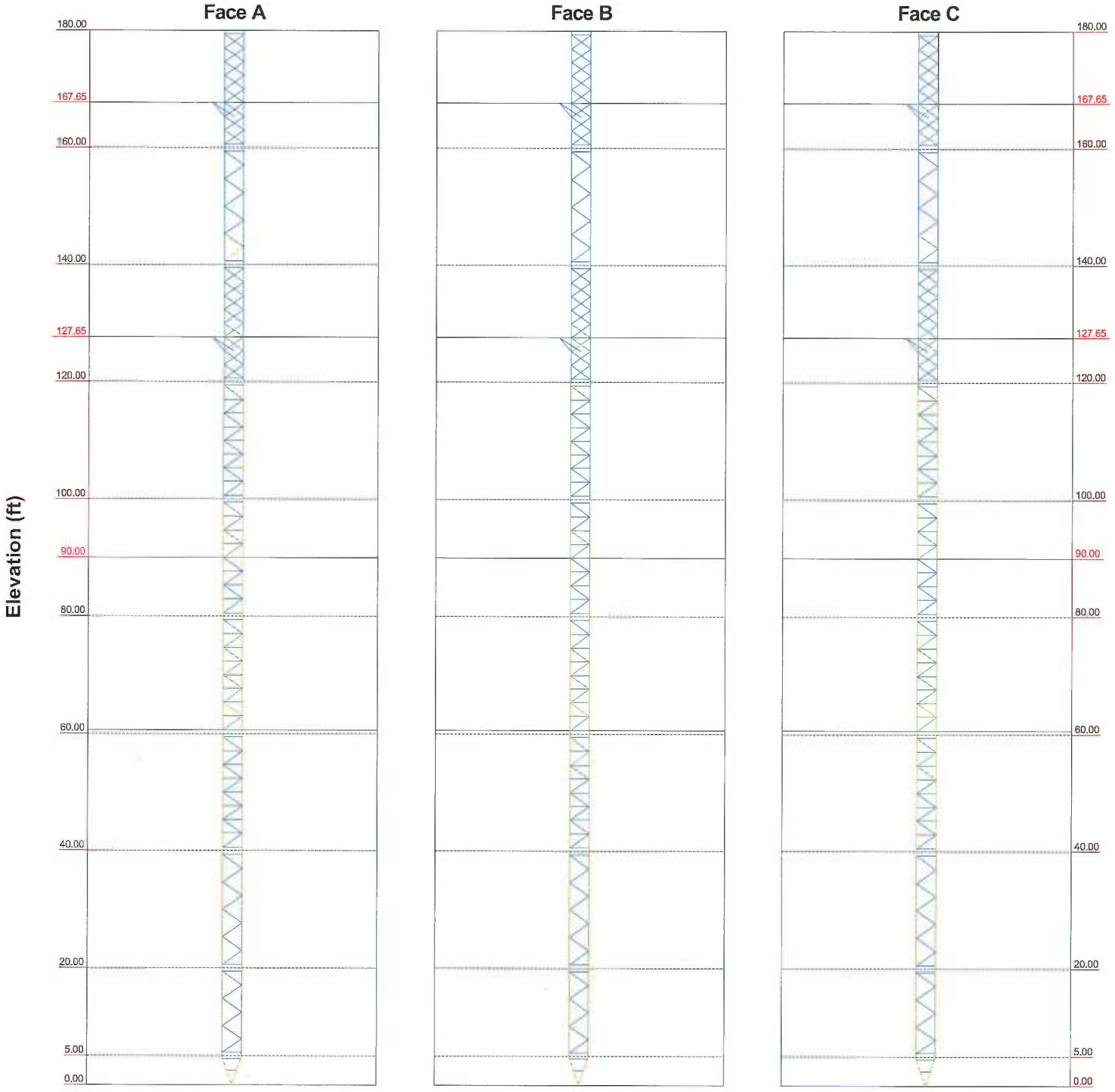


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***14234.000 - CT11029I***		
Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
Path: J:\Jobs\14000s\14029\CT11029I\Backup Documentation\ERI\180-ft Guyed Lattice Tower Madison, CT.eri		Dwg No. E-5

Stress Distribution Chart
0' - 180'

> 100% | 90%-100% | 75%-90% | 50%-75% | < 50% Overstress

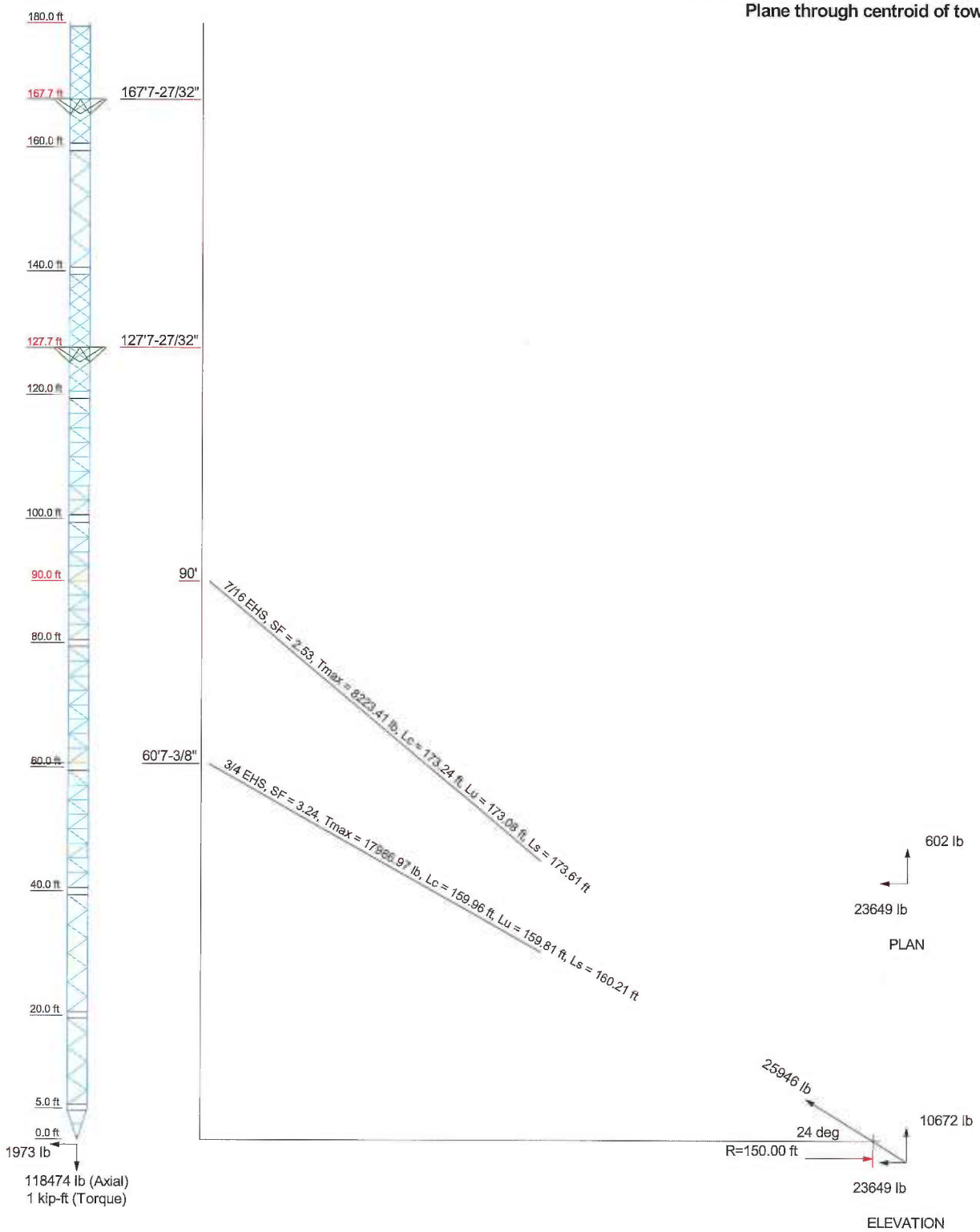


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***14234.000 - CT11029I***		
Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
Path: J:\Jobs\14\2500.W012 - CT11029I\Backup Documentation\ER\180 ft Guyed Lattice Tower_Madison_CT.er		Dwg No. E-8

Guy Tensions and Tower Reactions
TIA/EIA-222-F - 85 mph/85 mph 0.5000 in Ice

Maximum Values
Anchor 'A'@150 ft Azimuth 0 deg Elev 0 ft
Plane through centroid of tower

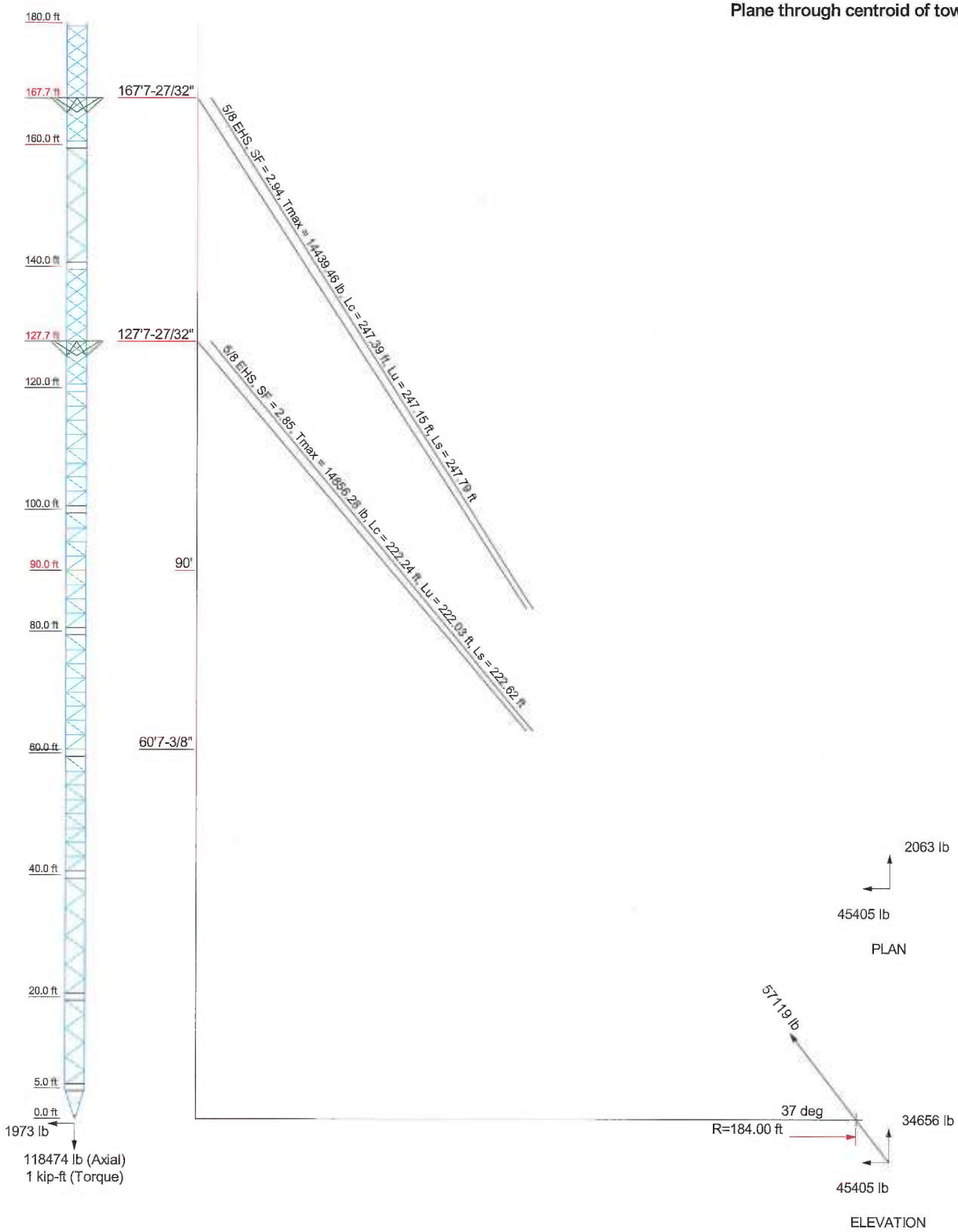


Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: **14234.000 - CT11029I**		
	Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
	Path: J:\Jobs\14025\01 WC\12 - CT11002I\Backup Documentation\ER\180 ft Guyed Lattice Tower_Madison, CT.eri		Dwg No. E-6

Guy Tensions and Tower Reactions

TIA/EIA-222-F - 85 mph/85 mph 0.5000 in Ice

Maximum Values
Anchor 'A'@184 ft Azimuth 0 deg Elev 0 ft
Plane through centroid of tower



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***14234.000 - CT11029I***		
	Project: ***180' Guyed Lattice Tower - 125 New Rd., Madison, CT***		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
	Path: J:\Jobs\14000s\00 WIP\12 - CT11029I\Backup Documents\tnx\ER\180-ft Guyed Lattice Tower_Madison_CT.eri		Dwg No. E-6

tnxTower	Job	Page
	14234.000 - CT11029I	1 of 63
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180' Guyed Lattice Tower - 125 New Rd., Madison, CT	**Date** 13:02:02 11/13/14
	Client T-Mobile	**Designed by** TJL

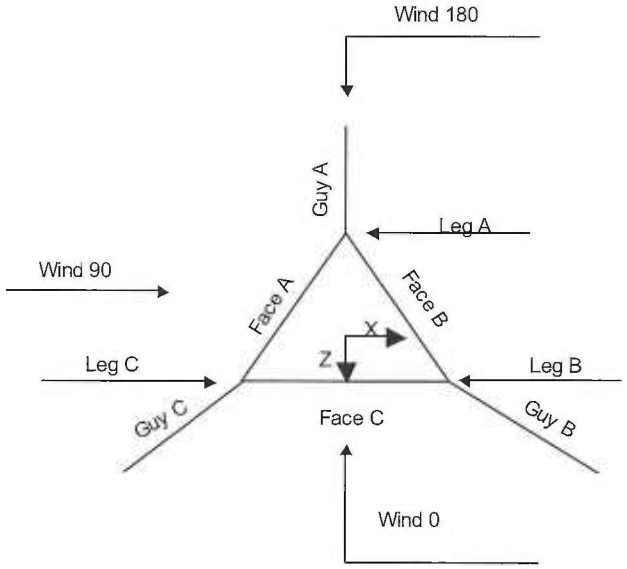
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.41 ft at the top and tapered at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

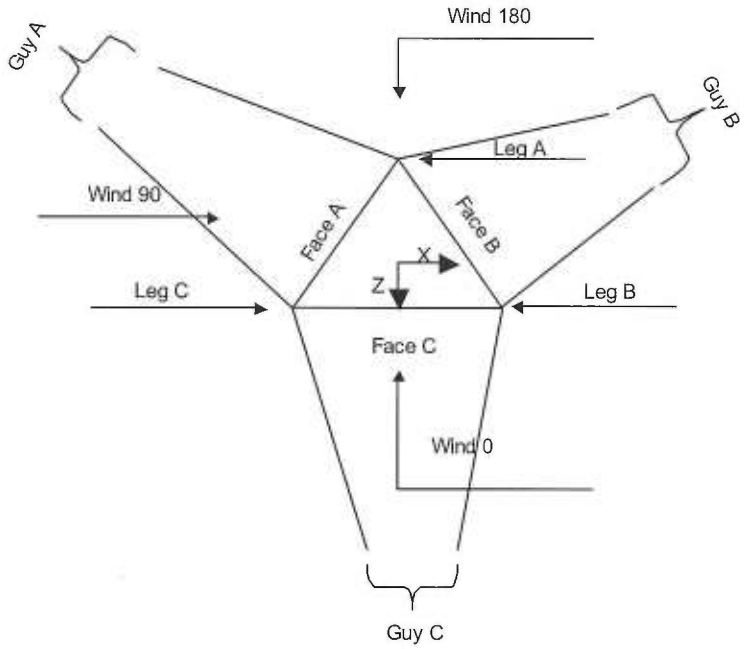
Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 85 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 85 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
Pressures are calculated at each section.
Safety factor used in guy design is 2.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	√ Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	√ SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		



Corner & Starmount Guyed Tower



Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00			3.41	1	20.00
T2	160.00-140.00			3.41	1	20.00
T3	140.00-120.00			3.41	1	20.00
T4	120.00-100.00			3.41	1	20.00
T5	100.00-80.00			3.41	1	20.00
T6	80.00-60.00			3.41	1	20.00
T7	60.00-40.00			3.41	1	20.00
T8	40.00-20.00			3.41	1	20.00
T9	20.00-5.00			3.41	1	15.00
T10	5.00-0.00			3.41	1	5.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.00-160.00	2.35	X Brace	No	Yes	7.3750	7.3750
T2	160.00-140.00	2.35	K Brace Left	No	Yes	7.3750	7.3750
T3	140.00-120.00	2.35	X Brace	No	Yes	7.3750	7.3750
T4	120.00-100.00	2.35	K Brace Left	No	Yes	7.3750	7.3750
T5	100.00-80.00	2.35	K Brace Left	No	Yes	7.3750	7.3750
T6	80.00-60.00	2.35	K Brace Left	No	Yes	7.3750	7.3750
T7	60.00-40.00	2.35	K Brace Left	No	Yes	7.3750	7.3750
T8	40.00-20.00	2.35	K Brace Left	No	No	7.3750	7.3750
T9	20.00-5.00	2.30	K Brace Left	No	Yes	7.3750	7.3750
T10	5.00-0.00	2.00	X Brace	No	Yes	6.0000	6.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 160.00-140.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-35 (35 ksi)
T3 140.00-120.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 120.00-100.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)
T5 100.00-80.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A53-B-35 (35 ksi)
T6 80.00-60.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)
T7 60.00-40.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)
T8 40.00-20.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-35 (35 ksi)
T9 20.00-5.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)
T10 5.00-0.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-35 (35 ksi)
T3 140.00-120.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 120.00-100.00	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)
T5 100.00-80.00	Pipe	ROHN TS1.5x16 ga	A36	Pipe	ROHN TS1.5x16 ga	A53-B-35

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T6 80.00-60.00	Equal Angle	L2 1/2x2 1/2x1/2	(36 ksi) A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	(35 ksi) A36 (36 ksi)
T7 60.00-40.00	Pipe	ROHN TS1.5x16 ga	(36 ksi) A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	(35 ksi) A53-B-35 (35 ksi)
T8 40.00-20.00	Pipe	ROHN TS1.5x16 ga	(36 ksi) A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	(35 ksi) A53-B-35 (35 ksi)
T9 20.00-5.00	Equal Angle	L2 1/2x2 1/2x1/2	(36 ksi) A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	(36 ksi) A36 (36 ksi)
T10 5.00-0.00	Channel	C12x20.7	(36 ksi) A36 (36 ksi)	Channel	C12x20.7	(36 ksi) A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T4 120.00-100.00	None	Flat Bar		(36 ksi) A36	Equal Angle	L2 1/2x2 1/2x1/2	(50 ksi) A572-50
T5 100.00-80.00	None	Flat Bar		(36 ksi) A36	Equal Angle	L2 1/2x2 1/2x1/2	(50 ksi) A572-50
T6 80.00-60.00	None	Channel		(36 ksi) A36	Solid Round	1	(50 ksi) A36
T7 60.00-40.00	None	Channel		(36 ksi) A36	Solid Round	1	(36 ksi) A36
T10 5.00-0.00	None	Channel		(36 ksi) A36 (36 ksi)	Channel	C12x20.7	(36 ksi) A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T8 40.00-20.00	0.00	0.0000	A36	1	1	1	Mid-Pt	36.0000

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
T9 20.00-5.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T10 5.00-0.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	Mid-Pt	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	K Single Diags X	K 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	No	1	1	1	1	1	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1
T9 20.00-5.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T10 5.00-0.00	Yes	No	1	1	1	1	1	1	1	1	1	1	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
180.00-160.00														
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
160.00-140.00														

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
T3 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 20.00-5.00	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
T10 5.00-0.00	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 180.00-160.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0
T5 100.00-80.00	Flange	0.7500 A325N	4	0.5000 A325X	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0
T6 80.00-60.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 60.00-40.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 40.00-20.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 20.00-5.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 5.00-0.00	Flange	0.7500 A325N	4	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %

167.654	EHS	A	5/8	4240.00	10%	21000	0.813	247.19	184.00	0.0000	0.00	100%
		B	5/8	4240.00	10%	21000	0.813	247.19	184.00	0.0000	0.00	100%
		C	5/8	4240.00	10%	21000	0.813	247.19	184.00	0.0000	0.00	100%
127.654	EHS	A	5/8	4240.00	10%	21000	0.813	222.06	184.00	0.0000	0.00	100%
		B	5/8	4240.00	10%	21000	0.813	222.06	184.00	0.0000	0.00	100%
		C	5/8	4240.00	10%	21000	0.813	222.06	184.00	0.0000	0.00	100%
60.6146	EHS	A	3/4	5830.00	10%	19000	1.155	159.82	150.00	0.0000	0.00	100%
		B	3/4	5830.00	10%	19000	1.155	164.27	154.80	0.0000	0.00	100%
		C	3/4	5830.00	10%	19000	1.155	170.23	161.20	0.0000	0.00	100%
90	EHS	A	7/16	2080.00	10%	21000	0.399	173.10	150.00	0.0000	0.00	100%
		B	7/16	2080.00	10%	21000	0.399	177.22	154.80	0.0000	0.00	100%
		C	7/16	2080.00	10%	21000	0.399	182.76	161.20	0.0000	0.00	100%

Guy Data(cont'd)

Guy Elevation *ft*	*Mount Type*	*Torque-Arm Spread* *ft*	*Torque-Arm Leg Angle* °	*Torque-Arm Style*	*Torque-Arm Grade*	*Torque-Arm Type*	*Torque-Arm Size*
167.654	Torque Arm	7.33	30.0000	Bat Ear	A53-B-35 (35 ksi)	Pipe	P4x.237 XP34.5x.03325
127.654	Torque Arm	7.33	30.0000	Bat Ear	A53-B-35 (35 ksi)	Pipe	P4x.237 XP34.5x.03325
60.6146	Corner						
90	Corner						

Guy Data (cont'd)

Guy Elevation *ft*	*Diagonal Grade*	*Diagonal Type*	*Upper Diagonal Size*	*Lower Diagonal Size*	*Is Strap.*	*Pull-Off Grade*	*Pull-Off Type*	*Pull-Off Size*
167.65	A572-50 (50 ksi)	Solid Round				A36 (36 ksi)	Solid Round	
127.65	A572-50 (50 ksi)	Solid Round				A36 (36 ksi)	Solid Round	
60.61	A572-50 (50 ksi)	Solid Round			Yes	A36 (36 ksi)	Flat Bar	4 1/2x3/8
90.00	A572-50 (50 ksi)	Solid Round			Yes	A36 (36 ksi)	Flat Bar	4 1/2x3/8

Guy Data (cont'd)

Guy Elevation *ft*	*Cable Weight A* *lb*	*Cable Weight B* *lb*	*Cable Weight C* *lb*	*Cable Weight D* *lb*	*Tower Intercept A* *ft*	*Tower Intercept B* *ft*	*Tower Intercept C* *ft*	*Tower Intercept D* *ft*
167.654	200.96	200.96	200.96		5.77 4.1 sec/pulse	5.77 4.1 sec/pulse	5.77 4.1 sec/pulse	
127.654	180.53	180.53	180.53		4.67 3.7 sec/pulse	4.67 3.7 sec/pulse	4.67 3.7 sec/pulse	

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
60.6146	184.59	189.73	196.61		2.52 2.7 sec/pulse	2.66 2.8 sec/pulse	2.86 2.9 sec/pulse	
90	69.07	70.71	72.92		2.85 2.9 sec/pulse	2.99 3.0 sec/pulse	3.18 3.1 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
167.654	No	No	1	1	1	1	1	1
127.654	No	No	1	1	1	1	1	1
60.6146	No	No			1	1	1	1
90	No	No			1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
167.654	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
127.654	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
60.6146	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	4	0.0000	1	0.0000 A325N	0	0.0000	1
90	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	4	0.0000	1	0.0000 A325N	0	0.0000	1

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
167.654	A	83.83	24	24	0.5000
	B	83.83	24	24	0.5000
	C	83.83	24	24	0.5000
127.654	A	63.83	22	22	0.5000
	B	63.83	22	22	0.5000
	C	63.83	22	22	0.5000
60.6146	A	30.31	18	18	0.5000
	B	30.31	18	18	0.5000
	C	30.31	18	18	0.5000
90	A	45.00	20	20	0.5000
	B	45.00	20	20	0.5000
	C	45.00	20	20	0.5000

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		lb	lb	lb	kip-ft	kip-ft	kip-ft
167.654	A	42.6630	4376.18 4240.00	-63.84	3019.87	-3166.59	-6.39	11.75	-11.07
	A	42.6630	4376.18 4240.00	63.84	3019.87	-3166.59	-6.39	-11.75	11.07
	B	42.6630	4376.18 4240.00	2774.27	3019.87	1528.01	12.79	11.75	0.00
	B	42.6630	4376.18 4240.00	2710.43	3019.87	1638.58	-6.39	-11.75	-11.07
	C	42.6630	4376.18 4240.00	-2710.43	3019.87	1638.58	-6.39	11.75	11.07
	C	42.6630	4376.18 4240.00	-2774.27	3019.87	1528.01	12.79	-11.75	0.00
			Sum:	0.00	18119.21	0.00	-0.00	0.00	0.00
127.654	A	35.0574	4343.69 4240.00	-70.80	2555.37	-3511.80	-5.41	13.03	-9.37
	A	35.0574	4343.69 4240.00	70.80	2555.37	-3511.80	-5.41	-13.03	9.37
	B	35.0574	4343.69 4240.00	3076.71	2555.37	1694.59	10.82	13.03	0.00
	B	35.0574	4343.69 4240.00	3005.91	2555.37	1817.21	-5.41	-13.03	-9.37
	C	35.0574	4343.69 4240.00	-3005.91	2555.37	1817.21	-5.41	13.03	9.37
	C	35.0574	4343.69 4240.00	-3076.71	2555.37	1694.59	10.82	-13.03	0.00
			Sum:	0.00	15332.21	0.00	-0.00	0.00	0.00
60.6146	A	22.2677	5899.95 5830.00	0.00	2314.65	-5426.95	-4.56	0.00	0.00
	B	21.6338	5899.95 5830.00	4720.84	2257.04	2725.58	2.22	0.00	-3.85
	C	20.8403	5899.95 5830.00	-4746.27	2184.77	2740.26	2.15	-0.00	3.73
			Sum:	**-25.43**	6756.46	**38.90**	**-0.18**	0.00	**-0.12**
90	A	31.2988	2115.88 2080.00	0.00	1124.38	-1792.41	-2.21	0.00	0.00
	B	30.4932	2115.88 2080.00	1565.37	1099.89	903.77	1.08	0.00	-1.88
	C	29.4758	2115.88 2080.00	-1581.48	1068.72	913.07	1.05	0.00	1.82
			Sum:	**-16.11**	3292.99	**24.43**	**-0.08**	0.00	**-0.05**

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		lb	lb	lb	kip-ft	kip-ft	kip-ft
167.654	A	42.6630	6214.82	-90.21	4311.60	-4475.03	-9.13	16.60	-15.81

