STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION OF CELLCO PARTNERSHIP	:	SUB-PETITION NO. 1133
D/B/A VERIZON WIRELESS FOR A	:	135 NEW ROAD
DECLARATORY RULING FOR APPROVAL	:	MADISON, CT
OF AN ELIGIBLE FACILITY REQUEST FOR	:	
MODIFICATIONS TO AN EXISTING	:	
TELECOMMUNICATIONS TOWER AT 135	:	
NEW ROAD, MADISON, CONNECTICUT	:	NOVEMBER 4, 2015

SUB-PETITION FOR DECLARATORY RULING:
ELIGIBLE FACILITIES REQUEST FOR MODIFICATIONS
THAT WILL NOT SUBSTANTIALLY CHANGE THE
PHYSICAL DIMENSIONS OF AN EXISTING TOWER

I. Introduction

Pursuant to Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, codified at 47 U.S.C. § 1455(a) ("Section 6409(a)") and the October 21, 2014 Report and Order (FCC-14-533) issued by the Federal Communications Commission ("FCC") (the "FCC Order"), Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby petitions the Connecticut Siting Council (the "Council") for a declaratory ruling ("Sub-Petition") that the proposed modifications to the existing Eversource (formerly Northeast Utilities) telecommunications facility at 135 New Road in Madison, Connecticut (the "Property") constitutes an Eligible Facilities Request ("EFR") under the FCC Order. Cellco has designated this site as its Madison 6 Facility.

II. Factual Background

Eversource maintains an existing 180-foot guyed-lattice tower on the Property. The Property, a 38-acre parcel, is surrounded by commercial and industrial uses, Interstate 95 and

residential uses. *See* Attachment 1 – Site Vicinity and Site Schematic Maps (Aerial Photograph). The existing tower is shared by Eversource and multiple wireless carriers including AT&T Wireless, Sprint, T-Mobile and American Messaging Service. Equipment associated with these existing antennas is located on the ground near the base of the tower.

Cellco is licensed to provide wireless telecommunications services in the 850 MHz, 1900 MHz, 700 MHz and 2100 MHz frequency ranges in Madison and throughout the State of Connecticut. Cellco intends to deploy all of its frequencies at the Madison 6 Facility.

III. Proposed Madison 6 Facility

At the Madison 6 Facility, Cellco will install a total of twelve (12) antennas and nine (9) remote radio heads ("RRHs") at a height of 95 feet above ground level ("AGL") on the existing tower. Cellco's equipment cabinets and a propane fueled back-up generator will be located on a 12' x 30' concrete pad near the base of the tower. A 1,000 gallon propane tank will also be installed within the fenced compound. Power and telephone service will extend from the existing utility service at the tower site. Project Plans for the Madison 6 Facility are included in Attachment 2. Specifications for Cellco's antennas and RRHs along with a Structural Analysis and Tower Reinforcement Report ("Structural Report") are included in Attachment 3. The tower can accommodate Cellco's proposed modifications with certain structural reinforcement, as outlined in the Structural Report.

IV. Discussion

A. The Proposed Modification Will Not Cause a Substantial Change to the Physical Dimensions of the Existing Base Station

Section 6409(a) provides, in relevant part, that "a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or

base station." Pursuant to the FCC Order, the proposed modification does not substantially change the physical dimensions of the base station if the following criteria are satisfied.

1. *The proposed modified facility will not increase the height of the base station by more than ten (10) percent or ten (10) feet, whichever is greater.* Cellco proposes to install its antennas at the 95-foot level on the existing 180-foot guyed-lattice tower.

2. *The proposed facility will not protrude from the edge of the structure more than six (6) feet.* The proposed antennas and mounting structures will not protrude more than six (6) feet from the existing tower structure.

3. *The proposed facility does not involve installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets.* Cellco intends to install three (3) small equipment cabinets on a concrete pad.

4. *The proposed facility does not entail any excavation or deployment outside the current site of the base station.* No excavation or site development activity will occur outside the limits of the existing fenced compound.

5. *The proposed facility does not defeat the existing concealment elements of the base station.* No concealment elements have been incorporated into the existing tower structure.

6. *The proposed facility complies with conditions associated with the prior approval of construction or modification of the base station.* None of the elements of Cellco's proposed facility conflict with any of the existing facility improvements or prior Council approvals for the shared use of the tower.

B. FCC Compliance

Radio frequency ("RF") emissions from Cellco's proposed installation will be below the standards adopted by the FCC. Included in Attachment 4 is a worst-case RF emissions calculation for Cellco's proposed base station modifications.

C. Notice to the Town, Property Owner and Abutting Landowners

On November 4, 2015, a copy of this Sub-Petition was sent to Madison's First Selectman Fillmore McPherson and Eversource, the Owner of the tower and the Property. *See* Attachment 5.

Copies of this Sub-Petition were also sent to the owners of land that abuts the Property. A sample abutter's cover letter and the list of those abutting landowners who were sent notice of the filing of the Sub-Petition is included in Attachment 6.

V. Conclusion

Based on the information provided above, Cellco respectfully submits that the proposed modification of the existing base station at the Property constitutes an "eligible facilities request" under Section 6409(a) and the FCC Order.

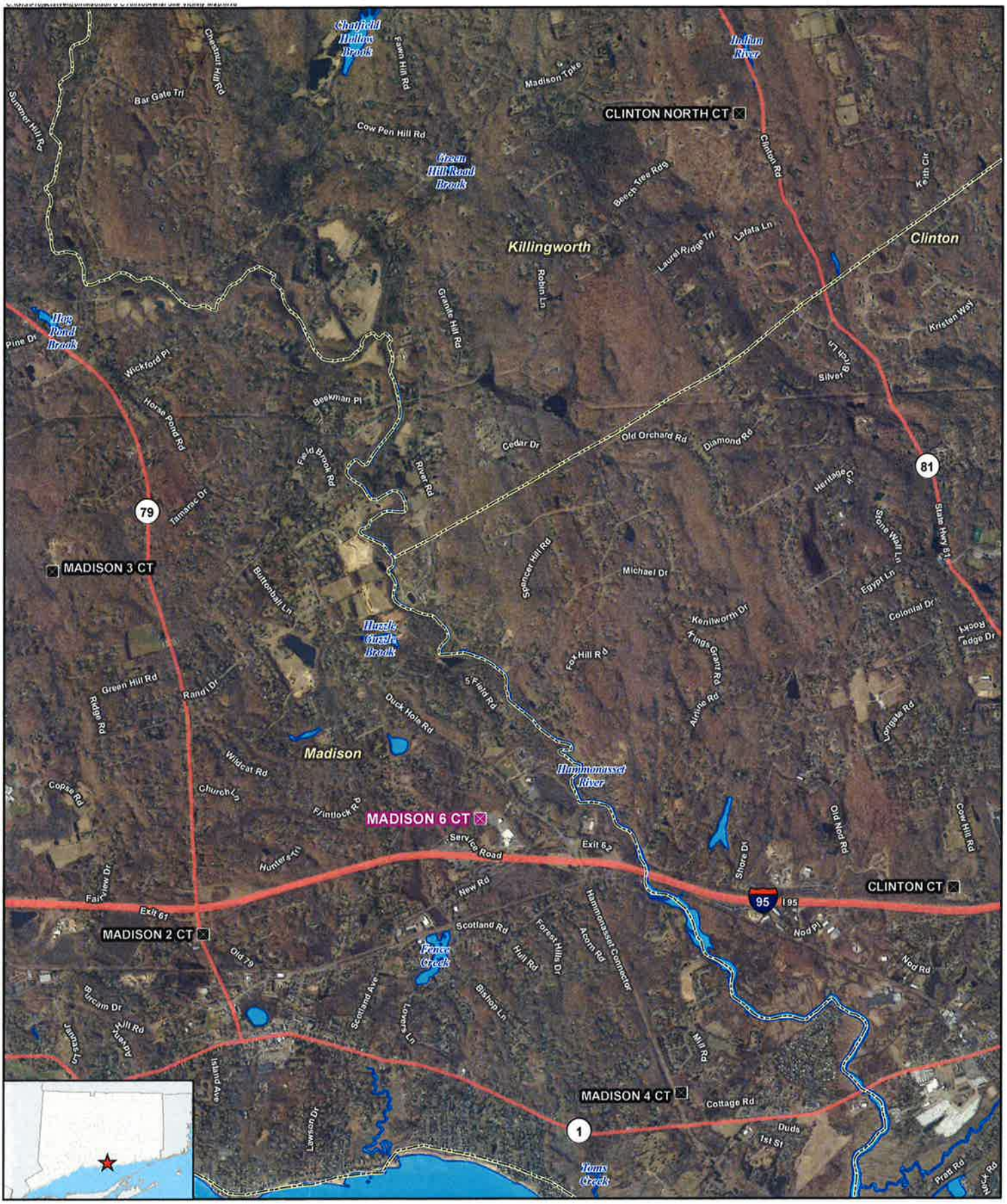
Respectfully submitted,

CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

By _____

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597
(860) 275-8200
Its Attorneys

ATTACHMENT 1



Legend

- Proposed Verizon Wireless Facility
- Surrounding Verizon Wireless Facilities
- Municipal Boundary
- Waterbody

Site Vicinity Map

Proposed Wireless
Telecommunications Facility
Madison 6 CT
135 New Road
Madison, Connecticut

Base Map Source: 2012 Aerial Photograph (CTECO)
Map Scale: 1 inch = 3,000 feet
Map Date: March 2015

N
W E
S

3,000 1,500 0 3,000
Feet

Legend

- Existing +/-180' Tall Guyed Tower
- Proposed Verizon Equipment Layout
- Proposed Verizon Underground Utilities
- Subject Property
- Approximate Parcel Boundary (CTDEEP GIS)

Map Notes:
Base Map Source: ESRI World Imagery; Microsoft, 3/28/2011
Map Date: March 2015

Aerial Photograph

Proposed Wireless
Telecommunications Facility
Madison 6 CT
135 New Road
Madison, Connecticut

verizonwireless

ALL POINTS

ATTACHMENT 2

Cellco Partnership

d.b.a. verizon wireless

WIRELESS COMMUNICATIONS FACILITY

MADISON 6

135 NEW ROAD

MADISON, CT 06443

SITE DIRECTIONS

FROM: 99 EAST RIVER DRIVE, EAST HARTFORD, CONNECTICUT **TO:** 135 NEW ROAD, MADISON, CT 06443

1. Head south on E River Dr toward Pitkin St.	0.9 mi
2. Stay straight to go onto E River Dr Ext	0.3 mi
3. Merge onto CT-15 S toward I-95 S	1.1 mi
4. Merge onto I-95 S via Exit 86 toward New Haven	8.9 mi
5. Merge onto CT-9 via Exit 22 S toward Middletown/Old Saybrook	13.9 mi
6. Take the CT-81 Exit, Exit 9 toward Killingworth/Clinton	0.2 mi
7. Turn right onto Killingworth Rd/CT-81. Pass though 1 Roundabout	13.1 mi
8. Merge onto I-95 S toward New Haven	2.0 mi
9. take Exit 62 toward Hammonasset State Park	0.3 mi
10. Turn rigth onto CT-450/Hammonasset Connector	0.06 mi
11. Turn sligth left onto New Road	0.2 mi

GENERAL NOTES

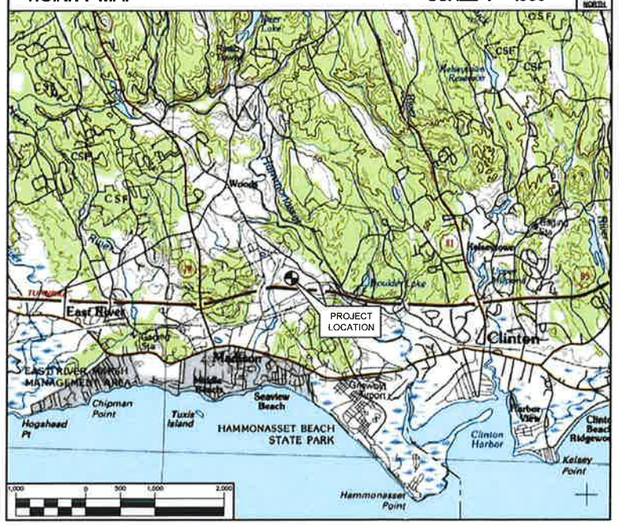
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE INSTALLATION OF THREE (3) CELLCO PARTNERSHIP EQUIPMENT CABINETS AND A PROPANE FUELED EMERGENCY POWER GENERATOR ON A 12'x30' CONCRETE PAD. ADDITIONALLY A 1000 GALLON PROPANE TANK IS PROPOSED ON A 5'x18' CONCRETE PAD.
2. A TOTAL OF TWELVE (12) DIRECTIONAL PANEL ANTENNAS, AND ASSOCIATED APPURTENANCES ARE PROPOSED TO BE MOUNTED TO EXISTING LATTICE TOWER WITH AN ANTENNA CENTERLINE ELEVATION AT ±95' A.G.L.
3. POWER AND TELCO UTILITIES SHALL BE ROUTED UNDERGROUND FROM THE PROPOSED UTILITY BACKBOARD. FINAL DEMARC LOCATION AND UTILITY ROUTING TO PROPOSED BACKBOARD WILL BE VERIFIED/DETERMINED BY LOCAL UTILITY COMPANIES. UTILITIES WILL BE ROUTED UNDERGROUND FROM UTILITY BACKBOARD TO THE PROPOSED EQUIPMENT CABINETS.
4. THERE WILL NOT BE ANY LIGHTING UNLESS REQUIRED BY THE FCC OR THE FAA.
5. THERE WILL NOT BE ANY SIGNS OR ADVERTISING ON THE ANTENNAS OR EQUIPMENT.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	MADISON 6
SITE ADDRESS:	135 NEW ROAD MADISON, CT 06443
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
CONTACT PERSON:	DOUG TALMADGE CELLCO PARTNERSHIP (860) 549-6116
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE (860) 275-8345
SITE COORDINATES:	LATITUDE: 41°-17'-36.34" N LONGITUDE: 72°-34'-42.15" W GROUND ELEVATION: ±62 A.M.S.L. COORDINATES & GROUND ELEVATION REFERENCED FROM CONNECTICUT SITING COUNCIL WEB LOG DATABASE.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	5
C-1	ABUTTERS MAP	5
C-2	PLAN, ELEVATION AND ANTENNA CONFIG.	4

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
5	10/07/15	CTP	DMD	ISSUED FOR CSC - REVISED ABUTTERS MAP
4	10/02/15	CTP	DMD	ISSUED FOR CSC - REVISED ABUTTERS MAP
3	09/29/15	CTP	DMD	ISSUED FOR CSC - REVISED EQUIPMENT PLAN
2	03/10/15	KAW	DMD	ISSUED FOR CSC - CLIENT REVIEW
1	03/09/15	KAW	DMD	ISSUED FOR CSC - CLIENT REVIEW
0	03/09/15	KAW	DMD	ISSUED FOR CSC - CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

Cellco Partnership d.b.a. verizon wireless

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

Cellco Partnership d/b/a Verizon Wireless

WIRELESS COMMUNICATIONS FACILITY

MADISON 6

135 NEW ROAD
MADISON, CT 06443

DATE: 03/06/15
SCALE: AS NOTED
JOB NO. 14234.000

TITLE SHEET

T-1

Sheet No. 1 of 3

N/F
JULIE K & SALVATORE N MANCUSO
30 FAIRFIELD ROAD
MADISON, CT 06443

N/F
ELEANOR F JONES
6 FAIRFIELD PLACE
MADISON, CT 06443

N/F
LOIS B & ROBERT A KRIMSIER
12 FAIRFIELD PLACE
MADISON, CT 06443

N/F
ERIC RACTCHMAN AND GREGORY ABDELNOUR
22 FAIRFIELD PLACE
MADISON, CT 06443

N/F
JOSH & ABBY LIPSCHUTZ
28 FAIRFIELD PLACE
MADISON, CT 06443

N/F
ANNE TODESCHINI
153 DUCK HOLE ROAD
MADISON, CT 06443

N/F
JULIETTE THAI
147 DUCK HOLE ROAD
MADISON, CT 06443

N/F
JACQUELYN A JOHN JR FASULO
141 DUCK HOLE ROAD
MADISON, CT 06443

N/F
JACQUELYN FASULA 2/3 & JOSEPH SALATTO 1/3
135 DUCK HOLE ROAD
MADISON, CT 06443

N/F
WILLIAM H H MILLARD
DUCK HOLE ROAD
MA: 911 SPANISH ISLE DRIVE
BOCA RATON, FL 33496

N/F
WILLIAM H H MILLARD
DUCK HOLE ROAD
MA: 911 SPANISH ISLE DRIVE
BOCA RATON, FL 33496

N/F
STEPHAN & GRACE BRUECKNER
39 CANADY LANE
MADISON, CT 06443

N/F
MADISON LAND CONSERVATION TRUST INC.
CANADY LANE
MA: P.O. BOX 561
MADISON, CT 06443

SUBJECT PROPERTY:
N/F
CONNECTICUT LIGHT AND POWER CO.
135 NEW ROAD
MADISON, CT 06443

1
C-2

N/F
LOULIE D & WILLIAM CANADY
HORSEPOND ROAD
MA: 127 JACKSON AVE SO PARK
MORGANTOWN, WV 26501

N/F
STATE OF CONNECTICUT DEPARTMENT OF ENERGY
AND ENVIRONMENTAL PROTECTION
721 ROUTE 95 S
MA: 79 ELM ST
HARTFORD, CT 06106

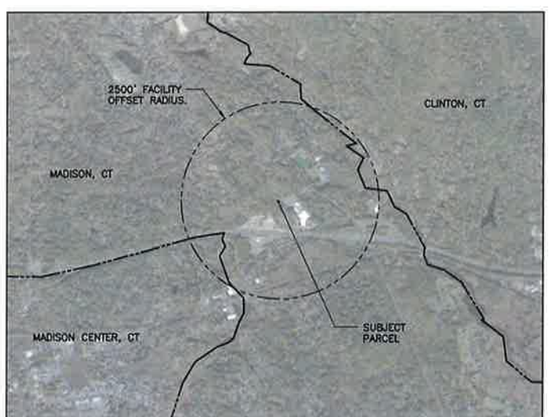
N/F
WILLIAM H H MILLARD
155 NEW ROAD
MA: 911 SPANISH ISLE DRIVE
BOCA RATON, FL 33496

N/F
WILLIAM H H MILLARD
NEW ROAD
MA: 911 SPANISH ISLE DRIVE
BOCA RATON, FL 33496

I – 95 SOUTH

NEW ROAD

I – 95 NORTH



MUNICIPALITY NOTIFICATION LIMIT MAP

1
C-1
ABUTTERS MAP
SCALE: 1" = 100'

APPROXIMATE NORTH

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100 ft.

MAP REFERENCE NOTE:

PROPERTY LINES SHOWN HEREIN ARE REFERENCED FROM GOOGLE EARTH. PARCEL OWNERSHIP INFORMATION CONTAINED HEREIN REFERENCED FROM THE VISION GOVERNMENT SOLUTIONS ON-LINE DATABASE.

REV:	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
5	10/07/15	CTP	DMD	ISSUED FOR CSC – REVISED ABUTTERS MAP
4	10/02/15	CTP	DMD	ISSUED FOR CSC – REVISED ABUTTERS MAP
3	09/29/15	CTP	DMD	ISSUED FOR CSC – REVISED EQUIPMENT PLAN
2	03/12/15	DRA	DMD	ISSUED FOR CSC
1	03/10/15	KAW	DMD	ISSUED FOR CSC – CLIENT REVIEW
0	03/09/15	KAW	DMD	ISSUED FOR CSC – CLIENT REVIEW

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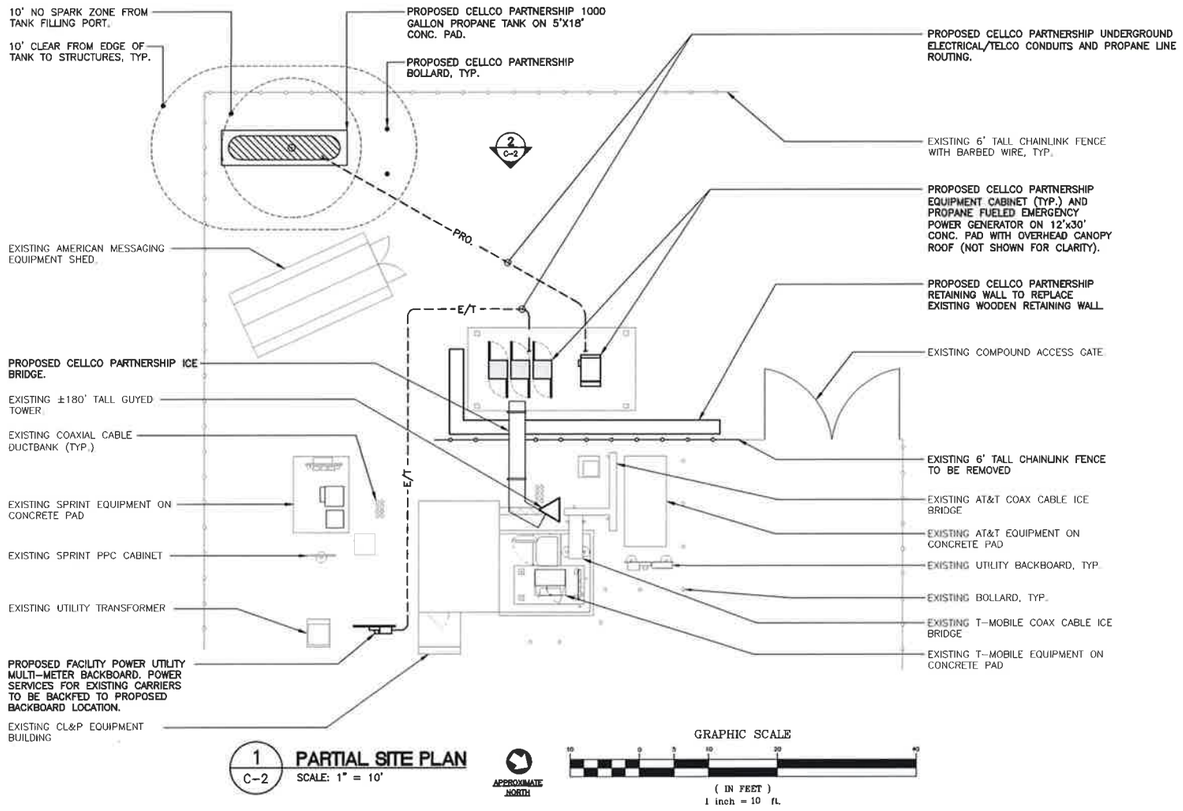
WIRELESS COMMUNICATIONS FACILITY
MADISON 6
135 NEW ROAD
MADISON, CT 06443

DATE: 03/06/15
SCALE: AS NOTED
JOB NO. 14234.000

ABUTTERS MAP

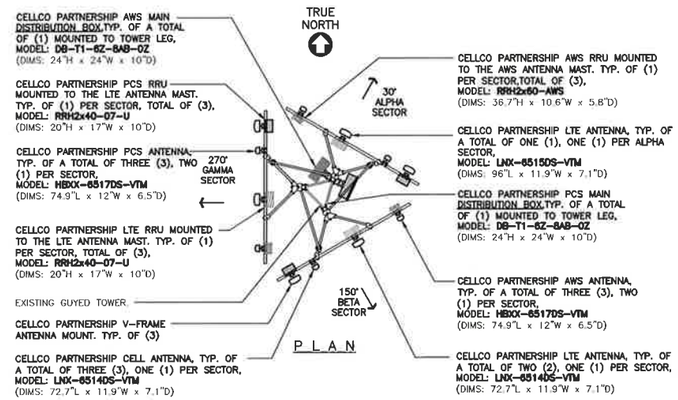
C-1
Sheet No. 2 of 3

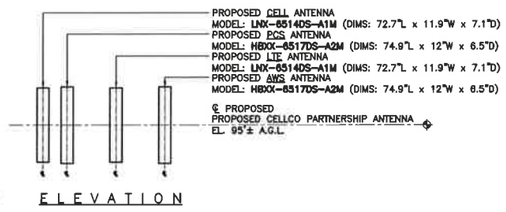


1 C-2 **PARTIAL SITE PLAN**
SCALE: 1" = 10'

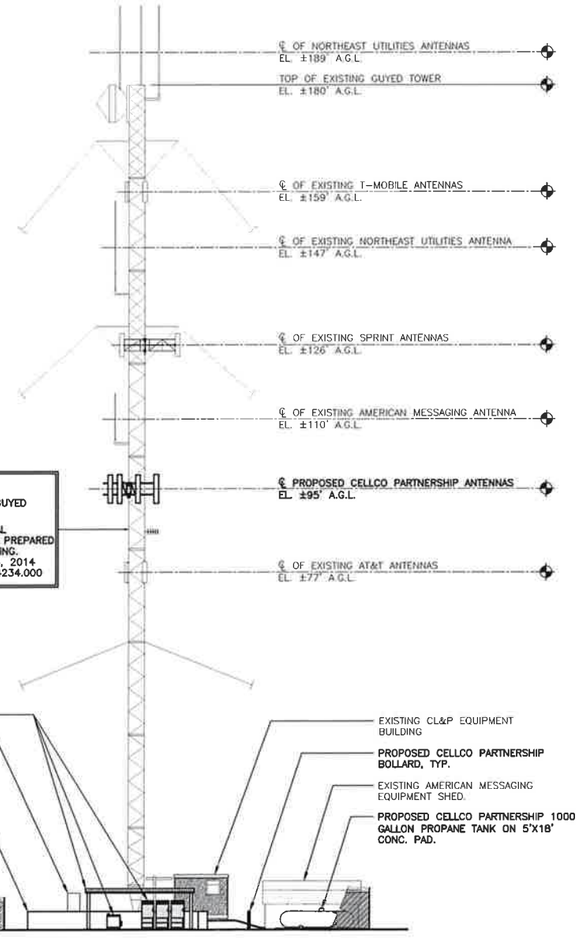
APPROXIMATE NORTH

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.





