Robinson+Cole

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Also admitted in Massachusetts

July 24, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
144 Old Boston Post Road, Danbury, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains ten (10) wireless telecommunications antennas at the top of the existing 65-foot tower at 144 Old Boston Post Road in Danbury, Connecticut (the "Property"). The tower and Property are owned by AT&T. The Council approved Cellco's use of this tower in 2000. Cellco now intends to modify its facility by replacing four (4) of existing antennas with two (2) BXA-171063-12BF, 1900 MHz antennas and two (2) model BXA-171063-12BF, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to install two (2) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mark D. Boughton, Mayor for the City of Danbury.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new antennas and RRHs will be installed at the top of the existing 65-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included behind Attachment 2. The Far Field calculations demonstrate that Cellco's modified facility will operate well within the RF emissions safety limits established by the FCC.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
    Mark D. Boughton, Danbury Mayor
    Sandy M. Carter

ATTACHMENT 1

1710-2170 MHz

Amphenol
ANTENNA SOLUTIONS

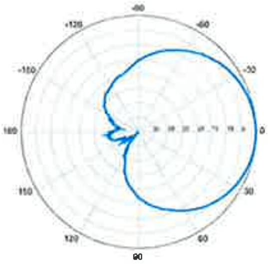
BXA-171063-12BF-EDIN-X

Replace "X" with desired electrical downtilt

X-Pol | FET Panel | 63° | 19.0 dBi

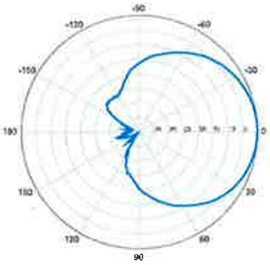
Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 4, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1842 x 154 x 105 mm		72.5 x 6.1 x 4.1 in
Depth with z-brackets	133 mm		5.2 in
Weight without mounting brackets	5.8 kg		12.8 lbs
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m² Side: 0.19 m²		Front: 3.1 ft² Side: 2.1 ft²
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N		Front: 103 lbf Side: 68 lbf
Mounting Options	**Part Number**	**Fits Pipe Diameter**	**Weight**
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12BF-EDIN-X-FP		

BXA-171063-12BF-EDIN-X



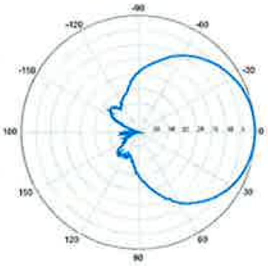
Horizontal | 1710-1880 MHz

BXA-171063-12BF-EDIN-X



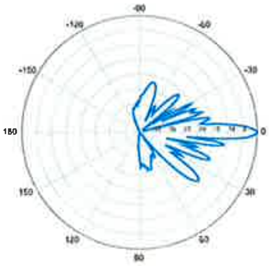
Horizontal | 1850-1990 MHz

BXA-171063-12BF-EDIN-X



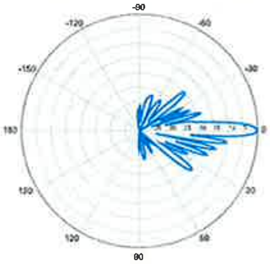
Horizontal | 1920-2170 MHz

BXA-171063-12BF-EDIN-0



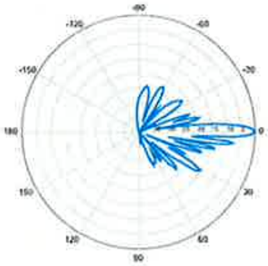
0° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-0

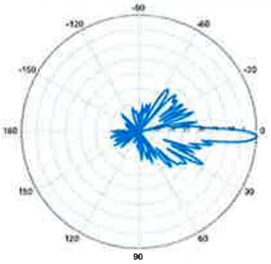


0° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-X

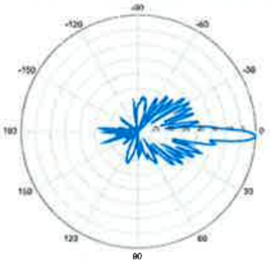
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12BF-EDIN-2



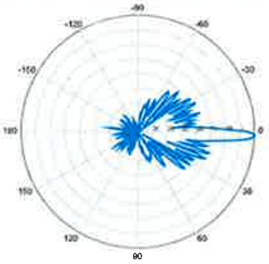
2° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-2



2° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-4

Pattern Available Soon

4° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-4

Pattern Available Soon

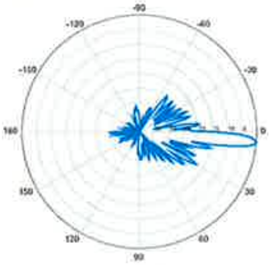
4° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-4

Pattern Available Soon

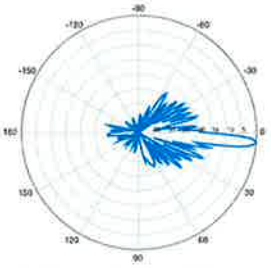
4° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-5



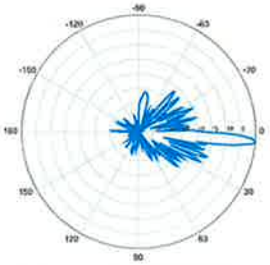
5° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-5



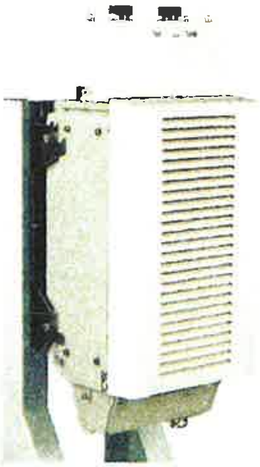
5° | Vertical | 1920-2170 MHz

Alcatel·Lucent

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



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

The Alcatel-Lucent RRH2x40-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. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

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

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

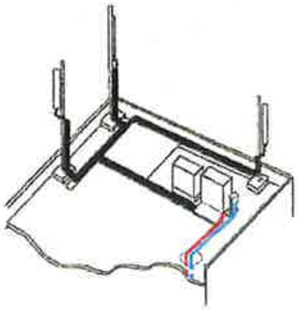
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

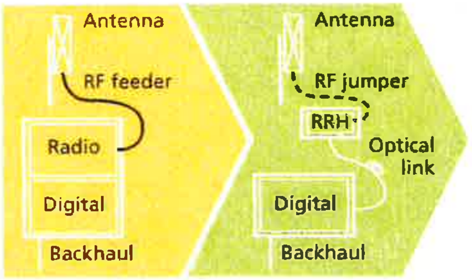
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

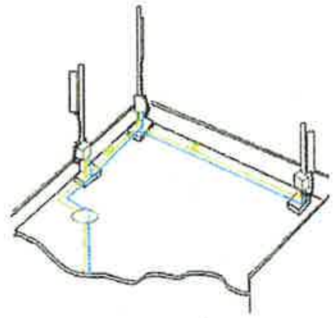
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

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

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - Single mode dual fiber (SM/DF)
- Multi-mode variant
  - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

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

Digital Ports and Alarms

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

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

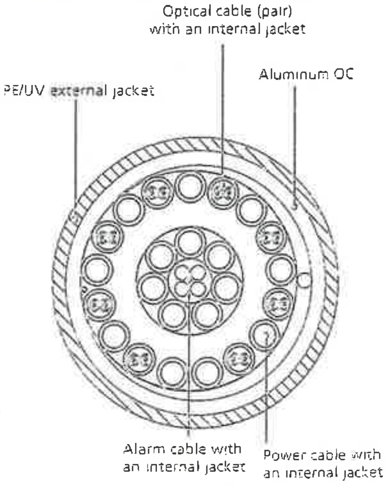


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Far Field Approximation
with downtilt variation

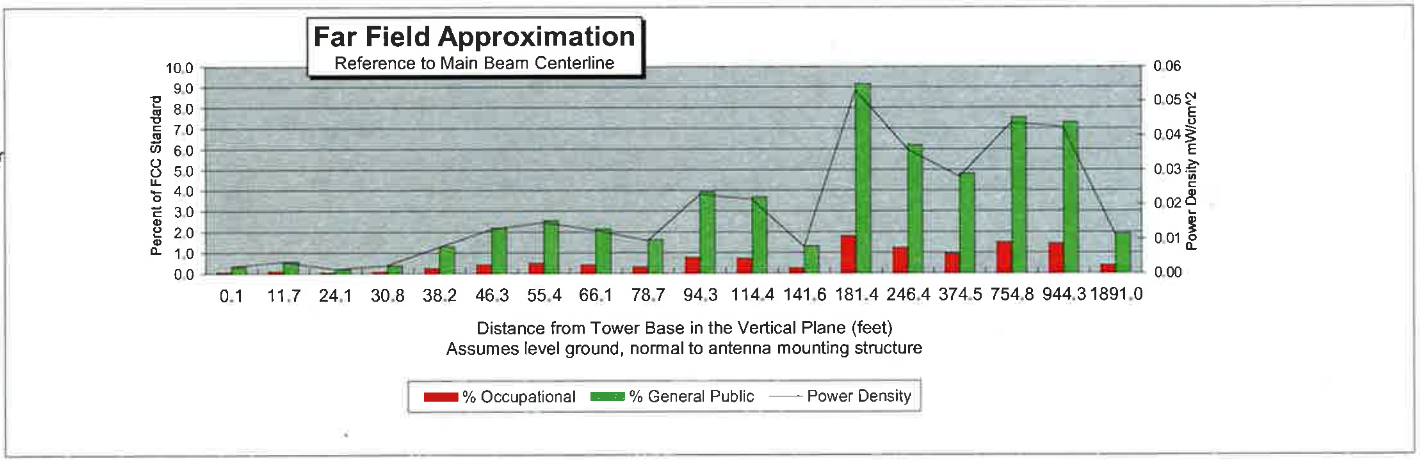
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Danbury South, CT
Site #:	5-0169
Date:	07/15/14
Name:	Ryan Ulanday
File Name:	Danbury South, CT - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**69.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3915.0**



This approximation is only valid in the far field, which begins at: 64.4 Feet

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	66.0	67.0	70.3	72.8	76.2	80.6	86.2	93.4	102.7	115.1	132.1	156.2	193.1	255.1	380.3	757.6	946.6	1892.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	11.7	24.1	30.8	38.2	46.3	55.4	66.1	78.7	94.3	114.4	141.6	181.4	246.4	374.5	754.8	944.3	1891.0	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.05	0.04	0.03	0.04	0.04	0.01	#NUM!
Percent of Occupational Standard	0.1	0.1	0.0	0.1	0.3	0.4	0.5	0.4	0.3	0.8	0.7	0.3	1.8	1.2	1.0	1.5	1.5	0.4	#NUM!
Percent of General Population Standard	0.3	0.6	0.2	0.4	1.3	2.2	2.5	2.2	1.6	3.9	3.7	1.3	9.2	6.2	4.8	7.5	7.3	1.9	#NUM!

Antenna Type	DB846F65ZAXY
Max%	9.15%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 P
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

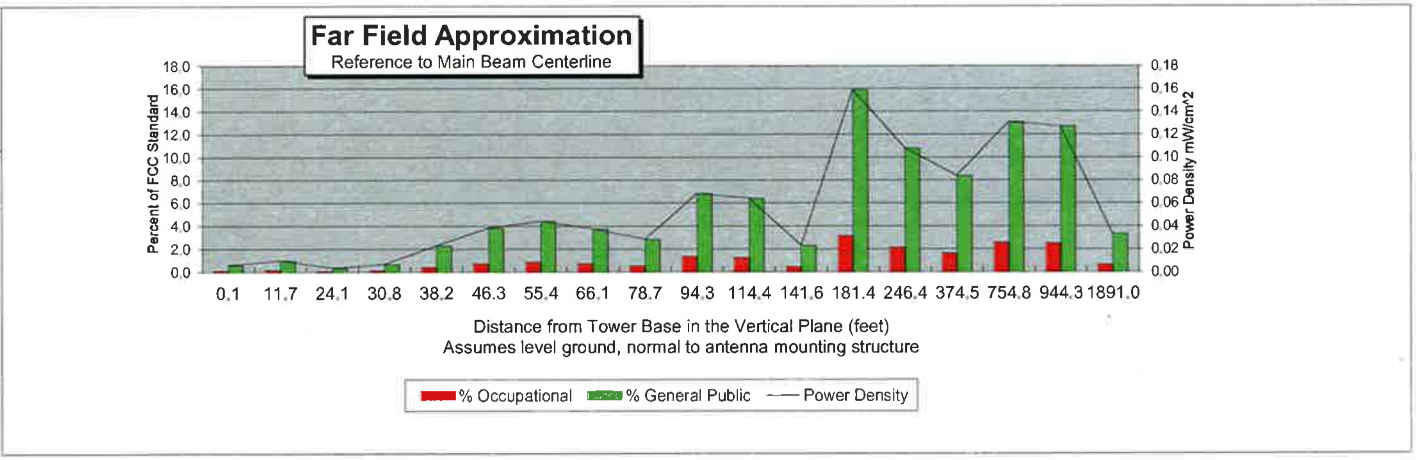
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Danbury South, CT
Site #:	5-0169
Date:	07/15/14
Name:	Ryan Ulanday
File Name:	Danbury South, CT - FF Power

Operating Freq. (MHz)	1971.0
Antenna Height (ft):	69.0
Antenna Gain (dBi):	18.7
Antenna Size (in.):	72.4
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	7410.0



This approximation is only valid in the far field, which begins at: 65.2 Feet

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	66.0	67.0	70.3	72.8	76.2	80.6	86.2	93.4	102.7	115.1	132.1	156.2	193.1	255.1	380.3	757.6	946.6	1892.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	11.7	24.1	30.8	38.2	46.3	55.4	66.1	78.7	94.3	114.4	141.6	181.4	246.4	374.5	754.8	944.3	1891.0	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.01	0.01	0.00	0.01	0.02	0.04	0.04	0.04	0.03	0.07	0.06	0.02	0.16	0.11	0.08	0.13	0.13	0.03	#NUM!
Percent of Occupational Standard	0.1	0.2	0.1	0.1	0.5	0.8	0.9	0.7	0.6	1.4	1.3	0.5	3.2	2.2	1.7	2.6	2.5	0.7	#NUM!
Percent of General Population Standard	0.6	1.0	0.3	0.7	2.3	3.8	4.4	3.7	2.8	6.8	6.4	2.3	15.9	10.8	8.4	13.1	12.7	3.3	#NUM!

Antenna Type	BXA-171063-12CF
Max%	15.91%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 P
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

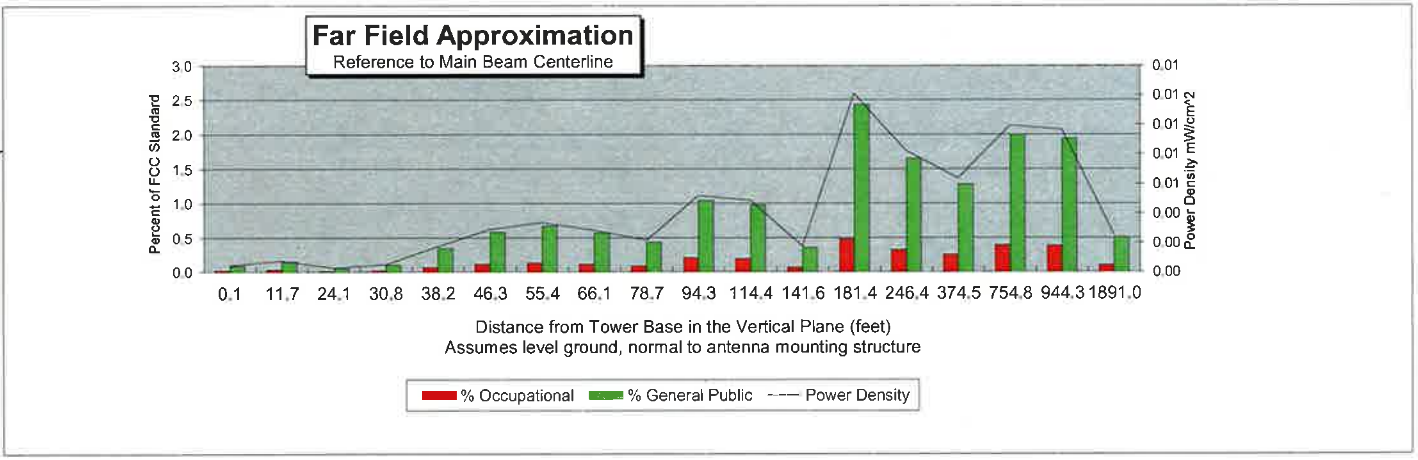
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Danbury South, CT
Site #:	5-0169
Date:	07/15/14
Name:	Ryan Ulanday
File Name:	Danbury South, CT - FF Power

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**69.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**71.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**892.0**



This approximation is only valid in the far field, which begins at: 62.6 Feet

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	66.0	67.0	70.3	72.8	76.2	80.6	86.2	93.4	102.7	115.1	132.1	156.2	193.1	255.1	380.3	757.6	946.6	1892.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	11.7	24.1	30.8	38.2	46.3	55.4	66.1	78.7	94.3	114.4	141.6	181.4	246.4	374.5	754.8	944.3	1891.0	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.3	0.3	0.4	0.4	0.1	#NUM!
Percent of General Population Standard	0.1	0.1	0.1	0.1	0.3	0.6	0.7	0.6	0.4	1.0	1.0	0.4	2.4	1.6	1.3	2.0	1.9	0.5	#NUM!

