STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A SUB-PETITION OF CELLCO	:	SUB-PETITION NO. 1133
PARTNERSHIP D/B/A VERIZON WIRELESS	:	911 ROUTE 21
FOR THE SHARED USE OF AN EXISTING	:	MONTVILLE, CT
WIRELESS TELECOMMUNICATIONS	:	
FACILITY AT 911 ROUTE 32, MONTVILLE,	:	
CONNECTICUT	:	JUNE 15, 2016

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

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-14-153) 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 installation of a single canister antenna and related telecommunications equipment at the existing wireless telecommunications base station at 911 Route 32 in Montville, Connecticut (the "Property") constitutes an Eligible Facilities Request ("EFR") under the FCC Order. Cellco has designated this site as its "Uncasville SC2 Facility".

II. Factual Background

The Property is a 17.16-acre parcel owned by the Town of Montville. The Property is zoned C-2 commercial and is occupied by the Town's Department of Public Safety. The Property is surrounded by commercial uses along Route 32. *See* Attachment 1 – Site Vicinity

Map and Site Schematic (Aerial Photograph). The Town maintains a 145-foot lattice tower used as part of the Town's public safety communications system. Equipment associated with the municipal antennas is located in an existing equipment shed adjacent to the base of the tower.

III. Proposed Uncasville SC2 Facility

Cellco is licensed to provide wireless telecommunications services in the 850 MHz, 1900 MHz, 700 MHz and 2100 MHz frequency ranges in Montville and throughout the State of Connecticut. The proposed Uncasville SC2 Facility described in this filing will provide only 2100 MHz service and is designed to provide coverage and capacity relief to Cellco's existing wireless network in Montville.

Cellco intends to install one (1) model NH65PS-DG-F0M canister antenna and one model RRH2X60 remote radio head ("RRH") on a mounting bracket at the 70-foot level on the existing tower. Cellco will also install an equipment cabinet on an 8-foot by 8-foot concrete pad and canopy structure near the base of the tower and within the limits of the fenced compound. Power and telephone service will extend from the existing utility service in the Town's equipment shed. Project Plans for the Uncasville SC2 Facility are included in Attachment 2. Specifications for Cellco's antenna and equipment are included in Attachment 3. A Structural Analysis Report confirming that the tower can support Cellco's antenna and related equipment is included in Attachment 4.

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 tower by more than ten (10) percent of the height.* Cellco does not intend to increase the height of the existing tower. Cellco's antenna and RRH will be located at the 70-foot level on the existing 145-foot tower.

2. *The proposed facility modification will not protrude from the edge of the structure more than six (6) feet.* Cellco's antenna and RRH will not protrude more than six (6) feet from the face of the tower.

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 two equipment cabinets on a concrete pad within the existing fenced compound.

4. *The proposed facility does not entail any excavation or deployment outside the current site of the base station.* Cellco's proposed modification will remain within the limits of the existing fenced compound.

5. *The proposed facility does not defeat the existing concealment elements of the base station.* There are no concealment elements incorporated into the existing base station.

6. *The proposed facility complies with conditions associated with the prior approval of construction or modification of the base station.* The Town of Montville issued Building Permit No. B2012-0054 on February 21, 2012 for the existing tower. Cellco's proposed installation does not violate any conditions of this permit approval. A copy of Building Permit No. B2012-0054 is included in Attachment 5.

B. FCC Compliance

Included in Attachment 6 is a worst case General Power Density table for Cellco's proposed antenna confirming that the facility will operate within the FCC safety standards for radio frequency emissions.

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

On June 15, 2016, a copy of this Sub-Petition was sent to Montville's Mayor, Ronald K. McDaniel. As mentioned above, the tower and the Property are owned by the Town of Montville. A copy of the cover letter sent to Mr. McDaniel is included in Attachment 7. A copy of this Sub-Petition was 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 and a copy of this filing is included in Attachment 8.

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.

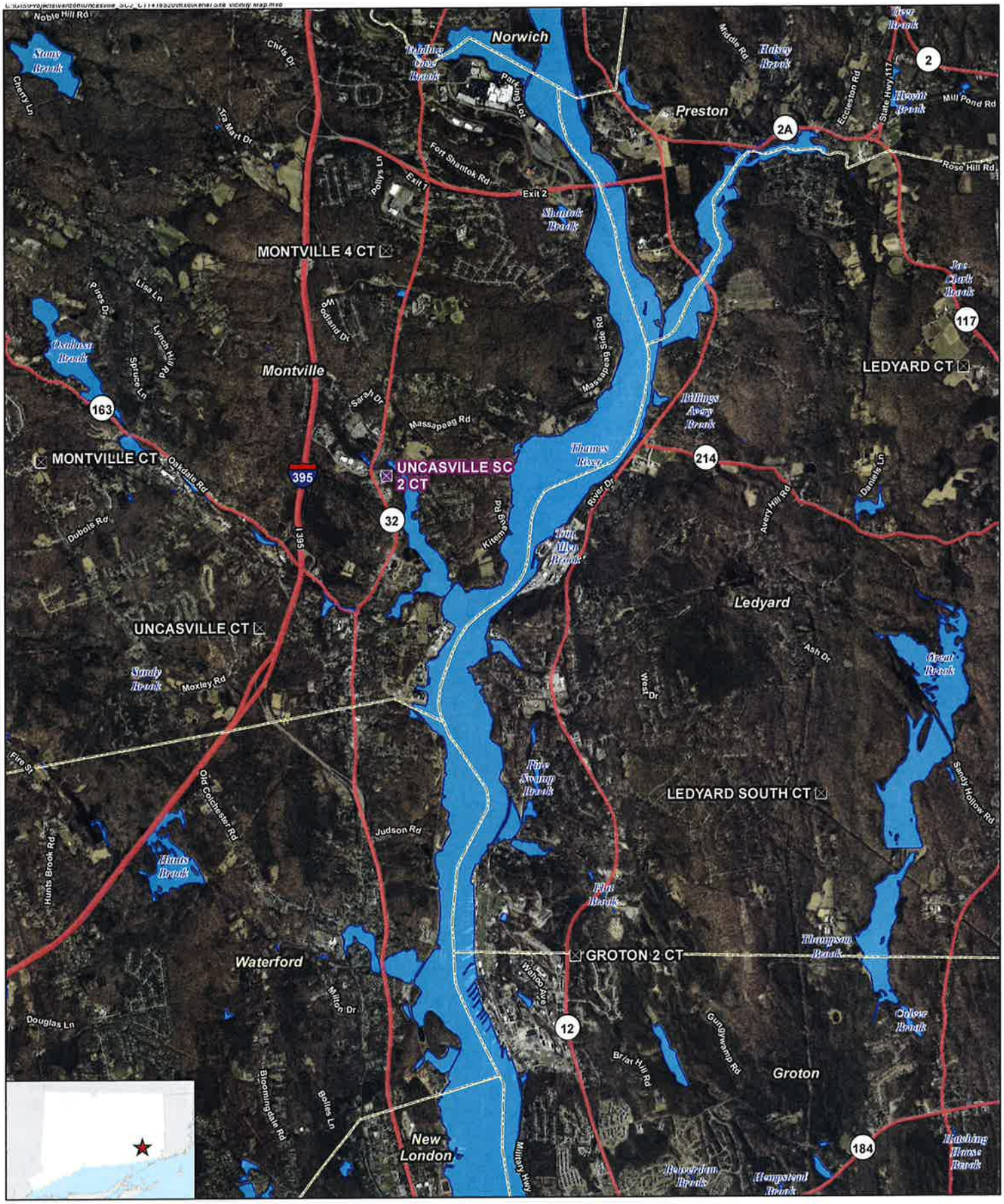
Respectfully submitted,

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

Base Map Source: 2012 Aerial Photograph (CTECO)
Map Scale: 1 inch = 5,000 feet
Map Date: May 2016

5,000 2,500 0 5,000 Feet

Site Vicinity Map

Proposed Wireless
Telecommunications Facility
Uncasville SC 2
911 Route 32
Montville, Connecticut

verizon

ALL-POINTS TECHNOLOGY CORPORATION

Legend

- Approximate Subject Property Boundary
- Approximate Parcel Boundary
- Existing 145' Lattice Tower (by others)
- Existing Tower Compound (by others)
- Proposed Verizon Wireless Equipment Lease and Easement Area
- Electrical Room
- Telco Room
- Electrical Route
- Telcom Route

N W E S

150 75 0 150 Feet

Base Map Source: ESRI World Imagery (NAIP, 7/17/2014)
Map Scale:1 inch = 150 feet
Map Date: May 2016

Site Schematic

Proposed Wireless
Telecommunications Facility
Uncasville SC 2
911 Route 32
Montville, Connecticut

verizon

ALL-POINTS TECHNOLOGY CORPORATION

ATTACHMENT 2

verizon

WIRELESS COMMUNICATIONS FACILITY

UNCASVILLE SC2 CT
911 ROUTE 32
MONTVILLE, CT 06382

SITE DIRECTIONS

FROM: 99 EAST RIVER DRIVE, EAST HARTFORD, CONNECTICUT **TO:** 911 ROUTE 32, MONTVILLE, CT 06382

1. Head northeast on E River Dr	0.9 mi
2. Merge left onto I-84 E/US-6 via the ramp on the left toward CT-2 E/Norwich	23.9 mi
3. Keep left to take CT-2 E toward Norich	1.4 mi
4. Take exit 28S onto I-395 S/E Governor	3.87 mi
5. Merge onto CT-2A E via EXIT 9 toward Preston/Ledyard	1.11 mi
6. Take the CT-32 exit, EXIT 1, toward Norwich/Uncasville	0.37 mi
7. Turn right onto Norwich New London Turnpike/CT-32	2.08 mi

GENERAL NOTES

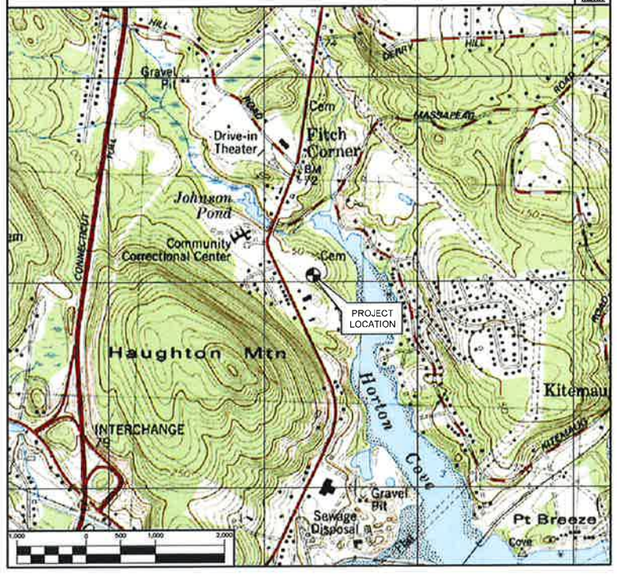
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED CELLCO PARTNERSHIP ANTENNA INSTALLATION TO CONSIST OF A TOTAL OF (1) ANTENNA, (1) RRH AND ASSOCIATED CABLES AND APPURTENANCES.
2. POWER AND TELCO UTILITY DEMARCS AND ROUTING SHOWN HEREIN ARE TENTATIVE/SCHEMATIC AND WILL BE COORDINATED WITH OWNER AND LOCAL UTILITY COMPANIES DURING THE CONSTRUCTION DOCUMENT PHASE OF THE PROJECT.
3. THE PROPOSED WIRELESS FACILITY INSTALLATION WILL BE DESIGNED IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	UNCASVILLE SC2 CT
SITE ADDRESS:	911 ROUTE 32 MONTVILLE, CT 06382
PROPERTY OWNER:	TOWN OF MONTVILLE 310 NORWICH NEW LONDON TPKE UNCASVILLE, CT 06382
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
VERIZON SITE ACQUISITION CONTACT:	JAMES SMITH CELLCO PARTNERSHIP (860) 608-0028
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE LLP (860) 275-8345
TOWER COORDINATES:	LATITUDE: 41°-27'-04.434"N LONGITUDE: 72°-06'-18.761"W GROUND ELEVATION: ±60.51' AMSL SITE COORDINATES & GROUND ELEVATION REFERENCED FROM FAA 2-C PREPARED FOR VERIZON WIRELESS BY CENTEK ENGINEERING DATED FEBRUARY 11, 2016.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	2
C-1	ABUTTERS MAP	2
C-2	PLANS, ANTENNA CONFIG. & TOWER ELEVATION	2

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	06/07/16	KAM/JR	DMD	ISSUED FOR CSC - REVISED
1	06/02/16	KAM/JR	DMD	ISSUED FOR CSC
0	05/23/16	KAM/JR	DMD	ISSUED FOR CSC - CLIENT REVIEW

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verizon

CENTEK engineering
Centered on Solutions
(203) 488-0580
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Branford, CT 06405
www.CentekEng.com

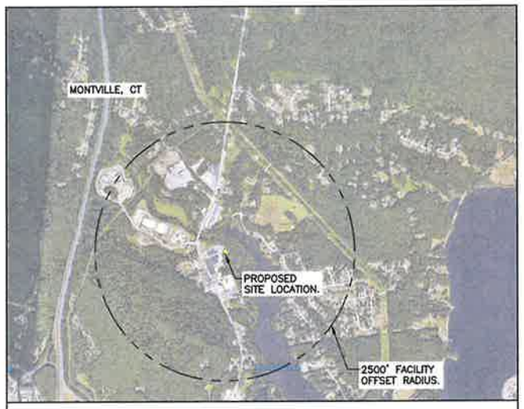
Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY
UNCASVILLE SC2 CT
911 ROUTE 32
MONTVILLE, CT 06382

DATE: 05/09/16
SCALE: AS NOTED
JOB NO. 15115.000

TITLE SHEET

T-1

Sheet No. 1 of 3



MUNICIPALITY NOTIFICATION LIMIT MAP

NORWICH NEW LONDON TPKE

N/F
029-00B
907 ROUTE 32 LLC
907 ROUTE 32
M.A.: PO BOX 507
UNCASVILLE, CT 06382-0507

N/F
029-00A
NEHOC LLC
905 ROUTE 32
M.A.: 20 PORTLAND RESERVOIR RD
EAST HAMPTON, CT 06424

N/F
030-000
SHORELINE BRANCHES LLC
887 ROUTE 32
M.A.: 231 FARMINGTON AVE
FARMINGTON, CT 06032

N/F
031-000
LIN JASON W & FUNG LINDA HOWYEE
867 ROUTE 32
M.A.: 5 LOST ACRES RD
NORWICH, CT 06360

N/F
033-000
855 ROUTE 32 ASSOCIATES LLC
C/O P&H CONSTRUCTION
855 ROUTE 32
M.A.: PO BOX 164
UNCASVILLE, CT 06382-0164

N/F
017-000
WISNIEWSKI THEODORE T ST REV LVNG TPKE
C/O THEODORE T WISNIEWSKI JR
ROUTE 32
M.A.: 996 NORWICH N L TPKE
UNCASVILLE, CT 06382

N/F
034-000
DCO REAL ESTATE LLC
841 ROUTE 32
M.A.: 841 ROUTE 32
UNCASVILLE, CT 06382

N/F
023-000
ECCLESTON ROBERT C JR
952 ROUTE 32
M.A.: 135 FELLOWS RD
OAKDALE, CT 06370

N/F
008-000
CONNECTICUT STATE OF
C/O DEPARTMENT OF CORRECTION
982 ROUTE 32
M.A.: 24 WOLCOTT HILL RD
WETHERSFIELD, CT 06109

N/F
010-000
LUSHER LLC
924 ROUTE 32
M.A.: 924 NORWICH NEW LONDON TPKE
UNCASVILLE, CT 06382

N/F
001-000
WISNIEWSKI THEODORE T SR REV L
C/O THEODORE T WISNIEWSKI JR
ROUTE 32
M.A.: 996 NORWICH N L TPKE
UNCASVILLE, CT 06382

KITEMAUG RD

N/F
016-000
BEETHAM HOWARD R JR &
HOWARD W & ELEANOR
1-19 KITEMAUG RD
M.A.: 20 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
015-000
CLOUTIER MARK E & LISA &
C/O CLOUTIER KATHY J
21-33 KITEMAUG RD
M.A.: 32 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
028-000
LAMPHERE HOWARD W & DOROTHY M
51 KITEMAUG RD
M.A.: 51 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
027-000
DAGENAIS GERALD & SUSAN &
GABRIEL & LYLE
59 KITEMAUG RD
M.A.: 59 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
026-000
MONTGOMERY AMY C FARRAR
KILLIAN SS &
C/O MONTGOMERY DORITHIA & ROBERT G
65 KITEMAUG RD
M.A.: 65 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
025-000
ALI BRENT S
67 KITEMAUG RD
M.A.: 5 GLENN RD
UNCASVILLE, CT 06382

N/F
164-000
PARADIS ADAM T & JAYNE L
75 KITEMAUG RD
M.A.: 75 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
163-000
ADAMS RONALD
77 KITEMAUG RD
M.A.: 904 CAROLINA AVE
ST CLOUD, FL 34769-3417

N/F
162-000
PIKE JANIS L
79 KITEMAUG RD
M.A.: 79 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
161-000
HUANG WEI
81 KITEMAUG RD
M.A.: 81 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
160-000
WOHLFERT WALTER & CYNTHIA S
83 KITEMAUG RD
M.A.: 48 PARRISH RD
ROCKY HILL, CT 06067

KITEMAUG RD

N/F
159-000
PIKE RONALD C
87 KITEMAUG RD
M.A.: 87 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
158-000
DAVIS ANN MARIE
89 KITEMAUG RD
M.A.: 89 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
157-000
BUTTON GRACE
93 KITEMAUG RD
M.A.: 93 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
156-000
DANIELS DONNA J
95 KITEMAUG RD
M.A.: 95 KITEMAUG RD
UNCASVILLE, CT 06382

N/F
150-000
KILLINGSWORTH, SHARON S
KITEMAUG RD
M.A.: 101 KITEMAUG RD
UNCASVILLE, CT 06382

1 / C-1 ABUTTERS MAP
SCALE: 1" = 150'