3 C-2 **ANTENNA MOUNTING CONFIGURATION**
NOT TO SCALE



2 C-2 **TOWER ELEVATION**
SCALE: 1" = 25'

GRAPHIC SCALE
25 0 12.5 25 50 100
(IN FEET)
1 inch = 25 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/02/15	CTP	DMD	ISSUED FOR CSC - REVISED ABUTTERS MAP
3	09/29/15	CTP	DMD	ISSUED FOR CSC - REVISED EQUIPMENT PLAN
2	03/12/15	DRA	DMD	ISSUED FOR CSC
1	03/10/15	KAW	DMD	ISSUED FOR CSC - CLIENT REVIEW
0	03/09/15	KAW	DMD	ISSUED FOR CSC - CLIENT REVIEW

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135 NEW ROAD
MADISON, CT 06443

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SCALE: AS NOTED
JOB NO. 14234.000

PLAN ELEVATION AND ANTENNA CONFIG.

C-2
Sheet No. 3 of 3

ATTACHMENT 3

Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

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

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
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°

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896
Beamwidth, Horizontal Tolerance, degrees	±3	±3

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

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	14.2 kg | 31.3 lb
Model with factory installed AISG 2.0 RET	LNX-6514DS-A1M

Product Specifications

COMMSCOPE®

LNX-6515DS-VTM

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

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	16.7	17.6
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	9.7	8.6
Beam Tilt, degrees	0–8	0–8
USLS, dB	17	17
Front-to-Back Ratio at 180°, dB	32	27
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°

Electrical Specifications, BASTA*

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 Tolerance, degrees	±1	±0.9
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4
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

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

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 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
Antenna Dimensions, L x W x D	2438.0 mm x 301.0 mm x 181.0 mm | 96.0 in x 11.9 in x 7.1 in
Net Weight	19.8 kg | 43.7 lb
Model with factory installed AISG 2.0 RET	LNX-6515DS-A1M

Product Specifications

COMMSCOPE®

HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°

**Values calculated using NGMN Alliance N-P-BASTA v9.6*

Mechanical Specifications

Color | Radome Material	Light gray | PVC, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1903.0 mm x 305.0 mm x 166.0 mm | 74.9 in x 12.0 in x 6.5 in
Net Weight	19.5 kg | 43.0 lb
Model with factory installed AISG 2.0 RET	HBXX-6517DS-A2M

Alcatel-Lucent RRH2x40-07-U

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-U is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Band 13). The Alcatel-Lucent RRH2x40-07-U is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.

A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-07-U is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-07-U has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 10 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-U is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-U installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-07-U is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-07-U is compact and weights less than 23 kg (50 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

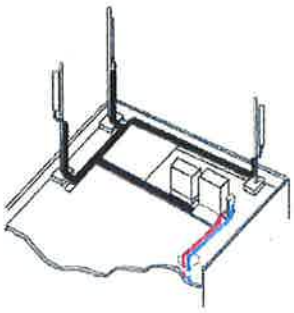
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-07-U provides more RF power while at the same time consuming less electricity.

Features

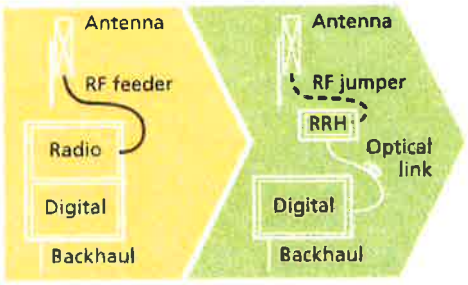
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

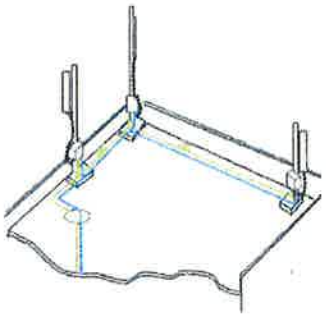
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 390 mm (15.4 in.)
- Width: 380 mm (15 in.)
- Depth: 210 mm (8.2 in.)
- Weight (without mounting kit): less than 23 kg (50 lb)

Power

- Power supply: -48V

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 700 MHz; 3GPP Band 13
- Bandwidth: up to 10 MHz
- RF output power at antenna port:
  - ¬ 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
  - ¬ TMA
  - ¬ Remote electrical tilt (RET) support (AISG v2.0)

Optical characteristics

Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
  - ¬ One SM fiber (9/125 µm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
  - ¬ Two MM fibers (50/125 µm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Alarms and ports

- Six external alarms
- Two optical ports to support daisy-chaining

CPG2809100913 (09)

Alcatel·Lucent

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

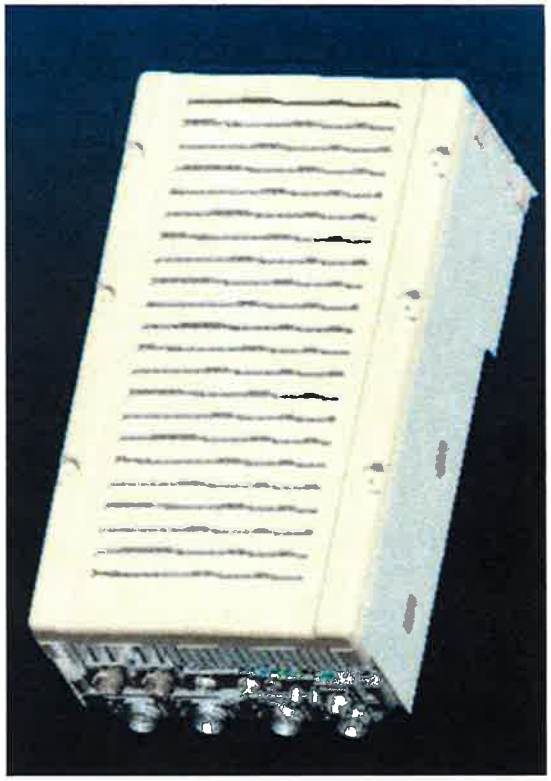
		RRH2x60
RF Output Power		2x60W
Instantaneous Bandwidth		20MHz
Transmitter		2 TX
Receiver	1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features		AISG 2.0 for RET/TMA
		Internal Smart Bias-T
Power		-48VDC
CPRI Ports		2 CPRI Rate 3 Ports
External Alarms		4 External User Alarms
Monitor Ports		TX
Environmental		GR487 Compliance
RF Connectors		7/16 DIN (top mounted)

** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2x60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

[illegible]

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

[illegible]

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

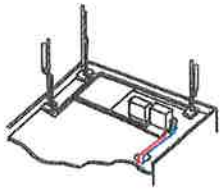
[illegible]

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

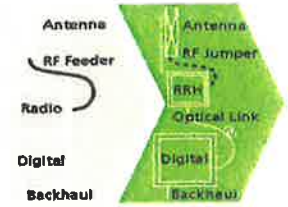
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

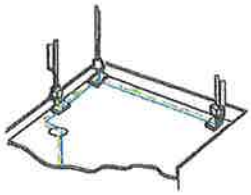
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control
- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights
- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data
- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics
- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity
- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications
- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data
- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Structure			
Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environmental			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

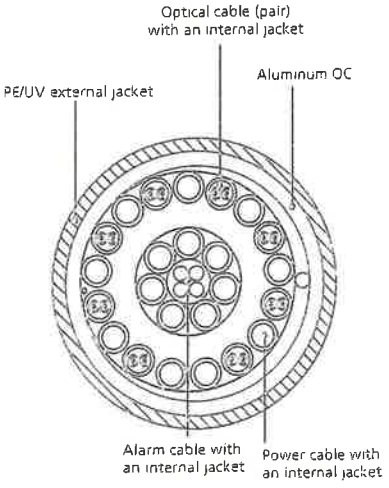


Figure 2: Construction Detail

* This data is provisional and subject to change

CENTEK engineering

Centered on Solutions℠

Structural Analysis and Tower Reinforcement Report

180-ft Existing ROHN Guyed Lattice Tower

Proposed Verizon Wireless
Antenna Installation

Verizon Site Ref: Madison 6

135 New Road
Madison, CT 06443

CENTEK Project No. 14234.000

Date: November 13, 2014

Prepared for:

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

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

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SECTION 4 – DRAWINGS

SECTION 5 – REFERENCE MATERIALS

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing 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.

Verizon proposes the installation of twelve (12) panel antennas, nine (9) remote radio heads and one (1) main distribution box 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.

- T-MOBILE (Existing/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.

- 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):
  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.

- 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.
- **VERIZON (PROPOSED):**
  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" Ø Hybriflex fiber lines running on the East face of the existing tower as specified in Section 3 of this report.

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 **with the reinforcements detailed in section 4 of this report were found to be within allowable limits**. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **91.6%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	20'-0"-40'-0"	91.6%	**PASS**
Diagonal (T6) (Bolts)	60'-0"-80'-0"	78.6%	**PASS**
Guy A @ 90-ft radius (T5)	90'-0"	79.0%	**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	0.5122	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)	**23.8 kips**	**43.1 kips**
Horizontal (Out of Plane of GW)	**0.6 kips**	**2.1 kips**
Vertical	**10.7 kips**	**32.7 kips**
Resultant Force at end of Guy Wire	**26.1 kips**	**54.1 kips**
Tower Base Reactions		
Vector	**Proposed Reaction**	
Horizontal Shear	**2.1 kips**	
Axial Compression	**115.6 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	2.6	**PASS**
	Sliding	2.0	2.2	**PASS**
		Allowable	**Proposed**	
Base Foundation	Bearing	8.0 ksf [4]	5.08 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.

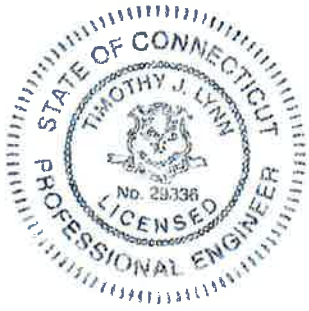
Conclusion

This analysis shows that the subject tower **with the proposed reinforcement detailed in section 4 of this report is adequate** to support the proposed antenna configuration.

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

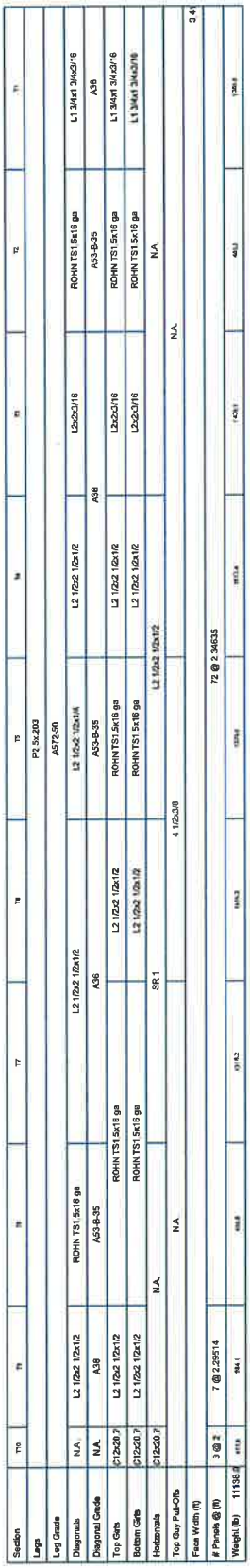
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or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

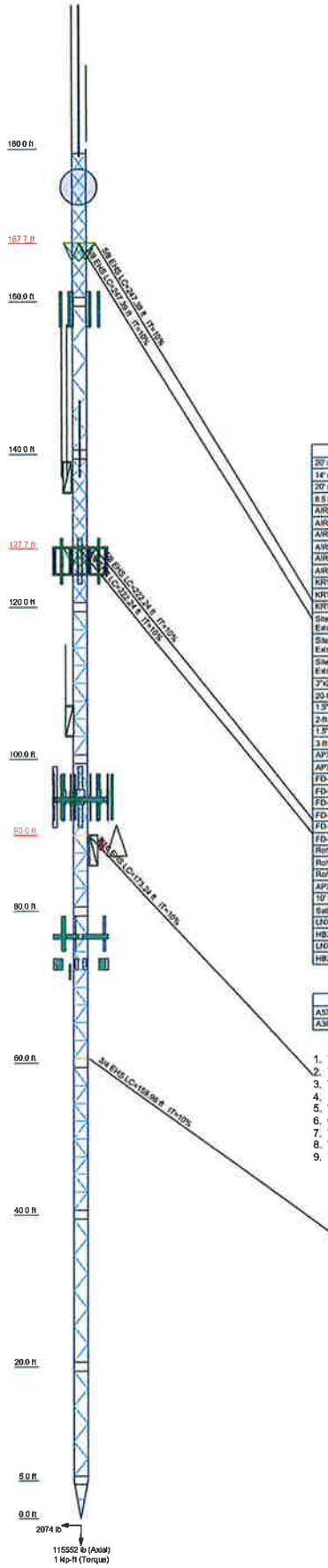
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

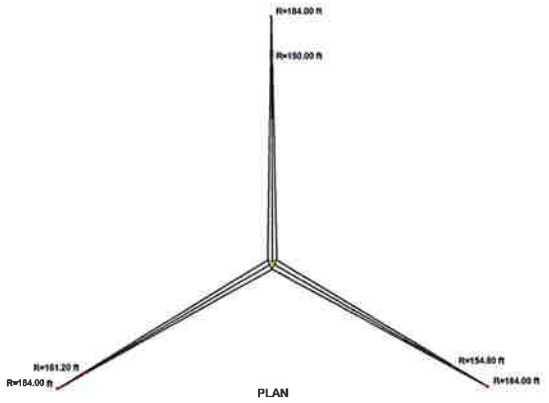
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, RISATower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

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.







DESIGNED APPURTENANCE LOADING

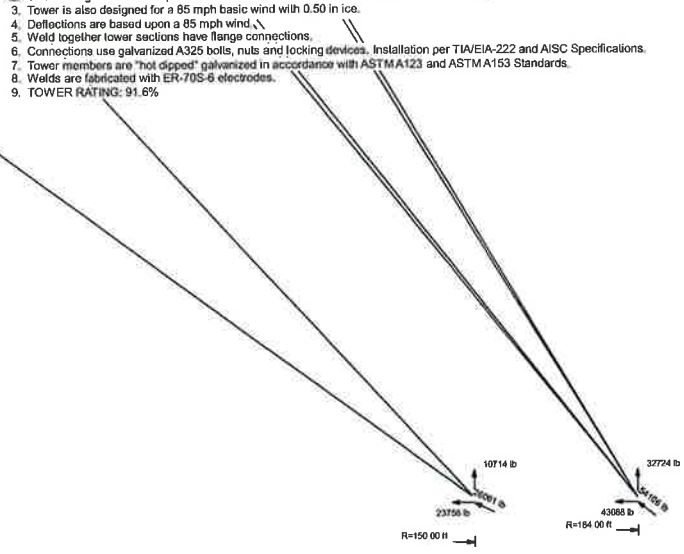
TYPE	ELEVATION	TYPE	ELEVATION
20' x 2" Dia Omni (NEU)	179	LNX-6514DS-VTM (Verizon - Proposed)	95
14' x 2" Dia Omni (NEU)	179	HBX-6517DS (Verizon - Proposed)	95
20' x 2" Dia Omni (NEU)	179	LNX-6514DS-VTM (Verizon - Proposed)	95
8.5 Dishwladome (NU)	175	HBX-6517DS (Verizon - Proposed)	95
AIR21 (T-Mobile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

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A53-B-35	35 ksi	60 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: 91.6%

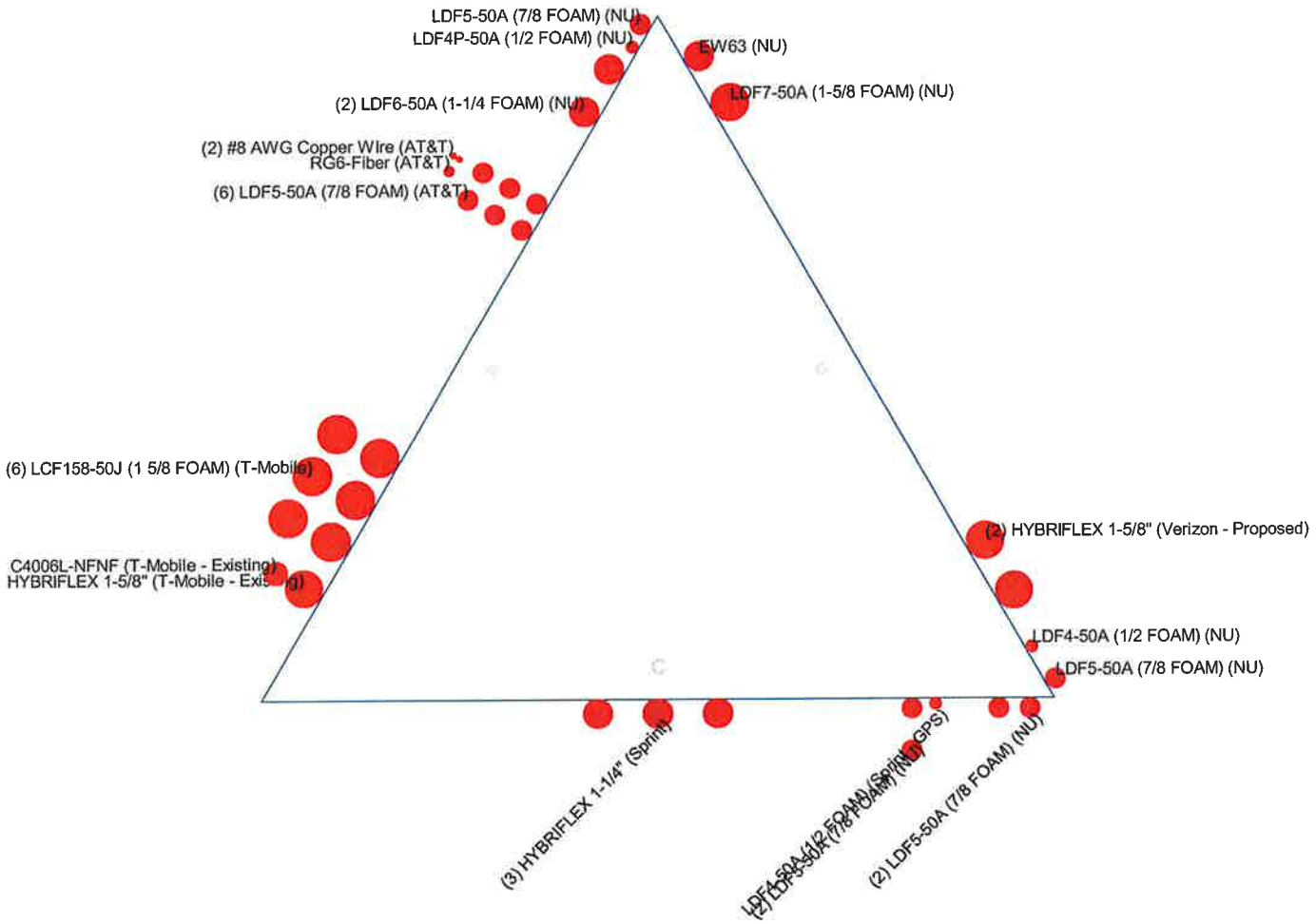


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	14234.000 - Madison 6
Project:	180' Guyed Lattice Tower - 125 New Rd., Madison, CT
Client: Verizon Wireless	Drawn by: TJL — App'd:
Code: TIA/EIA-222-F	Date: 11/13/14 — Scale: NTS
Path:	Dwg No. E-1