Antenna Type	BXA-70063-6CF
Max%	2.43%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

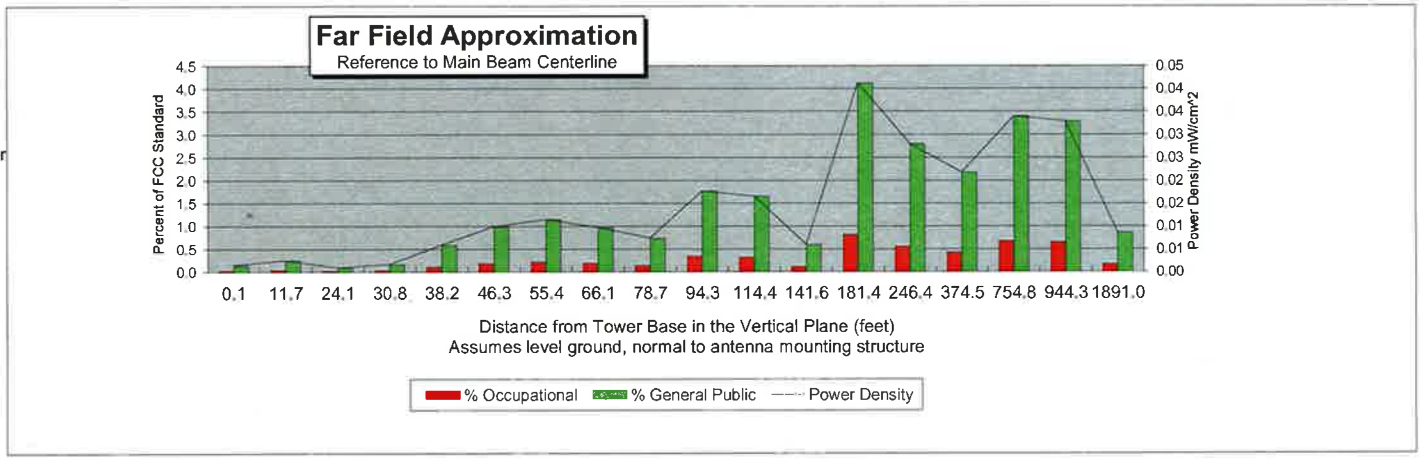
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Danbury South, CT
Site #:	5-0169
Date:	07/15/14
Name:	Ryan Ulanday
File Name:	Danbury South, CT - FF Power

Operating Freq. (MHz)	2110.0
Antenna Height (ft):	69.0
Antenna Gain (dBi):	19.1
Antenna Size (in.):	72.4
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	1750.0



This approximation is only valid in the far field, which begins at: 65.2 Feet

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	66.0	67.0	70.3	72.8	76.2	80.6	86.2	93.4	102.7	115.1	132.1	156.2	193.1	255.1	380.3	757.6	946.6	1892.1	
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Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.04	0.03	0.02	0.03	0.03	0.01	#NUM!
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.4	0.3	0.1	0.8	0.6	0.4	0.7	0.7	0.2	#NUM!
Percent of General Population Standard	0.1	0.3	0.1	0.2	0.6	1.0	1.1	1.0	0.7	1.8	1.7	0.6	4.1	2.8	2.2	3.4	3.3	0.9	#NUM!

Antenna Type	BXA-171063-12CF
Max%	4.12%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 P
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 3

AT&T Towers
2300 Northlake Center Dr., Ste 40
Tucker GA 30084
404-532-5800
Wednesday, June 04, 2014

FDH Engineering, Inc.
6521 Meridien Dr.
Raleigh, NC 27616
919-755-1012

STRUCTURAL ANALYSIS
65' SST

AT&T DESIGNATION:
Site USID: SNET005-A
Site FA: 10137472
Site Name: Danbury
Project Number: 1466U11400
Carrier Project: 3_Wireline Verizon Modification 12-13-13

ANALYSIS CRITERIA:
TIA/EIA-222-F
Codes: 2005 Connecticut Building Code

SITE DATA:
144 Old Boston Post Road, Danbury, CT 6810, Fairfield County
Latitude 41° 21' 34.22" N, Longitude 73° 27' 55.68" W
Market: NYC/NNJ
65' SST

Mr. Marty Jelleme

FDH Engineering Inc. is pleased to submit this Structural Analysis Report to determine the structural integrity of the aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	89.30%	Pass
Foundation Ratio with Proposed Equipment:	93.80%	Pass

We at FDH Engineering Inc. appreciate the opportunity of providing our continuing professional services to you and AT&T Towers. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully Submitted by: Mark S. Girgis, EI

Analysis Prepared by: Mark S. Girgis, EI

Analysis Reviewed by: Bradley R. Newman, PE

28630

6/4/14

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except under written agreement

FDH Engineering, Inc., 6521 Meridien Drive, Raleigh, NC 27616, Ph. 919.755.1012, Fax 919.755.1031

Structural Analysis for
AT&T Towers

65' Self-Support Tower

Site Name: Danbury
Site USID: SNET005-A
Site FA#: 10137472
Carrier Project: 3_Wireline Verizon Modification 12-13-13

FDH Project Number 1466U11400

Analysis Results

Tower Components	89.3%	Sufficient
Foundation	93.8%	Sufficient

Prepared By:

Mark S. Girgis

Mark S. Girgis, EI
Project Engineer

Reviewed By:

Bradley R. Newman, PE
Senior Project Engineer
CT PE License No. 29630

BRADLEY R. NEWMAN
29630
6/4/14

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com

June 4, 2014

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut Building Code

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of AT&T Towers, FDH Engineering, Inc. performed a structural analysis of the existing self-supported tower located in Danbury, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F* and the *2005 Connecticut Building Code (CBC)*. Information pertaining to the existing/proposed antenna loading, current tower geometry, the member sizes, soil parameters and foundation dimensions was obtained from:

- ☐ FDH, Inc. (Job No. 11-07130T T1) Self-Support Tower Mapping Report dated August 23, 2011
- ☐ FDH Engineering, Inc. (Project No. 11-07110E N1) Dispersive Wave Propagation Testing of an Existing Tower Foundation dated August 23, 2011
- ☐ FDH Engineering, Inc. (Project No. 11-07110E G1) Geotechnical Evaluation of Subsurface Conditions dated August 24, 2011
- ☐ FDH Engineering, Inc. (Project No. 12-03174E S1) Modification Drawings for a 65' Self-Support Tower dated March 16, 2012
- ☐ Hudson Design Group, LLC (Project No. CT2133) Final Report of Special Inspection dated January 11, 2013
- ☐ All documents and photos acquired from AT&T Siterra
- ☐ AT&T Towers

The *basic design wind speed* per the *TIA/EIA-222-F* standards is 85 mph without ice and 38 mph with 1/2" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from Verizon in place at 69 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and the *2005 CBC* provided the **Recommendations** listed below are satisfied. Furthermore, given the existing foundation dimensions (see FDH Project No. 11-07110E N1), and given soil parameters (see FDH Project No. 11-07110E G1), the foundation should have the necessary capacity to support the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards and the *2005 CBC* are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed feed line must be installed adjacent to Verizon's existing feed lines.
2. RRU/RRH Stipulation: The equipment may be installed in any arrangement as determined by the client.

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 1 - Material Strength

Member Type	Yield Strength
Legs	36 ksi (Assumed)
Bracing	36 ksi (Assumed)

Table 2 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 3** displays the maximum foundation reactions. **Table 4** displays the maximum antenna rotations at service wind speed (dishes only).

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

Table 2 - Summary of Working Percentage of Structural Components

Section No.	Elevation (ft)	Component Type	Size	% Capacity*	Pass Fail
T1	65 - 50.1042	Leg	15.5"Ø x 0.260 8-Sided Polygon	36.1	Pass
		Top Girt	12.45"Ø x 0.265 8-Sided Polygon	39.9	Pass
T2	50.1042 - 48.1042	Leg	15.5"Ø x 0.260 8-Sided Polygon	52.3	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	76.3	Pass
T3	48.1042 - 25.1667	Leg	15.5"Ø x 0.260 8-Sided Polygon	75.0	Pass
		Horizontal	W10x26	89.3	Pass
T4	25.1667 - 0	Leg	15.5"Ø x 0.260 8-Sided Polygon	18.4	Pass
		Diagonal	W6x25	23.6 38.1 (b)	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	0.7 1.1 (b)	Pass

*Capacities include 1/3 allowable increase for wind per *TIA/EIA-222-F* standards.

Table 3 - Maximum Base Reactions

Load Type	Direction	Current Analysis* *(TIA/EIA-222-F)*
Individual Foundation	Horizontal	21 k
	Uplift	80 k
	Compression	101 k
Overturning Moment	---	1,180 k-ft

*Foundation adequate per independent analysis.

Table 4 - Maximum Antenna Rotations at Service Wind Speeds (Dishes Only)

Centerline Elevation (ft)	Antenna	Tilt* (deg)	Twist* (deg)
60.5	(1) 6' Dish	0.0134	0.1060
57.5	(1) Radiowaves SPD2-5.8	0.0134	0.1011
57	(1) 6' Dish	0.0133	0.1002
46.5	(1) Gabriel PRFTV-48/75	0.0125	0.0780

*Allowable tilt and twist values to be determined by the carrier

GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of AT&T Towers to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

APPENDIX

Tower Analysis Summary Form

General Info

Site Name	Danbury
Site Number	5NET005-A
FA Number	10137472
Date of Analysis	8/4/2014
Company Performing Analysis	FDH Engineering, Inc.

Tower Info	Description	Date
Tower Type (G, SST, MP)	SST	
Tower Height (top of steel AGL)	65'	
Tower Manufacturer	N/A	
Tower Model	N/A	
Tower Design	N/A	
Foundation Design	N/A	
Geotech Report	FDH Engineering, Inc.	8/24/2011
Tower Mapping	FDH Engineering, Inc.	8/17/2011
Previous Structural Analysis	FDH Engineering, Inc.	3/16/2012
Foundation Mapping	FDH Engineering, Inc.	8/23/2011

Steel Yield Strength (ksi)

Tower Legs	36 (assumed)
Bracing	36 (assumed)

Design Parameters

Design Code Used	TIA/EIA-222-F 2005 CBC
Location of Tower (County, State)	Fairfield, CT
Basic Wind Speed (mph)	85
Ice Thickness (in)	0.5

Analysis Results (% Maximum Usage)

Existing/Reserved + Future + Proposed Condition	
Tower (%)	80.3%
Base Plate (%)	N/A
Foundation (%)	93.5%
Foundation Adequate?	Yes

Analysis Results (% Maximum Usage)

Existing/Reserved	
Tower (%)	66.0%
Base Plate (%)	N/A
Foundation (%)	94.0%
Foundation Adequate?	Yes

Analysis Results (% Maximum Usage)

Existing/Reserved + Proposed Condition	
Tower (%)	89.3%
Base Plate (%)	N/A
Foundation (%)	93.8%
Foundation Adequate?	Yes

Existing / Reserved Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
AT&T	62.5	64	6	Panel	Powerwave	7770	20, 140, 260	3		8.3' Face Mount T-Frames	12	Coax	1-5/8"	Face C
AT&T	62.5	64	6	Diplexer	Powerwave	LGP17210					1	Fiber	3/8"	Face C
AT&T	62.5	64	3	Panel	Powerwave	P65-16-XLH-RR	20, 140, 270							
AT&T	62.5	64	6	RRH	Ericsson	RBS 6000								
AT&T	62.5	64	6	TMA	Powerwave	TT08-19DB111-001								
AT&T	62.5	64	1	Surge Sup	Raycap	DC6-48-60-18-8F								
AT&T	62.5	64	1	GPS		GPS								
Verizon	72	73.5	1	GPS	N/A	GPS		1		Pipe Mount	1	Coax	1/2"	Face C
Verizon	66.5	69	2	Panel	Antel	BXA-70063/6CF	195, 280, 320	2		14.5' I-Beam Mounts	12	Coax	1 5/8"	Face C
Verizon	66.5	69	4	Panel	Decibel	DB846F65ZAXY	105, 280, 320							
Verizon*	66.5	69	4	Panel	Antel	LPA-185063/12CF	195, 280, 320							
N/A	68	72.6	1	Yagi	Antenex	5-Element Yagi		1		Pipe Mount	1	Coax	3/8	Face C
State Police	61.5	60.5	1	Dish	RFS	6'		1		Pipe Mount	1	Coax	WE65	Face C
State Police	58	67	1	Dish	RFS	6'		1		Pipe Mount	1	Coax	WE65	Face C
N/A	58							1		Pipe Mount				
N/A	57.5	65	1	Omni	TX/RX	15.5' x 3.5"		1		2' Standoff	1	Coax	1-1/4"	Face C
N/A	56.5	55	1	Dipole	N/A	9.5' x 1.75"		1		Pipe Mount	1	Coax	1/2"	Face C
N/A	56.5	59	1	TMA	Adtran	13" x 10.5" x 3.5"		1		Pipe Mount	1	Coax	1/2"	Face C
N/A	56.5	57.5	1	Dish	Radiowaves	SPD2-5.8		1						
N/A	60							1		Pipe Mount				
N/A	54.5	65	1	Omni	Telewave	21' x 2.5"		1		5' Standoff	1	Coax	1/2"	Face C
N/A	52.5	57.5	1	Omni	N/A	7.25' x 0.95"		1		Pipe Mount				
N/A	52.6							1		Pipe Mount				
N/A	52.5	55.5	1	Dipole	Telewave	10' x 1.8"		1		Pipe Mount	1	Coax	1/2"	Face C
N/A	52.5	55	1	Yagi	N/A	5-Element Yagi		1		Pipe Mount	1	Coax	1/2"	Face C
State Police	51.5	59.5	1	Omni	TX/RX	9.25' x 3.5"		1		0.5' I-Beam Standoff	2	Coax	1-5/8"	Face C
State Police	51.5	46.5	1	Dipole	Telewave	10' x 1.8"		1			2	Coax	7/8"	Face C
State Police	51.5	59.5	1	Omni	Decibel	10' x 3"		1		9.5' I-Beam Standoff	1	Coax	1-5/8"	Face C
State Police	51.5	57.5	1	Omni	Antel	11.5' x 2.5"		1			1	Coax	1-1/4"	Face C
State Police	51.5	51.5	1	TMA	N/A	20" x 18" x 7.25"		1			2	Coax	3/8"	Face C
State Police	51.5	45.5	1	Omni	Decibel	10' x 3"		1			1	Coax	1-5/8"	Face C
N/A	51.5							1		10.5' I-Beam Standoff				
N/A	50.5	45.5	1	Omni	Decibel	10' x 3"		1		6.5' Standoff	1	Coax	1-1/4"	Face C
N/A	50.5							2		15" Standoffs				
N/A	50.5	46	1	Omni	Decibel	DB536NS-C Omni		1		6.5' Standoff	1	Coax	1-1/4"	Face C
Skytel	50.5	52.5	1	TMA	N/A	20.5" x 6.75" x 4.5"		1		15" Standoff	1	Coax	1/2"	Face C
Skytel	50.5	43.5	1	Omni	Scala	11" x 2"		1						
N/A	40.5	40.5	1	Dish	Scala	PRFTV-45/75 Grid		1		5' Standoff	1	C	1/2"	Face C

*Verizon will removed (4) Antel LPA-185063/12CF panels prior to the installation of the proposed equipment

Proposed Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
Verizon	66.5	69	4	Panel	Antel	BXA-171063-12BF	40				1	HB158-1-08U8	1-5/8"	Face C
Verizon	66.5	69	2	RRH	Alcatel Lucent	RRH2X40-AWS								
Verizon	66.5	69	1	Box	RFS	DB-T1-6Z-8AB-0Z								

Note: The proposed loading will be installed in addition to the remaining existing loading.

