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Also admitted in Massachusetts

October 3, 2013

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

Re: **Notice of Exempt Modification – Antenna Swap**
219 New Park Avenue, Hartford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 105-foot level of the existing 108-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 2009 (Petition No. 889). Cellco now intends to replace six (6) of its antennas with three (3) model BXA-70063-6CF cellular antennas and three (3) model BXA-171063-12BF AWS antennas, at the same level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its antennas and one (1) HYBRIFLEX™ antenna cable, attached to the outside of the monopole tower. Included in Attachment 1 are specifications for the 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 Pedro E. Segarra, Mayor of the City of Hartford. A copy of this letter is also being sent to Connecticut Light & Power, the owner of the property on which the tower is located.

The proposed 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 replacement antennas and RRHs will be located at the 105-foot level of the 108-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 modified facility 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 at the modified facility are included in Attachment 2. These tables indicate that Cellco's modified facility will operate well within the FCC standards for RF emissions.

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, with certain modifications, can support Cellco's proposed modifications. (*See* Structural Analysis Report 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:
Pedro E. Segarra, Hartford Mayor
Connecticut Light & Power
Sandy Carter

ATTACHMENT 1

Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

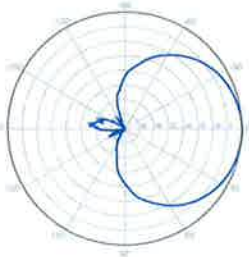
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m^2 Side: 0.24 m^2	Front: 5.5 ft^2 Side: 2.6 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

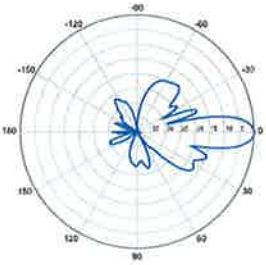
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



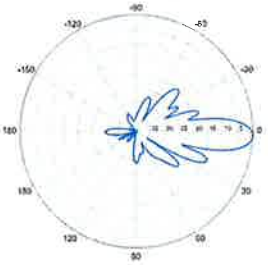
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

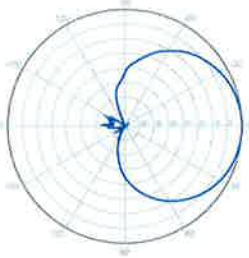


0° | Vertical | 750 MHz

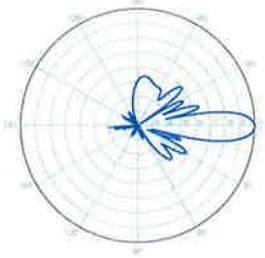
BXA-70063-6CF-EDIN-2



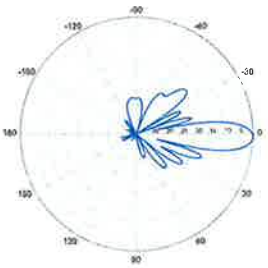
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

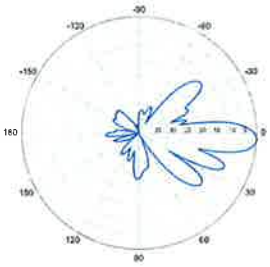


2° | Vertical | 850 MHz

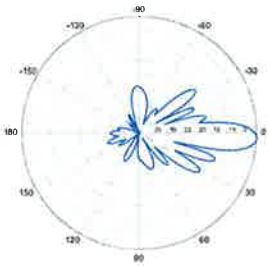
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

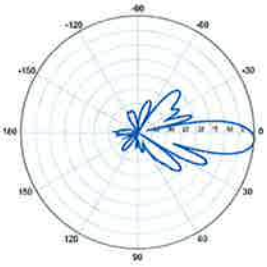


3° | Vertical | 750 MHz

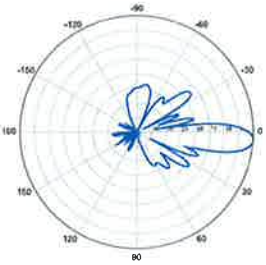


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

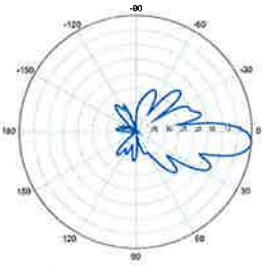


4° | Vertical | 750 MHz

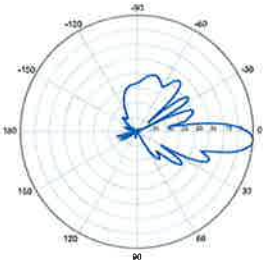


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5

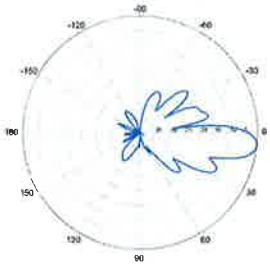


5° | Vertical | 750 MHz

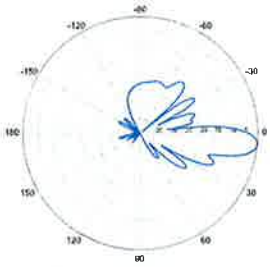


5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6

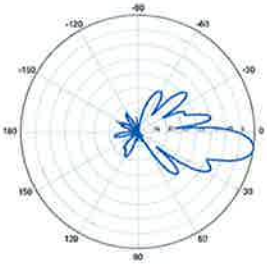


6° | Vertical | 750 MHz

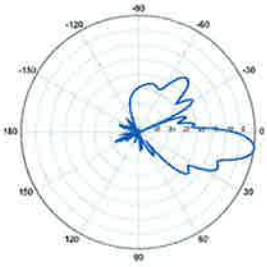


6° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-8

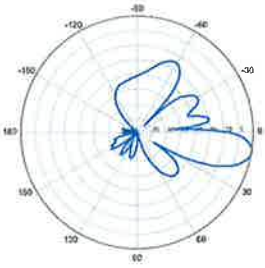


8° | Vertical | 750 MHz

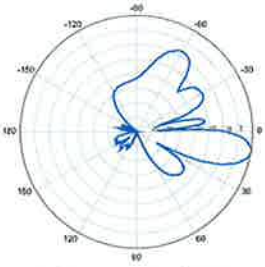


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

BXA-171063-12BF-EDIN-X

Replace "X" with desired electrical downtilt.

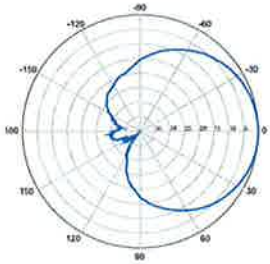
X-Pol | FET Panel | 63° | 19.0 dBi

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, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	> 28 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

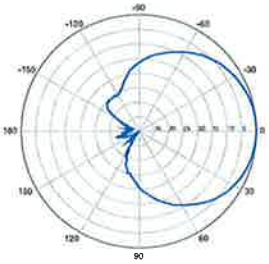
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12BF-EDIN-X-FP		

BXA-171063-12BF-EDIN-X



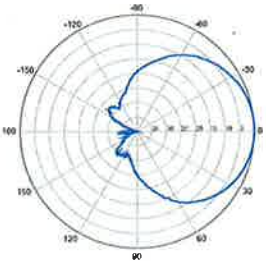
Horizontal | 1710-1880 MHz

BXA-171063-12BF-EDIN-X



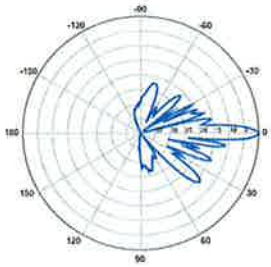
Horizontal | 1850-1990 MHz

BXA-171063-12BF-EDIN-X



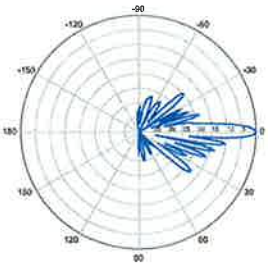
Horizontal | 1920-2170 MHz

BXA-171063-12BF-EDIN-0



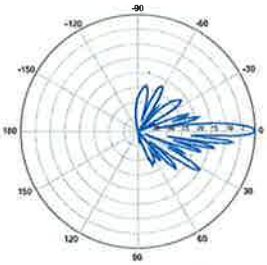
0° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-0

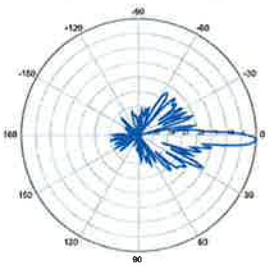


0° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-X

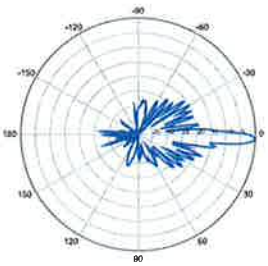
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12BF-EDIN-2



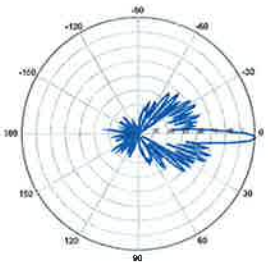
2° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-2



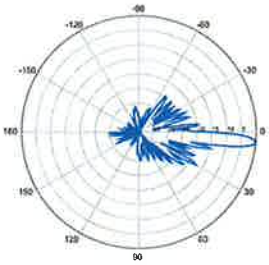
2° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-2



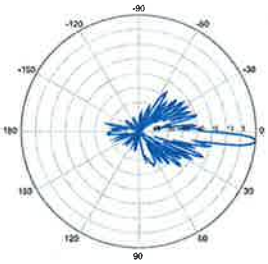
2° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-5



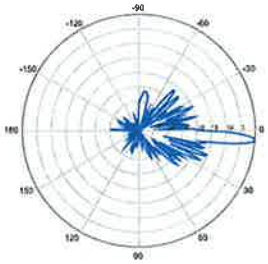
5° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-5

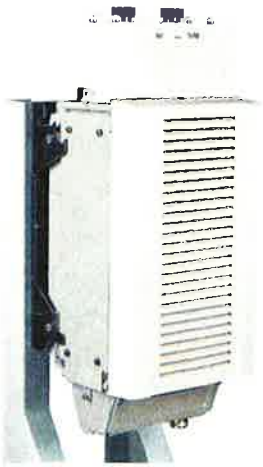


5° | Vertical | 1920-2170 MHz

Alcatel-Lucent 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

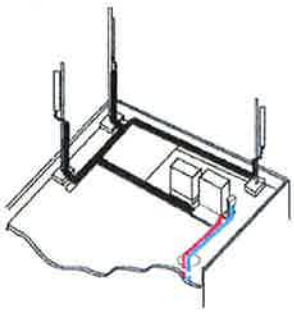
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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

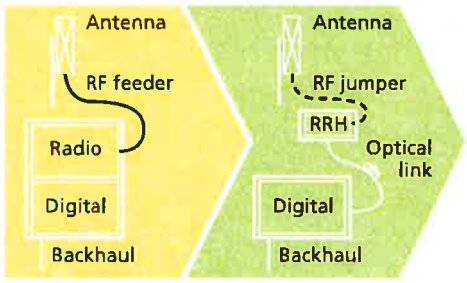
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

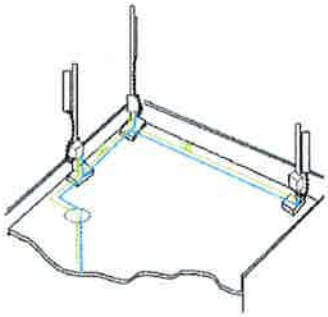
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Structure			
Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-93-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environment			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

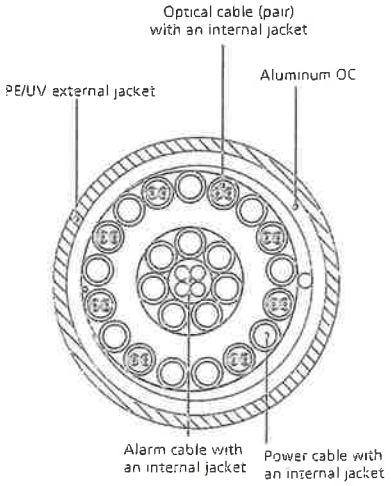


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Far Field Approximation
with downtilt variation

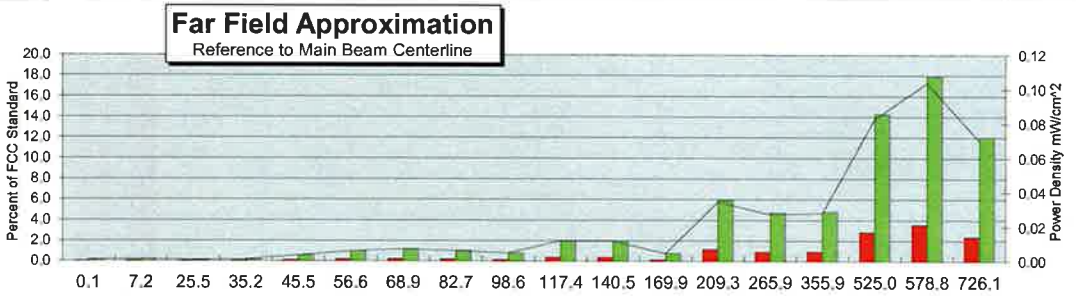
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	WEST HARTFORD 4, CT
Site #:	8-0292
Date:	09/26/13
Name:	Ryan Ulanday
File Name:	WEST HARTFORD 4, CT - FF

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**105.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**71.0**
Downtilt (degrees):	**6.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3699.0**



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	86.0	76.0	71.0	66.0	61.0	56.0	51.0	46.0	41.0	36.0	31.0	26.0	21.0	16.0	11.0	10.0	8.0	
Solve for r, dx to antenna	102.0	102.3	105.1	107.9	111.7	116.7	123.1	131.3	141.9	155.5	173.6	198.1	232.8	284.8	370.2	534.8	587.7	733.3	
Distance from Antenna Structure Base in Horizontal plane	0.1	7.2	25.5	35.2	45.5	56.6	68.9	82.7	98.6	117.4	140.5	169.9	209.3	265.9	355.9	525.0	578.8	726.1	#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	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.03	0.03	0.03	0.08	0.10	0.07	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.4	0.2	1.2	0.9	1.0	2.9	3.6	2.4	#NUM!
Percent of General Population Standard	0.1	0.2	0.1	0.2	0.6	1.0	1.2	1.0	0.8	2.0	2.0	0.8	5.9	4.7	4.8	14.3	17.9	12.0	#NUM!