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	kip-ft	kip-ft	kip-ft
			5963.53						
	A	42.6630	6214.82	90.21	4311.60	-4475.03	-9.13	-16.60	15.81
			5963.53						
	B	42.6630	6214.82	3920.60	4311.60	2159.39	18.25	16.60	0.00
			5963.53						
	B	42.6630	6214.82	3830.39	4311.60	2315.65	-9.13	-16.60	-15.81
			5963.53						
	C	42.6630	6214.82	-3830.39	4311.60	2315.65	-9.13	16.60	15.81
			5963.53						
	C	42.6630	6214.82	-3920.60	4311.60	2159.39	18.25	-16.60	0.00
			5963.53						
			Sum:	0.00	25869.62	0.00	-0.00	0.00	0.00
127.654	A	35.0574	6166.61	-100.13	3653.36	-4966.89	-7.73	18.42	-13.40
			5975.27						
	A	35.0574	6166.61	100.13	3653.36	-4966.89	-7.73	-18.42	13.40
			5975.27						
	B	35.0574	6166.61	4351.52	3653.36	2396.73	15.47	18.42	0.00
			5975.27						
	B	35.0574	6166.61	4251.39	3653.36	2570.16	-7.73	-18.42	-13.40
			5975.27						
	C	35.0574	6166.61	-4251.39	3653.36	2570.16	-7.73	18.42	13.40
			5975.27						
	C	35.0574	6166.61	-4351.52	3653.36	2396.73	15.47	-18.42	0.00
			5975.27						
			Sum:	0.00	21920.18	0.00	-0.00	0.00	0.00
60.6146	A	22.2677	8105.06	0.00	3202.43	-7445.57	-6.30	0.00	0.00
			7988.88						
	B	21.6338	8111.47	6481.96	3126.48	3742.36	3.08	0.00	-5.33
			7995.29						
	C	20.8403	8120.24	-6523.95	3031.36	3766.60	2.98	-0.00	5.17
			8004.06						
			Sum:	**-41.98**	9360.27	**63.40**	**-0.24**	0.00	**-0.16**
90	A	31.2988	3076.93	0.00	1659.70	-2590.93	-3.27	0.00	0.00
			2989.56						
	B	30.4932	3085.25	2268.93	1629.32	1309.97	1.60	0.00	-2.78
			2997.88						
	C	29.4758	3096.56	-2300.77	1590.80	1328.35	1.57	-0.00	2.71
			3009.19						
			Sum:	**-31.84**	4879.82	**47.39**	**-0.10**	0.00	**-0.07**

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	kip-ft	kip-ft	kip-ft
167.654	A	42.6630	4376.18	-63.84	3019.87	-3166.59	-6.39	11.75	-11.07
			4240.00						
	A	42.6630	4376.18	63.84	3019.87	-3166.59	-6.39	-11.75	11.07
			4240.00						
	B	42.6630	4376.18	2774.27	3019.87	1528.01	12.79	11.75	0.00
			4240.00						
	B	42.6630	4376.18	2710.43	3019.87	1638.58	-6.39	-11.75	-11.07

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	kip-ft	kip-ft	kip-ft
			4240.00						
	C	42.6630	4376.18	-2710.43	3019.87	1638.58	-6.39	11.75	11.07
			4240.00						
	C	42.6630	4376.18	-2774.27	3019.87	1528.01	12.79	-11.75	0.00
			4240.00						
			Sum:	0.00	18119.21	0.00	-0.00	0.00	0.00
127.654	A	35.0574	4343.69	-70.80	2555.37	-3511.80	-5.41	13.03	-9.37
			4240.00						
	A	35.0574	4343.69	70.80	2555.37	-3511.80	-5.41	-13.03	9.37
			4240.00						
	B	35.0574	4343.69	3076.71	2555.37	1694.59	10.82	13.03	0.00
			4240.00						
	B	35.0574	4343.69	3005.91	2555.37	1817.21	-5.41	-13.03	-9.37
			4240.00						
	C	35.0574	4343.69	-3005.91	2555.37	1817.21	-5.41	13.03	9.37
			4240.00						
	C	35.0574	4343.69	-3076.71	2555.37	1694.59	10.82	-13.03	0.00
			4240.00						
			Sum:	0.00	15332.21	0.00	-0.00	0.00	0.00
60.6146	A	22.2677	5899.95	0.00	2314.65	-5426.95	-4.56	0.00	0.00
			5830.00						
	B	21.6338	5899.95	4720.84	2257.04	2725.58	2.22	0.00	-3.85
			5830.00						
	C	20.8403	5899.95	-4746.27	2184.77	2740.26	2.15	-0.00	3.73
			5830.00						
			Sum:	**-25.43**	6756.46	**38.90**	**-0.18**	0.00	**-0.12**
90	A	31.2988	2115.88	0.00	1124.38	-1792.41	-2.21	0.00	0.00
			2080.00						
	B	30.4932	2115.88	1565.37	1099.89	903.77	1.08	0.00	-1.88
			2080.00						
	C	29.4758	2115.88	-1581.48	1068.72	913.07	1.05	0.00	1.82
			2080.00						
			Sum:	**-16.11**	3292.99	**24.43**	**-0.08**	0.00	**-0.05**

Guy-Tensioning Information

Guy Elevation		H	V	Temperature At Time Of Tensioning: 0 F Initial Tension	0 F Intercept	20 F Initial Tension	20 F Intercept	40 F Initial Tension	40 F Intercept	60 F Initial Tension	60 F Intercept	80 F Initial Tension	80 F Intercept	100 F Initial Tension	100 F Intercept	120 F Initial Tension	120 F Intercept
ft		ft	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft
167.654	A	181.92	167.65	5204	4.71	4878	5.03	4556	5.38	4240	5.77	3931	6.22	3631	6.72	3341	7.30
	B	181.92	167.65	5204	4.71	4878	5.03	4556	5.38	4240	5.77	3931	6.22	3631	6.72	3341	7.30
	C	181.92	167.65	5204	4.71	4878	5.03	4556	5.38	4240	5.77	3931	6.22	3631	6.72	3341	7.30
127.654	A	181.92	127.65	5439	3.65	5033	3.94	4632	4.28	4240	4.67	3859	5.13	3492	5.66	3143	6.28
	B	181.92	127.65	5439	3.65	5033	3.94	4632	4.28	4240	4.67	3859	5.13	3492	5.66	3143	6.28
	C	181.92	127.65	5439	3.65	5033	3.94	4632	4.28	4240	4.67	3859	5.13	3492	5.66	3143	6.28
60.6146	A	148.03	60.61	7863	1.87	7176	2.05	6497	2.26	5830	2.52	5179	2.83	4551	3.22	3958	3.70
	B	152.83	60.61	7875	1.97	7183	2.16	6501	2.39	5830	2.66	5177	2.99	4548	3.40	3957	3.91
	C	159.23	60.61	7888	2.11	7192	2.32	6504	2.56	5830	2.86	5175	3.22	4546	3.66	3957	4.20
90	A	148.03	90.00	2738	2.17	2516	2.36	2296	2.58	2080	2.85	1868	3.17	1663	3.56	1468	4.03
	B	152.83	90.00	2748	2.27	2522	2.47	2299	2.71	2080	2.99	1866	3.33	1659	3.74	1463	4.24
	C	159.23	90.00	2759	2.40	2529	2.62	2303	2.87	2080	3.18	1863	3.55	1654	3.99	1457	4.52

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
LDF5-50A (7/8 FOAM) (NU)	C	Yes	Ar (CfAe)	141.00 - 5.00	0.0000	-0.32	2	1	0.5000 1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (NU)	C	Yes	Ar (CfAe)	147.00 - 5.00	0.0000	-0.45	2	2	0.5000 1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (AT&T)	A	Yes	Ar (CfAe)	77.00 - 5.00	0.0000	0.2	6	2	0.5000	1.0900		0.33
LDF4-50A (1/2 FOAM) (Sprint - GPS)	C	Yes	Ar (CfAe)	88.00 - 5.00	0.0000	-0.35	1	1	0.6300	0.6300		0.15
EW63 (NU)	B	Yes	Ar (CfAe)	175.00 - 5.00	0.0000	-0.43	1	1	1.5742	1.5742		0.51
LDF4-50A (1/2 FOAM) (NU)	B	Yes	Ar (CfAe)	141.00 - 5.00	0.0000	0.43	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM) (NU)	B	Yes	Ar (CfAe)	105.00 - 5.00	0.0000	0.48	1	1	1.0900	1.0900		0.33
LDF7-50A (1-5/8 FOAM) (NU)	B	Yes	Ar (CfAe)	180.00 - 5.00	0.0000	-0.36	1	1	1.9800	1.9800		0.82
LCF158-50J (1 5/8 FOAM) (T-Mobile)	A	Yes	Ar (CfAe)	159.00 - 5.00	0.0000	-0.22	6	3	0.5000	2.0100		0.92
LDF5-50A (7/8 FOAM) (NU)	A	Yes	Ar (CfAe)	180.00 - 5.00	0.0000	0.48	1	1	0.5000 1.0900	1.0900		0.33
RG6-Fiber (AT&T)	A	Yes	Ar (CfAe)	77.00 - 5.00	5.0000	0.2	1	1	0.0000	0.6250		0.50
#8 AWG Copper WIre (AT&T)	A	Yes	Ar (CfAe)	77.00 - 5.00	5.0000	0.22	2	1	0.0000	0.3400		0.05
HYBRIFLEX 1-1/4" (Sprint)	C	Yes	Ar (CfAe)	126.00 - 5.00	0.0000	0	3	3	1.5400	1.5400		1.30
HYBRIFLEX 1-5/8" (T-Mobile - Existing)	A	Yes	Ar (CfAe)	159.00 - 5.00	0.0000	-0.35	1	1	1.0000	1.9800		1.90
C4006L-NFN F (T-Mobile - Existing)	A	Yes	Ar (CfAe)	159.00 - 5.00	2.0000	-0.35	1	1	1.2800	1.2800		0.56
HYBRIFLEX 1-5/8" (Verizon - Proposed)	B	Yes	Ar (CfAe)	95.00 - 5.00	0.0000	0.32	2	2	1.0000	1.9800		1.90
LDF4P-50A (1/2 FOAM) (NU)	A	Yes	Ar (CfAe)	180.00 - 5.00	0.0000	0.45	1	1	0.6300	0.6300		0.15
LDF6-50A (1-1/4 FOAM) (NU)	A	Yes	Ar (CfAe)	180.00 - 5.00	0.0000	0.38	2	2	1.0000	1.5500		0.66

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	180.00-160.00	A	8.033	0.000	0.000	0.000	36.00
		B	5.268	0.000	0.000	0.000	24.05
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	22.743	0.000	0.000	0.000	187.64
		B	5.976	0.000	0.000	0.000	26.75
		C	1.363	0.000	0.000	0.000	5.28
T3	140.00-120.00	A	23.517	0.000	0.000	0.000	195.62
		B	6.974	0.000	0.000	0.000	29.60
		C	7.760	0.000	0.000	0.000	49.80
T4	120.00-100.00	A	23.517	0.000	0.000	0.000	195.62
		B	7.428	0.000	0.000	0.000	31.25
		C	13.150	0.000	0.000	0.000	104.40
T5	100.00-80.00	A	23.517	0.000	0.000	0.000	195.62
		B	13.740	0.000	0.000	0.000	93.20
		C	13.570	0.000	0.000	0.000	105.60
T6	80.00-60.00	A	27.972	0.000	0.000	0.000	239.48
		B	15.390	0.000	0.000	0.000	112.20
		C	14.200	0.000	0.000	0.000	107.40
T7	60.00-40.00	A	28.758	0.000	0.000	0.000	247.22
		B	15.390	0.000	0.000	0.000	112.20
		C	14.200	0.000	0.000	0.000	107.40
T8	40.00-20.00	A	28.758	0.000	0.000	0.000	247.22
		B	15.390	0.000	0.000	0.000	112.20
		C	14.200	0.000	0.000	0.000	107.40
T9	20.00-5.00	A	21.569	0.000	0.000	0.000	185.41
		B	11.543	0.000	0.000	0.000	84.15
		C	10.650	0.000	0.000	0.000	80.55
T10	5.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	180.00-160.00	A	0.500	10.450	4.250	0.000	0.000	130.18
		B		8.184	0.000	0.000	0.000	73.35
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.500	23.544	12.198	0.000	0.000	503.74
		B		9.393	0.000	0.000	0.000	83.08
		C		1.393	0.927	0.000	0.000	20.53
T3	140.00-120.00	A	0.500	24.233	12.617	0.000	0.000	523.40
		B		11.974	0.000	0.000	0.000	99.05
		C		10.777	2.650	0.000	0.000	149.10
T4	120.00-100.00	A	0.500	24.233	12.617	0.000	0.000	523.40
		B		12.845	0.000	0.000	0.000	105.55
		C		19.667	2.650	0.000	0.000	256.04
T5	100.00-80.00	A	0.500	24.233	12.617	0.000	0.000	523.40
		B		19.182	3.725	0.000	0.000	238.64
		C		20.753	2.650	0.000	0.000	262.76
T6	80.00-60.00	A	0.500	31.395	14.869	0.000	0.000	681.39
		B		20.424	4.967	0.000	0.000	276.49
		C		22.383	2.650	0.000	0.000	272.84

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T7	60.00-40.00	A	0.500	32.658	15.267	0.000	0.000	709.27
		B		20.424	4.967	0.000	0.000	276.49
		C		22.383	2.650	0.000	0.000	272.84
T8	40.00-20.00	A	0.500	32.658	15.267	0.000	0.000	709.27
		B		20.424	4.967	0.000	0.000	276.49
		C		22.383	2.650	0.000	0.000	272.84
T9	20.00-5.00	A	0.500	24.494	11.450	0.000	0.000	531.95
		B		15.318	3.725	0.000	0.000	207.37
		C		16.788	1.987	0.000	0.000	204.63
T10	5.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	180.00-160.00	A	0.000	1.312	1.255	2.296
		B	0.000	0.731	0.823	1.278
		C	0.000	0.000	0.000	0.000
T2	160.00-140.00	A	1.665	4.360	0.000	0.000
		B	0.437	1.146	0.000	0.000
		C	0.100	0.283	0.000	0.000
T3	140.00-120.00	A	0.000	3.289	4.198	6.578
		B	0.000	1.069	1.245	2.137
		C	0.000	1.198	1.385	2.397
T4	120.00-100.00	A	0.000	2.873	4.584	7.182
		B	0.000	1.001	1.448	2.503
		C	0.000	1.740	2.563	4.350
T5	100.00-80.00	A	0.294	3.487	4.535	7.105
		B	0.172	2.168	2.649	4.417
		C	0.170	2.215	2.617	4.513
T6	80.00-60.00	A	0.816	5.149	3.937	6.511
		B	0.449	2.826	2.166	3.573
		C	0.414	2.786	1.998	3.523
T7	60.00-40.00	A	1.198	5.733	2.909	4.848
		B	0.641	3.037	1.557	2.568
		C	0.592	2.995	1.436	2.532
T8	40.00-20.00	A	2.105	5.846	0.000	0.000
		B	1.126	3.097	0.000	0.000
		C	1.039	3.054	0.000	0.000
T9	20.00-5.00	A	0.000	1.844	2.766	4.609
		B	0.000	0.977	1.480	2.442
		C	0.000	0.963	1.366	2.407
T10	5.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	180.00-160.00	-0.0324	-3.3049	0.0715	-2.6571
T2	160.00-140.00	-3.0488	-3.0619	-2.1212	-2.8380
T3	140.00-120.00	-1.3985	-1.2266	-0.7497	-1.0298
T4	120.00-100.00	-1.1992	-0.5388	-0.6117	-0.3488
T5	100.00-80.00	-0.2178	-0.1727	-0.0514	-0.0705
T6	80.00-60.00	-0.2341	-0.5559	-0.1193	-0.3634
T7	60.00-40.00	-0.3043	-0.6829	-0.1660	-0.4729
T8	40.00-20.00	-0.3603	-0.8084	-0.1755	-0.6182
T9	20.00-5.00	-0.3152	-0.7073	-0.1698	-0.5315
T10	5.00-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
GPS	B	From Leg	3.50	0.0000	88.00	No Ice	1.00	1.00	10.00
(Sprint)			0.00			1/2" Ice	1.50	1.50	15.00
			0.00						
3' GPS Stand-off Mount	B	From Leg	1.50	0.0000	88.00	No Ice	2.45	2.45	51.00
(Sprint)			0.00			1/2" Ice	3.98	3.98	75.00
			0.00						
APXVSPP18-C-A20 w/	A	From Leg	3.00	0.0000	126.00	No Ice	8.96	8.08	117.64
Mount			0.00			1/2" Ice	9.66	9.14	197.65
(Sprint)			0.00						
APXVSPP18-C-A20 w/	B	From Leg	3.00	0.0000	126.00	No Ice	8.96	8.08	117.64
Mount			0.00			1/2" Ice	9.66	9.14	197.65
(Sprint)			0.00						
APXVSPP18-C-A20 w/	C	From Leg	3.00	0.0000	126.00	No Ice	8.96	8.08	117.64
Mount			0.00			1/2" Ice	9.66	9.14	197.65
(Sprint)			0.00						
FD-RRH 2x50 800	A	From Leg	3.00	0.0000	126.00	No Ice	2.40	2.25	64.00
(Sprint)			0.00			1/2" Ice	2.61	2.46	86.12
			0.00						
FD-RRH 2x50 800	B	From Leg	3.00	0.0000	126.00	No Ice	2.40	2.25	64.00
(Sprint)			0.00			1/2" Ice	2.61	2.46	86.12
			0.00						
FD-RRH 2x50 800	C	From Leg	3.00	0.0000	126.00	No Ice	2.40	2.25	64.00
(Sprint)			0.00			1/2" Ice	2.61	2.46	86.12
			0.00						
FD-RRH 4x45 1900	A	From Leg	3.00	0.0000	126.00	No Ice	2.71	2.78	60.00
(Sprint)			0.00			1/2" Ice	2.94	3.02	83.97
			0.00						
FD-RRH 4x45 1900	B	From Leg	3.00	0.0000	126.00	No Ice	2.71	2.78	60.00
(Sprint)			0.00			1/2" Ice	2.94	3.02	83.97
			0.00						
FD-RRH 4x45 1900	C	From Leg	3.00	0.0000	126.00	No Ice	2.71	2.78	60.00
(Sprint)			0.00			1/2" Ice	2.94	3.02	83.97
			0.00						
Rohn 6' x 12' Boom Gate (1)	A	From Leg	2.00	0.0000	126.00	No Ice	16.60	16.60	560.00
(Sprint - Existing)			0.00			1/2" Ice	19.80	19.80	700.00
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Rohn 6' x 12' Boom Gate (1)	B	From Leg	2.00	0.0000	126.00	No Ice	16.60	16.60	560.00
(Sprint - Existing)			0.00			1/2" Ice	19.80	19.80	700.00
			0.00						
Rohn 6' x 12' Boom Gate (1)	C	From Leg	2.00	0.0000	126.00	No Ice	16.60	16.60	560.00
(Sprint - Existing)			0.00			1/2" Ice	19.80	19.80	700.00
			0.00						
10' x 3" Dia Omni	C	From Leg	2.00	0.0000	105.00	No Ice	3.00	3.00	30.00
(NEU)			0.00			1/2" Ice	4.03	4.03	51.79
			5.00						
Sabre 2' Sidearm	C	From Leg	1.00	0.0000	105.00	No Ice	3.90	3.90	87.00
(NEU)			0.00			1/2" Ice	4.40	4.40	97.00
			0.00						
1.5"x2'omni	A	From Leg	3.00	0.0000	143.00	No Ice	0.25	0.25	8.00
(NEU)			0.00			1/2" Ice	0.38	0.38	10.60
			1.00						
1.5"x2'omni	A	From Leg	3.00	0.0000	141.00	No Ice	0.25	0.25	8.00
(NEU)			0.00			1/2" Ice	0.38	0.38	10.60
			-1.00						
2-ft Stand Off	A	From Leg	1.00	0.0000	142.00	No Ice	1.07	1.07	20.00
(NEU)			0.00			1/2" Ice	1.62	1.62	28.00
			0.00						
3"x20-ft Omni	C	From Leg	3.00	0.0000	147.00	No Ice	3.56	3.56	23.00
(NEU)			0.00			1/2" Ice	7.13	7.13	46.00
			0.00						
3-ft Side Arm	C	From Leg	1.50	0.0000	137.00	No Ice	0.66	0.66	15.00
(NEU)			0.00			1/2" Ice	1.14	1.14	28.00
			0.00						
20-ft x 1.9in Support Pipe	C	From Leg	1.50	0.0000	147.00	No Ice	3.80	3.80	54.40
(NEU)			0.00			1/2" Ice	5.82	5.82	83.84
			0.00						
20' x 2" Dia Omni	A	From Leg	0.00	0.0000	179.00	No Ice	4.00	4.00	20.00
(NEU)			0.00			1/2" Ice	6.03	6.03	50.77
			10.00						
14' x 3" Dia Omni	B	From Leg	0.00	0.0000	179.00	No Ice	4.20	4.20	40.00
(NEU)			0.00			1/2" Ice	5.63	5.63	70.34
			7.00						
20' x 2" Dia Omni	C	From Leg	0.00	0.0000	179.00	No Ice	4.00	4.00	20.00
(NEU)			0.00			1/2" Ice	6.03	6.03	50.77
			10.00						
AM-X-CD-14-65-00TT-RET	A	From Face	3.00	0.0000	77.00	No Ice	5.51	2.83	36.40
(AT&T)			-4.00			1/2" Ice	5.90	3.14	68.35
			0.00						
AM-X-CD-14-65-00TT-RET	B	From Face	3.00	0.0000	77.00	No Ice	5.51	2.83	36.40
(AT&T)			-4.00			1/2" Ice	5.90	3.14	68.35
			0.00						
AM-X-CD-14-65-00TT-RET	C	From Face	3.00	0.0000	77.00	No Ice	5.51	2.83	36.40
(AT&T)			-4.00			1/2" Ice	5.90	3.14	68.35
			0.00						
7770.00	A	From Face	3.00	0.0000	77.00	No Ice	5.88	2.93	35.00
(AT&T)			4.00			1/2" Ice	6.31	3.27	67.63
			0.00						
7770.00	B	From Face	3.00	0.0000	77.00	No Ice	5.88	2.93	35.00
(AT&T)			4.00			1/2" Ice	6.31	3.27	67.63
			0.00						
7770.00	C	From Face	3.00	0.0000	77.00	No Ice	5.88	2.93	35.00
(AT&T)			4.00			1/2" Ice	6.31	3.27	67.63
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) LPG21401 TMA (AT&T)	A	From Face	3.00 4.00 0.00	0.0000	77.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
(2) LPG21401 TMA (AT&T)	B	From Face	3.00 4.00 0.00	0.0000	77.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
(2) LPG21401 TMA (AT&T)	C	From Face	3.00 4.00 0.00	0.0000	77.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
(2) RRUS-11 (AT&T)	A	From Face	3.00 0.00 0.00	0.0000	73.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) RRUS-11 (AT&T)	B	From Face	3.00 0.00 0.00	0.0000	73.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) RRUS-11 (AT&T)	C	From Face	3.00 0.00 0.00	0.0000	73.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
DC6-48-60-18-8F Surge Arrestor (AT&T)	C	From Leg	1.00 0.00 0.00	0.0000	72.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	20.00 39.36
Valmont T-Arm (1) (AT&T)	A	From Leg	2.00 0.00 0.00	0.0000	77.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	336.00 412.00
Valmont T-Arm (1) (AT&T)	B	From Leg	2.00 0.00 0.00	0.0000	77.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	336.00 412.00
Valmont T-Arm (1) (AT&T)	C	From Leg	2.00 0.00 0.00	0.0000	77.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	336.00 412.00
AIR21 (T-Mobile - Existing)	A	From Leg	2.00 -2.00 0.00	0.0000	159.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
AIR21 (T-Mobile - Existing)	A	From Leg	2.00 2.00 0.00	0.0000	159.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
AIR21 (T-Mobile - Existing)	B	From Leg	2.00 -2.00 0.00	0.0000	159.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
AIR21 (T-Mobile - Existing)	B	From Leg	2.00 2.00 0.00	0.0000	159.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
AIR21 (T-Mobile - Existing)	C	From Leg	2.00 -2.00 0.00	0.0000	159.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
AIR21 (T-Mobile - Existing)	C	From Leg	2.00 2.00 0.00	0.0000	159.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
KRY 112 TMA (T-Mobile - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	25.00 31.29
KRY 112 TMA (T-Mobile - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	25.00 31.29
KRY 112 TMA (T-Mobile - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	25.00 31.29