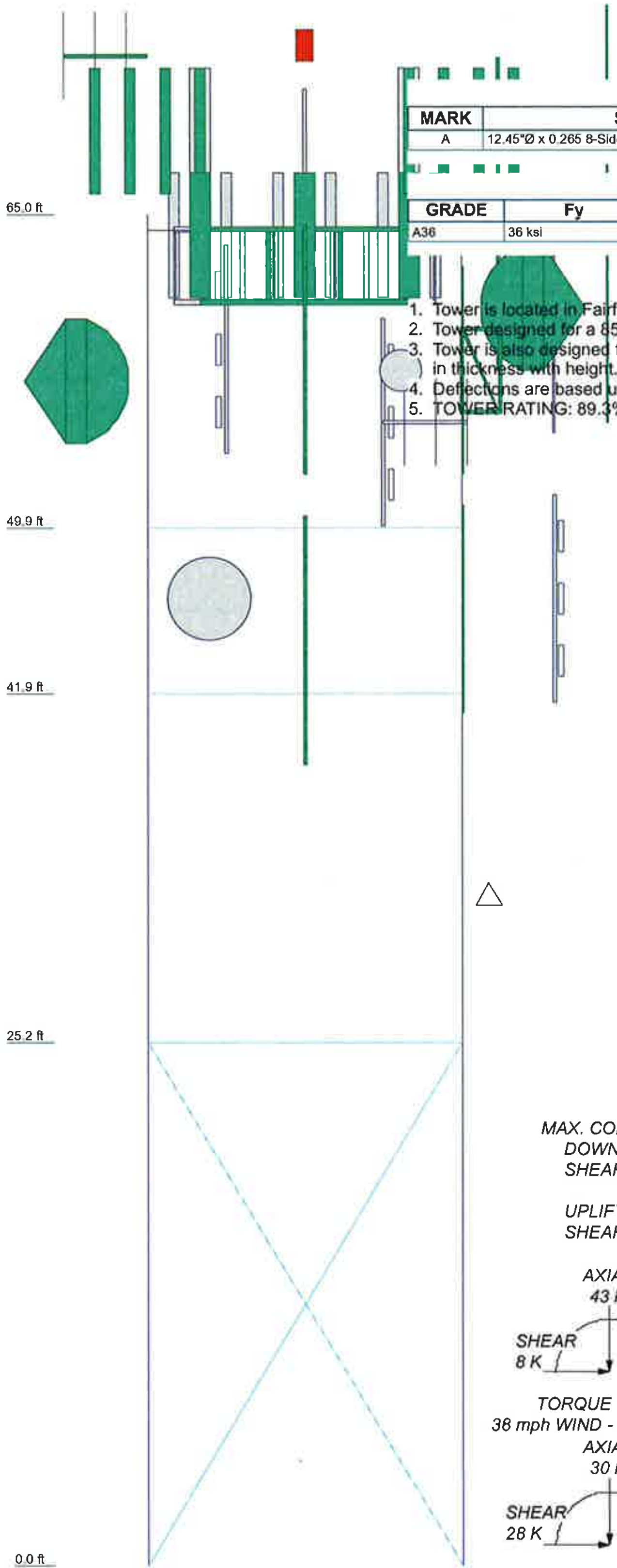
Future Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face

NOTE: THIS FORM MUST BE SAVED AS EXCEL 97-2003 TO UPLOAD IN SITERRA

Section	T1	T2	T3	T4
Legs	15.5"Ø x 0.260 8-Sided Polygon			
Leg Grade	A36			
Diagonals	N.A			W6x25
Diagonal Grade	N.A			A36
Top Girts	12.45"Ø x 0.265 8-Sided Polygon	N.A		
Horizontals	N.A	A	W10x30	12.45"Ø x 0.265 8-Sided Polygon
Face Width (ft)	15.0313			
# Panels @ (ft)	1 @ 14.2812	1 @ 8	1 @ 16.7604	1 @ 25.1667
Weight (K)	3.7	2.7	3.6	9.4

19.4



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	12.45"Ø x 0.265 8-Sided Polygon		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 89.3%

MAX. CORNER REACTIONS AT BASE:
DOWN: 101 K
SHEAR: 21 K

UPLIFT: -80 K
SHEAR: 17 K

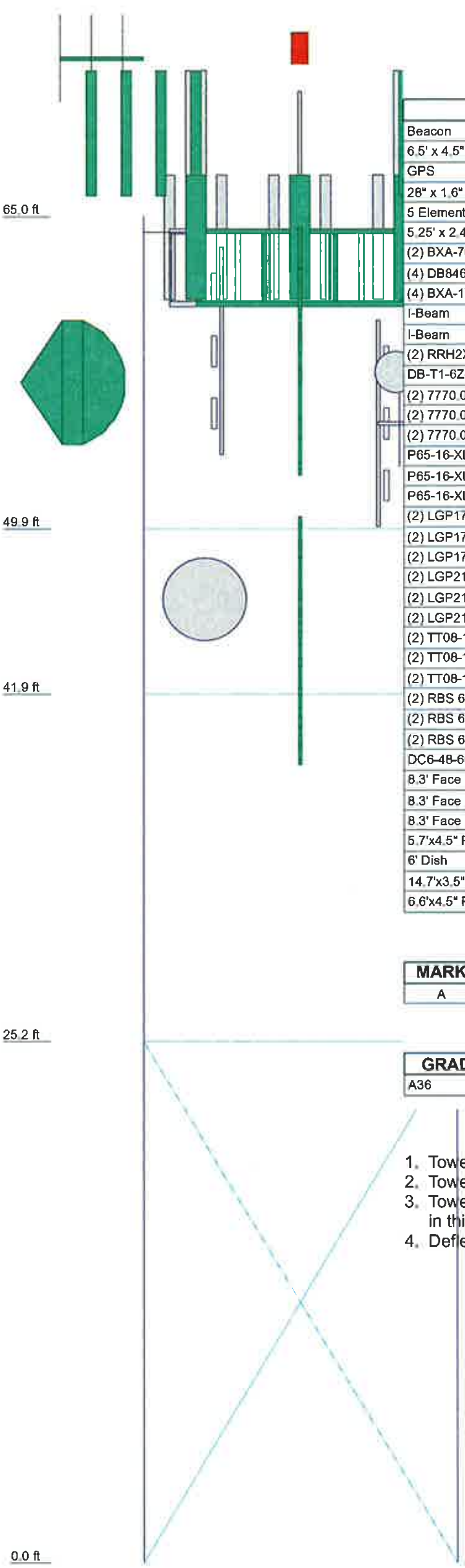
AXIAL
43 K
SHEAR
8 K
MOMENT
344 kip-ft
TORQUE 11 kip-ft
38 mph WIND - 0.5000 in ICE

AXIAL
30 K
SHEAR
28 K
MOMENT
1180 kip-ft
TORQUE 44 kip-ft
REACTIONS - 85 mph WIND

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
Phone: (919) 755-1012
FAX: (919) 755-1031

Job: **Danbury, SNET005-A/FA# 10137472**		
Project: **1466U11400**		
Client: AT&T Towers	Drawn by: Mark S. Girgis	App'd:
Code: TIA/EIA-222-F	Date: 06/04/14	Scale: NTS
Path:		Dwg No. E-1

Section	T1	T2	T3	T4	
Legs	15.5"Ø x 0.260 8-Sided Polygon				
Leg Grade	A36				
Diagonals	N.A			W6x25	
Diagonal Grade	N.A			A36	
Top Girts	12.45"Ø x 0.265 8-Sided Polygon	N.A			
Horizontals	N.A	A	W10x30	12.45"Ø x 0.265 8-Sided Polygon	
Face Width (ft)	15.0313				
# Panels @ (ft)	1 @ 14.2812	1 @ 8	1 @ 16.7604	1 @ 25.1667	
Weight (K)	3.7	2.7	3.6	9.4	19.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon	65	6' Dish	58
6.5' x 4.5" Pipe Mount	65	2' Standoff	57.5
GPS	65	15.5'x3.5" Omni	57.5
28" x 1.6" Pipe Mount	65	14.5x1.9" Pipe Mount	56.5
5 Element (38" x 13.5") Yagi	65	16'x3.5" Pipe Mount	56.5
5.25' x 2.4" Pipe Mount	65	13"x10.5"x3.5" TMA	56.5
(2) BXA-70063/6CF w/ Mount Pipe	65	9.5'x1.75" 4-Element Dipole	56.5
(4) DB846F65ZAXY w/Mount Pipe	65	SPD2-5.8	56.5
(4) BXA-171063-12BF w/ Mount Pipe	65	7.7'x1.6" Pipe Mount	56
I-Beam	65	21'x2.5" Omni	54.5
I-Beam	65	8' Standoff	54.5
(2) RRH2X40-AWS	65	5'x2.4" Pipe Mount	52.5
DB-T1-6Z-8AB-0Z	65	10'x1.6" Omni	52.5
(2) 7770.00 w/Mount Pipe	62.5	5-Element (80.5"x3.7") Yagi	52.5
(2) 7770.00 w/Mount Pipe	62.5	4-Element (10'x1.6") Dipole	52.5
(2) 7770.00 w/Mount Pipe	62.5	7.25'x0.95" Omni	52.5
P65-16-XLH-RR w/ Mount Pipe	62.5	(2) 5'x2.4" Pipe Mount	52.5
P65-16-XLH-RR w/ Mount Pipe	62.5	5'x2.4" Pipe Mount	52.5
P65-16-XLH-RR w/ Mount Pipe	62.5	10.5' I-Beam Standoff	51.5
(2) LGP17210 Diplexer	62.5	4'x2.4" Pipe Mount	51.5
(2) LGP17210 Diplexer	62.5	11.5'x2.5" Omni	51.5
(2) LGP17210 Diplexer	62.5	10'x3" Omni	51.5
(2) LGP21401 TMA	62.5	20"x16"x7.25" TMA	51.5
(2) LGP21401 TMA	62.5	10'x3" Omni	51.5
(2) LGP21401 TMA	62.5	9.5' I-Beam Standoff	51.5
(2) TT08-19DB111-001 TMA	62.5	9.25'x3.5" Omni	51.5
(2) TT08-19DB111-001 TMA	62.5	4-Element (10'x1.6") Dipole	51.5
(2) TT08-19DB111-001 TMA	62.5	6.5' I-Beam Standoff	51.5
(2) RBS 6000 RRH	62.5	15" Standoff	50.5
(2) RBS 6000 RRH	62.5	DB636NS-C	50.5
(2) RBS 6000 RRH	62.5	6.5' Standoff	50.5
DC6-48-60-18-8F	62.5	11'x2" Omni	50.5
8.3' Face Mounted T-Frame	62.5	15" Standoff	50.5
8.3' Face Mounted T-Frame	62.5	20.5"x6.75"x4.5" TMA	50.5
8.3' Face Mounted T-Frame	62.5	10'x3" Omni	50.5
5.7'x4.5" Pipe Mount	61.5	6.5' Standoff	50.5
6' Dish	61.5	15" Standoff	50.5
14.7'x3.5" Pipe Mount	58	5' Standoff Mnt	46.5
6.6'x4.5" Pipe Mount	58	PRFTV-48/75 Grid Dish	46.5

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	12.45"Ø x 0.265 8-Sided Polygon		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.

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Project: **1466U11400**		
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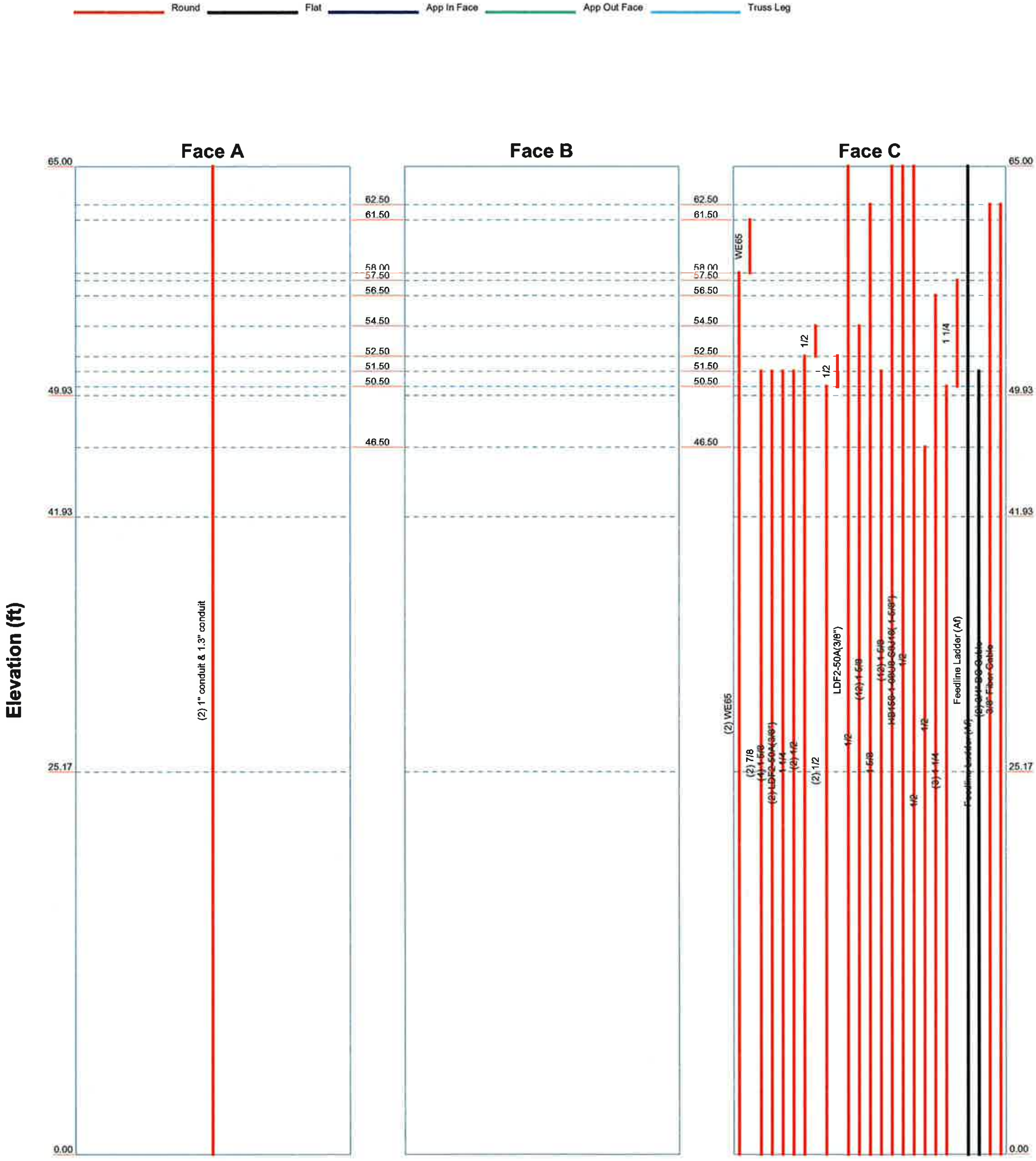
Code: TIA/EIA-222-F	Date: 06/04/14	Scale: NTS
Path:		Dwg No. E-1

Feed Line Distribution Chart
0' - 65'