Antenna Type BXA-70063-6CF-6-750MHz
Max% 17.91%

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 Pov
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

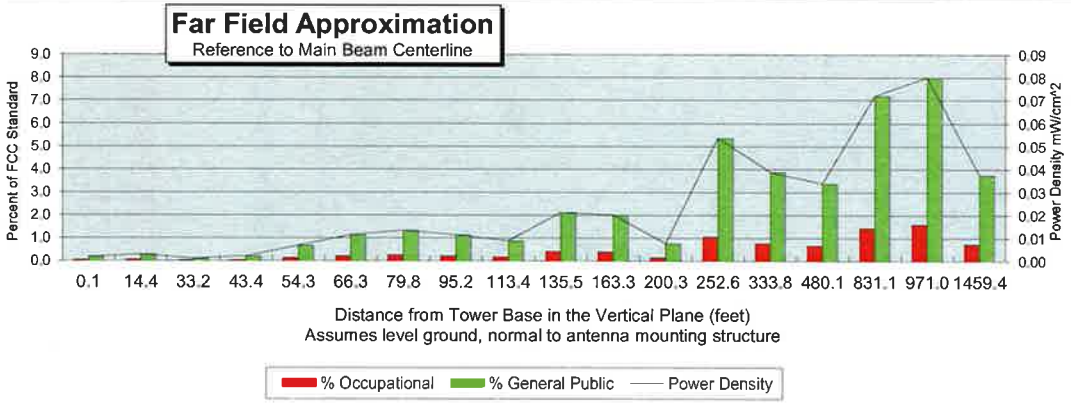
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	WEST HARTFORD 4, CT
Site #:	8-0292
Date:	09/26/13
Name:	Ryan Ulanday
File Name:	WEST HARTFORD 4, CT - FF

Operating Freq. (MHz)	**1971.0**
Antenna Height (ft):	**105.0**
Antenna Gain (dBi):	**18.7**
Antenna Size (in.):	**71.7**
Downtilt (degrees):	**2.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**4972.0**



This approximation is only valid in the far field, which begins at: 63.8 Feet

Enter Main Beam Distance in feet below:

Calc Angle	90.0	82.0	72.0	67.0	62.0	57.0	52.0	47.0	42.0	37.0	32.0	27.0	22.0	17.0	12.0	7.0	6.0	4.0	
Solve for r, dx to antenna	102.0	103.0	107.3	110.8	115.6	121.7	129.5	139.5	152.5	169.6	192.6	224.8	272.4	349.0	490.8	837.4	976.3	1463.0	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.4	33.2	43.4	54.3	66.3	79.8	95.2	113.4	135.5	163.3	200.3	252.6	333.8	480.1	831.1	971.0	1459.4	#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	0.07	0.08	0.04	#NUM!
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.4	0.4	0.2	1.1	0.8	0.7	1.4	1.6	0.7	#NUM!
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.7	1.1	1.3	1.1	0.9	2.1	2.0	0.8	5.4	3.9	3.4	7.2	8.0	3.7	#NUM!

Antenna Type BXA-171063-12BF-EDIN-2
Max% 8.01%

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 Pov
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

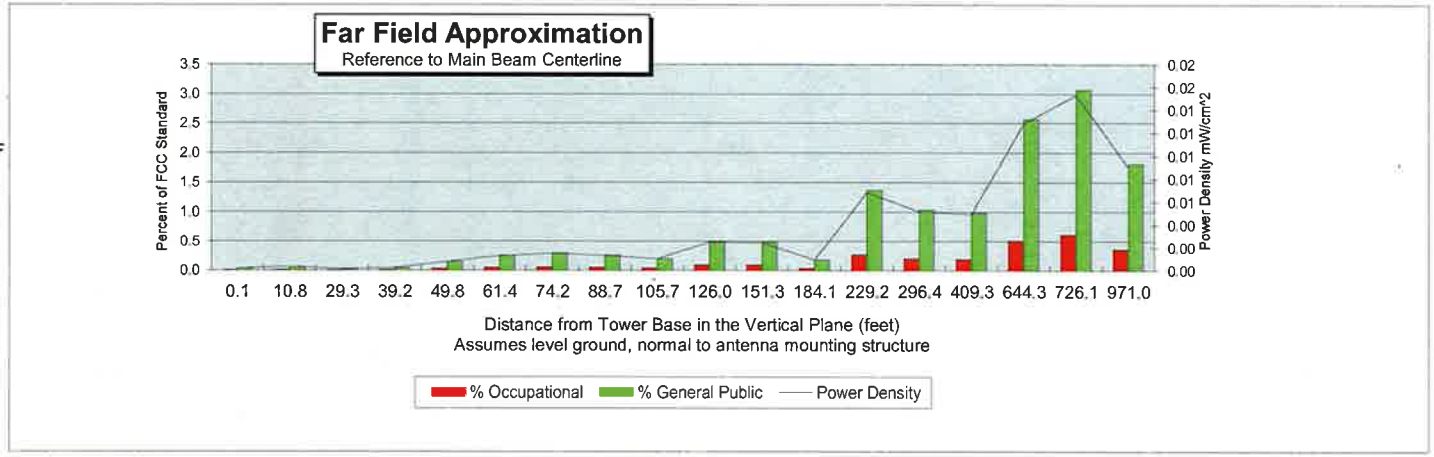
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	WEST HARTFORD 4, CT
Site #:	8-0292
Date:	09/26/13
Name:	Ryan Ulanday
File Name:	WEST HARTFORD 4, CT - FF

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**105.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**71.1**
Downtilt (degrees):	**4.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**849.0**



This approximation is only valid in the far field, which begins at: 62.7 Feet

Enter Main Beam Distance in feet below:

Calc Angle	90.0	84.0	74.0	69.0	64.0	59.0	54.0	49.0	44.0	39.0	34.0	29.0	24.0	19.0	14.0	9.0	8.0	6.0	
Solve for r, dx to antenna	102.0	102.6	106.1	109.3	113.5	119.0	126.1	135.2	146.9	162.1	182.5	210.5	250.9	313.5	421.8	652.4	733.3	976.3	
Distance from Antenna Structure Base in Horizontal plane	0.1	10.8	29.3	39.2	49.8	61.4	74.2	88.7	105.7	126.0	151.3	184.1	229.2	296.4	409.3	644.3	726.1	971.0	#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	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.02	0.01	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.3	0.2	0.2	0.5	0.6	0.4	#NUM!
Percent of General Population Standard	0.0	0.1	0.0	0.0	0.1	0.3	0.3	0.3	0.2	0.5	0.5	0.2	1.4	1.0	1.0	2.6	3.1	1.8	#NUM!

Antenna Type BXA-70063-6CF-4-750MHz
Max% 3.08%

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 Pov
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

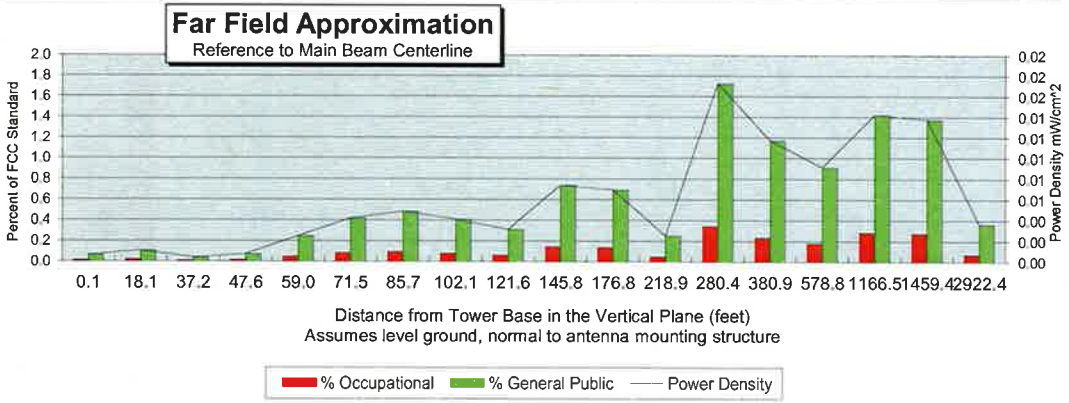
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	WEST HARTFORD 4, CT
Site #:	8-0292
Date:	09/26/13
Name:	Ryan Ulanday
File Name:	WEST HARTFORD 4, CT - FF

Operating Freq. (MHz)	**1710.0**
Antenna Height (ft):	**105.0**
Antenna Gain (dBi):	**19.1**
Antenna Size (in.):	**71.7**
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: 63.8 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	102.0	103.6	108.6	112.6	117.8	124.6	133.2	144.3	158.8	177.9	204.1	241.5	298.4	394.3	587.7	1170.9	1463.0	2924.2	
Distance from Antenna Structure Base in Horizontal plane	0.1	18.1	37.2	47.6	59.0	71.5	85.7	102.1	121.6	145.8	176.8	218.9	280.4	380.9	578.8	1166.5	1459.4	2922.4	#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	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.3	0.3	0.1	#NUM!
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.5	0.4	0.3	0.7	0.7	0.3	1.7	1.2	0.9	1.4	1.4	0.4	#NUM!

Antenna Type BXA-171063-12BF-EDIN-2
Max% 1.72%

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 Pov
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

July 26, 2013

Sean Dempsey
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
(704) 405-6565

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
ctuttle@btgrp.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	118004
	Carrier Site Name:	West Hartford 4
Crown Castle Designation:	**Crown Castle BU Number:**	876363
	Crown Castle Site Name:	HARTFORD - NU (SSUSA)
	Crown Castle JDE Job Number:	239274
	Crown Castle Work Order Number:	632149
	Crown Castle Application Number:	193728 Rev. 0
Engineering Firm Designation:	**B+T Group Project Number:**	85565.004.01
Site Data:	**219 New Park Rd., HARTFORD, Hartford County, CT** **Latitude *41° 45' 2.79"*, Longitude *-72° 42' 49.23"*** **108 Foot - Monopole Tower**	

Dear Sean Dempsey,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 563348, in accordance with application 193728, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC4.7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2003 IBC; 2003 IRC (State Building Code, 2005 CT supplement) based upon a wind speed of 80 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *B+T Group* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:
B+T Engineering, Inc.