Feedline Plan

Round Flat App In Face App Out Face



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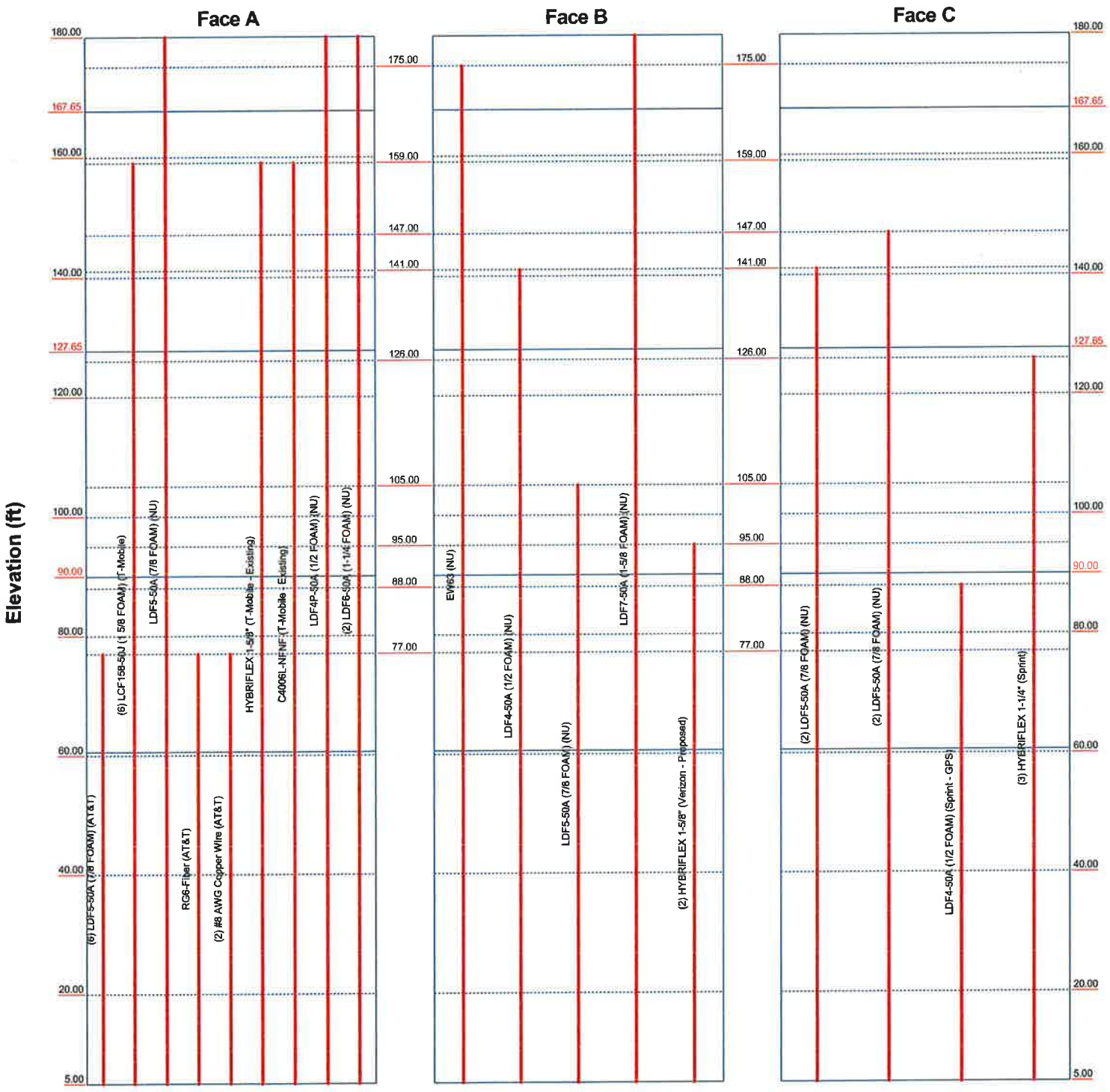
Client: Verizon Wireless		Drawn by: TJL	App'd:
Code: TIA/EIA-222-F		Date: 11/13/14	Scale: NTS
Path:			Dwg No. E-7

Feedline Distribution Chart
5' - 180'

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



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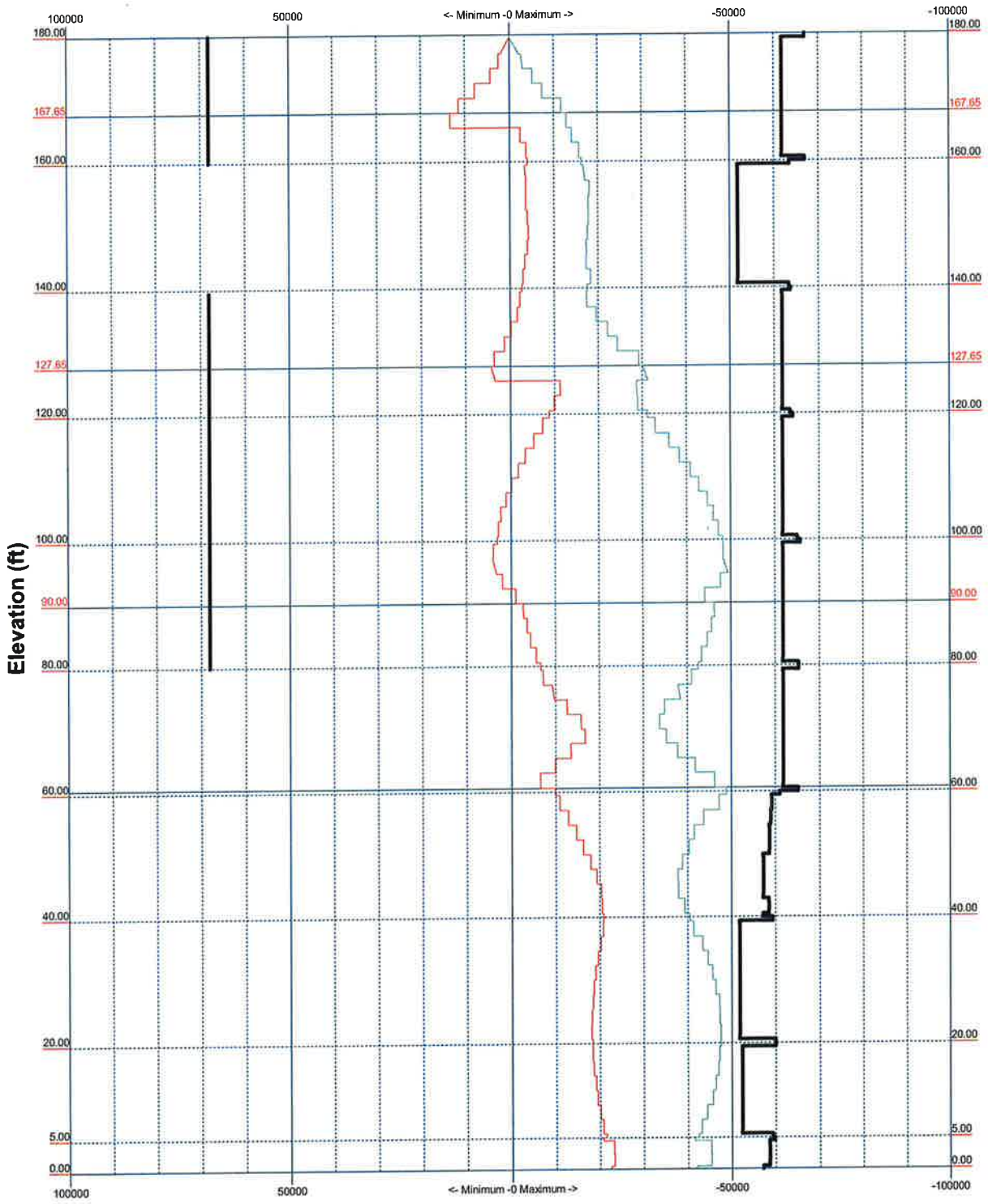
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS	
Path:		Dwg No. E-7	

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



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Job:	***14234.000 - Madison 6***		
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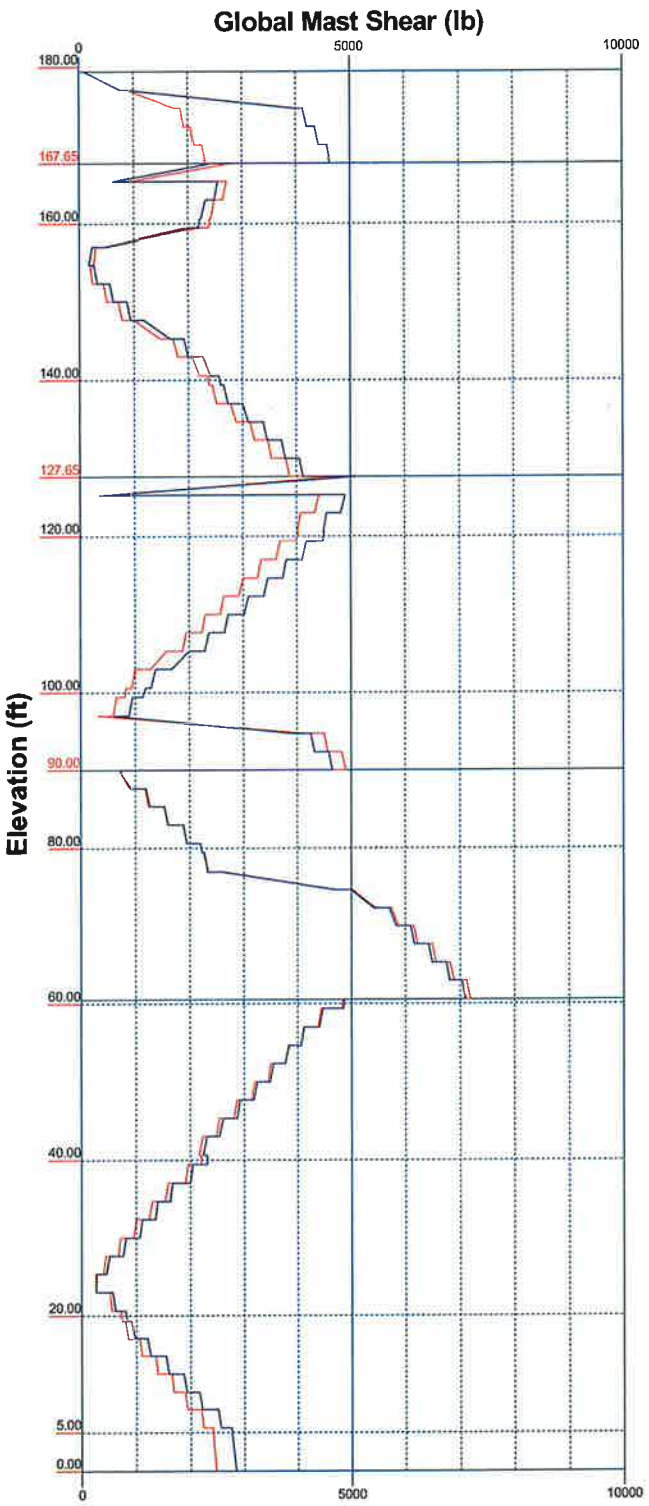
Client: Verizon Wireless		Drawn by: TJL	App'd:
Code: TIA/EIA-222-F		Date: 11/13/14	Scale: NTS
Path:			Dwg No. E-3

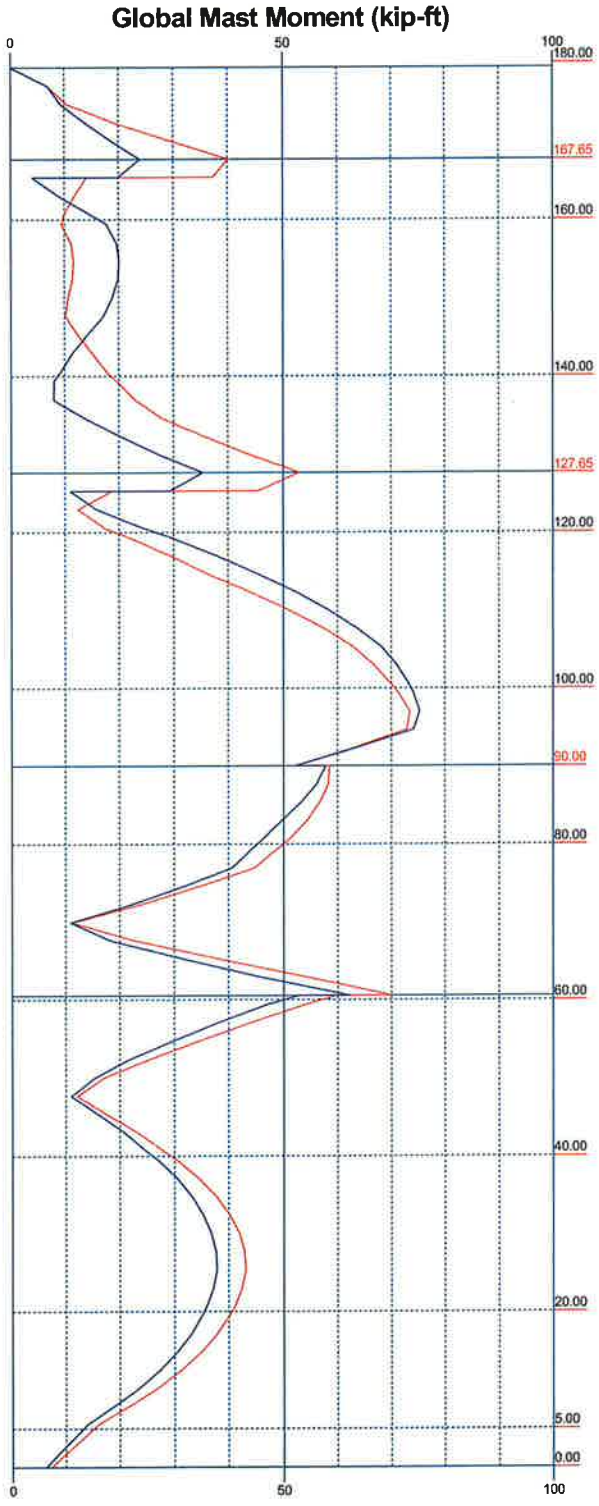
TIA/EIA-222-F - 85 mph/85 mph 0.5000 in Ice

Vx Vz

Maximum Values

Mx Mz





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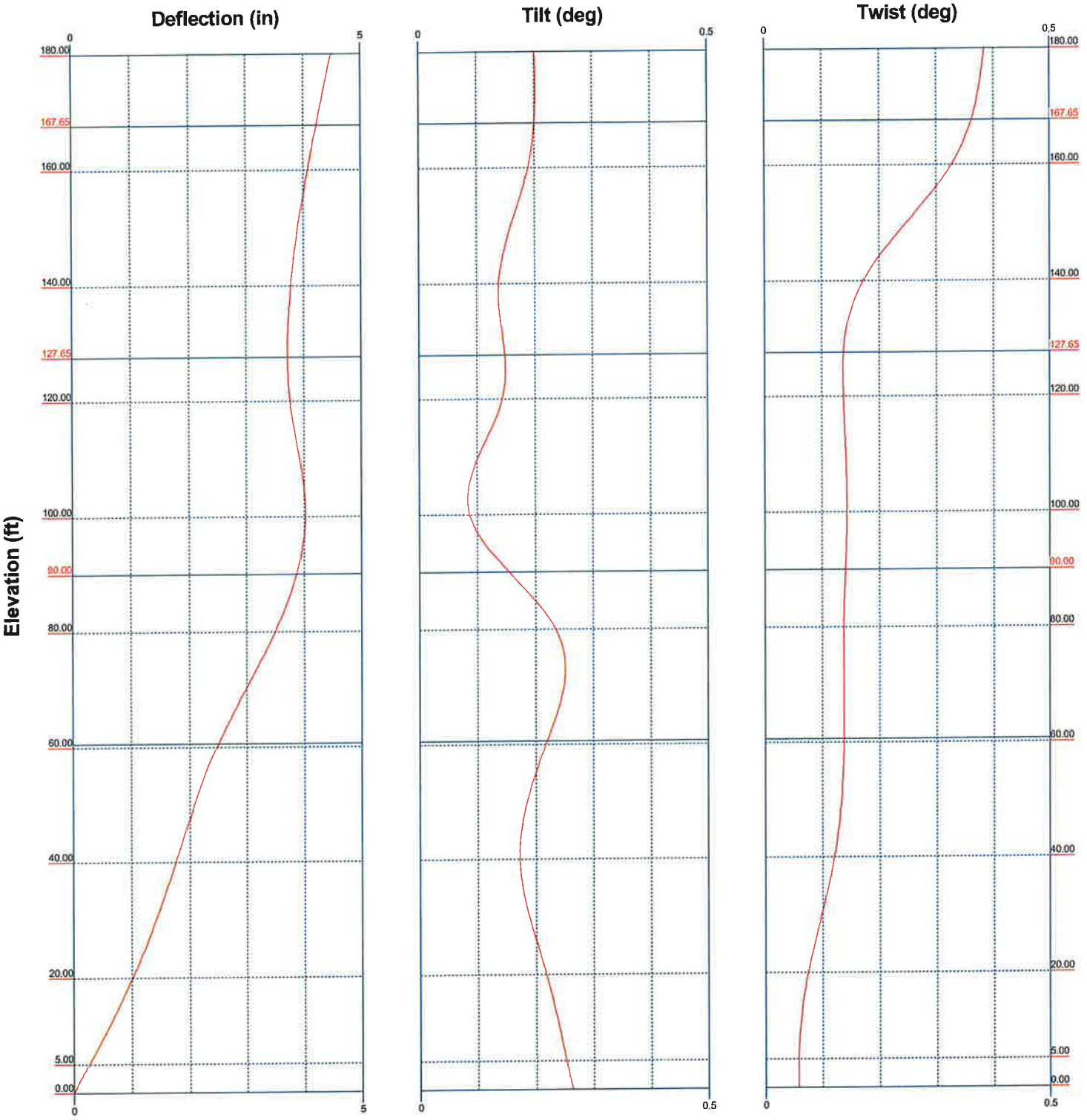
Job: *14234.000 - Madison 6*			
Project: *180' Guyed Lattice Tower - 125 New Rd., Madison, CT*			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS	
Path:		Dwg No. E-4	

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

Maximum Values



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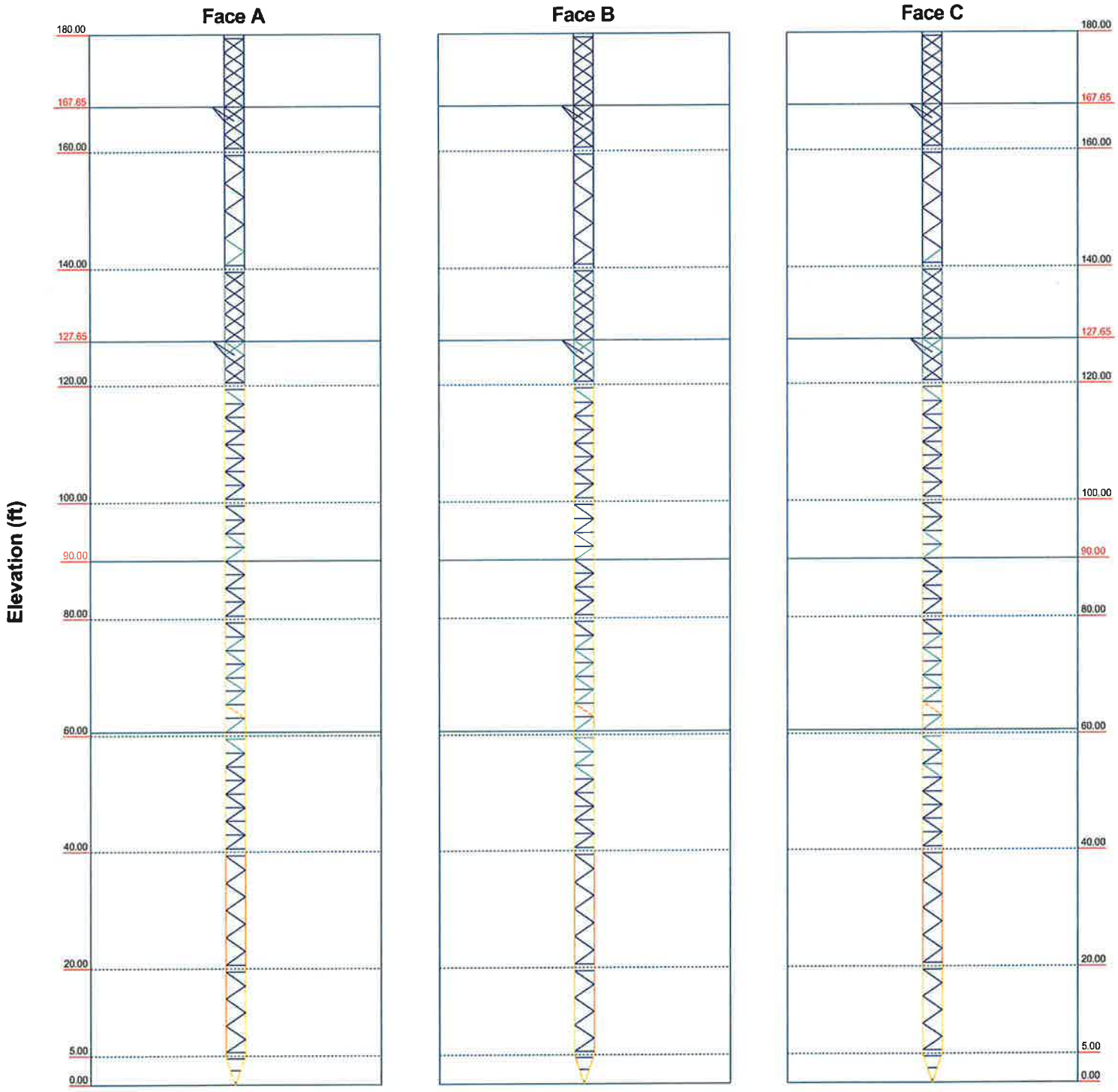
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 14234.000 - Madison 6			
Project: 180' Guyed Lattice Tower - 125 New Rd., Madison, CT			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS	
Path:		Dwg No. E-5	

Stress Distribution Chart
0' - 180'