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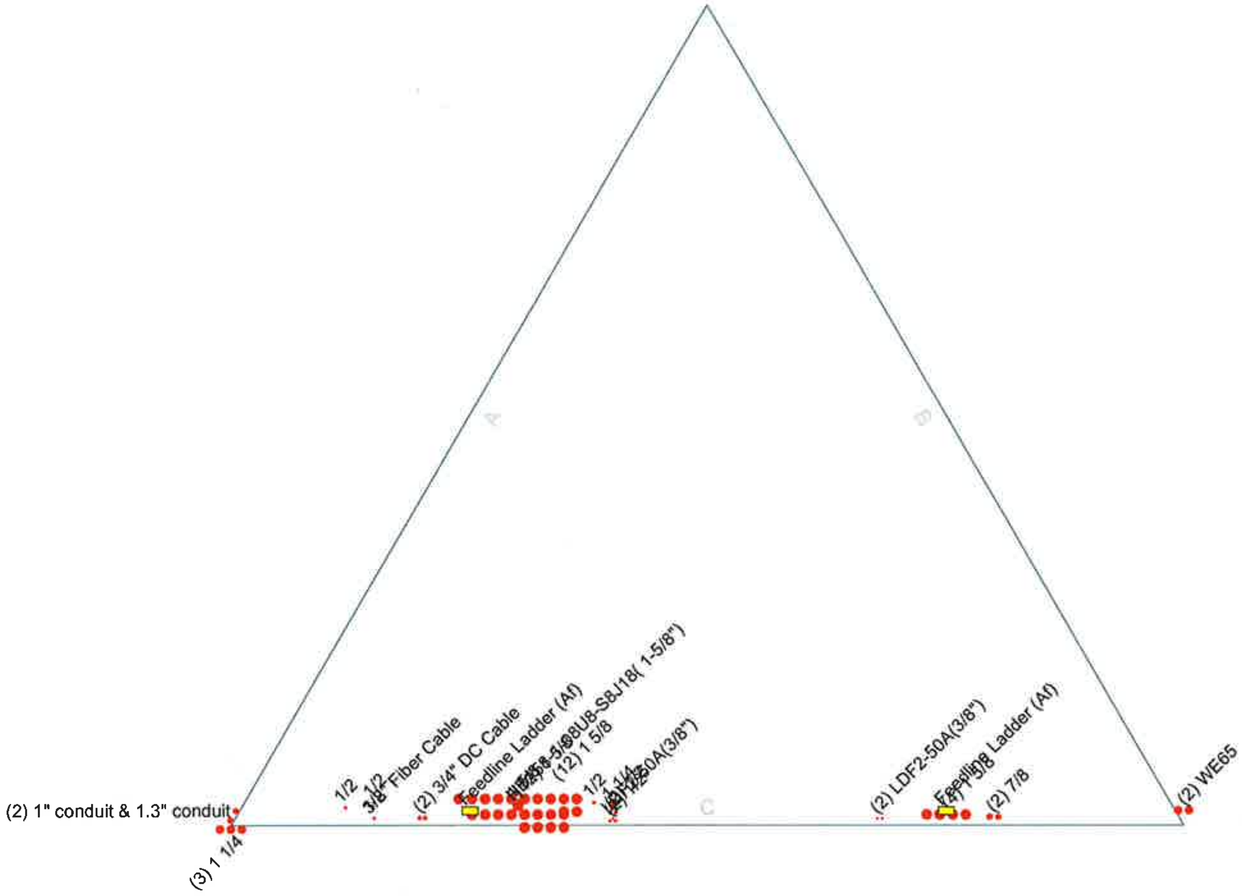
	Project: **1466U11400**		
	Client: AT&T Towers	Drawn by: Mark S. Girgis	App'd:
	Code: TIA/EIA-222-F	Date: 06/04/14	Scale: NTS
	Path:		Dwg No. E-7

Feed Line Plan

Round Flat App In Face App Out Face



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Client: AT&T Towers
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App'd:
Code: TIA/EIA-222-F
Date: 06/04/14
Scale: NTS
Path:
Dwg No. E-7

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 65.00 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 15.03 ft at the top and 15.03 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
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

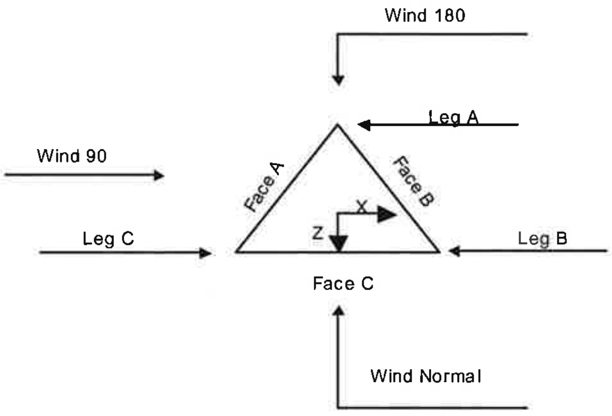
Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
√ Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Use TIA-222-G Tension Splice Capacity Exemption

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
√ SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
√ Include Angle Block Shear Check

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	65.00-49.93			15.03	1	15.07
T2	49.93-41.93			15.03	1	8.00
T3	41.93-25.17			15.03	1	16.76
T4	25.17-0.00			15.03	1	25.17

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	65.00-49.93	14.28	X Brace	No	Yes	9.5000	0.0000
T2	49.93-41.93	8.00	X Brace	No	Yes	0.0000	0.0000
T3	41.93-25.17	16.76	X Brace	No	Yes	0.0000	0.0000
T4	25.17-0.00	25.17	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 65.00-49.93	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T2 49.93-41.93	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T3 41.93-25.17	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Wide Flange		A36 (36 ksi)
T4 25.17-0.00	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Wide Flange	W6x25	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*No. of Mid Girts*	*Mid Girt Type*	*Mid Girt Size*	*Mid Girt Grade*	*Horizontal Type*	*Horizontal Size*	*Horizontal Grade*
T1 65.00-49.93	None	Flat Bar		A36 (36 ksi)	Arbitrary Shape	12.45"Ø x 0.265 8-Sided Polygon	A36 (36 ksi)
T2 49.93-41.93	None	Flat Bar		A36 (36 ksi)	Arbitrary Shape	12.45"Ø x 0.265 8-Sided Polygon	A36 (36 ksi)
T3 41.93-25.17	None	Flat Bar		A36 (36 ksi)	Wide Flange	W10x30	A572-50 (50 ksi)
T4 25.17-0.00	None	Flat Bar		A36 (36 ksi)	Arbitrary Shape	12.45"Ø x 0.265 8-Sided Polygon	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 65.00-49.93	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 49.93-41.93	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 41.93-25.17	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 25.17-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation ft	*Calc K Single Angles*	*Calc K Solid Rounds*	*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*

Tower Elevation *ft*	*Calc K Single Angles*	*Calc K Solid Rounds*	*K Factors*[1] *Legs*	*X Brace Diags X Y*	*K Brace Diags X Y*	*Single Diags X Y*	*Girts X Y*	*Horiz. X Y*	*Sec. Horiz. X Y*	*Inner Brace X Y*
T1	Yes	Yes	1	1	1	1	1	1	1	1
65.00-49.93				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
49.93-41.93				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
41.93-25.17				1	1	1	1	1	1	1
T4 25.17-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg*		*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 65.00-49.93	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 49.93-41.93	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 41.93-25.17	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 25.17-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Connection Type*	*Leg*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
		Bolt Size in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*
T1 65.00-49.93	Flange	1.0000 A325N	0	0.6250 A325N	0	1.2500 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 49.93-41.93	Flange	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.2500 A325N	0	0.6250 A325N	0
T3 41.93-25.17	Flange	2.2500 A572-50	4	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	4	0.6250 A325N	0
T4 25.17-0.00	Flange	2.2500 A572-50	4	0.7500 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.2500 A325N	4	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*

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*
***												
WE65	C	Yes	Ar (CfAe)	58.00 - 0.00	-2.0000	-0.5	2	2	0.5000	1.5836		0.53
WE65	C	Yes	Ar (CfAe)	61.50 - 58.00	-2.0000	-0.5	1	1	0.5000	1.5836		0.53
***												
7/8	C	Yes	Ar (CfAe)	51.50 - 0.00	-1.0000	-0.3	2	2	0.5000	1.1100		0.54
1 5/8	C	Yes	Ar (CfAe)	51.50 - 0.00	-1.0000	-0.25	4	4	0.5000	1.9800		1.04
LDF2-50A(3/8")	C	Yes	Ar (CfAe)	51.50 - 0.00	-1.0000	-0.18	2	2	0.4400	0.4400		0.08
***												
1 1/4	C	Yes	Ar (CfAe)	51.50 - 0.00	-3.0000	0.1	1	1	1.0000	1.5500		0.66
1/2	C	Yes	Ar (CfAe)	52.50 - 0.00	-2.0000	0.1	2	2	0.5000	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	54.50 - 52.50	-2.0000	0.1	1	1	0.5000	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	50.50 - 0.00	-0.5000	0.1	2	2	0.5000	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	52.50 - 50.50	-0.5000	0.1	1	1	0.5000	0.5800		0.25
LDF2-50A(3/8")	C	Yes	Ar (CfAe)	65.00 - 0.00	-1.0000	0.1	1	1	0.4400	0.4400		0.08
***												
1/2	C	Yes	Ar (CfAe)	54.50 - 0.00	-4.0000	0.12	1	1	0.5800	0.5800		0.25
1 5/8	C	Yes	Ar (CfAe)	62.50 - 0.00	-4.0000	0.2	12	10	0.5000	1.9800		1.04
1 5/8	C	Yes	Ar (CfAe)	51.50 - 0.00	-3.0000	0.2	1	1	0.5000	1.9800		1.04
1 5/8	C	Yes	Ar (CfAe)	65.00 - 0.00	-1.0000	0.2	12	8	0.5000	1.9800		1.04
HB158-1-08U8-S8J18(1-5/8")	C	Yes	Ar (CfAe)	65.00 - 0.00	-2.6250	0.2	1	1	0.5000	1.9800		1.30
1/2	C	Yes	Ar (CfAe)	65.00 - 0.00	-1.0000	0.35	1	1	0.5800	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	46.50 - 0.00	-3.0000	0.38	1	1	0.5800	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	56.50 - 0.00	-4.0000	0.35	1	1	0.5800	0.5800		0.25
1 1/4	C	Yes	Ar (CfAe)	50.50 - 0.00	0.0000	0.5	3	3	0.5000	1.5500		0.66
1 1/4	C	Yes	Ar (CfAe)	57.50 - 50.50	0.0000	0.5	1	1	0.5000	1.5500		0.66
***												
1" conduit & 1.3" conduit	A	Yes	Ar (CfAe)	65.00 - 0.00	0.0000	-0.49	2	2	1.0000	1.0900		0.33
***												
Feedline Ladder (Af)	C	Yes	Af (CfAe)	65.00 - 0.00	-2.0000	0.25	1	1	3.0000	3.0000	9.0000	8.40
Feedline Ladder (Af)	C	Yes	Af (CfAe)	51.50 - 0.00	-2.0000	-0.25	1	1	3.0000	3.0000	9.0000	8.40
***												
3/4" DC Cable	C	Yes	Ar (CfAe)	62.50 - 0.00	-1.0000	0.3	2	2	0.2500	0.7500		0.33
3/8" Fiber Cable	C	Yes	Ar (CfAe)	62.50 - 0.00	-1.0000	0.35	1	1	0.4400	0.4400		0.08
***												

Feed Line/Linear Appurtenances - Entered As Area

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement* *ft*	*Total Number*	*C_AA_A* *ft^2/ft*	*Weight* *plf*
***							

Feed Line/Linear Appurtenances Section Areas

Tower Section	*Tower Elevation ft*	*Face*	A_R *ft²*	A_F *ft²*	C_AA_A *In Face ft²*	C_AA_A *Out Face ft²*	*Weight K*
T1	65.00-49.93	A	2.738	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	53.104	4.161	0.000	0.000	0.55
T2	49.93-41.93	A	1.453	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	44.506	4.000	0.000	0.000	0.45
T3	41.93-25.17	A	3.045	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	93.589	8.380	0.000	0.000	0.94
T4	25.17-0.00	A	4.572	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	140.529	12.583	0.000	0.000	1.41

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation ft*	*Face or Leg*	*Ice Thickness in*	A_R *ft²*	A_F *ft²*	C_AA_A *In Face ft²*	C_AA_A *Out Face ft²*	*Weight K*
T1	65.00-49.93	A	0.534	2.712	2.625	0.000	0.000	0.05
		B		0.000	0.000	0.000	0.000	0.00
		C		26.656	54.571	0.000	0.000	1.27
T2	49.93-41.93	A	0.520	1.420	1.393	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		26.879	44.227	0.000	0.000	1.02
T3	41.93-25.17	A	0.501	2.922	2.919	0.000	0.000	0.05
		B		0.000	0.000	0.000	0.000	0.00
		C		56.261	92.587	0.000	0.000	2.11
T4	25.17-0.00	A	0.500	4.383	4.383	0.000	0.000	0.07
		B		0.000	0.000	0.000	0.000	0.00
		C		84.400	139.019	0.000	0.000	3.16

Feed Line Shielding

Section	*Elevation ft*	*Face*	A_R *ft²*	A_R *Ice ft²*	A_F *ft²*	A_F *Ice ft²*
T1	65.00-49.93	A	0.188	0.399	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.942	6.108	0.000	0.000
T2	49.93-41.93	A	0.188	0.395	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	6.291	10.057	0.000	0.000
T3	41.93-25.17	A	0.000	0.029	0.159	0.304
		B	0.000	0.000	0.000	0.000
		C	0.000	0.746	5.308	7.797
T4	25.17-0.00	A	0.188	0.504	0.377	0.722
		B	0.000	0.000	0.000	0.000
		C	6.312	12.916	12.616	18.525

Feed Line Center of Pressure

Section	*Elevation* *ft*	CP_X *in*	CP_Z *in*	CP_X *Ice* *in*	CP_Z *Ice* *in*
T1	65.00-49.93	-8.5238	12.9131	-9.1469	12.9126
T2	49.93-41.93	-6.0560	14.6200	-6.7993	13.2003
T3	41.93-25.17	-7.8040	18.6951	-8.7445	17.1123
T4	25.17-0.00	-6.2306	14.9259	-6.9289	13.3030

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *K*
Beacon	A	From Leg	0.00	0.0000	65.00	No Ice	2.00	2.00	0.02
			0.00			1/2" Ice	2.50	2.50	0.03
			7.30			1" Ice	3.00	3.00	0.04
						2" Ice	4.00	4.00	0.06
						4" Ice	6.00	6.00	0.10
6.5' x 4.5" Pipe Mount	A	From Leg	0.00	0.0000	65.00	No Ice	2.60	2.60	0.07
			0.00			1/2" Ice	3.01	3.01	0.09
			3.00			1" Ice	3.42	3.42	0.12
						2" Ice	4.28	4.28	0.19
						4" Ice	6.12	6.12	0.38
***									
GPS	C	From Leg	0.00	0.0000	65.00	No Ice	0.62	0.62	0.01
			11.00			1/2" Ice	0.75	0.75	0.02
			1.50			1" Ice	0.89	0.89	0.03
						2" Ice	1.20	1.20	0.05
						4" Ice	1.96	1.96	0.13
28" x 1.6" Pipe Mount	C	From Leg	0.00	0.0000	65.00	No Ice	0.36	0.36	0.03
			7.00			1/2" Ice	0.49	0.49	0.03
			0.00			1" Ice	0.65	0.65	0.04
						2" Ice	1.01	1.01	0.05
						4" Ice	1.87	1.87	0.11
***									
5 Element (38" x 13.5") Yagi	C	From Leg	0.00	0.0000	65.00	No Ice	1.50	1.50	0.02
			0.00			1/2" Ice	1.90	1.90	0.02
			7.60			1" Ice	2.30	2.30	0.03
						2" Ice	3.10	3.10	0.04
						4" Ice	4.70	4.70	0.05
5.25' x 2.4" Pipe Mount	C	From Leg	0.00	0.0000	65.00	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			3.00			1" Ice	1.95	1.95	0.05
						2" Ice	2.60	2.60	0.09
						4" Ice	4.11	4.11	0.22
***									
(2) BXA-70063/6CF w/ Mount Pipe	A	From Leg	0.00	-40.0000	65.00	No Ice	7.98	5.41	0.04
			0.00			1/2" Ice	8.62	6.56	0.10
			4.00			1" Ice	9.23	7.42	0.17
						2" Ice	10.47	9.20	0.33
						4" Ice	13.08	12.95	0.79
(4) DB846F65ZAXY w/Mount Pipe	B	From Leg	0.00	75.0000	65.00	No Ice	7.27	7.82	0.05
			0.00			1/2" Ice	7.88	9.01	0.11
			4.00			1" Ice	8.48	9.91	0.19