STATE OF CONNECTICUT
CHAD TUTTLE
No. 23924
LICENSED
PROFESSIONAL ENGINEER
7/26/13

Jennifer Barnat
Project Engineer

Chad E. Tuttle, P.E.
President

tnxTower Report - version 6.0.4.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 108 ft. Monopole tower designed by Summit in October of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
105.0	105.0	3	Alcatel Lucent	RRH2X40-AWS	1	1 5/8	--
		3	Antel	BXA-171063-12BF			
		3	Antel	BXA-70063/6CF			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
105.0	105.0	**6**	**Antel**	**LPA-80063-6CF-EDIN**	--	--	**3**
		3	Antel	BXA-171063-12BF	18	1 5/8	1
		3	Antel	BXA-70063-6CF-EDIN-0			
		1	--	Sector Mount [SM 405-3]			
98.0	102.0	1	Dragonwave	A-ANT-18G-2-C	2 3 5	1/2 5/16 1 1/4	1
		1	Dragonwave	A-ANT-23G-1-C			
		2	Dragonwave	HORIZON COMPACT			
	99.0	3	Argus	LLPX310R			
		2	Decibel	DB950F65E-M			
		4	Decibel	DB980H65T2E-M			
		1	RFS Celwave	APXV9ERR18-C-A20	4	1 1/4	2
		2	RFS Celwave	APXVSPP18-C-A20			
		3	RFS Celwave	IBC1900BB-1			
		3	RFS Celwave	IBC1900HG-2A			
		3	Samsung	WIMAX DAP HEAD	--	--	1
	98.0	1	--	Platform Mount [LP 712-1]			
96.0	96.0	3	Alcatel Lucent	800MHz 2X50W RRH W/FILTER	--	--	2
		6	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz			
		1	--	Side Arm Mount [SO 103-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
88.0	88.0	12	Decibel	844G65VTZAS	12	1 1/4	1
		1	--	Platform Mount [LP 303-1]			
81.0	81.0	1	--	T-Arm Mount [TA 601-3]	6	7/8	1
	80.0	3	Andrew	HBX-6516DS-VTM	1	5/16	
74.0	78.0	1	Lucent	KS24019-L112A	1	1/2	1
	74.0	1	--	Side Arm Mount [SO 702-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) **Equipment To Be Removed**

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
98	98	1	--	14' Low Profile Platform	--	--
		12	Dapa	48000 PCS Panel		
88	88	1	--	14' Low Profile Platform	--	--
		12	Dapa	48000 PCS Panel		
76	76		GPS	Antenna w/ Mount	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate Revision#0	193728	CCI Sites
Tower Manufacturing Drawing	Summit, Job No.11049	1947570	CCI Sites
Post Modification Inspection Report	PJF/TRI, Project No: 67310-0013	2445631	CCI Sites
Post Modification Inspection Report	PJF Report No:67309-0057	2445632	CCI Sites
Tower Modification Drawings	B+T Group, Project No:85565.001	3348853	CCI Sites
Foundation Drawing	Summit, Job No.11049	1613616	CCI Sites
Geotech Report	FDH, Project No: 08-10012e G1	2337384	CCI Sites
Antenna Configuration	Crown CAD Package	Date:07/18/2013	CCI Sites

3.1) Analysis Method

TnxTower (version 6.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) Mount areas and weights are assumed based on photographs provided.
6) The existing base plate grout was not considered in this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	108 - 98.5	Pole	TP8.625x8.625x0.313	1	-1.570	228.444	67.9	Pass
L2	98.5 - 98	Pole	TP16.5x8.625x0.313	2	-1.575	228.444	19.2	Pass
L3	98 - 82.25	Pole	TP19.021x16.5x0.313	3	-7.267	964.692	57.9	Pass
L4	82.25 - 76.75	Pole	TP19.901x19.021x0.49	4	-8.941	1255.166	58.4	Pass
L5	76.75 - 60.5	Pole	TP22.502x19.901x0.683	5	-12.370	1702.881	72.2	Pass
L6	60.5 - 59.5	Pole	TP22.662x22.502x0.852	6	-12.664	2111.245	60.4	Pass
L7	59.5 - 47	Pole	TP24.663x22.662x0.826	7	-15.427	2287.734	66.3	Pass
L8	47 - 29.75	Pole	TP26.901x23.518x0.756	8	-22.309	2355.891	86.0	Pass
L9	29.75 - 13.083	Pole	TP29.651x26.901x0.739	9	-27.835	2740.835	86.0	Pass
L10	13.083 - 10	Pole	TP30.16x29.651x0.715	10	-28.893	2708.283	97.5	Pass
L11	10 - 0	Pole	TP31.81x30.16x0.753	11	-32.552	3107.623	97.1	Pass
							Summary	
						Pole (L10)	97.5	Pass
						Rating =	97.5	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	77.1	Pass
1	Base Plate	Base	81.8	Pass
1	Base Foundation	Base	58.0	Pass
1	Flange Connection	98	29.1	Pass

Structure Rating (max from all components) =	97.5%

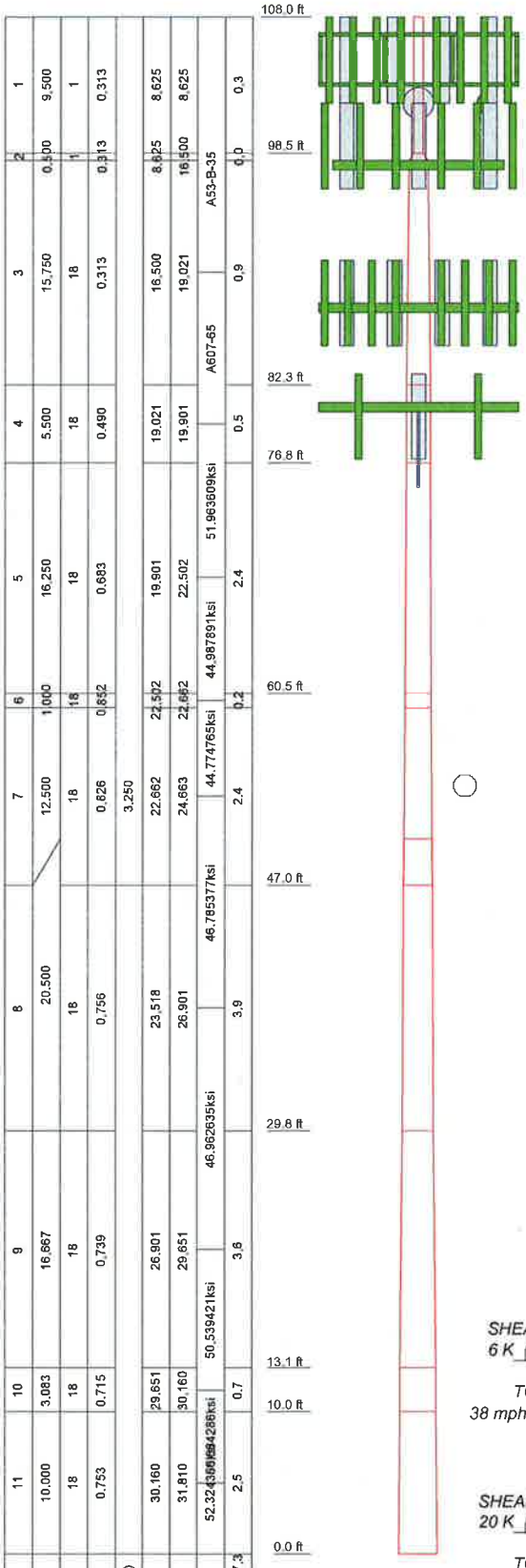
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. For the determined structural capacity to be effective the modifications proposed in document 3348853 (B+T mod drawings, Dated 10/15/2012) shall be installed prior to any loading changes.

APPENDIX A

TNXTOWER OUTPUT



Section	1	2	3	4	5	6	7	8	9	10	11
Length (ft)	9.500	0.500	15.750	5.500	16.250	1.000	12.500	20.500	16.667	3.083	10.000
Number of Sides	1	1	18	18	18	18	18	18	18	18	18
Thickness (in)	0.313	0.313	0.313	0.490	0.683	0.832	0.826	0.756	0.739	0.715	0.753
Socket Length (ft)							3.250				
Top Dia (in)	8.625	8.625	16.500	19.021	19.901	22.502	22.662	23.518	26.901	29.651	30.160
Bot Dia (in)	8.625	16.500	19.021	19.901	22.502	22.662	24.663	26.901	29.651	30.160	31.810
Grade	A53-B-35		A607-65		51.963609ksi	44.987891ksi	44.774765ksi	46.785377ksi	46.962635ksi	50.539421ksi	52.324365ksi
Weight (K)	0.3	0.0	0.9	0.5	2.4	0.2	2.4	3.9	3.6	0.7	2.5

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-70063/6CF w/ Mount Pipe (P)	105	IBC1900HG-2A (R)	98
		IBC1900HG-2A (R)	98
BXA-70063/6CF w/ Mount Pipe (P)	105	LLPX310R w/ Mount Pipe (E)	98
		LLPX310R w/ Mount Pipe (E)	98
BXA-70063/6CF w/ Mount Pipe (P)	105	LLPX310R w/ Mount Pipe (E)	98
		WIMAX DAP HEAD (E)	98
BXA-171063-12BF w/ Mount Pipe (P)	105	WIMAX DAP HEAD (E)	98
		WIMAX DAP HEAD (E)	98
BXA-171063-12BF w/ Mount Pipe (P)	105	HORIZON COMPACT (E)	98
		HORIZON COMPACT (E)	98
BXA-171063-12BF w/ Mount Pipe (P)	105	Platform Mount [LP 712-1] (E)	98
RRH2X40-AWS (P)	105	A-ANT-18G-2-C (E)	98
RRH2X40-AWS (P)	105	A-ANT-23G-1-C (E)	98
RRH2X40-AWS (P)	105	(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe (R)	96
DB-T1-6Z-8AB-0Z (P)	105		
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	105	800MHz 2X50W RRH W/FILTER (R)	96
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	105	800MHz 2X50W RRH W/FILTER (R)	96
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	105	800MHz 2X50W RRH W/FILTER (R)	96
BXA-171063-12BF w/ Mount Pipe (E)	105	Side Arm Mount [SO 103-3] (R)	96
		(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe (R)	96
BXA-171063-12BF w/ Mount Pipe (E)	105		
BXA-171063-12BF w/ Mount Pipe (E)	105	(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe (R)	96
		(4) 844G65VTZAS w/ Mount Pipe (E)	88
Sector Mount [SM 405-3] (E)	105		
(2) DB980H65T2E-M w/ Mount Pipe (E)	98	Platform Mount [LP 303-1] (E)	88
		(4) 844G65VTZAS w/ Mount Pipe (E)	88
(2) DB950F65E-M w/ Mount Pipe (E)	98	(4) 844G65VTZAS w/ Mount Pipe (E)	88
(2) DB980H65T2E-M w/ Mount Pipe (E)	98	HBX-6516DS-VTM w/ Mount Pipe (E)	81
APXV9ERR18-C-A20 w/ Mount Pipe (R)	98	6' x 2" Mount Pipe (E)	81
APXVSPP18-C-A20 w/ Mount Pipe (R)	98	6' x 2" Mount Pipe (E)	81
		6' x 2" Mount Pipe (E)	81
APXVSPP18-C-A20 w/ Mount Pipe (R)	98	T-Arm Mount [TA 601-3]	81
		HBX-6516DS-VTM w/ Mount Pipe (E)	81
IBC1900BB-1 (R)	98		
IBC1900BB-1 (R)	98	HBX-6516DS-VTM w/ Mount Pipe (E)	81
IBC1900BB-1 (R)	98		
IBC1900HG-2A (R)	98	KS24019-L112A (E)	74
		Side Arm Mount [SO 702-1] (E)	74

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	46.785377ksi	47 ksi	62 ksi
A607-65	65 ksi	80 ksi	46.962635ksi	47 ksi	62 ksi
51.963609ksi	52 ksi	67 ksi	50.539421ksi	51 ksi	66 ksi
44.987891ksi	45 ksi	60 ksi	50.664286ksi	51 ksi	66 ksi
44.774765ksi	45 ksi	60 ksi	52.324365ksi	52 ksi	67 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 97.5%

B+T Group
1717 South Boulder Ave, Suite 300
Tulsa, OK - 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

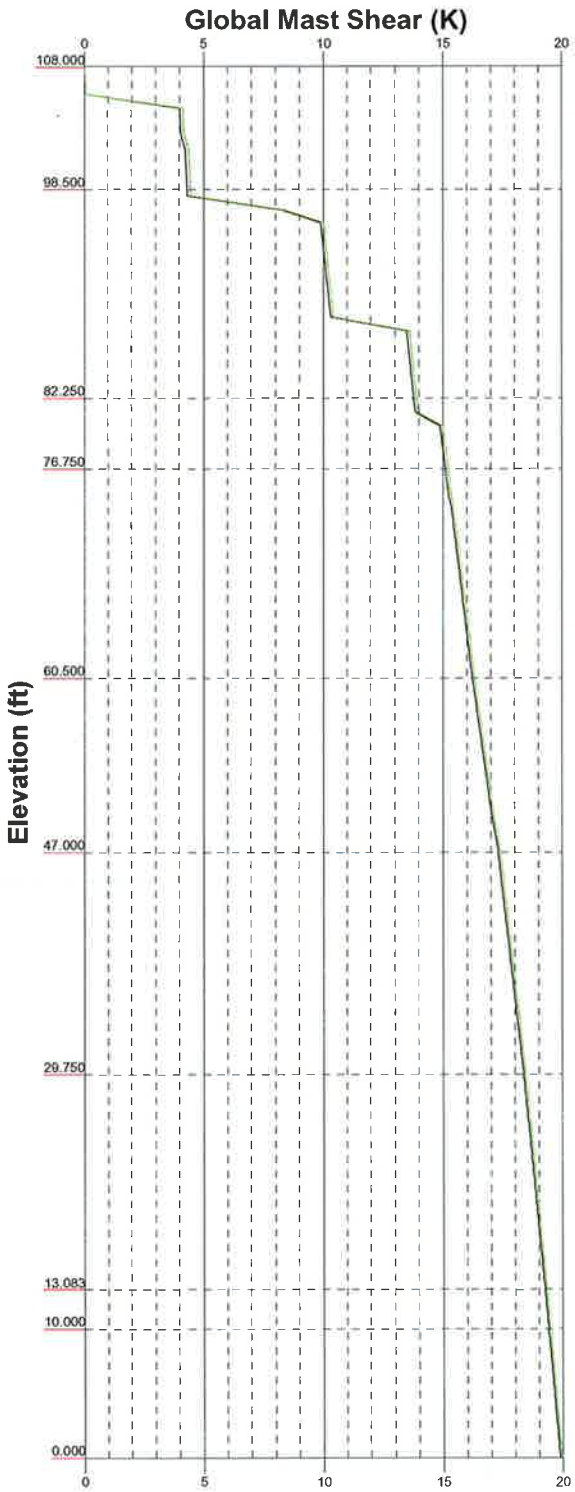
Job: 85565.004.01- Hartford-NU,CT (BU#876363			
Project:			
Client: Crown Castle	Drawn by: JBarnat	App'd:	
Code: TIA/EIA-222-F	Date: 07/26/13	Scale: NTS	
Path:		Dwg No. E-1	