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



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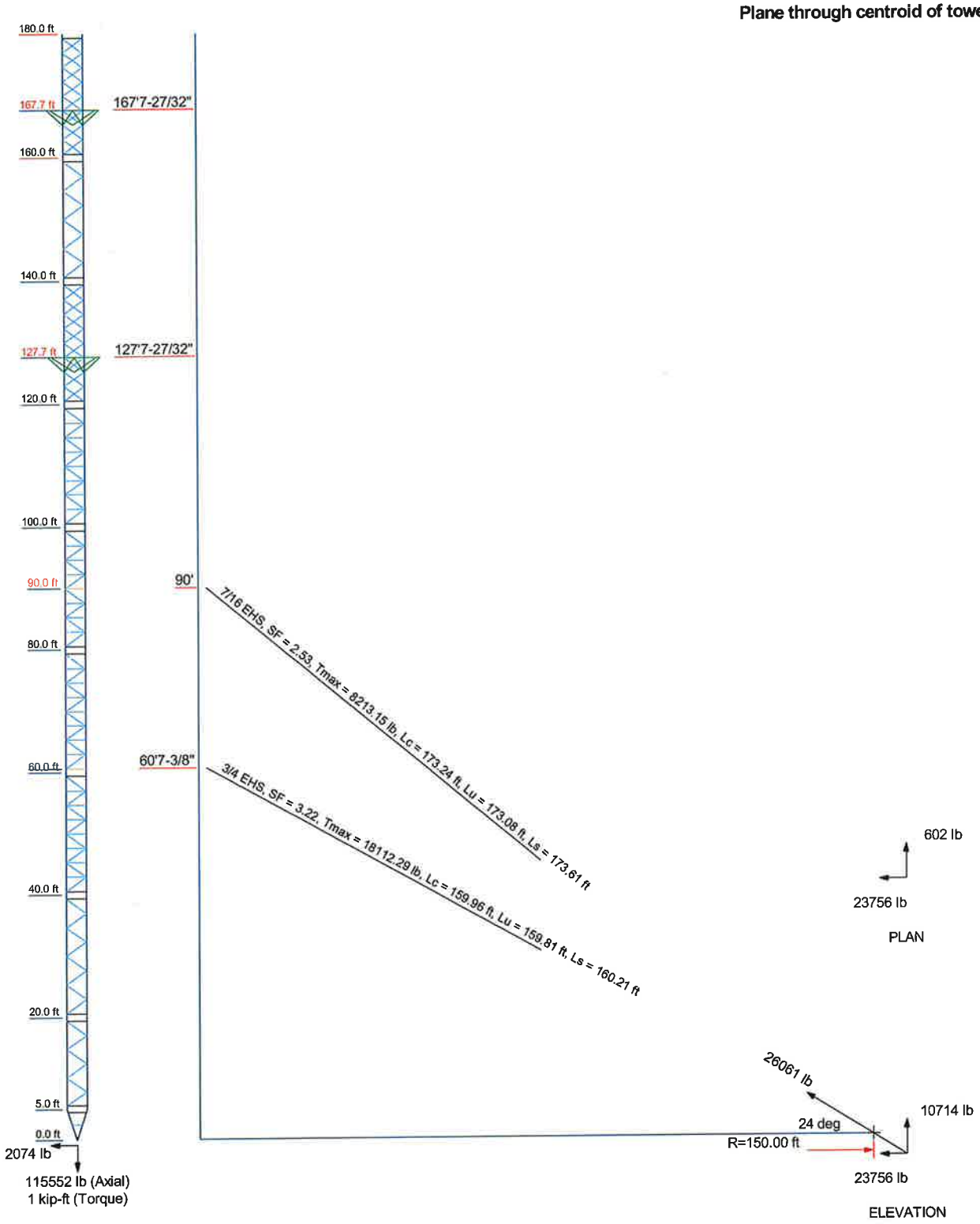
Job: 14234.000 - Madison 6			
Project: 180' Guyed Lattice Tower - 125 New Rd., Madison, CT			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS	
Path:		Dwg No. E-8	

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



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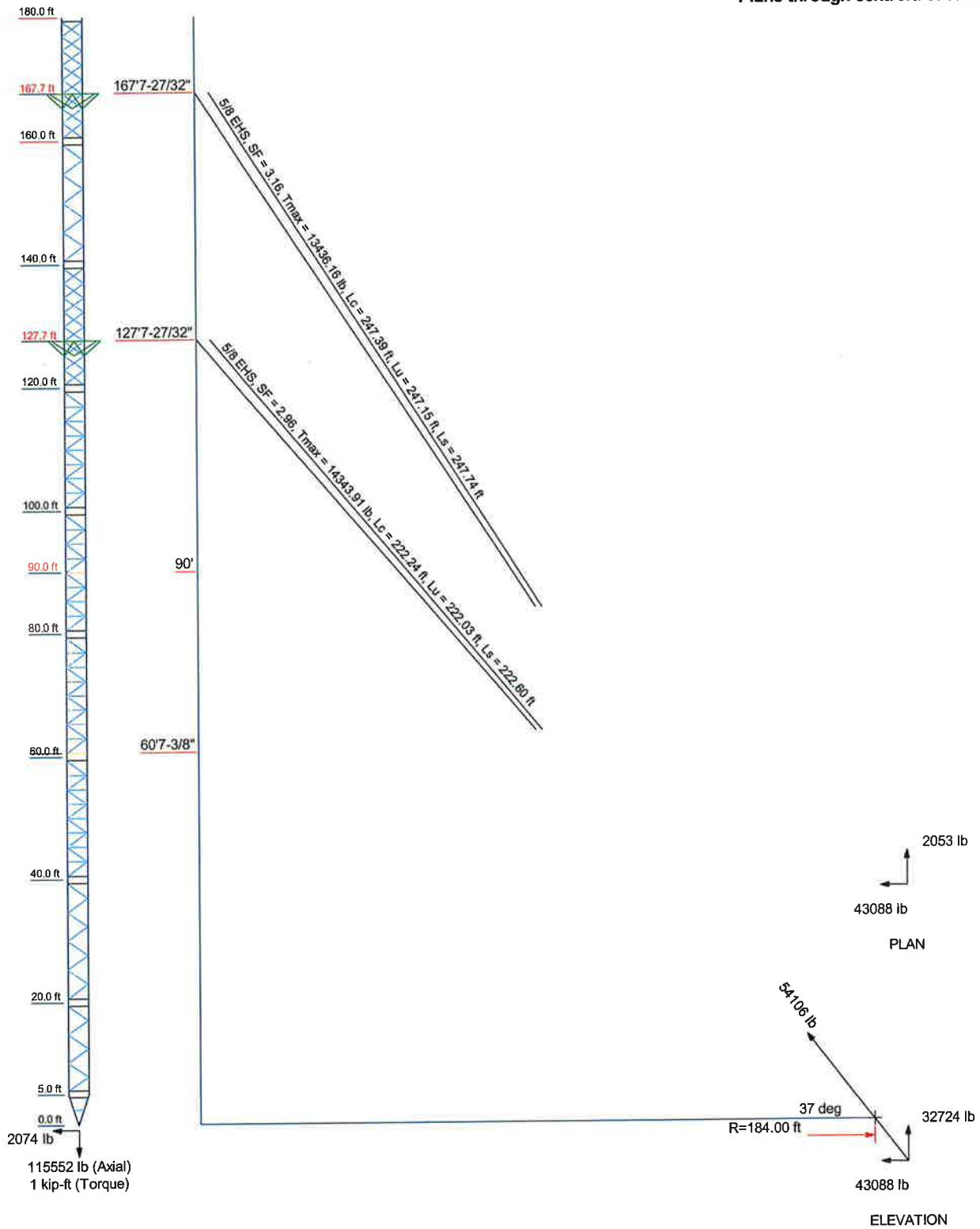
Job: 14234.000 - Madison 6			
Project: 180' Guyed Lattice Tower - 125 New Rd., Madison, CT			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS	
Path:		Dwg No. E-6	

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 - Madison 6**		
	Project: **180' Guyed Lattice Tower - 125 New Rd., Madison, CT**		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 11/13/14	Scale: NTS
	Path:		Dwg No. E-6

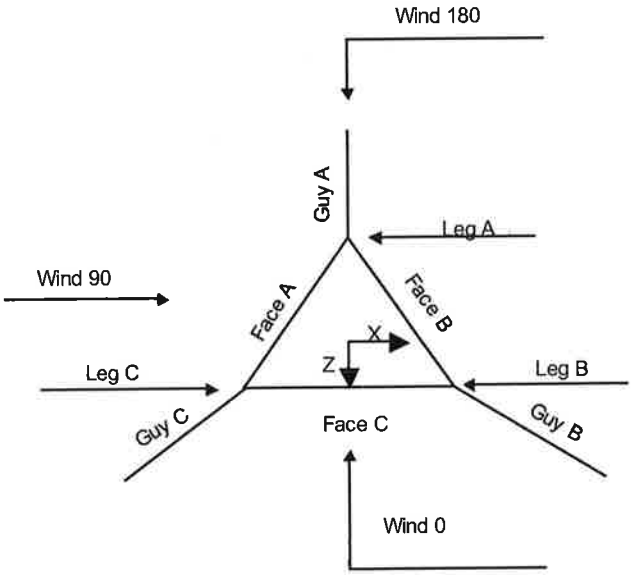
Tower Input Data

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:

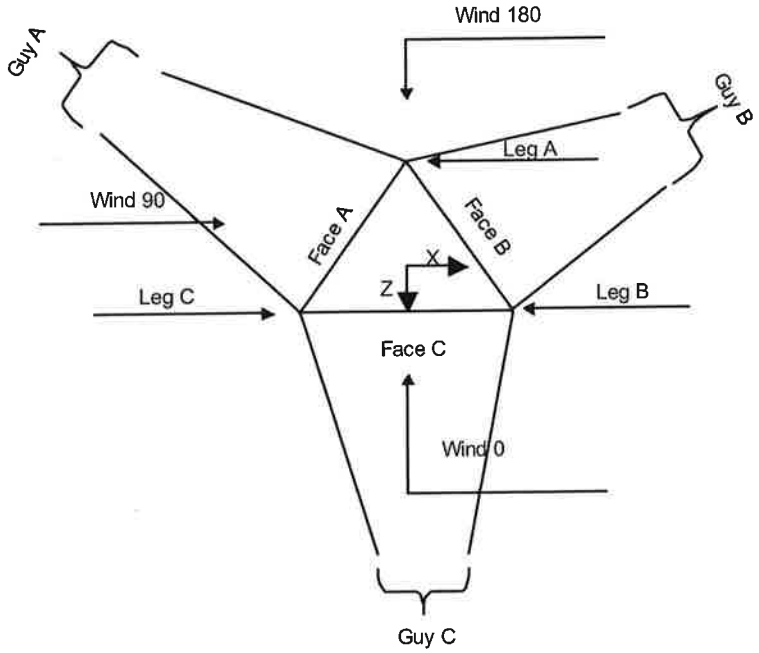
Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 85 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 85 mph.
Weld together tower sections 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	A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (35 ksi)
T7 60.00-40.00	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-35 (36 ksi)
T8 40.00-20.00	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-35 (35 ksi)
T9 20.00-5.00	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A36 (36 ksi)
T10 5.00-0.00	Channel	C12x20.7	A36 (36 ksi)	Channel	C12x20.7	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		A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A572-50 (50 ksi)
T5 100.00-80.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/2	A572-50 (50 ksi)
T6 80.00-60.00	None	Channel		A36 (36 ksi)	Solid Round	1	A36 (36 ksi)
T7 60.00-40.00	None	Channel		A36 (36 ksi)	Solid Round	1	A36 (36 ksi)
T10 5.00-0.00	None	Channel		A36 (36 ksi)	Channel	C12x20.7	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 Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.00-160.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.00-140.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-80.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 80.00-60.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 60.00-40.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 40.00-20.00	Yes	No	1	1 1	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
T10 5.00-0.00	Yes	No	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 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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

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

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
Site Pro Compact Tower Mount CWT8 (T-Mobile - Existing)	A	From Leg	1.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	150.00 200.00
Site Pro Compact Tower Mount CWT8 (T-Mobile - Existing)	B	From Leg	1.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	150.00 200.00
Site Pro Compact Tower Mount CWT8 (T-Mobile - Existing)	C	From Leg	1.00 0.00 0.00	0.0000	159.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	150.00 200.00
LNX-6515DS (Verizon - Proposed)	A	From Leg	3.00 -6.00 0.00	0.0000	95.00	No Ice 1/2" Ice	11.45 12.06	7.70 8.29	55.00 120.87
HBX-6517DS (Verizon - Proposed)	A	From Leg	3.00 -4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.24 5.71	3.30 3.75	14.00 41.26
LNX-6515DS (Verizon - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	11.45 12.06	7.70 8.29	55.00 120.87
HBX-6517DS (Verizon - Proposed)	A	From Leg	3.00 4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.24 5.71	3.30 3.75	14.00 41.26
LNX-6514DS-VTM (Verizon - Proposed)	B	From Leg	3.00 -6.00 0.00	0.0000	95.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	39.00 89.51
HBX-6517DS (Verizon - Proposed)	B	From Leg	3.00 -4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.24 5.71	3.30 3.75	14.00 41.26
LNX-6514DS-VTM (Verizon - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	39.00 89.51
HBX-6517DS (Verizon - Proposed)	B	From Leg	3.00 4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.24 5.71	3.30 3.75	14.00 41.26
LNX-6514DS-VTM (Verizon - Proposed)	C	From Leg	3.00 -6.00 0.00	0.0000	95.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	39.00 89.51
HBX-6517DS (Verizon - Proposed)	C	From Leg	3.00 -4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.24 5.71	3.30 3.75	14.00 41.26
LNX-6514DS-VTM (Verizon - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	39.00 89.51
HBX-6517DS (Verizon - Proposed)	C	From Leg	3.00 4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.24 5.71	3.30 3.75	14.00 41.26
RRH2x40-07-U (Verizon - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	0.00 0.00	1.23 1.39	50.00 66.85
RRH2x40-07-U (Verizon - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	0.00 0.00	1.23 1.39	50.00 66.85
RRH2x40-07-U (Verizon - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	0.00 0.00	1.23 1.39	50.00 66.85
RRH2x60-AWS (Verizon - Proposed)	A	From Leg	3.00 4.00 0.00	0.0000	95.00	No Ice 1/2" Ice	0.00 0.00	1.43 1.61	50.00 66.02

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-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						
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						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
8.5 Dishw/radome	A	Paraboloid w/o	From	0.00	0.0000		175.00	8.50	No Ice	56.75	75.00
(NU)		Radome	Leg	0.00					1/2" Ice	57.56	297.03
				0.00							

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 180.00-160.00	170.00	1.597	30	72.992	A	8.650	17.617	9.583	36.49	0.000	0.000
					B	9.082	14.851		40.04	0.000	0.000
					C	9.904	9.583		49.18	0.000	0.000
T2 160.00-140.00	150.00	1.541	29	72.992	A	0.000	35.302	9.583	27.15	0.000	0.000
					B	0.000	19.763		48.49	0.000	0.000
					C	0.000	15.487		61.88	0.000	0.000
T3 140.00-120.00	130.00	1.48	27	72.992	A	7.121	33.100	9.583	23.83	0.000	0.000
					B	10.074	16.557		35.99	0.000	0.000
					C	9.934	17.343		35.13	0.000	0.000
T4 120.00-100.00	110.00	1.411	26	72.992	A	7.775	33.100	9.583	23.45	0.000	0.000
					B	10.911	17.011		34.32	0.000	0.000
					C	9.796	22.733		29.46	0.000	0.000
T5 100.00-80.00	90.00	1.332	25	72.992	A	7.692	33.599	9.583	23.21	0.000	0.000
					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 180.00-160.00	170.00	1.597	30	0.5000	74.658	A	11.858	27.714	12.917	32.64	0.000	0.000
						B	8.626	26.030		37.27	0.000	0.000
						C	9.904	18.576		45.35	0.000	0.000
T2 160.00-140.00	150.00	1.541	29	0.5000	74.658	A	12.198	39.836	12.917	24.82	0.000	0.000
						B	0.000	28.899		44.70	0.000	0.000
						C	0.927	21.762		56.93	0.000	0.000
T3 140.00-120.00	130.00	1.48	27	0.5000	74.658	A	17.358	39.521	12.917	22.71	0.000	0.000
						B	9.182	29.481		33.41	0.000	0.000
						C	11.572	28.155		32.51	0.000	0.000
T4 120.00-100.00	110.00	1.411	26	0.5000	74.658	A	17.793	39.221	12.917	22.66	0.000	0.000
						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

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
						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
					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 ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	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 - 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 ft^2	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			

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	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			
			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			

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	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			
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			

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
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			

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	0.212	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			
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			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			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 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
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

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
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
Site Pro Compact Tower Mount CWT8	0.0000	150.00	0.00	-2.97	159.00	1.567	29	2.85	2.85
Site Pro Compact Tower Mount CWT8	120.0000	150.00	2.57	1.48	159.00	1.567	29	2.85	2.85
Site Pro Compact Tower Mount CWT8	240.0000	150.00	-2.57	1.48	159.00	1.567	29	2.85	2.85
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
	Sum	7783.52							

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
	Weight:								

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 Pipe	240.0000	83.84	-3.00	1.73	147.00	1.532	28	5.82	5.82	0.5000
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

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
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
Site Pro Compact Tower Mount CWT8	0.0000	200.00	0.00	-2.97	159.00	1.567	29	4.05	4.05	0.5000
Site Pro Compact Tower Mount CWT8	120.0000	200.00	2.57	1.48	159.00	1.567	29	4.05	4.05	0.5000
Site Pro Compact Tower Mount CWT8	240.0000	200.00	-2.57	1.48	159.00	1.567	29	4.05	4.05	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 Mount (1)	240.0000	600.00	-2.57	1.48	95.00	1.353	25	18.40	18.40	0.5000
	Sum Weight:	10961.48								

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
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

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
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
Site Pro Compact Tower Mount CWT8	0.0000	150.00	0.00	-2.97	159.00	1.567	29	2.85	2.85
Site Pro Compact Tower Mount CWT8	120.0000	150.00	2.57	1.48	159.00	1.567	29	2.85	2.85
Site Pro Compact Tower Mount CWT8	240.0000	150.00	-2.57	1.48	159.00	1.567	29	2.85	2.85
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
	Sum Weight:	7783.52							

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_s 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			
Total Weight	25090.42			
Wind 0 deg - No Ice		-39.67	-29535.76	-2.45
Wind 30 deg - No Ice		14243.93	-24970.18	-5.88
Wind 60 deg - No Ice		24186.99	-14351.25	-6.19
Wind 90 deg - No Ice		27727.50	17.46	-4.52
Wind 120 deg - No Ice		24250.87	16926.69	0.72
Wind 150 deg - No Ice		13513.19	26490.30	2.34
Wind 180 deg - No Ice		39.67	29977.79	2.43
Wind 210 deg - No Ice		-13444.48	26450.64	1.87
Wind 240 deg - No Ice		-24211.20	16857.98	1.73
Wind 270 deg - No Ice		-27727.50	-61.87	4.52
Wind 300 deg - No Ice		-24226.66	-14419.96	3.76
Wind 330 deg - No Ice		-14312.63	-25009.85	1.66
Member Ice	5379.31			
Guy Ice	2617.59			
Total Weight Ice	41648.10			
Wind 0 deg - Ice		-40.77	-41164.77	-3.13
Wind 30 deg - Ice		19716.36	-34450.17	-6.46
Wind 60 deg - Ice		33465.13	-19711.26	-6.50
Wind 90 deg - Ice		38662.45	18.25	-4.50
Wind 120 deg - Ice		34306.56	22772.47	1.09
Wind 150 deg - Ice		18976.12	35992.52	2.96
Wind 180 deg - Ice		40.77	40716.93	3.08
Wind 210 deg - Ice		-18905.51	35951.75	2.40
Wind 240 deg - Ice		-34265.79	22701.85	2.04
Wind 270 deg - Ice		-38662.45	-63.29	4.50
Wind 300 deg - Ice		-33505.90	-19781.88	3.41
Wind 330 deg - Ice		-19786.98	-34490.94	1.10
Total Weight	25090.42			
Wind 0 deg - Service		-39.67	-29535.76	-2.45
Wind 30 deg - Service		14243.93	-24970.18	-5.88
Wind 60 deg - Service		24186.99	-14351.25	-6.19

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques kip-ft
Wind 90 deg - Service		27727.50	17.46	-4.52
Wind 120 deg - Service		24250.87	16926.69	0.72
Wind 150 deg - Service		13513.19	26490.30	2.34
Wind 180 deg - Service		39.67	29977.79	2.43
Wind 210 deg - Service		-13444.48	26450.64	1.87
Wind 240 deg - Service		-24211.20	16857.98	1.73
Wind 270 deg - Service		-27727.50	-61.87	4.52
Wind 300 deg - Service		-24226.66	-14419.96	3.76
Wind 330 deg - Service		-14312.63	-25009.85	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
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	13463.16	-0.01	-0.24
			Max. Compression	23	-16356.03	-0.03	-0.08
			Max. Mx	24	-6228.87	0.83	0.02
			Max. My	21	-11765.00	0.04	-0.74
			Max. Vy	18	-1051.82	-0.79	0.04
			Max. Vx	19	951.01	0.03	-0.12
		Diagonal	Max Tension	20	2657.57	0.00	0.00
			Max. Compression	16	-2232.09	0.00	0.00
			Max. Mx	21	1615.03	-0.04	0.00
			Max. My	16	-1455.88	-0.01	0.02
			Max. Vy	21	-21.26	0.00	0.00
			Max. Vx	16	-7.48	-0.01	0.02
		Top Girt	Max Tension	15	66.33	0.00	0.00
			Max. Compression	21	-151.08	0.00	0.00
			Max. Mx	14	-24.29	-0.01	0.00
			Max. My	18	-94.37	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	452.78	0.00	0.00
			Max. Compression	17	-457.02	0.00	0.00
			Max. Mx	14	-3.79	-0.01	0.00
			Max. My	18	-449.84	0.00	0.00
			Max. Vy	14	-6.58	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Guy A	Bottom Tension	21	13186.44		
			Top Tension	21	13436.16		
			Top Cable Vert	21	9367.54		
			Top Cable Norm	21	9632.20		
			Top Cable Tan	21	7.12		
			Bot Cable Vert	21	-8629.74		
			Bot Cable Norm	21	9970.44		
			Bot Cable Tan	21	7.72		
		Guy B	Bottom Tension	25	12347.96		
			Top Tension	25	12597.78		
			Top Cable Vert	25	8801.64		
			Top Cable Norm	25	9013.05		
			Top Cable Tan	25	8.82		
			Bot Cable Vert	25	-8063.83		
			Bot Cable Norm	25	9351.29		
			Bot Cable Tan	25	6.03		
		Guy C	Bottom Tension	17	12413.13		
			Top Tension	17	12662.94		
			Top Cable Vert	17	8845.62		
			Top Cable Norm	17	9061.18		
			Top Cable Tan	17	9.08		
			Bot Cable Vert	17	-8107.81		
			Bot Cable Norm	17	9399.42		
			Bot Cable Tan	17	5.77		
		Torque Arm Top	Max Tension	21	14939.50	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	8813.42	0.02	0.00
			Max. My	18	13602.15	0.00	-0.00
			Max. Vy	24	25.42	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Torque Arm Bottom	Max Tension	10	253.12	0.00	0.00
			Max. Compression	21	-19549.00	0.00	0.00
			Max. Mx	19	-14156.13	0.07	0.00
			Max. My	18	-3031.02	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. Vy	19	-61.90	0.00	0.00
			Max. Vx	18	-0.33	0.00	0.00
T2	160 - 140	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	20	-18390.55	0.15	0.31
			Max. Mx	24	-15963.86	-0.61	0.06
			Max. My	15	-11802.87	0.11	-0.54
			Max. Vy	18	-1048.56	-0.14	0.01
			Max. Vx	15	-1046.23	-0.06	0.19
		Diagonal	Max Tension	21	2360.34	0.00	0.00
			Max. Compression	16	-2860.85	0.00	0.00
			Max. Mx	19	805.23	0.00	0.00
			Max. My	24	-111.12	0.00	-0.00
			Max. Vy	19	3.62	0.00	0.00
			Max. Vx	24	0.02	0.00	0.00
		Top Girt	Max Tension	24	791.25	0.00	0.00
			Max. Compression	18	-811.36	0.00	0.00
			Max. Mx	14	-28.31	0.00	0.00
			Max. My	18	126.47	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	1264.57	0.00	0.00
			Max. Compression	21	-1205.69	0.00	0.00
			Max. Mx	14	24.20	0.00	0.00
			Max. My	20	-395.89	0.00	-0.00
			Max. Vy	14	-3.61	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	8	4284.17	0.00	-0.30
			Max. Compression	15	-31309.12	0.01	0.65
			Max. Mx	18	-14613.40	-0.99	-0.03
			Max. My	15	-17162.90	0.06	1.10
			Max. Vy	24	1496.79	0.89	-0.20
			Max. Vx	15	1710.84	0.06	1.10
		Diagonal	Max Tension	26	3432.72	0.00	0.00
			Max. Compression	23	-3423.81	0.00	0.00
			Max. Mx	21	2220.52	-0.08	-0.00
			Max. My	16	-1332.09	-0.01	0.02
			Max. Vy	21	-42.22	0.00	0.00
			Max. Vx	16	-11.88	-0.01	0.02
		Top Girt	Max Tension	23	713.98	0.00	0.00
			Max. Compression	17	-244.47	0.00	0.00
			Max. Mx	14	172.44	-0.01	0.00
			Max. My	20	-180.72	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	1153.88	0.00	0.00
			Max. Compression	25	-495.87	0.00	0.00
			Max. Mx	14	244.73	-0.01	0.00
			Max. My	20	-418.87	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	14153.62		
			Top Tension	21	14343.91		
			Top Cable Vert	21	8450.97		
			Top Cable Norm	21	11590.03		
			Top Cable Tan	21	4.93		
			Bot Cable Vert	21	-7873.91		
			Bot Cable Norm	21	11761.22		
			Bot Cable Tan	21	5.53		
		Guy B	Bottom Tension	25	13903.29		
			Top Tension	25	14093.60		
			Top Cable Vert	25	8307.80		