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
LNX-6515DS	A	From Leg	3.00	0.0000	95.00	No Ice	11.45	7.70	55.00
(Verizon - Proposed)			-6.00			1/2" Ice	12.06	8.29	120.87
			0.00						
HBX-6517DS	A	From Leg	3.00	0.0000	95.00	No Ice	5.24	3.30	14.00
(Verizon - Proposed)			-4.00			1/2" Ice	5.71	3.75	41.26
			0.00						
LNX-6515DS	A	From Leg	3.00	0.0000	95.00	No Ice	11.45	7.70	55.00
(Verizon - Proposed)			0.00			1/2" Ice	12.06	8.29	120.87
			0.00						
HBX-6517DS	A	From Leg	3.00	0.0000	95.00	No Ice	5.24	3.30	14.00
(Verizon - Proposed)			4.00			1/2" Ice	5.71	3.75	41.26
			0.00						
LNX-6514DS-VTM	B	From Leg	3.00	0.0000	95.00	No Ice	8.41	5.41	39.00
(Verizon - Proposed)			-6.00			1/2" Ice	8.96	5.86	89.51
			0.00						
HBX-6517DS	B	From Leg	3.00	0.0000	95.00	No Ice	5.24	3.30	14.00
(Verizon - Proposed)			-4.00			1/2" Ice	5.71	3.75	41.26
			0.00						
LNX-6514DS-VTM	B	From Leg	3.00	0.0000	95.00	No Ice	8.41	5.41	39.00
(Verizon - Proposed)			0.00			1/2" Ice	8.96	5.86	89.51
			0.00						
HBX-6517DS	B	From Leg	3.00	0.0000	95.00	No Ice	5.24	3.30	14.00
(Verizon - Proposed)			4.00			1/2" Ice	5.71	3.75	41.26
			0.00						
LNX-6514DS-VTM	C	From Leg	3.00	0.0000	95.00	No Ice	8.41	5.41	39.00
(Verizon - Proposed)			-6.00			1/2" Ice	8.96	5.86	89.51
			0.00						
HBX-6517DS	C	From Leg	3.00	0.0000	95.00	No Ice	5.24	3.30	14.00
(Verizon - Proposed)			-4.00			1/2" Ice	5.71	3.75	41.26
			0.00						
LNX-6514DS-VTM	C	From Leg	3.00	0.0000	95.00	No Ice	8.41	5.41	39.00
(Verizon - Proposed)			0.00			1/2" Ice	8.96	5.86	89.51
			0.00						
HBX-6517DS	C	From Leg	3.00	0.0000	95.00	No Ice	5.24	3.30	14.00
(Verizon - Proposed)			4.00			1/2" Ice	5.71	3.75	41.26
			0.00						
RRH2x40-07-U	A	From Leg	3.00	0.0000	95.00	No Ice	0.00	1.23	50.00
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.39	66.85
			0.00						
RRH2x40-07-U	B	From Leg	3.00	0.0000	95.00	No Ice	0.00	1.23	50.00
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.39	66.85
			0.00						
RRH2x40-07-U	C	From Leg	3.00	0.0000	95.00	No Ice	0.00	1.23	50.00
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.39	66.85
			0.00						
RRH2x60-AWS	A	From Leg	3.00	0.0000	95.00	No Ice	0.00	1.43	50.00
(Verizon - Proposed)			4.00			1/2" Ice	0.00	1.61	66.02
			0.00						
RRH2x60-AWS	B	From Leg	3.00	0.0000	95.00	No Ice	0.00	1.43	50.00
(Verizon - Proposed)			4.00			1/2" Ice	0.00	1.61	66.02
			0.00						
RRH2x60-AWS	C	From Leg	3.00	0.0000	95.00	No Ice	0.00	1.43	50.00
(Verizon - Proposed)			4.00			1/2" Ice	0.00	1.61	66.02
			0.00						
RRH2x60-PCS	A	From Leg	3.00	0.0000	95.00	No Ice	2.58	2.03	63.00
(Verizon - Proposed)			-4.00			1/2" Ice	2.80	2.24	83.48
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
RRH2x60-PCS	B	From Leg	3.00	0.0000	95.00	No Ice	2.58	2.03	63.00
(Verizon - Proposed)			-4.00			1/2" Ice	2.80	2.24	83.48
			0.00						
RRH2x60-PCS	C	From Leg	3.00	0.0000	95.00	No Ice	2.58	2.03	63.00
(Verizon - Proposed)			-4.00			1/2" Ice	2.80	2.24	83.48
			0.00						
DB-T1-6Z-8AB-0Z	A	From Leg	3.00	0.0000	95.00	No Ice	5.60	2.33	44.00
(Verizon - Proposed)			0.00			1/2" Ice	5.92	2.56	80.13
			0.00						
DB-T1-6Z-8AB-0Z	B	From Leg	3.00	0.0000	95.00	No Ice	5.60	2.33	44.00
(Verizon - Proposed)			0.00			1/2" Ice	5.92	2.56	80.13
			0.00						
Pirod 12' T-Frame Sector	A	From Leg	1.00	0.0000	95.00	No Ice	13.60	13.60	465.00
Mount (1)			0.00			1/2" Ice	18.40	18.40	600.00
(Verizon - Proposed)			0.00						
Pirod 12' T-Frame Sector	B	From Leg	1.00	0.0000	95.00	No Ice	13.60	13.60	465.00
Mount (1)			0.00			1/2" Ice	18.40	18.40	600.00
(Verizon - Proposed)			0.00						
Pirod 12' T-Frame Sector	C	From Leg	1.00	0.0000	95.00	No Ice	13.60	13.60	465.00
Mount (1)			0.00			1/2" Ice	18.40	18.40	600.00
(Verizon - Proposed)			0.00						
Pirod 12' T-Frame Sector	A	From Leg	1.00	0.0000	159.00	No Ice	13.60	13.60	465.00
Mount (1)			0.00			1/2" Ice	18.40	18.40	600.00
(T-Mobile - Proposed)			0.00						
Pirod 12' T-Frame Sector	B	From Leg	1.00	0.0000	159.00	No Ice	13.60	13.60	465.00
Mount (1)			0.00			1/2" Ice	18.40	18.40	600.00
(T-Mobile - Proposed)			0.00						
Pirod 12' T-Frame Sector	C	From Leg	1.00	0.0000	159.00	No Ice	13.60	13.60	465.00
Mount (1)			0.00			1/2" Ice	18.40	18.40	600.00
(T-Mobile - Proposed)			0.00						
LNX-6515DS	A	From Leg	2.00	0.0000	159.00	No Ice	11.45	7.70	55.00
(T-Mobile - Proposed)			-2.00			1/2" Ice	12.06	8.29	120.87
			0.00						
LNX-6515DS	B	From Leg	2.00	0.0000	159.00	No Ice	11.45	7.70	55.00
(T-Mobile - Proposed)			-2.00			1/2" Ice	12.06	8.29	120.87
			0.00						
LNX-6515DS	C	From Leg	2.00	0.0000	159.00	No Ice	11.45	7.70	55.00
(T-Mobile - Proposed)			-2.00			1/2" Ice	12.06	8.29	120.87
			0.00						
RRUS-11	A	From Leg	2.00	0.0000	159.00	No Ice	2.99	1.25	50.00
(T-Mobile - Proposed)			-2.00			1/2" Ice	3.23	1.41	69.57
			0.00						
RRUS-11	B	From Leg	2.00	0.0000	159.00	No Ice	2.99	1.25	50.00
(T-Mobile - Proposed)			-2.00			1/2" Ice	3.23	1.41	69.57
			0.00						
RRUS-11	C	From Leg	2.00	0.0000	159.00	No Ice	2.99	1.25	50.00
(T-Mobile - Proposed)			-2.00			1/2" Ice	3.23	1.41	69.57
			0.00						

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 lb
8.5 Dishw/radome (NU)	A	Paraboloid w/o Radome	From Leg	0.00 0.00 0.00	0.0000		175.00	8.50	No Ice 1/2" Ice	56.75 57.56	75.00 297.03

Tower Pressures - No Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg % %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.597	30	72.992	A	8.650	17.617	9.583	36.49	0.000	0.000
180.00-160.00					B	9.082	14.851		40.04	0.000	0.000
					C	9.904	9.583		49.18	0.000	0.000
T2	150.00	1.541	29	72.992	A	0.000	35.302	9.583	27.15	0.000	0.000
160.00-140.00					B	0.000	19.763		48.49	0.000	0.000
					C	0.000	15.487		61.88	0.000	0.000
T3	130.00	1.48	27	72.992	A	7.121	33.100	9.583	23.83	0.000	0.000
140.00-120.00					B	10.074	16.557		35.99	0.000	0.000
					C	9.934	17.343		35.13	0.000	0.000
T4	110.00	1.411	26	72.992	A	7.775	33.100	9.583	23.45	0.000	0.000
120.00-100.00					B	10.911	17.011		34.32	0.000	0.000
					C	9.796	22.733		29.46	0.000	0.000
T5	90.00	1.332	25	72.992	A	7.692	33.599	9.583	23.21	0.000	0.000
100.00-80.00					B	9.577	23.945		28.59	0.000	0.000
					C	9.610	23.776		28.70	0.000	0.000
T6 80.00-60.00	70.00	1.24	23	72.992	A	4.987	38.589	9.583	21.99	0.000	0.000
					B	6.758	26.374		28.92	0.000	0.000
					C	6.925	25.219		29.81	0.000	0.000
T7 60.00-40.00	50.00	1.126	21	72.992	A	3.505	39.785	9.583	22.14	0.000	0.000
					B	4.857	26.974		30.11	0.000	0.000
					C	4.978	25.834		31.10	0.000	0.000
T8 40.00-20.00	30.00	1	18	72.992	A	0.000	40.878	9.583	23.44	0.000	0.000
					B	0.000	28.488		33.64	0.000	0.000
					C	0.000	27.385		34.99	0.000	0.000
T9 20.00-5.00	12.50	1	18	54.744	A	3.332	28.756	7.188	22.40	0.000	0.000
					B	4.618	18.730		30.78	0.000	0.000
					C	4.732	17.837		31.85	0.000	0.000
T10 5.00-0.00	2.50	1	18	9.791	A	4.396	2.575	2.575	36.94	0.000	0.000
					B	4.396	2.575		36.94	0.000	0.000
					C	4.396	2.575		36.94	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

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	170.00	1.597	30	0.5000	74.658	A	11.858	27.714	12.917	32.64	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
180.00-160.00						B	8.626	26.030		37.27	0.000	0.000
						C	9.904	18.576		45.35	0.000	0.000
T2	150.00	1.541	29	0.5000	74.658	A	12.198	39.836	12.917	24.82	0.000	0.000
160.00-140.00						B	0.000	28.899		44.70	0.000	0.000
						C	0.927	21.762		56.93	0.000	0.000
T3	130.00	1.48	27	0.5000	74.658	A	17.358	39.521	12.917	22.71	0.000	0.000
140.00-120.00						B	9.182	29.481		33.41	0.000	0.000
						C	11.572	28.155		32.51	0.000	0.000
T4	110.00	1.411	26	0.5000	74.658	A	17.793	39.221	12.917	22.66	0.000	0.000
120.00-100.00						B	9.855	29.703		32.65	0.000	0.000
						C	10.659	35.787		27.81	0.000	0.000
T5 100.00-80.00	90.00	1.332	25	0.5000	74.658	A	17.738	39.663	12.917	22.50	0.000	0.000
						B	11.535	35.931		27.21	0.000	0.000
						C	10.364	37.456		27.01	0.000	0.000
T6 80.00-60.00	70.00	1.24	23	0.5000	74.658	A	17.282	46.219	12.917	20.34	0.000	0.000
						B	10.317	37.572		26.97	0.000	0.000
						C	8.051	39.571		27.12	0.000	0.000
T7 60.00-40.00	50.00	1.126	21	0.5000	74.658	A	16.833	47.427	12.917	20.10	0.000	0.000
						B	8.812	37.888		27.66	0.000	0.000
						C	6.532	39.891		27.82	0.000	0.000
T8 40.00-20.00	30.00	1	18	0.5000	74.658	A	15.267	47.464	12.917	20.59	0.000	0.000
						B	4.967	37.978		30.08	0.000	0.000
						C	2.650	39.981		30.30	0.000	0.000
T9 20.00-5.00	12.50	1	18	0.5000	55.994	A	12.939	34.777	9.688	20.30	0.000	0.000
						B	7.381	26.468		28.62	0.000	0.000
						C	5.678	27.951		28.81	0.000	0.000
T10 5.00-0.00	2.50	1	18	0.5000	10.231	A	4.396	3.837	3.470	42.15	0.000	0.000
						B	4.396	3.837		42.15	0.000	0.000
						C	4.396	3.837		42.15	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.597	30	72.992	A	8.650	17.617	9.583	36.49	0.000	0.000
180.00-160.00					B	9.082	14.851		40.04	0.000	0.000
					C	9.904	9.583		49.18	0.000	0.000
T2	150.00	1.541	29	72.992	A	0.000	35.302	9.583	27.15	0.000	0.000
160.00-140.00					B	0.000	19.763		48.49	0.000	0.000
					C	0.000	15.487		61.88	0.000	0.000
T3	130.00	1.48	27	72.992	A	7.121	33.100	9.583	23.83	0.000	0.000
140.00-120.00					B	10.074	16.557		35.99	0.000	0.000
					C	9.934	17.343		35.13	0.000	0.000
T4	110.00	1.411	26	72.992	A	7.775	33.100	9.583	23.45	0.000	0.000
120.00-100.00					B	10.911	17.011		34.32	0.000	0.000
					C	9.796	22.733		29.46	0.000	0.000
T5	90.00	1.332	25	72.992	A	7.692	33.599	9.583	23.21	0.000	0.000
100.00-80.00					B	9.577	23.945		28.59	0.000	0.000
					C	9.610	23.776		28.70	0.000	0.000
T6 80.00-60.00	70.00	1.24	23	72.992	A	4.987	38.589	9.583	21.99	0.000	0.000
					B	6.758	26.374		28.92	0.000	0.000

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
					C	6.925	25.219		29.81	0.000	0.000
T7 60.00-40.00	50.00	1.126	21	72.992	A	3.505	39.785	9.583	22.14	0.000	0.000
					B	4.857	26.974		30.11	0.000	0.000
					C	4.978	25.834		31.10	0.000	0.000
T8 40.00-20.00	30.00	1	18	72.992	A	0.000	40.878	9.583	23.44	0.000	0.000
					B	0.000	28.488		33.64	0.000	0.000
					C	0.000	27.385		34.99	0.000	0.000
T9 20.00-5.00	12.50	1	18	54.744	A	3.332	28.756	7.188	22.40	0.000	0.000
					B	4.618	18.730		30.78	0.000	0.000
					C	4.732	17.837		31.85	0.000	0.000
T10 5.00-0.00	2.50	1	18	9.791	A	4.396	2.575	2.575	36.94	0.000	0.000
					B	4.396	2.575		36.94	0.000	0.000
					C	4.396	2.575		36.94	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
T1	60.05	811.06	A	0.36	2.149	0.636	1	1	19.855	1412.97	70.65	A
180.00-160.00		TA 557.98	B	0.328	2.224	0.625	1	1	18.361			
			C	0.267	2.388	0.606	1	1	15.715			
T2	219.67	455.02	A	0.484	1.922	0.689	1	1	24.334	1494.56	74.73	A
160.00-140.00			B	0.271	2.377	0.607	1	1	12.004			
			C	0.212	2.556	0.593	1	1	9.183			
T3	275.02	881.09	A	0.551	1.843	0.725	1	1	31.114	1758.41	87.92	A
140.00-120.00		TA 557.98	B	0.365	2.138	0.638	1	1	20.636			
			C	0.374	2.118	0.641	1	1	21.055			
T4	331.27	1813.41	A	0.56	1.834	0.73	1	1	31.936	1713.02	85.65	A
120.00-100.00			B	0.383	2.1	0.645	1	1	21.877			
			C	0.446	1.981	0.671	1	1	25.056			
T5	394.42	1375.48	A	0.566	1.829	0.733	1	1	32.327	1632.92	81.65	A
100.00-80.00			B	0.459	1.959	0.678	1	1	25.801			
			C	0.457	1.962	0.677	1	1	25.699			
T6	459.08	1515.27	A	0.597	1.806	0.752	1	1	33.997	1577.89	78.89	A
80.00-60.00			B	0.454	1.967	0.675	1	1	24.563			
			C	0.44	1.99	0.669	1	1	23.794			
T7	466.82	1318.17	A	0.593	1.808	0.749	1	1	33.320	1406.70	70.34	A
60.00-40.00			B	0.436	1.997	0.667	1	1	22.849			
			C	0.422	2.022	0.661	1	1	22.051			
T8	466.82	455.02	A	0.56	1.834	0.73	1	1	29.839	1134.66	56.73	A
40.00-20.00			B	0.39	2.084	0.648	1	1	18.452			
			C	0.375	2.115	0.642	1	1	17.575			
T9 20.00-5.00	350.12	984.05	A	0.586	1.813	0.745	1	1	24.762	930.84	62.06	A
			B	0.427	2.014	0.663	1	1	17.032			
			C	0.412	2.04	0.657	1	1	16.446			
T10 5.00-0.00	0.00	411.47	A	0.712	1.777	0.829	1	1	6.530	240.58	48.12	C
			B	0.712	1.777	0.829	1	1	6.530			
			C	0.712	1.777	0.829	1	1	6.530			
Sum Weight:	3023.26	11136.02								13302.56		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	60.05	811.06	A	0.36	2.149	0.636	0.8	1	18.125	1289.86	64.49	A
180.00-160.00		TA 557.98	B	0.328	2.224	0.625	0.8	1	16.545			
			C	0.267	2.388	0.606	0.8	1	13.734			
T2	219.67	455.02	A	0.484	1.922	0.689	0.8	1	24.334	1494.56	74.73	A
160.00-140.00			B	0.271	2.377	0.607	0.8	1	12.004			
			C	0.212	2.556	0.593	0.8	1	9.183			
T3	275.02	881.09	A	0.551	1.843	0.725	0.8	1	29.690	1677.92	83.90	A
140.00-120.00		TA 557.98	B	0.365	2.138	0.638	0.8	1	18.621			
			C	0.374	2.118	0.641	0.8	1	19.068			
T4	331.27	1813.41	A	0.56	1.834	0.73	0.8	1	30.381	1629.61	81.48	A
120.00-100.00			B	0.383	2.1	0.645	0.8	1	19.695			
			C	0.446	1.981	0.671	0.8	1	23.097			
T5	394.42	1375.48	A	0.566	1.829	0.733	0.8	1	30.788	1555.21	77.76	A
100.00-80.00			B	0.459	1.959	0.678	0.8	1	23.886			
			C	0.457	1.962	0.677	0.8	1	23.777			
T6	459.08	1515.27	A	0.597	1.806	0.752	0.8	1	33.000	1531.60	76.58	A
80.00-60.00			B	0.454	1.967	0.675	0.8	1	23.211			
			C	0.44	1.99	0.669	0.8	1	22.409			
T7	466.82	1318.17	A	0.593	1.808	0.749	0.8	1	32.619	1377.11	68.86	A
60.00-40.00			B	0.436	1.997	0.667	0.8	1	21.878			
			C	0.422	2.022	0.661	0.8	1	21.055			
T8	466.82	455.02	A	0.56	1.834	0.73	0.8	1	29.839	1134.66	56.73	A
40.00-20.00			B	0.39	2.084	0.648	0.8	1	18.452			
			C	0.375	2.115	0.642	0.8	1	17.575			
T9 20.00-5.00	350.12	984.05	A	0.586	1.813	0.745	0.8	1	24.096	905.79	60.39	A
			B	0.427	2.014	0.663	0.8	1	16.108			
			C	0.412	2.04	0.657	0.8	1	15.500			
T10 5.00-0.00	0.00	411.47	A	0.712	1.777	0.829	0.8	1	5.650	208.19	41.64	C
			B	0.712	1.777	0.829	0.8	1	5.650			
			C	0.712	1.777	0.829	0.8	1	5.650			
Sum Weight:	3023.26	11136.02								12804.50		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	60.05	811.06	A	0.36	2.149	0.636	0.85	1	18.557	1320.64	66.03	A
180.00-160.00		TA 557.98	B	0.328	2.224	0.625	0.85	1	16.999			
			C	0.267	2.388	0.606	0.85	1	14.230			
T2	219.67	455.02	A	0.484	1.922	0.689	0.85	1	24.334	1494.56	74.73	A
160.00-140.00			B	0.271	2.377	0.607	0.85	1	12.004			
			C	0.212	2.556	0.593	0.85	1	9.183			
T3	275.02	881.09	A	0.551	1.843	0.725	0.85	1	30.046	1698.04	84.90	A
140.00-120.00		TA 557.98	B	0.365	2.138	0.638	0.85	1	19.125			
			C	0.374	2.118	0.641	0.85	1	19.565			
T4	331.27	1813.41	A	0.56	1.834	0.73	0.85	1	30.770	1650.46	82.52	A
120.00-100.00			B	0.383	2.1	0.645	0.85	1	20.240			
			C	0.446	1.981	0.671	0.85	1	23.587			
T5	394.42	1375.48	A	0.566	1.829	0.733	0.85	1	31.173	1574.64	78.73	A
100.00-80.00			B	0.459	1.959	0.678	0.85	1	24.364			
			C	0.457	1.962	0.677	0.85	1	24.258			
T6	459.08	1515.27	A	0.597	1.806	0.752	0.85	1	33.249	1543.17	77.16	A
80.00-60.00			B	0.454	1.967	0.675	0.85	1	23.549			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.44	1.99	0.669	0.85	1	22.756			
T7	466.82	1318.17	A	0.593	1.808	0.749	0.85	1	32.794	1384.51	69.23	A
60.00-40.00			B	0.436	1.997	0.667	0.85	1	22.120			
			C	0.422	2.022	0.661	0.85	1	21.304			
T8	466.82	455.02	A	0.56	1.834	0.73	0.85	1	29.839	1134.66	56.73	A
40.00-20.00			B	0.39	2.084	0.648	0.85	1	18.452			
			C	0.375	2.115	0.642	0.85	1	17.575			
T9 20.00-5.00	350.12	984.05	A	0.586	1.813	0.745	0.85	1	24.262	912.05	60.80	A
			B	0.427	2.014	0.663	0.85	1	16.339			
			C	0.412	2.04	0.657	0.85	1	15.736			
T10 5.00-0.00	0.00	411.47	A	0.712	1.777	0.829	0.85	1	5.870	216.29	43.26	C
			B	0.712	1.777	0.829	0.85	1	5.870			
			C	0.712	1.777	0.829	0.85	1	5.870			
Sum Weight:	3023.26	11136.02								12929.02		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	203.53	1316.71	A	0.53	1.864	0.713	1	1	31.626	1952.27	97.61	A
180.00-160.00		TA	B	0.464	1.951	0.68	1	1	26.324			
		1183.98	C	0.381	2.102	0.644	1	1	21.872			
T2	607.34	725.09	A	0.697	1.776	0.818	1	1	44.773	2540.61	127.03	A
160.00-140.00			B	0.387	2.09	0.646	1	1	18.681			
			C	0.304	2.286	0.617	1	1	14.357			
T3	771.54	1429.35	A	0.762	1.793	0.866	1	1	51.583	2836.43	141.82	A
140.00-120.00		TA	B	0.518	1.878	0.707	1	1	30.018			
		1183.98	C	0.532	1.862	0.714	1	1	31.686			
T4	884.98	2382.38	A	0.764	1.794	0.867	1	1	51.814	2717.67	135.88	A
120.00-100.00			B	0.53	1.864	0.713	1	1	31.039			
			C	0.622	1.792	0.767	1	1	38.121			
T5	1024.79	1944.37	A	0.769	1.796	0.871	1	1	52.303	2594.30	129.72	A
100.00-80.00			B	0.636	1.786	0.776	1	1	39.422			
			C	0.641	1.784	0.779	1	1	39.550			
T6	1230.72	2005.79	A	0.851	1.862	0.939	1	1	60.680	2903.98	145.20	A
80.00-60.00			B	0.641	1.784	0.78	1	1	39.617			
			C	0.638	1.785	0.778	1	1	38.817			
T7	1258.60	1763.58	A	0.861	1.873	0.948	1	1	61.786	2702.26	135.11	A
60.00-40.00			B	0.626	1.79	0.77	1	1	37.970			
			C	0.622	1.792	0.767	1	1	37.135			
T8	1258.60	725.09	A	0.84	1.851	0.93	1	1	59.411	2280.18	114.01	A
40.00-20.00			B	0.575	1.821	0.739	1	1	33.023			
			C	0.571	1.825	0.736	1	1	32.088			
T9 20.00-5.00	943.95	1296.54	A	0.852	1.864	0.94	1	1	45.642	1763.62	117.57	A
			B	0.605	1.801	0.756	1	1	27.401			
			C	0.601	1.804	0.754	1	1	26.752			
T10 5.00-0.00	0.00	558.46	A	0.805	1.82	0.9	1	1	7.850	296.14	59.23	C
			B	0.805	1.82	0.9	1	1	7.850			
			C	0.805	1.82	0.9	1	1	7.850			
Sum Weight:	8184.05	16515.33								22587.47		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	203.53	1316.71	A	0.53	1.864	0.713	0.8	1	29.255	1805.87	90.29	A
180.00-160.00		TA	B	0.464	1.951	0.68	0.8	1	24.599			
		1183.98	C	0.381	2.102	0.644	0.8	1	19.891			
T2	607.34	725.09	A	0.697	1.776	0.818	0.8	1	42.334	2402.18	120.11	A
160.00-140.00			B	0.387	2.09	0.646	0.8	1	18.681			
			C	0.304	2.286	0.617	0.8	1	14.171			
T3	771.54	1429.35	A	0.762	1.793	0.866	0.8	1	48.111	2645.54	132.28	A
140.00-120.00		TA	B	0.518	1.878	0.707	0.8	1	28.182			
		1183.98	C	0.532	1.862	0.714	0.8	1	29.372			
T4	884.98	2382.38	A	0.764	1.794	0.867	0.8	1	48.255	2531.02	126.55	A
120.00-100.00			B	0.53	1.864	0.713	0.8	1	29.068			
			C	0.622	1.792	0.767	0.8	1	35.989			
T5	1024.79	1944.37	A	0.769	1.796	0.871	0.8	1	48.756	2418.34	120.92	A
100.00-80.00			B	0.636	1.786	0.776	0.8	1	37.116			
			C	0.641	1.784	0.779	0.8	1	37.478			
T6	1230.72	2005.79	A	0.851	1.862	0.939	0.8	1	57.224	2738.57	136.93	A
80.00-60.00			B	0.641	1.784	0.78	0.8	1	37.554			
			C	0.638	1.785	0.778	0.8	1	37.207			
T7	1258.60	1763.58	A	0.861	1.873	0.948	0.8	1	58.419	2555.02	127.75	A
60.00-40.00			B	0.626	1.79	0.77	0.8	1	36.207			
			C	0.622	1.792	0.767	0.8	1	35.829			
T8	1258.60	725.09	A	0.84	1.851	0.93	0.8	1	56.357	2162.99	108.15	A
40.00-20.00			B	0.575	1.821	0.739	0.8	1	32.030			
			C	0.571	1.825	0.736	0.8	1	31.558			
T9 20.00-5.00	943.95	1296.54	A	0.852	1.864	0.94	0.8	1	43.054	1663.63	110.91	A
			B	0.605	1.801	0.756	0.8	1	25.924			
			C	0.601	1.804	0.754	0.8	1	25.617			
T10 5.00-0.00	0.00	558.46	A	0.805	1.82	0.9	0.8	1	6.971	262.97	52.59	C
			B	0.805	1.82	0.9	0.8	1	6.971			
			C	0.805	1.82	0.9	0.8	1	6.971			
Sum Weight:	8184.05	16515.33								21186.13		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	203.53	1316.71	A	0.53	1.864	0.713	0.85	1	29.848	1842.47	92.12	A
180.00-160.00		TA	B	0.464	1.951	0.68	0.85	1	25.030			
		1183.98	C	0.381	2.102	0.644	0.85	1	20.386			
T2	607.34	725.09	A	0.697	1.776	0.818	0.85	1	42.944	2436.79	121.84	A
160.00-140.00			B	0.387	2.09	0.646	0.85	1	18.681			
			C	0.304	2.286	0.617	0.85	1	14.218			
T3	771.54	1429.35	A	0.762	1.793	0.866	0.85	1	48.979	2693.26	134.66	A
140.00-120.00		TA	B	0.518	1.878	0.707	0.85	1	28.641			
		1183.98	C	0.532	1.862	0.714	0.85	1	29.950			
T4	884.98	2382.38	A	0.764	1.794	0.867	0.85	1	49.145	2577.68	128.88	A
120.00-100.00			B	0.53	1.864	0.713	0.85	1	29.561			
			C	0.622	1.792	0.767	0.85	1	36.522			
T5	1024.79	1944.37	A	0.769	1.796	0.871	0.85	1	49.642	2462.33	123.12	A
100.00-80.00			B	0.636	1.786	0.776	0.85	1	37.692			
			C	0.641	1.784	0.779	0.85	1	37.996			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T6	1230.72	2005.79	A	0.851	1.862	0.939	0.85	1	58.088	2779.92	139.00	A
80.00-60.00			B	0.641	1.784	0.78	0.85	1	38.069			
			C	0.638	1.785	0.778	0.85	1	37.610			
T7	1258.60	1763.58	A	0.861	1.873	0.948	0.85	1	59.261	2591.83	129.59	A
60.00-40.00			B	0.626	1.79	0.77	0.85	1	36.648			
			C	0.622	1.792	0.767	0.85	1	36.156			
T8	1258.60	725.09	A	0.84	1.851	0.93	0.85	1	57.121	2192.29	109.61	A
40.00-20.00			B	0.575	1.821	0.739	0.85	1	32.278			
			C	0.571	1.825	0.736	0.85	1	31.690			
T9 20.00-5.00	943.95	1296.54	A	0.852	1.864	0.94	0.85	1	43.701	1688.63	112.58	A
			B	0.605	1.801	0.756	0.85	1	26.294			
			C	0.601	1.804	0.754	0.85	1	25.901			
T10 5.00-0.00	0.00	558.46	A	0.805	1.82	0.9	0.85	1	7.191	271.26	54.25	C
			B	0.805	1.82	0.9	0.85	1	7.191			
			C	0.805	1.82	0.9	0.85	1	7.191			
Sum Weight:	8184.05	16515.33								21536.46		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	60.05	811.06	A	0.36	2.149	0.636	1	1	19.855	1412.97	70.65	A
180.00-160.00		TA 557.98	B	0.328	2.224	0.625	1	1	18.361			
			C	0.267	2.388	0.606	1	1	15.715			
T2	219.67	455.02	A	0.484	1.922	0.689	1	1	24.334	1494.56	74.73	A
160.00-140.00			B	0.271	2.377	0.607	1	1	12.004			
			C	0.212	2.556	0.593	1	1	9.183			
T3	275.02	881.09	A	0.551	1.843	0.725	1	1	31.114	1758.41	87.92	A
140.00-120.00		TA 557.98	B	0.365	2.138	0.638	1	1	20.636			
			C	0.374	2.118	0.641	1	1	21.055			
T4	331.27	1813.41	A	0.56	1.834	0.73	1	1	31.936	1713.02	85.65	A
120.00-100.00			B	0.383	2.1	0.645	1	1	21.877			
			C	0.446	1.981	0.671	1	1	25.056			
T5	394.42	1375.48	A	0.566	1.829	0.733	1	1	32.327	1632.92	81.65	A
100.00-80.00			B	0.459	1.959	0.678	1	1	25.801			
			C	0.457	1.962	0.677	1	1	25.699			
T6	459.08	1515.27	A	0.597	1.806	0.752	1	1	33.997	1577.89	78.89	A
80.00-60.00			B	0.454	1.967	0.675	1	1	24.563			
			C	0.44	1.99	0.669	1	1	23.794			
T7	466.82	1318.17	A	0.593	1.808	0.749	1	1	33.320	1406.70	70.34	A
60.00-40.00			B	0.436	1.997	0.667	1	1	22.849			
			C	0.422	2.022	0.661	1	1	22.051			
T8	466.82	455.02	A	0.56	1.834	0.73	1	1	29.839	1134.66	56.73	A
40.00-20.00			B	0.39	2.084	0.648	1	1	18.452			
			C	0.375	2.115	0.642	1	1	17.575			
T9 20.00-5.00	350.12	984.05	A	0.586	1.813	0.745	1	1	24.762	930.84	62.06	A
			B	0.427	2.014	0.663	1	1	17.032			
			C	0.412	2.04	0.657	1	1	16.446			
T10 5.00-0.00	0.00	411.47	A	0.712	1.777	0.829	1	1	6.530	240.58	48.12	C
			B	0.712	1.777	0.829	1	1	6.530			
			C	0.712	1.777	0.829	1	1	6.530			
Sum Weight:	3023.26	11136.02								13302.56		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	60.05	811.06	A	0.36	2.149	0.636	0.8	1	18.125	1289.86	64.49	A
180.00-160.00		TA 557.98	B	0.328	2.224	0.625	0.8	1	16.545			
			C	0.267	2.388	0.606	0.8	1	13.734			
T2	219.67	455.02	A	0.484	1.922	0.689	0.8	1	24.334	1494.56	74.73	A
160.00-140.00			B	0.271	2.377	0.607	0.8	1	12.004			
			C	0.212	2.556	0.593	0.8	1	9.183			
T3	275.02	881.09	A	0.551	1.843	0.725	0.8	1	29.690	1677.92	83.90	A
140.00-120.00		TA 557.98	B	0.365	2.138	0.638	0.8	1	18.621			
			C	0.374	2.118	0.641	0.8	1	19.068			
T4	331.27	1813.41	A	0.56	1.834	0.73	0.8	1	30.381	1629.61	81.48	A
120.00-100.00			B	0.383	2.1	0.645	0.8	1	19.695			
			C	0.446	1.981	0.671	0.8	1	23.097			
T5	394.42	1375.48	A	0.566	1.829	0.733	0.8	1	30.788	1555.21	77.76	A
100.00-80.00			B	0.459	1.959	0.678	0.8	1	23.886			
			C	0.457	1.962	0.677	0.8	1	23.777			
T6	459.08	1515.27	A	0.597	1.806	0.752	0.8	1	33.000	1531.60	76.58	A
80.00-60.00			B	0.454	1.967	0.675	0.8	1	23.211			
			C	0.44	1.99	0.669	0.8	1	22.409			
T7	466.82	1318.17	A	0.593	1.808	0.749	0.8	1	32.619	1377.11	68.86	A
60.00-40.00			B	0.436	1.997	0.667	0.8	1	21.878			
			C	0.422	2.022	0.661	0.8	1	21.055			
T8	466.82	455.02	A	0.56	1.834	0.73	0.8	1	29.839	1134.66	56.73	A
40.00-20.00			B	0.39	2.084	0.648	0.8	1	18.452			
			C	0.375	2.115	0.642	0.8	1	17.575			
T9 20.00-5.00	350.12	984.05	A	0.586	1.813	0.745	0.8	1	24.096	905.79	60.39	A
			B	0.427	2.014	0.663	0.8	1	16.108			
			C	0.412	2.04	0.657	0.8	1	15.500			
T10 5.00-0.00	0.00	411.47	A	0.712	1.777	0.829	0.8	1	5.650	208.19	41.64	C
			B	0.712	1.777	0.829	0.8	1	5.650			
			C	0.712	1.777	0.829	0.8	1	5.650			
Sum Weight:	3023.26	11136.02								12804.50		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	60.05	811.06	A	0.36	2.149	0.636	0.85	1	18.557	1320.64	66.03	A
180.00-160.00		TA 557.98	B	0.328	2.224	0.625	0.85	1	16.999			
			C	0.267	2.388	0.606	0.85	1	14.230			
T2	219.67	455.02	A	0.484	1.922	0.689	0.85	1	24.334	1494.56	74.73	A
160.00-140.00			B	0.271	2.377	0.607	0.85	1	12.004			
			C	0.212	2.556	0.593	0.85	1	9.183			
T3	275.02	881.09	A	0.551	1.843	0.725	0.85	1	30.046	1698.04	84.90	A
140.00-120.00		TA 557.98	B	0.365	2.138	0.638	0.85	1	19.125			
			C	0.374	2.118	0.641	0.85	1	19.565			
T4	331.27	1813.41	A	0.56	1.834	0.73	0.85	1	30.770	1650.46	82.52	A
120.00-100.00			B	0.383	2.1	0.645	0.85	1	20.240			
			C	0.446	1.981	0.671	0.85	1	23.587			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T5	394.42	1375.48	A	0.566	1.829	0.733	0.85	1	31.173	1574.64	78.73	A
100.00-80.00			B	0.459	1.959	0.678	0.85	1	24.364			
			C	0.457	1.962	0.677	0.85	1	24.258			
T6	459.08	1515.27	A	0.597	1.806	0.752	0.85	1	33.249	1543.17	77.16	A
80.00-60.00			B	0.454	1.967	0.675	0.85	1	23.549			
			C	0.44	1.99	0.669	0.85	1	22.756			
T7	466.82	1318.17	A	0.593	1.808	0.749	0.85	1	32.794	1384.51	69.23	A
60.00-40.00			B	0.436	1.997	0.667	0.85	1	22.120			
			C	0.422	2.022	0.661	0.85	1	21.304			
T8	466.82	455.02	A	0.56	1.834	0.73	0.85	1	29.839	1134.66	56.73	A
40.00-20.00			B	0.39	2.084	0.648	0.85	1	18.452			
			C	0.375	2.115	0.642	0.85	1	17.575			
T9 20.00-5.00	350.12	984.05	A	0.586	1.813	0.745	0.85	1	24.262	912.05	60.80	A
			B	0.427	2.014	0.663	0.85	1	16.339			
			C	0.412	2.04	0.657	0.85	1	15.736			
T10 5.00-0.00	0.00	411.47	A	0.712	1.777	0.829	0.85	1	5.870	216.29	43.26	C
			B	0.712	1.777	0.829	0.85	1	5.870			
			C	0.712	1.777	0.829	0.85	1	5.870			
Sum Weight:	3023.26	11136.02								12929.02		