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*
						2" Ice	9.72	11.81	0.37
						4" Ice	12.33	15.98	0.87
(4) BXA-171063-12BF w/ Mount Pipe	C	From Leg	0.00	40.0000	65.00	No Ice	4.97	5.23	0.04
			0.00			1/2" Ice	5.52	6.39	0.09
			4.00			1" Ice	6.04	7.26	0.14
						2" Ice	7.09	9.05	0.27
						4" Ice	9.36	12.82	0.67
I-Beam	A	From Leg	0.00	0.0000	65.00	No Ice	8.76	0.78	0.34
			0.00			1/2" Ice	12.74	0.95	0.50
			1.50			1" Ice	16.72	1.13	0.66
						2" Ice	24.68	1.49	0.97
						4" Ice	40.60	2.21	1.59
I-Beam	C	From Leg	0.00	0.0000	65.00	No Ice	8.76	0.78	0.34
			0.00			1/2" Ice	12.74	0.95	0.50
			1.50			1" Ice	16.72	1.13	0.66
						2" Ice	24.68	1.49	0.97
						4" Ice	40.60	2.21	1.59
(2) RRH2X40-AWS	A	From Leg	0.00	-40.0000	65.00	No Ice	2.52	1.59	0.04
			0.00			1/2" Ice	2.75	1.80	0.06
			4.00			1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
DB-T1-6Z-8AB-0Z	C	From Leg	0.00	40.0000	65.00	No Ice	5.60	2.33	0.04
			0.00			1/2" Ice	5.92	2.56	0.08
			4.00			1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
***									
(2) 7770.00 w/Mount Pipe	A	From Face	0.00	50.0000	62.50	No Ice	6.46	4.59	0.05
			0.00			1/2" Ice	7.14	5.66	0.10
			1.50			1" Ice	7.73	6.45	0.16
						2" Ice	8.94	8.06	0.30
						4" Ice	11.51	11.64	0.71
(2) 7770.00 w/Mount Pipe	B	From Face	0.00	50.0000	62.50	No Ice	6.46	4.59	0.05
			0.00			1/2" Ice	7.14	5.66	0.10
			1.50			1" Ice	7.73	6.45	0.16
						2" Ice	8.94	8.06	0.30
						4" Ice	11.51	11.64	0.71
(2) 7770.00 w/Mount Pipe	C	From Face	0.00	30.0000	62.50	No Ice	6.46	4.59	0.05
			0.00			1/2" Ice	7.14	5.66	0.10
			1.50			1" Ice	7.73	6.45	0.16
						2" Ice	8.94	8.06	0.30
						4" Ice	11.51	11.64	0.71
P65-16-XLH-RR w/ Mount Pipe	A	From Face	0.00	50.0000	62.50	No Ice	8.64	6.36	0.08
			0.00			1/2" Ice	9.29	7.54	0.14
			1.50			1" Ice	9.91	8.43	0.22
						2" Ice	11.18	10.24	0.39
						4" Ice	13.83	14.10	0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Face	0.00	50.0000	62.50	No Ice	8.64	6.36	0.08
			0.00			1/2" Ice	9.29	7.54	0.14
			1.50			1" Ice	9.91	8.43	0.22
						2" Ice	11.18	10.24	0.39
						4" Ice	13.83	14.10	0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Face	0.00	30.0000	62.50	No Ice	8.64	6.36	0.08
			0.00			1/2" Ice	9.29	7.54	0.14
			1.50			1" Ice	9.91	8.43	0.22
						2" Ice	11.18	10.24	0.39

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
						4" Ice	13.83	14.10	0.89
(2) LGP17210 Diplexer	A	From Face	0.00	50.0000	62.50	No Ice	1.95	0.50	0.01
			0.00			1/2" Ice	2.13	0.62	0.02
			1.50			1" Ice	2.33	0.75	0.03
						2" Ice	2.75	1.03	0.07
						4" Ice	3.69	1.69	0.17
(2) LGP17210 Diplexer	B	From Face	0.00	50.0000	62.50	No Ice	1.95	0.50	0.01
			0.00			1/2" Ice	2.13	0.62	0.02
			1.50			1" Ice	2.33	0.75	0.03
						2" Ice	2.75	1.03	0.07
						4" Ice	3.69	1.69	0.17
(2) LGP17210 Diplexer	C	From Face	0.00	30.0000	62.50	No Ice	1.95	0.50	0.01
			0.00			1/2" Ice	2.13	0.62	0.02
			1.50			1" Ice	2.33	0.75	0.03
						2" Ice	2.75	1.03	0.07
						4" Ice	3.69	1.69	0.17
(2) LGP21401 TMA	A	From Face	0.00	30.0000	62.50	No Ice	0.95	0.37	0.02
			0.00			1/2" Ice	1.09	0.48	0.02
			1.50			1" Ice	1.24	0.60	0.03
						2" Ice	1.57	0.87	0.05
						4" Ice	2.32	1.51	0.12
(2) LGP21401 TMA	B	From Face	0.00	30.0000	62.50	No Ice	0.95	0.37	0.02
			0.00			1/2" Ice	1.09	0.48	0.02
			1.50			1" Ice	1.24	0.60	0.03
						2" Ice	1.57	0.87	0.05
						4" Ice	2.32	1.51	0.12
(2) LGP21401 TMA	C	From Face	0.00	30.0000	62.50	No Ice	0.95	0.37	0.02
			0.00			1/2" Ice	1.09	0.48	0.02
			1.50			1" Ice	1.24	0.60	0.03
						2" Ice	1.57	0.87	0.05
						4" Ice	2.32	1.51	0.12
(2) TT08-19DB111-001 TMA	A	From Face	0.00	50.0000	62.50	No Ice	0.92	0.75	0.02
			0.00			1/2" Ice	1.06	0.88	0.03
			1.50			1" Ice	1.21	1.02	0.04
						2" Ice	1.54	1.32	0.06
						4" Ice	2.29	2.04	0.15
(2) TT08-19DB111-001 TMA	B	From Face	0.00	50.0000	62.50	No Ice	0.92	0.75	0.02
			0.00			1/2" Ice	1.06	0.88	0.03
			1.50			1" Ice	1.21	1.02	0.04
						2" Ice	1.54	1.32	0.06
						4" Ice	2.29	2.04	0.15
(2) TT08-19DB111-001 TMA	C	From Face	0.00	30.0000	62.50	No Ice	0.92	0.75	0.02
			0.00			1/2" Ice	1.06	0.88	0.03
			1.50			1" Ice	1.21	1.02	0.04
						2" Ice	1.54	1.32	0.06
						4" Ice	2.29	2.04	0.15
(2) RBS 6000 RRH	A	From Face	0.00	50.0000	62.50	No Ice	2.94	1.19	0.06
			0.00			1/2" Ice	3.17	1.35	0.07
			1.50			1" Ice	3.41	1.52	0.10
						2" Ice	3.91	1.89	0.15
						4" Ice	5.02	2.72	0.30
(2) RBS 6000 RRH	B	From Face	0.00	50.0000	62.50	No Ice	2.94	1.19	0.06
			0.00			1/2" Ice	3.17	1.35	0.07
			1.50			1" Ice	3.41	1.52	0.10
						2" Ice	3.91	1.89	0.15
						4" Ice	5.02	2.72	0.30
(2) RBS 6000 RRH	C	From Face	0.00	30.0000	62.50	No Ice	2.94	1.19	0.06

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			1/2" Ice	3.17	1.35	0.07
			1.50			1" Ice	3.41	1.52	0.10
						2" Ice	3.91	1.89	0.15
						4" Ice	5.02	2.72	0.30
DC6-48-60-18-8F	C	From Face	0.00	30.0000	62.50	No Ice	2.57	4.32	0.03
			0.00			1/2" Ice	2.80	4.60	0.06
			1.50			1" Ice	3.04	4.88	0.10
						2" Ice	3.54	5.49	0.18
						4" Ice	4.66	6.80	0.40
8.3' Face Mounted T-Frame	A	From Face	0.00	0.0000	62.50	No Ice	13.80	3.75	0.28
			0.00			1/2" Ice	18.42	5.95	0.39
			0.00			1" Ice	23.04	8.15	0.50
						2" Ice	32.28	12.55	0.73
						4" Ice	50.76	21.35	1.18
8.3' Face Mounted T-Frame	B	From Face	0.00	0.0000	62.50	No Ice	13.80	3.75	0.28
			0.00			1/2" Ice	18.42	5.95	0.39
			0.00			1" Ice	23.04	8.15	0.50
						2" Ice	32.28	12.55	0.73
						4" Ice	50.76	21.35	1.18
8.3' Face Mounted T-Frame	C	From Face	0.00	0.0000	62.50	No Ice	13.80	3.75	0.28
			0.00			1/2" Ice	18.42	5.95	0.39
			0.00			1" Ice	23.04	8.15	0.50
						2" Ice	32.28	12.55	0.73
						4" Ice	50.76	21.35	1.18
***									
5.7'x4.5" Pipe Mount	B	From Leg	0.00	0.0000	61.50	No Ice	2.60	2.60	0.07
			0.00			1/2" Ice	3.01	3.01	0.09
			0.00			1" Ice	3.42	3.42	0.12
						2" Ice	4.28	4.28	0.19
						4" Ice	6.12	6.12	0.38
***									
6.6'x4.5" Pipe Mount	C	From Leg	0.00	0.0000	58.00	No Ice	2.60	2.60	0.07
			0.00			1/2" Ice	3.01	3.01	0.09
			0.00			1" Ice	3.42	3.42	0.12
						2" Ice	4.28	4.28	0.19
						4" Ice	6.12	6.12	0.38
***									
15.5'x3.5" Omni	B	From Leg	2.00	0.0000	57.50	No Ice	5.25	5.25	0.02
			0.00			1/2" Ice	6.79	6.79	0.06
			7.50			1" Ice	8.34	8.34	0.10
						2" Ice	11.40	11.40	0.23
						4" Ice	15.13	15.13	0.60
2' Standoff	B	From Leg	1.00	0.0000	57.50	No Ice	1.00	0.90	0.02
			0.00			1/2" Ice	1.39	1.42	0.03
			0.00			1" Ice	1.78	1.94	0.04
						2" Ice	2.56	2.98	0.06
						4" Ice	4.12	5.06	0.10
***									
14.7'x3.5" Pipe Mount	A	From Face	0.00	0.0000	58.00	No Ice	5.87	5.87	0.26
			0.00			1/2" Ice	7.40	7.40	0.33
			0.00			1" Ice	8.95	8.95	0.39
						2" Ice	11.58	11.58	0.54
						4" Ice	15.56	15.56	0.94
7.7'x1.6" Pipe Mount	A	From Face	0.00	0.0000	56.00	No Ice	2.30	2.30	0.04
			0.00			1/2" Ice	3.13	3.13	0.06
			0.00			1" Ice	3.62	3.62	0.08
						2" Ice	4.62	4.62	0.14

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
						4" Ice	6.73	6.73	0.33
***									
9.5'x1.75" 4-Element Dipole	B	From Face	0.00	0.0000	56.50	No Ice	1.75	1.75	0.03
			0.00			1/2" Ice	2.77	2.77	0.04
			-1.50			1" Ice	3.81	3.81	0.06
						2" Ice	5.56	5.56	0.12
						4" Ice	8.11	8.11	0.33
14.5x1.9" Pipe Mount	B	From Face	0.00	0.0000	56.50	No Ice	3.45	3.45	0.10
			0.00			1/2" Ice	4.94	4.94	0.14
			0.00			1" Ice	6.47	6.47	0.18
						2" Ice	9.60	9.60	0.28
						4" Ice	14.01	14.01	0.61
***									
16'x3.5" Pipe Mount	C	From Face	0.00	0.0000	56.50	No Ice	6.40	6.40	0.30
			0.00			1/2" Ice	8.05	8.05	0.37
			0.00			1" Ice	9.72	9.72	0.44
						2" Ice	13.04	13.04	0.60
						4" Ice	17.28	17.28	1.03
13"x10.5"x3.5" TMA	C	From Face	0.00	0.0000	56.50	No Ice	1.52	0.36	0.02
			0.00			1/2" Ice	1.69	0.47	0.03
			2.50			1" Ice	1.86	0.58	0.04
						2" Ice	2.24	0.84	0.07
						4" Ice	3.09	1.44	0.15
***									
21'x2.5" Omni	B	From Leg	8.00	0.0000	54.50	No Ice	5.25	5.25	0.03
			0.00			1/2" Ice	7.38	7.38	0.07
			10.50			1" Ice	9.53	9.53	0.12
						2" Ice	13.87	13.87	0.27
						4" Ice	22.65	22.65	0.72
8' Standoff	B	From Leg	4.00	0.0000	54.50	No Ice	5.00	5.00	0.25
			0.00			1/2" Ice	10.00	10.00	0.30
			0.00			1" Ice	15.00	15.00	0.35
						2" Ice	25.00	25.00	0.45
						4" Ice	45.00	45.00	0.65
***									
7.25'x0.95" Omni	B	From Leg	0.00	0.0000	52.50	No Ice	0.69	0.69	0.02
			0.00			1/2" Ice	1.43	1.43	0.02
			5.00			1" Ice	2.19	2.19	0.03
						2" Ice	3.29	3.29	0.07
						4" Ice	5.20	5.20	0.21
(2) 5'x2.4" Pipe Mount	B	From Face	0.00	0.0000	52.50	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			0.00			1" Ice	1.95	1.95	0.05
						2" Ice	2.60	2.60	0.09
						4" Ice	4.11	4.11	0.22
5'x2.4" Pipe Mount	C	From Face	0.00	0.0000	52.50	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			0.00			1" Ice	1.95	1.95	0.05
						2" Ice	2.60	2.60	0.09
						4" Ice	4.11	4.11	0.22
5'x2.4" Pipe Mount	A	From Face	0.00	0.0000	52.50	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			0.00			1" Ice	1.95	1.95	0.05
						2" Ice	2.60	2.60	0.09
						4" Ice	4.11	4.11	0.22
10'x1.6" Omni	A	From Face	0.00	0.0000	52.50	No Ice	2.00	2.00	0.02
			0.00			1/2" Ice	3.02	3.02	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*
			6.00			1" Ice	4.07	4.07	0.06
						2" Ice	5.70	5.70	0.12
						4" Ice	8.26	8.26	0.33
5-Element (80.5"x3.7") Yagi	B	From Face	0.00	0.0000	52.50	No Ice	2.40	2.40	0.04
			0.00			1/2" Ice	3.19	3.19	0.06
			2.50			1" Ice	3.67	3.67	0.08
						2" Ice	4.68	4.68	0.14
						4" Ice	6.79	6.79	0.34
4-Element (10'x1.6") Dipole	A	From Face	0.00	0.0000	52.50	No Ice	2.00	2.00	0.02
			0.00			1/2" Ice	3.02	3.02	0.04
			6.00			1" Ice	4.07	4.07	0.06
						2" Ice	5.70	5.70	0.12
						4" Ice	8.26	8.26	0.33
***									
***									
9.25'x3.5" Omni	B	From Face	6.50	0.0000	51.50	No Ice	2.85	2.85	0.03
			5.00			1/2" Ice	3.83	3.83	0.05
			8.00			1" Ice	4.67	4.67	0.07
						2" Ice	5.85	5.85	0.15
						4" Ice	8.30	8.30	0.37
4-Element (10'x1.6") Dipole	B	From Face	6.50	0.0000	51.50	No Ice	2.00	2.00	0.02
			5.00			1/2" Ice	3.02	3.02	0.04
			-5.00			1" Ice	4.07	4.07	0.06
						2" Ice	5.70	5.70	0.12
						4" Ice	8.26	8.26	0.33
6.5' I-Beam Standoff	B	From Face	3.25	0.0000	51.50	No Ice	0.37	4.82	0.16
			5.00			1/2" Ice	0.46	5.37	0.20
			0.00			1" Ice	0.55	5.93	0.24
						2" Ice	0.76	7.08	0.34
						4" Ice	1.29	9.47	0.63
***									
10.5' I-Beam Standoff	B	From Leg	5.75	0.0000	51.50	No Ice	0.37	7.79	0.26
			-5.00			1/2" Ice	0.46	8.65	0.32
			0.00			1" Ice	0.55	9.52	0.38
						2" Ice	0.76	11.29	0.54
						4" Ice	1.29	14.93	0.98
4'x2.4" Pipe Mount	B	From Leg	10.50	0.0000	51.50	No Ice	1.00	1.00	0.03
			-5.00			1/2" Ice	1.39	1.39	0.04
			0.00			1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
***									
11.5'x2.5" Omni	C	From Face	3.00	0.0000	51.50	No Ice	2.75	2.75	0.03
			0.00			1/2" Ice	3.88	3.88	0.05
			6.00			1" Ice	5.03	5.03	0.07
						2" Ice	6.81	6.81	0.15
						4" Ice	9.60	9.60	0.40
10'x3" Omni	C	From Face	9.50	0.0000	51.50	No Ice	3.00	3.00	0.03
			0.00			1/2" Ice	4.03	4.03	0.05
			8.00			1" Ice	5.03	5.03	0.08
						2" Ice	6.26	6.26	0.15
						4" Ice	8.83	8.83	0.39
20"x16"x7.25" TMA	C	From Face	0.00	0.0000	51.50	No Ice	3.11	1.41	0.04
			0.00			1/2" Ice	3.35	1.59	0.06
			0.00			1" Ice	3.60	1.78	0.08
						2" Ice	4.11	2.19	0.14
						4" Ice	5.25	3.10	0.30