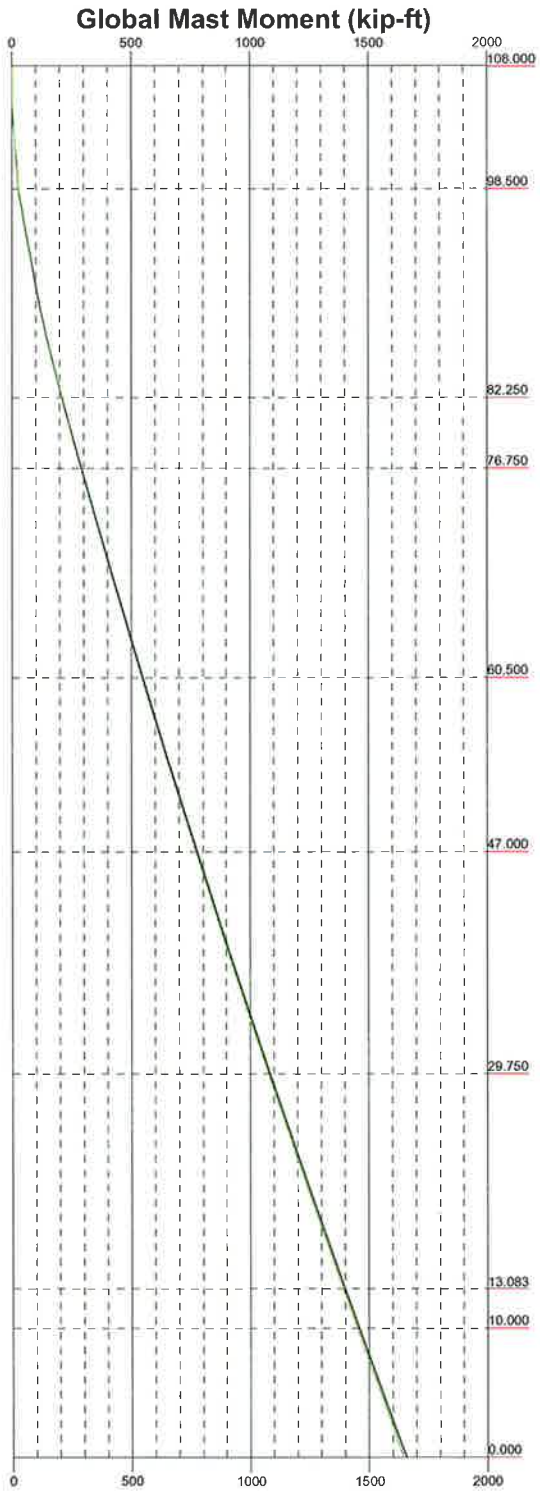
TIA/EIA-222-F - 80 mph/38 mph 1.000 in Ice

Vx Vz

Maximum Values

Mx Mz





B+T Group
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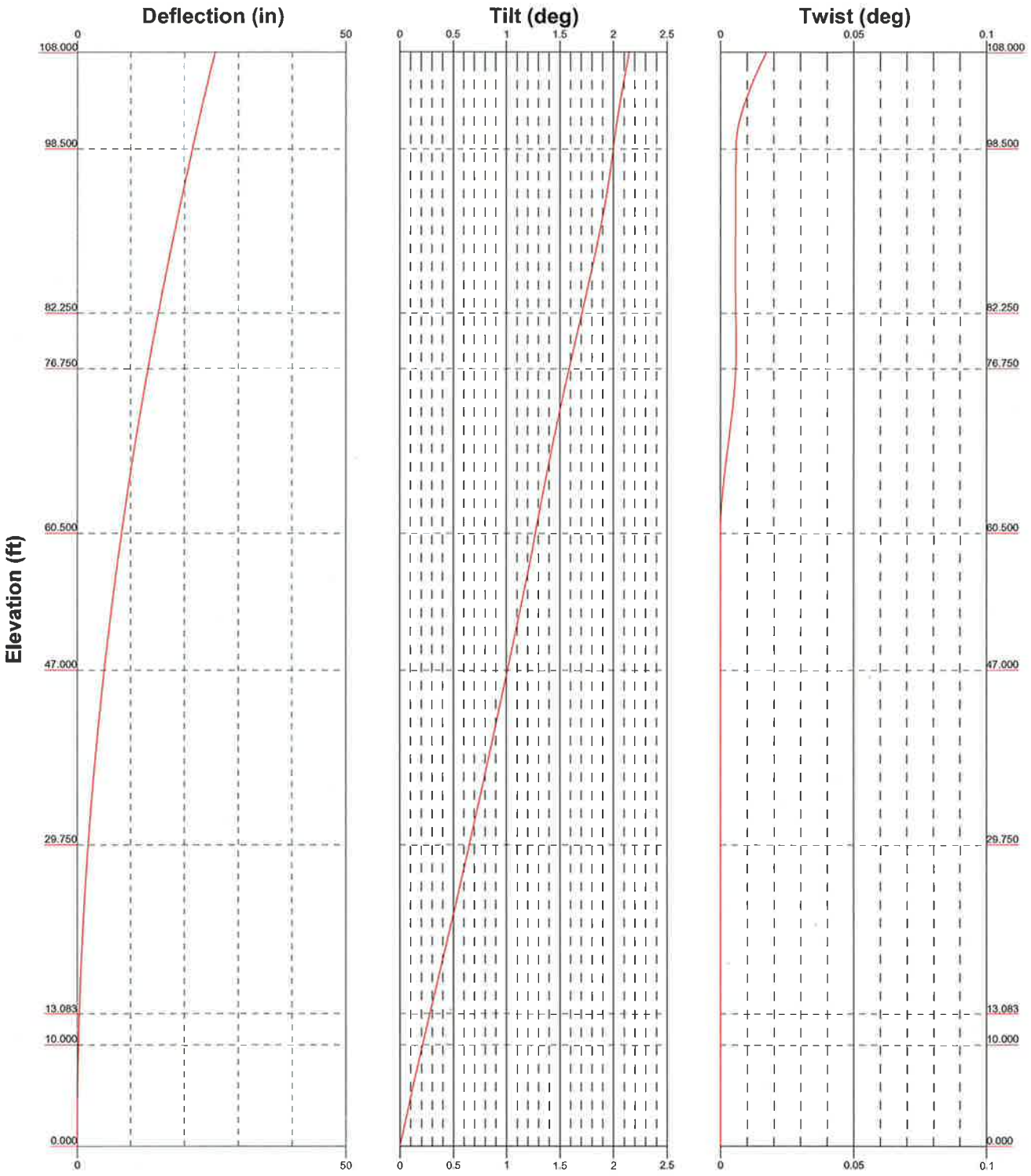
Tulsa, OK - 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: 85565.004.01- Hartford-NU,CT (BU#87636			
Project:			
Client: Crown Castle	Drawn by: JBarnat	App'd:	
Code: TIA/EIA-222-F	Date: 07/26/13	Scale: NTS	
Path:		Dwg No. E-4	

TIA/EIA-222-F - Service - 50 mph

Maximum Values



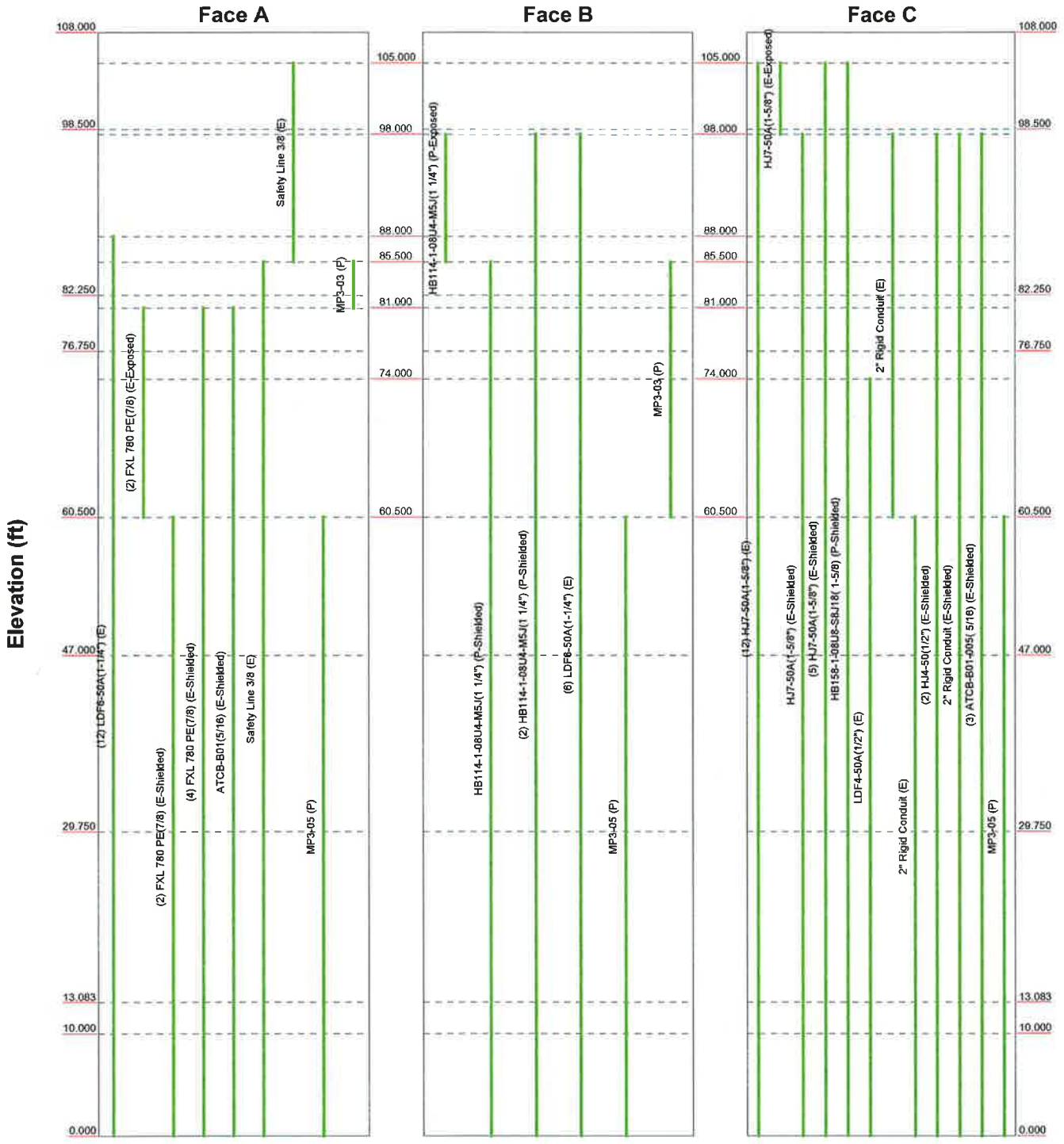
B+T GRP

B+T Group
1717 South Boulder Ave, Suite 300
Tulsa, OK - 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: *85565.004.01- Hartford-NU,CT (BU#87636*			
Project:			
Client: Crown Castle	Drawn by: JBarnat	App'd:	
Code: TIA/EIA-222-F	Date: 07/26/13	Scale: NTS	
Path:		Dwg No. E-5	

Feedline Distribution Chart
0' - 108'

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



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Phone: (918) 587-4630
FAX: (918) 295-0265