APPROXIMATE NORTH

GRAPHIC SCALE
150 0 75 150 300 600
(IN FEET)
1 inch = 150 ft

MAP REFERENCE NOTE:

PROPERTY LINES AND PROPERTY OWNERSHIP INFORMATION SHOWN HEREIN ARE REFERENCED FROM THE TOWN OF MONTVILLE ON-LINE ASSESSORS MAPPING AND ASSESSORS DATABASE.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	06/07/16	KAMJR	DMD	ISSUED FOR CSC - REVISED
1	05/02/16	KAMJR	DMD	ISSUED FOR CSC
0	05/23/16	KAMJR	DMD	ISSUED FOR CSC - CLIENT REVIEW

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Cellco Partnership d/b/a Verizon Wireless
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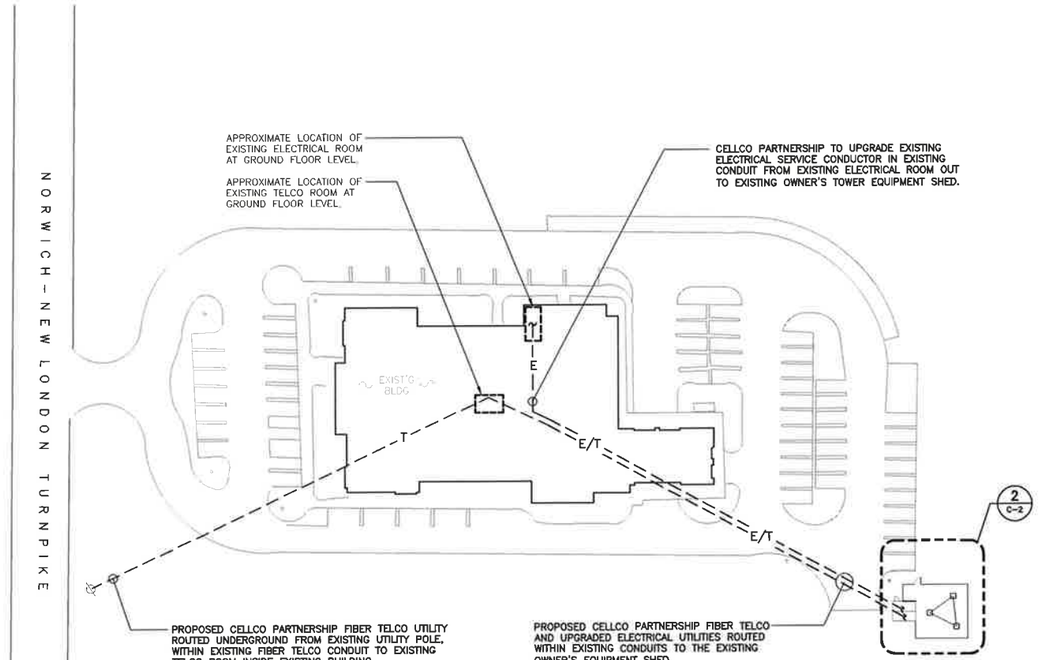
UNCASVILLE SC2 CT
911 ROUTE 32
MONTVILLE, CT 06382

DATE: 05/09/16
SCALE: AS NOTED
JOB NO. 15115.000

ABUTTERS MAP

C-1

Sheet No. 2 of 3



1 C-2 SITE/UTILITY ROUTING PLAN

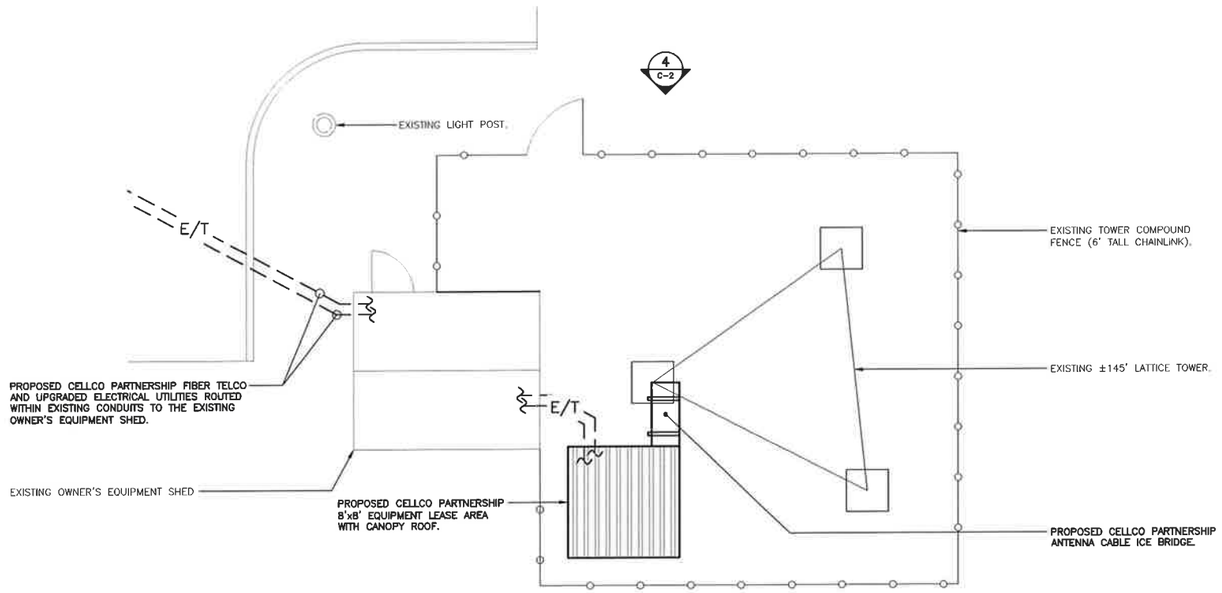
SCALE: 1" = 40'

APPROXIMATE NORTH

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.



2 C-2 PARTIAL SITE/COMPOUND PLAN

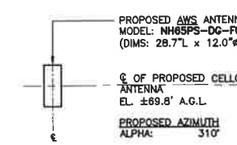
SCALE: 1" = 5'

APPROXIMATE NORTH

GRAPHIC SCALE

5 0 5 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.



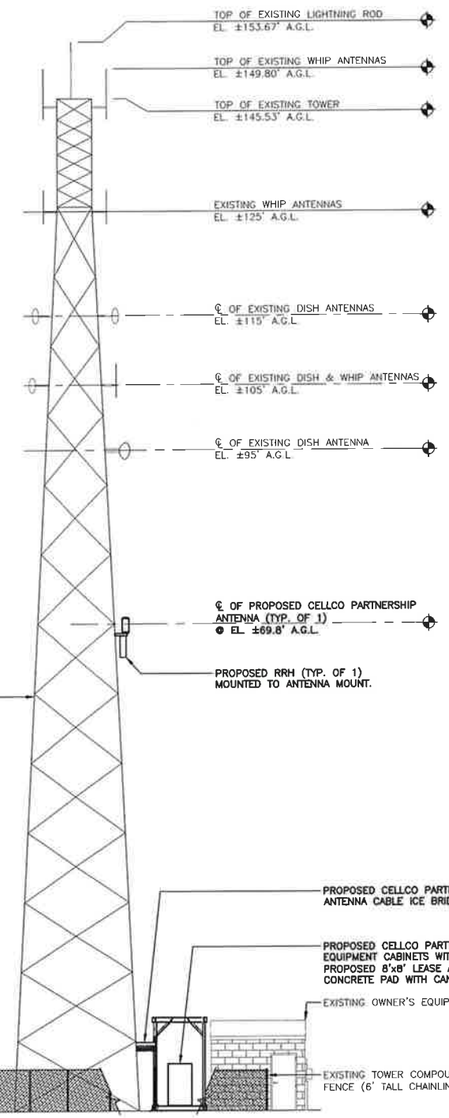
RRH BOX MOUNTING NOTE:

- RRH (MODEL: **ALU RRH2x60-AWS** (DIMS: 36.7"L x 10.6"W x 5.8"D) (TYP. OF 1)
- MAIN DISTRIBUTION BOX (MODEL: **DB-B1-6C-12AB-0Z** (DIMS: 26"L x 16"W x 10"D) (TYP. OF 1)

RRH AND MAIN DISTRIBUTION BOX MOUNTED TO ANTENNA MOUNT.

3 C-2 TYP. ANTENNA MOUNTING CONFIGURATION

NOT TO SCALE



TOWER NOTES:

1. 145' TALL MONOPOLE TOWER STRUCTURE DESIGNED AND MANUFACTURED BY VALMONT INDUSTRIES.
2. REFER TO STRUCTURAL DESIGN ANALYSIS OF TOWER AND TOWER FOUNDATION AS PREPARED BY CENTEK ENGINEERING, INC. DATED MAY 19, 2015 CENTEK PROJECT NUMBER: 15115.000

4 C-2 TOWER ELEVATION

SCALE: 1" = 10

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	06/07/16	KAWAR	DMD	ISSUED FOR CSC - REVISED
1	05/02/16	KAWAR	DMD	ISSUED FOR CSC
0	05/23/16	KAWAR	DMD	ISSUED FOR CSC - CLIENT REVIEW

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MONTVILLE, CT 06382

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PLANS, ANTENNA CONFIG, & TOWER ELEVATION

C-2

Sheet No. 3 of 3

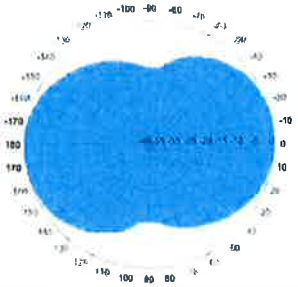
ATTACHMENT 3

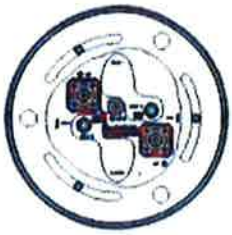
COMMSCOPE®

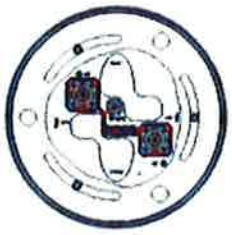
verizonwireless

Metro Cell Antennas with Internal Diplexer and GPS Antenna

Dualband Bi-Directional (2x65°), Metro Cell Antenna



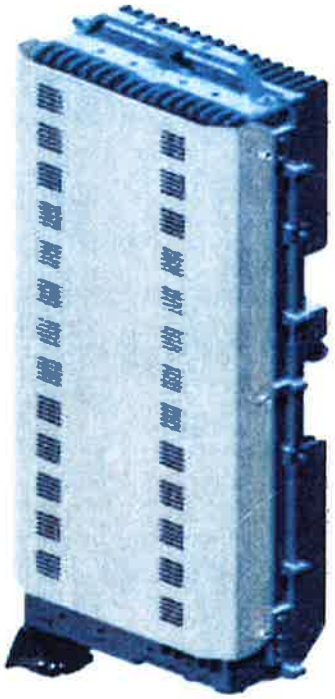




	NH65PS-DG-F0M					NH65PT-DG-F0				
ELECTRICAL SPECIFICATIONS										
Operating Frequency Range	698 - 896 and 1710 - 2170 MHz					698 - 896 and 1710 - 2170 MHz				
Frequency Bands, MHz	698 - 806	806 - 896	1710 - 1880	1850 - 1990	1920 - 2170	698 - 806	806 - 896	1710 - 1880	1850 - 1990	1920 - 2170
Polarization	±45°	±45°	±45°	±45°	±45°	±45°	±45°	±45°	±45°	±45°
Gain, dBi	6.5	7.5	10.2	10.4	10.7	3.5	4.5	6.1	6.2	6.5
Beamwidth, Horizontal, degrees	70	70	65	65	65	70	70	65	65	65
Beamwidth, Vertical, degrees	30.0	24.0	16.0	15.0	14.0	60.0	55.0	16.0	15.0	14.0
USLS, dB	12	12	15	15	15	–	–	12	10	10
Beam Tilt, degrees	0	0	0–16	0–16	0–16	0	0	0	0	0
Isolation, dB	25	25	25	25	25	25	25	25	25	25
VSWR (Return Loss, dB)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)	1.5 (14.0)
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150
Input Power per Port, maximum, watts	250	250	250	250	250	250	250	250	250	250
MECHANICAL SPECIFICATIONS										
Connnector Interface	7-16 DIN Female					7-16 DIN Female				
Connector Quantity, Location	2, Bottom					2, Bottom				
GPS Connnector Interface	4.1/9.5 DIN Female					4.1/9.5 DIN Female				
GPS Connector Quantity, Location	1, Bottom					1, Bottom				
Length, mm (inch)	730 (28.7)					360 (14.2)				
Outer Diameter, mm (inch)	305 (12.0)					305 (12.0)				
Wind Speed, maximum, km/h (mph)	241.4 (150)					241.4 (150)				
Net Weight, kg (lb)	16.0 (35.3)					10.0 (22.0)				
AVAILABILITY										
Expected Ready Date for Manufacturing	May 2014					June 2014				

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.

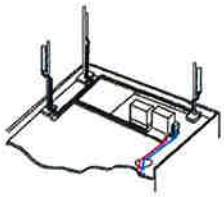
EASY INSTALLATION

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.

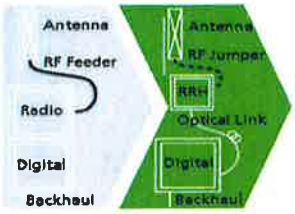
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

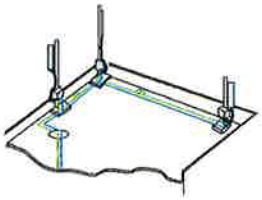
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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™

ATTACHMENT 4

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

145' Valmont Lattice Tower

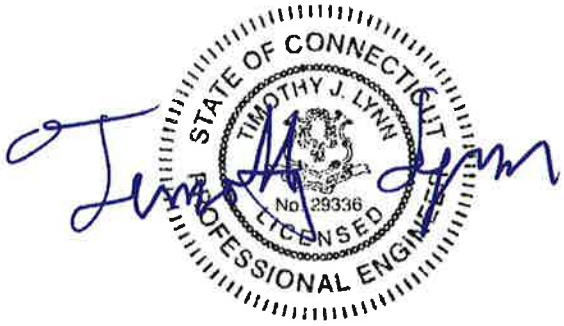
Proposed Verizon Wireless
Antenna Installation

Verizon Site Ref: Uncasville SC2

911 Route 32
Uncasville, CT

CENTEK Project No. 15115.000

~~Date: May 19, 2015~~
Rev 1: October 20, 2015



Prepared for:

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

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by Verizon Wireless on the existing lattice tower located in Uncasville, Connecticut.

The host tower is a 145-ft, three legged, lattice tower designed and manufactured by Valmont eng. file no. A-158420 dated November 11, 2011. The tower geometry, structure member sizes and foundation information were taken from the original design documents.

Antenna and appurtenance inventory were taken from an antenna schedule provided by Montville PD, visual verification from grade conducted by Centek personnel on May 8, 2015 and a Verizon RF data sheet.

The tower consists of eight (8) vertical sections consisting of solid round legs and truss legs conforming to ASTM A572 Gr. 50 and solid round lateral bracing conforming to ASTM A572 Gr. 50 and angle lateral bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 5.0-ft at the top and 18.0-ft at the bottom.

Verizon Wireless proposes the installation of one (1) antenna, one (1) remote radio head and one (1) main distribution box leg mounted. 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 and proposed loads considered in the analysis consist of the following:

- Unknown (Existing):
  Antenna: Two (2) Telewave ANT150F2 Omni-directional whips, one (1) Kreco CO41A Omni-directional whip and one (1) Telewave ANT450F2 Omni-directional whip mounted on three (3) 3-ft side arms with an elevation of ±145-ft above grade level.
  Coax Cable: Four (4) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: Two (2) Telewave ANT150F2 Omni-directional whips and one (1) Kreco CO156AN Omni-directional whip mounted on three (3) 3-ft side arms with an elevation of ±125-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ and one (1) 7/8" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: Two (2) Telewave ANT150D dipoles mounted on two (2) 3-ft standoffs with an elevation of ±115-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) Telewave ANT150F2 Omni-directional whip mounted on one (1) 3-ft side arm with an elevation of ±110-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg of the existing tower as specified in Section 3 of this report.

- Unknown (Existing):
  Antenna: One (1) Telewave ANT150D dipole and one (1) 10-ft Omni-directional whip mounted on one (1) 3-ft side arm and one (1) 3-ft standoff with an elevation of ±105-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) Telewave ANT150D dipole mounted on one (1) 3-ft standoff with an elevation of ±102-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) Radiowaves SPD2-4.7 microwave dish pipe mounted with an elevation of ±95-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- **VERIZON (Proposed):**
  Antennas: One (1) Andrew NH65PS-DG-F0M antenna, one (1) Alcatel-Lucent RRH2x60-AWS remote radio head and one (1) Raycap RRFDC-3315-PF-48 (DB-B1-6C-12AB-0Z) main distribution box leg mounted with a RAD center elevation of ±70-ft above grade level.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable running on a leg of the 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 should be routed as specified in section 3 of this report.

Analysis

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

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of 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).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

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 on the tower structure and its components.

Basic Wind Speed:	New London; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Uncasville (Montville); v = 115 mph (3 second gust) equivalent to v = 95 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix-K wind speed controls.	
Load Cases:	Load Case 1; 95 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 82 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 82 mph wind speed velocity represents 75% of the wind pressure generated by the 95 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

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.