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*
10'x3" Omni	C	From Face	9.50	0.0000	51.50	No Ice	3.00	3.00	0.03
			0.00			1/2" Ice	4.03	4.03	0.05
			6.00			1" Ice	5.03	5.03	0.08
						2" Ice	6.26	6.26	0.15
						4" Ice	8.83	8.83	0.39
9.5' I-Beam Standoff	C	From Face	4.75	0.0000	51.50	No Ice	0.37	7.05	0.24
			0.00			1/2" Ice	0.46	7.83	0.29
			0.00			1" Ice	0.55	8.63	0.35
						2" Ice	0.76	10.24	0.49
						4" Ice	1.29	13.57	0.89
***									
10'x3" Omni	C	From Face	6.50	0.0000	50.50	No Ice	3.00	3.00	0.03
			0.00			1/2" Ice	4.03	4.03	0.05
			-5.00			1" Ice	5.03	5.03	0.08
						2" Ice	6.26	6.26	0.15
						4" Ice	8.83	8.83	0.39
6.5' Standoff	C	From Leg	3.25	0.0000	50.50	No Ice	2.72	12.93	0.15
			0.00			1/2" Ice	4.11	17.82	0.22
			0.00			1" Ice	5.50	22.71	0.30
						2" Ice	8.28	32.49	0.46
						4" Ice	13.84	52.05	0.77
***									
15" Standoff	B	From Leg	0.00	0.0000	50.50	No Ice	0.63	0.94	0.02
			0.00			1/2" Ice	1.00	1.45	0.03
			0.00			1" Ice	1.37	1.96	0.04
						2" Ice	2.11	2.98	0.06
						4" Ice	3.59	5.02	0.09
15" Standoff	C	From Leg	0.00	0.0000	50.50	No Ice	0.63	0.94	0.02
			0.00			1/2" Ice	1.00	1.45	0.03
			0.00			1" Ice	1.37	1.96	0.04
						2" Ice	2.11	2.98	0.06
						4" Ice	3.59	5.02	0.09
***									
DB636NS-C	B	From Leg	0.00	0.0000	50.50	No Ice	2.51	2.51	0.03
			0.00			1/2" Ice	3.59	3.59	0.05
			-4.50			1" Ice	4.68	4.68	0.07
						2" Ice	6.30	6.30	0.15
						4" Ice	8.97	8.97	0.38
6.5' Standoff	B	From Leg	6.50	0.0000	50.50	No Ice	2.72	12.93	0.15
			0.00			1/2" Ice	4.11	17.82	0.22
			0.00			1" Ice	5.50	22.71	0.30
						2" Ice	8.28	32.49	0.46
						4" Ice	13.84	52.05	0.77
***									
11'x2" Omni	C	From Face	1.25	0.0000	50.50	No Ice	2.75	2.75	0.03
			0.00			1/2" Ice	3.88	3.88	0.05
			-7.00			1" Ice	5.03	5.03	0.07
						2" Ice	6.81	6.81	0.15
						4" Ice	9.60	9.60	0.40
15" Standoff	C	From Face	0.00	0.0000	50.50	No Ice	0.63	0.94	0.02
			0.00			1/2" Ice	1.00	1.45	0.03
			0.00			1" Ice	1.37	1.96	0.04
						2" Ice	2.11	2.98	0.06
						4" Ice	3.59	5.02	0.09
20.5"x6.75"x4.5" TMA	C	From Face	1.25	0.0000	50.50	No Ice	1.35	0.90	0.04
			0.00			1/2" Ice	1.53	1.06	0.05
			2.00			1" Ice	1.72	1.24	0.06

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert ft ft ft*	*Azimuth Adjustment °*	*Placement ft*		*C_AA_A Front ft²*	*C_AA_A Side ft²*	*Weight K*
						2" Ice	2.12	1.61	0.09
						4" Ice	3.03	2.47	0.19
***									
5' Standoff Mnt	A	From Face	5.00	0.0000	46.50	No Ice	0.98	2.60	0.05
			0.00			1/2" Ice	1.70	4.50	0.07
			0.00			1" Ice	2.42	6.40	0.09
						2" Ice	3.86	10.20	0.14
						4" Ice	6.74	17.80	0.23
***									
***									

Dishes

Description	*Face or Leg*	*Dish Type*	*Offset Type*	*Offsets: Horz Lateral Vert ft*	*Azimuth Adjustment °*	*3 dB Beam Width °*	*Elevation ft*	*Outside Diameter ft*		*Aperture Area ft²*	*Weight K*
6' Dish	B	Paraboloid w/Radome	From Leg	1.00	0.0000		61.50	6.00	No Ice	28.27	0.38
				0.00					1/2" Ice	29.07	0.45
				-1.00					1" Ice	29.86	0.52
									2" Ice	31.44	0.66
									4" Ice	34.60	0.94
6' Dish	C	Paraboloid w/Radome	From Leg	1.00	0.0000		58.00	6.00	No Ice	28.27	0.38
				0.00					1/2" Ice	29.07	0.45
				-1.00					1" Ice	29.86	0.52
									2" Ice	31.44	0.66
									4" Ice	34.60	0.94
SPD2-5.8	B	Paraboloid w/o Radome	From Face	1.00	0.0000		56.50	2.00	No Ice	3.14	0.02
				0.00					1/2" Ice	3.41	0.04
				1.00					1" Ice	3.67	0.06
									2" Ice	4.21	0.09
									4" Ice	5.28	0.16
PRFTV-48/75 Grid Dish	A	Grid	From Face	1.00	0.0000		46.50	4.00	No Ice	12.57	0.07
				0.00					1/2" Ice	13.10	0.14
				0.00					1" Ice	13.62	0.21
									2" Ice	14.68	0.35
									4" Ice	16.80	0.63

Tower Pressures - No Ice

$G_H = 1.195$

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*

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 65.00-49.93	57.46	1.172	22	246.034	A	0.000	55.743	38.938	69.85	0.000	0.000
					B	0.000	53.193		73.20	0.000	0.000
					C	4.161	102.356		36.56	0.000	0.000
T2 49.93-41.93	45.93	1.099	20	130.583	A	0.000	36.186	20.667	57.11	0.000	0.000
					B	0.000	34.921		59.18	0.000	0.000
					C	4.000	73.137		26.79	0.000	0.000
T3 41.93-25.17	33.55	1.005	19	273.579	A	11.829	46.343	43.298	74.43	0.000	0.000
					B	11.988	43.298		78.32	0.000	0.000
					C	15.060	136.887		28.50	0.000	0.000
T4 25.17-0.00	12.58	1	18	410.794	A	28.115	83.652	65.014	58.17	0.000	0.000
					B	28.492	79.269		60.33	0.000	0.000
					C	28.459	213.486		26.87	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.195$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 65.00-49.93	57.46	1.172	4	0.5344	247.376	A	2.625	59.415	41.623	67.09	0.000	0.000
						B	0.000	57.102		72.89	0.000	0.000
						C	54.571	77.650		31.48	0.000	0.000
T2 49.93-41.93	45.93	1.099	4	0.5202	131.277	A	1.393	38.525	22.054	55.25	0.000	0.000
						B	0.000	37.500		58.81	0.000	0.000
						C	44.227	54.322		22.38	0.000	0.000
T3 41.93-25.17	33.55	1.005	4	0.5010	274.978	A	14.603	50.137	46.097	71.20	0.000	0.000
						B	11.988	47.244		77.82	0.000	0.000
						C	96.777	102.758		23.10	0.000	0.000
T4 25.17-0.00	12.58	1	4	0.5000	412.891	A	32.153	92.954	69.208	55.32	0.000	0.000
						B	28.492	89.074		58.87	0.000	0.000
						C	148.986	160.558		22.36	0.000	0.000

Tower Pressure - Service

$G_H = 1.195$

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 65.00-49.93	57.46	1.172	7	246.034	A	0.000	55.743	38.938	69.85	0.000	0.000
					B	0.000	53.193		73.20	0.000	0.000
					C	4.161	102.356		36.56	0.000	0.000
T2 49.93-41.93	45.93	1.099	7	130.583	A	0.000	36.186	20.667	57.11	0.000	0.000
					B	0.000	34.921		59.18	0.000	0.000
					C	4.000	73.137		26.79	0.000	0.000
T3 41.93-25.17	33.55	1.005	6	273.579	A	11.829	46.343	43.298	74.43	0.000	0.000
					B	11.988	43.298		78.32	0.000	0.000
					C	15.060	136.887		28.50	0.000	0.000
T4 25.17-0.00	12.58	1	6	410.794	A	28.115	83.652	65.014	58.17	0.000	0.000

Section Elevation *ft*	*z* *ft*	*K_Z*	*q_z* *psf*	*A_G* *ft^2*	*Face*	*A_F* *ft^2*	*A_R* *ft^2*	*A_{leg}* *ft^2*	*Leg %*	*C_AA_A In Face* *ft^2*	*C_AA_A Out Face* *ft^2*
					B	28.492	79.269		60.33	0.000	0.000
					C	28.459	213.486		26.87	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* *ft^2*	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 65.00-49.93	0.56	3.66	A	0.227	2.51	0.596	1	1	33.233	3.75	248.64	C
			B	0.216	2.543	0.594	1	1	31.588			
			C	0.433	2.002	0.666	1	1	72.289			
T2 49.93-41.93	0.45	2.71	A	0.277	2.359	0.609	1	1	22.043	2.58	322.54	C
			B	0.267	2.386	0.606	1	1	21.179			
			C	0.591	1.81	0.748	1	1	58.703			
T3 41.93-25.17	0.95	3.60	A	0.213	2.554	0.593	1	1	39.313	4.68	279.10	C
			B	0.202	2.589	0.591	1	1	37.569			
			C	0.555	1.838	0.727	1	1	114.620			
T4 25.17-0.00	1.43	9.41	A	0.272	2.373	0.608	1	1	78.955	7.52	298.83	C
			B	0.262	2.401	0.605	1	1	76.457			
			C	0.589	1.811	0.747	1	1	187.914			
Sum Weight:	3.39	19.39						OTM	585.43 kip-ft	18.53		

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 65.00-49.93	0.56	3.66	A	0.227	2.51	0.596	0.8	1	33.233	3.70	245.78	C
			B	0.216	2.543	0.594	0.8	1	31.588			
			C	0.433	2.002	0.666	0.8	1	71.456			
T2 49.93-41.93	0.45	2.71	A	0.277	2.359	0.609	0.8	1	22.043	2.55	318.15	C
			B	0.267	2.386	0.606	0.8	1	21.179			
			C	0.591	1.81	0.748	0.8	1	57.903			
T3 41.93-25.17	0.95	3.60	A	0.213	2.554	0.593	0.8	1	36.947	4.55	271.77	C
			B	0.202	2.589	0.591	0.8	1	35.172			
			C	0.555	1.838	0.727	0.8	1	111.608			
T4 25.17-0.00	1.43	9.41	A	0.272	2.373	0.608	0.8	1	73.332	7.29	289.78	C
			B	0.262	2.401	0.605	0.8	1	70.759			
			C	0.589	1.811	0.747	0.8	1	182.222			
Sum Weight:	3.39	19.39						OTM	574.34 kip-ft	18.10		

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 65.00-49.93	0.56	3.66	A	0.227	2.51	0.596	0.85	1	33.233	3.72	246.49	C
			B	0.216	2.543	0.594	0.85	1	31.588			
			C	0.433	2.002	0.666	0.85	1	71.664			
T2 49.93-41.93	0.45	2.71	A	0.277	2.359	0.609	0.85	1	22.043	2.55	319.25	C
			B	0.267	2.386	0.606	0.85	1	21.179			
			C	0.591	1.81	0.748	0.85	1	58.103			
T3 41.93-25.17	0.95	3.60	A	0.213	2.554	0.593	0.85	1	37.539	4.59	273.60	C
			B	0.202	2.589	0.591	0.85	1	35.771			
			C	0.555	1.838	0.727	0.85	1	112.361			
T4 25.17-0.00	1.43	9.41	A	0.272	2.373	0.608	0.85	1	74.738	7.35	292.04	C
			B	0.262	2.401	0.605	0.85	1	72.183			
			C	0.589	1.811	0.747	0.85	1	183.645			
Sum Weight:	3.39	19.39						OTM	577.11 kip-ft	18.20		

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 ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 65.00-49.93	1.32	4.49	A	0.251	2.435	0.602	1	1	38.397	1.04	68.83	C
			B	0.231	2.496	0.597	1	1	34.100			
			C	0.534	1.859	0.716	1	1	110.145			
T2 49.93-41.93	1.04	3.31	A	0.304	2.285	0.617	1	1	25.169	0.77	96.42	C
			B	0.286	2.335	0.612	1	1	22.936			
			C	0.751	1.788	0.857	1	1	90.803			
T3 41.93-25.17	2.16	4.50	A	0.235	2.482	0.598	1	1	44.598	1.41	84.39	C
			B	0.215	2.545	0.594	1	1	40.035			
			C	0.726	1.78	0.839	1	1	182.944			
T4 25.17-0.00	3.24	11.84	A	0.303	2.288	0.617	1	1	89.489	2.21	87.98	C
			B	0.285	2.337	0.611	1	1	82.947			
			C	0.75	1.787	0.857	1	1	286.527			
Sum Weight:	7.76	24.13						OTM	170.35 kip-ft	5.44		

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 65.00-49.93	1.32	4.49	A	0.251	2.435	0.602	0.8	1	37.872	0.93	62.01	C
			B	0.231	2.496	0.597	0.8	1	34.100			
			C	0.534	1.859	0.716	0.8	1	99.231			
T2 49.93-41.93	1.04	3.31	A	0.304	2.285	0.617	0.8	1	24.891	0.70	87.03	C
			B	0.286	2.335	0.612	0.8	1	22.936			
			C	0.751	1.788	0.857	0.8	1	81.958			
T3 41.93-25.17	2.16	4.50	A	0.235	2.482	0.598	0.8	1	41.677	1.26	75.46	C
			B	0.215	2.545	0.594	0.8	1	37.637			
			C	0.726	1.78	0.839	0.8	1	163.589			

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*
T4 25.17-0.00	3.24	11.84	A	0.303	2.288	0.617	0.8	1	83.058	1.98	78.83	C
			B	0.285	2.337	0.611	0.8	1	77.249			
			C	0.75	1.787	0.857	0.8	1	256.729			
Sum Weight:	7.76	24.13						OTM	153.08 kip-ft	4.88		

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 ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 65.00-49.93	1.32	4.49	A	0.251	2.435	0.602	0.85	1	38.004	0.96	63.71	C
			B	0.231	2.496	0.597	0.85	1	34.100			
			C	0.534	1.859	0.716	0.85	1	101.959			
T2 49.93-41.93	1.04	3.31	A	0.304	2.285	0.617	0.85	1	24.960	0.72	89.38	C
			B	0.286	2.335	0.612	0.85	1	22.936			
			C	0.751	1.788	0.857	0.85	1	84.169			
T3 41.93-25.17	2.16	4.50	A	0.235	2.482	0.598	0.85	1	42.408	1.30	77.69	C
			B	0.215	2.545	0.594	0.85	1	38.237			
			C	0.726	1.78	0.839	0.85	1	168.428			
T4 25.17-0.00	3.24	11.84	A	0.303	2.288	0.617	0.85	1	84.666	2.04	81.12	C
			B	0.285	2.337	0.611	0.85	1	78.673			
			C	0.75	1.787	0.857	0.85	1	264.179			
Sum Weight:	7.76	24.13						OTM	157.40 kip-ft	5.02		

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 ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 65.00-49.93	0.56	3.66	A	0.227	2.51	0.596	1	1	33.233	1.30	86.03	C
			B	0.216	2.543	0.594	1	1	31.588			
			C	0.433	2.002	0.666	1	1	72.289			
T2 49.93-41.93	0.45	2.71	A	0.277	2.359	0.609	1	1	22.043	0.89	111.61	C
			B	0.267	2.386	0.606	1	1	21.179			
			C	0.591	1.81	0.748	1	1	58.703			
T3 41.93-25.17	0.95	3.60	A	0.213	2.554	0.593	1	1	39.313	1.62	96.58	C
			B	0.202	2.589	0.591	1	1	37.569			
			C	0.555	1.838	0.727	1	1	114.620			
T4 25.17-0.00	1.43	9.41	A	0.272	2.373	0.608	1	1	78.955	2.60	103.40	C
			B	0.262	2.401	0.605	1	1	76.457			
			C	0.589	1.811	0.747	1	1	187.914			
Sum Weight:	3.39	19.39						OTM	202.57 kip-ft	6.41		