Job: *85565.004.01- Hartford-NU,CT (BU#876363*			
Project:			
Client: Crown Castle	Drawn by: JBarnat	App'd:	
Code: TIA/EIA-222-F	Date: 07/26/13	Scale: NTS	
Path:		Dwg No. E-7	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.000 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 50 mph.
TOWER RATING: 97.5%.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	108.000-98.500	9.500	0.000	Round	8.625	8.625	0.313		A53-B-35 (35 ksi)
L2	98.500-98.000	0.500	0.000	Round	8.625	16.500	0.313		A53-B-35 (35 ksi)
L3	98.000-82.250	15.750	0.000	18	16.500	19.021	0.313	1.250	A607-65 (65 ksi)
L4	82.250-76.750	5.500	0.000	18	19.021	19.901	0.490	1.961	51.963609ksi (52 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L5	76.750-60.500	16.250	0.000	18	19.901	22.502	0.683	2.734	44.987891ksi (45 ksi)
L6	60.500-59.500	1.000	0.000	18	22.502	22.662	0.852	3.407	44.774765ksi (45 ksi)
L7	59.500-47.000	12.500	3.250	18	22.662	24.663	0.826	3.304	46.785377ksi (47 ksi)
L8	47.000-29.750	20.500	0.000	18	23.518	26.901	0.756	3.023	46.962635ksi (47 ksi)
L9	29.750-13.083	16.667	0.000	18	26.901	29.651	0.739	2.956	50.539421ksi (51 ksi)
L10	13.083-10.000	3.083	0.000	18	29.651	30.160	0.715	2.861	50.664286ksi (51 ksi)
L11	10.000-0.000	10.000		18	30.160	31.810	0.753	3.013	52.324365ksi (52 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	8.625	8.161	70.540	2.943	4.313	16.357	140.889	4.078	0.000	0
	8.625	8.161	70.540	2.943	4.313	16.357	140.889	4.078	0.000	0
L2	8.625	8.161	70.540	2.943	4.313	16.357	140.889	4.078	0.000	0
	16.500	15.892	520.933	5.730	8.250	63.143	1040.447	7.941	0.000	0
L3	16.755	16.056	531.537	5.747	8.382	63.414	1063.774	8.030	2.354	7.533
	19.314	18.556	820.552	6.641	9.663	84.920	1642.184	9.280	2.798	8.953
L4	19.314	28.831	1250.797	6.578	9.663	129.447	2503.240	14.418	2.485	5.069
	20.208	30.201	1437.661	6.891	10.110	142.204	2877.214	15.103	2.640	5.385
L5	20.208	41.685	1945.040	6.822	10.110	192.391	3892.640	20.847	2.300	3.365
	22.849	47.327	2846.473	7.746	11.431	249.011	5696.692	23.668	2.758	4.035
L6	22.849	58.523	3465.794	7.686	11.431	303.189	6936.149	29.267	2.462	2.89
	23.012	58.956	3543.230	7.743	11.512	307.774	7091.122	29.483	2.490	2.923
L7	23.012	57.256	3449.147	7.752	11.512	299.602	6902.832	28.634	2.535	3.068
	25.043	62.502	4486.751	8.462	12.529	358.115	8979.406	31.257	2.887	3.494
L8	24.425	54.607	3574.392	8.081	11.947	299.186	7153.487	27.308	2.809	3.716
	27.316	62.722	5416.656	9.281	13.666	396.373	10840.440	31.367	3.404	4.504
L9	27.316	61.356	5305.556	9.287	13.666	388.243	10618.094	30.684	3.434	4.648
	30.108	67.807	7160.940	10.264	15.063	475.408	14331.302	33.910	3.918	5.303
L10	30.108	65.681	6947.890	10.272	15.063	461.263	13904.923	32.847	3.960	5.537
	30.625	66.836	7320.846	10.453	15.321	477.825	14651.325	33.424	4.049	5.662
L11	30.625	70.312	7681.652	10.439	15.321	501.375	15373.412	35.163	3.982	5.286
	32.301	74.258	9048.780	11.025	16.159	559.967	18109.466	37.136	4.273	5.672

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
L1				1	1	1		
108.000-98.500								
L2				1	1	1		
98.500-98.000								
L3				1	1	1		
98.000-82.250								
L4				1	1	0.933614		

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
82.250-76.750								
L5				1	1	0.967696		
76.750-60.500								
L6				1	1	0.91861		
60.500-59.500								
L7				1	1	0.932896		
59.500-47.000								
L8				1	1	0.953002		
47.000-29.750								
L9				1	1	0.970277		
29.750-13.083								
L10				1	1	0.991927		
13.083-10.000								
L11				1	1	1.00334		
10.000-0.000								

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
**										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight klf
HJ7-50A(1-5/8") (E)	C	No	Inside Pole	105.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HJ7-50A(1-5/8") (E-Exposed)	C	No	CaAa (Out Of Face)	105.000 - 98.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.003
						1" Ice	0.398	0.005
						2" Ice	0.598	0.011
						4" Ice	0.998	0.030
HJ7-50A(1-5/8") (E-Shielded)	C	No	CaAa (Out Of Face)	98.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.005
						2" Ice	0.000	0.011
						4" Ice	0.000	0.030
HJ7-50A(1-5/8") (E-Shielded)	C	No	CaAa (Out Of Face)	105.000 - 0.000	5	No Ice	0.000	0.001
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.005
						2" Ice	0.000	0.011
						4" Ice	0.000	0.030
HB158-1-08U8-S8J18(1-5/8) (P-Shielded)	C	No	CaAa (Out Of Face)	105.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.005
						2" Ice	0.000	0.011

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						4" Ice	0.000	0.031
/								
HB114-1-08U4-M5J(1 1/4") (P-Exposed)	B	No	CaAa (Out Of Face)	98.000 - 85.500	1	No Ice	0.154	0.001
						1/2" Ice	0.254	0.002
						1" Ice	0.354	0.004
						2" Ice	0.554	0.010
						4" Ice	0.954	0.028
HB114-1-08U4-M5J(1 1/4") (P-Shielded)	B	No	CaAa (Out Of Face)	85.500 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.028
HB114-1-08U4-M5J(1 1/4") (P-Shielded)	B	No	CaAa (Out Of Face)	98.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.028
LDF6-50A(1-1/4") (E)	B	No	Inside Pole	98.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF4-50A(1/2") (E)	C	No	Inside Pole	74.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
2" Rigid Conduit (E)	C	No	CaAa (Out Of Face)	98.000 - 60.500	1	No Ice	0.200	0.003
						1/2" Ice	0.300	0.004
						1" Ice	0.400	0.006
						2" Ice	0.600	0.013
						4" Ice	1.000	0.032
2" Rigid Conduit (E)	C	No	CaAa (Out Of Face)	60.500 - 0.000	1	No Ice	0.000	0.003
						1/2" Ice	0.000	0.004
						1" Ice	0.000	0.006
						2" Ice	0.000	0.013
						4" Ice	0.000	0.032
HJ4-50(1/2") (E-Shielded)	C	No	CaAa (Out Of Face)	98.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.007
						4" Ice	0.000	0.023
2" Rigid Conduit (E-Shielded)	C	No	CaAa (Out Of Face)	98.000 - 0.000	1	No Ice	0.000	0.003
						1/2" Ice	0.000	0.004
						1" Ice	0.000	0.006
						2" Ice	0.000	0.013
						4" Ice	0.000	0.032
ATCB-B01-005(5/16) (E-Shielded)	C	No	CaAa (Out Of Face)	98.000 - 0.000	3	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.006
						4" Ice	0.000	0.021
/								
LDF6-50A(1-1/4") (E)	A	No	Inside Pole	88.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
/								
FXL 780 PE(7/8) (E-Exposed)	A	No	CaAa (Out Of Face)	81.000 - 60.500	2	No Ice	0.109	0.000
						1/2" Ice	0.209	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						1" Ice	0.309	0.003
						2" Ice	0.509	0.008
						4" Ice	0.909	0.025
FXL 780 PE(7/8) (E-Shielded)	A	No	CaAa (Out Of Face)	60.500 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
						2" Ice	0.000	0.008
						4" Ice	0.000	0.025
FXL 780 PE(7/8) (E-Shielded)	A	No	CaAa (Out Of Face)	81.000 - 0.000	4	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
						2" Ice	0.000	0.008
						4" Ice	0.000	0.025
ATCB-B01(5/16) (E-Shielded)	A	No	CaAa (Out Of Face)	81.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.006
						4" Ice	0.000	0.021
/								
Safety Line 3/8 (E)	A	No	Inside Pole	85.500 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
Safety Line 3/8 (E)	A	No	CaAa (Out Of Face)	105.000 - 85.500	1	No Ice	0.037	0.000
						1/2" Ice	0.137	0.001
						1" Ice	0.238	0.001
						2" Ice	0.437	0.002
						4" Ice	0.838	0.004
/								
MP3-05 (P)	C	No	CaAa (Out Of Face)	60.500 - 0.000	1	No Ice	0.348	0.019
						1/2" Ice	0.432	0.021
						1" Ice	0.515	0.023
						2" Ice	0.682	0.029
						4" Ice	1.015	0.044
MP3-05 (P)	B	No	CaAa (Out Of Face)	60.500 - 0.000	1	No Ice	0.348	0.019
						1/2" Ice	0.432	0.021
						1" Ice	0.515	0.023
						2" Ice	0.682	0.029
						4" Ice	1.015	0.044
MP3-05 (P)	A	No	CaAa (Out Of Face)	60.500 - 0.000	1	No Ice	0.348	0.019
						1/2" Ice	0.432	0.021
						1" Ice	0.515	0.023
						2" Ice	0.682	0.029
						4" Ice	1.015	0.044
MP3-03 (P)	A	No	CaAa (Out Of Face)	85.500 - 81.000	1	No Ice	0.262	0.010
						1/2" Ice	0.345	0.015
						1" Ice	0.428	0.020
						2" Ice	0.595	0.040
						4" Ice	0.928	0.080
MP3-03 (P)	B	No	CaAa (Out Of Face)	85.500 - 60.500	1	No Ice	0.262	0.010
						1/2" Ice	0.345	0.015
						1" Ice	0.428	0.020
						2" Ice	0.595	0.040
						4" Ice	0.928	0.080
**								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	108.000-98.500	A	0.000	0.000	0.000	0.244	0.001
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.287	0.130
L2	98.500-98.000	A	0.000	0.000	0.000	0.019	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.099	0.010
L3	98.000-82.250	A	0.000	0.000	0.000	1.319	0.081
		B	0.000	0.000	0.000	2.775	0.146
		C	0.000	0.000	0.000	3.150	0.415
L4	82.250-76.750	A	0.000	0.000	0.000	1.254	0.064
		B	0.000	0.000	0.000	1.439	0.094
		C	0.000	0.000	0.000	1.100	0.145
L5	76.750-60.500	A	0.000	0.000	0.000	3.542	0.158
		B	0.000	0.000	0.000	4.252	0.278
		C	0.000	0.000	0.000	3.250	0.430
L6	60.500-59.500	A	0.000	0.000	0.000	0.348	0.029
		B	0.000	0.000	0.000	0.348	0.026
		C	0.000	0.000	0.000	0.348	0.046
L7	59.500-47.000	A	0.000	0.000	0.000	4.354	0.362
		B	0.000	0.000	0.000	4.354	0.330
		C	0.000	0.000	0.000	4.354	0.571
L8	47.000-29.750	A	0.000	0.000	0.000	6.009	0.499
		B	0.000	0.000	0.000	6.009	0.456
		C	0.000	0.000	0.000	6.009	0.789
L9	29.750-13.083	A	0.000	0.000	0.000	5.806	0.482
		B	0.000	0.000	0.000	5.806	0.440
		C	0.000	0.000	0.000	5.806	0.762
L10	13.083-10.000	A	0.000	0.000	0.000	1.074	0.089
		B	0.000	0.000	0.000	1.074	0.081
		C	0.000	0.000	0.000	1.074	0.141
L11	10.000-0.000	A	0.000	0.000	0.000	3.483	0.289
		B	0.000	0.000	0.000	3.483	0.264
		C	0.000	0.000	0.000	3.483	0.457

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	108.000-98.500	A	1.147	0.000	0.000	0.000	1.734	0.009
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	2.778	0.336
L2	98.500-98.000	A	1.140	0.000	0.000	0.000	0.133	0.001
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.213	0.026
L3	98.000-82.250	A	1.128	0.000	0.000	0.000	4.750	0.137
		B		0.000	0.000	0.000	6.206	0.367
		C		0.000	0.000	0.000	6.703	1.221
L4	82.250-76.750	A	1.111	0.000	0.000	0.000	3.374	0.167
		B		0.000	0.000	0.000	2.458	0.223
		C		0.000	0.000	0.000	2.322	0.419
L5	76.750-60.500	A	1.092	0.000	0.000	0.000	10.637	0.484
		B		0.000	0.000	0.000	7.208	0.648
		C		0.000	0.000	0.000	6.797	1.217
L6	60.500-59.500	A	1.074	0.000	0.000	0.000	0.527	0.053
		B		0.000	0.000	0.000	0.527	0.041
		C		0.000	0.000	0.000	0.527	0.097

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
L7	59.500-47.000	A	1.059	0.000	0.000	0.000	6.560	0.654
		B		0.000	0.000	0.000	6.560	0.514
		C		0.000	0.000	0.000	6.560	1.201
L8	47.000-29.750	A	1.018	0.000	0.000	0.000	9.053	0.902
		B		0.000	0.000	0.000	9.053	0.710
		C		0.000	0.000	0.000	9.053	1.658
L9	29.750-13.083	A	1.000	0.000	0.000	0.000	8.584	0.833
		B		0.000	0.000	0.000	8.584	0.664
		C		0.000	0.000	0.000	8.584	1.522
L10	13.083-10.000	A	1.000	0.000	0.000	0.000	1.588	0.154
		B		0.000	0.000	0.000	1.588	0.123
		C		0.000	0.000	0.000	1.588	0.282
L11	10.000-0.000	A	1.000	0.000	0.000	0.000	5.150	0.500
		B		0.000	0.000	0.000	5.150	0.398
		C		0.000	0.000	0.000	5.150	0.913