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **81.6%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	0'-0"-20'-0"	79.3%	**PASS**
Diagonal (T8)	0'-0"-20'-0"	81.6%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 3.0-ft square x 4.5-ft long reinforced concrete piers on a 26.5-ft square x 1.5-ft thick reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned design documents. Tower legs are connected to the foundation by means of (6) 1.0"∅, ASTM F1554 GR. 105 anchor bolts per leg, embedded 5-ft into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 2 were used in the verification of the foundation:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**20 kips**
	Compression	**23 kips**
	Moment	**1456 kip-ft**
Leg	Shear	**13 kips**
	Uplift	**101 kips**
	Compression	**79 kips**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	28.5%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Mat	OM[2]	2.0	4.17	**PASS**

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

Conclusion and Recommendations

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

- **All coax cables routed as specified in Section 3 of this report**

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

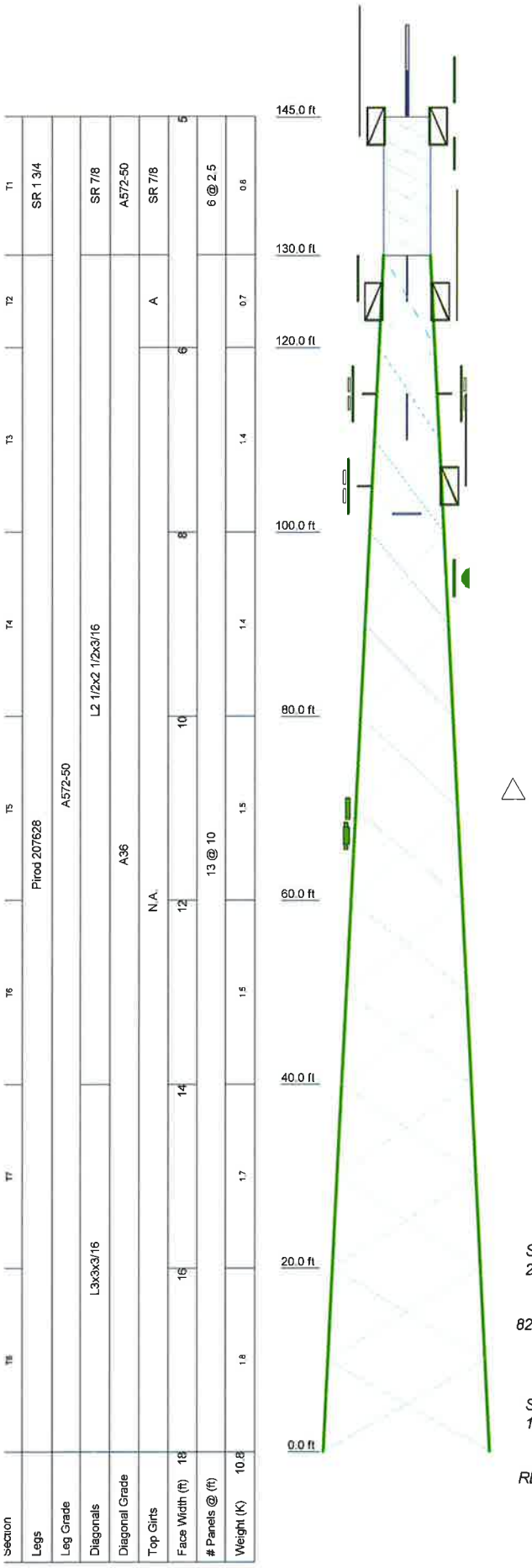
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

TnxTower Features:

- TnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- TnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
10-ft Lightning Rod	145	ANT150D	115
ANT150F2	145	3' Pipe Mount Side Arm	115
ANT150F2	145	3' Side Mount Standoff	110
ANT450F2	145	ANT150F2	110
CO-41A	145	10' x 3" Dia Omni	105
3' Side Mount Standoff	144	3' Side Mount Standoff	105
3' Side Mount Standoff	144	ANT150D	105
3' Side Mount Standoff	144	3' Pipe Mount Side Arm	105
ANT150F2	125	3' Pipe Mount Side Arm	102
CO156AN	125	ANT150D	102
3' Side Mount Standoff	125	4'x4" Pipe Mount	95
3' Side Mount Standoff	125	SPD2-4.7	95
ANT150F2	125	NH65PS-DG-F0M (Verizon Proposed)	70
3' Side Mount Standoff	125	RRFDC-3315-PF-48 (Verizon Proposed)	67
ANT150D	115		
3' Pipe Mount Side Arm	115	RRH2x60-AWS (Verizon Proposed)	67

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2 1/2x2 1/2x3/16		

MATERIAL STRENGTH

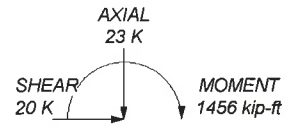
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

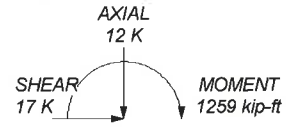
1. Tower designed for a 95 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 82 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 81.6%

MAX. CORNER REACTIONS AT BASE:
DOWN: 101 K
SHEAR: 10 K

UPLIFT: -79 K
SHEAR: 13 K



TORQUE 9 kip-ft
82 mph WIND - 0.5000 in ICE

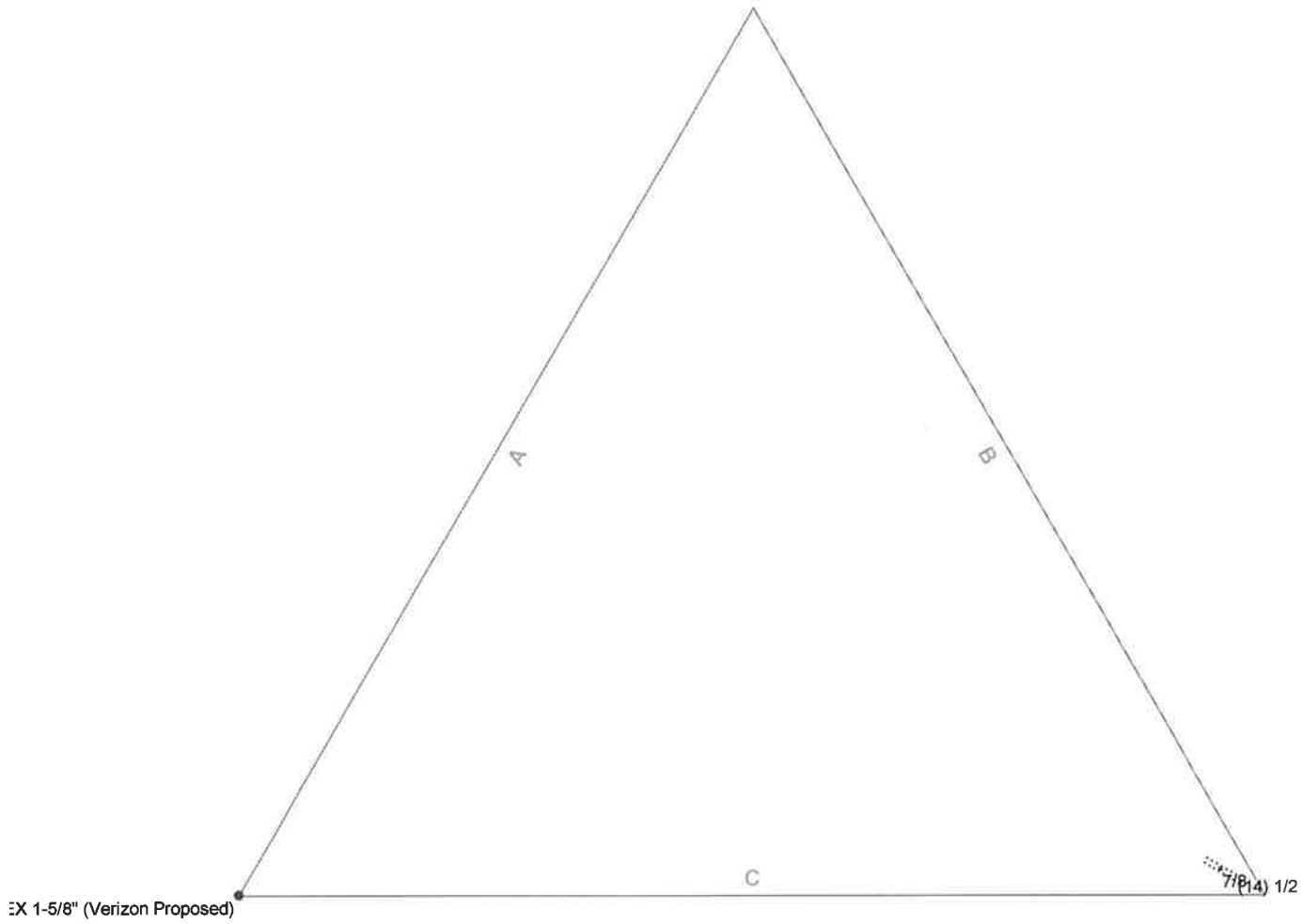


TORQUE 7 kip-ft
REACTIONS - 95 mph WIND

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

Job: *15115.000 - Uncasville SC2*		
Project: *145' Valmont Lattice Tower - 911 Route 32 Uncasville,*		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 10/20/15	Scale: NTS
Path:		Dwg No. E-1

Round Flat App In Face App Out Face Truss-Leg



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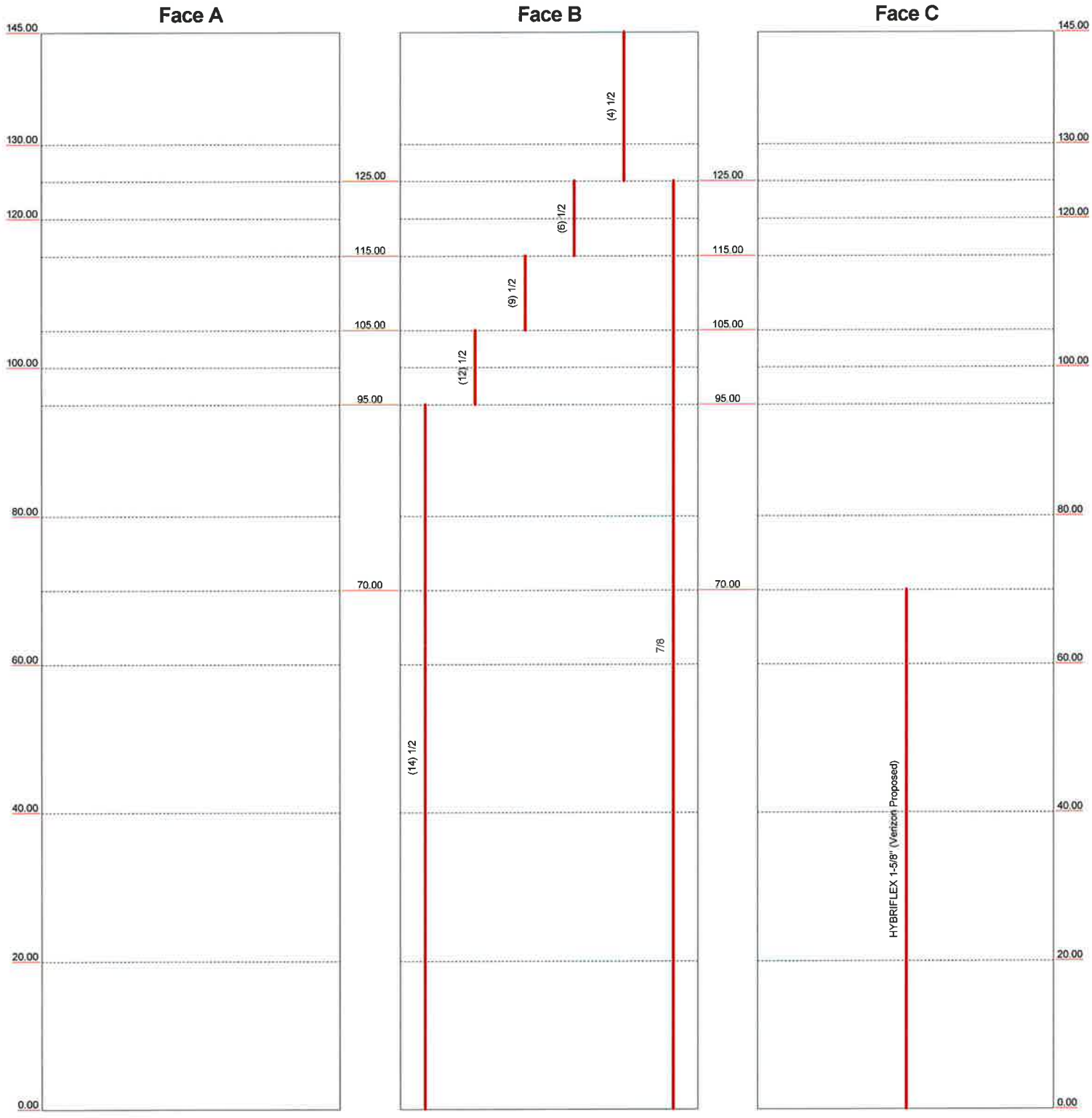
Project: ***145' Valmont Lattice Tower - 911 Route 32 Uncasville,***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 10/20/15	Scale: NTS
Path:		Dwg No. E-7

0' - 145'

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: 10/20/15	Scale: NTS	
Path:		Dwg No. E-7	

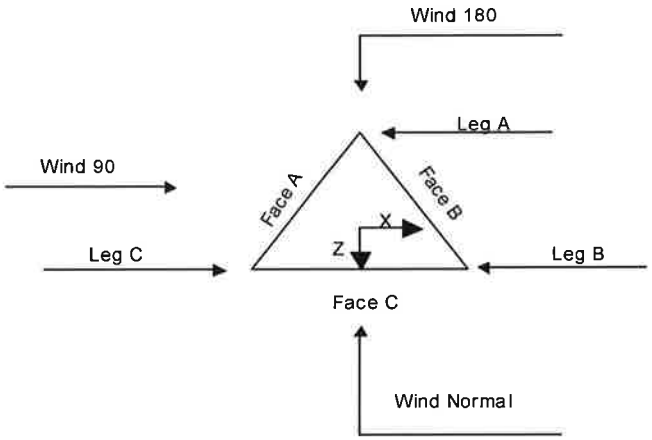
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 145.00 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 5.00 ft at the top and 18.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 95 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 82 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 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..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		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		Use TIA-222-G Tension Splice Capacity Exemption		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	145.00-130.00			5.00	1	15.00
T2	130.00-120.00			5.00	1	10.00
T3	120.00-100.00			6.00	1	20.00
T4	100.00-80.00			8.00	1	20.00
T5	80.00-60.00			10.00	1	20.00
T6	60.00-40.00			12.00	1	20.00
T7	40.00-20.00			14.00	1	20.00
T8	20.00-0.00			16.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	145.00-130.00	2.50	X Brace	No	No	0.0000	0.0000
T2	130.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 145.00-130.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 130.00-120.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 120.00-100.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 80.00-60.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 60.00-40.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 40.00-20.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 20.00-0.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	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 145.00-130.00	Solid Round	7/8	A572-50 (50 ksi)	Equal Angle		A36 (36 ksi)
T2 130.00-120.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Equal Angle		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 145.00-130.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 130.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	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
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X 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 145.00-130.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 130.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2 130.00-120.00	1	0.5	0.85	1	0.5	0.85
T3 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T4 100.00-80.00	1	0.5	0.85	1	0.5	0.85

T5 80.00-60.00	1	0.5	0.85	1	0.5	0.85	
T6 60.00-40.00	1	0.5	0.85	1	0.5	0.85	
T7 40.00-20.00	1	0.5	0.85	1	0.5	0.85	
T8 20.00-0.00	1	0.5	0.85	1	0.5	0.85	

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 145.00-130.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 130.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

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 145.00-130.00	Flange	1.0000 A325N	6	1.0000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 130.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 100.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 60.00-40.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 40.00-20.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T8 20.00-0.00	Flange	1.0000 F1554-105	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1/2	B	No	Ar (Leg)	95.00 - 0.00	0.0000	0.05	14	7	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	105.00 - 95.00	0.0000	0.05	12	6	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	115.00 - 105.00	0.0000	0.05	9	5	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	125.00 - 115.00	0.0000	0.05	6	3	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	145.00 - 125.00	0.0000	0.05	4	2	0.5800	0.5800		0.25
7/8	B	No	Ar (Leg)	125.00 - 0.00	0.0000	0.05	1	1	1.1100	1.1100		0.54
HYBRIFLEX 1-5/8" (Verizon Proposed)	C	No	Ar (Leg)	70.00 - 0.00	0.0000	0	1	1	1.9800	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	145.00-130.00	A	0.000	0.000	0.000	0.000	0.00
		B	1.450	0.000	0.000	0.000	0.01
		C	1.450	0.000	0.000	0.000	0.00
T2	130.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	1.671	0.000	0.000	0.000	0.02
		C	1.671	0.000	0.000	0.000	0.00
T3	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	6.442	0.000	0.000	0.000	0.06
		C	6.442	0.000	0.000	0.000	0.00
T4	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	8.375	0.000	0.000	0.000	0.08
		C	8.375	0.000	0.000	0.000	0.00
T5	80.00-60.00	A	1.650	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	10.267	0.000	0.000	0.000	0.02
T6	60.00-40.00	A	3.300	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	11.917	0.000	0.000	0.000	0.04
T7	40.00-20.00	A	3.300	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	11.917	0.000	0.000	0.000	0.04
T8	20.00-0.00	A	3.300	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	11.917	0.000	0.000	0.000	0.04

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	145.00-130.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		1.975	1.450	0.000	0.000	0.05
		C		1.975	1.450	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T2	130.00-120.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		2.196	1.450	0.000	0.000	0.05
		C		2.196	1.450	0.000	0.000	0.00
T3	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		6.150	7.250	0.000	0.000	0.17
		C		6.150	7.250	0.000	0.000	0.00
T4	100.00-80.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		6.150	11.117	0.000	0.000	0.24
		C		6.150	11.117	0.000	0.000	0.00
T5	80.00-60.00	A	0.500	2.483	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		8.633	11.600	0.000	0.000	0.03
T6	60.00-40.00	A	0.500	4.967	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		11.117	11.600	0.000	0.000	0.07
T7	40.00-20.00	A	0.500	4.967	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		11.117	11.600	0.000	0.000	0.07
T8	20.00-0.00	A	0.500	4.967	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		11.117	11.600	0.000	0.000	0.07

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	145.00-130.00	1.2681	0.7321	0.6592	0.3806
T2	130.00-120.00	1.3270	0.7661	1.1036	0.6372
T3	120.00-100.00	3.2028	1.8491	3.0999	1.7897
T4	100.00-80.00	4.8319	2.7897	4.8857	2.8207
T5	80.00-60.00	4.3440	3.9160	4.6387	3.9185
T6	60.00-40.00	3.5391	4.9940	4.0524	4.9684
T7	40.00-20.00	3.6286	5.1203	4.3130	5.2879
T8	20.00-0.00	3.9318	5.5480	4.7107	5.7756