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 65.00-49.93	0.56	3.66	A	0.227	2.51	0.596	0.8	1	33.233	1.28	85.04	C
			B	0.216	2.543	0.594	0.8	1	31.588			
			C	0.433	2.002	0.666	0.8	1	71.456			
T2 49.93-41.93	0.45	2.71	A	0.277	2.359	0.609	0.8	1	22.043	0.88	110.09	C
			B	0.267	2.386	0.606	0.8	1	21.179			
			C	0.591	1.81	0.748	0.8	1	57.903			
T3 41.93-25.17	0.95	3.60	A	0.213	2.554	0.593	0.8	1	36.947	1.58	94.04	C
			B	0.202	2.589	0.591	0.8	1	35.172			
			C	0.555	1.838	0.727	0.8	1	111.608			
T4 25.17-0.00	1.43	9.41	A	0.272	2.373	0.608	0.8	1	73.332	2.52	100.27	C
			B	0.262	2.401	0.605	0.8	1	70.759			
			C	0.589	1.811	0.747	0.8	1	182.222			
Sum Weight:	3.39	19.39						OTM	198.73 kip-ft	6.26		

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 65.00-49.93	0.56	3.66	A	0.227	2.51	0.596	0.85	1	33.233	1.29	85.29	C
			B	0.216	2.543	0.594	0.85	1	31.588			
			C	0.433	2.002	0.666	0.85	1	71.664			
T2 49.93-41.93	0.45	2.71	A	0.277	2.359	0.609	0.85	1	22.043	0.88	110.47	C
			B	0.267	2.386	0.606	0.85	1	21.179			
			C	0.591	1.81	0.748	0.85	1	58.103			
T3 41.93-25.17	0.95	3.60	A	0.213	2.554	0.593	0.85	1	37.539	1.59	94.67	C
			B	0.202	2.589	0.591	0.85	1	35.771			
			C	0.555	1.838	0.727	0.85	1	112.361			
T4 25.17-0.00	1.43	9.41	A	0.272	2.373	0.608	0.85	1	74.738	2.54	101.05	C
			B	0.262	2.401	0.605	0.85	1	72.183			
			C	0.589	1.811	0.747	0.85	1	183.645			
Sum Weight:	3.39	19.39						OTM	199.69 kip-ft	6.30		

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	8.71					
Bracing Weight	10.67					
Total Member Self-Weight	19.39			26.01	-0.51	
Total Weight	29.95			26.01	-0.51	
Wind 0 deg - No Ice		-0.03	-28.26	-1157.27	2.63	0.36
Wind 30 deg - No Ice		13.57	-24.20	-991.33	-564.13	21.33

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 60 deg - No Ice		23.59	-13.90	-558.32	-985.67	37.16
Wind 90 deg - No Ice		27.54	0.02	28.43	-1152.97	43.48
Wind 120 deg - No Ice		24.10	14.10	617.14	-1004.94	37.56
Wind 150 deg - No Ice		13.71	23.97	1031.11	-574.03	20.65
Wind 180 deg - No Ice		-0.07	27.47	1177.53	2.57	-0.47
Wind 210 deg - No Ice		-13.73	23.91	1026.81	572.97	-21.38
Wind 240 deg - No Ice		-24.11	14.07	613.41	1003.73	-37.92
Wind 270 deg - No Ice		-27.58	0.03	26.44	1155.05	-43.74
Wind 300 deg - No Ice		-23.72	-13.90	-560.00	993.73	-36.70
Wind 330 deg - No Ice		-13.65	-24.24	-995.21	570.09	-20.34
Member Ice	4.74					
Total Weight Ice	42.70			48.55	6.62	
Wind 0 deg - Ice		0.00	-7.81	-266.41	6.53	-0.74
Wind 30 deg - Ice		3.61	-6.40	-213.00	-139.58	4.89
Wind 60 deg - Ice		6.22	-3.58	-98.24	-247.31	9.07
Wind 90 deg - Ice		7.32	0.04	50.35	-291.13	11.01
Wind 120 deg - Ice		6.70	3.91	206.22	-262.32	10.15
Wind 150 deg - Ice		3.68	6.35	307.40	-142.83	5.55
Wind 180 deg - Ice		0.05	7.20	343.32	4.63	0.27
Wind 210 deg - Ice		-3.64	6.34	306.87	154.66	-4.90
Wind 240 deg - Ice		-6.68	3.90	205.82	274.68	-9.41
Wind 270 deg - Ice		-7.30	0.02	49.66	303.66	-10.88
Wind 300 deg - Ice		-6.18	-3.61	-99.72	259.13	-9.34
Wind 330 deg - Ice		-3.61	-6.41	-213.53	152.82	-5.68
Total Weight	29.95			26.01	-0.51	
Wind 0 deg - Service		-0.01	-9.78	-397.48	-5.20	0.13
Wind 30 deg - Service		4.69	-8.37	-340.06	-201.31	7.38
Wind 60 deg - Service		8.16	-4.81	-190.23	-347.17	12.86
Wind 90 deg - Service		9.53	0.01	12.79	-405.06	15.04
Wind 120 deg - Service		8.34	4.88	216.50	-353.84	13.00
Wind 150 deg - Service		4.74	8.29	359.74	-204.74	7.15
Wind 180 deg - Service		-0.02	9.51	410.41	-5.22	-0.16
Wind 210 deg - Service		-4.75	8.27	358.25	192.15	-7.40
Wind 240 deg - Service		-8.34	4.87	215.21	341.20	-13.12
Wind 270 deg - Service		-9.54	0.01	12.10	393.56	-15.13
Wind 300 deg - Service		-8.21	-4.81	-190.81	337.74	-12.70
Wind 330 deg - Service		-4.72	-8.39	-341.41	191.15	-7.04

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 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp

Comb. No.	*Description*
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	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	65 - 49.9271	Leg	Max Tension	12	5.69	34.27	-2.68
			Max. Compression	6	-11.73	24.86	-0.24
			Max. Mx	2	-7.89	-36.62	1.29
			Max. My	3	-0.72	-0.09	16.20
			Max. Vy	2	-5.54	25.13	-0.43
			Max. Vx	3	3.35	-0.00	-7.03
		Top Girt	Max Tension	2	1.55	-3.41	0.02
			Max. Compression	12	-1.64	-1.77	-0.05
			Max. Mx	11	-0.05	-29.76	-0.08
			Max. My	10	-0.85	-25.29	-0.08
			Max. Vy	11	4.16	-29.76	-0.08
			Max. Vx	11	0.01	28.72	0.08
T2	49.9271 - 41.9271	Leg	Max Tension	8	14.85	46.70	-1.87
			Max. Compression	6	-23.97	25.83	-0.06
			Max. Mx	2	-21.84	-49.20	1.97
			Max. My	3	-4.90	0.50	23.74
			Max. Vy	2	-9.58	26.31	-0.57
			Max. Vx	10	-1.58	-11.67	-11.94
		Horizontal	Max Tension	2	3.40	-3.65	0.05
			Max. Compression	12	-3.36	-5.82	-0.07
			Max. Mx	11	-0.04	-56.95	-0.11
			Max. My	10	-1.74	-49.83	-0.12
			Max. Vy	11	7.76	-56.95	-0.11
			Max. Vx	11	0.01	55.65	0.11
T3	41.9271 - 25.1667	Leg	Max Tension	8	26.89	58.03	-1.50
			Max. Compression	6	-38.58	50.92	-8.11
			Max. Mx	2	-36.19	-60.10	1.77

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
			Max. My	3	-6.47	-0.95	-54.92
			Max. Vy	2	-6.90	51.79	-2.10
			Max. Vx	3	6.49	-0.95	-54.92
		Horizontal	Max Tension	12	4.42	8.18	-0.01
			Max. Compression	2	-4.37	-0.16	-0.01
			Max. Mx	11	0.09	-66.10	0.04
			Max. My	10	2.29	-57.45	0.04
			Max. Vy	11	8.95	-66.10	0.04
			Max. Vx	11	-0.00	65.08	-0.04
T4	25.1667 - 0	Leg	Max Tension	8	47.55	-50.41	1.82
			Max. Compression	6	-57.80	0.00	0.00
			Max. Mx	2	-55.32	51.79	-2.10
			Max. My	3	-4.31	-0.95	-54.92
			Max. Vy	2	2.39	51.79	-2.10
			Max. Vx	3	-2.54	-0.95	-54.92
		Diagonal	Max Tension	4	23.21	0.00	0.00
			Max. Compression	10	-28.29	0.00	0.00
			Max. Mx	7	16.06	-0.80	0.02
			Max. My	11	-16.90	-0.05	-0.04
			Max. Vy	22	0.16	-0.56	-0.01
			Max. Vx	11	-0.00	0.00	0.00
		Horizontal	Max Tension	8	1.34	0.00	0.00
			Max. Compression	24	-1.51	0.00	0.00
			Max. Mx	14	-1.47	1.24	0.00
			Max. Vy	14	-0.33	0.00	0.00

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical K*	*Horizontal, X K*	*Horizontal, Z K*
Leg C	Max. Vert	10	100.32	18.96	-9.12
	Max. H_x	10	100.32	18.96	-9.12
	Max. H_z	4	-77.04	-14.98	7.11
	Min. Vert	4	-77.04	-14.98	7.11
	Min. H_x	4	-77.04	-14.98	7.11
	Min. H_z	10	100.32	18.96	-9.12
Leg B	Max. Vert	6	100.55	-18.99	-9.15
	Max. H_x	12	-77.64	15.04	7.16
	Max. H_z	12	-77.64	15.04	7.16
	Min. Vert	12	-77.64	15.04	7.16
	Min. H_x	6	100.55	-18.99	-9.15
	Min. H_z	6	100.55	-18.99	-9.15
Leg A	Max. Vert	2	98.89	0.01	21.06
	Max. H_x	5	7.80	2.01	1.85
	Max. H_z	2	98.89	0.01	21.06
	Min. Vert	8	-80.47	-0.01	-16.80
	Min. H_x	11	7.95	-2.01	1.86
	Min. H_z	8	-80.47	-0.01	-16.80

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	29.95	0.00	0.00	26.01	-0.51	0.00
Dead+Wind 0 deg - No Ice	29.95	-0.03	-28.26	-1157.27	2.63	0.36
Dead+Wind 30 deg - No Ice	29.95	13.57	-24.20	-991.33	-564.13	21.33
Dead+Wind 60 deg - No Ice	29.95	23.59	-13.90	-558.32	-985.67	37.16
Dead+Wind 90 deg - No Ice	29.95	27.54	0.02	28.43	-1152.97	43.48
Dead+Wind 120 deg - No Ice	29.95	24.10	14.10	617.14	-1004.94	37.56
Dead+Wind 150 deg - No Ice	29.95	13.71	23.97	1031.11	-574.03	20.65
Dead+Wind 180 deg - No Ice	29.95	-0.07	27.47	1177.53	2.57	-0.47
Dead+Wind 210 deg - No Ice	29.95	-13.73	23.91	1026.81	572.97	-21.38
Dead+Wind 240 deg - No Ice	29.95	-24.11	14.07	613.41	1003.73	-37.92
Dead+Wind 270 deg - No Ice	29.95	-27.58	0.03	26.44	1155.05	-43.74
Dead+Wind 300 deg - No Ice	29.95	-23.72	-13.90	-560.00	993.73	-36.70
Dead+Wind 330 deg - No Ice	29.95	-13.65	-24.24	-995.21	570.09	-20.34
Dead+Ice+Temp	42.70	0.00	0.00	48.55	6.62	0.00
Dead+Wind 0 deg+Ice+Temp	42.70	0.00	-7.81	-266.41	6.53	-0.74
Dead+Wind 30 deg+Ice+Temp	42.70	3.61	-6.40	-213.00	-139.58	4.89
Dead+Wind 60 deg+Ice+Temp	42.70	6.22	-3.58	-98.24	-247.31	9.07
Dead+Wind 90 deg+Ice+Temp	42.70	7.32	0.04	50.35	-291.13	11.01
Dead+Wind 120 deg+Ice+Temp	42.70	6.70	3.91	206.22	-262.32	10.15
Dead+Wind 150 deg+Ice+Temp	42.70	3.68	6.35	307.40	-142.83	5.55
Dead+Wind 180 deg+Ice+Temp	42.70	0.05	7.20	343.32	4.63	0.27
Dead+Wind 210 deg+Ice+Temp	42.70	-3.64	6.34	306.87	154.66	-4.90
Dead+Wind 240 deg+Ice+Temp	42.70	-6.68	3.90	205.82	274.68	-9.41
Dead+Wind 270 deg+Ice+Temp	42.70	-7.30	0.02	49.66	303.66	-10.88
Dead+Wind 300 deg+Ice+Temp	42.70	-6.18	-3.61	-99.72	259.13	-9.34
Dead+Wind 330 deg+Ice+Temp	42.70	-3.61	-6.41	-213.53	152.82	-5.68
Dead+Wind 0 deg - Service	29.95	-0.01	-9.78	-383.43	0.58	0.13
Dead+Wind 30 deg - Service	29.95	4.69	-8.37	-326.01	-195.53	7.38
Dead+Wind 60 deg - Service	29.95	8.16	-4.81	-176.18	-341.40	12.86
Dead+Wind 90 deg - Service	29.95	9.53	0.01	26.85	-399.28	15.04
Dead+Wind 120 deg - Service	29.95	8.34	4.88	230.55	-348.06	13.00
Dead+Wind 150 deg - Service	29.95	4.74	8.29	373.79	-198.96	7.15
Dead+Wind 180 deg - Service	29.95	-0.02	9.51	424.46	0.56	-0.16
Dead+Wind 210 deg - Service	29.95	-4.75	8.27	372.31	197.93	-7.40
Dead+Wind 240 deg - Service	29.95	-8.34	4.87	229.26	346.98	-13.12
Dead+Wind 270 deg - Service	29.95	-9.54	0.01	26.16	399.34	-15.13
Dead+Wind 300 deg - Service	29.95	-8.21	-4.81	-176.76	343.52	-12.70
Dead+Wind 330 deg - Service	29.95	-4.72	-8.39	-327.35	196.93	-7.04

Solution Summary

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX* *K*	*PY* *K*	*PZ* *K*	*PX* *K*	*PY* *K*	*PZ* *K*	*% Error*
1	0.00	-29.95	0.00	0.00	29.95	0.00	0.000%
2	-0.03	-29.95	-28.26	0.03	29.95	28.26	0.000%
3	13.57	-29.95	-24.20	-13.57	29.95	24.20	0.000%
4	23.59	-29.95	-13.90	-23.59	29.95	13.90	0.000%
5	27.54	-29.95	0.02	-27.54	29.95	-0.02	0.000%
6	24.10	-29.95	14.10	-24.10	29.95	-14.10	0.000%
7	13.71	-29.95	23.97	-13.71	29.95	-23.97	0.000%
8	-0.07	-29.95	27.47	0.07	29.95	-27.47	0.000%
9	-13.73	-29.95	23.91	13.73	29.95	-23.91	0.000%
10	-24.11	-29.95	14.07	24.11	29.95	-14.07	0.000%
11	-27.58	-29.95	0.03	27.58	29.95	-0.03	0.000%
12	-23.72	-29.95	-13.90	23.72	29.95	13.90	0.000%
13	-13.65	-29.95	-24.24	13.65	29.95	24.24	0.000%
14	0.00	-42.70	0.00	0.00	42.70	0.00	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
15	0.00	-42.70	-7.81	-0.00	42.70	7.81	0.000%
16	3.61	-42.70	-6.40	-3.61	42.70	6.40	0.000%
17	6.22	-42.70	-3.58	-6.22	42.70	3.58	0.000%
18	7.32	-42.70	0.04	-7.32	42.70	-0.04	0.000%
19	6.70	-42.70	3.91	-6.70	42.70	-3.91	0.000%
20	3.68	-42.70	6.35	-3.68	42.70	-6.35	0.000%
21	0.05	-42.70	7.20	-0.05	42.70	-7.20	0.000%
22	-3.64	-42.70	6.34	3.64	42.70	-6.34	0.000%
23	-6.68	-42.70	3.90	6.68	42.70	-3.90	0.000%
24	-7.30	-42.70	0.02	7.30	42.70	-0.02	0.000%
25	-6.18	-42.70	-3.61	6.18	42.70	3.61	0.000%
26	-3.61	-42.70	-6.41	3.61	42.70	6.41	0.000%
27	-0.01	-29.95	-9.78	0.01	29.95	9.78	0.000%
28	4.69	-29.95	-8.37	-4.69	29.95	8.37	0.000%
29	8.16	-29.95	-4.81	-8.16	29.95	4.81	0.000%
30	9.53	-29.95	0.01	-9.53	29.95	-0.01	0.000%
31	8.34	-29.95	4.88	-8.34	29.95	-4.88	0.000%
32	4.74	-29.95	8.29	-4.74	29.95	-8.29	0.000%
33	-0.02	-29.95	9.51	0.02	29.95	-9.51	0.000%
34	-4.75	-29.95	8.27	4.75	29.95	-8.27	0.000%
35	-8.34	-29.95	4.87	8.34	29.95	-4.87	0.000%
36	-9.54	-29.95	0.01	9.54	29.95	-0.01	0.000%
37	-8.21	-29.95	-4.81	8.21	29.95	4.81	0.000%
38	-4.72	-29.95	-8.39	4.72	29.95	8.39	0.000%