Feed Line Center of Pressure

Section	Elevation ft	CP_X Ice in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	108.000-98.500	-0.144	0.052	-0.197	-0.028
L2	98.500-98.000	-0.210	0.075	-0.300	-0.043
L3	98.000-82.250	-0.022	0.117	-0.021	0.085
L4	82.250-76.750	0.056	0.003	0.016	-0.133
L5	76.750-60.500	0.058	0.014	0.017	-0.171
L6	60.500-59.500	0.000	0.000	0.000	0.000
L7	59.500-47.000	0.000	0.000	0.000	0.000
L8	47.000-29.750	0.000	0.000	0.000	0.000
L9	29.750-13.083	0.000	0.000	0.000	0.000
L10	13.083-10.000	0.000	0.000	0.000	0.000
L11	10.000-0.000	0.000	0.000	0.000	0.000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
BXA-70063/6CF w/ Mount Pipe (P)	A	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.979 8.621 9.228 10.473 13.082	5.407 6.558 7.422 9.198 12.952	0.042 0.098 0.166 0.328 0.788
BXA-70063/6CF w/ Mount Pipe (P)	B	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.979 8.621 9.228 10.473 13.082	5.407 6.558 7.422 9.198 12.952	0.042 0.098 0.166 0.328 0.788

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-70063/6CF w/ Mount Pipe (P)	C	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.979 8.621 9.228 10.473 13.082	5.407 6.558 7.422 9.198 12.952	0.042 0.098 0.166 0.328 0.788
BXA-171063-12BF w/ Mount Pipe (P)	A	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.971 5.521 6.036 7.091 9.359	5.228 6.389 7.261 9.046 12.817	0.040 0.083 0.137 0.271 0.671
BXA-171063-12BF w/ Mount Pipe (P)	B	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.971 5.521 6.036 7.091 9.359	5.228 6.389 7.261 9.046 12.817	0.040 0.083 0.137 0.271 0.671
BXA-171063-12BF w/ Mount Pipe (P)	C	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.971 5.521 6.036 7.091 9.359	5.228 6.389 7.261 9.046 12.817	0.040 0.083 0.137 0.271 0.671
RRH2X40-AWS (P)	A	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.522 2.753 2.993 3.499 4.615	1.589 1.795 2.010 2.465 3.479	0.044 0.061 0.082 0.132 0.275
RRH2X40-AWS (P)	B	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.522 2.753 2.993 3.499 4.615	1.589 1.795 2.010 2.465 3.479	0.044 0.061 0.082 0.132 0.275
RRH2X40-AWS (P)	C	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.522 2.753 2.993 3.499 4.615	1.589 1.795 2.010 2.465 3.479	0.044 0.061 0.082 0.132 0.275
DB-T1-6Z-8AB-0Z (P)	A	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.600 5.915 6.240 6.914 8.365	2.333 2.558 2.791 3.284 4.373	0.044 0.080 0.120 0.213 0.455
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.969 8.609 9.216 10.459 13.066	5.801 6.953 7.819 9.601 13.366	0.042 0.100 0.170 0.335 0.803
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.969 8.609 9.216 10.459 13.066	5.801 6.953 7.819 9.601 13.366	0.042 0.100 0.170 0.335 0.803
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.969 8.609 9.216 10.459 13.066	5.801 6.953 7.819 9.601 13.366	0.042 0.100 0.170 0.335 0.803
BXA-171063-12BF w/ Mount Pipe	A	From Leg	4.000 0.000	0.000	105.000	No Ice 1/2" Ice	4.971 5.521	5.228 6.389	0.040 0.083

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(E)			0.000			1" Ice	6.036	7.261	0.137
						2" Ice	7.091	9.046	0.271
						4" Ice	9.359	12.817	0.671
BXA-171063-12BF w/ Mount Pipe	B	From Leg	4.000	0.000	105.000	No Ice	4.971	5.228	0.040
			0.000			1/2" Ice	5.521	6.389	0.083
(E)			0.000			1" Ice	6.036	7.261	0.137
						2" Ice	7.091	9.046	0.271
						4" Ice	9.359	12.817	0.671
BXA-171063-12BF w/ Mount Pipe	C	From Leg	4.000	0.000	105.000	No Ice	4.971	5.228	0.040
			0.000			1/2" Ice	5.521	6.389	0.083
(E)			0.000			1" Ice	6.036	7.261	0.137
						2" Ice	7.091	9.046	0.271
						4" Ice	9.359	12.817	0.671
Sector Mount [SM 405-3]	C	None		0.000	105.000	No Ice	18.730	18.730	0.861
(E)						1/2" Ice	27.190	27.190	1.262
						1" Ice	35.650	35.650	1.664
						2" Ice	52.570	52.570	2.467
						4" Ice	86.410	86.410	4.074
/									
(2) DB980H65T2E-M w/ Mount Pipe	A	From Leg	4.000	0.000	98.000	No Ice	4.036	3.619	0.030
			0.000			1/2" Ice	4.499	4.481	0.064
(E)			1.000			1" Ice	4.947	5.219	0.107
						2" Ice	5.870	6.744	0.216
						4" Ice	8.046	9.995	0.549
(2) DB950F65E-M w/ Mount Pipe	B	From Leg	4.000	0.000	98.000	No Ice	6.362	5.661	0.038
			0.000			1/2" Ice	6.907	6.545	0.090
(E)			1.000			1" Ice	7.438	7.306	0.153
						2" Ice	8.532	8.949	0.302
						4" Ice	10.841	12.536	0.723
(2) DB980H65T2E-M w/ Mount Pipe	C	From Leg	4.000	0.000	98.000	No Ice	4.036	3.619	0.030
			0.000			1/2" Ice	4.499	4.481	0.064
(E)			1.000			1" Ice	4.947	5.219	0.107
						2" Ice	5.870	6.744	0.216
						4" Ice	8.046	9.995	0.549
APXV9ERR18-C-A20 w/ Mount Pipe	A	From Leg	4.000	0.000	98.000	No Ice	8.498	7.471	0.088
			0.000			1/2" Ice	9.149	8.656	0.155
(R)			1.000			1" Ice	9.767	9.556	0.235
						2" Ice	11.031	11.388	0.421
						4" Ice	13.679	15.527	0.935
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000	0.000	98.000	No Ice	8.498	6.946	0.083
			0.000			1/2" Ice	9.149	8.127	0.148
(R)			1.000			1" Ice	9.767	9.021	0.225
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000	0.000	98.000	No Ice	8.498	6.946	0.083
			0.000			1/2" Ice	9.149	8.127	0.148
(R)			1.000			1" Ice	9.767	9.021	0.225
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
IBC1900BB-1	A	From Leg	4.000	0.000	98.000	No Ice	1.127	0.533	0.022
(R)			0.000			1/2" Ice	1.273	0.647	0.030
			1.000			1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900BB-1	B	From Leg	4.000	0.000	98.000	No Ice	1.127	0.533	0.022
(R)			0.000			1/2" Ice	1.273	0.647	0.030
			1.000			1" Ice	1.427	0.770	0.039

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	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900BB-1	C	From Leg	4.000	0.000	98.000	No Ice	1.127	0.533	0.022
(R)			0.000			1/2" Ice	1.273	0.647	0.030
			1.000			1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900HG-2A	A	From Leg	4.000	0.000	98.000	No Ice	1.127	0.533	0.022
(R)			0.000			1/2" Ice	1.273	0.647	0.030
			1.000			1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900HG-2A	B	From Leg	4.000	0.000	98.000	No Ice	1.127	0.533	0.022
(R)			0.000			1/2" Ice	1.273	0.647	0.030
			1.000			1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900HG-2A	C	From Leg	4.000	0.000	98.000	No Ice	1.127	0.533	0.022
(R)			0.000			1/2" Ice	1.273	0.647	0.030
			1.000			1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
LLPX310R w/ Mount Pipe	A	From Leg	4.000	0.000	98.000	No Ice	5.065	2.985	0.045
(E)			0.000			1/2" Ice	5.480	3.528	0.081
			1.000			1" Ice	5.905	4.087	0.125
						2" Ice	6.788	5.314	0.232
						4" Ice	8.705	8.133	0.544
LLPX310R w/ Mount Pipe	B	From Leg	4.000	0.000	98.000	No Ice	5.065	2.985	0.045
(E)			0.000			1/2" Ice	5.480	3.528	0.081
			1.000			1" Ice	5.905	4.087	0.125
						2" Ice	6.788	5.314	0.232
						4" Ice	8.705	8.133	0.544
LLPX310R w/ Mount Pipe	C	From Leg	4.000	0.000	98.000	No Ice	5.065	2.985	0.045
(E)			0.000			1/2" Ice	5.480	3.528	0.081
			1.000			1" Ice	5.905	4.087	0.125
						2" Ice	6.788	5.314	0.232
						4" Ice	8.705	8.133	0.544
WIMAX DAP HEAD	A	From Leg	4.000	0.000	98.000	No Ice	1.804	0.778	0.033
(E)			0.000			1/2" Ice	1.988	0.918	0.045
			1.000			1" Ice	2.180	1.067	0.058
						2" Ice	2.589	1.391	0.094
						4" Ice	3.512	2.143	0.201
WIMAX DAP HEAD	B	From Leg	4.000	0.000	98.000	No Ice	1.804	0.778	0.033
(E)			0.000			1/2" Ice	1.988	0.918	0.045
			1.000			1" Ice	2.180	1.067	0.058
						2" Ice	2.589	1.391	0.094
						4" Ice	3.512	2.143	0.201
WIMAX DAP HEAD	C	From Leg	4.000	0.000	98.000	No Ice	1.804	0.778	0.033
(E)			0.000			1/2" Ice	1.988	0.918	0.045
			1.000			1" Ice	2.180	1.067	0.058
						2" Ice	2.589	1.391	0.094
						4" Ice	3.512	2.143	0.201
HORIZON COMPACT	A	From Leg	4.000	0.000	98.000	No Ice	0.841	0.429	0.012
(E)			0.000			1/2" Ice	0.966	0.525	0.018
			4.000			1" Ice	1.099	0.629	0.026
						2" Ice	1.392	0.863	0.048
						4" Ice	2.082	1.435	0.122

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
HORIZON COMPACT	B	From Leg	4.000	0.000	98.000	No Ice	0.841	0.429	0.012
(E)			0.000			1/2" Ice	0.966	0.525	0.018
			4.000			1" Ice	1.099	0.629	0.026
						2" Ice	1.392	0.863	0.048
						4" Ice	2.082	1.435	0.122
Platform Mount [LP 712-1]	C	None		0.000	98.000	No Ice	24.530	24.530	1.335
(E)						1/2" Ice	29.940	29.940	1.646
						1" Ice	35.350	35.350	1.956
						2" Ice	46.170	46.170	2.577
						4" Ice	67.810	67.810	3.820
/									
(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe	A	From Leg	4.000	0.000	96.000	No Ice	3.637	4.036	0.082
			0.000			1/2" Ice	4.202	4.772	0.118
			0.000			1" Ice	4.690	5.386	0.163
(R)						2" Ice	5.709	6.668	0.271
						4" Ice	7.925	9.446	0.585
(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe	B	From Leg	4.000	0.000	96.000	No Ice	3.637	4.036	0.082
			0.000			1/2" Ice	4.202	4.772	0.118
			0.000			1" Ice	4.690	5.386	0.163
(R)						2" Ice	5.709	6.668	0.271
						4" Ice	7.925	9.446	0.585
(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe	C	From Leg	4.000	0.000	96.000	No Ice	3.637	4.036	0.082
			0.000			1/2" Ice	4.202	4.772	0.118
			0.000			1" Ice	4.690	5.386	0.163
(R)						2" Ice	5.709	6.668	0.271
						4" Ice	7.925	9.446	0.585
800MHz 2X50W RRH W/FILTER	A	From Leg	4.000	0.000	96.000	No Ice	2.401	2.254	0.064
			0.000			1/2" Ice	2.613	2.460	0.086
(R)			0.000			1" Ice	2.833	2.675	0.111
						2" Ice	3.300	3.132	0.172
						4" Ice	4.337	4.148	0.338
800MHz 2X50W RRH W/FILTER	B	From Leg	4.000	0.000	96.000	No Ice	2.401	2.254	0.064
			0.000			1/2" Ice	2.613	2.460	0.086
(R)			0.000			1" Ice	2.833	2.675	0.111
						2" Ice	3.300	3.132	0.172
						4" Ice	4.337	4.148	0.338
800MHz 2X50W RRH W/FILTER	C	From Leg	4.000	0.000	96.000	No Ice	2.401	2.254	0.064
			0.000			1/2" Ice	2.613	2.460	0.086
(R)			0.000			1" Ice	2.833	2.675	0.111
						2" Ice	3.300	3.132	0.172
						4" Ice	4.337	4.148	0.338
Side Arm Mount [SO 103-3]	C	None		0.000	96.000	No Ice	9.500	9.500	0.224
(R)						1/2" Ice	11.800	11.800	0.317
						1" Ice	14.100	14.100	0.410
						2" Ice	18.700	18.700	0.596
						4" Ice	27.900	27.900	0.968
/									
(4) 844G65VTZAS w/ Mount Pipe	A	From Leg	4.000	0.000	88.000	No Ice	6.071	5.154	0.034
			0.000			1/2" Ice	6.529	5.833	0.084
(E)			0.000			1" Ice	6.996	6.523	0.143
						2" Ice	7.963	7.959	0.281
						4" Ice	10.031	11.092	0.667
(4) 844G65VTZAS w/ Mount Pipe	B	From Leg	4.000	0.000	88.000	No Ice	6.071	5.154	0.034
			0.000			1/2" Ice	6.529	5.833	0.084
(E)			0.000			1" Ice	6.996	6.523	0.143
						2" Ice	7.963	7.959	0.281
						4" Ice	10.031	11.092	0.667