Discrete Appurtenance Pressures - No Ice $G_H = 1.121$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft²	C_AA_C Side ft²
Torque Arm Face C	180.0000	0.00	0.00	2.61	166.60	1.588	29	14.36	20.48
Torque Arm Face B	60.0000	0.00	2.26	-1.30	166.60	1.588	29	14.36	20.48
Torque Arm Face A	300.0000	0.00	-2.26	-1.30	166.60	1.588	29	14.36	20.48
Torque Arm Face C	180.0000	0.00	0.00	2.61	126.60	1.468	27	14.36	20.48
Torque Arm Face B	60.0000	0.00	2.26	-1.30	126.60	1.468	27	14.36	20.48
Torque Arm Face A	300.0000	0.00	-2.26	-1.30	126.60	1.468	27	14.36	20.48
GPS	120.0000	10.00	4.74	2.73	88.00	1.323	24	1.00	1.00
3' GPS Stand-off Mount	120.0000	51.00	3.00	1.73	88.00	1.323	24	2.45	2.45
APXVSPP18-C-A20 w/ Mount	0.0000	117.64	0.00	-4.97	126.00	1.466	27	8.96	8.08
APXVSPP18-C-A20 w/ Mount	120.0000	117.64	4.30	2.48	126.00	1.466	27	8.96	8.08
APXVSPP18-C-A20 w/ Mount	240.0000	117.64	-4.30	2.48	126.00	1.466	27	8.96	8.08
FD-RRH 2x50 800	0.0000	64.00	0.00	-4.97	126.00	1.466	27	2.40	2.25
FD-RRH 2x50 800	120.0000	64.00	4.30	2.48	126.00	1.466	27	2.40	2.25
FD-RRH 2x50 800	240.0000	64.00	-4.30	2.48	126.00	1.466	27	2.40	2.25
FD-RRH 4x45 1900	0.0000	60.00	0.00	-4.97	126.00	1.466	27	2.71	2.78
FD-RRH 4x45 1900	120.0000	60.00	4.30	2.48	126.00	1.466	27	2.71	2.78
FD-RRH 4x45 1900	240.0000	60.00	-4.30	2.48	126.00	1.466	27	2.71	2.78
Rohn 6' x 12' Boom Gate (1)	0.0000	560.00	0.00	-3.97	126.00	1.466	27	16.60	16.60
Rohn 6' x 12' Boom Gate (1)	120.0000	560.00	3.44	1.98	126.00	1.466	27	16.60	16.60
Rohn 6' x 12' Boom Gate (1)	240.0000	560.00	-3.44	1.98	126.00	1.466	27	16.60	16.60
10' x 3" Dia Omni	240.0000	30.00	-3.44	1.98	110.00	1.411	26	3.00	3.00
Sabre 2' Sidearm	240.0000	87.00	-2.57	1.48	105.00	1.392	26	3.90	3.90
1.5"x2'omni	0.0000	8.00	0.00	-4.97	144.00	1.523	28	0.25	0.25
1.5"x2'omni	0.0000	8.00	0.00	-4.97	140.00	1.511	28	0.25	0.25
2-ft Stand Off	0.0000	20.00	0.00	-2.97	142.00	1.517	28	1.07	1.07

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
3"x20-ft Omni	240.0000	23.00	-4.30	2.48	147.00	1.532	28	3.56	3.56
3-ft Side Arm	240.0000	15.00	-3.00	1.73	137.00	1.502	28	0.66	0.66
20-ft x 1.9in Support Pipe	240.0000	54.40	-3.00	1.73	147.00	1.532	28	3.80	3.80
20' x 2" Dia Omni	0.0000	20.00	0.00	-1.97	189.00	1.646	30	4.00	4.00
14' x 3" Dia Omni	120.0000	40.00	1.71	0.98	186.00	1.639	30	4.20	4.20
20' x 2" Dia Omni	240.0000	20.00	-1.71	0.98	189.00	1.646	30	4.00	4.00
AM-X-CD-14-65-00TT-RET	300.0000	36.40	-5.45	1.47	77.00	1.274	24	5.51	2.83
AM-X-CD-14-65-00TT-RET	60.0000	36.40	1.45	-5.46	77.00	1.274	24	5.51	2.83
AM-X-CD-14-65-00TT-RET	180.0000	36.40	4.00	3.98	77.00	1.274	24	5.51	2.83
7770.00	300.0000	35.00	-1.45	-5.46	77.00	1.274	24	5.88	2.93
7770.00	60.0000	35.00	5.45	1.47	77.00	1.274	24	5.88	2.93
7770.00	180.0000	35.00	-4.00	3.98	77.00	1.274	24	5.88	2.93
LPG21401 TMA	300.0000	35.00	-1.45	-5.46	77.00	1.274	24	1.91	0.73
LPG21401 TMA	60.0000	35.00	5.45	1.47	77.00	1.274	24	1.91	0.73
LPG21401 TMA	180.0000	35.00	-4.00	3.98	77.00	1.274	24	1.91	0.73
RRUS-11	300.0000	100.00	-3.45	-1.99	73.00	1.255	23	5.99	2.49
RRUS-11	60.0000	100.00	3.45	-1.99	73.00	1.255	23	5.99	2.49
RRUS-11	180.0000	100.00	0.00	3.98	73.00	1.255	23	5.99	2.49
DC6-48-60-18-8F Surge Arrestor	240.0000	20.00	-2.57	1.48	72.00	1.250	23	2.23	2.23
Valmont T-Arm (1)	0.0000	336.00	0.00	-3.97	77.00	1.274	24	10.54	10.54
Valmont T-Arm (1)	120.0000	336.00	3.44	1.98	77.00	1.274	24	10.54	10.54
Valmont T-Arm (1)	240.0000	336.00	-3.44	1.98	77.00	1.274	24	10.54	10.54
AIR21	0.0000	83.00	-2.00	-3.97	159.00	1.567	29	6.53	4.36
AIR21	0.0000	83.00	2.00	-3.97	159.00	1.567	29	6.53	4.36
AIR21	120.0000	83.00	4.44	0.25	159.00	1.567	29	6.53	4.36
AIR21	120.0000	83.00	2.44	3.72	159.00	1.567	29	6.53	4.36
AIR21	240.0000	83.00	-2.44	3.72	159.00	1.567	29	6.53	4.36
AIR21	240.0000	83.00	-4.44	0.25	159.00	1.567	29	6.53	4.36
KRY 112 TMA	0.0000	25.00	0.00	-3.97	159.00	1.567	29	0.78	0.49
KRY 112 TMA	120.0000	25.00	3.44	1.98	159.00	1.567	29	0.78	0.49
KRY 112 TMA	240.0000	25.00	-3.44	1.98	159.00	1.567	29	0.78	0.49
LNX-6515DS	0.0000	55.00	-6.00	-4.97	95.00	1.353	25	11.45	7.70
HBX-6517DS	0.0000	14.00	-4.00	-4.97	95.00	1.353	25	5.24	3.30
LNX-6515DS	0.0000	55.00	0.00	-4.97	95.00	1.353	25	11.45	7.70
HBX-6517DS	0.0000	14.00	4.00	-4.97	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	120.0000	39.00	7.30	-2.71	95.00	1.353	25	8.41	5.41
HBX-6517DS	120.0000	14.00	6.30	-0.98	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	120.0000	39.00	4.30	2.48	95.00	1.353	25	8.41	5.41
HBX-6517DS	120.0000	14.00	2.30	5.95	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	240.0000	39.00	-1.30	7.68	95.00	1.353	25	8.41	5.41
HBX-6517DS	240.0000	14.00	-2.30	5.95	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	240.0000	39.00	-4.30	2.48	95.00	1.353	25	8.41	5.41
HBX-6517DS	240.0000	14.00	-6.30	-0.98	95.00	1.353	25	5.24	3.30
RRH2x40-07-U	0.0000	50.00	0.00	-4.97	95.00	1.353	25	0.00	1.23
RRH2x40-07-U	120.0000	50.00	4.30	2.48	95.00	1.353	25	0.00	1.23
RRH2x40-07-U	240.0000	50.00	-4.30	2.48	95.00	1.353	25	0.00	1.23
RRH2x60-AWS	0.0000	50.00	4.00	-4.97	95.00	1.353	25	0.00	1.43
RRH2x60-AWS	120.0000	50.00	2.30	5.95	95.00	1.353	25	0.00	1.43
RRH2x60-AWS	240.0000	50.00	-6.30	-0.98	95.00	1.353	25	0.00	1.43
RRH2x60-PCS	0.0000	63.00	-4.00	-4.97	95.00	1.353	25	2.58	2.03
RRH2x60-PCS	120.0000	63.00	6.30	-0.98	95.00	1.353	25	2.58	2.03
RRH2x60-PCS	240.0000	63.00	-2.30	5.95	95.00	1.353	25	2.58	2.03
DB-T1-6Z-8AB-0Z	0.0000	44.00	0.00	-4.97	95.00	1.353	25	5.60	2.33
DB-T1-6Z-8AB-0Z	120.0000	44.00	4.30	2.48	95.00	1.353	25	5.60	2.33
Pirod 12' T-Frame Sector Mount (1)	0.0000	465.00	0.00	-2.97	95.00	1.353	25	13.60	13.60

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Pirod 12' T-Frame Sector Mount (1)	120.0000	465.00	2.57	1.48	95.00	1.353	25	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	240.0000	465.00	-2.57	1.48	95.00	1.353	25	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	0.0000	465.00	0.00	-2.97	159.00	1.567	29	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	120.0000	465.00	2.57	1.48	159.00	1.567	29	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	240.0000	465.00	-2.57	1.48	159.00	1.567	29	13.60	13.60
LNX-6515DS	0.0000	55.00	-2.00	-3.97	159.00	1.567	29	11.45	7.70
LNX-6515DS	120.0000	55.00	4.44	0.25	159.00	1.567	29	11.45	7.70
LNX-6515DS	240.0000	55.00	-2.44	3.72	159.00	1.567	29	11.45	7.70
RRUS-11	0.0000	50.00	-2.00	-3.97	159.00	1.567	29	2.99	1.25
RRUS-11	120.0000	50.00	4.44	0.25	159.00	1.567	29	2.99	1.25
RRUS-11	240.0000	50.00	-2.44	3.72	159.00	1.567	29	2.99	1.25
	Sum Weight:	9043.52							

Discrete Appurtenance Pressures - With Ice $G_H = 1.121$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Torque Arm Face C	180.0000	0.00	0.00	2.61	166.60	1.588	29	14.98	21.36	0.5000
Torque Arm Face B	60.0000	0.00	2.26	-1.30	166.60	1.588	29	14.98	21.36	0.5000
Torque Arm Face A	300.0000	0.00	-2.26	-1.30	166.60	1.588	29	14.98	21.36	0.5000
Torque Arm Face C	180.0000	0.00	0.00	2.61	126.60	1.468	27	14.98	21.36	0.5000
Torque Arm Face B	60.0000	0.00	2.26	-1.30	126.60	1.468	27	14.98	21.36	0.5000
Torque Arm Face A	300.0000	0.00	-2.26	-1.30	126.60	1.468	27	14.98	21.36	0.5000
GPS	120.0000	15.00	4.74	2.73	88.00	1.323	24	1.50	1.50	0.5000
3' GPS Stand-off Mount	120.0000	75.00	3.00	1.73	88.00	1.323	24	3.98	3.98	0.5000
APXVSPP18-C-A20 w/ Mount	0.0000	197.65	0.00	-4.97	126.00	1.466	27	9.66	9.14	0.5000
APXVSPP18-C-A20 w/ Mount	120.0000	197.65	4.30	2.48	126.00	1.466	27	9.66	9.14	0.5000
APXVSPP18-C-A20 w/ Mount	240.0000	197.65	-4.30	2.48	126.00	1.466	27	9.66	9.14	0.5000
FD-RRH 2x50 800	0.0000	86.12	0.00	-4.97	126.00	1.466	27	2.61	2.46	0.5000
FD-RRH 2x50 800	120.0000	86.12	4.30	2.48	126.00	1.466	27	2.61	2.46	0.5000
FD-RRH 2x50 800	240.0000	86.12	-4.30	2.48	126.00	1.466	27	2.61	2.46	0.5000
FD-RRH 4x45 1900	0.0000	83.97	0.00	-4.97	126.00	1.466	27	2.94	3.02	0.5000
FD-RRH 4x45 1900	120.0000	83.97	4.30	2.48	126.00	1.466	27	2.94	3.02	0.5000
FD-RRH 4x45 1900	240.0000	83.97	-4.30	2.48	126.00	1.466	27	2.94	3.02	0.5000
Rohn 6' x 12' Boom Gate (1)	0.0000	700.00	0.00	-3.97	126.00	1.466	27	19.80	19.80	0.5000
Rohn 6' x 12' Boom Gate (1)	120.0000	700.00	3.44	1.98	126.00	1.466	27	19.80	19.80	0.5000
Rohn 6' x 12' Boom Gate (1)	240.0000	700.00	-3.44	1.98	126.00	1.466	27	19.80	19.80	0.5000
10' x 3" Dia Omni	240.0000	51.79	-3.44	1.98	110.00	1.411	26	4.03	4.03	0.5000
Sabre 2' Sidearm	240.0000	97.00	-2.57	1.48	105.00	1.392	26	4.40	4.40	0.5000
1.5"x2'omni	0.0000	10.60	0.00	-4.97	144.00	1.523	28	0.38	0.38	0.5000
1.5"x2'omni	0.0000	10.60	0.00	-4.97	140.00	1.511	28	0.38	0.38	0.5000
2-ft Stand Off	0.0000	28.00	0.00	-2.97	142.00	1.517	28	1.62	1.62	0.5000
3"x20-ft Omni	240.0000	46.00	-4.30	2.48	147.00	1.532	28	7.13	7.13	0.5000
3-ft Side Arm	240.0000	28.00	-3.00	1.73	137.00	1.502	28	1.14	1.14	0.5000
20-ft x 1.9in Support	240.0000	83.84	-3.00	1.73	147.00	1.532	28	5.82	5.82	0.5000

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Pipe										
20' x 2" Dia Omni	0.0000	50.77	0.00	-1.97	189.00	1.646	30	6.03	6.03	0.5000
14' x 3" Dia Omni	120.0000	70.34	1.71	0.98	186.00	1.639	30	5.63	5.63	0.5000
20' x 2" Dia Omni	240.0000	50.77	-1.71	0.98	189.00	1.646	30	6.03	6.03	0.5000
AM-X-CD-14-65-00TT-RET	300.0000	68.35	-5.45	1.47	77.00	1.274	24	5.90	3.14	0.5000
AM-X-CD-14-65-00TT-RET	60.0000	68.35	1.45	-5.46	77.00	1.274	24	5.90	3.14	0.5000
AM-X-CD-14-65-00TT-RET	180.0000	68.35	4.00	3.98	77.00	1.274	24	5.90	3.14	0.5000
7770.00	300.0000	67.63	-1.45	-5.46	77.00	1.274	24	6.31	3.27	0.5000
7770.00	60.0000	67.63	5.45	1.47	77.00	1.274	24	6.31	3.27	0.5000
7770.00	180.0000	67.63	-4.00	3.98	77.00	1.274	24	6.31	3.27	0.5000
LPG21401 TMA	300.0000	46.63	-1.45	-5.46	77.00	1.274	24	2.19	0.96	0.5000
LPG21401 TMA	60.0000	46.63	5.45	1.47	77.00	1.274	24	2.19	0.96	0.5000
LPG21401 TMA	180.0000	46.63	-4.00	3.98	77.00	1.274	24	2.19	0.96	0.5000
RRUS-11	300.0000	139.15	-3.45	-1.99	73.00	1.255	23	6.45	2.82	0.5000
RRUS-11	60.0000	139.15	3.45	-1.99	73.00	1.255	23	6.45	2.82	0.5000
RRUS-11	180.0000	139.15	0.00	3.98	73.00	1.255	23	6.45	2.82	0.5000
DC6-48-60-18-8F Surge Arrestor	240.0000	39.36	-2.57	1.48	72.00	1.250	23	2.45	2.45	0.5000
Valmont T-Arm (1)	0.0000	412.00	0.00	-3.97	77.00	1.274	24	14.45	14.45	0.5000
Valmont T-Arm (1)	120.0000	412.00	3.44	1.98	77.00	1.274	24	14.45	14.45	0.5000
Valmont T-Arm (1)	240.0000	412.00	-3.44	1.98	77.00	1.274	24	14.45	14.45	0.5000
AIR21	0.0000	124.90	-2.00	-3.97	159.00	1.567	29	6.98	4.77	0.5000
AIR21	0.0000	124.90	2.00	-3.97	159.00	1.567	29	6.98	4.77	0.5000
AIR21	120.0000	124.90	4.44	0.25	159.00	1.567	29	6.98	4.77	0.5000
AIR21	120.0000	124.90	2.44	3.72	159.00	1.567	29	6.98	4.77	0.5000
AIR21	240.0000	124.90	-2.44	3.72	159.00	1.567	29	6.98	4.77	0.5000
AIR21	240.0000	124.90	-4.44	0.25	159.00	1.567	29	6.98	4.77	0.5000
KRY 112 TMA	0.0000	31.29	0.00	-3.97	159.00	1.567	29	0.90	0.59	0.5000
KRY 112 TMA	120.0000	31.29	3.44	1.98	159.00	1.567	29	0.90	0.59	0.5000
KRY 112 TMA	240.0000	31.29	-3.44	1.98	159.00	1.567	29	0.90	0.59	0.5000
LNX-6515DS	0.0000	120.87	-6.00	-4.97	95.00	1.353	25	12.06	8.29	0.5000
HBX-6517DS	0.0000	41.26	-4.00	-4.97	95.00	1.353	25	5.71	3.75	0.5000
LNX-6515DS	0.0000	120.87	0.00	-4.97	95.00	1.353	25	12.06	8.29	0.5000
HBX-6517DS	0.0000	41.26	4.00	-4.97	95.00	1.353	25	5.71	3.75	0.5000
LNX-6514DS-VTM	120.0000	89.51	7.30	-2.71	95.00	1.353	25	8.96	5.86	0.5000
HBX-6517DS	120.0000	41.26	6.30	-0.98	95.00	1.353	25	5.71	3.75	0.5000
LNX-6514DS-VTM	120.0000	89.51	4.30	2.48	95.00	1.353	25	8.96	5.86	0.5000
HBX-6517DS	120.0000	41.26	2.30	5.95	95.00	1.353	25	5.71	3.75	0.5000
LNX-6514DS-VTM	240.0000	89.51	-1.30	7.68	95.00	1.353	25	8.96	5.86	0.5000
HBX-6517DS	240.0000	41.26	-2.30	5.95	95.00	1.353	25	5.71	3.75	0.5000
LNX-6514DS-VTM	240.0000	89.51	-4.30	2.48	95.00	1.353	25	8.96	5.86	0.5000
HBX-6517DS	240.0000	41.26	-6.30	-0.98	95.00	1.353	25	5.71	3.75	0.5000
RRH2x40-07-U	0.0000	66.85	0.00	-4.97	95.00	1.353	25	0.00	1.39	0.5000
RRH2x40-07-U	120.0000	66.85	4.30	2.48	95.00	1.353	25	0.00	1.39	0.5000
RRH2x40-07-U	240.0000	66.85	-4.30	2.48	95.00	1.353	25	0.00	1.39	0.5000
RRH2x60-AWS	0.0000	66.02	4.00	-4.97	95.00	1.353	25	0.00	1.61	0.5000
RRH2x60-AWS	120.0000	66.02	2.30	5.95	95.00	1.353	25	0.00	1.61	0.5000
RRH2x60-AWS	240.0000	66.02	-6.30	-0.98	95.00	1.353	25	0.00	1.61	0.5000
RRH2x60-PCS	0.0000	83.48	-4.00	-4.97	95.00	1.353	25	2.80	2.24	0.5000
RRH2x60-PCS	120.0000	83.48	6.30	-0.98	95.00	1.353	25	2.80	2.24	0.5000
RRH2x60-PCS	240.0000	83.48	-2.30	5.95	95.00	1.353	25	2.80	2.24	0.5000
DB-T1-6Z-8AB-0Z	0.0000	80.13	0.00	-4.97	95.00	1.353	25	5.92	2.56	0.5000
DB-T1-6Z-8AB-0Z	120.0000	80.13	4.30	2.48	95.00	1.353	25	5.92	2.56	0.5000
Pirod 12' T-Frame Sector Mount (1)	0.0000	600.00	0.00	-2.97	95.00	1.353	25	18.40	18.40	0.5000
Pirod 12' T-Frame Sector Mount (1)	120.0000	600.00	2.57	1.48	95.00	1.353	25	18.40	18.40	0.5000
Pirod 12' T-Frame Sector	240.0000	600.00	-2.57	1.48	95.00	1.353	25	18.40	18.40	0.5000