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	25	11384.64		
			Top Cable Tan	25	4.60		
			Bot Cable Vert	25	-7730.74		
			Bot Cable Norm	25	11555.83		
			Bot Cable Tan	25	5.86		
		Guy C	Bottom Tension	17	14035.95		
			Top Tension	17	14226.25		
			Top Cable Vert	17	8383.61		
			Top Cable Norm	17	11493.53		
			Top Cable Tan	17	4.99		
			Bot Cable Vert	17	-7806.55		
			Bot Cable Norm	17	11664.72		
			Bot Cable Tan	17	5.47		
		Torque Arm Top	Max Tension	16	14084.82	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	9806.92	0.02	0.00
			Max. My	20	13655.46	0.00	0.00
			Max. Vy	24	25.42	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Torque Arm Bottom	Max Tension	23	3214.63	0.00	0.00
			Max. Compression	21	-19462.74	0.00	0.00
			Max. Mx	19	-11102.34	0.07	0.00
			Max. My	20	1733.01	0.00	-0.00
			Max. Vy	19	-61.90	0.00	0.00
			Max. Vx	20	-0.20	0.00	0.00
T4	120 - 100	Leg	Max Tension	6	3113.67	-0.12	-0.14
			Max. Compression	17	-48163.19	-0.09	-0.31
			Max. Mx	24	-14889.34	-0.94	-0.03
			Max. My	15	-24824.22	-0.09	-1.01
			Max. Vy	24	1490.44	-0.02	-0.12
			Max. Vx	15	1706.17	0.10	0.05
		Diagonal	Max Tension	22	4010.36	0.00	0.00
			Max. Compression	16	-4658.56	0.00	0.00
			Max. Mx	19	3225.41	-0.02	0.00
			Max. My	20	1954.24	0.00	0.00
			Max. Vy	19	-17.07	0.00	0.00
			Max. Vx	20	0.06	0.00	0.00
		Horizontal	Max Tension	25	1302.01	0.00	0.00
			Max. Compression	17	-834.21	0.00	0.00
			Max. Mx	24	779.94	-0.01	0.00
			Max. My	20	517.66	0.00	0.00
			Max. Vy	24	17.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Top Girt	Max Tension	15	2226.88	0.00	0.00
			Max. Compression	21	-1898.67	0.00	0.00
			Max. Mx	14	65.87	-0.01	0.00
			Max. My	20	65.43	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	813.88	0.00	0.00
			Max. Compression	19	-435.25	0.00	0.00
			Max. Mx	14	236.94	-0.01	0.00
			Max. My	20	656.66	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	4144.89	-0.17	0.05
			Max. Compression	17	-49383.04	-0.31	-0.45
			Max. Mx	18	-31541.66	0.74	-0.14
			Max. My	21	-24917.26	-0.00	0.77
			Max. Vy	24	-1734.23	0.48	0.10
			Max. Vx	21	1620.07	-0.14	-0.43

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	16	3266.08	0.00	0.00
			Max. Compression	16	-5048.24	0.00	0.00
			Max. Mx	26	1307.45	-0.01	0.00
			Max. My	20	-1509.47	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	2763.75	0.00	0.00
			Max. Compression	19	-1140.79	0.00	0.00
			Max. Mx	14	1134.87	-0.01	0.00
			Max. My	20	1053.05	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	742.04	0.00	0.00
			Max. Compression	10	-263.63	0.00	0.00
			Max. Mx	14	168.80	0.00	0.00
			Max. My	20	44.81	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	956.81	0.00	0.00
			Max. Compression	25	-553.22	0.00	0.00
			Max. Mx	14	200.73	0.00	0.00
			Max. My	20	858.41	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	8126.32		
			Top Tension	21	8213.15		
			Top Cable Vert	21	4380.06		
			Top Cable Norm	21	6947.72		
			Top Cable Tan	21	0.42		
			Bot Cable Vert	21	-4081.92		
			Bot Cable Norm	21	7026.74		
			Bot Cable Tan	21	0.42		
		Guy B	Bottom Tension	25	8129.85		
			Top Tension	25	8216.69		
			Top Cable Vert	25	4284.62		
			Top Cable Norm	25	7011.14		
			Top Cable Tan	25	0.50		
			Bot Cable Vert	25	-3984.41		
			Bot Cable Norm	25	7086.53		
			Bot Cable Tan	25	0.50		
		Guy C	Bottom Tension	17	8028.43		
			Top Tension	17	8115.29		
			Top Cable Vert	17	4111.09		
			Top Cable Norm	17	6996.92		
			Top Cable Tan	17	0.17		
			Bot Cable Vert	17	-3808.10		
			Bot Cable Norm	17	7067.81		
			Bot Cable Tan	17	0.17		
		Top Guy Pull-Off	Max Tension	17	2072.81	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	851.15	0.01	0.00
			Max. My	20	1794.80	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	20	-48832.72	-0.24	0.20
			Max. Mx	18	-14497.10	-1.42	-0.19
			Max. My	15	-23062.00	0.02	1.42
			Max. Vy	24	1917.30	1.12	-0.29
			Max. Vx	15	1791.16	0.25	1.19
		Diagonal	Max Tension	16	4950.83	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. Compression	22	-6754.01	0.00	0.00
			Max. Mx	26	3598.32	-0.02	0.00
			Max. My	20	-3768.81	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	1388.56	0.00	0.00
			Max. Compression	20	-845.81	0.00	0.00
			Max. Mx	14	651.31	0.01	0.00
			Max. My	20	977.14	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	1373.48	0.00	0.00
			Max. Compression	18	-598.15	0.00	0.00
			Max. Mx	14	267.58	-0.01	0.00
			Max. My	20	-429.06	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	26	5384.93	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	2506.62	-0.01	0.00
			Max. My	24	4221.61	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	17996.48		
			Top Tension	21	18112.29		
			Top Cable Vert	21	7016.19		
			Top Cable Norm	21	16698.14		
			Top Cable Tan	21	1.18		
			Bot Cable Vert	21	-6632.54		
			Bot Cable Norm	21	16729.69		
			Bot Cable Tan	21	1.18		
		Guy B	Bottom Tension	25	17918.76		
			Top Tension	25	18034.58		
			Top Cable Vert	25	6806.33		
			Top Cable Norm	25	16700.90		
			Top Cable Tan	25	1.30		
			Bot Cable Vert	25	-6415.89		
			Bot Cable Norm	25	16730.76		
			Bot Cable Tan	25	1.30		
		Guy C	Bottom Tension	17	17637.20		
			Top Tension	17	17753.04		
			Top Cable Vert	17	6479.78		
			Top Cable Norm	17	16528.24		
			Top Cable Tan	17	0.40		
			Bot Cable Vert	17	-6080.15		
			Bot Cable Norm	17	16556.05		
			Bot Cable Tan	17	0.40		
		Top Guy Pull-Off	Max Tension	26	4038.70	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	1879.97	0.01	0.00
			Max. My	24	3166.21	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	20	-48834.79	0.35	1.24
			Max. Mx	24	-44731.87	-1.23	-0.29
			Max. My	20	-45647.55	0.35	1.24
			Max. Vy	18	-1909.99	-0.25	-0.21
			Max. Vx	15	1793.72	0.35	0.10
		Diagonal	Max Tension	26	4159.65	0.00	0.00
			Max. Compression	20	-5741.57	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. Mx	24	-5587.59	-0.02	0.00
			Max. My	24	-2504.13	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	1642.29	0.00	0.00
			Max. Compression	20	-845.84	0.00	0.00
			Max. Mx	14	629.23	0.01	0.00
			Max. My	24	1612.34	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	2181.84	0.00	0.00
			Max. Compression	17	-1497.77	0.00	0.00
			Max. Mx	14	258.35	0.00	0.00
			Max. My	24	1975.28	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	1229.72	0.00	0.00
			Max. Compression	20	-747.36	0.00	0.00
			Max. Mx	14	165.76	0.00	0.00
			Max. My	24	-712.26	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	-47489.00	0.11	0.18
			Max. Mx	24	-40151.08	-0.64	0.05
			Max. My	21	-40500.33	0.25	0.60
			Max. Vy	18	-1035.40	-0.21	-0.26
			Max. Vx	21	-1038.85	0.27	-0.04
		Diagonal	Max Tension	26	1824.67	0.00	0.00
			Max. Compression	20	-2257.85	0.00	0.00
			Max. Mx	19	408.94	0.00	0.00
			Max. My	23	-11.81	0.00	-0.00
			Max. Vy	19	3.62	0.00	0.00
			Max. Vx	23	0.01	0.00	0.00
		Top Girt	Max Tension	20	1005.96	0.00	0.00
			Max. Compression	26	-627.96	0.00	0.00
			Max. Mx	14	163.54	0.00	0.00
			Max. My	24	975.17	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	460.76	0.00	0.00
			Max. Compression	23	-267.31	0.00	0.00
			Max. Mx	14	71.26	0.00	0.00
			Max. My	18	21.43	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	-47466.23	0.15	0.08
			Max. Mx	17	-41841.14	-2.39	1.23
			Max. My	21	-42417.30	0.18	-2.73
			Max. Vy	25	-4865.98	2.25	1.49
			Max. Vx	21	5656.06	0.18	-2.73
		Diagonal	Max Tension	23	1853.47	0.00	0.00
			Max. Compression	15	-2333.13	0.00	0.00
			Max. Mx	23	1853.47	-0.02	0.00
			Max. My	23	-90.41	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	502.94	0.00	0.00
			Max. Compression	15	-452.21	0.00	0.00
			Max. Mx	14	81.02	-0.01	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. My	18	236.01	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	3779.48	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	2313.55	-0.01	0.00
			Max. My	24	3628.80	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	-45341.04	-0.31	0.11
			Max. Mx	21	-35185.63	-3.03	0.50
			Max. My	24	-36416.25	-2.87	0.61
			Max. Vy	21	10350.88	2.73	0.17
			Max. Vx	18	1194.14	-1.00	-0.28
		Horizontal	Max Tension	17	33.56	-0.01	0.02
			Max. Compression	24	-27.52	-0.06	0.04
			Max. Mx	18	-0.36	-0.64	-0.06
			Max. My	18	-0.36	-0.64	-0.06
			Max. Vy	18	404.32	-0.59	-0.02
			Max. Vx	18	61.60	-0.64	-0.06
		Top Girt	Max Tension	20	6350.55	-1.70	0.04
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	6311.81	-2.53	-0.11
			Max. My	24	6311.81	-2.53	-0.11
			Max. Vy	23	-368.01	-2.08	-0.05
			Max. Vx	21	-55.46	-2.47	-0.09
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-2772.81	-1.01	0.06
			Max. Mx	18	-2043.71	-1.29	-0.13
			Max. My	23	-2336.15	-0.73	0.16
			Max. Vy	18	2862.50	-1.10	0.06
			Max. Vx	23	-698.47	-0.57	-0.08

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Mast	Max. Vert	21	115551.93	0.96	-1592.30
	Max. H_x	23	108030.23	1769.62	-1065.17
	Max. H_z	15	107276.42	-16.72	2053.46
	Max. M_x	1	0.00	-1.88	-1.69
	Max. M_z	1	0.00	-1.88	-1.69
	Max. Torsion	18	0.61	-1718.89	-67.26
	Min. Vert	1	65492.09	-1.88	-1.69
	Min. H_x	19	107652.37	-1781.68	-1061.12
	Min. H_z	21	115551.93	0.96	-1592.30
	Min. M_x	1	0.00	-1.88	-1.69
	Min. M_z	1	0.00	-1.88	-1.69
	Min. Torsion	24	-0.54	1699.02	-73.13
Guy C @ 184 ft Elev 0 ft Azimuth 240 deg	Max. Vert	10	-1835.63	-1820.49	1052.33
	Max. H_x	35	-1835.63	-1820.49	1052.33
	Max. H_z	17	-31230.16	-35843.04	20716.57
	Min. Vert	17	-31230.16	-35843.04	20716.57

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Min. H_x	17	-31230.16	-35843.04	20716.57
	Min. H_z	10	-1835.63	-1820.49	1052.33
Guy B @ 184 ft Elev 0 ft Azimuth 120 deg	Max. Vert	6	-1849.35	1832.19	1060.89
	Max. H_x	25	-31270.15	35888.98	20733.21
	Max. H_z	25	-31270.15	35888.98	20733.21
	Min. Vert	25	-31270.15	35888.98	20733.21
	Min. H_x	6	-1849.35	1832.19	1060.89
	Min. H_z	6	-1849.35	1832.19	1060.89
Guy A @ 184 ft Elev 0 ft Azimuth 0 deg	Max. Vert	2	-1780.67	-1.48	-2042.87
	Max. H_x	24	-17903.07	2052.56	-23093.14
	Max. H_z	2	-1780.67	-1.48	-2042.87
	Min. Vert	21	-32723.61	8.75	-43087.98
	Min. H_x	18	-17911.80	-2052.50	-23104.75
	Min. H_z	21	-32723.61	8.75	-43087.98
Guy C @ 161.2 ft Elev 0 ft Azimuth 240 deg	Max. Vert	23	-385.03	-1146.98	662.23
	Max. H_x	23	-385.03	-1146.98	662.23
	Max. H_z	17	-9888.25	-20459.15	11811.44
	Min. Vert	17	-9888.25	-20459.15	11811.44
	Min. H_x	17	-9888.25	-20459.15	11811.44
	Min. H_z	23	-385.03	-1146.98	662.23
Guy B @ 154.8 ft Elev 0 ft Azimuth 120 deg	Max. Vert	19	-357.79	1025.26	592.00
	Max. H_x	25	-10400.30	20627.28	11907.09
	Max. H_z	25	-10400.30	20627.28	11907.09
	Min. Vert	25	-10400.30	20627.28	11907.09
	Min. H_x	19	-357.79	1025.26	592.00
	Min. H_z	19	-357.79	1025.26	592.00
Guy A @ 150 ft Elev 0 ft Azimuth 0 deg	Max. Vert	15	-357.87	-0.03	-1117.73
	Max. H_x	24	-5618.26	602.42	-12505.17
	Max. H_z	15	-357.87	-0.03	-1117.73
	Min. Vert	21	-10714.46	1.59	-23756.43
	Min. H_x	18	-5593.95	-602.15	-12445.98
	Min. H_z	21	-10714.46	1.59	-23756.43

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	65492.09	1.88	1.69	0.00	0.00	-0.02
Dead+Wind 0 deg - No Ice+Guy	71095.20	8.03	-982.92	0.00	0.00	-0.31
Dead+Wind 30 deg - No Ice+Guy	72674.52	452.49	-766.40	0.00	0.00	-0.37
Dead+Wind 60 deg - No Ice+Guy	73469.04	752.27	-431.01	0.00	0.00	-0.46
Dead+Wind 90 deg - No Ice+Guy	72529.15	891.20	0.16	0.00	0.00	-0.41

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
Dead+Wind 120 deg - No Ice+Guy	71437.56	846.32	512.39	0.00	0.00	-0.01
Dead+Wind 150 deg - No Ice+Guy	73467.82	433.67	779.15	0.00	0.00	0.26
Dead+Wind 180 deg - No Ice+Guy	74627.94	-5.71	869.64	0.00	0.00	0.27
Dead+Wind 210 deg - No Ice+Guy	73602.45	-442.54	782.59	0.00	0.00	0.20
Dead+Wind 240 deg - No Ice+Guy	71698.57	-847.35	517.05	0.00	0.00	0.26
Dead+Wind 270 deg - No Ice+Guy	72867.57	-886.57	6.96	0.00	0.00	0.37
Dead+Wind 300 deg - No Ice+Guy	73797.23	-742.25	-423.90	0.00	0.00	0.13
Dead+Wind 330 deg - No Ice+Guy	72853.50	-438.22	-761.36	0.00	0.00	-0.17
Dead+Ice+Temp+Guy	91520.91	8.06	7.32	0.00	0.00	-0.03
Dead+Wind 0 deg+Ice+Temp+Guy	107276.42	16.72	-2053.46	0.00	0.00	-0.36
Dead+Wind 30 deg+Ice+Temp+Guy	111592.66	815.46	-1505.81	0.00	0.00	-0.27
Dead+Wind 60 deg+Ice+Temp+Guy	113863.02	1381.61	-786.89	0.00	0.00	-0.51
Dead+Wind 90 deg+Ice+Temp+Guy	111403.68	1718.89	67.26	0.00	0.00	-0.61
Dead+Wind 120 deg+Ice+Temp+Guy	107652.37	1781.68	1061.12	0.00	0.00	-0.01
Dead+Wind 150 deg+Ice+Temp+Guy	112774.00	901.39	1464.28	0.00	0.00	0.43
Dead+Wind 180 deg+Ice+Temp+Guy	115551.93	-0.96	1592.30	0.00	0.00	0.27
Dead+Wind 210 deg+Ice+Temp+Guy	112961.58	-898.65	1467.74	0.00	0.00	0.04
Dead+Wind 240 deg+Ice+Temp+Guy	108030.23	-1769.62	1065.17	0.00	0.00	0.27
Dead+Wind 270 deg+Ice+Temp+Guy	111904.49	-1699.02	73.13	0.00	0.00	0.54
Dead+Wind 300 deg+Ice+Temp+Guy	114386.82	-1356.16	-778.77	0.00	0.00	0.12
Dead+Wind 330 deg+Ice+Temp+Guy	111881.23	-784.58	-1499.21	0.00	0.00	-0.35
Dead+Wind 0 deg - Service+Guy	71095.20	8.03	-982.92	0.00	0.00	-0.31
Dead+Wind 30 deg - Service+Guy	72674.52	452.49	-766.40	0.00	0.00	-0.37
Dead+Wind 60 deg - Service+Guy	73469.04	752.27	-431.01	0.00	0.00	-0.46
Dead+Wind 90 deg - Service+Guy	72529.15	891.20	0.16	0.00	0.00	-0.41
Dead+Wind 120 deg - Service+Guy	71437.56	846.32	512.39	0.00	0.00	-0.01
Dead+Wind 150 deg - Service+Guy	73467.82	433.67	779.15	0.00	0.00	0.26
Dead+Wind 180 deg - Service+Guy	74627.94	-5.71	869.64	0.00	0.00	0.27
Dead+Wind 210 deg - Service+Guy	73602.45	-442.54	782.59	0.00	0.00	0.20
Dead+Wind 240 deg - Service+Guy	71698.57	-847.35	517.05	0.00	0.00	0.26
Dead+Wind 270 deg - Service+Guy	72867.57	-886.57	6.96	0.00	0.00	0.37

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
Dead+Wind 300 deg - Service+Guy	73797.23	-742.25	-423.90	0.00	0.00	0.13
Dead+Wind 330 deg - Service+Guy	72853.50	-438.22	-761.36	0.00	0.00	-0.17