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) 844G65VTZAS w/ Mount Pipe	C	From Leg	4.000	0.000	88.000	No Ice	6.071	5.154	0.034
			0.000			1/2" Ice	6.529	5.833	0.084
(E)			0.000			1" Ice	6.996	6.523	0.143
						2" Ice	7.963	7.959	0.281
						4" Ice	10.031	11.092	0.667
Platform Mount [LP 303-1]	C	None		0.000	88.000	No Ice	14.660	14.660	1.250
(E)						1/2" Ice	18.870	18.870	1.481
						1" Ice	23.080	23.080	1.713
						2" Ice	31.500	31.500	2.175
						4" Ice	48.340	48.340	3.101
/									
HBX-6516DS-VTM w/ Mount Pipe	A	From Leg	4.000	0.000	81.000	No Ice	3.598	3.241	0.029
			0.000			1/2" Ice	3.998	3.914	0.060
(E)			-1.000			1" Ice	4.435	4.564	0.100
						2" Ice	5.368	5.914	0.199
						4" Ice	7.361	8.877	0.504
HBX-6516DS-VTM w/ Mount Pipe	B	From Leg	4.000	0.000	81.000	No Ice	3.598	3.241	0.029
			0.000			1/2" Ice	3.998	3.914	0.060
(E)			-1.000			1" Ice	4.435	4.564	0.100
						2" Ice	5.368	5.914	0.199
						4" Ice	7.361	8.877	0.504
HBX-6516DS-VTM w/ Mount Pipe	C	From Leg	4.000	0.000	81.000	No Ice	3.598	3.241	0.029
			0.000			1/2" Ice	3.998	3.914	0.060
(E)			-1.000			1" Ice	4.435	4.564	0.100
						2" Ice	5.368	5.914	0.199
						4" Ice	7.361	8.877	0.504
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	81.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
6' x 2" Mount Pipe	B	From Leg	4.000	0.000	81.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
6' x 2" Mount Pipe	C	From Leg	4.000	0.000	81.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
T-Arm Mount [TA 601-3]	C	None		0.000	81.000	No Ice	10.900	10.900	0.726
						1/2" Ice	14.650	14.650	0.926
						1" Ice	18.400	18.400	1.125
						2" Ice	25.900	25.900	1.524
						4" Ice	40.900	40.900	2.322
/									
KS24019-L112A	A	From Leg	3.000	0.000	74.000	No Ice	0.156	0.156	0.005
(E)			0.000			1/2" Ice	0.225	0.225	0.007
			4.000			1" Ice	0.302	0.302	0.009
						2" Ice	0.484	0.484	0.018
						4" Ice	0.951	0.951	0.056
Side Arm Mount [SO 702-1]	A	From Leg	1.500	0.000	74.000	No Ice	1.000	1.430	0.027
(E)			0.000			1/2" Ice	1.000	2.050	0.038
			0.000			1" Ice	1.000	2.670	0.049
						2" Ice	1.000	3.910	0.071
						4" Ice	1.000	6.390	0.115

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft	C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
/								

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
A-ANT-18G-2-C (E)	A	Paraboloid w/Radome	From Leg	4.000 0.000 4.000	52.000		98.000	2.175	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.715 4.006 4.296 4.876 6.037	0.027 0.048 0.068 0.109 0.192
A-ANT-23G-1-C (E)	B	Paraboloid w/o Radome	From Leg	4.000 0.000 4.000	81.000		98.000	1.275	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.280 1.450 1.620 1.970 2.660	0.007 0.010 0.012 0.013 0.016
//											

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
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

Comb. No.	Description
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
L1	108 - 98.5	Pole	Max Tension	5	0.000	0.000	-0.000
			Max. Compression	14	-5.109	0.035	0.844
			Max. Mx	11	-1.583	27.184	0.153
			Max. My	2	-1.570	-0.097	28.249
			Max. Vy	11	-4.314	27.184	0.153
			Max. Vx	8	4.444	0.039	-27.746
			Max. Torque	12			-0.814
L2	98.5 - 98	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-5.166	0.044	0.840
			Max. Mx	11	-1.617	29.346	0.143
			Max. My	2	-1.604	-0.111	30.464
			Max. Vy	11	-4.331	29.346	0.143
			Max. Vx	8	4.461	0.047	-29.973
			Max. Torque	12			-0.813
L3	98 - 82.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-18.351	-0.033	0.295
			Max. Mx	11	-7.281	207.894	0.076
			Max. My	2	-7.267	-0.313	210.400
			Max. Vy	11	-13.780	207.894	0.076
			Max. Vx	8	13.891	-0.022	-210.358
			Max. Torque	13			-1.257
L4	82.25 - 76.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-21.494	0.072	0.170
			Max. Mx	11	-8.957	288.409	0.011
			Max. My	8	-8.941	-0.040	-291.527
			Max. Vy	11	-15.109	288.409	0.011
			Max. Vx	8	15.221	-0.040	-291.527
			Max. Torque	13			-1.252
L5	76.75 - 60.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-26.773	0.400	-0.065
			Max. Mx	11	-12.382	543.299	-0.152
			Max. My	8	-12.370	-0.085	-548.109
			Max. Vy	11	-16.234	543.299	-0.152
			Max. Vx	8	16.330	-0.085	-548.109
			Max. Torque	13			-1.322
L6	60.5 - 59.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-27.180	0.439	-0.081
			Max. Mx	11	-12.676	559.575	-0.162

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	-12.664	-0.080	-564.480
			Max. Vy	11	-16.313	559.575	-0.162
			Max. Vx	8	16.410	-0.080	-564.480
			Max. Torque	13			-1.322
L7	59.5 - 47	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-30.970	0.804	-0.228
			Max. Mx	11	-15.437	713.761	-0.266
			Max. My	8	-15.427	-0.024	-719.543
			Max. Vy	11	-17.019	713.761	-0.266
			Max. Vx	8	17.116	-0.024	-719.543
			Max. Torque	13			-1.322
L8	47 - 29.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-40.181	1.667	-0.576
			Max. Mx	11	-22.316	1077.436	-0.509
			Max. My	8	-22.309	0.117	-1085.156
			Max. Vy	11	-18.376	1077.436	-0.509
			Max. Vx	8	18.472	0.117	-1085.156
			Max. Torque	13			-1.321
L9	29.75 - 13.083	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-47.356	2.395	-0.880
			Max. Mx	11	-27.838	1391.114	-0.724
			Max. My	8	-27.835	0.257	-1400.377
			Max. Vy	11	-19.262	1391.114	-0.724
			Max. Vx	8	19.356	0.257	-1400.377
			Max. Torque	13			-1.319
L10	13.083 - 10	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-48.722	2.537	-0.939
			Max. Mx	11	-28.895	1450.725	-0.765
			Max. My	8	-28.893	0.285	-1460.269
			Max. Vy	11	-19.414	1450.725	-0.765
			Max. Vx	8	19.508	0.285	-1460.269
			Max. Torque	13			-1.318
L11	10 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-53.396	3.016	-1.139
			Max. Mx	11	-32.552	1647.288	-0.901
			Max. My	8	-32.552	0.380	-1657.732
			Max. Vy	11	-19.901	1647.288	-0.901
			Max. Vx	8	19.993	0.380	-1657.732
			Max. Torque	13			-1.318

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	53.396	6.088	-0.001
	Max. H_x	11	32.561	19.887	-0.004
	Max. H_z	2	32.561	-0.015	19.959
	Max. M_x	2	1654.911	-0.015	19.959
	Max. M_z	5	1643.293	-19.860	0.044
	Max. Torsion	7	0.922	-9.912	-17.277
	Min. Vert	1	32.561	0.000	0.000
	Min. H_x	5	32.561	-19.860	0.044
	Min. H_z	8	32.561	-0.003	-19.979
	Min. M_x	8	-1657.732	-0.003	-19.979
	Min. M_z	11	-1647.288	19.887	-0.004
	Min. Torsion	13	-1.318	9.901	17.298

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K

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	32.561	0.000	0.000	0.393	0.600	-0.000
Dead+Wind 0 deg - No Ice	32.561	0.015	-19.959	-1654.911	-0.960	1.060
Dead+Wind 30 deg - No Ice	32.561	9.927	-17.314	-1436.160	-820.980	0.596
Dead+Wind 60 deg - No Ice	32.561	17.201	-10.018	-831.368	-1423.236	0.065
Dead+Wind 90 deg - No Ice	32.561	19.860	-0.044	-4.328	-1643.293	-0.325
Dead+Wind 120 deg - No Ice	32.561	17.157	9.986	828.676	-1418.562	-0.882
Dead+Wind 150 deg - No Ice	32.561	9.912	17.277	1433.067	-819.412	-0.922
Dead+Wind 180 deg - No Ice	32.561	0.003	19.979	1657.732	0.380	-0.801
Dead+Wind 210 deg - No Ice	32.561	-9.942	17.313	1436.866	823.836	-0.366
Dead+Wind 240 deg - No Ice	32.561	-17.226	9.982	828.357	1427.056	0.195
Dead+Wind 270 deg - No Ice	32.561	-19.887	0.004	0.901	1647.288	0.654
Dead+Wind 300 deg - No Ice	32.561	-17.188	-9.990	-828.329	1423.059	1.073
Dead+Wind 330 deg - No Ice	32.561	-9.901	-17.298	-1434.522	819.403	1.318
Dead+Ice+Temp	53.396	0.000	0.000	1.139	3.016	-0.000
Dead+Wind 0 deg+Ice+Temp	53.396	0.004	-6.095	-532.946	2.733	0.283
Dead+Wind 30 deg+Ice+Temp	53.396	3.039	-5.286	-462.210	-262.715	0.139
Dead+Wind 60 deg+Ice+Temp	53.396	5.266	-3.058	-267.060	-457.599	-0.014
Dead+Wind 90 deg+Ice+Temp	53.396	6.081	-0.013	-0.210	-528.893	-0.121
Dead+Wind 120 deg+Ice+Temp	53.396	5.255	3.049	268.437	-456.328	-0.269
Dead+Wind 150 deg+Ice+Temp	53.396	3.036	5.275	463.461	-262.348	-0.261
Dead+Wind 180 deg+Ice+Temp	53.396	0.001	6.099	535.802	3.079	-0.209
Dead+Wind 210 deg+Ice+Temp	53.396	-3.043	5.285	464.477	269.541	-0.075
Dead+Wind 240 deg+Ice+Temp	53.396	-5.273	3.047	268.243	464.702	0.087
Dead+Wind 270 deg+Ice+Temp	53.396	-6.088	0.001	1.314	535.985	0.212
Dead+Wind 300 deg+Ice+Temp	53.396	-5.263	-3.051	-266.224	463.592	0.321
Dead+Wind 330 deg+Ice+Temp	53.396	-3.032	-5.282	-461.840	268.287	0.374
Dead+Wind 0 deg - Service	32.561	0.006	-7.839	-651.423	-0.004	0.418
Dead+Wind 30 deg - Service	32.561	3.899	-6.800	-565.277	-322.927	0.234
Dead+Wind 60 deg - Service	32.561	6.756	-3.934	-327.118	-560.085	0.025
Dead+Wind 90 deg - Service	32.561	7.800	-0.017	-1.451	-646.736	-0.129
Dead+Wind 120 deg - Service	32.561	6.739	3.922	326.545	-558.253	-0.347
Dead+Wind 150 deg - Service	32.561	3.893	6.785	564.547	-322.313	-0.362
Dead+Wind 180 deg - Service	32.561	0.001	7.846	653.012	0.521	-0.314
Dead+Wind 210 deg - Service	32.561	-3.905	6.799	566.038	324.791	-0.144
Dead+Wind 240 deg - Service	32.561	-6.765	3.920	326.425	562.327	0.076
Dead+Wind 270 deg - Service	32.561	-7.810	0.002	0.593	649.049	0.257
Dead+Wind 300 deg - Service	32.561	-6.751	-3.923	-325.930	560.760	0.422
Dead+Wind 330 deg - Service	32.561	-3.889	-6.794	-564.636	323.054	0.519