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Mount (1)										
Pirod 12' T-Frame Sector Mount (1)	0.0000	600.00	0.00	-2.97	159.00	1.567	29	18.40	18.40	0.5000
Pirod 12' T-Frame Sector Mount (1)	120.0000	600.00	2.57	1.48	159.00	1.567	29	18.40	18.40	0.5000
Pirod 12' T-Frame Sector Mount (1)	240.0000	600.00	-2.57	1.48	159.00	1.567	29	18.40	18.40	0.5000
LNX-6515DS	0.0000	120.87	-2.00	-3.97	159.00	1.567	29	12.06	8.29	0.5000
LNX-6515DS	120.0000	120.87	4.44	0.25	159.00	1.567	29	12.06	8.29	0.5000
LNX-6515DS	240.0000	120.87	-2.44	3.72	159.00	1.567	29	12.06	8.29	0.5000
RRUS-11	0.0000	69.57	-2.00	-3.97	159.00	1.567	29	3.23	1.41	0.5000
RRUS-11	120.0000	69.57	4.44	0.25	159.00	1.567	29	3.23	1.41	0.5000
RRUS-11	240.0000	69.57	-2.44	3.72	159.00	1.567	29	3.23	1.41	0.5000
	Sum Weight:	12732.80								

Discrete Appurtenance Pressures - Service $G_H = 1.121$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Torque Arm Face C	180.0000	0.00	0.00	2.61	166.60	1.588	29	14.36	20.48
Torque Arm Face B	60.0000	0.00	2.26	-1.30	166.60	1.588	29	14.36	20.48
Torque Arm Face A	300.0000	0.00	-2.26	-1.30	166.60	1.588	29	14.36	20.48
Torque Arm Face C	180.0000	0.00	0.00	2.61	126.60	1.468	27	14.36	20.48
Torque Arm Face B	60.0000	0.00	2.26	-1.30	126.60	1.468	27	14.36	20.48
Torque Arm Face A	300.0000	0.00	-2.26	-1.30	126.60	1.468	27	14.36	20.48
GPS	120.0000	10.00	4.74	2.73	88.00	1.323	24	1.00	1.00
3' GPS Stand-off Mount	120.0000	51.00	3.00	1.73	88.00	1.323	24	2.45	2.45
APXVSPP18-C-A20 w/ Mount	0.0000	117.64	0.00	-4.97	126.00	1.466	27	8.96	8.08
APXVSPP18-C-A20 w/ Mount	120.0000	117.64	4.30	2.48	126.00	1.466	27	8.96	8.08
APXVSPP18-C-A20 w/ Mount	240.0000	117.64	-4.30	2.48	126.00	1.466	27	8.96	8.08
FD-RRH 2x50 800	0.0000	64.00	0.00	-4.97	126.00	1.466	27	2.40	2.25
FD-RRH 2x50 800	120.0000	64.00	4.30	2.48	126.00	1.466	27	2.40	2.25
FD-RRH 2x50 800	240.0000	64.00	-4.30	2.48	126.00	1.466	27	2.40	2.25
FD-RRH 4x45 1900	0.0000	60.00	0.00	-4.97	126.00	1.466	27	2.71	2.78
FD-RRH 4x45 1900	120.0000	60.00	4.30	2.48	126.00	1.466	27	2.71	2.78
FD-RRH 4x45 1900	240.0000	60.00	-4.30	2.48	126.00	1.466	27	2.71	2.78
Rohn 6' x 12' Boom Gate (1)	0.0000	560.00	0.00	-3.97	126.00	1.466	27	16.60	16.60
Rohn 6' x 12' Boom Gate (1)	120.0000	560.00	3.44	1.98	126.00	1.466	27	16.60	16.60
Rohn 6' x 12' Boom Gate (1)	240.0000	560.00	-3.44	1.98	126.00	1.466	27	16.60	16.60
10' x 3" Dia Omni	240.0000	30.00	-3.44	1.98	110.00	1.411	26	3.00	3.00
Sabre 2' Sidearm	240.0000	87.00	-2.57	1.48	105.00	1.392	26	3.90	3.90
1.5"x2'omni	0.0000	8.00	0.00	-4.97	144.00	1.523	28	0.25	0.25
1.5"x2'omni	0.0000	8.00	0.00	-4.97	140.00	1.511	28	0.25	0.25
2-ft Stand Off	0.0000	20.00	0.00	-2.97	142.00	1.517	28	1.07	1.07
3"x20-ft Omni	240.0000	23.00	-4.30	2.48	147.00	1.532	28	3.56	3.56
3-ft Side Arm	240.0000	15.00	-3.00	1.73	137.00	1.502	28	0.66	0.66
20-ft x 1.9in Support Pipe	240.0000	54.40	-3.00	1.73	147.00	1.532	28	3.80	3.80
20' x 2" Dia Omni	0.0000	20.00	0.00	-1.97	189.00	1.646	30	4.00	4.00
14' x 3" Dia Omni	120.0000	40.00	1.71	0.98	186.00	1.639	30	4.20	4.20

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
20' x 2" Dia Omni	240.0000	20.00	-1.71	0.98	189.00	1.646	30	4.00	4.00
AM-X-CD-14-65-00TT-RET	300.0000	36.40	-5.45	1.47	77.00	1.274	24	5.51	2.83
AM-X-CD-14-65-00TT-RET	60.0000	36.40	1.45	-5.46	77.00	1.274	24	5.51	2.83
AM-X-CD-14-65-00TT-RET	180.0000	36.40	4.00	3.98	77.00	1.274	24	5.51	2.83
7770.00	300.0000	35.00	-1.45	-5.46	77.00	1.274	24	5.88	2.93
7770.00	60.0000	35.00	5.45	1.47	77.00	1.274	24	5.88	2.93
7770.00	180.0000	35.00	-4.00	3.98	77.00	1.274	24	5.88	2.93
LPG21401 TMA	300.0000	35.00	-1.45	-5.46	77.00	1.274	24	1.91	0.73
LPG21401 TMA	60.0000	35.00	5.45	1.47	77.00	1.274	24	1.91	0.73
LPG21401 TMA	180.0000	35.00	-4.00	3.98	77.00	1.274	24	1.91	0.73
RRUS-11	300.0000	100.00	-3.45	-1.99	73.00	1.255	23	5.99	2.49
RRUS-11	60.0000	100.00	3.45	-1.99	73.00	1.255	23	5.99	2.49
RRUS-11	180.0000	100.00	0.00	3.98	73.00	1.255	23	5.99	2.49
DC6-48-60-18-8F Surge Arrestor	240.0000	20.00	-2.57	1.48	72.00	1.250	23	2.23	2.23
Valmont T-Arm (1)	0.0000	336.00	0.00	-3.97	77.00	1.274	24	10.54	10.54
Valmont T-Arm (1)	120.0000	336.00	3.44	1.98	77.00	1.274	24	10.54	10.54
Valmont T-Arm (1)	240.0000	336.00	-3.44	1.98	77.00	1.274	24	10.54	10.54
AIR21	0.0000	83.00	-2.00	-3.97	159.00	1.567	29	6.53	4.36
AIR21	0.0000	83.00	2.00	-3.97	159.00	1.567	29	6.53	4.36
AIR21	120.0000	83.00	4.44	0.25	159.00	1.567	29	6.53	4.36
AIR21	120.0000	83.00	2.44	3.72	159.00	1.567	29	6.53	4.36
AIR21	240.0000	83.00	-2.44	3.72	159.00	1.567	29	6.53	4.36
AIR21	240.0000	83.00	-4.44	0.25	159.00	1.567	29	6.53	4.36
KRY 112 TMA	0.0000	25.00	0.00	-3.97	159.00	1.567	29	0.78	0.49
KRY 112 TMA	120.0000	25.00	3.44	1.98	159.00	1.567	29	0.78	0.49
KRY 112 TMA	240.0000	25.00	-3.44	1.98	159.00	1.567	29	0.78	0.49
LNX-6515DS	0.0000	55.00	-6.00	-4.97	95.00	1.353	25	11.45	7.70
HBX-6517DS	0.0000	14.00	-4.00	-4.97	95.00	1.353	25	5.24	3.30
LNX-6515DS	0.0000	55.00	0.00	-4.97	95.00	1.353	25	11.45	7.70
HBX-6517DS	0.0000	14.00	4.00	-4.97	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	120.0000	39.00	7.30	-2.71	95.00	1.353	25	8.41	5.41
HBX-6517DS	120.0000	14.00	6.30	-0.98	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	120.0000	39.00	4.30	2.48	95.00	1.353	25	8.41	5.41
HBX-6517DS	120.0000	14.00	2.30	5.95	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	240.0000	39.00	-1.30	7.68	95.00	1.353	25	8.41	5.41
HBX-6517DS	240.0000	14.00	-2.30	5.95	95.00	1.353	25	5.24	3.30
LNX-6514DS-VTM	240.0000	39.00	-4.30	2.48	95.00	1.353	25	8.41	5.41
HBX-6517DS	240.0000	14.00	-6.30	-0.98	95.00	1.353	25	5.24	3.30
RRH2x40-07-U	0.0000	50.00	0.00	-4.97	95.00	1.353	25	0.00	1.23
RRH2x40-07-U	120.0000	50.00	4.30	2.48	95.00	1.353	25	0.00	1.23
RRH2x40-07-U	240.0000	50.00	-4.30	2.48	95.00	1.353	25	0.00	1.23
RRH2x60-AWS	0.0000	50.00	4.00	-4.97	95.00	1.353	25	0.00	1.43
RRH2x60-AWS	120.0000	50.00	2.30	5.95	95.00	1.353	25	0.00	1.43
RRH2x60-AWS	240.0000	50.00	-6.30	-0.98	95.00	1.353	25	0.00	1.43
RRH2x60-PCS	0.0000	63.00	-4.00	-4.97	95.00	1.353	25	2.58	2.03
RRH2x60-PCS	120.0000	63.00	6.30	-0.98	95.00	1.353	25	2.58	2.03
RRH2x60-PCS	240.0000	63.00	-2.30	5.95	95.00	1.353	25	2.58	2.03
DB-T1-6Z-8AB-0Z	0.0000	44.00	0.00	-4.97	95.00	1.353	25	5.60	2.33
DB-T1-6Z-8AB-0Z	120.0000	44.00	4.30	2.48	95.00	1.353	25	5.60	2.33
Pirod 12' T-Frame Sector Mount (1)	0.0000	465.00	0.00	-2.97	95.00	1.353	25	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	120.0000	465.00	2.57	1.48	95.00	1.353	25	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	240.0000	465.00	-2.57	1.48	95.00	1.353	25	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	0.0000	465.00	0.00	-2.97	159.00	1.567	29	13.60	13.60

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Pirod 12' T-Frame Sector Mount (1)	120.0000	465.00	2.57	1.48	159.00	1.567	29	13.60	13.60
Pirod 12' T-Frame Sector Mount (1)	240.0000	465.00	-2.57	1.48	159.00	1.567	29	13.60	13.60
LNX-6515DS	0.0000	55.00	-2.00	-3.97	159.00	1.567	29	11.45	7.70
LNX-6515DS	120.0000	55.00	4.44	0.25	159.00	1.567	29	11.45	7.70
LNX-6515DS	240.0000	55.00	-2.44	3.72	159.00	1.567	29	11.45	7.70
RRUS-11	0.0000	50.00	-2.00	-3.97	159.00	1.567	29	2.99	1.25
RRUS-11	120.0000	50.00	4.44	0.25	159.00	1.567	29	2.99	1.25
RRUS-11	240.0000	50.00	-2.44	3.72	159.00	1.567	29	2.99	1.25
	Sum Weight:	9043.52							

Dish Pressures - No Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z psf
175.00	8.5 Dishw/radome	0.0000	75.00	0.00	-1.97	1.611	56.75	30
		Sum Weight:	75.00					

Dish Pressures - With Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z psf	t_z in
175.00	8.5 Dishw/radome	0.0000	297.03	0.00	-1.97	1.611	57.56	30	0.5000
		Sum Weight:	297.03						

Dish Pressures - Service

Elevation ft	Dish Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z psf
175.00	8.5 Dishw/radome	0.0000	75.00	0.00	-1.97	1.611	56.75	30
		Sum Weight:	75.00					

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques kip-ft
Leg Weight	3137.70			
Bracing Weight	7998.32			
Total Member Self-Weight	11136.02			
Guy Weight	3072.61			

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques kip-ft
Total Weight	26350.42			
Wind 0 deg - No Ice		-39.67	-31723.02	-2.45
Wind 30 deg - No Ice		15337.56	-26864.41	-5.88
Wind 60 deg - No Ice		26081.22	-15444.88	-6.19
Wind 90 deg - No Ice		29914.76	17.46	-4.52
Wind 120 deg - No Ice		26145.09	18020.32	0.72
Wind 150 deg - No Ice		14606.82	28384.53	2.34
Wind 180 deg - No Ice		39.67	32165.05	2.43
Wind 210 deg - No Ice		-14538.11	28344.86	1.87
Wind 240 deg - No Ice		-26105.42	17951.61	1.73
Wind 270 deg - No Ice		-29914.76	-61.87	4.52
Wind 300 deg - No Ice		-26120.88	-15513.59	3.76
Wind 330 deg - No Ice		-15406.26	-26904.07	1.66
Member Ice	5379.31			
Guy Ice	2617.59			
Total Weight Ice	43419.42			
Wind 0 deg - Ice		-40.77	-43781.34	-3.13
Wind 30 deg - Ice		21024.65	-36716.18	-6.46
Wind 60 deg - Ice		35731.14	-21019.54	-6.50
Wind 90 deg - Ice		41279.02	18.25	-4.50
Wind 120 deg - Ice		36572.57	24080.75	1.09
Wind 150 deg - Ice		20284.40	38258.53	2.96
Wind 180 deg - Ice		40.77	43333.50	3.08
Wind 210 deg - Ice		-20213.79	38217.76	2.40
Wind 240 deg - Ice		-36531.80	24010.14	2.04
Wind 270 deg - Ice		-41279.02	-63.29	4.50
Wind 300 deg - Ice		-35771.91	-21090.16	3.41
Wind 330 deg - Ice		-21095.26	-36756.95	1.10
Total Weight	26350.42			
Wind 0 deg - Service		-39.67	-31723.02	-2.45
Wind 30 deg - Service		15337.56	-26864.41	-5.88
Wind 60 deg - Service		26081.22	-15444.88	-6.19
Wind 90 deg - Service		29914.76	17.46	-4.52
Wind 120 deg - Service		26145.09	18020.32	0.72
Wind 150 deg - Service		14606.82	28384.53	2.34
Wind 180 deg - Service		39.67	32165.05	2.43
Wind 210 deg - Service		-14538.11	28344.86	1.87
Wind 240 deg - Service		-26105.42	17951.61	1.73
Wind 270 deg - Service		-29914.76	-61.87	4.52
Wind 300 deg - Service		-26120.88	-15513.59	3.76
Wind 330 deg - Service		-15406.26	-26904.07	1.66

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice+Guy
3	Dead+Wind 30 deg - No Ice+Guy
4	Dead+Wind 60 deg - No Ice+Guy
5	Dead+Wind 90 deg - No Ice+Guy
6	Dead+Wind 120 deg - No Ice+Guy
7	Dead+Wind 150 deg - No Ice+Guy
8	Dead+Wind 180 deg - No Ice+Guy

Comb. No.	Description
9	Dead+Wind 210 deg - No Ice+Guy
10	Dead+Wind 240 deg - No Ice+Guy
11	Dead+Wind 270 deg - No Ice+Guy
12	Dead+Wind 300 deg - No Ice+Guy
13	Dead+Wind 330 deg - No Ice+Guy
14	Dead+Ice+Temp+Guy
15	Dead+Wind 0 deg+Ice+Temp+Guy
16	Dead+Wind 30 deg+Ice+Temp+Guy
17	Dead+Wind 60 deg+Ice+Temp+Guy
18	Dead+Wind 90 deg+Ice+Temp+Guy
19	Dead+Wind 120 deg+Ice+Temp+Guy
20	Dead+Wind 150 deg+Ice+Temp+Guy
21	Dead+Wind 180 deg+Ice+Temp+Guy
22	Dead+Wind 210 deg+Ice+Temp+Guy
23	Dead+Wind 240 deg+Ice+Temp+Guy
24	Dead+Wind 270 deg+Ice+Temp+Guy
25	Dead+Wind 300 deg+Ice+Temp+Guy
26	Dead+Wind 330 deg+Ice+Temp+Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	21	13280.81	-0.01	-0.23
			Max. Compression	25	-22309.63	0.06	0.12
			Max. Mx	24	-1428.86	1.30	0.00
			Max. My	15	-3065.96	-0.13	1.23
			Max. Vy	18	-1779.95	-1.28	0.04
			Max. Vx	15	1592.80	-0.13	1.23
		Diagonal	Max Tension	20	3252.64	0.00	0.00
			Max. Compression	23	-2666.95	0.00	0.00
			Max. Mx	21	1776.83	-0.04	0.00
			Max. My	16	-1435.49	-0.01	0.02
			Max. Vy	21	-22.77	0.00	0.00
			Max. Vx	16	-8.24	-0.01	0.02
		Top Girt	Max Tension	15	66.14	0.00	0.00
			Max. Compression	21	-153.11	0.00	0.00
			Max. Mx	14	-24.27	-0.01	0.00
			Max. My	18	-95.85	0.00	0.00
			Max. Vy	14	-6.58	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Bottom Girt	Max Tension	24	872.55	0.00	0.00
			Max. Compression	17	-892.61	0.00	0.00
			Max. Mx	14	-4.44	-0.01	0.00
			Max. My	18	-876.62	0.00	0.00
			Max. Vy	14	-6.58	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	18	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	14189.90		
			Top Tension	21	14439.46		
			Top Cable Vert	21	10044.02		
			Top Cable Norm	21	10373.79		
			Top Cable Tan	21	7.03		
			Bot Cable Vert	21	-9306.21		
			Bot Cable Norm	21	10712.03		
			Bot Cable Tan	21	7.82		
		Guy B	Bottom Tension	25	13339.39		
			Top Tension	25	13589.05		
			Top Cable Vert	25	9470.23		
			Top Cable Norm	25	9745.61		
			Top Cable Tan	25	8.95		
			Bot Cable Vert	25	-8732.42		
			Bot Cable Norm	25	10083.85		
			Bot Cable Tan	25	5.89		
		Guy C	Bottom Tension	17	13407.52		
			Top Tension	17	13657.17		
			Top Cable Vert	17	9516.18		
			Top Cable Norm	17	9795.95		
			Top Cable Tan	17	9.25		
			Bot Cable Vert	17	-8778.38		
			Bot Cable Norm	17	10134.19		
			Bot Cable Tan	17	5.60		
		Torque Arm Top	Max Tension	21	15870.01	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	8401.11	0.02	0.00
			Max. My	18	14516.28	0.00	-0.00
			Max. Vy	18	25.42	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Torque Arm Bottom	Max Tension	10	1453.48	0.00	0.00
			Max. Compression	21	-21436.10	0.00	0.00
			Max. Mx	19	-14941.57	0.07	0.00
			Max. My	18	-1651.21	0.00	0.00
			Max. Vy	19	-61.87	0.00	0.00
			Max. Vx	18	-0.31	0.00	0.00
T2	160 - 140	Leg	Max Tension	11	618.26	-0.43	0.13
			Max. Compression	25	-24394.38	0.12	-0.23
			Max. Mx	24	-21189.73	-1.21	0.06
			Max. My	15	-15146.97	0.22	-1.10
			Max. Vy	18	-1775.45	-0.19	0.01
			Max. Vx	21	-1589.43	-0.07	-0.24
		Diagonal	Max Tension	21	3122.20	0.00	0.00
			Max. Compression	16	-3749.21	0.00	0.00
			Max. Mx	20	1413.04	0.00	0.00
			Max. My	24	-176.62	0.00	-0.00
			Max. Vy	20	-3.62	0.00	0.00
			Max. Vx	24	0.02	0.00	0.00
		Top Girt	Max Tension	25	970.06	0.00	0.00
			Max. Compression	18	-1023.80	0.00	0.00
			Max. Mx	14	-26.78	0.00	0.00
			Max. My	18	82.91	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	1642.52	0.00	0.00
			Max. Compression	21	-1594.71	0.00	0.00
			Max. Mx	14	24.99	0.00	0.00
			Max. My	20	-1345.52	0.00	0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T3	140 - 120	Leg	Max Tension	21	6864.75	0.01	-0.38
			Max. Compression	15	-35281.59	0.01	0.68
			Max. Mx	18	-19405.20	-1.01	-0.02
			Max. My	15	-22902.57	0.07	1.12
			Max. Vy	24	1520.09	0.92	-0.21
			Max. Vx	15	1720.07	0.07	1.12
		Diagonal	Max Tension	26	3616.28	0.00	0.00
			Max. Compression	23	-3646.07	-0.01	-0.00
			Max. Mx	21	2396.55	-0.09	-0.00
			Max. My	16	-1670.55	-0.01	0.03
			Max. Vy	21	-45.92	0.00	0.00
			Max. Vx	16	-13.20	-0.01	0.03
		Top Girt	Max Tension	23	929.12	0.00	0.00
			Max. Compression	17	-429.97	0.00	0.00
			Max. Mx	14	184.31	-0.01	0.00
			Max. My	20	773.67	0.00	-0.00
			Max. Vy	14	7.45	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	1130.57	0.00	0.00
			Max. Compression	25	-449.02	0.00	0.00
			Max. Mx	14	257.35	-0.01	0.00
			Max. My	20	-374.18	0.00	0.00
			Max. Vy	14	7.45	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	14666.03		
			Top Tension	21	14856.28		
			Top Cable Vert	21	8743.68		
			Top Cable Norm	21	12010.71		
			Top Cable Tan	21	4.88		
			Bot Cable Vert	21	-8166.62		
			Bot Cable Norm	21	12181.90		
			Bot Cable Tan	21	5.58		
		Guy B	Bottom Tension	25	14415.86		
			Top Tension	25	14606.12		
			Top Cable Vert	25	8600.61		
			Top Cable Norm	25	11805.44		
			Top Cable Tan	25	4.56		
			Bot Cable Vert	25	-8023.55		
			Bot Cable Norm	25	11976.63		
			Bot Cable Tan	25	5.90		
		Guy C	Bottom Tension	17	14550.26		
			Top Tension	17	14740.51		
			Top Cable Vert	17	8677.40		
			Top Cable Norm	17	11915.76		
			Top Cable Tan	17	4.97		
			Bot Cable Vert	17	-8100.34		
			Bot Cable Norm	17	12086.95		
			Bot Cable Tan	17	5.49		
		Torque Arm Top	Max Tension	16	14594.89	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	7064.58	0.02	0.00
			Max. My	20	14122.70	0.00	0.00
			Max. Vy	21	25.42	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Torque Arm Bottom	Max Tension	23	3458.34	0.00	0.00
			Max. Compression	21	-20234.17	0.00	0.00
			Max. Mx	19	-11635.94	0.07	0.00
			Max. My	20	2149.97	0.00	-0.00
			Max. Vy	19	-61.84	0.00	0.00
			Max. Vx	20	-0.17	0.00	0.00
T4	120 - 100	Leg	Max Tension	6	623.22	-0.13	-0.14

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	17	-47121.41	-0.10	-0.31
			Max. Mx	24	-15670.26	-0.95	-0.04
			Max. My	15	-24598.09	-0.09	-1.01
			Max. Vy	24	1513.85	-0.02	-0.13
			Max. Vx	15	1716.34	0.12	0.07
		Diagonal	Max Tension	22	4031.87	0.00	0.00
			Max. Compression	16	-4722.73	0.00	0.00
			Max. Mx	19	3188.54	-0.02	0.00
			Max. My	20	-544.82	0.00	0.00
			Max. Vy	19	17.05	0.00	0.00
			Max. Vx	20	-0.06	0.00	0.00
		Horizontal	Max Tension	25	1334.52	0.00	0.00
			Max. Compression	17	-816.17	0.00	0.00
			Max. Mx	14	487.67	-0.01	0.00
			Max. My	20	737.30	0.00	0.00
			Max. Vy	14	17.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Top Girt	Max Tension	15	2227.06	0.00	0.00
			Max. Compression	21	-1926.75	0.00	0.00
			Max. Mx	14	68.82	-0.01	0.00
			Max. My	20	82.06	0.00	0.00
			Max. Vy	14	-17.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Bottom Girt	Max Tension	25	865.89	0.00	0.00
			Max. Compression	19	-419.49	0.00	0.00
			Max. Mx	14	243.37	-0.01	0.00
			Max. My	20	-187.18	0.00	0.00
			Max. Vy	14	-17.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T5	100 - 80	Leg	Max Tension	2	1608.68	-0.19	0.06
			Max. Compression	17	-48472.38	-0.32	-0.45
			Max. Mx	18	-27376.69	0.72	0.12
			Max. My	21	-26512.57	-0.01	0.75
			Max. Vy	24	-1747.39	0.50	0.09
			Max. Vx	21	1631.00	-0.16	-0.45
		Diagonal	Max Tension	16	3176.72	0.00	0.00
			Max. Compression	16	-5039.32	0.00	0.00
			Max. Mx	26	1171.88	-0.01	0.00
			Max. My	20	235.36	0.00	0.00
			Max. Vy	26	10.91	0.00	0.00
			Max. Vx	20	-0.05	0.00	0.00
		Horizontal	Max Tension	17	2775.44	0.00	0.00
			Max. Compression	19	-1104.77	0.00	0.00
			Max. Mx	14	1143.55	-0.01	0.00
			Max. My	20	1069.12	0.00	0.00
			Max. Vy	14	17.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Top Girt	Max Tension	19	756.33	0.00	0.00
			Max. Compression	10	-251.14	0.00	0.00
			Max. Mx	14	173.93	0.00	0.00
			Max. My	20	627.84	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Bottom Girt	Max Tension	18	934.64	0.00	0.00
			Max. Compression	25	-495.16	0.00	0.00
			Max. Mx	14	205.72	0.00	0.00
			Max. My	20	837.45	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Guy A	Bottom Tension	21	8136.59		
			Top Tension	21	8223.41		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Top Cable Vert	21	4385.32		
			Top Cable Norm	21	6956.54		
			Top Cable Tan	21	0.42		
			Bot Cable Vert	21	-4087.17		
			Bot Cable Norm	21	7035.56		
			Bot Cable Tan	21	0.42		
		Guy B	Bottom Tension	25	8140.34		
			Top Tension	25	8227.17		
			Top Cable Vert	25	4289.86		
			Top Cable Norm	25	7020.22		
			Top Cable Tan	25	0.51		
			Bot Cable Vert	25	-3989.66		
			Bot Cable Norm	25	7095.61		
			Bot Cable Tan	25	0.51		
		Guy C	Bottom Tension	17	8038.29		
			Top Tension	17	8125.16		
			Top Cable Vert	17	4115.87		
			Top Cable Norm	17	7005.55		
			Top Cable Tan	17	0.17		
			Bot Cable Vert	17	-3812.89		
			Bot Cable Norm	17	7076.44		
			Bot Cable Tan	17	0.17		
		Top Guy Pull-Off	Max Tension	17	2081.58	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	857.67	0.01	0.00
			Max. My	20	1811.20	0.00	-0.00
			Max. Vy	14	-13.54	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T6	80 - 60	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50961.07	0.46	0.09
			Max. Mx	18	-14958.84	-1.43	-0.20
			Max. My	15	-23513.39	0.02	1.45
			Max. Vy	24	1933.16	1.13	-0.31
			Max. Vx	15	1817.80	0.26	1.22
		Diagonal	Max Tension	16	4818.29	0.00	0.00
			Max. Compression	22	-6697.44	0.00	0.00
			Max. Mx	26	3467.63	-0.02	0.00
			Max. My	20	-3200.00	0.00	0.00
			Max. Vy	26	-17.10	0.00	0.00
			Max. Vx	20	-0.08	0.00	0.00
		Horizontal	Max Tension	15	1431.35	0.00	0.00
			Max. Compression	26	-882.67	0.00	0.00
			Max. Mx	14	666.56	0.01	0.00
			Max. My	20	1013.89	0.00	-0.00
			Max. Vy	14	-6.12	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Top Girt	Max Tension	25	1328.86	0.00	0.00
			Max. Compression	18	-549.61	0.00	0.00
			Max. Mx	14	273.69	-0.01	0.00
			Max. My	20	-384.48	0.00	0.00
			Max. Vy	14	-17.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Bottom Girt	Max Tension	18	5356.59	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	2509.43	-0.01	0.00
			Max. My	24	4187.04	0.00	0.00
			Max. Vy	14	-17.02	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	17871.16		
			Top Tension	21	17986.97		
			Top Cable Vert	21	6968.84		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Top Cable Norm	21	16582.11		
			Top Cable Tan	21	1.17		
			Bot Cable Vert	21	-6585.19		
			Bot Cable Norm	21	16613.66		
			Bot Cable Tan	21	1.17		
		Guy B	Bottom Tension	25	17795.54		
			Top Tension	25	17911.36		
			Top Cable Vert	25	6761.03		
			Top Cable Norm	25	16586.30		
			Top Cable Tan	25	1.30		
			Bot Cable Vert	25	-6370.59		
			Bot Cable Norm	25	16616.16		
			Bot Cable Tan	25	1.30		
		Guy C	Bottom Tension	17	17515.91		
			Top Tension	17	17631.75		
			Top Cable Vert	17	6436.74		
			Top Cable Norm	17	16414.83		
			Top Cable Tan	17	0.41		
			Bot Cable Vert	17	-6037.11		
			Bot Cable Norm	17	16442.64		
			Bot Cable Tan	17	0.41		
		Top Guy Pull-Off	Max Tension	18	4017.45	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	1882.07	0.01	0.00
			Max. My	24	3140.28	0.00	-0.00
			Max. Vy	14	-13.54	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T7	60 - 40	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50966.47	0.07	-0.80
			Max. Mx	24	-46760.58	-1.24	-0.30
			Max. My	20	-47731.10	0.35	1.25
			Max. Vy	18	-1922.13	-0.26	-0.22
			Max. Vx	15	1821.46	0.37	0.10
		Diagonal	Max Tension	26	4158.87	0.00	0.00
			Max. Compression	20	-5794.76	0.00	0.00
			Max. Mx	24	-5640.38	-0.02	0.00
			Max. My	24	-2530.98	0.00	0.00
			Max. Vy	24	17.08	0.00	0.00
			Max. Vx	24	-0.07	0.00	0.00
		Horizontal	Max Tension	20	1673.44	0.00	0.00
			Max. Compression	26	-882.77	0.00	0.00
			Max. Mx	14	642.04	0.01	0.00
			Max. My	24	1642.84	0.00	-0.00
			Max. Vy	14	-6.12	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Top Girt	Max Tension	19	2219.17	0.00	0.00
			Max. Compression	17	-1496.78	0.00	0.00
			Max. Mx	14	263.13	0.00	0.00
			Max. My	24	1997.90	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Bottom Girt	Max Tension	17	1245.18	0.00	0.00
			Max. Compression	20	-765.83	0.00	0.00
			Max. Mx	14	168.46	0.00	0.00
			Max. My	24	-730.38	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
T8	40 - 20	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-48328.76	0.11	0.18
			Max. Mx	24	-40802.20	-0.65	0.06
			Max. My	21	-42001.84	0.26	0.61