Maximum Tower Deflections - Service Wind

Section No.	*Elevation ft*	*Horz. Deflection in*	*Gov. Load Comb.*	*Tilt °*	*Twist °*
T1	65 - 49.9271	0.893	31	0.0135	0.1130
T2	49.9271 - 41.9271	0.676	27	0.0129	0.0864
T3	41.9271 - 25.1667	0.524	27	0.0119	0.0645
T4	25.1667 - 0	0.043	32	0.0083	0.0046

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	*Appurtenance*	*Gov. Load Comb.*	*Deflection in*	*Tilt °*	*Twist °*	*Radius of Curvature ft*
65.00	Beacon	31	0.893	0.0135	0.1130	129713
62.50	(2) 7770.00 w/Mount Pipe	27	0.859	0.0135	0.1092	129713
61.50	5.7'x4.5" Pipe Mount	27	0.845	0.0135	0.1076	129713
60.50	6' Dish	27	0.831	0.0134	0.1060	129713
58.00	6.6'x4.5" Pipe Mount	27	0.796	0.0134	0.1020	92652
57.50	SPD2-5.8	27	0.789	0.0134	0.1011	86475
57.00	6' Dish	27	0.782	0.0133	0.1002	81071
56.50	9.5'x1.75" 4-Element Dipole	27	0.775	0.0133	0.0994	76302
56.00	7.7'x1.6" Pipe Mount	27	0.768	0.0133	0.0985	72063
54.50	21'x2.5" Omni	27	0.746	0.0132	0.0957	61737
52.50	7.25'x0.95" Omni	27	0.716	0.0131	0.0919	48175
51.50	9.25'x3.5" Omni	27	0.701	0.0130	0.0898	40009

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
50.50	10'x3" Omni	27	0.685	0.0129	0.0876	31882
46.50	PRFTV-48/75 Grid Dish	27	0.619	0.0125	0.0780	12154

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
T1	65 - 49.9271	2.599	2	0.0368	0.3265
T2	49.9271 - 41.9271	1.966	2	0.0350	0.2496
T3	41.9271 - 25.1667	1.522	2	0.0323	0.1863
T4	25.1667 - 0	0.123	6	0.0229	0.0134

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
65.00	Beacon	2	2.599	0.0368	0.3265	45147
62.50	(2) 7770.00 w/Mount Pipe	2	2.499	0.0367	0.3155	45147
61.50	5.7'x4.5" Pipe Mount	2	2.459	0.0366	0.3110	45147
60.50	6' Dish	2	2.419	0.0365	0.3064	45147
58.00	6.6'x4.5" Pipe Mount	2	2.316	0.0363	0.2946	32248
57.50	SPD2-5.8	2	2.296	0.0363	0.2922	30098
57.00	6' Dish	2	2.275	0.0362	0.2897	28217
56.50	9.5'x1.75" 4-Element Dipole	2	2.254	0.0362	0.2872	26557
56.00	7.7'x1.6" Pipe Mount	2	2.233	0.0361	0.2846	25082
54.50	21'x2.5" Omni	2	2.169	0.0359	0.2767	21488
52.50	7.25'x0.95" Omni	2	2.082	0.0356	0.2655	16761
51.50	9.25'x3.5" Omni	2	2.038	0.0354	0.2595	13913
50.50	10'x3" Omni	2	1.993	0.0352	0.2533	11080
46.50	PRFTV-48/75 Grid Dish	2	1.800	0.0340	0.2256	4216

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	65	Top Girt	A325N	1.2500	4	0.41	25.77	0.016 ✓	1.333	Bolt Shear
T3	41.9271	Leg	A572-50	2.2500	4	6.72	85.29	0.079 ✓	1.333	Bolt Tension
		Horizontal	A325N	1.0000	4	1.11	16.49	0.067 ✓	1.333	Bolt Shear
T4	25.1667	Leg	A572-50	2.2500	4	11.89	85.29	0.139 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	6	4.72	9.28	0.508 ✓	1.333	Bolt Shear
		Horizontal	A325N	1.2500	4	0.37	25.77	0.014 ✓	1	Bolt Shear

Section No.	*Elevation* *ft*	*Component Type*	*Bolt Grade*	*Bolt Size* *in*	*Number Of Bolts*	*Maximum Load per Bolt* *K*	*Allowable Load* *K*	*Ratio* $\frac{Load}{Allowable}$	*Allowable Ratio*	*Criteria*

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* $\frac{P}{P_a}$
T1	65 - 49.9271	15.5"Ø x 0.260 8-Sided Polygon	15.07	14.28	30.9 K=1.00	19.875	13.1302	-8.46	260.97	0.032
T2	49.9271 - 41.9271	15.5"Ø x 0.260 8-Sided Polygon	8.00	8.00	17.3 K=1.00	20.758	13.1302	-21.22	272.56	0.078
T3	41.9271 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	16.76	16.76	36.3 K=1.00	19.478	13.1302	-33.36	255.76	0.130
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	25.17	25.17	54.5 K=1.00	17.946	13.1302	-57.80	235.63	0.245

Leg Bending Design Data (Compression)

Section No.	*Elevation* *ft*	*Size*	*Actual* M_x *kip-ft*	*Actual* f_{bx} *ksi*	*Allow.* F_{bx} *ksi*	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Actual* M_y *kip-ft*	*Actual* f_{by} *ksi*	*Allow.* F_{by} *ksi*	*Ratio* $\frac{f_{by}}{F_{by}}$
T1	65 - 49.9271	15.5"Ø x 0.260 8-Sided Polygon	-31.18	-7.192	21.600	0.333	-10.81	-2.495	21.600	0.116
T2	49.9271 - 41.9271	15.5"Ø x 0.260 8-Sided Polygon	-41.43	-9.557	21.600	0.442	16.60	-3.830	21.600	0.177
T3	41.9271 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	-50.78	-11.714	21.600	0.542	-30.61	-7.061	21.600	0.327
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Leg Interaction Design Data (Compression)

Section No.	*Elevation* *ft*	*Size*	*Ratio* $\frac{P}{P_a}$	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Ratio* $\frac{f_{by}}{F_{by}}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
T1	65 - 49.9271	15.5"Ø x 0.260 8-Sided Polygon	0.032	0.333	0.116	0.481 ✓	1.333	H1-3 ✓
T2	49.9271 - 41.9271	15.5"Ø x 0.260 8-Sided Polygon	0.078	0.442	0.177	0.698 ✓	1.333	H1-3 ✓
T3	41.9271 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	0.130	0.542	0.327	1.000 ✓	1.333	H1-3 ✓

Section No.	*Elevation ft*	*Size*	*Ratio* $\frac{P}{P_a}$	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Ratio* $\frac{f_{by}}{F_{by}}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.245	0.000	0.000	0.245 ✓	1.333	H1-3 ✓

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* $\frac{P}{P_a}$
T4	25.1667 - 0	W6x25	29.31	13.40	105.8 K=1.00	12.234	7.3400	-28.29	89.80	0.315 ✓

Horizontal 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* $\frac{P}{P_a}$
T2	49.9271 - 41.9271	12.45"Ø x 0.265 8-Sided Polygon	15.03	13.74	37.2 K=1.00	19.408	10.7000	-0.04	207.67	0.000
T3	41.9271 - 25.1667	W10x30	15.03	13.74	120.3 K=1.00	32.500	6.3769	0.00	91.15	0.000
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	15.03	13.74	37.2 K=1.00	19.408	10.7000	-1.47	207.67	0.007*

* DL controls

Horizontal Bending Design Data

Section No.	*Elevation ft*	*Size*	*Actual* M_x *kip-ft*	*Actual* f_{bx} *ksi*	*Allow.* F_{bx} *ksi*	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Actual* M_y *kip-ft*	*Actual* f_{by} *ksi*	*Allow.* F_{by} *ksi*	*Ratio* $\frac{f_{by}}{F_{by}}$
T2	49.9271 - 41.9271	12.45"Ø x 0.265 8-Sided Polygon	-56.95	-21.923	21.600	1.015	-0.11	-0.042	21.600	0.002
T3	41.9271 - 25.1667	W10x30	-66.10	-24.481	20.618	1.187	0.04	-0.074	37.500	0.002
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Horizontal Interaction Design Data

Section No.	*Elevation ft*	*Size*	*Ratio* $\frac{P}{P_a}$	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Ratio* $\frac{f_{by}}{F_{by}}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
T2	49.9271 -	12.45"Ø x 0.265 8-Sided	0.000	1.015	0.002	1.017	1.333	H1-3 ✓

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	41.9271	Polygon				✓		
T3	41.9271 - 25.1667	W10x30	0.000	1.187	0.002	1.189 ✓	1.333	H1-3 ✓
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.007	0.000	0.000	0.007* ✓	1.000	H1-3 ✓

* DL controls

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	65 - 49.9271	12.45"Ø x 0.265 8-Sided Polygon	15.03	13.74	37.2 K=1.00	19.408	10.7000	-0.05	207.67	0.000

Top Girt Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	65 - 49.9271	12.45"Ø x 0.265 8-Sided Polygon	-29.76	-11.456	21.600	0.530	-0.08	-0.030	21.600	0.001

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	65 - 49.9271	12.45"Ø x 0.265 8-Sided Polygon	0.000	0.530	0.001	0.532 ✓	1.333	H1-3 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	65 - 49.9271	15.5"Ø x 0.260 8-Sided Polygon	15.07	14.28	30.9	21.600	13.1302	4.80	283.61	0.017

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 $\frac{P}{P_a}$
T2	49.9271 - 41.9271	15.5"Ø x 0.260 8-Sided Polygon	8.00	8.00	17.3	21.600	13.1302	10.48	283.61	0.037
T3	41.9271 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	16.76	16.76	36.3	21.600	13.1302	20.73	283.61	0.073
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	25.17	25.17	54.5	21.600	13.1302	47.55	283.61	0.168

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	65 - 49.9271	15.5"Ø x 0.260 8-Sided Polygon	29.52	6.810	21.600	0.315	-10.74	2.477	21.600	0.115
T2	49.9271 - 41.9271	15.5"Ø x 0.260 8-Sided Polygon	40.37	9.314	21.600	0.431	-16.66	3.844	21.600	0.178
T3	41.9271 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	50.34	11.613	21.600	0.538	-30.67	7.075	21.600	0.328
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	65 - 49.9271	15.5"Ø x 0.260 8-Sided Polygon	0.017	0.315	0.115	0.447 ✓	1.333	H2-1 ✓
T2	49.9271 - 41.9271	15.5"Ø x 0.260 8-Sided Polygon	0.037	0.431	0.178	0.646 ✓	1.333	H2-1 ✓
T3	41.9271 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	0.073	0.538	0.328	0.938 ✓	1.333	H2-1 ✓
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.168	0.000	0.000	0.168 ✓	1.333	H2-1 ✓

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 $\frac{P}{P_a}$
T4	25.1667 - 0	W6x25	29.31	13.40	105.8	29.000	5.2950	23.21	153.56	0.151 ✓

Horizontal 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* $\frac{P}{P_a}$
T2	49.9271 - 41.9271	12.45"Ø x 0.265 8-Sided Polygon	15.03	13.74	37.2	21.600	10.7000	1.68	231.12	0.007
T3	41.9271 - 25.1667	W10x30	15.03	13.74	120.3	32.500	6.3769	0.09	207.25	0.000
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	15.03	13.74	37.2	21.600	10.7000	1.04	231.12	0.005*

* DL controls

Horizontal Bending Design Data

Section No.	*Elevation* *ft*	*Size*	*Actual* M_x *kip-ft*	*Actual* f_{bx} *ksi*	*Allow.* F_{bx} *ksi*	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Actual* M_y *kip-ft*	*Actual* f_{by} *ksi*	*Allow.* F_{by} *ksi*	*Ratio* $\frac{f_{by}}{F_{by}}$
T2	49.9271 - 41.9271	12.45"Ø x 0.265 8-Sided Polygon	-49.82	19.180	21.600	0.888	-0.07	0.027	21.600	0.001
T3	41.9271 - 25.1667	W10x30	-66.10	24.481	20.618	1.187	0.04	0.074	37.500	0.002
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Horizontal Interaction Design Data

Section No.	*Elevation* *ft*	*Size*	*Ratio* $\frac{P}{P_a}$	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Ratio* $\frac{f_{by}}{F_{by}}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
T2	49.9271 - 41.9271	12.45"Ø x 0.265 8-Sided Polygon	0.007	0.888	0.001	0.896 ✓	1.333	H2-1 ✓
T3	41.9271 - 25.1667	W10x30	0.000	1.187	0.002	1.190 ✓	1.333	H2-1 ✓
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.005	0.000	0.000	0.005* ✓	1.000	H2-1 ✓

* DL controls

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	65 - 49.9271	12.45"Ø x 0.265 8-Sided Polygon	15.03	13.74	37.2	21.600	10.7000	0.74	231.12	0.003

Top Girt Bending Design Data

Section No.	*Elevation* *ft*	*Size*	*Actual* M_x *kip-ft*	*Actual* f_{bx} *ksi*	*Allow.* F_{bx} *ksi*	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Actual* M_y *kip-ft*	*Actual* f_{by} *ksi*	*Allow.* F_{by} *ksi*	*Ratio* $\frac{f_{by}}{F_{by}}$
T1	65 - 49.9271	12.45"Ø x 0.265 8-Sided Polygon	-26.65	10.259	21.600	0.475	-0.06	0.022	21.600	0.001

Top Girt Interaction Design Data

Section No.	*Elevation* *ft*	*Size*	*Ratio* $\frac{P}{P_a}$	*Ratio* $\frac{f_{bx}}{F_{bx}}$	*Ratio* $\frac{f_{by}}{F_{by}}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
T1	65 - 49.9271	12.45"Ø x 0.265 8-Sided Polygon	0.003	0.475	0.001	0.479 ✓	1.333	H2-1 ✓

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P* *K*	SF^*P_{allow} *K*	*% Capacity*	*Pass Fail*
T1	65 - 49.9271	Leg	15.5"Ø x 0.260 8-Sided Polygon	1	-8.46	347.87	36.1	Pass
		Top Girt	12.45"Ø x 0.265 8-Sided Polygon	4	0.74	308.08	39.9	Pass
T2	49.9271 - 41.9271	Leg	15.5"Ø x 0.260 8-Sided Polygon	8	-21.22	363.33	52.3	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	10	1.68	308.08	76.3	Pass
T3	41.9271 - 25.1667	Leg	15.5"Ø x 0.260 8-Sided Polygon	13	-33.36	340.92	75.0	Pass
		Horizontal	W10x30	16	0.09	276.26	89.3	Pass
T4	25.1667 - 0	Leg	15.5"Ø x 0.260 8-Sided Polygon	20	-57.80	314.10	18.4	Pass
		Diagonal	W6x25	25	-28.29	119.70	23.6 38.1 (b)	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	23	-1.47	207.67	0.7 1.1 (b)	Pass
							Summary	
						Leg (T3)	75.0	Pass
						Diagonal (T4)	38.1	Pass
						Horizontal (T3)	89.3	Pass
						Top Girt (T1)	39.9	Pass
						Bolt Checks	38.1	Pass
						RATING =	**89.3**	**Pass**

FDH

Project: Danbury, SNET005-A
Sheet 1 of 1
By: MSG
Checked By:
Date:
FDH Project #:
Drawing #:

Overturning:

$$FS = \frac{(P + W_c + \cancelto{0}{W_s})(L/2)}{M + V(d)} = \frac{(43\ k + 140\ k)(21.6\ ft/2)}{1,180\ k\text{-}ft + 28\ k\ (2.5\ ft)}$$

$$= 1.6 > 1.5 \ \underline{OK} \qquad 1.5/1.6 = \boxed{93.8\%}$$

Toe Pressure:

$$q_uH = 25\ KSF$$

$$\frac{M}{S} + \frac{P}{A} \Rightarrow S = \frac{I}{y} = \frac{11,197.4\ ft^4}{13} = 861.3\ ft^3$$

$$\sigma = \frac{1,180\ k\text{-}ft}{861.3\ ft^3} + \frac{43\ k}{357.2\ ft^2} = 1.49\ ksf$$

$$\frac{1.49\ ksf}{0.5(25\ ksf)} = \boxed{11.9\%}$$