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-25090.06	0.00	0.23	25089.98	-0.38	0.002%
2	-46.11	-25379.80	-32986.52	46.12	25379.76	32985.42	0.003%
3	15951.41	-25089.47	-27940.12	-15951.81	25089.40	27937.74	0.006%
4	27156.36	-24797.99	-16071.21	-27156.06	24797.96	16069.81	0.004%
5	31142.06	-25089.72	21.02	-31140.50	25089.66	-19.75	0.005%
6	27226.51	-25380.80	18657.70	-27225.58	25380.75	-18657.20	0.003%
7	15231.21	-25090.31	29471.39	-15229.09	25090.25	-29470.69	0.005%
8	46.11	-24800.31	33428.55	-46.25	24800.28	-33427.63	0.002%
9	-15151.96	-25090.65	29420.58	15149.90	25090.59	-29419.89	0.005%
10	-27180.57	-25382.12	18577.94	27179.71	25382.08	-18577.46	0.002%
11	-31142.06	-25090.40	-65.43	31140.56	25090.34	66.67	0.005%
12	-27202.30	-24799.32	-16150.98	27201.95	24799.29	16149.68	0.003%
13	-16030.66	-25089.81	-27990.93	16031.09	25089.74	27988.57	0.006%
14	0.00	-41647.42	0.00	-0.93	41647.34	0.73	0.003%
15	-58.23	-42409.45	-50232.70	58.25	42409.34	50230.47	0.003%
16	24202.57	-41645.84	-42254.54	-24202.86	41645.80	42253.30	0.002%
17	41266.29	-40879.15	-24230.43	-41266.30	40879.12	24229.11	0.002%
18	47633.89	-41646.51	27.94	-47631.34	41646.38	-25.61	0.005%
19	42124.69	-42412.36	27321.60	-42122.82	42412.25	-27320.59	0.003%
20	23490.95	-41648.09	43827.10	-23489.81	41648.05	-43826.80	0.002%
21	58.23	-40885.40	49784.86	-59.08	40885.31	-49782.39	0.004%
22	-23391.71	-41649.01	43756.13	23390.61	41648.97	-43755.83	0.002%
23	-42066.95	-42415.70	27221.02	42065.20	42415.60	-27220.06	0.003%
24	-47633.89	-41648.34	-72.99	47631.46	41648.22	75.25	0.005%
25	-41324.15	-40882.74	-24331.08	41324.03	40882.71	24330.01	0.002%
26	-24301.81	-41646.76	-42325.52	24302.12	41646.72	42324.27	0.002%
27	-46.11	-25379.80	-32986.52	46.12	25379.76	32985.42	0.003%
28	15951.41	-25089.47	-27940.12	-15951.81	25089.40	27937.74	0.006%
29	27156.36	-24797.99	-16071.21	-27156.06	24797.96	16069.81	0.004%
30	31142.06	-25089.72	21.02	-31140.50	25089.66	-19.75	0.005%
31	27226.51	-25380.80	18657.70	-27225.58	25380.75	-18657.20	0.003%
32	15231.21	-25090.31	29471.39	-15229.09	25090.25	-29470.69	0.005%
33	46.11	-24800.31	33428.55	-46.25	24800.28	-33427.63	0.002%
34	-15151.96	-25090.65	29420.58	15149.90	25090.59	-29419.89	0.005%
35	-27180.57	-25382.12	18577.94	27179.71	25382.08	-18577.46	0.002%
36	-31142.06	-25090.40	-65.43	31140.56	25090.34	66.67	0.005%
37	-27202.30	-24799.32	-16150.98	27201.95	24799.29	16149.68	0.003%
38	-16030.66	-25089.81	-27990.93	16031.09	25089.74	27988.57	0.006%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance

1	Yes	8	0.00000001	0.00003179
2	Yes	13	0.00000001	0.00006500
3	Yes	12	0.00000001	0.00009477
4	Yes	10	0.00000001	0.00006713
5	Yes	12	0.00000001	0.00009593
6	Yes	13	0.00000001	0.00006274
7	Yes	12	0.00000001	0.00008985
8	Yes	10	0.00000001	0.00003327
9	Yes	12	0.00000001	0.00008693
10	Yes	13	0.00000001	0.00005903
11	Yes	12	0.00000001	0.00009274
12	Yes	10	0.00000001	0.00006674
13	Yes	12	0.00000001	0.00009450
14	Yes	6	0.00000001	0.00004715
15	Yes	14	0.00000001	0.00007777
16	Yes	14	0.00000001	0.00003034
17	Yes	11	0.00000001	0.00006253
18	Yes	13	0.00000001	0.00009610
19	Yes	14	0.00000001	0.00007546
20	Yes	14	0.00000001	0.00002930
21	Yes	10	0.00000001	0.00005302
22	Yes	14	0.00000001	0.00002747
23	Yes	14	0.00000001	0.00007061
24	Yes	13	0.00000001	0.00009059
25	Yes	11	0.00000001	0.00006455
26	Yes	14	0.00000001	0.00003009
27	Yes	13	0.00000001	0.00006500
28	Yes	12	0.00000001	0.00009477
29	Yes	10	0.00000001	0.00006713
30	Yes	12	0.00000001	0.00009593
31	Yes	13	0.00000001	0.00006274
32	Yes	12	0.00000001	0.00008985
33	Yes	10	0.00000001	0.00003327
34	Yes	12	0.00000001	0.00008693
35	Yes	13	0.00000001	0.00005903
36	Yes	12	0.00000001	0.00009274
37	Yes	10	0.00000001	0.00006674
38	Yes	12	0.00000001	0.00009450

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	4.495	33	0.2019	0.3834
T2	160 - 140	4.082	33	0.1883	0.3278
T3	140 - 120	3.784	33	0.1372	0.1730
T4	120 - 100	3.766	38	0.1437	0.1389
T5	100 - 80	4.029	31	0.0859	0.1449
T6	80 - 60	3.490	31	0.2341	0.1400
T7	60 - 40	2.479	35	0.2194	0.1372
T8	40 - 20	1.762	35	0.1690	0.1228
T9	20 - 5	1.010	35	0.2149	0.0727
T10	5 - 0	0.269	35	0.2495	0.0600

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	4.474	0.2022	0.3823	56349
175.00	8.5 Dishw/radome	33	4.388	0.2029	0.3776	56349
167.65	Guy	33	4.235	0.2006	0.3623	22820
159.00	AIR21	33	4.063	0.1857	0.3214	14641
147.00	3"x20-ft Omni	33	3.862	0.1471	0.2233	16054
143.00	1.5"x2'omni	33	3.813	0.1390	0.1922	14879
142.00	2-ft Stand Off	33	3.802	0.1379	0.1853	14715
141.00	1.5"x2'omni	33	3.793	0.1373	0.1789	14487
137.00	3-ft Side Arm	33	3.763	0.1397	0.1586	14987
127.65	Guy	33	3.740	0.1557	0.1389	22261
126.00	APXVSPP18-C-A20 w/ Mount	33	3.742	0.1565	0.1382	24382
105.00	10' x 3" Dia Omni	31	4.011	0.0630	0.1441	5556
95.00	LNX-6515DS	31	3.981	0.1234	0.1446	4759
90.00	Guy	31	3.869	0.1648	0.1432	5499
88.00	GPS	31	3.808	0.1809	0.1424	5863
77.00	AM-X-CD-14-65-00TT-RET	35	3.346	0.2447	0.1395	11491
73.00	(2) RRUS-11	35	3.142	0.2519	0.1389	27520
72.00	DC6-48-60-18-8F Surge Arrestor	35	3.089	0.2521	0.1387	42433
60.61	Guy	35	2.507	0.2219	0.1373	7413

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	6.972	21	0.2469	0.4488
T2	160 - 140	6.545	21	0.2463	0.3937
T3	140 - 120	6.176	21	0.1882	0.2572
T4	120 - 100	6.110	21	0.2362	0.2381
T5	100 - 80	6.159	18	0.1350	0.2423
T6	80 - 60	5.418	23	0.3409	0.2172
T7	60 - 40	4.305	23	0.3001	0.2084
T8	40 - 20	3.408	23	0.2574	0.1810
T9	20 - 5	2.048	23	0.4182	0.0976
T10	5 - 0	0.551	23	0.5091	0.0806

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	6.951	0.2484	0.4482	56349
175.00	8.5 Dishw/radome	21	6.866	0.2538	0.4450	56349
167.65	Guy	21	6.709	0.2580	0.4311	22820
159.00	AIR21	21	6.523	0.2431	0.3864	14641
147.00	3"x20-ft Omni	21	6.280	0.1944	0.2741	13063
143.00	1.5"x2'omni	21	6.215	0.1866	0.2615	11968
142.00	2-ft Stand Off	21	6.201	0.1863	0.2601	11727
141.00	1.5"x2'omni	21	6.188	0.1868	0.2587	11591
137.00	3-ft Side Arm	21	6.146	0.1973	0.2530	12368
127.65	Guy	21	6.102	0.2406	0.2420	18278

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
126.00	APXVSPP18-C-A20 w/ Mount	21	6.101	0.2451	0.2407	19843
105.00	10' x 3" Dia Omni	18	6.170	0.0965	0.2429	4171
95.00	LNX-6515DS	18	6.059	0.1911	0.2380	3639
90.00	Guy	18	5.878	0.2500	0.2312	4122
88.00	GPS	18	5.785	0.2722	0.2282	4354
77.00	AM-X-CD-14-65-00TT-RET	23	5.268	0.3536	0.2145	7702
73.00	(2) RRUS-11	23	5.047	0.3566	0.2120	15353
72.00	DC6-48-60-18-8F Surge Arrestor	23	4.989	0.3553	0.2116	20481
60.61	Guy	23	4.337	0.3038	0.2086	4979

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	2657.57	4123.34	0.645 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	151.08	4123.34	0.037 ✔	1.333	Bolt Shear
T2	160	Leg	A325N	0.7500	4	0.00	19430.70	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2360.34	3197.25	0.738 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	791.25	2943.50	0.269 ✔	1.333	Member Bearing
T3	140	Leg	A325N	0.7500	4	0.00	19430.60	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3432.72	4123.34	0.833 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	713.98	4123.34	0.173 ✔	1.333	Bolt Shear
T4	120	Leg	A325N	0.7500	4	0.00	19418.00	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4658.56	6442.72	0.723 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.6250	1	1302.01	6442.72	0.202 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	1	2226.88	6442.72	0.346 ✔	1.333	Bolt Shear
T5	100	Leg	A325N	0.7500	4	777.88	19437.10	0.040 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.5000	1	5048.24	5890.49	0.857 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.6250	1	2763.75	6442.72	0.429 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	742.04	2943.50	0.252 ✔	1.333	Member Bearing
		Top Guy Pull-Off@90	A325N	0.6250	4	518.20	6442.72	0.080 ✔	1.333	Bolt Shear
T6	80	Leg	A325N	0.7500	4	0.00	19432.80	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6754.01	6442.72	1.048 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	1	1373.48	6442.72	0.213 ✔	1.333	Bolt Shear
		Top Guy Pull-Off@60.6146	A325N	0.6250	4	1009.67	6442.72	0.157 ✔	1.333	Bolt Shear
T7	60	Leg	A325N	0.7500	4	0.00	19412.10	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5741.57	6442.72	0.891 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	2181.83	2943.50	0.741 ✔	1.333	Member Bearing

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
T8	40	Leg	A325N	0.7500	4	0.00	19430.60	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1824.67	3197.25	0.571 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	1005.96	2943.50	0.342 ✔	1.333	Member Bearing
T9	20	Leg	A325N	0.7500	4	0.00	19437.60	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2333.13	6442.72	0.362 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	1	502.94	6442.72	0.078 ✔	1.333	Bolt Shear
T10	5	Leg	A325N	0.7500	4	0.00	18667.20	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	13260.20	21200.00	2.000	3.198 ✔
	167.65 (A) (449)	5/8 EHS	4240.00	42399.99	13436.20	21200.00	2.000	3.156 ✔
	167.65 (B) (442)	5/8 EHS	4240.00	42399.99	12162.10	21200.00	2.000	3.486 ✔
	167.65 (B) (443)	5/8 EHS	4240.00	42399.99	12597.80	21200.00	2.000	3.366 ✔
	167.65 (C) (436)	5/8 EHS	4240.00	42399.99	12662.90	21200.00	2.000	3.348 ✔
	167.65 (C) (437)	5/8 EHS	4240.00	42399.99	12056.10	21200.00	2.000	3.517 ✔
T3	127.65 (A) (466)	5/8 EHS	4240.00	42399.99	14055.00	21200.00	2.000	3.017 ✔
	127.65 (A) (467)	5/8 EHS	4240.00	42399.99	14343.90	21200.00	2.000	2.956 ✔
	127.65 (B) (460)	5/8 EHS	4240.00	42399.99	14049.00	21200.00	2.000	3.018 ✔
	127.65 (B) (461)	5/8 EHS	4240.00	42399.99	14093.60	21200.00	2.000	3.008 ✔
	127.65 (C) (454)	5/8 EHS	4240.00	42399.99	14226.30	21200.00	2.000	2.980 ✔
	127.65 (C) (455)	5/8 EHS	4240.00	42399.99	13894.40	21200.00	2.000	3.052 ✔
T5	90.00 (A) (483)	7/16 EHS	2080.00	20800.02	8213.15	10400.00	2.000	2.533 ✔
	90.00 (B) (482)	7/16 EHS	2080.00	20800.02	8216.69	10400.00	2.000	2.531 ✔
	90.00 (C) (478)	7/16 EHS	2080.00	20800.02	8115.29	10400.00	2.000	2.563 ✔
T6	60.61 (A) (477)	3/4 EHS	5830.00	58299.91	18112.30	29150.00	2.000	3.219 ✔
	60.61 (B) (476)	3/4 EHS	5830.00	58299.91	18034.60	29150.00	2.000	3.233 ✔
	60.61 (C) (472)	3/4 EHS	5830.00	58299.91	17753.00	29150.00	2.000	3.284 ✔

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	-16356.00	46328.80	0.353 ✓
T2	160 - 140	P2.5x.203	20.00	2.35	59.4 K=2.00	1.00	22.813	1.7040	-18390.50	38874.80	0.473 ✓
T3	140 - 120	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-31309.10	46328.80	0.676 ✓
T4	120 - 100	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-48163.20	46328.80	1.040 ✓
T5	100 - 80	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-49383.00	46328.80	1.066 ✓
T6	80 - 60	P2.5x.203	20.00	2.35	29.7 K=1.00	1.00	27.188	1.7040	-48832.70	46328.80	1.054 ✓
T7	60 - 40	P2.5x.203	20.00	2.35	29.7 K=1.00	0.96	25.994	1.7040	-48833.00	44295.80	1.102 ✓
T8	40 - 20	P2.5x.203	20.00	2.35	59.4 K=2.00	1.00	22.813	1.7040	-47489.00	38874.80	1.222 ✓
T9	20 - 5	P2.5x.203	15.00	2.30	58.1 K=2.00	1.00	23.032	1.7040	-47460.00	39248.30	1.209 ✓
T10	5 - 0	P2.5x.203	5.37	2.15	27.2 K=1.00	0.94	25.776	1.7040	-45341.00	43922.70	1.032 ✓

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	-2232.09	9713.78	0.230 ✓
T2	160 - 140	ROHN TS1.5x16 ga	4.14	3.85	90.5 K=1.00	13.897	0.2627	-2860.85	3651.52	0.783 ✓
T3	140 - 120	L2x2x3/16	4.14	1.81	71.3 K=1.29	16.291	0.7150	-3423.81	11648.20	0.294 ✓
T4	120 - 100	L2 1/2x2 1/2x1/2	4.14	3.58	104.1 K=1.18	12.455	2.2500	-4658.56	28023.90	0.166 ✓
T5	100 - 80	L2 1/2x2 1/2x1/4	4.14	3.62	104.2 K=1.18	12.274	1.1900	-5048.24	14605.50	0.346 ✓
T6	80 - 60	L2 1/2x2 1/2x1/2	4.14	3.58	104.1 K=1.18	12.455	2.2500	-6754.01	28023.90	0.241 ✓
T7	60 - 40	L2 1/2x2 1/2x1/2	4.14	3.58	104.1 K=1.18	12.455	2.2500	-5741.57	28023.90	0.205 ✓
T8	40 - 20	ROHN TS1.5x16 ga	4.14	3.85	90.5 K=1.00	13.897	0.2627	-2257.85	3651.52	0.618

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 $\frac{P}{P_a}$
T9	20 - 5	L2 1/2x2 1/2x1/2	4.11	3.55	103.7 K=1.19	12.498	2.2500	-2333.13	28120.20	0.083 ✔

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	-834.21	35280.90	0.024 ✔
T5	100 - 80	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	15.680	2.2500	-1140.79	35280.90	0.032 ✔
T6	80 - 60	1	3.41	3.17	152.2 K=1.00	6.448	0.7854	-845.81	5064.38	0.167 ✔
T7	60 - 40	1	3.41	3.17	152.2 K=1.00	6.448	0.7854	-845.84	5064.38	0.167 ✔
T10	5 - 0	C12x20.7	1.70	1.47	49.0 K=1.00	18.437	6.0900	-27.52	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	-151.08	7133.13	0.021 ✔
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-811.36	4190.65	0.194 ✔
T3	140 - 120	L2x2x3/16	3.41	2.94	104.8 K=1.17	12.362	0.7150	-244.48	8839.01	0.028 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	13.512	2.2500	-1898.67	30401.80	0.062 ✔
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-263.63	4190.65	0.063 ✔
T6	80 - 60	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	13.512	2.2500	-598.15	30401.80	0.020 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-1497.77	4190.65	0.357 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.949	0.2627	-627.96	4190.65	0.150 ✔
T9	20 - 5	L2 1/2x2 1/2x1/2	3.41	2.90	95.7 K=1.34	13.512	2.2500	-452.21	30401.80	0.015 ✔

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	-457.02	6791.15	0.067 ✔
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-1205.69	4102.70	0.294 ✔
T3	140 - 120	L2x2x3/16	3.41	3.17	108.3 K=1.12	11.902	0.7150	-495.87	8510.09	0.058 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	3.17	99.1 K=1.27	13.096	2.2500	-435.25	29466.80	0.015 ✔
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-553.22	4102.70	0.135 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-747.36	4102.70	0.182 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6 K=1.00	15.615	0.2627	-267.31	4102.70	0.065 ✔
T10	5 - 0	C12x20.7	0.34	0.10	3.5 K=1.00	21.459	6.0900	-2772.81	130688.00	0.021 ✔

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

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	-17804.30	52701.60	0.338 ✔
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	-19549.00	52701.60	0.371 ✔
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	-17950.20	52701.60	0.341 ✔
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	-17804.50	52701.60	0.338 ✔
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	-17732.90	52701.60	0.336 ✔
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	-19321.30	52701.60	0.367 ✔
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	-19215.00	52701.60	0.365 ✔
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	-19462.70	52701.60	0.369 ✔
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	-19235.00	52701.60	0.365 ✔
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	-19158.30	52701.60	0.364 ✔
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	-19183.50	52701.60	0.364 ✔
T3	140 - 120 (471)	d/t > 13000/Fy - 470 XP34.5x.03325 d/t > 13000/Fy - 471	4.36	4.21	4.1 K=1.00	14.638	3.6003	-19313.70	52701.60	0.366 ✔

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	13463.20	51121.50	0.263 ✔
T3	140 - 120	P2.5x.203	20.00	2.35	29.7	30.000	1.7040	4284.17	51121.50	0.084 ✔
T4	120 - 100	P2.5x.203	20.00	0.61	7.8	30.000	1.7040	3113.67	51121.50	0.061 ✔
T5	100 - 80	P2.5x.203	20.00	2.35	29.7	30.000	1.7040	4144.89	51121.50	0.081 ✔

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	2657.57	10960.00	0.242 ✔
T2	160 - 140	ROHN TS1.5x16 ga	4.14	3.85	90.5	21.000	0.2627	2360.34	5517.75	0.428 ✔
T3	140 - 120	L2x2x3/16	4.14	1.81	37.4	29.000	0.4484	3432.72	13002.40	0.264 ✔
T4	120 - 100	L2 1/2x2 1/2x1/2	4.14	3.58	62.5	29.000	1.4063	4010.36	40781.30	0.098 ✔
T5	100 - 80	L2 1/2x2 1/2x1/4	4.14	3.62	60.1	31.500	0.7753	3266.08	24422.30	0.134 ✔
T6	80 - 60	L2 1/2x2 1/2x1/2	4.14	3.58	62.5	29.000	1.4063	4950.83	40781.30	0.121 ✔
T7	60 - 40	L2 1/2x2 1/2x1/2	4.14	3.58	62.5	29.000	1.4063	4159.65	40781.30	0.102 ✔
T8	40 - 20	ROHN TS1.5x16 ga	4.14	3.85	90.5	21.000	0.2627	1824.67	5517.75	0.331 ✔
T9	20 - 5	L2 1/2x2 1/2x1/2	4.11	3.55	62.1	29.000	1.4063	1853.47	40781.30	0.045 ✔

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	1302.01	45703.10	0.028 ✔
T5	100 - 80	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	32.500	1.4063	2763.75	45703.10	0.060 ✔
T6	80 - 60	1	3.41	3.17	152.2	21.600	0.7854	1388.56	16964.60	0.082

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 $\frac{P}{P_a}$
T7	60 - 40	1	3.41	3.17	152.2	21.600	0.7854	1642.29	16964.60	0.097 ✓
T10	5 - 0	C12x20.7	1.70	1.47	22.0	21.600	6.0900	33.56	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	66.33	10960.00	0.006 ✓
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	791.25	5675.41	0.139 ✓
T3	140 - 120	L2x2x3/16	3.41	2.94	61.7	29.000	0.4484	713.98	13002.40	0.055 ✓
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	29.000	1.4063	2226.88	40781.30	0.055 ✓
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	742.04	5675.41	0.131 ✓
T6	80 - 60	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	29.000	1.4063	1373.48	40781.30	0.034 ✓
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	2181.83	5675.41	0.384 ✓
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.600	0.2627	1005.96	5675.41	0.177 ✓
T9	20 - 5	L2 1/2x2 1/2x1/2	3.41	2.90	51.5	29.000	1.4063	502.94	40781.30	0.012 ✓
T10	5 - 0	C12x20.7	3.07	2.83	42.5	21.600	6.0900	6350.55	131544.00	0.048 ✓

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	452.78	13415.60	0.034 ✓
T2	160 - 140	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	1264.57	5517.75	0.229 ✓
T3	140 - 120	L2x2x3/16	3.41	3.17	61.7	21.600	0.7150	1153.88	15444.00	0.075 ✓
T4	120 - 100	L2 1/2x2 1/2x1/2	3.41	3.17	51.5	21.600	2.2500	813.88	48600.00	0.017 ✓
T5	100 - 80	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	956.81	5517.75	0.173 ✓

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 $\frac{P}{P_a}$
T6	80 - 60	L2 1/2x2 1/2x1/2	3.41	3.17	51.5	21.600	2.2500	5384.93	48600.00	0.111 ✔
T7	60 - 40	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	1229.72	5517.75	0.223 ✔
T8	40 - 20	ROHN TS1.5x16 ga	3.41	3.17	74.6	21.000	0.2627	460.76	5517.75	0.084 ✔
T9	20 - 5	L2 1/2x2 1/2x1/2	3.41	3.17	51.5	21.600	2.2500	3779.48	48600.00	0.078 ✔

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	2072.76	36450.00	0.057
T6	80 - 60	4 1/2x3/8	3.41	3.17	351.4	21.600	1.6875	4038.66	36450.00	0.111

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	0.111	0.004	0.000	0.115 ✔	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	13747.10	66655.00	0.206 ✔

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 (439)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14933.40	66655.00	0.224 ✔
T1	180 - 160 (444)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14785.20	66655.00	0.222 ✔
T1	180 - 160 (445)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14801.60	66655.00	0.222 ✔
T1	180 - 160 (450)	P4x.237	3.67	3.55	28.2	21.000	3.1741	13764.00	66655.00	0.206 ✔
T1	180 - 160 (451)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14939.50	66655.00	0.224 ✔
T3	140 - 120 (456)	P4x.237	3.67	3.55	28.2	21.000	3.1741	13615.20	66655.00	0.204 ✔
T3	140 - 120 (457)	P4x.237	3.67	3.55	28.2	21.000	3.1741	13655.70	66655.00	0.205 ✔
T3	140 - 120 (462)	P4x.237	3.67	3.55	28.2	21.000	3.1741	13799.20	66655.00	0.207 ✔
T3	140 - 120 (463)	P4x.237	3.67	3.55	28.2	21.000	3.1741	14084.80	66655.00	0.211 ✔
T3	140 - 120 (468)	P4x.237	3.67	3.55	28.2	21.000	3.1741	13636.60	66655.00	0.205 ✔
T3	140 - 120 (469)	P4x.237	3.67	3.55	28.2	21.000	3.1741	13900.70	66655.00	0.209 ✔