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	18	-1058.40	-0.22	-0.27
			Max. Vx	21	-1053.46	0.28	-0.04
		Diagonal	Max Tension	26	1861.48	0.00	0.00
			Max. Compression	20	-2307.75	0.00	0.00
			Max. Mx	23	412.82	0.00	0.00
			Max. My	23	-16.48	0.00	-0.00
			Max. Vy	23	-3.62	0.00	0.00
			Max. Vx	23	0.01	0.00	0.00
		Top Girt	Max Tension	20	1035.46	0.00	0.00
			Max. Compression	26	-634.24	0.00	0.00
			Max. Mx	14	166.78	0.00	0.00
			Max. My	24	1003.93	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	420.64	0.00	0.00
			Max. Compression	23	-232.31	0.00	0.00
			Max. Mx	14	72.28	0.00	0.00
			Max. My	18	42.42	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T9	20 - 5	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-48316.16	0.16	0.08
			Max. Mx	17	-42763.12	-2.44	1.26
			Max. My	21	-43359.89	0.19	-2.78
			Max. Vy	25	-4958.60	2.30	1.52
			Max. Vx	21	5766.15	0.19	-2.78
		Diagonal	Max Tension	23	1777.64	0.00	0.00
			Max. Compression	15	-2271.26	0.00	0.00
			Max. Mx	23	1777.64	-0.02	0.00
			Max. My	23	-99.23	0.00	0.00
			Max. Vy	23	17.11	0.00	0.00
			Max. Vx	23	-0.07	0.00	0.00
		Top Girt	Max Tension	23	470.61	0.00	0.00
			Max. Compression	15	-401.65	0.00	0.00
			Max. Mx	14	82.45	-0.01	0.00
			Max. My	18	217.88	0.00	0.00
			Max. Vy	14	-17.02	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Bottom Girt	Max Tension	16	3843.72	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	2356.90	-0.01	0.00
			Max. My	24	3687.19	0.00	0.00
			Max. Vy	14	-17.02	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
T10	5 - 0	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-46355.53	-0.32	0.11
			Max. Mx	21	-36149.70	-3.11	0.50
			Max. My	24	-37353.19	-2.95	0.60
			Max. Vy	21	10597.79	2.78	0.17
			Max. Vx	18	1179.22	-1.03	-0.28
		Horizontal	Max Tension	17	32.37	-0.01	0.02
			Max. Compression	24	-27.26	-0.07	0.03
			Max. Mx	18	-1.25	-0.65	-0.06
			Max. My	18	-1.25	-0.65	-0.06
			Max. Vy	18	399.44	-0.59	-0.02
			Max. Vx	18	60.67	-0.65	-0.06
		Top Girt	Max Tension	20	6499.65	-1.74	0.04
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	6456.63	-2.58	-0.11
			Max. My	24	6456.63	-2.58	-0.11
			Max. Vy	23	-364.08	-2.14	-0.05

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	21	-55.80	-2.52	-0.09
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-2818.26	-1.03	0.06
			Max. Mx	17	-2636.85	-1.31	-0.07
			Max. My	23	-2401.66	-0.75	0.15
			Max. Vy	18	2809.12	-1.11	0.05
			Max. Vx	23	-667.47	-0.61	-0.08

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Mast	Max. Vert	21	118474.11	0.78	-1565.61
	Max. H_x	23	111943.96	1682.51	-1014.82
	Max. H_z	15	111254.95	-16.33	1952.36
	Max. M_x	1	0.00	-1.88	-1.68
	Max. M_z	1	0.00	-1.88	-1.68
	Max. Torsion	18	0.61	-1664.96	-41.41
	Min. Vert	1	66751.84	-1.88	-1.68
	Min. H_x	19	111544.49	-1694.45	-1011.15
	Min. H_z	21	118474.11	0.78	-1565.61
	Min. M_x	1	0.00	-1.88	-1.68
	Min. M_z	1	0.00	-1.88	-1.68
	Min. Torsion	24	-0.53	1645.25	-47.13
Guy C @ 184 ft Elev 0 ft Azimuth 240 deg	Max. Vert	10	-1041.47	-1051.26	607.28
	Max. H_x	35	-1041.47	-1051.26	607.28
	Max. H_z	17	-33141.31	-37828.01	21863.84
	Min. Vert	17	-33141.31	-37828.01	21863.84
	Min. H_x	17	-33141.31	-37828.01	21863.84
	Min. H_z	10	-1041.47	-1051.26	607.28
Guy B @ 184 ft Elev 0 ft Azimuth 120 deg	Max. Vert	6	-1049.72	1058.46	612.25
	Max. H_x	25	-33181.83	37874.63	21880.57
	Max. H_z	25	-33181.83	37874.63	21880.57
	Min. Vert	25	-33181.83	37874.63	21880.57
	Min. H_x	6	-1049.72	1058.46	612.25
	Min. H_z	6	-1049.72	1058.46	612.25
Guy A @ 184 ft Elev 0 ft Azimuth 0 deg	Max. Vert	2	-1015.42	-0.64	-1185.44
	Max. H_x	24	-18329.88	2062.86	-23620.18
	Max. H_z	2	-1015.42	-0.64	-1185.44
	Min. Vert	21	-34656.08	9.00	-45404.60
	Min. H_x	18	-18335.95	-2062.78	-23628.56
	Min. H_z	21	-34656.08	9.00	-45404.60
Guy C @ 161.2 ft Elev 0 ft Azimuth 240 deg	Max. Vert	23	-386.01	-1149.74	663.82
	Max. H_x	23	-386.01	-1149.74	663.82
	Max. H_z	17	-9850.00	-20368.42	11759.04
	Min. Vert	17	-9850.00	-20368.42	11759.04
	Min. H_x	17	-9850.00	-20368.42	11759.04
	Min. H_z	23	-386.01	-1149.74	663.82

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Guy B @ 154.8 ft Elev 0 ft Azimuth 120 deg	Max. Vert	19	-359.35	1028.73	594.00
	Max. H_x	25	-10360.25	20535.90	11854.32
	Max. H_z	25	-10360.25	20535.90	11854.32
	Min. Vert	25	-10360.25	20535.90	11854.32
	Min. H_x	19	-359.35	1028.73	594.00
	Min. H_z	19	-359.35	1028.73	594.00
Guy A @ 150 ft Elev 0 ft Azimuth 0 deg	Max. Vert	15	-358.91	-0.03	-1120.87
	Max. H_x	24	-5626.44	602.40	-12512.61
	Max. H_z	15	-358.91	-0.03	-1120.87
	Min. Vert	21	-10672.35	1.59	-23649.22
	Min. H_x	18	-5602.33	-602.13	-12453.92
	Min. H_z	21	-10672.35	1.59	-23649.22

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	66751.84	1.88	1.68	0.00	0.00	-0.02
Dead+Wind 0 deg - No Ice+Guy	73854.06	7.69	-924.26	0.00	0.00	-0.31
Dead+Wind 30 deg - No Ice+Guy	75084.11	447.60	-727.77	0.00	0.00	-0.38
Dead+Wind 60 deg - No Ice+Guy	75444.04	737.55	-423.10	0.00	0.00	-0.47
Dead+Wind 90 deg - No Ice+Guy	74678.87	856.93	-15.16	0.00	0.00	-0.41
Dead+Wind 120 deg - No Ice+Guy	74093.07	795.86	483.77	0.00	0.00	-0.00
Dead+Wind 150 deg - No Ice+Guy	75774.05	402.46	756.85	0.00	0.00	0.27
Dead+Wind 180 deg - No Ice+Guy	76681.80	-5.75	853.19	0.00	0.00	0.27
Dead+Wind 210 deg - No Ice+Guy	75916.92	-411.56	760.06	0.00	0.00	0.20
Dead+Wind 240 deg - No Ice+Guy	74370.20	-797.07	488.18	0.00	0.00	0.25
Dead+Wind 270 deg - No Ice+Guy	75020.40	-852.44	-8.43	0.00	0.00	0.37
Dead+Wind 300 deg - No Ice+Guy	75771.75	-727.61	-416.09	0.00	0.00	0.14
Dead+Wind 330 deg - No Ice+Guy	75262.10	-433.74	-722.79	0.00	0.00	-0.16
Dead+Ice+Temp+Guy	93248.85	8.11	7.24	0.00	0.00	-0.03
Dead+Wind 0 deg+Ice+Temp+Guy	111254.95	16.33	-1952.36	0.00	0.00	-0.36
Dead+Wind 30 deg+Ice+Temp+Guy	114866.78	809.64	-1445.28	0.00	0.00	-0.28
Dead+Wind 60 deg+Ice+Temp+Guy	116727.50	1357.81	-774.04	0.00	0.00	-0.52
Dead+Wind 90 deg+Ice+Temp+Guy	114462.85	1664.96	41.41	0.00	0.00	-0.61
Dead+Wind 120	111544.49	1694.45	1011.15	0.00	0.00	-0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
deg+Ice+Temp+Guy Dead+Wind 150	115930.22	851.74	1430.60	0.00	0.00	0.42
deg+Ice+Temp+Guy Dead+Wind 180	118474.11	-0.78	1565.61	0.00	0.00	0.28
deg+Ice+Temp+Guy Dead+Wind 210	116133.36	-849.01	1433.71	0.00	0.00	0.05
deg+Ice+Temp+Guy Dead+Wind 240	111943.96	-1682.51	1014.82	0.00	0.00	0.26
deg+Ice+Temp+Guy Dead+Wind 270	114970.11	-1645.25	47.13	0.00	0.00	0.53
deg+Ice+Temp+Guy Dead+Wind 300	117251.17	-1332.30	-766.35	0.00	0.00	0.13
deg+Ice+Temp+Guy Dead+Wind 330	115150.83	-779.19	-1439.03	0.00	0.00	-0.33
deg+Ice+Temp+Guy Dead+Wind 0 deg - Service+Guy	73854.06	7.69	-924.26	0.00	0.00	-0.31
Dead+Wind 30 deg - Service+Guy	75084.11	447.60	-727.77	0.00	0.00	-0.38
Dead+Wind 60 deg - Service+Guy	75444.04	737.55	-423.10	0.00	0.00	-0.47
Dead+Wind 90 deg - Service+Guy	74678.87	856.93	-15.16	0.00	0.00	-0.41
Dead+Wind 120 deg - Service+Guy	74093.07	795.86	483.77	0.00	0.00	-0.00
Dead+Wind 150 deg - Service+Guy	75774.05	402.46	756.85	0.00	0.00	0.27
Dead+Wind 180 deg - Service+Guy	76681.80	-5.75	853.19	0.00	0.00	0.27
Dead+Wind 210 deg - Service+Guy	75916.92	-411.56	760.06	0.00	0.00	0.20
Dead+Wind 240 deg - Service+Guy	74370.20	-797.07	488.18	0.00	0.00	0.25
Dead+Wind 270 deg - Service+Guy	75020.40	-852.44	-8.43	0.00	0.00	0.37
Dead+Wind 300 deg - Service+Guy	75771.75	-727.61	-416.09	0.00	0.00	0.14
Dead+Wind 330 deg - Service+Guy	75262.10	-433.74	-722.79	0.00	0.00	-0.16

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-26350.05	0.00	0.25	26349.97	-0.39	0.002%
2	-46.11	-26639.79	-35173.77	46.12	26639.69	35171.22	0.006%
3	17045.04	-26349.46	-29834.34	-17045.24	26349.42	29833.02	0.003%
4	29050.58	-26057.98	-17164.84	-29050.44	26057.94	17162.82	0.005%
5	33329.32	-26349.71	21.02	-33328.58	26349.68	-20.42	0.002%
6	29120.72	-26640.79	19751.33	-29118.62	26640.69	-19750.19	0.005%
7	16324.84	-26350.30	31365.61	-16323.65	26350.26	-31365.21	0.003%
8	46.11	-26060.30	35615.80	-46.28	26060.27	-35614.70	0.003%
9	-16245.59	-26350.64	31314.80	16244.42	26350.60	-31314.40	0.003%
10	-29074.79	-26642.11	19671.56	29072.73	26642.02	-19670.45	0.005%
11	-33329.32	-26350.39	-65.43	33328.60	26350.36	66.02	0.002%
12	-29096.51	-26059.31	-17244.60	29096.32	26059.27	17242.71	0.004%
13	-17124.28	-26349.80	-29885.15	17124.50	26349.76	29883.83	0.003%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
14	0.00	-43418.73	0.00	-0.95	43418.64	0.74	0.003%
15	-58.23	-44180.75	-52849.24	58.24	44180.69	52847.89	0.002%
16	25510.84	-43417.15	-44520.53	-25511.30	43417.09	44518.54	0.003%
17	43532.28	-42650.46	-25538.70	-43532.46	42650.45	25538.09	0.001%
18	50250.42	-43417.81	27.94	-50249.22	43417.76	-26.81	0.002%
19	44390.67	-44183.66	28629.87	-44389.53	44183.61	-28629.26	0.002%
20	24799.22	-43419.40	46093.09	-24797.36	43419.34	-46092.60	0.003%
21	58.23	-42656.71	52401.40	-59.19	42656.61	-52398.90	0.004%
22	-24699.98	-43420.31	46022.12	24698.14	43420.26	-46021.63	0.003%
23	-44332.94	-44187.00	28529.29	44331.84	44186.95	-28528.70	0.002%
24	-50250.42	-43419.64	-72.99	50249.26	43419.59	74.09	0.002%
25	-43590.14	-42654.05	-25639.34	43590.24	42654.01	25637.85	0.002%
26	-25610.08	-43418.06	-44591.50	25610.57	43418.00	44589.51	0.003%
27	-46.11	-26639.79	-35173.77	46.12	26639.69	35171.22	0.006%
28	17045.04	-26349.46	-29834.34	-17045.24	26349.42	29833.02	0.003%
29	29050.58	-26057.98	-17164.84	-29050.44	26057.94	17162.82	0.005%
30	33329.32	-26349.71	21.02	-33328.58	26349.68	-20.42	0.002%
31	29120.72	-26640.79	19751.33	-29118.62	26640.69	-19750.19	0.005%
32	16324.84	-26350.30	31365.61	-16323.65	26350.26	-31365.21	0.003%
33	46.11	-26060.30	35615.80	-46.28	26060.27	-35614.70	0.003%
34	-16245.59	-26350.64	31314.80	16244.42	26350.60	-31314.40	0.003%
35	-29074.79	-26642.11	19671.56	29072.73	26642.02	-19670.45	0.005%
36	-33329.32	-26350.39	-65.43	33328.60	26350.36	66.02	0.002%
37	-29096.51	-26059.31	-17244.60	29096.32	26059.27	17242.71	0.004%
38	-17124.28	-26349.80	-29885.15	17124.50	26349.76	29883.83	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	8	0.00000001	0.00003369
2	Yes	13	0.00000001	0.00009869
3	Yes	13	0.00000001	0.00004719
4	Yes	10	0.00000001	0.00008899
5	Yes	13	0.00000001	0.00003940
6	Yes	13	0.00000001	0.00009357
7	Yes	13	0.00000001	0.00004151
8	Yes	10	0.00000001	0.00003809
9	Yes	13	0.00000001	0.00004151
10	Yes	13	0.00000001	0.00009164
11	Yes	13	0.00000001	0.00003856
12	Yes	10	0.00000001	0.00008753
13	Yes	13	0.00000001	0.00004714
14	Yes	6	0.00000001	0.00004683
15	Yes	15	0.00000001	0.00003728
16	Yes	14	0.00000001	0.00004053
17	Yes	12	0.00000001	0.00002994
18	Yes	14	0.00000001	0.00003644
19	Yes	15	0.00000001	0.00003600
20	Yes	14	0.00000001	0.00003587
21	Yes	10	0.00000001	0.00005272
22	Yes	14	0.00000001	0.00003645
23	Yes	15	0.00000001	0.00003517
24	Yes	14	0.00000001	0.00003542
25	Yes	11	0.00000001	0.00007819
26	Yes	14	0.00000001	0.00004009

27	Yes	13	0.00000001	0.00009869
28	Yes	13	0.00000001	0.00004719
29	Yes	10	0.00000001	0.00008899
30	Yes	13	0.00000001	0.00003940
31	Yes	13	0.00000001	0.00009357
32	Yes	13	0.00000001	0.00004151
33	Yes	10	0.00000001	0.00003809
34	Yes	13	0.00000001	0.00004151
35	Yes	13	0.00000001	0.00009164
36	Yes	13	0.00000001	0.00003856
37	Yes	10	0.00000001	0.00008753
38	Yes	13	0.00000001	0.00004714

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	5.236	33	0.1925	0.3940
T2	160 - 140	4.759	33	0.1673	0.3378
T3	140 - 120	4.218	33	0.1153	0.1783
T4	120 - 100	4.134	31	0.0849	0.1432
T5	100 - 80	4.235	31	0.1090	0.1486
T6	80 - 60	3.549	31	0.2483	0.1419
T7	60 - 40	2.460	35	0.2290	0.1391
T8	40 - 20	1.718	35	0.1703	0.1255
T9	20 - 5	0.981	35	0.2095	0.0742
T10	5 - 0	0.261	35	0.2421	0.0612

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	20' x 2" Dia Omni	33	5.214	0.1920	0.3930	45556
175.00	8.5 Dishw/radome	33	5.124	0.1900	0.3884	45556
167.65	Guy	33	4.954	0.1832	0.3730	18449
159.00	AIR21	33	4.731	0.1643	0.3312	12846
147.00	3"x20-ft Omni	33	4.393	0.1277	0.2302	26202
143.00	1.5"x2'omni	33	4.288	0.1210	0.1981	16168
142.00	2-ft Stand Off	33	4.264	0.1193	0.1910	14937
141.00	1.5"x2'omni	33	4.240	0.1177	0.1844	14050
137.00	3-ft Side Arm	33	4.155	0.1054	0.1635	13130
127.65	Guy	32	4.061	0.0920	0.1433	15412
126.00	APXVSPP18-C-A20 w/ Mount	27	4.066	0.0914	0.1426	15918
105.00	10' x 3" Dia Omni	31	4.265	0.0706	0.1480	6144
95.00	LNX-6515DS	31	4.143	0.1493	0.1481	5136
90.00	Guy	31	3.992	0.1871	0.1467	6007
88.00	GPS	31	3.917	0.2005	0.1458	6444
77.00	AM-X-CD-14-65-00TT-RET	35	3.389	0.2570	0.1415	13812
73.00	(2) RRUS-11	35	3.166	0.2614	0.1408	43885
72.00	DC6-48-60-18-8F Surge Arrestor	35	3.109	0.2611	0.1407	74990
60.61	Guy	35	2.490	0.2313	0.1391	7252

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	7.948	21	0.2257	0.4506
T2	160 - 140	7.420	21	0.1988	0.3954
T3	140 - 120	6.735	21	0.1621	0.2545
T4	120 - 100	6.354	21	0.1418	0.2349
T5	100 - 80	6.314	18	0.1653	0.2398
T6	80 - 60	5.514	23	0.3520	0.2152
T7	60 - 40	4.277	23	0.3019	0.2067
T8	40 - 20	3.339	23	0.2595	0.1791
T9	20 - 5	2.001	23	0.4098	0.0965
T10	5 - 0	0.538	23	0.4974	0.0798

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	20' x 2" Dia Omni	21	7.924	0.2243	0.4500	36324
175.00	8.5 Dishw/radome	21	7.829	0.2201	0.4471	36324
167.65	Guy	21	7.644	0.2168	0.4334	14710
159.00	AIR21	21	7.387	0.1975	0.3879	10277
147.00	3"x20-ft Omni	21	6.964	0.1786	0.2727	24824
143.00	1.5"x2'omni	21	6.829	0.1699	0.2594	14402
142.00	2-ft Stand Off	21	6.797	0.1674	0.2577	13053
141.00	1.5"x2'omni	21	6.765	0.1648	0.2561	12102
137.00	3-ft Side Arm	21	6.652	0.1531	0.2499	10999
127.65	Guy	21	6.453	0.1453	0.2385	12517
126.00	APXVSPP18-C-A20 w/ Mount	21	6.427	0.1480	0.2372	12845
105.00	10' x 3" Dia Omni	18	6.375	0.1095	0.2403	4607
95.00	LNX-6515DS	18	6.172	0.2233	0.2356	3936
90.00	Guy	19	5.975	0.2774	0.2290	4567
88.00	GPS	19	5.901	0.2965	0.2260	4852
77.00	AM-X-CD-14-65-00TT-RET	23	5.339	0.3604	0.2125	9327
73.00	(2) RRUS-11	23	5.088	0.3600	0.2102	22735
72.00	DC6-48-60-18-8F Surge Arrestor	23	5.023	0.3581	0.2097	35655
60.61	Guy	23	4.311	0.3057	0.2069	4888

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.7500	4	0.00	19438.60	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3252.64	4123.34	0.789 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	153.11	4123.34	0.037 ✔	1.333	Bolt Shear
T2	160	Leg	A325N	0.7500	4	28.20	19429.00	0.001 ✔	1.333	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.5000	1	3122.20	3197.25	0.977 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	970.05	2943.50	0.330 ✔	1.333	Member Bearing
T3	140	Leg	A325N	0.7500	4	0.00	19424.60	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3646.07	4123.34	0.884 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	929.12	4123.34	0.225 ✔	1.333	Bolt Shear
T4	120	Leg	A325N	0.7500	4	0.00	19417.80	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4722.73	6442.72	0.733 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.6250	1	1334.52	6442.72	0.207 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	1	2227.06	6442.72	0.346 ✔	1.333	Bolt Shear
T5	100	Leg	A325N	0.7500	4	155.26	19437.10	0.008 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.5000	1	5039.32	5890.49	0.856 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.6250	1	2775.44	6442.72	0.431 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	756.33	2943.50	0.257 ✔	1.333	Member Bearing
		Top Guy Pull-Off@90	A325N	0.6250	4	520.40	6442.72	0.081 ✔	1.333	Bolt Shear
T6	80	Leg	A325N	0.7500	4	0.00	19433.30	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6697.44	6442.72	1.040 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	1	1328.86	6442.72	0.206 ✔	1.333	Bolt Shear
		Top Guy Pull-Off@60.6146	A325N	0.6250	4	1004.36	6442.72	0.156 ✔	1.333	Bolt Shear
T7	60	Leg	A325N	0.7500	4	0.00	19411.80	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5794.76	6442.72	0.899 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	2219.17	2943.50	0.754 ✔	1.333	Member Bearing
T8	40	Leg	A325N	0.7500	4	0.00	19430.30	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1861.48	3197.25	0.582 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	1035.46	2943.50	0.352 ✔	1.333	Member Bearing
T9	20	Leg	A325N	0.7500	4	0.00	19437.80	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2271.26	6442.72	0.353 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	1	470.61	6442.72	0.073 ✔	1.333	Bolt Shear
T10	5	Leg	A325N	0.7500	4	0.00	18629.10	0.000 ✔	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T_a lb	Required S.F.	Actual S.F.
T1	167.65 (A) (448)	5/8 EHS	4240.00	42399.99	14258.20	21200.00	2.000	2.974 ✔
	167.65 (A) (449)	5/8 EHS	4240.00	42399.99	14439.50	21200.00	2.000	2.936 ✔