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
10-ft Lightning Rod	A	From Leg	0.00 0.00 5.00	0.0000	145.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.05 0.07
ANT150F2	A	From Leg	3.00 0.00 2.50	0.0000	145.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
3' Side Mount Standoff	A	From Leg	1.00	0.0000	144.00	No Ice	2.64	2.64	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice	3.69	3.69	0.05
ANT150F2	A	From Leg	3.00 0.00 2.50	0.0000	125.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
3' Side Mount Standoff	A	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150F2	A	From Leg	3.00 0.00 2.50	0.0000	110.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
3' Side Mount Standoff	A	From Leg	1.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150D	A	From Leg	3.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	0.80 1.44	0.80 1.44	0.01 0.01
3' Pipe Mount Side Arm	A	From Leg	1.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	0.47 0.69	0.47 0.69	0.01 0.05
ANT150F2	B	From Leg	3.00 0.00 4.00	0.0000	145.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
ANT450F2	B	From Leg	3.00 0.00 -4.00	0.0000	145.00	No Ice 1/2" Ice	0.79 1.01	0.79 1.01	0.01 0.02
3' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
CO156AN	B	From Leg	3.00 0.00 5.00	0.0000	125.00	No Ice 1/2" Ice	2.27 3.71	2.27 3.71	0.01 0.03
3' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150D	B	From Leg	3.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.80 1.44	0.80 1.44	0.01 0.01
3' Pipe Mount Side Arm	B	From Leg	1.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.47 0.69	0.47 0.69	0.01 0.05
10' x 3" Dia Omni	B	From Leg	3.00 0.00 5.00	0.0000	105.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.03 0.05
3' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
4'x4" Pipe Mount	B	From Leg	1.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.32 1.58	1.32 1.58	0.04 0.06
CO-41A	C	From Leg	3.00 0.00 5.00	0.0000	145.00	No Ice 1/2" Ice	2.27 3.71	2.27 3.71	0.01 0.03
3' Side Mount Standoff	C	From Leg	1.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150F2	C	From Leg	3.00	0.0000	125.00	No Ice	1.29	1.29	0.02

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 K
			0.00			1/2" Ice	1.60	1.60	0.03
			2.50						
3' Side Mount Standoff	C	From Leg	1.00	0.0000	125.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
ANT150D	C	From Leg	3.00	0.0000	115.00	No Ice	0.80	0.80	0.01
			0.00			1/2" Ice	1.44	1.44	0.01
			0.00						
3' Pipe Mount Side Arm	C	From Leg	1.00	0.0000	115.00	No Ice	0.47	0.47	0.01
			0.00			1/2" Ice	0.69	0.69	0.05
			0.00						
ANT150D	C	From Leg	3.00	0.0000	105.00	No Ice	0.80	0.80	0.01
			0.00			1/2" Ice	1.44	1.44	0.01
			0.00						
3' Pipe Mount Side Arm	C	From Leg	1.00	0.0000	105.00	No Ice	0.47	0.47	0.01
			0.00			1/2" Ice	0.69	0.69	0.05
			0.00						
NH65PS-DG-F0M (Verizon Proposed)	C	From Leg	1.00	0.0000	70.00	No Ice	1.91	1.91	0.03
			0.00			1/2" Ice	2.15	2.15	0.05
			0.00						
RRH2x60-AWS (Verizon Proposed)	C	From Leg	1.00	0.0000	67.00	No Ice	3.78	2.07	0.06
			0.00			1/2" Ice	4.09	2.35	0.08
			0.00						
RRFDC-3315-PF-48 (Verizon Proposed)	C	From Leg	1.00	0.0000	67.00	No Ice	3.52	2.29	0.03
			0.00			1/2" Ice	3.77	2.51	0.05
			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 K
SPD2-4.7	B	Paraboloid w/o Radome	From Leg	2.00	0.0000		95.00	2.00	No Ice	3.14	0.03
				0.00					1/2" Ice	3.41	0.04
				0.00							

Truss-Leg Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in^2
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816

Tower Pressures - No Ice

$G_H = 1.136$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	137.50	1.503	35	77.188	A	0.000	9.478	4.375	46.16	0.000	0.000
145.00-130.00					B	0.000	10.928		40.04	0.000	0.000
					C	0.000	10.928		40.04	0.000	0.000
T2	125.00	1.463	34	66.055	A	5.273	6.506	6.506	55.23	0.000	0.000
130.00-120.00					B	5.273	8.177		48.37	0.000	0.000
					C	5.273	8.177		48.37	0.000	0.000
T3	110.00	1.411	33	162.111	A	8.723	13.012	13.012	59.87	0.000	0.000
120.00-100.00					B	8.723	19.454		46.18	0.000	0.000
					C	8.723	19.454		46.18	0.000	0.000
T4	90.00	1.332	31	202.111	A	9.970	13.012	13.012	56.62	0.000	0.000
100.00-80.00					B	9.970	21.387		41.50	0.000	0.000
					C	9.970	21.387		41.50	0.000	0.000
T5 80.00-60.00	70.00	1.24	29	242.111	A	11.267	14.662	13.012	50.18	0.000	0.000
					B	11.267	21.629		39.56	0.000	0.000
					C	11.267	23.279		37.67	0.000	0.000
T6 60.00-40.00	50.00	1.126	26	282.111	A	12.620	16.312	13.012	44.97	0.000	0.000
					B	12.620	21.629		37.99	0.000	0.000
					C	12.620	24.929		34.65	0.000	0.000
T7 40.00-20.00	30.00	1	23	322.111	A	16.830	16.312	13.012	39.26	0.000	0.000
					B	16.830	21.629		33.83	0.000	0.000
					C	16.830	24.929		31.16	0.000	0.000
T8 20.00-0.00	10.00	1	23	362.111	A	18.566	16.312	13.012	37.31	0.000	0.000
					B	18.566	21.629		32.37	0.000	0.000
					C	18.566	24.929		29.92	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.136$

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	137.50	1.503	26	0.5000	78.438	A	0.000	17.809	6.875	38.60	0.000	0.000
145.00-130.00						B	1.450	19.784		32.38	0.000	0.000
						C	1.450	19.784		32.38	0.000	0.000
T2	125.00	1.463	25	0.5000	66.890	A	5.273	14.064	11.955	61.82	0.000	0.000
130.00-120.00						B	6.723	16.260		52.02	0.000	0.000
						C	6.723	16.260		52.02	0.000	0.000
T3	110.00	1.411	24	0.5000	163.780	A	8.723	27.399	23.910	66.19	0.000	0.000
120.00-100.00						B	15.973	33.549		48.28	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	15.973	33.549		48.28	0.000	0.000
T4 100.00-80.00	90.00	1.332	23	0.5000	203.780	A	9.970	27.898	23.910	63.14	0.000	0.000
						B	21.087	34.048		43.37	0.000	0.000
						C	21.087	34.048		43.37	0.000	0.000
T5 80.00-60.00	70.00	1.24	21	0.5000	243.780	A	11.267	30.900	23.910	56.70	0.000	0.000
						B	22.867	34.567		41.63	0.000	0.000
						C	22.867	37.050		39.91	0.000	0.000
T6 60.00-40.00	50.00	1.126	20	0.5000	283.780	A	12.620	33.925	23.910	51.37	0.000	0.000
						B	24.220	35.108		40.30	0.000	0.000
						C	24.220	40.075		37.19	0.000	0.000
T7 40.00-20.00	30.00	1	17	0.5000	323.780	A	16.830	34.487	23.910	46.59	0.000	0.000
						B	28.430	35.670		37.30	0.000	0.000
						C	28.430	40.637		34.62	0.000	0.000
T8 20.00-0.00	10.00	1	17	0.5000	363.780	A	18.566	35.065	23.910	44.58	0.000	0.000
						B	30.166	36.249		36.00	0.000	0.000
						C	30.166	41.215		33.50	0.000	0.000