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	253.12	75606.90	0.003 ✔
T1	180 - 160 (441)	d/t > 13000/Fy - 440 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	90.54	75606.90	0.001 ✔
T1	180 - 160 (452)	d/t > 13000/Fy - 441 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	173.09	75606.90	0.002 ✔
T3	140 - 120 (458)	d/t > 13000/Fy - 452 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3214.63	75606.90	0.043 ✔
T3	140 - 120 (459)	d/t > 13000/Fy - 458 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3197.02	75606.90	0.042 ✔
T3	140 - 120 (464)	d/t > 13000/Fy - 459 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3140.52	75606.90	0.042 ✔
T3	140 - 120 (465)	d/t > 13000/Fy - 464 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3117.65	75606.90	0.041 ✔
T3	140 - 120 (470)	d/t > 13000/Fy - 465 XP34.5x.03325	4.36	4.21	4.1	21.000	3.6003	3202.39	75606.90	0.042 ✔

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 (471)	d/t > 13000/Fy - 470 XP34.5x.03325 d/t > 13000/Fy - 471	4.36	4.21	4.1	21.000	3.6003	3149.43	75606.90	0.042 ✔

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	-16356.00	61756.29	26.5	Pass
T2	160 - 140	Leg	P2.5x.203	58	-18390.50	51820.11	35.5	Pass
T3	140 - 120	Leg	P2.5x.203	93	-31309.10	61756.29	50.7	Pass
T4	120 - 100	Leg	P2.5x.203	148	-48163.20	61756.29	78.0	Pass
T5	100 - 80	Leg	P2.5x.203	202	-49383.00	61756.29	80.0	Pass
T6	80 - 60	Leg	P2.5x.203	257	-48832.70	61756.29	79.1	Pass
T7	60 - 40	Leg	P2.5x.203	311	-48833.00	59046.30	82.7	Pass
T8	40 - 20	Leg	P2.5x.203	366	-47489.00	51820.11	91.6	Pass
T9	20 - 5	Leg	P2.5x.203	399	-47460.00	52317.98	90.7	Pass
T10	5 - 0	Leg	P2.5x.203	426	-45341.00	58548.96	77.4	Pass
T1	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	23	2657.57	14609.68	18.2 48.4 (b)	Pass
T2	160 - 140	Diagonal	ROHN TS1.5x16 ga	69	-2860.85	4867.48	58.8	Pass
T3	140 - 120	Diagonal	L2x2x3/16	115	-3423.81	15527.05	22.1 62.5 (b)	Pass
T4	120 - 100	Diagonal	L2 1/2x2 1/2x1/2	201	-4658.56	37355.86	12.5 54.2 (b)	Pass
T5	100 - 80	Diagonal	L2 1/2x2 1/2x1/4	237	-5048.24	19469.13	25.9 64.3 (b)	Pass
T6	80 - 60	Diagonal	L2 1/2x2 1/2x1/2	273	-6754.01	37355.86	18.1 78.6 (b)	Pass
T7	60 - 40	Diagonal	L2 1/2x2 1/2x1/2	362	-5741.57	37355.86	15.4 66.9 (b)	Pass
T8	40 - 20	Diagonal	ROHN TS1.5x16 ga	395	-2257.85	4867.48	46.4	Pass
T9	20 - 5	Diagonal	L2 1/2x2 1/2x1/2	408	-2333.13	37484.22	6.2 27.2 (b)	Pass
T4	120 - 100	Horizontal	L2 1/2x2 1/2x1/2	196	1302.01	60922.23	2.1 15.2 (b)	Pass
T5	100 - 80	Horizontal	L2 1/2x2 1/2x1/2	234	2763.75	60922.23	4.5 32.2 (b)	Pass
T6	80 - 60	Horizontal	1	274	-845.81	6750.82	12.5	Pass
T7	60 - 40	Horizontal	1	323	-845.84	6750.82	12.5	Pass
T10	5 - 0	Horizontal	C12x20.7	434	33.56	175348.14	0.7	Pass
T1	180 - 160	Top Girt	L1 3/4x1 3/4x3/16	4	-151.08	9508.46	1.6 2.7 (b)	Pass
T2	160 - 140	Top Girt	ROHN TS1.5x16 ga	61	-811.36	5586.14	14.5 20.2 (b)	Pass
T3	140 - 120	Top Girt	L2x2x3/16	95	713.98	17332.20	4.1 13.0 (b)	Pass
T4	120 - 100	Top Girt	L2 1/2x2 1/2x1/2	153	-1898.67	40525.60	4.7 25.9 (b)	Pass
T5	100 - 80	Top Girt	ROHN TS1.5x16 ga	206	742.04	7565.32	9.8 18.9 (b)	Pass
T6	80 - 60	Top Girt	L2 1/2x2 1/2x1/2	260	1373.48	54361.47	2.5 16.0 (b)	Pass
T7	60 - 40	Top Girt	ROHN TS1.5x16 ga	314	2181.83	7565.32	28.8 55.6 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T8	40 - 20	Top Girt	ROHN TS1.5x16 ga	368	1005.96	7565.32	13.3 25.6 (b)	Pass
T9	20 - 5	Top Girt	L2 1/2x2 1/2x1/2	402	-452.21	40525.60	1.1 5.9 (b)	Pass
T10	5 - 0	Top Girt	C12x20.7	429	6350.55	175348.14	3.6	Pass
T1	180 - 160	Bottom Girt	L1 3/4x1 3/4x3/16	8	-457.02	9052.60	5.0	Pass
T2	160 - 140	Bottom Girt	ROHN TS1.5x16 ga	66	-1205.69	5468.90	22.0	Pass
T3	140 - 120	Bottom Girt	L2x2x3/16	97	1153.88	20586.85	5.6	Pass
T4	120 - 100	Bottom Girt	L2 1/2x2 1/2x1/2	155	813.88	64783.80	1.3	Pass
T5	100 - 80	Bottom Girt	ROHN TS1.5x16 ga	209	956.81	7355.16	13.0	Pass
T6	80 - 60	Bottom Girt	L2 1/2x2 1/2x1/2	262	5384.93	64783.80	8.3	Pass
T7	60 - 40	Bottom Girt	ROHN TS1.5x16 ga	316	1229.72	7355.16	16.7	Pass
T8	40 - 20	Bottom Girt	ROHN TS1.5x16 ga	372	460.76	7355.16	6.3	Pass
T9	20 - 5	Bottom Girt	L2 1/2x2 1/2x1/2	405	3779.48	64783.80	5.8	Pass
T10	5 - 0	Bottom Girt	C12x20.7	431	-2758.95	174207.10	5.1	Pass
T1	180 - 160	Guy A@167.654	5/8	449	13436.20	21200.00	63.4	Pass
T3	140 - 120	Guy A@127.654	5/8	467	14343.90	21200.00	67.7	Pass
T5	100 - 80	Guy A@90	7/16	483	8213.15	10400.00	79.0	Pass
T6	80 - 60	Guy A@60.6146	3/4	477	18112.30	29150.00	62.1	Pass
T1	180 - 160	Guy B@167.654	5/8	443	12597.80	21200.00	59.4	Pass
T3	140 - 120	Guy B@127.654	5/8	461	14093.60	21200.00	66.5	Pass
T5	100 - 80	Guy B@90	7/16	482	8216.69	10400.00	79.0	Pass
T6	80 - 60	Guy B@60.6146	3/4	476	18034.60	29150.00	61.9	Pass
T1	180 - 160	Guy C@167.654	5/8	436	12662.90	21200.00	59.7	Pass
T3	140 - 120	Guy C@127.654	5/8	454	14226.30	21200.00	67.1	Pass
T5	100 - 80	Guy C@90	7/16	478	8115.29	10400.00	78.0	Pass
T6	80 - 60	Guy C@60.6146	3/4	472	17753.00	29150.00	60.9	Pass
T5	100 - 80	Top Guy Pull-Off@90	4 1/2x3/8	481	2072.76	48587.85	4.6 6.0 (b)	Pass
T6	80 - 60	Top Guy Pull-Off@60.6146	4 1/2x3/8	473	4038.66	48587.85	8.6 11.8 (b)	Pass
T1	180 - 160	Torque Arm Top@167.654	P4x.237	451	14939.50	88851.11	16.8	Pass
T3	140 - 120	Torque Arm Top@127.654	P4x.237	463	14084.80	88851.11	15.9	Pass
T1	180 - 160	Torque Arm Bottom@167.654	XP34.5x.03325	441	-19549.00	70251.23	27.8	Pass
T3	140 - 120	Torque Arm Bottom@127.654	XP34.5x.03325	459	-19462.70	70251.23	27.7	Pass

Summary		
Leg (T8)	91.6	Pass
Diagonal (T6)	78.6	Pass
Horizontal (T5)	32.2	Pass
Top Girt (T7)	55.6	Pass
Bottom Girt (T2)	22.0	Pass
Guy A (T5)	79.0	Pass
Guy B (T5)	79.0	Pass
Guy C (T5)	78.0	Pass
Top Guy Pull-Off (T6)	11.8	Pass
Torque Arm Top (T1)	16.8	Pass
Torque Arm Bottom (T1)	27.8	Pass
Bolt Checks	78.6	Pass
RATING =	**91.6**	**Pass**

Element Map

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

Section No.	Section Elevation ft	Component Type	Element List
T9	20.00-5.00	Top Girt	367-369
		Bottom Girt	370-372
		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
		Top Girt	427-429
		Bottom Girt	430-432
			Total number of elements: 483

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F: (203) 488-8587

Job :	Verizon ~ Madison 6: 180-ft Guyed Lattice Tower	**Project No.**	14234	**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

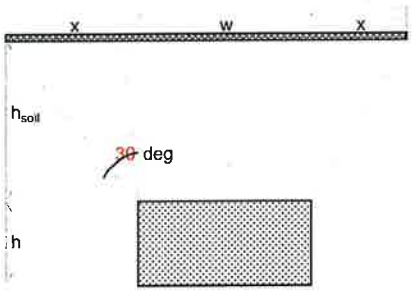
ANCHOR (A) AT 150.0ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	10.7	kips
Sliding =	23.8	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



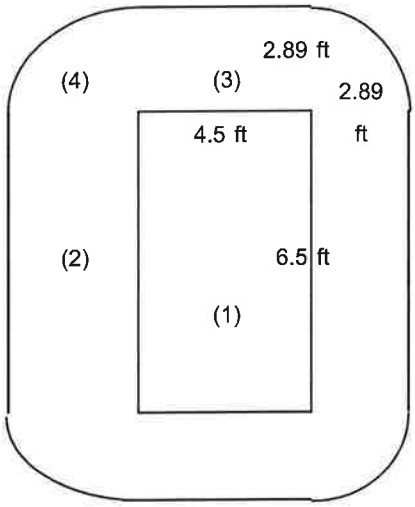
Foundation Section

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				(Wr + Wc) / 2.0 > UPLIFT			
24.66	>	*10.7*	***OK***	*24.66*	>	*10.7*	***OK***

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

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Job :	Verizon ~ Madison 6: 180-ft Guyed Lattice Tower	**Project No.**	14234	**Sheet**	2	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**			

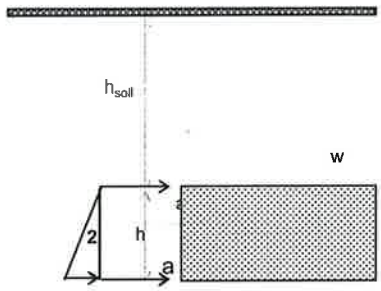
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

γ soil =	110	pcf
h_{soil} =	5	ft
h =	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***

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Job :	Verizon ~ Madison 6: 180-ft Guyed Lattice Tower	**Project No.**	14234	**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

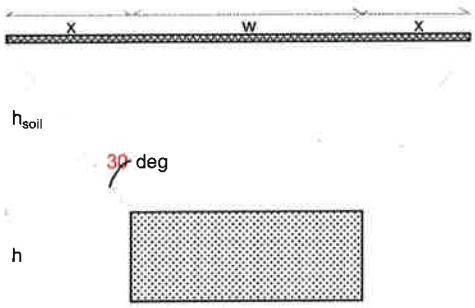
ANCHOR (A) AT 184.0ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	32.7	kips
Sliding =	43.1	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



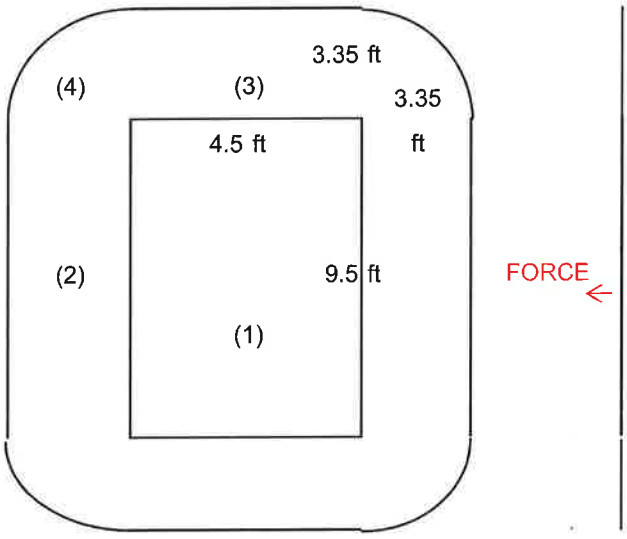
Foundation Section

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				(Wr + Wc) / 2.0 > UPLIFT			
41.96	>	*32.7*	***OK***	*41.96*	>	*32.7*	***OK***

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

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Job :	Verizon ~ Madison 6: 180-ft Guyed Lattice Tower	**Project No.**	14234	**Sheet**	2 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**	

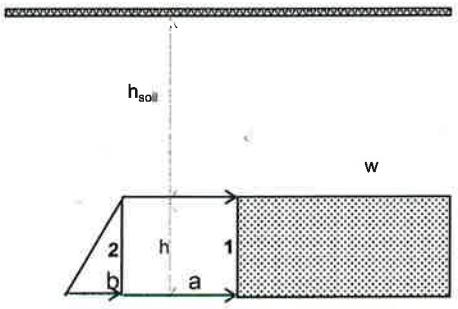
CHECK SLIDING RESISTANCE

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 =		-32.7	k
SUM =		51.21	k

COEF. OF FRICTION, (0.45) =	23.05	k
RESIST TO SLIDING =	70.04	k
SUM =	93.09	k

SF AGAINST SLIDING

SF = 2.2 > 2 OK

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

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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. 14234.000

Guyed Tower Base Foundation:

Input Data:

Tower Data

Shear Force =	Shear := 2.1·kip	(User Input from tnxTower)	
Axial Force =	Axial := 115.6·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 =

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

Adjusted Soil Unit Weight =

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

Passive Pressure =

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

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

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

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

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

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

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

Soil Shear Resistance =

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

Weight of Concrete =

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

Total Weight =

$$WT_{tot} := WT_c + Axial = 126.49 \cdot kip$$

Soil/Concrete Friction Resistance =

$$Sl_2 := \mu \cdot WT_{tot} = 56.92 \cdot kips$$

Total Sliding Resistance =

$$Sl_{tot} := Sl_1 + Sl_2 = 79.47 \cdot kips$$

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 =

$$P_{max} := \frac{WT_{tot}}{A_{mat}} = 5.08 \cdot ksf$$

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

Max_Pressure_Check = "Okay"

NORTHEAST UTILITIES SYSTEM

TOWER REINFORCEMENT DESIGN

VERIZON WIRELESS
135 NEW ROAD
MADISON, CT 06443

VICINITY MAP — NORTH

PROJECT SUMMARY

SITE ADDRESS:	135 NEW ROAD MADISON, CT 06443
PROJECT COORDINATES:	LAT: 41°-17'-36.35"N LON: 72°-34'-42.25"W ELEV: ±50 AMSL
NU CONTACT:	STEVE FLORIO 860.665.5611
VERIZON SITE REF.:	MADISON 6
VERIZON CONTACT:	JOHN TIERNEY 860.999.1179
ANTENNA CL HEIGHT:	95'-0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS & GENERAL NOTES	0
N-2	STRUCTURAL STEEL NOTES	0
MI-1	MODIFICATION INSPECTION REQUIREMENTS	0
S-1	TOWER ELEVATION AND FEEDLINE PLAN	0
S-2	TOWER REINFORCEMENT DETAILS	0

REV. 0 | DATE 11/13/14 | DRAWN BY MA | CHK'D BY CFC | ISSUED FOR NU REVIEW

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CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

MADISON 6

135 NEW ROAD
MADISON, CT 06443

DATE: 11/12/14
SCALE: AS SHOWN
JOB NO. 14234.000

TITLE SHEET

SHEET NO. T-1
Sheet No. 1 of 8

DESIGN BASIS

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

1. DESIGN CRITERIA:

   WIND SPEED OF 85 MPH (FASTEST MILE) AND 85 MPH (FASTEST MILE) CONCURRENT WITH 0.5" OF RADIAL ICE NEU SUB-090.

   - SEISMIC LOAD: PER ASCE 7-95 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES (DOES NOT GOVERN).

PROJECT SCOPE

1. INSTALLATION OF 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 RRH2X40-07-U REMOTE RADIO HEADS, THREE (3) ALCATEL-LUCENT RRH2X60-AWS REMOTE RADIO HEADS, THREE (3) ALCATEL-LUCENT RRH2X60-PCS REMOTE RADIO HEADS AND TWO (2) RFS DB-T1-6Z-8AB-0Z MAIN DISTRIBUTION BOXES MOUNTED ON THREE (3) SITE PRO LIGHTWEIGHT T-FRAMES (P/N LTF12) WITH A RAD CENTER ELEVATION OF 95'-0" AGL.

3. INSTALLATION OF TWO (2) 1-5/8" ø FIBER CABLES MOUNTED TO THE EAST FACE OF THE EXISTING TOWER.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, FOR VERIZON WIRELESS, DATED 11/13/14.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM A PREVIOUS STRUCTURAL REPORT PREPARED BY CENTEK ENGINEERING PROJECT #14025.001, DATED MARCH 3, 2014.
3. THE TEMPORARY DETACHMENT AND/OR REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE CONDUCTED ON DAYS WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.
4. ALL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.
5. PROVIDE TEMPORARY ANCHORS, GUYING AND/OR BRACING AS REQUIRED TO SAFELY CONDUCT THE WORK.
6. ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
7. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIE-DOWNS, WHICH MIGHT BE NECESSARY.
8. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
9. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
10. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
12. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
13. TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
14. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE TEMPORARILY RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.
15. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

REV.	DATE	DRAWN BY	CHK'D	ISSUED FOR PRE-REVIEW
0	11/13/14	TA	CFC	ISSUED FOR PRE-REVIEW

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CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

MADISON 6

DATE: 11/12/14
SCALE: AS SHOWN
JOB NO. 14234.000

DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL STEEL (TOWER REINF. SOLID ROUND BAR)--- ASTM A572_GR50 (50 KSI)
   D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   F. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.
   E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

16. ALL BOLTS SHALL BE INSTALLED PER THE REQUIREMENTS OF AISC 14TH EDITION & RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS".

17. ALL BOLTS SHALL BE INSTALLED AS SNUG-TIGHT CONNECTIONS UNLESS OTHERWISE INDICATED. CONNECTIONS SPECIFIED AS PRETENSIONED OR SLIP-CRITICAL SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.

18. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.