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T_a lb	Required S.F.	Actual S.F.
	167.65 (B) (442)	5/8 EHS	4240.00	42399.99	13138.30	21200.00	2.000	3.227 ✔
	167.65 (B) (443)	5/8 EHS	4240.00	42399.99	13589.00	21200.00	2.000	3.120 ✔
	167.65 (C) (436)	5/8 EHS	4240.00	42399.99	13657.20	21200.00	2.000	3.105 ✔
	167.65 (C) (437)	5/8 EHS	4240.00	42399.99	13028.80	21200.00	2.000	3.254 ✔
T3	127.65 (A) (466)	5/8 EHS	4240.00	42399.99	14563.20	21200.00	2.000	2.911 ✔
	127.65 (A) (467)	5/8 EHS	4240.00	42399.99	14856.30	21200.00	2.000	2.854 ✔
	127.65 (B) (460)	5/8 EHS	4240.00	42399.99	14559.40	21200.00	2.000	2.912 ✔
	127.65 (B) (461)	5/8 EHS	4240.00	42399.99	14606.10	21200.00	2.000	2.903 ✔
	127.65 (C) (454)	5/8 EHS	4240.00	42399.99	14740.50	21200.00	2.000	2.876 ✔
	127.65 (C) (455)	5/8 EHS	4240.00	42399.99	14402.90	21200.00	2.000	2.944 ✔
T5	90.00 (A) (483)	7/16 EHS	2080.00	20800.02	8223.41	10400.00	2.000	2.529 ✔
	90.00 (B) (482)	7/16 EHS	2080.00	20800.02	8227.17	10400.00	2.000	2.528 ✔
	90.00 (C) (478)	7/16 EHS	2080.00	20800.02	8125.16	10400.00	2.000	2.560 ✔
T6	60.61 (A) (477)	3/4 EHS	5830.00	58299.91	17987.00	29150.00	2.000	3.241 ✔
	60.61 (B) (476)	3/4 EHS	5830.00	58299.91	17911.40	29150.00	2.000	3.255 ✔
	60.61 (C) (472)	3/4 EHS	5830.00	58299.91	17631.70	29150.00	2.000	3.307 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-22309.60	46328.80	0.482 ✔
T2	160 - 140	P2.5x.203	20.00	2.35	59.4 K=2.00	1.00	22.813	1.7040	-24394.40	38874.80	0.628 ✔
T3	140 - 120	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-35281.60	46328.80	0.762 ✔
T4	120 - 100	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-47121.40	46328.80	1.017 ✔
T5	100 - 80	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-48472.40	46328.80	1.046 ✔
T6	80 - 60	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-50961.10	46328.80	1.100 ✔
T7	60 - 40	P2.5x.203	20.00	2.35	29.7 K=1.00	0.96	26.018	1.7040	-50960.30	44335.80	1.149

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T8	40 - 20	P2.5x.203	20.00	2.35	59.4 K=2.00	1.00	22.813	1.7040	-48328.80	38874.80	1.243
T9	20 - 5	P2.5x.203	15.00	2.30	58.1 K=2.00	1.00	23.032	1.7040	-48310.00	39248.30	1.231
T10	5 - 0	P2.5x.203	5.37	2.15	27.2 K=1.00	0.94	25.781	1.7040	-46355.50	43932.00	1.055

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	4.14	1.81	77.4 K=1.22	15.640	0.6211	-2666.95	9713.78	0.275
T2	160 - 140	ROHN TS1.5x16 ga	4.14	3.85	90.5 K=1.00	13.897	0.2627	-3749.21	3651.52	1.027
T3	140 - 120	L2x2x3/16	4.14	1.81	71.3 K=1.29	16.291	0.7150	-3646.07	11648.20	0.313
T4	120 - 100	L2 1/2x2 1/2x1/2	4.14	3.58	104.1 K=1.18	12.455	2.2500	-4722.73	28023.90	0.169
T5	100 - 80	L2 1/2x2 1/2x1/4	4.14	3.62	104.2 K=1.18	12.274	1.1900	-5039.32	14605.50	0.345
T6	80 - 60	L2 1/2x2 1/2x1/2	4.14	3.58	104.1 K=1.18	12.455	2.2500	-6697.44	28023.90	0.239
T7	60 - 40	L2 1/2x2 1/2x1/2	4.14	3.58	104.1 K=1.18	12.455	2.2500	-5794.76	28023.90	0.207
T8	40 - 20	ROHN TS1.5x16 ga	4.14	3.85	90.5 K=1.00	13.897	0.2627	-2307.75	3651.52	0.632
T9	20 - 5	L2 1/2x2 1/2x1/2	4.11	3.55	103.7 K=1.19	12.498	2.2500	-2271.26	28120.20	0.081

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	15.680	2.2500	-816.17	35280.90	0.023
T5	100 - 80	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	15.680	2.2500	-1104.77	35280.90	0.031
T6	80 - 60	1	3.41	3.17	152.2 K=1.00	6.448	0.7854	-882.67	5064.38	0.174
T7	60 - 40	1	3.41	3.17	152.2 K=1.00	6.448	0.7854	-882.77	5064.38	0.174

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T10	5 - 0	C12x20.7	1.70	1.47	49.0 K=1.00	18.437	6.0900	-27.26	112281.00	0.000 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	3.41	2.94	111.4 K=1.08	11.485	0.6211	-153.11	7133.13	0.021 ✔
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-1023.80	4190.65	0.244 ✔
T3	140 - 120	L2x2x3/16	3.41	2.94	104.8 K=1.17	12.362	0.7150	-429.97	8839.01	0.049 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	13.512	2.2500	-1926.75	30401.80	0.063 ✔
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-251.14	4190.65	0.060 ✔
T6	80 - 60	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	13.512	2.2500	-549.61	30401.80	0.018 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-1496.78	4190.65	0.357 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-634.24	4190.65	0.151 ✔
T9	20 - 5	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	13.512	2.2500	-401.65	30401.80	0.013 ✔

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	3.41	3.17	115.4 K=1.04	10.934	0.6211	-892.61	6791.15	0.131 ✔
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-1594.71	4102.70	0.389 ✔
T3	140 - 120	L2x2x3/16	3.41	3.17	108.3 K=1.12	11.902	0.7150	-449.02	8510.09	0.053 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	3.17	99.1 K=1.27	13.096	2.2500	-419.49	29466.80	0.014 ✔
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-495.16	4102.70	0.121 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-765.83	4102.70	0.187 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-232.31	4102.70	0.057 ✔
T10	5 - 0	C12x20.7	0.34	0.10	3.5	21.459	6.0900	-2818.26	130688.00	0.022

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
					K=1.00					✔

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T5	100 - 80	4 1/2x3/8	3.41	3.17	351.4 K=1.00	21.600	1.6875	0.00	2040.24	0.000*
T6	80 - 60	4 1/2x3/8	3.41	3.17	351.4 K=1.00	21.600	1.6875	0.00	2040.24	0.000*

* DL controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T5	100 - 80	4 1/2x3/8	0.01	-0.109	27.000	0.004	0.00	0.000	27.000	0.000
T6	80 - 60	4 1/2x3/8	0.01	-0.109	27.000	0.004	0.00	0.000	27.000	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	100 - 80	4 1/2x3/8	0.000	0.004	0.000	0.004* ✔	1.000	H1-3 ✔
T6	80 - 60	4 1/2x3/8	0.000	0.004	0.000	0.004* ✔	1.000	H1-3 ✔

* DL controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160 (440)	XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19678.20	52701.60	0.373 ✔
T1	180 - 160 (441)	d/t > 13000/Fy - 440 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-21436.10	52701.60	0.407

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160 (446)	d/t > 13000/Fy - 441 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19819.10	52701.60	0.376 ✔
T1	180 - 160 (447)	d/t > 13000/Fy - 446 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19666.00	52701.60	0.373 ✔
T1	180 - 160 (452)	d/t > 13000/Fy - 447 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19600.00	52701.60	0.372 ✔
T1	180 - 160 (453)	d/t > 13000/Fy - 452 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-21211.10	52701.60	0.402 ✔
T3	140 - 120 (458)	d/t > 13000/Fy - 453 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19988.40	52701.60	0.379 ✔
T3	140 - 120 (459)	d/t > 13000/Fy - 458 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-20234.20	52701.60	0.384 ✔
T3	140 - 120 (464)	d/t > 13000/Fy - 459 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-20008.60	52701.60	0.380 ✔
T3	140 - 120 (465)	d/t > 13000/Fy - 464 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19931.60	52701.60	0.378 ✔
T3	140 - 120 (470)	d/t > 13000/Fy - 465 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19956.50	52701.60	0.379 ✔
T3	140 - 120 (471)	d/t > 13000/Fy - 470 XP34.5x.03325	4.36	4.21	4.1 K=1.00	14.638	3.6003	-20084.20	52701.60	0.381 ✔
		d/t > 13000/Fy - 471								

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	P2.5x.203	20.00	2.35	29.7	30.000	1.7040	13280.80	51121.50	0.260 ✔
T2	160 - 140	P2.5x.203	20.00	2.35	29.7	30.000	1.7040	618.26	51121.50	0.012 ✔
T3	140 - 120	P2.5x.203	20.00	2.35	29.7	30.000	1.7040	6864.75	51121.50	0.134 ✔
T4	120 - 100	P2.5x.203	20.00	0.61	7.8	30.000	1.7040	623.22	51121.50	0.012 ✔
T5	100 - 80	P2.5x.203	20.00	2.35	29.7	30.000	1.7040	1608.68	51121.50	0.031

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	4.14	1.81	43.0	29.000	0.3779	3252.64	10960.00	0.297
T2	160 - 140	ROHN TS1.5x16 ga	4.14	3.85	90.5	21.000	0.2627	3122.20	5517.75	0.566
T3	140 - 120	L2x2x3/16	4.14	1.81	37.4	29.000	0.4484	3616.28	13002.40	0.278
T4	120 - 100	L2 1/2x2 1/2x1/2	4.14	3.58	62.5	29.000	1.4063	4031.87	40781.30	0.099
T5	100 - 80	L2 1/2x2 1/2x1/4	4.14	3.62	60.1	31.500	0.7753	3176.72	24422.30	0.130
T6	80 - 60	L2 1/2x2 1/2x1/2	4.14	3.58	62.5	29.000	1.4063	4818.29	40781.30	0.118
T7	60 - 40	L2 1/2x2 1/2x1/2	4.14	3.58	62.5	29.000	1.4063	4158.87	40781.30	0.102
T8	40 - 20	ROHN TS1.5x16 ga	4.14	3.85	90.5	21.000	0.2627	1861.48	5517.75	0.337
T9	20 - 5	L2 1/2x2 1/2x1/2	4.11	3.55	62.1	29.000	1.4063	1777.64	40781.30	0.044

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	32.500	1.4063	1334.52	45703.10	0.029
T5	100 - 80	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	32.500	1.4063	2775.44	45703.10	0.061
T6	80 - 60	1	3.41	3.17	152.2	21.600	0.7854	1431.35	16964.60	0.084
T7	60 - 40	1	3.41	3.17	152.2	21.600	0.7854	1673.44	16964.60	0.099
T10	5 - 0	C12x20.7	1.70	1.47	22.0	21.600	6.0900	32.37	131544.00	0.000

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	3.41	2.94	70.9	29.000	0.3779	66.14	10960.00	0.006 ✔
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	970.05	5675.41	0.171 ✔
T3	140 - 120	L2x2x3/16	3.41	2.94	61.7	29.000	0.4484	929.12	13002.40	0.071 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	29.000	1.4063	2227.06	40781.30	0.055 ✔
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	756.33	5675.41	0.133 ✔
T6	80 - 60	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	29.000	1.4063	1328.86	40781.30	0.033 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	2219.17	5675.41	0.391 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	1035.46	5675.41	0.182 ✔
T9	20 - 5	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	29.000	1.4063	470.61	40781.30	0.012 ✔
T10	5 - 0	C12x20.7	3.07	2.83	42.5	21.600	6.0900	6499.65	131544.00	0.049 ✔

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	3.41	3.17	70.9	21.600	0.6211	872.55	13415.60	0.065 ✔
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	1642.52	5517.75	0.298 ✔
T3	140 - 120	L2x2x3/16	3.41	3.17	61.7	21.600	0.7150	1130.57	15444.00	0.073 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	3.17	51.5	21.600	2.2500	865.89	48600.00	0.018 ✔
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	934.64	5517.75	0.169 ✔
T6	80 - 60	L2 1/2x2 1/2x1/2	3.41	3.17	51.5	21.600	2.2500	5356.59	48600.00	0.110 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	1245.18	5517.75	0.226 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	420.64	5517.75	0.076 ✔
T9	20 - 5	L2 1/2x2 1/2x1/2	3.41	3.17	51.5	21.600	2.2500	3843.72	48600.00	0.079 ✔

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T5	100 - 80	4 1/2x3/8	3.41	3.17	351.4	21.600	1.6875	2081.52	36450.00	0.057
T6	80 - 60	4 1/2x3/8	3.41	3.17	351.4	21.600	1.6875	4017.41	36450.00	0.110

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T5	100 - 80	4 1/2x3/8	0.01	0.109	27.000	0.004	0.00	0.000	27.000	0.000
T6	80 - 60	4 1/2x3/8	0.01	0.109	27.000	0.004	0.00	0.000	27.000	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	100 - 80	4 1/2x3/8	0.057	0.004	0.000	0.061 ✔	1.333	H2-1 ✔
T6	80 - 60	4 1/2x3/8	0.110	0.004	0.000	0.114 ✔	1.333	H2-1 ✔

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160 (438)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14656.50	66655.00	0.220 ✔
T1	180 - 160 (439)	P4x.237	3.67	3.55	28.2	21.000	3.1741	15859.10	66655.00	0.238 ✔
T1	180 - 160 (444)	P4x.237	3.67	3.55	28.2	21.000	3.1741	15838.60	66655.00	0.238 ✔
T1	180 - 160 (445)	P4x.237	3.67	3.55	28.2	21.000	3.1741	15869.30	66655.00	0.238 ✔
T1	180 - 160 (450)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14669.60	66655.00	0.220 ✔
T1	180 - 160 (451)	P4x.237	3.67	3.55	28.2	21.000	3.1741	15870.00	66655.00	0.238 ✔
T3	140 - 120 (456)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14114.40	66655.00	0.212 ✔
T3	140 - 120 (457)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14122.80	66655.00	0.212 ✔
T3	140 - 120 (462)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14290.70	66655.00	0.214 ✔
T3	140 - 120 (463)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14594.90	66655.00	0.219

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T3	140 - 120 (468)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14100.90	66655.00	0.212 ✔
T3	140 - 120 (469)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14389.00	66655.00	0.216 ✔

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	180 - 160 (440)	XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	1453.48	75606.90	0.019 ✔
T1	180 - 160 (441)	d/t > 13000/Fy - 440 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	1229.55	75606.90	0.016 ✔
T1	180 - 160 (446)	d/t > 13000/Fy - 441 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	877.18	75606.90	0.012 ✔
T1	180 - 160 (447)	d/t > 13000/Fy - 446 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	819.85	75606.90	0.011 ✔
T1	180 - 160 (452)	d/t > 13000/Fy - 447 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	1381.93	75606.90	0.018 ✔
T1	180 - 160 (453)	d/t > 13000/Fy - 452 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	1111.63	75606.90	0.015 ✔
T3	140 - 120 (458)	d/t > 13000/Fy - 453 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3458.34	75606.90	0.046 ✔
T3	140 - 120 (459)	d/t > 13000/Fy - 458 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3442.59	75606.90	0.046 ✔
T3	140 - 120 (464)	d/t > 13000/Fy - 459 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3386.97	75606.90	0.045 ✔
T3	140 - 120 (465)	d/t > 13000/Fy - 464 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3364.76	75606.90	0.045 ✔
T3	140 - 120 (470)	d/t > 13000/Fy - 465 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3444.92	75606.90	0.046 ✔
T3	140 - 120 (471)	d/t > 13000/Fy - 470 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3395.84	75606.90	0.045 ✔
		d/t > 13000/Fy - 471								

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	180 - 160	Leg	P2.5x.203	2	-22309.60	61756.29	36.1	Pass
T2	160 - 140	Leg	P2.5x.203	59	-24394.40	51820.11	47.1	Pass
T3	140 - 120	Leg	P2.5x.203	93	-35281.60	61756.29	57.1	Pass
T4	120 - 100	Leg	P2.5x.203	148	-47121.40	61756.29	76.3	Pass
T5	100 - 80	Leg	P2.5x.203	202	-48472.40	61756.29	78.5	Pass
T6	80 - 60	Leg	P2.5x.203	258	-50961.10	61756.29	82.5	Pass
T7	60 - 40	Leg	P2.5x.203	312	-50960.30	59099.62	86.2	Pass
T8	40 - 20	Leg	P2.5x.203	366	-48328.80	51820.11	93.3	Pass
T9	20 - 5	Leg	P2.5x.203	399	-48310.00	52317.98	92.3	Pass
T10	5 - 0	Leg	P2.5x.203	426	-46355.50	58561.35	79.2	Pass
T1	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	23	3252.64	14609.68	22.3	Pass
							59.2 (b)	
T2	160 - 140	Diagonal	ROHN TS1.5x16 ga	69	-3749.21	4867.48	77.0	Pass
T3	140 - 120	Diagonal	L2x2x3/16	115	-3646.07	15527.05	23.5	Pass
							66.3 (b)	
T4	120 - 100	Diagonal	L2 1/2x2 1/2x1/2	201	-4722.73	37355.86	12.6	Pass
							55.0 (b)	
T5	100 - 80	Diagonal	L2 1/2x2 1/2x1/4	237	-5039.32	19469.13	25.9	Pass
							64.2 (b)	
T6	80 - 60	Diagonal	L2 1/2x2 1/2x1/2	273	-6697.44	37355.86	17.9	Pass
							78.0 (b)	
T7	60 - 40	Diagonal	L2 1/2x2 1/2x1/2	362	-5794.76	37355.86	15.5	Pass
							67.5 (b)	
T8	40 - 20	Diagonal	ROHN TS1.5x16 ga	395	-2307.75	4867.48	47.4	Pass
T9	20 - 5	Diagonal	L2 1/2x2 1/2x1/2	408	-2271.26	37484.22	6.1	Pass
							26.4 (b)	
T4	120 - 100	Horizontal	L2 1/2x2 1/2x1/2	196	1334.52	60922.23	2.2	Pass
							15.5 (b)	
T5	100 - 80	Horizontal	L2 1/2x2 1/2x1/2	234	2775.44	60922.23	4.6	Pass
							32.3 (b)	
T6	80 - 60	Horizontal	1	270	-882.67	6750.82	13.1	Pass
T7	60 - 40	Horizontal	1	323	-882.77	6750.82	13.1	Pass
T10	5 - 0	Horizontal	C12x20.7	434	32.37	175348.14	0.7	Pass
T1	180 - 160	Top Girt	L1 3/4x1 3/4x3/16	4	-153.11	9508.46	1.6	Pass
							2.8 (b)	
T2	160 - 140	Top Girt	ROHN TS1.5x16 ga	61	-1023.80	5586.14	18.3	Pass
							24.7 (b)	
T3	140 - 120	Top Girt	L2x2x3/16	95	929.12	17332.20	5.4	Pass
							16.9 (b)	
T4	120 - 100	Top Girt	L2 1/2x2 1/2x1/2	153	-1926.75	40525.60	4.8	Pass
							25.9 (b)	
T5	100 - 80	Top Girt	ROHN TS1.5x16 ga	206	756.33	7565.32	10.0	Pass
							19.3 (b)	
T6	80 - 60	Top Girt	L2 1/2x2 1/2x1/2	260	1328.86	54361.47	2.4	Pass
							15.5 (b)	
T7	60 - 40	Top Girt	ROHN TS1.5x16 ga	314	2219.17	7565.32	29.3	Pass
							56.6 (b)	
T8	40 - 20	Top Girt	ROHN TS1.5x16 ga	368	1035.46	7565.32	13.7	Pass
							26.4 (b)	
T9	20 - 5	Top Girt	L2 1/2x2 1/2x1/2	402	-401.65	40525.60	1.0	Pass
							5.5 (b)	
T10	5 - 0	Top Girt	C12x20.7	429	6499.65	175348.14	3.7	Pass
T1	180 - 160	Bottom Girt	L1 3/4x1 3/4x3/16	8	-892.61	9052.60	9.9	Pass
T2	160 - 140	Bottom Girt	ROHN TS1.5x16 ga	66	-1594.71	5468.90	29.2	Pass
T3	140 - 120	Bottom Girt	L2x2x3/16	97	1130.57	20586.85	5.5	Pass
T4	120 - 100	Bottom Girt	L2 1/2x2 1/2x1/2	155	865.89	64783.80	1.3	Pass
T5	100 - 80	Bottom Girt	ROHN TS1.5x16 ga	209	934.64	7355.16	12.7	Pass
T6	80 - 60	Bottom Girt	L2 1/2x2 1/2x1/2	264	5356.59	64783.80	8.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T7	60 - 40	Bottom Girt	ROHN TS1.5x16 ga	316	1245.18	7355.16	16.9	Pass
T8	40 - 20	Bottom Girt	ROHN TS1.5x16 ga	372	420.64	7355.16	5.7	Pass
T9	20 - 5	Bottom Girt	L2 1/2x2 1/2x1/2	405	3843.72	64783.80	5.9	Pass
T10	5 - 0	Bottom Girt	C12x20.7	431	-2804.25	174207.10	5.0	Pass
T1	180 - 160	Guy A@167.654	5/8	449	14439.50	21200.00	68.1	Pass
T3	140 - 120	Guy A@127.654	5/8	467	14856.30	21200.00	70.1	Pass
T5	100 - 80	Guy A@90	7/16	483	8223.41	10400.00	79.1	Pass
T6	80 - 60	Guy A@60.6146	3/4	477	17987.00	29150.00	61.7	Pass
T1	180 - 160	Guy B@167.654	5/8	443	13589.00	21200.00	64.1	Pass
T3	140 - 120	Guy B@127.654	5/8	461	14606.10	21200.00	68.9	Pass
T5	100 - 80	Guy B@90	7/16	482	8227.17	10400.00	79.1	Pass
T6	80 - 60	Guy B@60.6146	3/4	476	17911.40	29150.00	61.4	Pass
T1	180 - 160	Guy C@167.654	5/8	436	13657.20	21200.00	64.4	Pass
T3	140 - 120	Guy C@127.654	5/8	454	14740.50	21200.00	69.5	Pass
T5	100 - 80	Guy C@90	7/16	478	8125.16	10400.00	78.1	Pass
T6	80 - 60	Guy C@60.6146	3/4	472	17631.70	29150.00	60.5	Pass
T5	100 - 80	Top Guy Pull-Off@90	4 1/2x3/8	481	2081.52	48587.85	4.6 6.1 (b)	Pass
T6	80 - 60	Top Guy Pull-Off@60.6146	4 1/2x3/8	475	4017.41	48587.85	8.6 11.7 (b)	Pass
T1	180 - 160	Torque Arm Top@167.654	P4x.237	451	15870.00	88851.11	17.9	Pass
T3	140 - 120	Torque Arm Top@127.654	P4x.237	463	14594.90	88851.11	16.4	Pass
T1	180 - 160	Torque Arm Bottom@167.654	XP34.5x.03325	441	-21436.10	70251.23	30.5	Pass
T3	140 - 120	Torque Arm Bottom@127.654	XP34.5x.03325	459	-20234.20	70251.23	28.8	Pass

	Summary	
Leg (T8)	93.3	Pass
Diagonal (T6)	78.0	Pass
Horizontal (T5)	32.3	Pass
Top Girt (T7)	56.6	Pass
Bottom Girt (T2)	29.2	Pass
Guy A (T5)	79.1	Pass
Guy B (T5)	79.1	Pass
Guy C (T5)	78.1	Pass
Top Guy Pull-Off (T6)	11.7	Pass
Torque Arm Top (T1)	17.9	Pass
Torque Arm Bottom (T1)	30.5	Pass
Bolt Checks	78.0	Pass
RATING =	**93.3**	**Pass**

Element Map

Section No.	Section Elevation ft	Component Type	Element List
T1	180.00-160.00	Leg	1-3

Section No.	Section Elevation ft	Component Type	Element List
		Diagonal	10-57
		Top Girt	4-6
		Bottom Girt	7-9
		Guy A	448-449
		Guy B	442-443
		Guy C	436-437
		Torque Arm Top	438-439,444-445,450-451
		Torque Arm Bottom	440-441,446-447,452-453
T2	160.00-140.00	Leg	58-60
		Diagonal	67-90
		Top Girt	61-63
		Bottom Girt	64-66
T3	140.00-120.00	Leg	91-93
		Diagonal	100-147
		Top Girt	94-96
		Bottom Girt	97-99
		Guy A	466-467
		Guy B	460-461
		Guy C	454-455
		Torque Arm Top	456-457,462-463,468-469
		Torque Arm Bottom	458-459,464-465,470-471
T4	120.00-100.00	Leg	148-150
		Diagonal	157-159,163-165,169-171,175-177,181-183,187-189,193-195,199-201
		Horizontal	160-162,166-168,172-174,178-180,184-186,190-192,196-198
		Top Girt	151-153
		Bottom Girt	154-156
T5	100.00-80.00	Leg	202-204
		Diagonal	211-213,217-219,223-225,229-231,235-237,241-243,247-249,253-255
		Horizontal	214-216,220-222,226-228,232-234,238-240,244-246,250-252
		Top Girt	205-207
		Bottom Girt	208-210
		Guy A	483
		Guy B	482
		Guy C	478
		Top Guy Pull-Off	479-481
T6	80.00-60.00	Leg	256-258
		Diagonal	265-267,271-273,277-279,283-285,289-291,295-297,301-303,307-309
		Horizontal	268-270,274-276,280-282,286-288,292-294,298-300,304-306
		Top Girt	259-261
		Bottom Girt	262-264
		Guy A	477
		Guy B	476
		Guy C	472
		Top Guy Pull-Off	473-475
T7	60.00-40.00	Leg	310-312
		Diagonal	319-321,325-327,331-333,337-339,343-345,349-351,355-357,361-363
		Horizontal	322-324,328-330,334-336,340-342,346-348,352-354,358-360
		Top Girt	313-315
		Bottom Girt	316-318
T8	40.00-20.00	Leg	364-366
		Diagonal	373-396
		Top Girt	367-369
		Bottom Girt	370-372
T9	20.00-5.00	Leg	397-399
		Diagonal	406-423
		Top Girt	400-402
		Bottom Girt	403-405
T10	5.00-0.00	Leg	424-426
		Horizontal	433-435

Section No.	Section Elevation ft	Component Type	Element List
		Top Girt Bottom Girt	427-429 430-432 Total number of elements: 483

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Job :	T-Mobile ~ CT11029I: 180-ft Guyed Lattice Tower	**Project No.**	14025.012	**Sheet**	1 of	2
Address:	125 New Rd., Madison, CT	**Computed by**	TJL	**Date**	11/13/14	
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**		

CHECK UPLIFT RESISTANCE

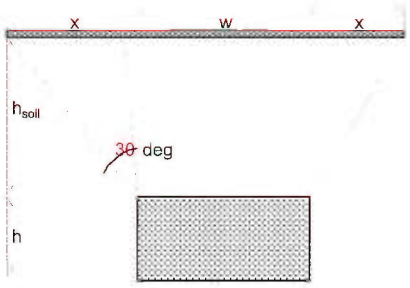
ANCHOR (A) AT 150.0ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	10.7	kips
Sliding =	23.7	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4.5	ft
h =	2.5	ft
d =	6.5	ft
Vol. =	*73.13*	ft^3
Wc =	*10.97*	kips



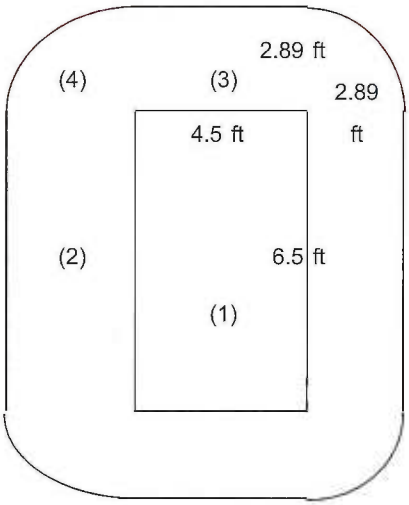
Foundation Section

SOIL PARAMETERS:

γ_{soil} =	110	pcf
h_{soil} =	5	ft
x =	*2.89*	ft

Soil Weight (Wr):

(1) =	16.09	kips
(2) =	10.32	kips
(3) =	7.14	kips
(4) =	4.80	kips
*(5) Anchor Reinf. =	0	kips
Total =	38.35	kips



Foundation Plan View

CHECK UPLIFT (PER EIA/TIA-222-F STANDARD AND 2005 CT BUILDING CODE):