Tower Pressure - Service

$G_H = 1.136$

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	137.50	1.503	10	77.188	A	0.000	9.478	4.375	46.16	0.000	0.000
145.00-130.00					B	0.000	10.928		40.04	0.000	0.000
					C	0.000	10.928		40.04	0.000	0.000
T2	125.00	1.463	9	66.055	A	5.273	6.506	6.506	55.23	0.000	0.000
130.00-120.00					B	5.273	8.177		48.37	0.000	0.000
					C	5.273	8.177		48.37	0.000	0.000
T3	110.00	1.411	9	162.111	A	8.723	13.012	13.012	59.87	0.000	0.000
120.00-100.00					B	8.723	19.454		46.18	0.000	0.000
					C	8.723	19.454		46.18	0.000	0.000
T4	90.00	1.332	9	202.111	A	9.970	13.012	13.012	56.62	0.000	0.000
100.00-80.00					B	9.970	21.387		41.50	0.000	0.000
					C	9.970	21.387		41.50	0.000	0.000
T5 80.00-60.00	70.00	1.24	8	242.111	A	11.267	14.662	13.012	50.18	0.000	0.000
					B	11.267	21.629		39.56	0.000	0.000
					C	11.267	23.279		37.67	0.000	0.000
T6 60.00-40.00	50.00	1.126	7	282.111	A	12.620	16.312	13.012	44.97	0.000	0.000
					B	12.620	21.629		37.99	0.000	0.000
					C	12.620	24.929		34.65	0.000	0.000
T7 40.00-20.00	30.00	1	6	322.111	A	16.830	16.312	13.012	39.26	0.000	0.000
					B	16.830	21.629		33.83	0.000	0.000
					C	16.830	24.929		31.16	0.000	0.000
T8 20.00-0.00	10.00	1	6	362.111	A	18.566	16.312	13.012	37.31	0.000	0.000
					B	18.566	21.629		32.37	0.000	0.000
					C	18.566	24.929		29.92	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	1	1	5.475	0.70	46.73	C
145.00-130.00			B	0.142	2.803	0.58	1	1	6.340			
			C	0.142	2.803	0.58	1	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	1	1	9.087	1.00	100.25	C
130.00-120.00			B	0.204	2.584	0.591	1	1	10.107			
			C	0.204	2.584	0.591	1	1	10.107			
T3	0.06	1.36	A	0.134	2.831	0.579	1	1	16.259	2.00	99.95	C
120.00-100.00			B	0.174	2.686	0.585	1	1	20.111			
			C	0.174	2.686	0.585	1	1	20.111			
T4	0.08	1.41	A	0.114	2.91	0.577	1	1	17.473	2.16	107.86	C
100.00-80.00			B	0.155	2.753	0.582	1	1	22.423			
			C	0.155	2.753	0.582	1	1	22.423			
T5	0.10	1.46	A	0.107	2.936	0.576	1	1	19.710	2.26	112.77	C
80.00-60.00			B	0.136	2.824	0.579	1	1	23.799			
			C	0.143	2.799	0.58	1	1	24.777			
T6	0.12	1.52	A	0.103	2.954	0.575	1	1	22.006	2.27	113.29	C
60.00-40.00			B	0.121	2.88	0.578	1	1	25.111			
			C	0.133	2.835	0.579	1	1	27.055			
T7	0.12	1.71	A	0.103	2.952	0.575	1	1	26.216	2.34	116.76	C
40.00-20.00			B	0.119	2.887	0.577	1	1	29.316			
			C	0.13	2.848	0.579	1	1	31.253			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	1	1	27.941	2.49	124.72	C
			B	0.111	2.92	0.576	1	1	31.031			
			C	0.12	2.885	0.577	1	1	32.959			
Sum Weight:	0.62	10.77						OTM	1001.92 kip-ft	15.21		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	0.825	1	5.475	0.70	46.73	C
145.00-130.00			B	0.142	2.803	0.58	0.825	1	6.340			
			C	0.142	2.803	0.58	0.825	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	0.825	1	8.164	0.91	91.10	C
130.00-120.00			B	0.204	2.584	0.591	0.825	1	9.184			
			C	0.204	2.584	0.591	0.825	1	9.184			
T3	0.06	1.36	A	0.134	2.831	0.579	0.825	1	14.732	1.85	92.37	C
120.00-100.00			B	0.174	2.686	0.585	0.825	1	18.585			
			C	0.174	2.686	0.585	0.825	1	18.585			
T4	0.08	1.41	A	0.114	2.91	0.577	0.825	1	15.728	1.99	99.46	C
100.00-80.00			B	0.155	2.753	0.582	0.825	1	20.679			
			C	0.155	2.753	0.582	0.825	1	20.679			
T5	0.10	1.46	A	0.107	2.936	0.576	0.825	1	17.738	2.08	103.80	C
80.00-60.00			B	0.136	2.824	0.579	0.825	1	21.827			
			C	0.143	2.799	0.58	0.825	1	22.805			
T6	0.12	1.52	A	0.103	2.954	0.575	0.825	1	19.797	2.08	104.04	C
60.00-40.00			B	0.121	2.88	0.578	0.825	1	22.903			
			C	0.133	2.835	0.579	0.825	1	24.846			
T7	0.12	1.71	A	0.103	2.952	0.575	0.825	1	23.271	2.12	105.76	C
40.00-20.00			B	0.119	2.887	0.577	0.825	1	26.370			
			C	0.13	2.848	0.579	0.825	1	28.308			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	0.825	1	24.692	2.25	112.43	C
			B	0.111	2.92	0.576	0.825	1	27.782			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	0.62	10.77	C	0.12	2.885	0.577	0.825	1 OTM	29.710 927.81 kip-ft	13.97		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	0.8	1	5.475	0.70	46.73	C
145.00-130.00			B	0.142	2.803	0.58	0.8	1	6.340			
			C	0.142	2.803	0.58	0.8	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	0.8	1	8.033	0.90	89.79	C
130.00-120.00			B	0.204	2.584	0.591	0.8	1	9.052			
			C	0.204	2.584	0.591	0.8	1	9.052			
T3	0.06	1.36	A	0.134	2.831	0.579	0.8	1	14.514	1.83	91.28	C
120.00-100.00			B	0.174	2.686	0.585	0.8	1	18.366			
			C	0.174	2.686	0.585	0.8	1	18.366			
T4	0.08	1.41	A	0.114	2.91	0.577	0.8	1	15.479	1.97	98.26	C
100.00-80.00			B	0.155	2.753	0.582	0.8	1	20.429			
			C	0.155	2.753	0.582	0.8	1	20.429			
T5	0.10	1.46	A	0.107	2.936	0.576	0.8	1	17.456	2.05	102.52	C
80.00-60.00			B	0.136	2.824	0.579	0.8	1	21.545			
			C	0.143	2.799	0.58	0.8	1	22.524			
T6	0.12	1.52	A	0.103	2.954	0.575	0.8	1	19.482	2.05	102.72	C
60.00-40.00			B	0.121	2.88	0.578	0.8	1	22.587			
			C	0.133	2.835	0.579	0.8	1	24.531			
T7	0.12	1.71	A	0.103	2.952	0.575	0.8	1	22.850	2.08	104.19	C
40.00-20.00			B	0.119	2.887	0.577	0.8	1	25.950			
			C	0.13	2.848	0.579	0.8	1	27.887			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	0.8	1	24.228	2.21	110.67	C
			B	0.111	2.92	0.576	0.8	1	27.317			
			C	0.12	2.885	0.577	0.8	1	29.246			
Sum Weight:	0.62	10.77						OTM	917.22 kip-ft	13.79		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	0.85	1	5.475	0.70	46.73	C
145.00-130.00			B	0.142	2.803	0.58	0.85	1	6.340			
			C	0.142	2.803	0.58	0.85	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	0.85	1	8.296	0.92	92.41	C
130.00-120.00			B	0.204	2.584	0.591	0.85	1	9.316			
			C	0.204	2.584	0.591	0.85	1	9.316			
T3	0.06	1.36	A	0.134	2.831	0.579	0.85	1	14.950	1.87	93.45	C
120.00-100.00			B	0.174	2.686	0.585	0.85	1	18.803			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.174	2.686	0.585	0.85	1	18.803			
T4	0.08	1.41	A	0.114	2.91	0.577	0.85	1	15.977	2.01	100.66	C
100.00-80.00			B	0.155	2.753	0.582	0.85	1	20.928			
			C	0.155	2.753	0.582	0.85	1	20.928			
T5	0.10	1.46	A	0.107	2.936	0.576	0.85	1	18.020	2.10	105.08	C
80.00-60.00			B	0.136	2.824	0.579	0.85	1	22.109			
			C	0.143	2.799	0.58	0.85	1	23.087			
T6	0.12	1.52	A	0.103	2.954	0.575	0.85	1	20.113	2.11	105.37	C
60.00-40.00			B	0.121	2.88	0.578	0.85	1	23.218			
			C	0.133	2.835	0.579	0.85	1	25.162			
T7	0.12	1.71	A	0.103	2.952	0.575	0.85	1	23.691	2.15	107.33	C
40.00-20.00			B	0.119	2.887	0.577	0.85	1	26.791			
			C	0.13	2.848	0.579	0.85	1	28.728			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	0.85	1	25.156	2.28	114.18	C
			B	0.111	2.92	0.576	0.85	1	28.246			
			C	0.12	2.885	0.577	0.85	1	30.174			
Sum Weight:	0.62	10.77						OTM	938.39 kip-ft	14.15		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	1.05	A	0.227	2.508	0.596	1	1	10.620	0.95	63.13	C
145.00-130.00			B	0.271	2.377	0.607	1	1	13.467			
			C	0.271	2.377	0.607	1	1	13.467			
T2	0.05	1.37	A	0.289	2.325	0.613	1	1	13.889	1.07	106.83	C
130.00-120.00			B	0.344	2.186	0.63	1	1	16.971			
			C	0.344	2.186	0.63	1	1	16.971			
T3	0.17	2.63	A	0.221	2.529	0.595	1	1	25.020	2.33	116.50	C
120.00-100.00			B	0.302	2.29	0.617	1	1	36.660			
			C	0.302	2.29	0.617	1	1	36.660			
T4	0.24	2.71	A	0.186	2.644	0.588	1	1	26.364	2.60	130.12	C
100.00-80.00			B	0.271	2.377	0.607	1	1	41.766			
			C	0.271	2.377	0.607	1	1	41.766			
T5	0.28	2.80	A	0.173	2.689	0.585	1	1	29.351	2.70	134.87	C
80.00-60.00			B	0.236	2.481	0.598	1	1	43.548			
			C	0.246	2.45	0.601	1	1	45.126			
T6	0.32	2.90	A	0.164	2.721	0.584	1	1	32.423	2.68	133.78	C
60.00-40.00			B	0.209	2.566	0.592	1	1	45.014			
			C	0.227	2.51	0.596	1	1	48.112			
T7	0.32	3.23	A	0.158	2.74	0.583	1	1	36.929	2.64	131.92	C
40.00-20.00			B	0.198	2.603	0.59	1	1	49.475			
			C	0.213	2.552	0.593	1	1	52.536			
T8 20.00-0.00	0.32	3.36	A	0.147	2.781	0.581	1	1	38.942	2.80	139.81	C
			B	0.183	2.655	0.587	1	1	51.444			
			C	0.196	2.609	0.59	1	1	54.468			
Sum Weight:	1.75	20.07						OTM	1183.96 kip-ft	17.76		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.05	1.05	A	0.227	2.508	0.596	0.825	1	10.620	0.93	61.94	C
145.00-130.00			B	0.271	2.377	0.607	0.825	1	13.213			
			C	0.271	2.377	0.607	0.825	1	13.213			
T2	0.05	1.37	A	0.289	2.325	0.613	0.825	1	12.967	0.99	99.42	C
130.00-120.00			B	0.344	2.186	0.63	0.825	1	15.794			
			C	0.344	2.186	0.63	0.825	1	15.794			
T3	0.17	2.63	A	0.221	2.529	0.595	0.825	1	23.493	2.15	107.62	C
120.00-100.00			B	0.302	2.29	0.617	0.825	1	33.865			
			C	0.302	2.29	0.617	0.825	1	33.865			
T4	0.24	2.71	A	0.186	2.644	0.588	0.825	1	24.619	2.37	118.62	C
100.00-80.00			B	0.271	2.377	0.607	0.825	1	38.075			
			C	0.271	2.377	0.607	0.825	1	38.075			
T5	0.28	2.80	A	0.173	2.689	0.585	0.825	1	27.379	2.46	122.91	C
80.00-60.00			B	0.236	2.481	0.598	0.825	1	39.546			
			C	0.246	2.45	0.601	0.825	1	41.125			
T6	0.32	2.90	A	0.164	2.721	0.584	0.825	1	30.214	2.44	121.99	C
60.00-40.00			B	0.209	2.566	0.592	0.825	1	40.776			
			C	0.227	2.51	0.596	0.825	1	43.873			
T7	0.32	3.23	A	0.158	2.74	0.583	0.825	1	33.984	2.39	119.43	C
40.00-20.00			B	0.198	2.603	0.59	0.825	1	44.500			
			C	0.213	2.552	0.593	0.825	1	47.561			
T8 20.00-0.00	0.32	3.36	A	0.147	2.781	0.581	0.825	1	35.693	2.53	126.26	C
			B	0.183	2.655	0.587	0.825	1	46.165			
			C	0.196	2.609	0.59	0.825	1	49.189			
Sum Weight:	1.75	20.07						OTM	1093.28 kip-ft	16.26		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.05	1.05	A	0.227	2.508	0.596	0.8	1	10.620	0.93	61.77	C
145.00-130.00			B	0.271	2.377	0.607	0.8	1	13.177			
			C	0.271	2.377	0.607	0.8	1	13.177			
T2	0.05	1.37	A	0.289	2.325	0.613	0.8	1	12.835	0.98	98.36	C
130.00-120.00			B	0.344	2.186	0.63	0.8	1	15.626			
			C	0.344	2.186	0.63	0.8	1	15.626			
T3	0.17	2.63	A	0.221	2.529	0.595	0.8	1	23.275	2.13	106.35	C
120.00-100.00			B	0.302	2.29	0.617	0.8	1	33.465			
			C	0.302	2.29	0.617	0.8	1	33.465			
T4	0.24	2.71	A	0.186	2.644	0.588	0.8	1	24.369	2.34	116.98	C
100.00-80.00			B	0.271	2.377	0.607	0.8	1	37.548			
			C	0.271	2.377	0.607	0.8	1	37.548			
T5	0.28	2.80	A	0.173	2.689	0.585	0.8	1	27.098	2.42	121.20	C
80.00-60.00			B	0.236	2.481	0.598	0.8	1	38.975			
			C	0.246	2.45	0.601	0.8	1	40.553			
T6	0.32	2.90	A	0.164	2.721	0.584	0.8	1	29.899	2.41	120.31	C
60.00-40.00			B	0.209	2.566	0.592	0.8	1	40.170			
			C	0.227	2.51	0.596	0.8	1	43.268			
T7	0.32	3.23	A	0.158	2.74	0.583	0.8	1	33.563	2.35	117.64	C
40.00-20.00			B	0.198	2.603	0.59	0.8	1	43.789			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.213	2.552	0.593	0.8	1	46.850			
T8 20.00-0.00	0.32	3.36	A	0.147	2.781	0.581	0.8	1	35.229	2.49	124.32	C
			B	0.183	2.655	0.587	0.8	1	45.411			
			C	0.196	2.609	0.59	0.8	1	48.435			
Sum Weight:	1.75	20.07						OTM	1080.33 kip-ft	16.05		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	1.05	A	0.227	2.508	0.596	0.85	1	10.620	0.93	62.11	C
145.00-130.00			B	0.271	2.377	0.607	0.85	1	13.249			
			C	0.271	2.377	0.607	0.85	1	13.249			
T2	0.05	1.37	A	0.289	2.325	0.613	0.85	1	13.098	1.00	100.48	C
130.00-120.00			B	0.344	2.186	0.63	0.85	1	15.962			
			C	0.344	2.186	0.63	0.85	1	15.962			
T3	0.17	2.63	A	0.221	2.529	0.595	0.85	1	23.711	2.18	108.89	C
120.00-100.00			B	0.302	2.29	0.617	0.85	1	34.264			
			C	0.302	2.29	0.617	0.85	1	34.264			
T4	0.24	2.71	A	0.186	2.644	0.588	0.85	1	24.868	2.41	120.27	C
100.00-80.00			B	0.271	2.377	0.607	0.85	1	38.602			
			C	0.271	2.377	0.607	0.85	1	38.602			
T5	0.28	2.80	A	0.173	2.689	0.585	0.85	1	27.661	2.49	124.62	C
80.00-60.00			B	0.236	2.481	0.598	0.85	1	40.118			
			C	0.246	2.45	0.601	0.85	1	41.696			
T6	0.32	2.90	A	0.164	2.721	0.584	0.85	1	30.530	2.47	123.68	C
60.00-40.00			B	0.209	2.566	0.592	0.85	1	41.381			
			C	0.227	2.51	0.596	0.85	1	44.479			
T7	0.32	3.23	A	0.158	2.74	0.583	0.85	1	34.405	2.42	121.21	C
40.00-20.00			B	0.198	2.603	0.59	0.85	1	45.210			
			C	0.213	2.552	0.593	0.85	1	48.271			
T8 20.00-0.00	0.32	3.36	A	0.147	2.781	0.581	0.85	1	36.157	2.56	128.19	C
			B	0.183	2.655	0.587	0.85	1	46.919			
			C	0.196	2.609	0.59	0.85	1	49.944			
Sum Weight:	1.75	20.07						OTM	1106.24 kip-ft	16.47		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	1	1	5.475	0.19	12.95	C
145.00-130.00			B	0.142	2.803	0.58	1	1	6.340			
			C	0.142	2.803	0.58	1	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	1	1	9.087	0.28	27.77	C
130.00-120.00			B	0.204	2.584	0.591	1	1	10.107			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.204	2.584	0.591	1	1	10.107			
T3	0.06	1.36	A	0.134	2.831	0.579	1	1	16.259	0.55	27.69	C
120.00-100.00			B	0.174	2.686	0.585	1	1	20.111			
			C	0.174	2.686	0.585	1	1	20.111			
T4	0.08	1.41	A	0.114	2.91	0.577	1	1	17.473	0.60	29.88	C
100.00-80.00			B	0.155	2.753	0.582	1	1	22.423			
			C	0.155	2.753	0.582	1	1	22.423			
T5	0.10	1.46	A	0.107	2.936	0.576	1	1	19.710	0.62	31.24	C
80.00-60.00			B	0.136	2.824	0.579	1	1	23.799			
			C	0.143	2.799	0.58	1	1	24.777			
T6	0.12	1.52	A	0.103	2.954	0.575	1	1	22.006	0.63	31.38	C
60.00-40.00			B	0.121	2.88	0.578	1	1	25.111			
			C	0.133	2.835	0.579	1	1	27.055			
T7	0.12	1.71	A	0.103	2.952	0.575	1	1	26.216	0.65	32.34	C
40.00-20.00			B	0.119	2.887	0.577	1	1	29.316			
			C	0.13	2.848	0.579	1	1	31.253			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	1	1	27.941	0.69	34.55	C
			B	0.111	2.92	0.576	1	1	31.031			
			C	0.12	2.885	0.577	1	1	32.959			
Sum Weight:	0.62	10.77						OTM	277.54 kip-ft	4.21		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	0.825	1	5.475	0.19	12.95	C
145.00-130.00			B	0.142	2.803	0.58	0.825	1	6.340			
			C	0.142	2.803	0.58	0.825	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	0.825	1	8.164	0.25	25.23	C
130.00-120.00			B	0.204	2.584	0.591	0.825	1	9.184			
			C	0.204	2.584	0.591	0.825	1	9.184			
T3	0.06	1.36	A	0.134	2.831	0.579	0.825	1	14.732	0.51	25.59	C
120.00-100.00			B	0.174	2.686	0.585	0.825	1	18.585			
			C	0.174	2.686	0.585	0.825	1	18.585			
T4	0.08	1.41	A	0.114	2.91	0.577	0.825	1	15.728	0.55	27.55	C
100.00-80.00			B	0.155	2.753	0.582	0.825	1	20.679			
			C	0.155	2.753	0.582	0.825	1	20.679			
T5	0.10	1.46	A	0.107	2.936	0.576	0.825	1	17.738	0.58	28.75	C
80.00-60.00			B	0.136	2.824	0.579	0.825	1	21.827			
			C	0.143	2.799	0.58	0.825	1	22.805			
T6	0.12	1.52	A	0.103	2.954	0.575	0.825	1	19.797	0.58	28.82	C
60.00-40.00			B	0.121	2.88	0.578	0.825	1	22.903			
			C	0.133	2.835	0.579	0.825	1	24.846			
T7	0.12	1.71	A	0.103	2.952	0.575	0.825	1	23.271	0.59	29.30	C
40.00-20.00			B	0.119	2.887	0.577	0.825	1	26.370			
			C	0.13	2.848	0.579	0.825	1	28.308			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	0.825	1	24.692	0.62	31.14	C
			B	0.111	2.92	0.576	0.825	1	27.782			
			C	0.12	2.885	0.577	0.825	1	29.710			
Sum Weight:	0.62	10.77						OTM	257.01 kip-ft	3.87		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	0.8	1	5.475	0.19	12.95	C
145.00-130.00			B	0.142	2.803	0.58	0.8	1	6.340			
			C	0.142	2.803	0.58	0.8	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	0.8	1	8.033	0.25	24.87	C
130.00-120.00			B	0.204	2.584	0.591	0.8	1	9.052			
			C	0.204	2.584	0.591	0.8	1	9.052			
T3	0.06	1.36	A	0.134	2.831	0.579	0.8	1	14.514	0.51	25.29	C
120.00-100.00			B	0.174	2.686	0.585	0.8	1	18.366			
			C	0.174	2.686	0.585	0.8	1	18.366			
T4	0.08	1.41	A	0.114	2.91	0.577	0.8	1	15.479	0.54	27.22	C
100.00-80.00			B	0.155	2.753	0.582	0.8	1	20.429			
			C	0.155	2.753	0.582	0.8	1	20.429			
T5	0.10	1.46	A	0.107	2.936	0.576	0.8	1	17.456	0.57	28.40	C
80.00-60.00			B	0.136	2.824	0.579	0.8	1	21.545			
			C	0.143	2.799	0.58	0.8	1	22.524			
T6	0.12	1.52	A	0.103	2.954	0.575	0.8	1	19.482	0.57	28.46	C
60.00-40.00			B	0.121	2.88	0.578	0.8	1	22.587			
			C	0.133	2.835	0.579	0.8	1	24.531			
T7	0.12	1.71	A	0.103	2.952	0.575	0.8	1	22.850	0.58	28.86	C
40.00-20.00			B	0.119	2.887	0.577	0.8	1	25.950			
			C	0.13	2.848	0.579	0.8	1	27.887			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	0.8	1	24.228	0.61	30.66	C
			B	0.111	2.92	0.576	0.8	1	27.317			
			C	0.12	2.885	0.577	0.8	1	29.246			
Sum Weight:	0.62	10.77						OTM	254.08 kip-ft	3.82		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.01	0.81	A	0.123	2.874	0.578	0.85	1	5.475	0.19	12.95	C
145.00-130.00			B	0.142	2.803	0.58	0.85	1	6.340			
			C	0.142	2.803	0.58	0.85	1	6.340			
T2	0.02	0.71	A	0.178	2.67	0.586	0.85	1	8.296	0.26	25.60	C
130.00-120.00			B	0.204	2.584	0.591	0.85	1	9.316			
			C	0.204	2.584	0.591	0.85	1	9.316			
T3	0.06	1.36	A	0.134	2.831	0.579	0.85	1	14.950	0.52	25.89	C
120.00-100.00			B	0.174	2.686	0.585	0.85	1	18.803			
			C	0.174	2.686	0.585	0.85	1	18.803			
T4	0.08	1.41	A	0.114	2.91	0.577	0.85	1	15.977	0.56	27.88	C
100.00-80.00			B	0.155	2.753	0.582	0.85	1	20.928			
			C	0.155	2.753	0.582	0.85	1	20.928			
T5	0.10	1.46	A	0.107	2.936	0.576	0.85	1	18.020	0.58	29.11	C
80.00-60.00			B	0.136	2.824	0.579	0.85	1	22.109			
			C	0.143	2.799	0.58	0.85	1	23.087			
T6	0.12	1.52	A	0.103	2.954	0.575	0.85	1	20.113	0.58	29.19	C
60.00-40.00			B	0.121	2.88	0.578	0.85	1	23.218			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.133	2.835	0.579	0.85	1	25.162			
T7	0.12	1.71	A	0.103	2.952	0.575	0.85	1	23.691	0.59	29.73	C
40.00-20.00			B	0.119	2.887	0.577	0.85	1	26.791			
			C	0.13	2.848	0.579	0.85	1	28.728			
T8 20.00-0.00	0.12	1.79	A	0.096	2.979	0.575	0.85	1	25.156	0.63	31.63	C
			B	0.111	2.92	0.576	0.85	1	28.246			
			C	0.12	2.885	0.577	0.85	1	30.174			
Sum Weight:	0.62	10.77						OTM	259.94 kip-ft	3.92		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	6.29					
Bracing Weight	4.48					
Total Member Self-Weight	10.77			2.49	-1.63	
Total Weight	12.17			2.49	-1.63	
Wind 0 deg - No Ice		-0.10	-17.30	-1248.86	9.47	4.74
Wind 30 deg - No Ice		8.14	-14.01	-1021.17	-595.94	6.58
Wind 45 deg - No Ice		11.40	-11.32	-825.50	-836.55	6.95
Wind 60 deg - No Ice		13.78	-7.94	-579.50	-1013.21	6.87
Wind 90 deg - No Ice		16.26	-0.04	0.26	-1190.82	5.55
Wind 120 deg - No Ice		15.00	8.61	625.90	-1086.88	2.54
Wind 135 deg - No Ice		11.35	11.31	832.04	-833.77	0.51
Wind 150 deg - No Ice		8.10	14.02	1028.00	-594.30	-1.39
Wind 180 deg - No Ice		-0.02	15.83	1164.79	-0.66	-4.52
Wind 210 deg - No Ice		-8.14	14.01	1026.27	592.47	-6.58
Wind 225 deg - No Ice		-11.46	11.28	827.31	839.20	-6.95
Wind 240 deg - No Ice		-15.11	8.56	618.55	1093.09	-7.28
Wind 270 deg - No Ice		-16.31	-0.05	-3.29	1192.49	-5.19
Wind 300 deg - No Ice		-13.82	-7.93	-581.20	1014.82	-2.36
Wind 315 deg - No Ice		-11.43	-11.32	-827.98	837.76	-0.74
Wind 330 deg - No Ice		-8.20	-14.02	-1023.29	600.44	1.03
Member Ice	9.30					
Total Weight Ice	23.07			6.61	-6.16	
Wind 0 deg - Ice		-0.09	-19.89	-1435.25	3.00	6.05
Wind 30 deg - Ice		9.32	-16.07	-1170.61	-688.37	7.98
Wind 45 deg - Ice		13.04	-12.97	-945.11	-963.42	8.28
Wind 60 deg - Ice		15.77	-9.08	-661.31	-1165.91	8.05
Wind 90 deg - Ice		18.63	-0.03	4.92	-1371.26	6.26
Wind 120 deg - Ice		17.24	9.92	725.81	-1256.05	2.61
Wind 135 deg - Ice		13.00	12.97	959.78	-961.34	0.22
Wind 150 deg - Ice		9.29	16.08	1185.46	-687.26	-2.01
Wind 180 deg - Ice		-0.02	18.14	1341.29	-5.51	-5.64
Wind 210 deg - Ice		-9.32	16.07	1183.92	675.87	-7.98
Wind 225 deg - Ice		-13.09	12.95	955.74	955.91	-8.28
Wind 240 deg - Ice		-17.33	9.87	719.60	1251.30	-8.66
Wind 270 deg - Ice		-18.67	-0.04	1.77	1362.95	-5.97
Wind 300 deg - Ice		-15.80	-9.09	-662.91	1157.68	-2.41
Wind 315 deg - Ice		-13.07	-12.98	-947.32	954.92	-0.41
Wind 330 deg - Ice		-9.37	-16.08	-1172.46	682.58	1.72
Total Weight	12.17			2.49	-1.63	
Wind 0 deg - Service		-0.03	-4.79	-346.23	3.12	1.31