19. LOAD INDICATOR WASHERS SHALL BE UTILIZED ON ALL PRETENSIONED OR SLIP-CRITICAL CONNECTIONS.

20. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

21. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

22. FABRICATE BEAMS WITH MILL CAMBER UP.

23. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

24. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

REV	DATE	BY	DESCRIPTION
0	11/12/14	GFC	ISSUED FOR PRJ. REVIEW

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CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

MADISON 6

[redacted] ROAD
MADISON, CT 06443

DATE: 11/12/14
SCALE: AS SHOWN
JOB NO. 14234.000

STRUCTURAL STEEL NOTES

SHEET NO.
N-2
Sheet No. 2 of 8

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	-	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	-	EARTHWORK: BACKFILL MATERIAL & COMPACTION	-	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
-	EOR APPROVED POST-INSTALLED ANCHOR MPII	-	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
-	FABRICATION INSPECTION	-	CONCRETE TESTING		
-	FABRICATOR CERTIFIED WELDER INSPECTION	X	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	-	POST INSTALLED ANCHOR ROD VERIFICATION		
		-	BASE PLATE GROUT VERIFICATION		
		-	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:
1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. 'X' DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. '-' DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR - ENGINEER OF RECORD
5. MPII - 'MANUFACTURER'S PRINTED INSTALLATION GUIDELINES'

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:

   - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:

   - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:

   - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:

   - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

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0	11/12/14	JA	CFC	ISSUED FOR MI REVIEW

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MADISON 6

80 NEW ROAD
MADISON, CT 06443

DATE:	11/12/14
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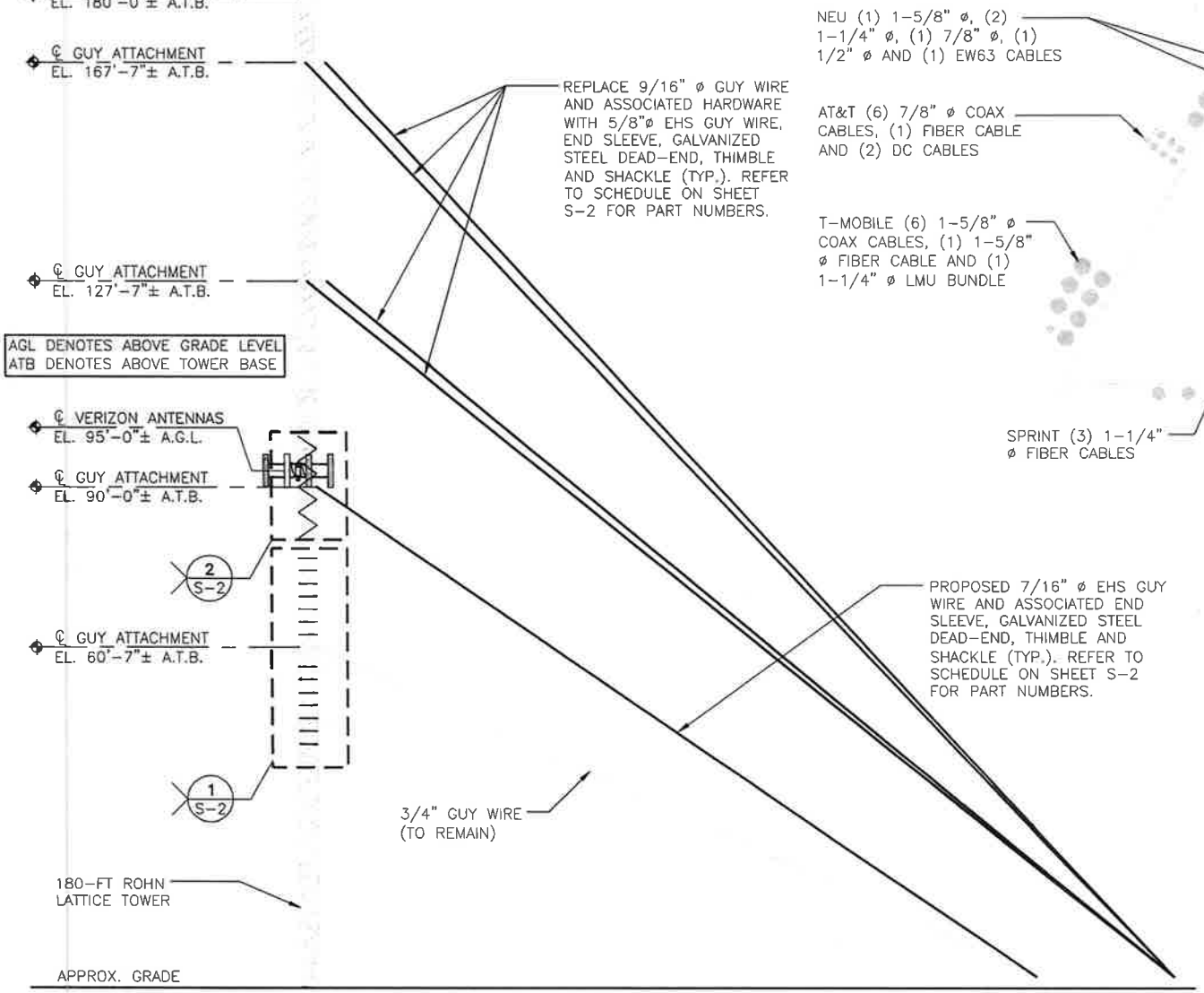
JOB NO.	14234.000

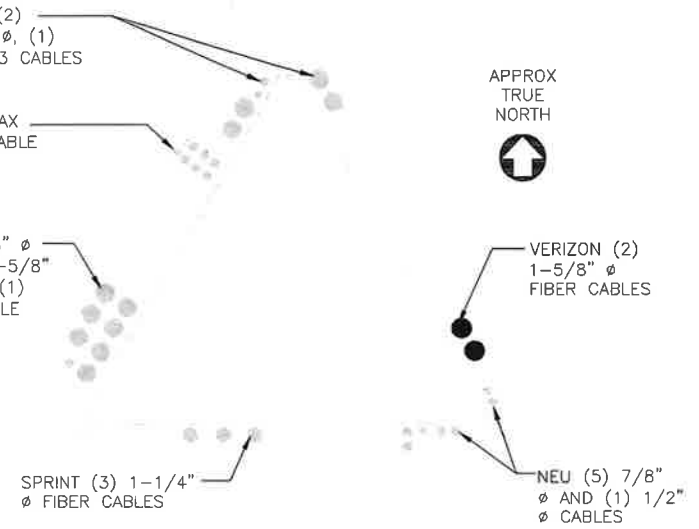
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 2 of 5



1 S-1 TOWER ELEVATION - PROPOSED

SCALE: 1" = 20'-0"



2 S-1 FEEDLINE PLAN

SCALE: 1/2" = 1'-0"

NOTES

1. ALL NON VERIZON WIRELESS EQUIPMENT NOT SHOWN FOR CLARITY
2. WHERE REINFORCEMENT INSTALLATION COINCIDES WITH EXIST. EXTERIOR COAX CABLE PLACEMENT. GC. TO TEMPORARILY DETACH COAX TO PERMIT THE INSTALLATION OF THE REINFORCEMENT THEN REINSTATE COAX PRE-EXISTING CONDITION
3. REFER TO SHEET S-2 FOR GUY WIRE HARDWARE PART NUMBERS.

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0	11/12/14	TA	CFC	

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MADISON 6

89 WEST ROAD
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JOB NO.	14234.000

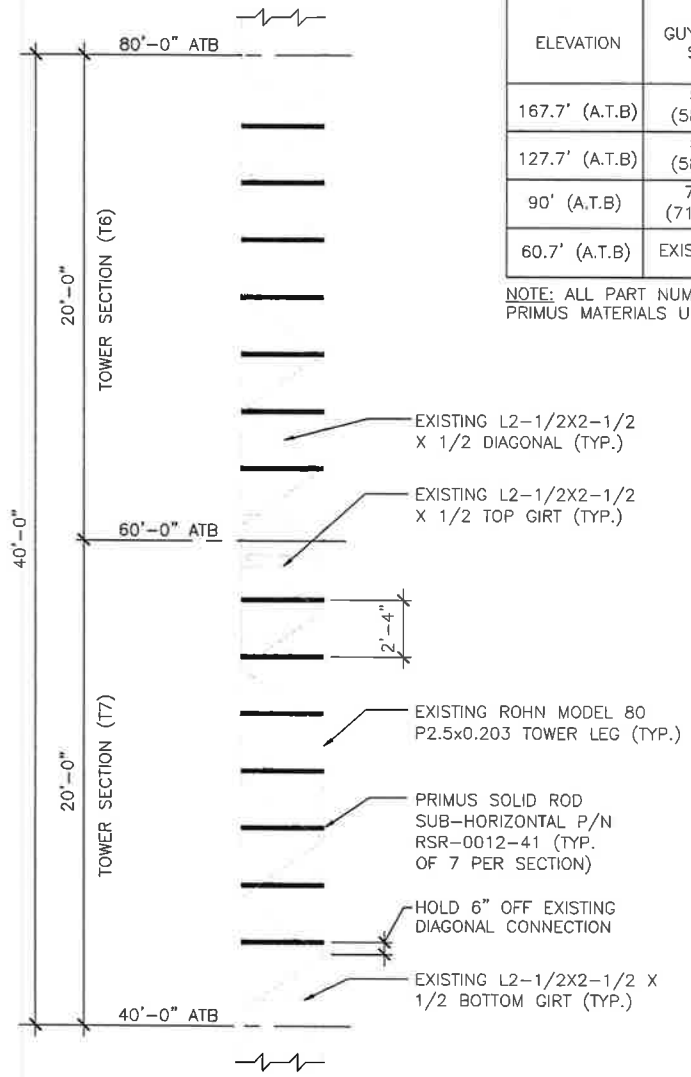
TOWER ELEVATION & FEEDLINE PLAN

SHEET NO.
S-1
Sheet No. 3 of 8

TOWER GUY WIRE COMPONENT SCHEDULE

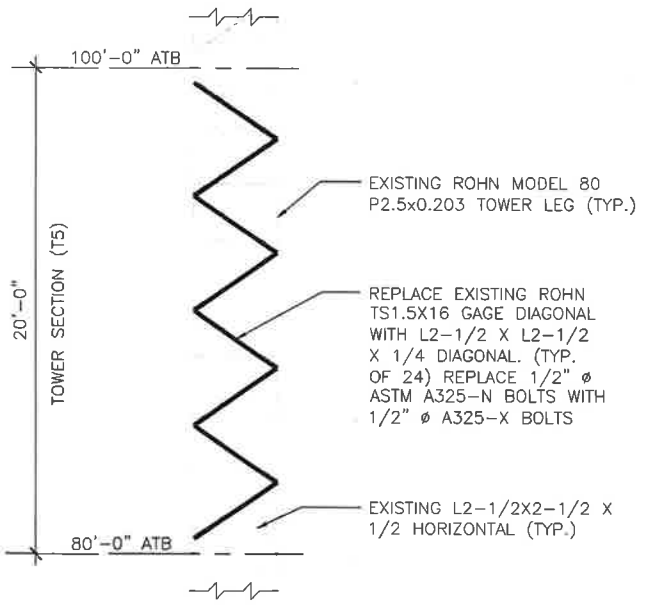
ELEVATION	GUY WIRE SIZE	GUY WIRE ATTACHMENT/ TORQUE ARM P/N	BOLT TYPE SHACKLE P/N	END SLEEVE (ICE CLIP) P/N	GALV. DEAD END (BIG GRIP) P/N	THIMBLE P/N	TURNBUCKLE P/N	ANCHOR ROD P/N
167.7' (A.T.B)	5/8" (58AEHS)	EXIST.	5/8" (1019490)	5/8" (GC65268)	5/8" (BG2111)	3/4" (1037773)	1" JAW EYE (1032199)	EXIST.
127.7' (A.T.B)	5/8" (58AEHS)	EXIST.	5/8" (1019490)	5/8" (GC65268)	5/8" (BG2111)	3/4" (1037773)	1" JAW EYE (1032199)	EXIST.
90' (A.T.B)	7/16" (716AEHS)	RGA-0002-42 & RGA-100-28	1/2" (1019472)	7/16" (GC65265)	7/16" (BG2148)	1/2" (1037719)	3/4" JAW EYE (1032091)	EXIST.
60.7' (A.T.B)	EXIST. 3/4"	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.

NOTE: ALL PART NUMBERS SHOWN ABOVE ARE BASED ON PRIMUS MATERIALS UNLESS OTHERWISE SPECIFIED.



1 S-2 **TYPICAL SUB HORZ. REINFORCEMENT DETAILS**

SCALE: 1" = 5'-0"



2 S-2 **TYPICAL DIAG. REINFORCEMENT DETAILS**

SCALE: 1" = 5'-0"

CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

MADISON 6

195 NEW ROAD
MADISON, CT 06443

DATE: 11/12/14
SCALE: AS SHOWN
JOB NO. 14234.000

TOWER REINFORCEMENT DETAILS

SHEET NO. S-2

SITE NAME	MADISON 6 CT	ECP & CELL #	2	0740
Note: New Cell Build. PCS RRH for leasing only, do not order equipment.		LATITUDE	41-17-36.34 N	
		LONGITUDE	72-34-42.15 W	
		STRUCTURE TYPE	Monopole	

700 MHz LTE SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700 BBU+RRH		LTE-700 BBU+RRH		LTE-700 BBU+RRH	
ANTENNA TYPE	LNX-6515DS-A1M_0DT_750MHZ		LNX-6514DS-A1M_2DT_750MHZ		LNX-6514DS-A1M_2DT_750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	95		95		95	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-700U	1	ALU RH_2X40-700U	1	ALU RH_2X40-700U
SECTOR DISTRIBUTION BOX - QTY / MODEL						
MAIN DISTRIBUTION BOX - QTY / MODEL	1		DB-T1-6Z-8AB-0Z			

850 MHz CELLULAR SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	LNX-6515DS-A1M_0DT_750MHZ		LNX-6514DS-A1M_2DT_750MHZ		LNX-6514DS-A1M_2DT_750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	95		95		95	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 MHz PCS SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 3 - +45_02DT_1920		HBXX-6517DS-A2M_PORT 3 - +45_02DT_1920		HBXX-6517DS-A2M_PORT 3 - +45_02DT_1920	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	95		95		95	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_60W-PCS	1	ALU RH_60W-PCS	1	ALU RH_60W-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

2100 MHz AWS LTE SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110		HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110		HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	95		95		95	
TMA - QTY / MODEL						
DIPLEX WITH LTE CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

NUMBER OF CABLES NEEDED				FIBER LINES MODEL NUMBER				
TOTAL # FIBER LINES	2	TOTAL # OF MAIN COAX LINES	0	FIBER LINE MODEL #			HB158-1-08U8-S8J18	
TOTAL # FIBER TOP JUMPERS	6	TOTAL # OF TOP JUMPERS	12	FIBER TOP JUMPER MODEL #			HB114-1-08U4-S4J18	
EQUIPMENT CABLE ORDERING		MAIN CABLE #	0	+	0	TOP JUMPER #	12 + 0	

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular-A Band	PCS-F/AWS Band	700 MHz C-Block	Celiular (Watts)	20
TX: 869-880/890-891.5 MHz	TX: 1970-1975/2145-2155 MHz	TX: 746-757 MHz	PCS (Watts)	16
RX: 824-835/845-846.5 MHz	RX: 1890-1895/1745-1755 MHz	RX: 776-787 MHz	LTE 700/AWS/PCS (Watts)	40/60/60

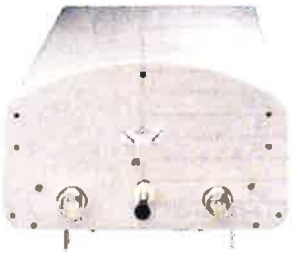
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0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

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared by: Jaime Laredo	Robert Hesselbach	JL	11/13/2014

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.

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

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

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
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

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Product Specifications

LNX-6514DS-VTM

Dimensions

Depth	181.0 mm | 7.1 in
Length	1847.0 mm | 72.7 in
Width	301.0 mm | 11.9 in
Net Weight	17.6 kg | 38.8 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6514DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-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 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression
- 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	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® single band, quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz
Number of Ports, all types	4

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom

Product Specifications

HBXX-6517DS-VTM

RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBXX-6517DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
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

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

Alcatel-Lucent RRH2x40-07-U

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-U is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Band 13). The Alcatel-Lucent RRH2x40-07-U is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.

A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-07-U is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-07-U has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 10 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-U is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-U installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-07-U is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-07-U is compact and weights less than 23 kg (50 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

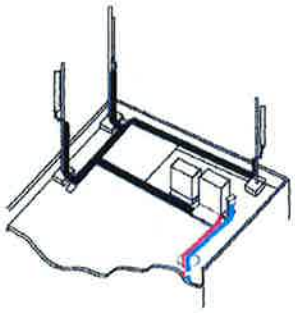
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-07-U provides more RF power while at the same time consuming less electricity.

Features

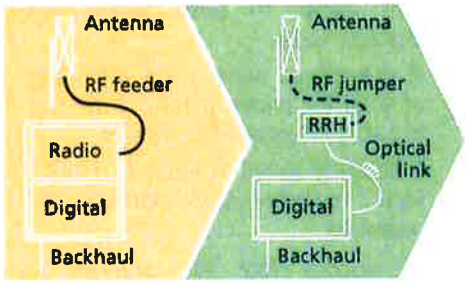
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

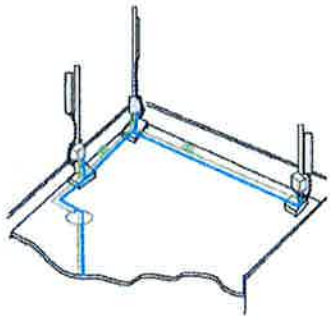
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 390 mm (15.4 in.)
- Width: 380 mm (15 in.)
- Depth: 210 mm (8.2 in.)
- Weight (without mounting kit): less than 23 kg (50 lb)

Power

- Power supply: -48V

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 700 MHz; 3GPP Band 13
- Bandwidth: up to 10 MHz
- RF output power at antenna port:
  - ¬ 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
  - ¬ TMA
  - ¬ Remote electrical tilt (RET) support (AISG v2.0)

Optical characteristics

Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
  - ¬ One SM fiber (9/125 µm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
  - ¬ Two MM fibers (50/125 µm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Alarms and ports

- Six external alarms
- Two optical ports to support daisy-chaining

Alcatel·Lucent

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

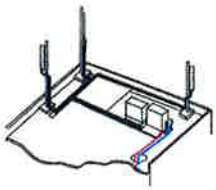
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

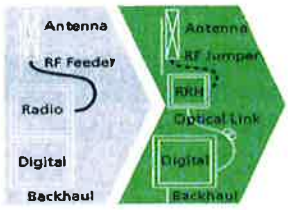
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

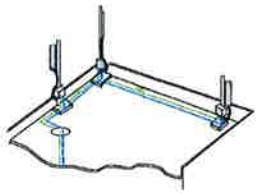
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

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

Features/Benefits

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

Technical Specifications

Mechanical Specifications

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

Electrical Specifications

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

* This data is provisional and subject to change.

ATTACHMENT 4

	General	Power	Density					
Site Name: Madison 6								
Tower Height: 180ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	500	77	0.0713	1900	1.0000	0.71%	
*AT&T UMTS	1	500	77	0.0357	880	0.5867	0.61%	
*AT&T GSM	1	427	77	0.0305	1900	1.0000	0.30%	
*AT&T GSM	2	296	77	0.0422	880	0.5867	0.72%	
*AT&T LTE	1	500	77	0.0357	740	0.4933	0.72%	
*T-Mobile LTE	2	2335	159	0.0717	2100	1.0000	0.72%	
*T-Mobile GSM/UMTS	4	1167	159	0.0717	1900	1.0000	0.72%	
*T-Mobile LTE	1	865	159	0.0133	700	0.4667	0.28%	
*Sprint CDMA/LTE	2	693	125.3	0.0350	1900	1.0000	0.35%	
*Sprint CDMA/LTE	1	390	125.3	0.0099	850	0.5667	0.17%	
*Unidentified				0.0022	952.37	0.6349		
*Unidentified				0.0013	37.48	0.2000		
*Unidentified				0.0016	37.6	0.2000		
*Unidentified				0.0013	48.34	0.2000		
*Unidentified				0.0011	44.14	0.2000		
*Unidentified				0.0013	48.16	0.2000		
*Unidentified				0.0102	6995	1.0000		
*Unidentified				0.0158	154.46	0.2000		
*Unidentified				0.0024	48	0.2000		
*Unidentified				0.0146	152.48	0.2000		
*Unidentified				0.0101	158.7	0.2000		
*Unidentified				0.0063	454.05	0.3027		
*Unidentified				0.2503	929.9375	0.6200		
*Unidentified				0.0213	48	0.2000		
Verizon PCS	**7**	**447**	**95**	**0.1247**	**1970**	**1.0000**	**12.47%**	
Verizon Cellular	**9**	**416**	**95**	**0.1492**	**869**	**0.5793**	**25.75%**	
Verizon AWS	**1**	**2812**	**95**	**0.1120**	**2145**	**1.0000**	**11.20%**	
Verizon 700	**1**	**1067**	**95**	**0.0425**	**746**	**0.4973**	**8.55%**	
								63.28%
* Source: Siting Council								

ATTACHMENT 5

Robinson + Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

November 4, 2015

Via Certificate of Mailing

Fillmore McPherson, First Selectman
Town of Madison
Madison Town Campus
8 Campus Drive
Madison, CT 06443-2563

Re: **Proposed Installation of a "Small Cell" Telecommunications Facility at 135 New Road, Madison, Connecticut**

Dear Mr. McPherson:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to install antennas and related equipment on the existing Eversource tower at 135 New Road in Madison (the "Property"). Cellco intends to install twelve (12) antennas and nine (9) remote radio heads at the 95-foot level on the tower. Three (3) equipment cabinets and a propane fueled back-up generator will be installed on a 12' x 30' concrete pad near the base of the tower. A 1,000 gallon propane tank will also be installed within the existing fenced compound.

As presented in the Sub-Petition, the proposed facility improvements at the Property constitute an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-533). A copy of the full Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent notice of this filing along with a copy of the Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment

Robinson + Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

November 4, 2015

Via Certificate of Mailing

Steven J. Florio
Eversource
Telecommunications Engineering
107 Selden Street
Berlin, CT 06037

Re: **Proposed Installation of a "Small Cell" Telecommunications Facility on Property at 135 New Road, Madison, Connecticut**

Dear Mr. Florio:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to install antennas and related equipment on the existing Eversource tower at 135 New Road in Madison (the "Property"). Cellco intends to install twelve (12) antennas and nine (9) remote radio heads at the 95-foot level on the tower. Three (3) equipment cabinets and a propane fueled back-up generator will be installed on a 12' x 30' concrete pad near the base of the tower. A 1,000 gallon propane tank will also be installed within the existing fenced compound.

As presented in the Sub-Petition, the proposed facility improvements at the Property constitute an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-533). A copy of the full Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent notice of this filing along with a copy of the Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment

ATTACHMENT 6

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

November 4, 2015

Via Certificate of Mailing

«Name_and_Address»

Re: **Proposed Installation of a "Small Cell) Telecommunications Facility at 135 New Road, Madison, Connecticut**

Dear «Salutation»:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to install antennas and related equipment on the existing Eversource tower at 135 New Road in Madison (the "Property"). Cellco intends to install twelve (12) antennas and nine (9) remote radio heads at the 95-foot level on the tower. Three (3) equipment cabinets and a propane fueled back-up generator will be installed on a 12' x 30' concrete pad near the base of the tower. A 1,000 gallon propane tank will also be installed within the existing fenced compound.

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Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the Sub-Petition.

This notice is being sent to you because you are listed as an owner of land that abuts the Property. If you have any questions regarding the Sub-Petition, the Council's process for reviewing the Sub-Petition or the details of the filing itself, please feel free to contact me at the number listed above. You may also contact the Council directly at 860-827-2935.

Sincerely,

Kenneth C. Baldwin

Attachment

CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS

ABUTTING PROPERTY OWNERS

135 NEW ROAD, MADISON, CONNECTICUT

	Property Address	**Owner and Mailing Address**
1.	721 Route 95 S Gas Station	CT DEEP 79 Elm Street Hartford, CT 06106
2.	Duck Hole Road	CT DEEP 79 Elm Street Hartford, CT 06106
3.	New Road	William H.H. Millard 911 Spanish Isle Drive Boca Raton, FL 33940
4.	155 New Road	William H.H. Millard 911 Spanish Isle Drive Boca Raton, FL 33940
5.	Duck Hole Road	William H.H. Millard 911 Spanish Isle Drive Boca Raton, FL 33940
6.	Duck Hole Road	William H.H. Millard 911 Spanish Isle Drive Boca Raton, FL 33940
7.	135 Duck Hole Road	Jacquelyn Fasulo and Joseph Salatto 135 Duck Hole Road Madison, CT 06443
8.	141 Duck Hole Road	Jacquelyn Fasulo and Joseph Salatto 141 Duck Hole Road Madison, CT 06443
9.	147 Duck Hole Road	Juliette Thai 147 Duck Hole Road Madison, CT 06443
10.	153 Duck Hole Road	Anne M. Todeschini 153 Duck Hole Road Madison, CT 06443

	Property Address	Owner and Mailing Address
11.	28 Fairfield Place	Josh and Abby Lipschutz 28 Fairfield Place Madison, CT 06443
12.	22 Fairfield Place	Eric C. Ratchman and Gregory Abdelnour 22 Fairfield Place Madison, CT 06443
13.	12 Fairfield Place	Robert A. and Lois B. Krimsier 12 Fairfield Place Madison, CT 06443
14.	6 Fairfield Place	Eleanor F. Jones 6 Fairfield Place Madison, CT 06443
15.	30 Fairfield Place	Salvatore N. and Julie K. Mancuso 30 Fairfield Place Madison, CT 06443
16.	39 Canady Lane	Stephan and Grace Brueckner 39 Canady Lane Madison, CT 06443
17.	Canady Lane	Madison Land Conservation Trust Inc. P.O. Box 561 Madison, CT 06443
18.	Horsepond Road	William J. and Loulie D. Canady 127 Jackson Avenue So Park Morgantown, WV 26501