Wr / 2.0 + Wc / 2.0 > UPLIFT

24.66 > *10.7* ***OK***

(Wr + Wc) / 2.0 > UPLIFT

24.66 > *10.7* ***OK***

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Job :	T-Mobile ~ CT11029I: 180-ft Guyed Lattice Tower	**Project No.**	14025.012	**Sheet**	1	of	2
Address:	125 New Rd., Madison, CT	**Computed by**	TJL	**Date**		11/13/14	
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**			

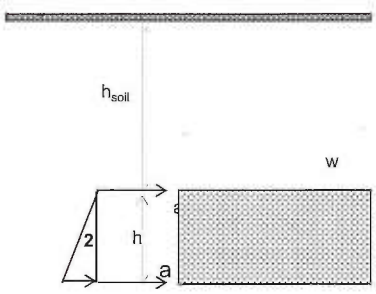
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ =	110	pcf
h_{soil} =	5	ft
h =	2.5	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.5	ft
h =	2.5	ft
d =	6.5	ft



Foundation Elevation View

K_p = 3.00

HORIZONTAL FORCES

1 =	26.81 k
2 =	6.70 k
RESIST TO SLIDING =	33.52 k

SOIL & CONCRETE WEIGHT =	Wr + Wc =	49.32 k
UPLIFT REACTIONS =		-10.7 k
SUM =		38.62 k

COEF. OF FRICTION, (0.45) =	17.38 k
RESIST TO SLIDING =	33.52 k
SUM =	50.89 k

SF AGAINST SLIDING

SF = 2.1 > 2 OK

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Job :	T-Mobile ~ CT11029I: 180-ft Guyed Lattice Tower	**Project No.**	14025.012	**Sheet**	1 of 2
Address:	125 New Rd., Madison, CT	**Computed by**	TJL	**Date**	11/13/14
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**	

CHECK UPLIFT RESISTANCE

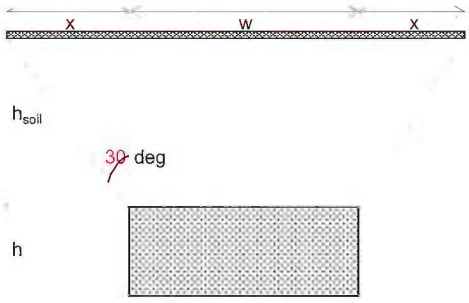
ANCHOR (A) AT 184.0ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	34.7	kips
Sliding =	45.4	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4.5	ft
h =	3	ft
d =	9.5	ft
Vol. =	*128.25*	ft^3
Wc =	*19.24*	kips



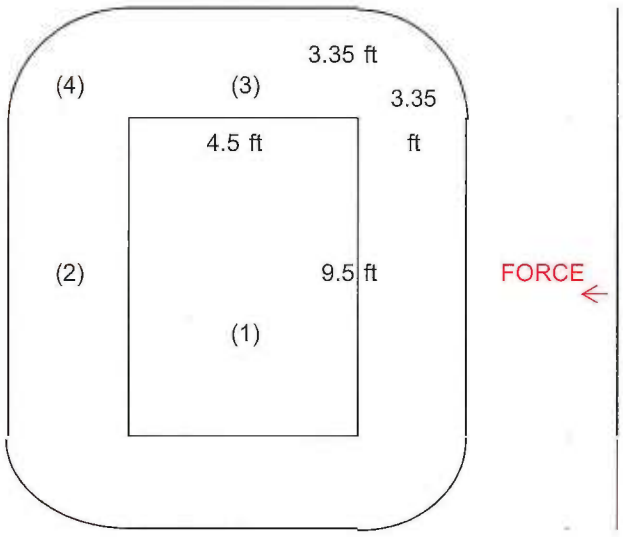
Foundation Section

SOIL PARAMETERS:

γ_{soil} =	110	pcf
h_{soil} =	5.8	ft
x =	*3.35*	ft

Soil Weight (Wr):

(1) =	27.27	kips
(2) =	20.30	kips
(3) =	9.61	kips
(4) =	7.49	kips
*(5) Anchor Reinf. =	0	kips
Total =	64.68	kips



Foundation Plan View

CHECK UPLIFT (PER EIA/TIA-222-F STANDARD AND 2005 CT BUILDING CODE):

Wr / 2.0 + Wc / 2.0 > UPLIFT

41.96 > *34.7* **OK**

(Wr + Wc) / 2.0 > UPLIFT

41.96 > *34.7* **OK**

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Job :	T-Mobile ~ CT11029I: 180-ft Guyed Lattice Tower	**Project No.**	14025.012	**Sheet**	1 of 2
Address:	125 New Rd., Madison, CT	**Computed by**	TJL	**Date**	11/13/14
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**	

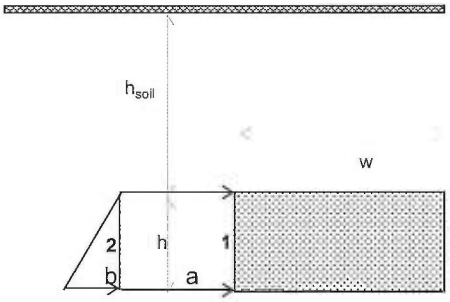
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

γ soil =	110	pcf
h_{soil} =	5	ft
h =	3	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.5	ft
h =	3.0	ft
d =	9.5	ft



Foundation Elevation View

K_p = 3.00

HORIZONTAL FORCES

1 =	61.13	k
2 =	8.91	k
RESIST TO SLIDING =	70.04	k

SOIL & CONCRETE WEIGHT =	Wr + Wc =	83.91	k
UPLIFT REACTIONS =		-34.7	k
SUM =		49.21	k

COEF. OF FRICTION, (0.45) =	22.15	k
RESIST TO SLIDING =	70.04	k
SUM =	92.19	k

SF AGAINST SLIDING

SF = 2.0 > 2 OK

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject:	Base Foundation Analysis
Location:	180-ft Guyed Lattice Tower Madison, CT.
Rev. 0: 11/13/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.012

Guyed Tower Base Foundation:

Input Data:

Tower Data

Shear Force =	Shear := 2.0·kip	(User Input from tnxTower)	
Axial Force =	Axial := 118.5·kip	(User Input from tnxTower)	
Tower Height =	$H_t := 180.0 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 7.70 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 5.70 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.50 \cdot ft$	(User Input)	
Width of Pier =	$W_p := 2.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.0 \cdot ft$	(User Input)	
Width of Footing =	$W_{f1} := 4.7 \cdot ft$	(User Input)	
Length of Footing =	$W_{f2} := 5.3 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 32 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 8000 \cdot psf$	(User Input)	(Weather Rock per Geotech prepared by Clarence Welti dated 6/16/97 = 8 tons/sf w/ factor of safety of 2 used)
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)	
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Calculated Factors:

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.255$$

Load Factor =

$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft} \right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

$\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 110 \cdot pcf$

Passive Pressure =

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 2.041 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 2.041 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.757 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 2.399 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 2$

$A_p := W_{f1} \cdot T_p = 9.4$

Soil Shear Resistance =

$Sl_1 := P_{ave} \cdot A_p = 22.55 \cdot kip$

Weight of Concrete =

$WT_c := \left[(W_{f1} \cdot W_{f2} \cdot T_f) + W_p^2 L_p\right] \cdot \gamma_c = 10.89 \cdot kip$

Total Weight =

$WT_{tot} := WT_c + Axial = 129.39 \cdot kip$

Soil/Concrete Friction Resistance =

$Sl_2 := \mu \cdot WT_{tot} = 58.23 \cdot kips$

Total Sliding Resistance =

$Sl_{tot} := Sl_1 + Sl_2 = 80.77 \cdot kips$

Sliding Resistance Ratio =

$Sliding\_Resistance_{ratio} := \frac{Shear \cdot 2.0}{Sl_{tot}} = 0.05$

$Sliding\_Resistance\_Check := if\left[\left(\frac{Shear \cdot 2.0}{Sl_{tot}} < 1.0\right), "Okay", "No\ Good"\right]$

Sliding_Resistance_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat =

$A_{mat} := W_{f1} \cdot W_{f2} = 24.91$

Maximum Pressure in Mat =

$P_{max} := \frac{WT_{tot}}{A_{mat}} = 5.19 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Network Modernization RFDS v3.0

Site ID	**CT11029I**	**Latitude**	41.29344
		Longitude	-72.57841
Site Name	Madison/ I-95/ X61/ Jct_1	**Site Type**	Structure (Non-Building)
Address	135 New Road, Madison, CONNECTICUT, 06443	**Site Class**	Guyed Tower
Market	CONNECTICUT	**Landlord**	CL&P

Configuration

702CU

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	X

Date 07/16/2014

Work Order #

NOC# (888) 218-6664

Site Information

Existing Configuration					Proposed Configuration			
1	2	3	4	Cabinet #	1	2	3	4
GSM/UMTS/LTE	GSM			Technology	GSM/UMTS/LTE	GSM		
3106	S8000			Cabinet type	3106	S8000		
				CBU				
2				DUW30	2			
1				DUL20				
1				DUG20	1			
1				DUS41	1			
				RBS6601				
				dTRU/TRX				
6				RU22 B4	6			
				RUS01 B2				
				RUS01 B4				

- [ ] Relocate cabinet
- [ ] Add cabinet
- [ ] Swap cabinet
- [ ] Remove cabinet
- [ ] Make cabinet dark

Scope of Work

Swap DUL for DUS

ALPHA - Scope of Work

- [x] Add new mount
- [ ] Relocate antenna
- [x] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [x] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Add a B12 passive antenna. Add RRUS at antenna. Use spare fiber for LTE 700.

BETA - Scope of Work

- [x] Add new mount
- [ ] Relocate antenna
- [x] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [x] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Add a B12 passive antenna. Add RRUS at antenna. Use spare fiber for LTE 700.

GAMMA - Scope of Work

- [x] Add new mount
- [ ] Relocate antenna
- [x] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [x] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Add a B12 passive antenna. Add RRUS at antenna. Use spare fiber for LTE 700.

DELTA - Scope of Work

- [ ] Add new mount
- [ ] Relocate antenna
- [ ] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Network Modernization RFDS v3.0

Site ID	**CT11029I**	**Latitude**	41.29344
		Longitude	-72.57841
Site Name	Madison/ I-95/ X61/ Jct_1	**Site Type**	Structure (Non-Building)
Address	135 New Road, Madison, CONNECTICUT, 06443	**Site Class**	Guyed Tower
Market	CONNECTICUT	**Landlord**	CL&P

Configuration
702CU

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	X

Date 07/16/2014

ALPHA (view from behind)

	Existing Configuration					Proposed Configuration			
Mount	X					X	X	X	
Technology	GSM/UMTS / UMTS	LTE				GSM/UMTS / UMTS	LTE	LTE	
Band	B2 / B4	B4				B2 / B4	B12	B4	
Active/Passive	A / P	A				A / P	P	A	
Ant. Type	Quad pole	Quad pole				Quad pole	Dual pole	Quad pole	
Ant. Model	AIR21 B2A/B4P	AIR21 B4A/B2P				AIR21 B2A/B4P	LNX-6515DS-VTM	AIR21 B4A/B2P	
Ant. Vendor	Ericsson	Ericsson				Ericsson	Commscope	Ericsson	
Ant. Height	159	159				159	159	159	
Azimuth	0	0				0	0	0	
RET deployed	Yes / Yes	Yes				Yes / Yes	Yes	Yes	
E-Tilt	2 / 2	2				2 / 2	2	2	
M-Tilt							0		
TMA #	1					1			
TMA Type	dd B4					dd B4			
RRU #							1		
RRU Type							RUS11_B		
Used Coax #	2 / 2					2 / 2			
Coax Type	1-1/4" / 1 5/8"					1-1/4" / 1 5/8"			
Coax Length (ft)	175					175			
Fiber (CPRI) #	2	2				2	1	2	
Splitter #									
Combiner #									
Combiner Type									

- [x] Add new mount
- [ ] Relocate antenna
- [x] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [x] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Scope of work

Add a B12 passive antenna. Add RRUS at antenna. Use spare fiber for LTE 700.

BETA (view from behind)

	Existing Configuration					Proposed Configuration			
Mount	X					X	X	X	
Technology	GSM/UMTS / UMTS	LTE				GSM/UMTS / UMTS	LTE	LTE	
Band	B2 / B4	B4				B2 / B4	B12	B4	
Active/Passive	A / P	A				A / P	P	A	
Ant. Type	Quad pole	Quad pole				Quad pole	Dual pole	Quad pole	
Ant. Model	AIR21 B2A/B4P	AIR21 B4A/B2P				AIR21 B2A/B4P	LNX-6515DS-VTM	AIR21 B4A/B2P	
Ant. Vendor	Ericsson	Ericsson				Ericsson	Commscope	Ericsson	
Ant. Height	159	159				159	159	159	
Azimuth	120	120				120	120	120	
RET deployed	Yes / Yes	Yes				Yes / Yes	Yes	Yes	
E-Tilt	2 / 2	2				2 / 2	2	2	
M-Tilt							0		
TMA #	1					1			
TMA Type	dd B4					dd B4			
RRU #							1		
RRU Type							RUS11_B		
Used Coax #	2 / 2					2 / 2			
Coax Type	1-1/4" / 1 5/8"					1-1/4" / 1 5/8"			
Coax Length (ft)	175					175			
Fiber (CPRI) #	2	2				2	1	2	
Splitter #									
Combiner #									
Combiner Type									

- [x] Add new mount
- [ ] Relocate antenna
- [x] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [x] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Scope of work

Add a B12 passive antenna. Add RRUS at antenna. Use spare fiber for LTE 700.

Network Modernization RFDS v3.0

Site ID	**CT11029I**	**Latitude**	41.29344
		Longitude	-72.57841
Site Name	Madison/ I-95/ X61/ Jct_1	**Site Type**	Structure (Non-Building)
Address	135 New Road, Madison, CONNECTICUT, 06443	**Site Class**	Guyed Tower
Market	CONNECTICUT	**Landlord**	CL&P

Configuration
702CU

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	X

Date 07/16/2014

GAMMA (view from behind)

Existing Configuration					Proposed Configuration				
X					X	X			
GSM/UMTS / UMTS	LTE			Technology	GSM/UMTS / UMTS	LTE	LTE	
B2 / B4	B4			Band	B2 / B4	B12	B4	
A / P	A			Active/Passive	A / P	P	A	
Quad pole	Quad pole			Ant. Type	Quad pole	Dual pole	Quad pole	
AIR21 B2A/B4P	AIR21 B4A/B2P			Ant. Model	AIR21 B2A/B4P	LNX-6515DS-VTM	AIR21 B4A/B2P	
Ericsson	Ericsson			Ant. Vendor	Ericsson	Commscope	Ericsson	
159	159			Ant. Height	159	159	159	
240	240			Azimuth	240	240	240	
Yes / Yes	Yes			RET deployed	Yes / Yes	Yes	Yes	
2 / 2	2			E-Tilt	2 / 2	2	2	
				M-Tilt		0		
1 / dd B4				TMA # / TMA Type	1 / dd B4			
				RRU #		1		
				RRU Type		RUS11_B		
2 (LMU) / 2				Used Coax #	2 (LMU) / 2			
1-1/4" / 1 5/8"				Coax Type	1-1/4" / 1 5/8"			
175				Coax Length (ft)	175			
2	2			Fiber (CPRI) #	2	1	2	
				Splitter #				
				Combiner #				
				Combiner Type				

x	Add new mount	x	Add RRU
	Relocate antenna		Swap existing RRU
x	Add antenna		Remove RRU
	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Add a B12 passive antenna. Add RRUS at antenna. Use spare fiber for LTE 700.

DELTA (view from behind)

Existing Configuration					Proposed Configuration				
				Technology					
				Band					
				Active/Passive					
				Ant. Type					
				Ant. Model					
				Ant. Vendor					
				Ant. Height					
				Azimuth					
				RET deployed					
				E-Tilt					
				M-Tilt					
				TMA # / TMA Type					
				RRU #					
				RRU Type					
				Used Coax #					
				Coax Type					
				Coax Length (ft)					
				Fiber (CPRI) #					
				Splitter #					
				Combiner #					
				Combiner Type					

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6515DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Exceptional horizontal pattern roll-off and strong front-to-back ratio
- Extended bandwidth allows one antenna to serve multiple frequency allocations
- Great solution to maximize network coverage and capacity
- The RF connectors are designed for IP67 rating and the radome for IP56 rating
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	16.6	16.9
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 16.6 4 ° | 16.6 8 ° | 16.4	0 ° | 17.0 4 ° | 17.0 8 ° | 16.8
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Horizontal Tolerance, degrees	±1	±0.9
Beamwidth, Vertical, degrees	9.7	8.6
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4
Beam Tilt, degrees	0–8	0–8
USLS, dB	18	18
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	698 – 896 MHz
Number of Ports, all types	2

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum

Product Specifications

LNX-6515DS-VTM

Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	878.0 N @ 150 km/h 197.4 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	2449.0 mm | 96.4 in
Width	301.0 mm | 11.9 in
Net Weight	22.8 kg | 50.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6515DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-6515DS-A1M
RET System	Teletilt®

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

Included Products

DB380-3 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Used for wide panel antennas. Includes three clamp sets.

DB5083D — Downtilt Mounting Kit for 2.4"-4.5" (60-115 mm) OD round members. Consists of two DB5083 heavy-duty, galvanized steel downtilt mounting brackets. This kit is compatible with the DB380-3 pipe mount for panel antennas with three mounting points.

RRUS 11

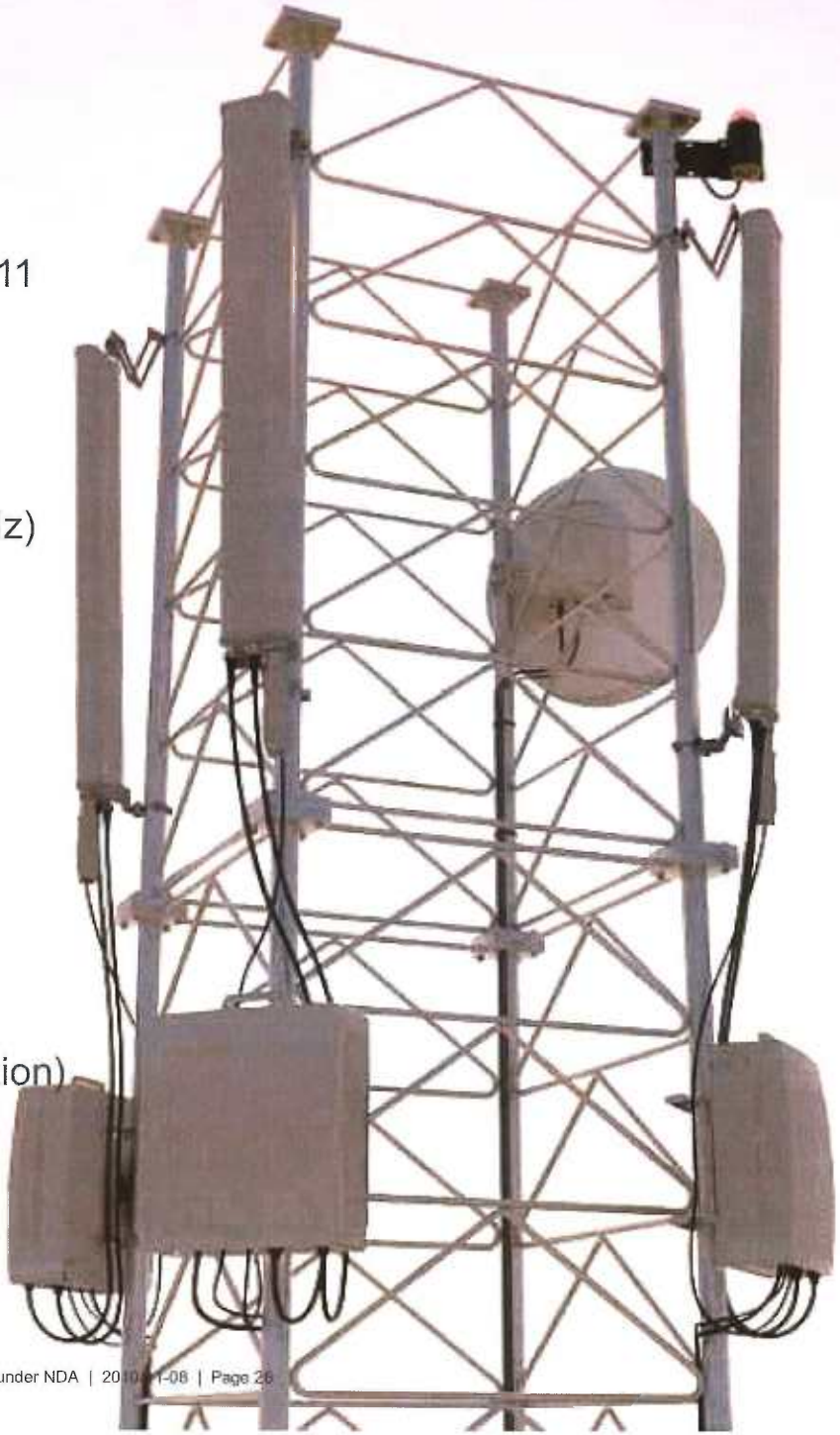
Frequency (AT&T)
- ✓ Band 12 (Lower 700 MHz)
- ✓ Band 4 (AWS, 17/2100 MHz) — 2Q2011

RF Characteristics
- ✓ Output power: 2x30 Watts
- ✓ 2x2 MIMO Capable
- ✓ IBW of 20 MHz
- ✓ Rx Sens.: Better than -105 dBm (5 MHz)

RET/TMA Support
- ✓ AISG 2.0 Compatible
- ✓ Via RET Port and Centre Conductor
- ✓ Cascading
- ✓ 30 VDC Bias

Environmental
- ✓ Self Convection
- ✓ Temperature -40 to 131 F

Power
- ✓ Input voltage: -48 VDC or AC (exemption)
- ✓ Fuse size: 13 – 32 A
  - Recommended: 25 A
- ✓ Power Consumption:
  - Typical 200 Watts
  - Max 310 Watts
  - Excl. RET and TMA load



RRUS 11 Mechanics

Wall and pole mounting brackets
- Reused from RRUW and RRU22
- Vertical Mount Only

Clearing distances:
- Above >= 16 in.
- Below >= 12 in.
- Side >= 0 mm

DC connector
- Bayonet
- Screw terminals in connector plug
- Supported outer cable diameter: 6-18 mm

CPRI connector
- LCD with proprietary cover
- Separate cover available from 1Q2011

Size & Weight
- Band 4: 44 lbs
- Band 12: 50 lbs
- 17.8" x 17.3" x 7.2" incl. sun shield

EXHIBIT C

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11029I

Madison / I-95 / X61 / Jct_1
135 New Road
Madison, CT 06443

January 12, 2015

EBI Project Number: 62150132

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	49.37 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

January 12, 2015

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11029I – Madison / I-95 / X61 / Jct_1**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **135 New Road, Madison, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **135 New Road, Madison, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

6) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **159 feet** above ground level (AGL).

9) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

EBI Consulting
environmental | engineering | due diligence

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	159	Height (AGL):	159	Height (AGL):	159
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	0.72	Antenna B1 MPE%	0.72	Antenna C1 MPE%	0.72
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	159	Height (AGL):	159	Height (AGL):	159
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE%	0.72	Antenna B2 MPE%	0.72	Antenna C2 MPE%	0.72
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	159	Height (AGL):	159	Height (AGL):	159
Frequency Bands	700 MHz	Frequency Bands	700 MHz.	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	0.28	Antenna B3 MPE%	0.28	Antenna C3 MPE%	0.28

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**5.16**
AT&T	26.09 %
Sprint	4.75 %
Field Measurements	13.37 %
Site Total MPE %:	**49.37 %**

T-Mobile Sector 1 Total:	1.72 %
T-Mobile Sector 2 Total:	1.72 %
T-Mobile Sector 3 Total:	1.72 %
Site Total:	49.37 %

EBI Consulting
environmental | engineering | due diligence

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector 1:	1.72 %
Sector 2:	1.72 %
Sector 3 :	1.72 %
T-Mobile Total:	5.16 %
Site Total:	49.37 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **49.37%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

EXHIBIT A

EXHIBIT B

EXHIBIT C

EXHIBIT D

EVERSOURCE ENERGY

107 Selden Street
Berlin, CT 06037

April 16th 2015

Mark Richard, Development Project Manager
T-Mobile Northeast LLC
35 Griffin Road, South
Bloomfield, CT 06002

Re: Site Permitting Authorization

Dear Mr. Richard:

Authorization is hereby given to T-Mobile Northeast LLC, its employees and its duly authorized agents and independent contractors, to apply for any and all local municipal, state and federal licenses, permits and approvals, including but not limited to Connecticut Siting Council, building permits, zoning variances, zoning special exceptions, site plan and subdivision approvals, driveway, wetlands and terrain alteration permits, which are or may be necessary or required for T-Mobile Northeast LLC to construct, operate and maintain a wireless communications system (PCS System), and/or antenna site on the following property owned by The Connecticut Light & Power Company d/b/a Eversource Energy ("Eversource"):

135 New Road
Madison, CT
CT11029I

The foregoing authorization is given subject to the following conditions:

1. This authorization shall be nonexclusive. Nothing herein shall prevent or restrict Eversource from authorizing any other person or entity to apply for any similar licenses, permits or approvals to construct, operate and maintain any other communication system or facility of any type on the property at any time.

2. This authorization shall not obligate Eversource to pay for or reimburse any costs or expenses or to provide any assistance of any kind in connection with any applications, or bind or obligate Eversource to agree or be responsible for any on-site or off-site improvements, development restrictions, impact fees or assessments, capital improvement charges, bonds or other security, or any other fee, assessment, charge or expense imposed or required as a condition of any license, permit or approval. T-Mobile Northeast LLC shall be solely and fully responsible for all fees, charges costs and expenses of any kind in connection with any applications. Eversource agrees to reasonably cooperate with T-Mobile Northeast LLC in signing such applications or other similar documents as may be required in order for T-Mobile Northeast LLC to apply for any license, permit or approval.

EVERSOURCE ENERGY

107 Selden Street
Berlin, CT 06037

3. This authorization shall not be deemed or construed to grant or transfer to T-Mobile Northeast LLC any interest in the property, whatsoever, and shall not in any respect obligate or require Eversource to sell, lease or license the Property to T-Mobile Northeast LLC or otherwise allow T-Mobile Northeast LLC to use or occupy the property for any purpose, regardless of whether any licenses, permits and approvals applied for by T-Mobile Northeast LLC for the property are granted. T-Mobile Northeast LLC understands and acknowledges that any and all applications filed by T-Mobile Northeast LLC for the property at T-Mobile Northeast LLC sole risk and without any enforceable expectation that the property will be made available for T-Mobile Northeast LLC' use.

4. T-Mobile Northeast LLC shall be required to supply to Eversource, free of charge and contemporaneous with T-Mobile Northeast LLC filing of same, a complete copy of any and all applications, plans, reports and other public filings made by T-Mobile Northeast LLC with any local, municipal, state or federal governmental or regulatory officer, agency board, bureau, commission or other person or body for any licenses, permits or approvals for the property, and to keep Eversource fully informed on a regular basis of the status of T-Mobile Northeast LLC' applications.

5. This authorization shall automatically expire six (6) months after the date of this letter, unless extended in writing by mutual agreement of Eversource and T-Mobile Northeast LLC.

Very truly yours,

Marco V. Charamella
Supervisor, Real Estate
Eversource Energy

AGREED TO ON BEHALF OF

T-MOBILE NORTHEAST LLC

By: _____
Duly Authorized

Date: 4.23.2015

135 New Road
Madison, CT
CT11029I