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 30 deg - Service		2.25	-3.88	-283.16	-164.58	1.82
Wind 45 deg - Service		3.16	-3.13	-228.96	-231.23	1.93
Wind 60 deg - Service		3.82	-2.20	-160.81	-280.17	1.90
Wind 90 deg - Service		4.50	-0.01	-0.21	-329.37	1.54
Wind 120 deg - Service		4.16	2.39	173.09	-300.57	0.70
Wind 135 deg - Service		3.14	3.13	230.20	-230.46	0.14
Wind 150 deg - Service		2.24	3.88	284.48	-164.12	-0.38
Wind 180 deg - Service		-0.01	4.39	322.37	0.32	-1.25
Wind 210 deg - Service		-2.25	3.88	284.00	164.62	-1.82
Wind 225 deg - Service		-3.17	3.13	228.89	232.97	-1.92
Wind 240 deg - Service		-4.19	2.37	171.06	303.30	-2.02
Wind 270 deg - Service		-4.52	-0.01	-1.20	330.83	-1.44
Wind 300 deg - Service		-3.83	-2.20	-161.28	281.62	-0.65
Wind 315 deg - Service		-3.17	-3.14	-229.64	232.57	-0.20
Wind 330 deg - Service		-2.27	-3.88	-283.74	166.83	0.29

Load Combinations

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

Comb. No.	Description
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	145 - 130	Leg	Max Tension	22	3.41	-0.00	0.00
			Max. Compression	24	-4.30	-0.02	-0.01
			Max. Mx	31	-0.19	-0.06	-0.00
			Max. My	27	-0.39	-0.00	0.06
			Max. Vy	31	0.19	0.00	0.00
			Max. Vx	27	-0.20	0.00	0.00
		Diagonal	Max Tension	28	0.60	0.00	0.00
			Max. Compression	28	-0.61	0.00	0.00
			Max. Mx	19	0.47	-0.00	0.00
			Max. My	19	-0.01	-0.00	-0.00
			Max. Vy	19	0.00	-0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	13	0.06	0.00	0.00
			Max. Compression	27	-0.08	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	28	-0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	28	0.00	0.00	0.00
T2	130 - 120	Leg	Max Tension	22	5.24	-0.02	-0.01
			Max. Compression	24	-6.89	0.62	-0.01
			Max. Mx	22	5.06	-0.70	-0.02
			Max. My	20	-0.93	-0.05	-0.70
			Max. Vy	32	0.25	-0.70	0.00
			Max. Vx	20	0.27	-0.05	-0.70
		Diagonal	Max Tension	33	1.19	0.00	0.00
			Max. Compression	30	-1.31	0.00	0.00
			Max. Mx	22	1.11	0.02	-0.00
			Max. My	22	-0.89	0.01	-0.00
			Max. Vy	22	0.01	0.02	-0.00
			Max. Vx	21	0.00	0.00	0.00
		Top Girt	Max Tension	22	0.02	0.00	0.00
			Max. Compression	25	-0.01	0.00	0.00
			Max. Mx	30	-0.01	-0.02	0.00
			Max. My	28	0.00	0.00	0.00
			Max. Vy	30	0.01	0.00	0.00
			Max. Vx	28	0.00	0.00	0.00
T3	120 - 100	Leg	Max Tension	27	14.16	-0.66	0.04
			Max. Compression	24	-18.45	0.89	-0.00
			Max. Mx	32	13.63	-0.92	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	20	-2.16	-0.02	-0.92
			Max. Vy	32	0.18	-0.92	-0.00
			Max. Vx	20	0.21	-0.02	-0.92
		Diagonal	Max Tension	34	2.21	0.00	0.00
			Max. Compression	34	-2.27	0.00	0.00
			Max. Mx	22	1.77	0.03	-0.00
			Max. My	28	-1.02	0.02	0.00
			Max. Vy	22	0.01	0.03	-0.00
			Max. Vx	28	-0.00	0.00	0.00
T4	100 - 80	Leg	Max Tension	22	25.69	-0.92	-0.04
			Max. Compression	24	-32.90	1.03	-0.00
			Max. Mx	24	-32.90	1.03	-0.00
			Max. My	20	-3.36	-0.01	-1.04
			Max. Vy	32	0.13	-0.94	-0.00
			Max. Vx	28	-0.14	-0.02	0.95
		Diagonal	Max Tension	34	2.81	0.00	0.00
			Max. Compression	34	-2.86	0.00	0.00
			Max. Mx	22	2.03	0.04	-0.00
			Max. My	20	-1.45	0.02	-0.01
			Max. Vy	22	0.02	0.04	-0.00
			Max. Vx	20	0.00	0.00	0.00
T5	80 - 60	Leg	Max Tension	22	37.79	-1.13	-0.03
			Max. Compression	24	-48.20	1.18	-0.02
			Max. Mx	22	37.32	-1.27	-0.03
			Max. My	26	-3.98	-0.08	-1.23
			Max. Vy	22	-0.15	-1.13	-0.03
			Max. Vx	9	-0.16	-0.01	-0.95
		Diagonal	Max Tension	31	3.24	0.00	0.00
			Max. Compression	31	-3.29	0.00	0.00
			Max. Mx	27	2.41	0.05	0.01
			Max. My	21	-2.29	0.03	-0.01
			Max. Vy	27	0.02	0.05	0.01
			Max. Vx	21	0.00	0.00	0.00
T6	60 - 40	Leg	Max Tension	27	50.28	-1.01	0.02
			Max. Compression	24	-64.32	1.04	-0.01
			Max. Mx	22	49.91	-1.93	-0.04
			Max. My	28	-5.64	-0.49	1.41
			Max. Vy	32	0.18	-1.93	0.01
			Max. Vx	28	-0.11	-0.49	1.41
		Diagonal	Max Tension	31	3.70	0.00	0.00
			Max. Compression	31	-3.59	0.00	0.00
			Max. Mx	27	2.76	0.05	0.01
			Max. My	22	-3.02	0.03	-0.01
			Max. Vy	27	0.03	0.05	0.01
			Max. Vx	21	0.00	0.00	0.00
T7	40 - 20	Leg	Max Tension	27	62.37	-0.19	0.01
			Max. Compression	24	-80.98	-0.29	-0.00
			Max. Mx	22	62.03	-3.46	-0.02
			Max. My	28	-6.90	1.04	1.54
			Max. Vy	32	0.40	-3.46	0.01
			Max. Vx	28	0.16	1.04	1.54
		Diagonal	Max Tension	31	4.55	0.00	0.00
			Max. Compression	31	-4.16	0.00	0.00
			Max. Mx	27	2.57	0.08	0.01
			Max. My	22	-3.54	0.04	-0.01
			Max. Vy	27	0.03	0.08	0.01
			Max. Vx	21	0.00	0.00	0.00
T8	20 - 0	Leg	Max Tension	27	73.81	1.14	0.02
			Max. Compression	24	-97.84	-0.00	0.00
			Max. Mx	24	-87.86	3.96	-0.00
			Max. My	28	-8.94	2.49	2.84

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	32	-0.54	-3.46	0.01
			Max. Vx	28	0.37	2.49	2.84
		Diagonal	Max Tension	31	5.96	0.00	0.00
			Max. Compression	31	-5.16	0.00	0.00
			Max. Mx	27	1.81	0.11	0.01
			Max. My	22	-4.70	0.07	-0.02
			Max. Vy	27	0.04	0.11	0.01
			Max. Vx	22	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	100.60	9.22	-4.99
	Max. H_x	13	84.79	9.59	-5.26
	Max. H_z	21	-76.44	-10.87	6.29
	Min. Vert	22	-78.59	-11.23	6.20
	Min. H_x	22	-78.59	-11.23	6.20
	Min. H_z	13	84.79	9.59	-5.26
Leg B	Max. Vert	24	101.07	-9.11	-5.15
	Max. H_x	32	-78.19	11.14	6.35
	Max. H_z	33	-76.04	10.75	6.50
	Min. Vert	32	-78.19	11.14	6.35
	Min. H_x	7	84.68	-9.48	-5.38
	Min. H_z	7	84.68	-9.48	-5.38
Leg A	Max. Vert	19	100.08	0.20	10.44
	Max. H_x	31	7.57	0.85	-1.65
	Max. H_z	2	84.34	0.15	10.89
	Min. Vert	27	-78.65	-0.17	-12.79
	Min. H_x	24	-39.03	-0.89	-7.74
	Min. H_z	27	-78.65	-0.17	-12.79

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	12.17	0.00	0.00	2.49	-1.63	0.00
Dead+Wind 0 deg - No Ice	12.17	-0.10	-17.30	-1251.45	9.48	4.75
Dead+Wind 30 deg - No Ice	12.17	8.14	-14.01	-1023.30	-597.20	6.58
Dead+Wind 45 deg - No Ice	12.17	11.40	-11.32	-827.22	-838.31	6.96
Dead+Wind 60 deg - No Ice	12.17	13.78	-7.94	-580.71	-1015.33	6.88
Dead+Wind 90 deg - No Ice	12.17	16.26	-0.04	0.27	-1193.31	5.56
Dead+Wind 120 deg - No Ice	12.17	15.00	8.61	627.20	-1089.14	2.55
Dead+Wind 135 deg - No Ice	12.17	11.35	11.31	833.78	-835.51	0.50
Dead+Wind 150 deg - No Ice	12.17	8.10	14.02	1030.14	-595.54	-1.39
Dead+Wind 180 deg - No Ice	12.17	-0.02	15.83	1167.23	-0.67	-4.52
Dead+Wind 210 deg - No Ice	12.17	-8.14	14.01	1028.42	593.70	-6.58
Dead+Wind 225 deg - No Ice	12.17	-11.46	11.28	829.05	840.95	-6.95
Dead+Wind 240 deg - No Ice	12.17	-15.11	8.56	619.84	1095.35	-7.29
Dead+Wind 270 deg - No Ice	12.17	-16.31	-0.05	-3.29	1194.98	-5.20
Dead+Wind 300 deg - No Ice	12.17	-13.82	-7.93	-582.42	1016.95	-2.36

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 315 deg - No Ice	12.17	-11.43	-11.32	-829.72	839.52	-0.73
Dead+Wind 330 deg - No Ice	12.17	-8.20	-14.02	-1025.43	601.69	1.03
Dead+Ice+Temp	23.07	-0.00	-0.00	6.61	-6.16	-0.00
Dead+Wind 0 deg+Ice+Temp	23.07	-0.09	-19.89	-1440.18	3.00	6.08
Dead+Wind 30 deg+Ice+Temp	23.07	9.32	-16.07	-1174.65	-690.76	8.01
Dead+Wind 45 deg+Ice+Temp	23.07	13.04	-12.97	-948.37	-966.77	8.32
Dead+Wind 60 deg+Ice+Temp	23.07	15.77	-9.08	-663.59	-1169.96	8.07
Dead+Wind 90 deg+Ice+Temp	23.07	18.63	-0.03	4.95	-1376.00	6.28
Dead+Wind 120 deg+Ice+Temp	23.07	17.24	9.92	728.30	-1260.37	2.62
Dead+Wind 135 deg+Ice+Temp	23.07	13.00	12.97	963.10	-964.67	0.22
Dead+Wind 150 deg+Ice+Temp	23.07	9.29	16.08	1189.55	-689.64	-2.01
Dead+Wind 180 deg+Ice+Temp	23.07	-0.02	18.14	1345.94	-5.54	-5.66
Dead+Wind 210 deg+Ice+Temp	23.07	-9.32	16.07	1188.02	678.19	-8.01
Dead+Wind 225 deg+Ice+Temp	23.07	-13.09	12.95	959.06	959.20	-8.31
Dead+Wind 240 deg+Ice+Temp	23.07	-17.33	9.87	722.08	1255.59	-8.69
Dead+Wind 270 deg+Ice+Temp	23.07	-18.67	-0.04	1.78	1367.66	-5.99
Dead+Wind 300 deg+Ice+Temp	23.07	-15.80	-9.09	-665.21	1161.69	-2.41
Dead+Wind 315 deg+Ice+Temp	23.07	-13.07	-12.98	-950.60	958.22	-0.41
Dead+Wind 330 deg+Ice+Temp	23.07	-9.37	-16.08	-1176.52	684.94	1.72
Dead+Wind 0 deg - Service	12.17	-0.03	-4.79	-344.86	1.45	1.31
Dead+Wind 30 deg - Service	12.17	2.25	-3.88	-281.66	-166.61	1.83
Dead+Wind 45 deg - Service	12.17	3.16	-3.13	-227.35	-233.40	1.93
Dead+Wind 60 deg - Service	12.17	3.82	-2.20	-159.06	-282.44	1.91
Dead+Wind 90 deg - Service	12.17	4.50	-0.01	1.88	-331.74	1.54
Dead+Wind 120 deg - Service	12.17	4.16	2.39	175.54	-302.88	0.71
Dead+Wind 135 deg - Service	12.17	3.14	3.13	232.77	-232.62	0.14
Dead+Wind 150 deg - Service	12.17	2.24	3.88	287.16	-166.15	-0.38
Dead+Wind 180 deg - Service	12.17	-0.01	4.39	325.14	-1.37	-1.25
Dead+Wind 210 deg - Service	12.17	-2.25	3.88	286.68	163.28	-1.83
Dead+Wind 225 deg - Service	12.17	-3.17	3.13	231.45	231.77	-1.93
Dead+Wind 240 deg - Service	12.17	-4.19	2.37	173.50	302.24	-2.02
Dead+Wind 270 deg - Service	12.17	-4.52	-0.01	0.89	329.84	-1.44
Dead+Wind 300 deg - Service	12.17	-3.83	-2.20	-159.53	280.52	-0.65
Dead+Wind 315 deg - Service	12.17	-3.17	-3.14	-228.04	231.37	-0.20
Dead+Wind 330 deg - Service	12.17	-2.27	-3.88	-282.25	165.49	0.29

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-12.17	0.00	0.00	12.17	0.00	0.000%
2	-0.10	-12.17	-17.30	0.10	12.17	17.30	0.000%
3	8.14	-12.17	-14.01	-8.14	12.17	14.01	0.000%
4	11.40	-12.17	-11.32	-11.40	12.17	11.32	0.000%
5	13.78	-12.17	-7.94	-13.78	12.17	7.94	0.000%
6	16.26	-12.17	-0.04	-16.26	12.17	0.04	0.000%
7	15.00	-12.17	8.61	-15.00	12.17	-8.61	0.001%
8	11.35	-12.17	11.31	-11.35	12.17	-11.31	0.000%
9	8.10	-12.17	14.02	-8.10	12.17	-14.02	0.002%
10	-0.02	-12.17	15.83	0.02	12.17	-15.83	0.000%
11	-8.14	-12.17	14.01	8.14	12.17	-14.01	0.000%
12	-11.46	-12.17	11.28	11.46	12.17	-11.28	0.000%
13	-15.11	-12.17	8.56	15.11	12.17	-8.56	0.000%
14	-16.31	-12.17	-0.05	16.31	12.17	0.05	0.000%
15	-13.82	-12.17	-7.93	13.82	12.17	7.93	0.000%
16	-11.43	-12.17	-11.32	11.43	12.17	11.32	0.000%
17	-8.20	-12.17	-14.02	8.20	12.17	14.02	0.002%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
18	0.00	-23.07	0.00	0.00	23.07	0.00	0.000%
19	-0.09	-23.07	-19.89	0.09	23.07	19.89	0.000%
20	9.32	-23.07	-16.07	-9.32	23.07	16.07	0.000%
21	13.04	-23.07	-12.97	-13.04	23.07	12.97	0.000%
22	15.77	-23.07	-9.08	-15.77	23.07	9.08	0.000%
23	18.63	-23.07	-0.03	-18.63	23.07	0.03	0.000%
24	17.24	-23.07	9.92	-17.24	23.07	-9.92	0.000%
25	13.00	-23.07	12.97	-13.00	23.07	-12.97	0.000%
26	9.29	-23.07	16.08	-9.29	23.07	-16.08	0.000%
27	-0.02	-23.07	18.14	0.02	23.07	-18.14	0.000%
28	-9.32	-23.07	16.07	9.32	23.07	-16.07	0.000%
29	-13.09	-23.07	12.95	13.09	23.07	-12.95	0.000%
30	-17.33	-23.07	9.87	17.33	23.07	-9.87	0.000%
31	-18.67	-23.07	-0.04	18.67	23.07	0.04	0.000%
32	-15.80	-23.07	-9.09	15.80	23.07	9.09	0.000%
33	-13.07	-23.07	-12.98	13.07	23.07	12.98	0.000%
34	-9.37	-23.07	-16.08	9.37	23.07	16.08	0.000%
35	-0.03	-12.17	-4.79	0.03	12.17	4.79	0.000%
36	2.25	-12.17	-3.88	-2.25	12.17	3.88	0.000%
37	3.16	-12.17	-3.13	-3.16	12.17	3.13	0.000%
38	3.82	-12.17	-2.20	-3.82	12.17	2.20	0.000%
39	4.50	-12.17	-0.01	-4.50	12.17	0.01	0.000%
40	4.16	-12.17	2.39	-4.16	12.17	-2.39	0.000%
41	3.14	-12.17	3.13	-3.14	12.17	-3.13	0.000%
42	2.24	-12.17	3.88	-2.24	12.17	-3.88	0.000%
43	-0.01	-12.17	4.39	0.01	12.17	-4.39	0.000%
44	-2.25	-12.17	3.88	2.25	12.17	-3.88	0.000%
45	-3.17	-12.17	3.13	3.17	12.17	-3.13	0.000%
46	-4.19	-12.17	2.37	4.19	12.17	-2.37	0.000%
47	-4.52	-12.17	-0.01	4.52	12.17	0.01	0.000%
48	-3.83	-12.17	-2.20	3.83	12.17	2.20	0.000%
49	-3.17	-12.17	-3.14	3.17	12.17	3.14	0.000%
50	-2.27	-12.17	-3.88	2.27	12.17	3.88	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001

19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000413
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	2.049	40	0.1023	0.0092
T2	130 - 120	1.727	40	0.1001	0.0094
T3	120 - 100	1.517	40	0.0979	0.0092
T4	100 - 80	1.112	40	0.0899	0.0079
T5	80 - 60	0.749	40	0.0772	0.0057
T6	60 - 40	0.446	40	0.0611	0.0040
T7	40 - 20	0.213	40	0.0425	0.0024
T8	20 - 0	0.062	40	0.0220	0.0012

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	10-ft Lightning Rod	40	2.049	0.1023	0.0092	891172
144.00	3' Side Mount Standoff	40	2.027	0.1021	0.0093	891172
125.00	ANT150F2	40	1.621	0.0992	0.0094	286570
115.00	ANT150D	40	1.413	0.0964	0.0090	203527

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
110.00	ANT150F2	40	1.311	0.0946	0.0087	159563
105.00	10' x 3" Dia Omni	40	1.210	0.0924	0.0083	130836
102.00	ANT150D	40	1.151	0.0910	0.0081	118330
95.00	SPD2-4.7	40	1.017	0.0871	0.0074	101017
70.00	NH65PS-DG-F0M	40	0.590	0.0695	0.0048	73263
67.00	RRH2x60-AWS	40	0.545	0.0670	0.0045	71518

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	8.492	24	0.4229	0.0363
T2	130 - 120	7.161	24	0.4144	0.0381
T3	120 - 100	6.290	24	0.4053	0.0375
T4	100 - 80	4.617	24	0.3722	0.0322
T5	80 - 60	3.115	24	0.3201	0.0238
T6	60 - 40	1.855	24	0.2538	0.0169
T7	40 - 20	0.885	24	0.1769	0.0105
T8	20 - 0	0.259	24	0.0915	0.0052

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	10-ft Lightning Rod	24	8.492	0.4229	0.0363	239257
144.00	3' Side Mount Standoff	24	8.402	0.4225	0.0365	239257
125.00	ANT150F2	24	6.723	0.4104	0.0380	72275
115.00	ANT150D	24	5.861	0.3990	0.0367	48711
110.00	ANT150F2	24	5.438	0.3913	0.0355	38570
105.00	10' x 3" Dia Omni	24	5.023	0.3824	0.0340	31924
102.00	ANT150D	24	4.778	0.3764	0.0330	28987
95.00	SPD2-4.7	24	4.222	0.3608	0.0302	24804
70.00	NH65PS-DG-F0M	24	2.451	0.2885	0.0203	17829
67.00	RRH2x60-AWS	24	2.265	0.2784	0.0193	17365

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	145	Leg	A325N	1.0000	6	0.57	34.56	0.016 ✔	1.333	Bolt Tension
T2	130	Leg	A325N	1.0000	6	0.87	34.56	0.025 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	1.19	8.16	0.146 ✔	1.333	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325N	1.0000	1	0.02	8.16	0.003 ✓	1.333	Member Bearing
T3	120	Leg	A325N	1.0000	6	2.36	34.56	0.068 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	2.21	8.16	0.271 ✓	1.333	Member Bearing
T4	100	Leg	A325N	1.0000	6	4.28	34.56	0.124 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	2.81	8.16	0.345 ✓	1.333	Member Bearing
T5	80	Leg	A325N	1.0000	6	6.29	34.56	0.182 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	3.24	8.16	0.397 ✓	1.333	Member Bearing
T6	60	Leg	A325N	1.0000	6	8.38	34.56	0.243 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	3.70	8.16	0.453 ✓	1.333	Member Bearing
T7	40	Leg	A325N	1.0000	6	10.40	34.56	0.301 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.55	8.16	0.558 ✓	1.333	Member Bearing
T8	20	Leg	F1554-105	1.0000	6	12.30	32.40	0.380 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5.96	8.16	0.731 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	145 - 130	1 3/4	15.00	2.50	68.6 K=1.00	21.201	2.4053	-4.30	50.99	0.084 ✓
T2	130 - 120	Pirod 207628	10.02	10.02	44.8 K=1.00	25.140	3.6816	-6.89	92.56	0.074 ✓
T3	120 - 100	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-18.45	92.56	0.199 ✓
T4	100 - 80	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-32.90	92.56	0.355 ✓
T5	80 - 60	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-48.20	92.56	0.521 ✓
T6	60 - 40	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-64.32	92.56	0.695 ✓
T7	40 - 20	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-80.98	92.56	0.875 ✓
T8	20 - 0	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-97.84	92.56	1.057 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	130 - 120	0.5	1.47	120.0	10.365	0.1963	0.27	2.30	0.120 ✓
T3	120 - 100	0.5	1.47	120.0	10.365	0.1963	0.22	2.30	0.098 ✓
T4	100 - 80	0.5	1.47	120.0	10.365	0.1963	0.16	2.30	0.068 ✓
T5	80 - 60	0.5	1.47	120.0	10.365	0.1963	0.14	2.30	0.063 ✓
T6	60 - 40	0.5	1.47	120.0	10.365	0.1963	0.18	2.30	0.077 ✓
T7	40 - 20	0.5	1.47	120.0	10.365	0.1963	0.40	2.30	0.176 ✓
T8	20 - 0	0.5	1.47	120.0	10.365	0.1963	0.57	2.30	0.248 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.59	2.71	134.0 K=0.90	8.320	0.6013	-0.61	5.00	0.122 ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	11.42	5.02	121.8 K=1.00	10.024	0.9020	-1.31	9.04	0.145 ✓
T3	120 - 100	L2 1/2x2 1/2x3/16	12.50	5.67	137.4 K=1.00	7.907	0.9020	-2.27	7.13	0.318 ✓
T4	100 - 80	L2 1/2x2 1/2x3/16	13.80	6.37	154.4 K=1.00	6.265	0.9020	-2.86	5.65	0.506 ✓
T5	80 - 60	L2 1/2x2 1/2x3/16	15.24	7.12	172.7 K=1.00	5.008	0.9020	-3.29	4.52	0.729 ✓
T6	60 - 40	L2 1/2x2 1/2x3/16	16.80	7.92	192.1 K=1.00	4.047	0.9020	-3.59	3.65	0.984 ✓
T7	40 - 20	L3x3x3/16	17.62	8.35	168.1 K=1.00	5.283	1.0900	-4.16	5.76	0.722 ✓
T8	20 - 0	L3x3x3/16	19.30	9.20	185.2 K=1.00	4.354	1.0900	-5.16	4.75	1.087 ✓

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.08	2.58	0.029 ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	5.00	4.52	114.8 K=1.05	11.016	0.9020	-0.01	9.94	0.001 ✓

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

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T1	145 - 130	1 3/4	15.00	2.50	68.6	30.000	2.4053	3.41	72.16	0.047 ✔
T2	130 - 120	Pirod 207628	10.02	10.02	44.8	30.000	3.6816	5.24	110.45	0.047 ✔
T3	120 - 100	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	14.16	110.45	0.128 ✔
T4	100 - 80	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	25.69	110.45	0.233 ✔
T5	80 - 60	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	37.74	110.45	0.342 ✔
T6	60 - 40	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	50.28	110.45	0.455 ✔
T7	40 - 20	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	62.37	110.45	0.565 ✔
T8	20 - 0	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	73.81	110.45	0.668 ✔

Truss-Leg Diagonal Data

Section No.	Elevation	Diagonal Size	L_d	Kl/r	F_a	A	Actual V	Allow. V_a	Stress Ratio
	ft		ft		ksi	in^2	K	K	
T2	130 - 120	0.5	1.47	120.0	10.365	0.1963	0.27	2.30	0.120 ✔
T3	120 - 100	0.5	1.47	120.0	10.365	0.1963	0.22	2.30	0.098 ✔
T4	100 - 80	0.5	1.47	120.0	10.365	0.1963	0.16	2.30	0.068 ✔
T5	80 - 60	0.5	1.47	120.0	10.365	0.1963	0.14	2.30	0.063 ✔
T6	60 - 40	0.5	1.47	120.0	10.365	0.1963	0.18	2.30	0.077 ✔
T7	40 - 20	0.5	1.47	120.0	10.365	0.1963	0.40	2.30	0.176 ✔
T8	20 - 0	0.5	1.47	120.0	10.365	0.1963	0.57	2.30	0.248 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.59	2.71	148.9	30.000	0.6013	0.60	18.04	0.033 ✔
T2	130 - 120	L2 1/2x2 1/2x3/16	11.42	5.02	80.1	21.600	0.9020	1.19	19.48	0.061 ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.50	5.67	90.0	21.600	0.9020	2.21	19.48	0.114 ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	13.80	6.37	100.8	21.600	0.9020	2.81	19.48	0.144 ✔
T5	80 - 60	L2 1/2x2 1/2x3/16	15.24	7.12	112.4	21.600	0.9020	3.24	19.48	0.166 ✔
T6	60 - 40	L2 1/2x2 1/2x3/16	16.80	7.92	124.8	21.600	0.9020	3.70	19.48	0.190 ✔
T7	40 - 20	L3x3x3/16	18.45	8.76	114.1	21.600	1.0900	4.55	23.54	0.193 ✔
T8	20 - 0	L3x3x3/16	20.16	9.62	125.1	21.600	1.0900	5.96	23.54	0.253 ✔

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.00	4.85	266.3	30.000	0.6013	0.06	18.04	0.003 ✔
T2	130 - 120	L2 1/2x2 1/2x3/16	5.00	4.52	74.9	21.600	0.9020	0.02	19.48	0.001 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	145 - 130	Leg	1 3/4	2	-4.30	67.98	6.3	Pass
T2	130 - 120	Leg	Pirod 207628	44	-6.89	123.38	9.0	Pass
T3	120 - 100	Leg	Pirod 207628	56	-18.45	123.38	15.0	Pass
T4	100 - 80	Leg	Pirod 207628	71	-32.90	123.38	26.7	Pass
T5	80 - 60	Leg	Pirod 207628	86	-48.20	123.38	39.1	Pass
T6	60 - 40	Leg	Pirod 207628	101	-64.32	123.38	52.1	Pass
T7	40 - 20	Leg	Pirod 207628	116	-80.98	123.38	65.6	Pass
T8	20 - 0	Leg	Pirod 207628	131	-97.84	123.38	79.3	Pass
T1	145 - 130	Diagonal	7/8	12	-0.61	6.67	9.1	Pass
T2	130 - 120	Diagonal	L2 1/2x2 1/2x3/16	49	-1.31	12.05	10.9 11.0 (b)	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	61	-2.27	9.51	23.8	Pass
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	76	-2.86	7.53	38.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	88	-3.29	6.02	54.7	Pass
T6	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	103	-3.59	4.87	73.8	Pass
T7	40 - 20	Diagonal	L3x3x3/16	124	-4.16	7.68	54.2	Pass
T8	20 - 0	Diagonal	L3x3x3/16	139	-5.16	6.33	81.6	Pass
T1	145 - 130	Top Girt	7/8	4	-0.08	3.45	2.2	Pass
T2	130 - 120	Top Girt	L2 1/2x2 1/2x3/16	47	-0.01	13.25	0.1	Pass
							0.2 (b)	
							Summary	
						Leg (T8)	79.3	Pass
						Diagonal (T8)	81.6	Pass
						Top Girt (T1)	2.2	Pass
						Bolt Checks	54.9	Pass
						RATING =	**81.6**	**Pass**

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Subject:	FOUNDATION ANALYSIS
Location:	Uncasville, CT
Rev. 1: 10/20/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 15115.000

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 1456 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 20 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 23 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 101 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 79 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 145 \cdot ft$	(User Input)	
Tower Width =	$W_t := 18 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 5.5 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 1.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 26.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 6$	(User Input)	
Bar Diameter =	$d_{bpier} := 0.75 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.75 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 39$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 6$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.75 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 39$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =
$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.442 \cdot in^2$$

Pad Top Reinforcement Bar Area =
$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.442 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =
$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.442 \cdot in^2$$

Coefficient of Lateral Soil Pressure =
$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

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

Stability of Footing:

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

Adjusted Soil Unit Weight =
$\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 100 \cdot pcf$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.2 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.2 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.65 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.425 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 1.5$

$A_p := W_f \cdot T_p = 39.75$

Ultimate Shear =
$S_u := P_{ave} \cdot A_p = 56.644 \cdot kip$

Weight of Concrete Pad =
$WT_{pad} := (W_f^2 \cdot T_f) \cdot \gamma_c = 158.006 \cdot kip$

Weight of Concrete Piers =
$WT_{pier} := 3 \cdot [(L_p \cdot d_p^2) \cdot \gamma_c] = 18.225 \cdot kip$

Total Weight of Concrete =
$WT_c := WT_{pad} + WT_{pier} = 176 \cdot kip$

Weight of Soil Above Footing =
$WT_{s1} := (W_f^2 - 3 \cdot d_p^2) \cdot (L_p - L_{pag}) \cdot \gamma_s = 270 \cdot kip$

Weight of Soil Back Face =
$WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f)^2}{2} \cdot W_f\right] \cdot \gamma_s = 23 \cdot kip$

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

$X_t := if(Pos_t, X_{t1}, X_{t2}) = 5.456$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 2.598$

Resisting Moment =
$M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 6573 \cdot kip$

Overturning Moment =
$M_{ot} := OM + S_t \cdot (L_p + T_f) = 1576 \cdot kip \cdot ft$

Factor of Safety Actual =
$FS := \frac{M_r}{M_{ot}} = 4.17$

Factor of Safety Required =
$FS_{req} := 2$

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

$OverTurning\_Moment\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 469 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\,2} = 702.25$

Section Modulus of Mat = $S := \frac{W_f^{\,3}}{6} = 3101.6 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.176 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 0.16 \cdot ksf$

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

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 10.226$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.417$

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

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 3.358$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 1.194 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.176 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^{\,2}}{4} = 2.25 \times 10^3 \cdot kips$ (ACI-2008 10.14)

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

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 14.625 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.1438 \cdot ksf$

$V_{req} := LF \cdot FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f = 13.905 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 500 \cdot kip$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

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

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 13.3$

Required Shear Strength = $V_{req} := LF \cdot FL \cdot \left[W_f^2 - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}\right] = 132 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 500.2 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off} = 1584\cdot ft\cdot k$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_p - T_f\right)\right] + WT_{s2}\cdot\left[\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2} + \left(D_f - n\right)\cdot\tan\left(\Phi_s\right)\right]\right] = -4$$

$$M_{nC} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left(\gamma_c\cdot T_f\right)\right]$$

Design Moment = $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 596.29\cdot kips\cdot ft$

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

(ACI-200810.2.7.3)

$$b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p = 223.061\cdot in$$

$$d := T_f - Cvr_{pad} - d_{bbot} = 14.25\cdot in$$

$$A_s := \frac{M_n}{\left(f_y\cdot d\right)} = 8.369\cdot in^2$$

$$a := \frac{A_s\cdot f_y}{\beta\cdot f_c\cdot b_{eff}} = 0.662\cdot in$$

$$A_s := \frac{M_n}{f_y\cdot\left(d - \frac{a}{2}\right)} = 8.568\cdot in^2$$

$$\rho := \frac{A_s}{b_{eff}\,d} = 0.0027$$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \begin{cases} \left(\rho \cdot b_{eff} \cdot d\right) & \text{if } \left(\rho \cdot b_{eff} \cdot d\right) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 8.568 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 17.2 \cdot in^2$$

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

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 8.6 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 17.2 \cdot in^2$$

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

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 7.44 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 13.3 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 48 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1017.88 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 5.09 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 5.3 \cdot in^2$

Steel_Area_Check := if($A_{sprov} > A_{smin}$, "Okay", "No Good")

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.675 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 30 \cdot in$

Maximum Moment in Pier = $M_p := \left[S_t \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 1599.6 \cdot in \cdot kips$

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

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

$(D \ N \ n \ P_u \ M_{xu}) = (36 \ \ 12 \ \ 6 \ \ 134.6 \ \ 1599.6)$

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

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

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (715.6 \ \ 8502 \ \ -60 \ \ 0)$

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

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 51 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 15 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

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

Transverse Reinforcement =

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

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 13.34 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 9.961 \cdot in$ (ACI 12.2.1)

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

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

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

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

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 14.23 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 13.5 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 14.23 \cdot in$

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

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

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #3 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 12 \cdot in$

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot in$

$s_{lim3} := D_f \cdot z = 66 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 12 \cdot in$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 5$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 5 \cdot ft$

Length of Anchor Bolt = $L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 10.87 \cdot ft$

$Depth\_Check := if(D_{ab} \ge L_{anchor}, "Okay", "No Good")$

Depth_Check = "No Good"

Note: Anchor plate is provided

Site Name	Uncasvile CT SC 2	Site #	2 - 0787
Latitude	41-27-04.37 N	Longitude	72-06-18.68 W
		GEL (Feet)	40
			Rooftop
Remote BBU? YES	Remote Site Name: Facilities populated	Site #	Facilities populated

700 MHz LTE Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE			
ANTENNA TYPE			
QUANTITY PER FACE			
ORIENTATION			
DOWN TILT (DEG.)			
RAD CTR (FT AGL)			
TOWER MOUNTED AMPS (QTY)			
DIPLEXER - QTY/MODEL			
RRH - QTY/MODEL			
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX			

850 MHz Cellular Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE			
ANTENNA TYPE			
QUANTITY PER FACE			
ORIENTATION			
DOWN TILT (DEG.)			
RAD CTR (FT AGL)			
TOWER MOUNTED AMPS (QTY)			
DIPLEXER - QTY/MODEL			

1900 MHz PCS Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE			
ANTENNA TYPE			
QUANTITY PER FACE			
ORIENTATION			
DOWN TILT (DEG.)			
RAD CTR (FT AGL)			
TOWER MOUNTED AMPS (QTY)			
DIPLEXER - QTY/MODEL			
RRH - QTY/MODEL			
SECTOR DISTRIBUTION BOX			

2100 MHz LTE Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	2100 MHz Small cell		
ANTENNA TYPE	NH65PS-DG-F0M		
QUANTITY PER FACE	1		
ORIENTATION	310		
DOWN TILT (DEG.)	0° Mech + 0° Elec		
RAD CTR (FT AGL)	40		
TOWER MOUNTED AMPS (QTY)	N/A		
DIPLEXER - QTY/MODEL			
RRH - QTY/MODEL	1 RRH 2 X 60 AWS		
SECTOR DISTRIBUTION BOX	1	DB-B1-6C-12AB-0Z	
MAIN DISTRIBUTION BOX			

Coax Cable Ordering					
MAINLINE SIZE	1 5/8"	TOTAL # OF MAIN LINES	0	COAX LINE MODEL #	
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS	2	TOP JUMPER MODEL #	
Fiber Cable Ordering					
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES	1	FIBER LINE MODEL #	
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS		TOP JUMPER MODEL #	

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F / AWS-Band	700 Mhz C - Block	Cellular (Watts)	0
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-2155	TX - 746-757	PCS (Watts)	0
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-1755	RX - 776-787	700 MHz / 2100 MHz (Watts)	0/60

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color	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	RF INITIALS	DATE
Prepared By: Ray Paradis	Robert Hesselbach	RLP	3/26/2015

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

NH65PS-DG-F0M

Andrew® Dualband Bi-Directional Metro Cell Antenna, 698-896 and 1710–2170 MHz with fixed tilt in the low band and manual tilt in the high band. Contains internal diplexer and GPS antenna.

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2170
Gain, dBi	6.4	7.0	9.0	9.3	9.3
Beamwidth, Horizontal, degrees	70	69	62	58	56
Beamwidth, Vertical, degrees	37.0	34.5	14.7	13.9	13.3
Beam Tilt, degrees	0	0	0–16	0–16	0–16
USLS, dB	17	17	12	12	11
CPR at Boresight, dB	15	18	19	21	18
CPR at Sector, dB	8	5	7	8	8
Isolation, dB	25	25	25	25	25
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	125	125	125	125	125
Polarization	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2170
Gain by all Beam Tilts, average, dBi	6.6	6.9	9.3	9.5	9.5
Gain by all Beam Tilts Tolerance, dB	±0.6	±0.8	±0.8	±0.7	±0.8
Gain by Beam Tilt, average, dBi			0 ° | 9.7	0 ° | 10.0	0 ° | 9.9
			8 ° | 9.4	8 ° | 9.6	8 ° | 9.5
			16 ° | 8.6	16 ° | 8.8	16 ° | 8.9
Beamwidth, Horizontal Tolerance, degrees	±4.4	±6.7	±5.6	±5.4	±6
Beamwidth, Vertical Tolerance, degrees	±3.2	±1.9	±1.3	±0.8	±1.2
USLS, dB	18	18	12	13	12
CPR at Boresight, dB	15	19	20	22	19
CPR at Sector, dB	9	5	8	8	8

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	Metro Cell
Band	Multiband
Brand	DualPol®
Operating Frequency Band	1710 – 2170 MHz | 698 – 896 MHz
Internal GPS frequency band	1575.42 MHz
Internal GPS VSWR	2.0
Performance Note	Outdoor usage

Mechanical Specifications

Product Specifications

NH65PS-DG-F0M

Color	Light gray
GPS Connector Interface	4.1-9.5 DIN Female
GPS Connector Quantity	1
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	ASA, UV stabilized
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	167.0 N @ 150 km/h 37.5 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Length	728.0 mm | 28.7 in
Outer Diameter	305.0 mm | 12.0 in
Net Weight	11.5 kg | 25.4 lb

Regulatory Compliance/Certifications

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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.

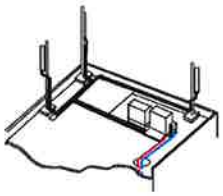
EASY INSTALLATION

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.

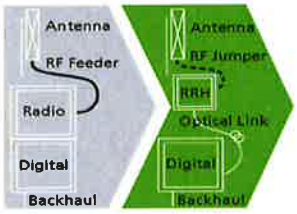
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

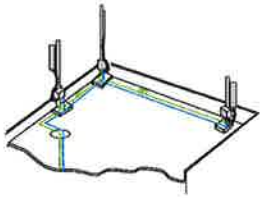
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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

36.7"x10.6"x5.8"

- HxWxD : ~~510x265x106mm~~ (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™

Installation Instructions:

RRFDC-3315-PF-48
(DB-B1-6C-12AB-0Z)

DATA SHEET

DC Surge Protection for RRH/Integrated Antenna Radio Head

RxxDC-4750-PF-48 • RxxDC-3103-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 6 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.

Shown with optional 90° elbow for side entry. Can be installed on left or right side of unit.

Mounting Bracket Included

Features

- Employs the Strikesorb® 30-V1-HV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V).
- The Strikesorb 30-V1-HV is a Class I SPD, certified by VDE per the IEC 61643-1 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-HV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units.
- Alarms for SPD sacrifice, Moisture detection and Intrusion.
- Fully recognized to the UL 1449 3rd Edition Safety Standard.
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents.
- Protects up to 6 Remote Radio Heads and connects up to 12 fiber pairs.
- Utilizes an IP 67 rated enclosure, allowing for indoor or outdoor installation on a roof or tower top.
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1⅝" coax class cables) depending upon port configuration.
- Lightweight aerodynamic design provides maximum flexibility for tower top installation.
- Companion to the RxxDC-4291-PF-48 / RxxDC-1064-PF-48 (Sector) models.

Tower / Base / Rooftop / Rooftop Distribution Models
RxxDC-4750-PF-48
RxxDC-3103-PF-48
RxxDC-3315-PF-48

Companion Sector Models:
RxxDC-4291-PF-48
RxxDC-1064-PF-48

G02-00-236 121003

Raycap

www.raycapsurgeprotection.com

SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head

RxxDC-4750-PF-48 • RxxDC-3103-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Electrical

Model Numbers	RxxDC-4750-PF-48	RxxDC-3103-PF-48	RxxDC-3315-PF-48
Nominal Operating Voltage	48 VDC	48 VDC	48 VDC
Nominal Discharge Current [I_n]	20 kA 8/20 µs	20 kA 8/20 µs	20 kA 8/20 µs
Maximum Surge Current [I_{max}]	60 kA 8/20 µs	60 kA 8/20 µs	60 kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-1	5 kA 10/350 µs	5 kA 10/350 µs	5 kA 10/350 µs
Maximum Continuous Operating Voltage [U_c]	75 VDC	75 VDC	75 VDC
Voltage Protection Rating (VPR) per UL 1449 3rd Edition	400V	400V	400V
Protection Class as per IEC 61643-1	Class I	Class I	Class I
SPD Alarm	upon sacrifice	upon sacrifice	upon sacrifice
Intrusion Sensor	microswitch	microswitch	microswitch
Moisture Sensor	infrared moisture detector	infrared moisture detector	infrared moisture detector
Strikesorb Module Type	**No Strikesorb modules installed**	30-V1-HV **Strikesorb modules installed to protect 3 Remote Radio Heads**	30-V1-HV **Strikesorb modules installed to protect 6 Remote Radio Heads**

Mechanical

Suppression Connection Method	Compression lug, #14 - #2/0 AWG (2.5 mm² - 70 mm²) Copper; #12 - #2/0 AWG (4 mm² - 70 mm²) Aluminum		
Fiber Connection Method	LC-LC Single mode		
Pressure Equalizing Vent	Gore™ Vent		
Environmental Rating	IP 67		
Operating Temperature	-40° C to +80° C		
UV Resistant	Yes		
Weight	System: 16.0 lbs (7.25 kg) Mount: 5.5 lbs (2.49 kg) Total: 21.5 lbs (9.75 kg)	System: 18.7 lbs (8.48 kg) Mount: 5.5 lbs (2.49 kg) Total: 24.2 lbs (10.98 kg)	System: 21.4 lbs (9.70 kg) Mount: 5.5 lbs (2.49 kg) Total: 26.9 lbs (12.20 kg)
Combined Wind Loading	150mph (sustained): 200 lbs (889.6 N)		

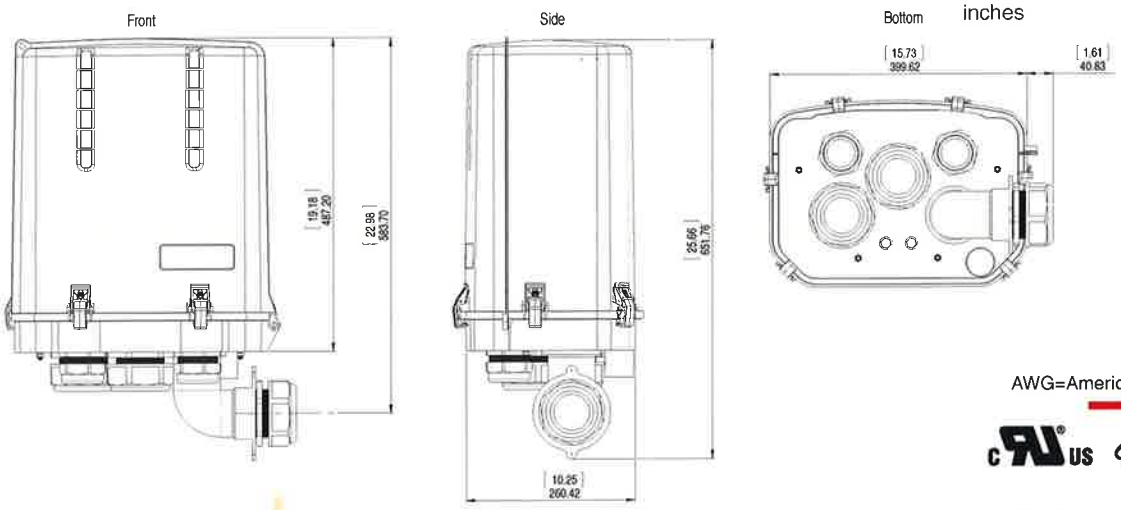
Standards Compliance

Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards

Standards	ANSI/UL 1449 3rd Edition
	IEEE C62.41
	NEMA LS-1, IEC 61643-1:2005 2nd Edition (Class I Protection)
	IEC 61643-12
	EN 61643-11:2002 (including A11:2007)

Product Diagram

[mm]
inches



AWG=American Wire Gauge

ATTACHMENT 5

TOWN OF MONTVILLE

Building Department

310 NORWICH-NEW LONDON TURNPIKE

UNCASVILLE, CT 06382-2599

TEL. (860) 848-3030 X382 FAX. (860) 848-7231

BUILDING PERMIT

Permit Number: **B2012-0054** Date: 21-Feb-12 Map/Lot: 083/029-000 Owner ID: 6675000

Project Location: 911 ROUTE 32 **Unit:**

Job Description: 10x12 Block Building, 140' Self Supporting Steel Radio Tower

Owner Nam Town Of Montville
Careof:
310 Norwich N L Tpke
Uncasville CT 06382-

Tenant Name N/A
Telephone:

Contractor Nam Marcia Vlaun
DBA: Town of Montville
310 Route 32
Uncasville CT 06382-

Telephone:
Lic/Reg Type
Lic/Reg N 0
Exp Date:

Construction Value		Permit Fees		Construction Information
Building Value:	$101,545.00	Building Fee:	$0.00	Use Group: U
Plumbing Value:	$0.00	Plumbing Fee:	$0.00	Code: 2005 State Building Code
Mechanical Valu	$500.00	Mechanical Fe	$0.00	
Electrical Value:	$5,000.00	Electrical Fee:	$0.00	Construction Type 2B
Total Value:	**$107,045.00**	Penalty Fee:	$0.00	Permit Code: C5
		C of O Fee:	$0.00	Comment
		Plan Review Fe	$0.00	
		State Ed Fee:	$27.84	
		Total Fee Paid:	**$27.84**	

It shall be the owners repsonsibility to schedule the following inspections a minimum of 2 business days in advance:

Field set of approved construction documents shall be available onsite during all inspections.

BUILDING PERMIT INSPECTIONS

- ☐ Footing - Prior to pouring concrete
- ☐ Deck Piers
- ☐ Backfill - Footing drains and waterproofing
- ☐ Concrete Slab - Prior to pouring concrete
- ☐ Anchor Bolts - with sill plate and prior to floor frami
- ☐ Framing
- ☐ Masonry Fireplace Throat or Chimney Thimble
- ☐ Fireblocking Draftstopping
- ☐ Insulation

PLUMBING, MECHANICAL, ELECTRICAL PERMIT INSPECTIONS

- ☐ R Plumbing and leak test
- ☑ R Electrical
- ☐ Elec Trench - with conduit installed
- ☐ Pool Bonding
- ☐ Electrical Service CRS No: 0
- ☑ R HVAC
- ☐ Gas Piping and leak test

INSPECTION REQUIRED UPON COMPLETION

- ☐ Certificate of Approval
- ☑ Certificate of Occupancy

Building Official's Approval:

ATTACHMENT 6

Site Name: Uncasville SC 2, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW PCS	1970	0	542	0	69.8	0.0000	1.0	0.00%
VZW Cellular	869	0	461	0	69.8	0.0000	0.579333333	0.00%
VZW AWS	2145	1	1750	1750	69.8	0.1292	1.0	12.92%
VZW 700	746	0	1050	0	69.8	0.0000	0.497333333	0.00%

Total Percentage of Maximum Permissible Exposure 12.92%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used.

ATTACHMENT 7

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

June 15, 2016

Via Certificate of Mailing

Ronald K. McDaniel, Mayor
Town of Montville
Montville Town Hall
310 Norwich-New London Turnpike
Uncasville, CT 06382

Re: **Proposed Telecommunications Facility at 911 Route 32 in Montville, Connecticut**

Dear Mayor McDaniel:

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 an antenna and related equipment on the existing telecommunications tower at 911 Route 32 in Montville (the "Property"). Cellco intends to install a single canister antenna at the 70-foot level on the existing tower. Equipment associated with Cellco's antenna will be located on the ground near the base of the tower.

As presented in the Sub-Petition, the proposed facility modifications 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.

14860841-v1

Robinson+Cole

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 8

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

[SAMPLE ABUTTERS LETTER]

June15, 2016

Via Certificate of Mailing

«Name_and_Address»

Re: **Proposed Telecommunications Facility at 911 Route 32 in Montville, 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 an antenna and related equipment on the existing telecommunications tower at 911 Route 32 in Montville (the "Property"). Cellco intends to install a single canister antenna at the 70-foot level on the existing tower. Equipment associated with Cellco's antenna will be located on the ground near the base of the tower.

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.

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

911 ROUTE 32
MONTVILLE, CONNECTICUT

	Property Address	Owner's and Mailing Address
1.	841 Route 32	DCO Real Estate LLC 841 Route 32 Uncasville, CT 06382
2.	855 Route 32	855 Route 32 Associates LLC c/o P&H Construction P.O. Box 164 Uncasville, CT 06382-0164
3.	867 Route 32	Jason W. Lin and Linda Howyee Fung 5 Lost Acres Road Norwich, CT 06360
4.	887 Route 32	Shoreline Branches LLC 231 Farmington Avenue Farmington, CT 06032
5.	905 Route 32	NEHOC LLC 20 Portland Reservoir Road East Hampton, CT 06424
6.	907 Route 32	907 Route 32 LLC P.O. Box 507 Uncasville, CT 06382-0507
7.	924 Route 32	Lusher LLC 924 Norwich–New London Turnpike Uncasville, CT 06370
8.	952 Route 32	Robert C. Eccleston, Jr. 135 Fellows Road Oakdale, CT 06370

	Property Address	Owner's and Mailing Address
9.	982 Route 32	State of Connecticut Department of Corrections 24 Wolcott Hill Road Wethersfield, CT 06109
10.	Route 32	Theodore T. Wisniewski, Sr. Rev. Liv. Tr. c/o Theodore T. Wisniewski, Jr. 996 Norwich-New London Turnpike Uncasville, CT 06382
11.	996 Route 32	Theodore T. Wisniewski, Sr. Rev. Liv. Tr. c/o Theodore T. Wisniewski, Jr. 996 Norwich-New London Turnpike Uncasville, CT 06382
12.	Route 32	Theodore T. Wisniewski, Sr. Rev. Liv. Tr. c/o Theodore T. Wisniewski, Jr. 996 Norwich-New London Turnpike Uncasville, CT 06382
13.	1-19 Kitemaug Road	Eleanor W. and Howard R. Beetham, Jr. 20 Kitemaug Road Uncasville, CT 06382
14.	21-23 Kitemaug Road	Lisa and Mark E. Cloutier and Kathy J. Cloutier 32 Kitemaug Road Uncasville, CT 06382
15.	51 Kitemaug Road	Dorothy and Howard W. Lamphere 51 Kitemaug Road Uncasville, CT 06382
16.	59 Kitemaug Road	Susan, Gabriel, Lyle and Gerald Dagenais 59 Kitemaug Road Uncasville, CT 06382
17.	65 Kitemaug Road	Amy C. Montgomery, Killian Ferrar and Robert G. and Dorithia Montgomery 65 Kitemaug Road Uncasville, CT 06382
18.	67 Kitemaug Road	Brent S. Ali 5 Glenn Road Uncasville, CT 06382

	Property Address	Owner's and Mailing Address
19.	75 Kitemaug Road	Jayne L. and Adam Paradis 75 Kitemaug Road Uncasville, CT 06382
20.	77 Kitemaug Road	Ronald Adams 904 Carolina Avenue St. Cloud, FL 34769-3417
21.	79 Kitemaug Road	Janis Pike 79 Kitemaug Road Uncasville, CT 06382
22.	81 Kitemaug Road	Wei Huang 81 Kitemaug Road Uncasville, CT 06382
23.	83 Kitemaug Road	Cynthia S. and Walter Wohlfert 48 Parrish Road Rocky Hill, CT 06067
24.	87 Kitemaug Road	Ronald Pike 87 Kitemaug Road Uncasville, CT 06382
25.	89 Kitemaug Road	Ann Marie Davis 89 Kitemaug Road Uncasville, CT 06382
26.	93 Kitemaug Road	Grace Button 93 Kitemaug Road Uncasville, CT 06382
27.	95 Kitemaug Road	Donna J. Daniels 95 Kitemaug Road Uncasville, CT 06382
28.	Kitemaug Road	Sharon S. Killingsworth 101 Kitemaug Road Uncasville, CT 06382