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	0.000	-32.561	0.000	0.000	32.561	0.000	0.000%
2	0.015	-32.561	-19.959	-0.015	32.561	19.959	0.000%
3	9.927	-32.561	-17.314	-9.927	32.561	17.314	0.000%
4	17.201	-32.561	-10.018	-17.201	32.561	10.018	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
5	19.860	-32.561	-0.044	-19.860	32.561	0.044	0.000%
6	17.157	-32.561	9.986	-17.157	32.561	-9.986	0.000%
7	9.912	-32.561	17.277	-9.912	32.561	-17.277	0.000%
8	0.003	-32.561	19.979	-0.003	32.561	-19.979	0.000%
9	-9.942	-32.561	17.313	9.942	32.561	-17.313	0.000%
10	-17.226	-32.561	9.982	17.226	32.561	-9.982	0.000%
11	-19.887	-32.561	0.004	19.887	32.561	-0.004	0.000%
12	-17.188	-32.561	-9.990	17.188	32.561	9.990	0.000%
13	-9.901	-32.561	-17.298	9.901	32.561	17.298	0.000%
14	0.000	-53.396	0.000	0.000	53.396	0.000	0.000%
15	0.004	-53.396	-6.095	-0.004	53.396	6.095	0.000%
16	3.039	-53.396	-5.286	-3.039	53.396	5.286	0.000%
17	5.266	-53.396	-3.058	-5.266	53.396	3.058	0.000%
18	6.081	-53.396	-0.013	-6.081	53.396	0.013	0.000%
19	5.255	-53.396	3.049	-5.255	53.396	-3.049	0.000%
20	3.036	-53.396	5.275	-3.036	53.396	-5.275	0.000%
21	0.001	-53.396	6.099	-0.001	53.396	-6.099	0.000%
22	-3.043	-53.396	5.284	3.043	53.396	-5.285	0.000%
23	-5.273	-53.396	3.047	5.273	53.396	-3.047	0.000%
24	-6.088	-53.396	0.001	6.088	53.396	-0.001	0.000%
25	-5.263	-53.396	-3.051	5.263	53.396	3.051	0.000%
26	-3.032	-53.396	-5.282	3.032	53.396	5.282	0.000%
27	0.006	-32.561	-7.839	-0.006	32.561	7.839	0.000%
28	3.899	-32.561	-6.800	-3.899	32.561	6.800	0.000%
29	6.756	-32.561	-3.934	-6.756	32.561	3.934	0.000%
30	7.800	-32.561	-0.017	-7.800	32.561	0.017	0.000%
31	6.739	-32.561	3.922	-6.739	32.561	-3.922	0.000%
32	3.893	-32.561	6.785	-3.893	32.561	-6.785	0.000%
33	0.001	-32.561	7.846	-0.001	32.561	-7.846	0.000%
34	-3.905	-32.561	6.799	3.905	32.561	-6.799	0.000%
35	-6.765	-32.561	3.920	6.765	32.561	-3.920	0.000%
36	-7.810	-32.561	0.002	7.810	32.561	-0.002	0.000%
37	-6.751	-32.561	-3.923	6.751	32.561	3.923	0.000%
38	-3.889	-32.561	-6.794	3.889	32.561	6.794	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00006713
3	Yes	5	0.00000001	0.00091428
4	Yes	5	0.00000001	0.00089076
5	Yes	4	0.00000001	0.00065908
6	Yes	5	0.00000001	0.00086031
7	Yes	5	0.00000001	0.00092027
8	Yes	5	0.00000001	0.00004931
9	Yes	5	0.00000001	0.00088346
10	Yes	5	0.00000001	0.00088678
11	Yes	4	0.00000001	0.00097320
12	Yes	5	0.00000001	0.00092561
13	Yes	5	0.00000001	0.00084934
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00054854
16	Yes	5	0.00000001	0.00073597
17	Yes	5	0.00000001	0.00073258

18	Yes	5	0.00000001	0.00054275
19	Yes	5	0.00000001	0.00072569
20	Yes	5	0.00000001	0.00073763
21	Yes	5	0.00000001	0.00054926
22	Yes	5	0.00000001	0.00074047
23	Yes	5	0.00000001	0.00073842
24	Yes	5	0.00000001	0.00054863
25	Yes	5	0.00000001	0.00074514
26	Yes	5	0.00000001	0.00073173
27	Yes	4	0.00000001	0.00036305
28	Yes	5	0.00000001	0.00009254
29	Yes	5	0.00000001	0.00008740
30	Yes	4	0.00000001	0.00014126
31	Yes	5	0.00000001	0.00008205
32	Yes	5	0.00000001	0.00009420
33	Yes	4	0.00000001	0.00027582
34	Yes	5	0.00000001	0.00008598
35	Yes	5	0.00000001	0.00008679
36	Yes	4	0.00000001	0.00021998
37	Yes	5	0.00000001	0.00009535
38	Yes	5	0.00000001	0.00008032

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	108 - 98.5	25.681	33	2.148	0.015
L2	98.5 - 98	21.496	33	1.997	0.009
L3	98 - 82.25	21.288	33	1.994	0.008
L4	82.25 - 76.75	15.096	33	1.705	0.004
L5	76.75 - 60.5	13.197	33	1.590	0.003
L6	60.5 - 59.5	8.308	33	1.271	0.002
L7	59.5 - 47	8.044	33	1.253	0.002
L8	50.25 - 29.75	5.785	33	1.079	0.002
L9	29.75 - 13.083	1.997	33	0.653	0.001
L10	13.083 - 10	0.375	33	0.279	0.000
L11	10 - 0	0.218	33	0.209	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.000	BXA-70063/6CF w/ Mount Pipe	33	24.330	2.088	0.012	3111
102.000	A-ANT-18G-2-C	33	22.999	2.036	0.010	2698
98.000	(2) DB980H65T2E-M w/ Mount Pipe	33	21.288	1.994	0.008	2996
96.000	(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe	33	20.458	1.975	0.008	3941
88.000	(4) 844G65VTZAS w/ Mount Pipe	33	17.246	1.834	0.006	2844
81.000	HBX-6516DS-VTM w/ Mount Pipe	33	14.652	1.678	0.004	2395
74.000	KS24019-L112A	33	12.295	1.533	0.003	3076

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	108 - 98.5	65.071	8	5.423	0.038
L2	98.5 - 98	54.474	8	5.057	0.021
L3	98 - 82.25	53.946	8	5.049	0.021
L4	82.25 - 76.75	38.272	8	4.321	0.010
L5	76.75 - 60.5	33.461	8	4.030	0.009
L6	60.5 - 59.5	21.073	8	3.222	0.005
L7	59.5 - 47	20.403	8	3.178	0.005
L8	50.25 - 29.75	14.674	8	2.736	0.004
L9	29.75 - 13.083	5.066	8	1.657	0.002
L10	13.083 - 10	0.953	8	0.707	0.001
L11	10 - 0	0.553	8	0.531	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.000	BXA-70063/6CF w/ Mount Pipe	8	61.650	5.276	0.031	1288
102.000	A-ANT-18G-2-C	8	58.279	5.150	0.025	1117
98.000	(2) DB980H65T2E-M w/ Mount Pipe	8	53.946	5.049	0.021	1233
96.000	(2) PCS 1900MHz 4x45W-65MHz w/ Mount Pipe	8	51.846	5.004	0.020	1609
88.000	(4) 844G65VTZAS w/ Mount Pipe	8	43.716	4.648	0.014	1144
81.000	HBX-6516DS-VTM w/ Mount Pipe	8	37.146	4.253	0.010	959
74.000	KS24019-L112A	8	31.175	3.887	0.008	1226

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_n K	Ratio $\frac{P}{P_n}$
L1	108 - 98.5 (1)	TP8.625x8.625x0.313	9.500	0.000	0.0	21.000	8.161	-1.570	171.376	0.009
L2	98.5 - 98 (2)	TP16.5x8.625x0.313	0.500	0.000	0.0	21.000	8.161	-1.575	171.376	0.009
L3	98 - 82.25 (3)	TP19.021x16.5x0.313	15.750	0.000	0.0	39.000	18.556	-7.267	723.700	0.010
L4	82.25 - 76.75 (4)	TP19.901x19.021x0.49	5.500	0.000	0.0	31.178	30.201	-8.941	941.610	0.009
L5	76.75 - 60.5 (5)	TP22.502x19.901x0.683	16.250	0.000	0.0	26.993	47.327	-12.370	1277.480	0.010
L6	60.5 - 59.5 (6)	TP22.662x22.502x0.852	1.000	0.000	0.0	26.865	58.956	-12.664	1583.830	0.008
L7	59.5 - 47 (7)	TP24.663x22.662x0.826	12.500	0.000	0.0	28.071	61.138	-15.427	1716.230	0.009
L8	47 - 29.75 (8)	TP26.901x23.518x0.756	20.500	0.000	0.0	28.178	62.722	-22.309	1767.360	0.013
L9	29.75 - 13.083 (9)	TP29.651x26.901x0.739	16.667	0.000	0.0	30.324	67.807	-27.835	2056.140	0.014
L10	13.083 - 10 (10)	TP30.16x29.651x0.715	3.083	0.000	0.0	30.399	66.836	-28.893	2031.720	0.014
L11	10 - 0 (11)	TP31.81x30.16x0.753	10.000	0.000	0.0	31.395	74.258	-32.552	2331.300	0.014

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 $\frac{P}{P_a}$

Pole 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 $\frac{f_{by}}{F_{by}}$
L1	108 - 98.5 (1)	TP8.625x8.625x0.313	28.250	20.724	23.100	0.897	0.000	0.000	23.100	0.000
L2	98.5 - 98 (2)	TP16.5x8.625x0.313	28.250	20.724	23.100	0.897	0.000	0.000	23.100	0.000
L3	98 - 82.25 (3)	TP19.021x16.5x0.313	210.400	29.732	39.000	0.762	0.000	0.000	39.000	0.000
L4	82.25 - 76.75 (4)	TP19.901x19.021x0.49	291.527	24.601	31.178	0.789	0.000	0.000	31.178	0.000
L5	76.75 - 60.5 (5)	TP22.502x19.901x0.683	548.109	26.414	26.993	0.979	0.000	0.000	26.993	0.000
L6	60.5 - 59.5 (6)	TP22.662x22.502x0.852	564.480	22.009	26.865	0.819	0.000	0.000	26.865	0.000
L7	59.5 - 47 (7)	TP24.663x22.662x0.826	719.543	25.218	28.071	0.898	0.000	0.000	28.071	0.000
L8	47 - 29.75 (8)	TP26.901x23.518x0.756	1085.158	32.853	28.178	1.166	0.000	0.000	28.178	0.000
L9	29.75 - 13.083 (9)	TP29.651x26.901x0.739	1400.375	35.348	30.324	1.166	0.000	0.000	30.324	0.000
L10	13.083 - 10 (10)	TP30.16x29.651x0.715	1460.267	36.673	30.399	1.206	0.000	0.000	30.399	0.000
L11	10 - 0 (11)	TP31.81x30.16x0.753	1657.733	35.525	31.395	1.132	0.000	0.000	31.395	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	108 - 98.5 (1)	TP8.625x8.625x0.313	4.425	0.542	14.000	0.078	0.364	0.129	14.000	0.009
L2	98.5 - 98 (2)	TP16.5x8.625x0.313	4.442	0.544	14.000	0.040	0.363	0.129	14.000	0.009
L3	98 - 82.25 (3)	TP19.021x16.5x0.313	13.871	0.748	26.000	0.057	1.059	0.072	26.000	0.003
L4	82.25 - 76.75 (4)	TP19.901x19.021x0.49	15.221	0.504	20.785	0.048	0.800	0.032	20.785	0.002
L5	76.75 - 60.5 (5)	TP22.502x19.901x0.683	16.330	0.345	17.995	0.038	0.804	0.018	17.995	0.001
L6	60.5 - 59.5 (6)	TP22.662x22.502x0.852	16.410	0.278	17.910	0.031	0.804	0.015	17.910	0.001
L7	59.5 - 47 (7)	TP24.663x22.662x0.826	17.116	0.280	18.714	0.030	0.803	0.013	18.714	0.001
L8	47 - 29.75 (8)	TP26.901x23.518x0.756	18.472	0.295	18.785	0.031	0.802	0.012	18.785	0.001
L9	29.75 - 13.083 (9)	TP29.651x26.901x0.739	19.356	0.285	20.216	0.028	0.801	0.010	20.216	0.000
L10	13.083 - 10 (10)	TP30.16x29.651x0.715	19.508	0.292	20.266	0.029	0.801	0.010	20.266	0.000
L11	10 - 0 (11)	TP31.81x30.16x0.753	19.993	0.269	20.930	0.026	0.801	0.008	20.930	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	108 - 98.5 (1)	0.009	0.897	0.000	0.078	0.009	0.909 ✔	1.333	H1-3+VT ✔
L2	98.5 - 98 (2)	0.009	0.897	0.000	0.040	0.009	0.909 ✔	1.333	H1-3+VT ✔
L3	98 - 82.25 (3)	0.010	0.762	0.000	0.057	0.003	0.773 ✔	1.333	H1-3+VT ✔
L4	82.25 - 76.75 (4)	0.009	0.789	0.000	0.048	0.002	0.799 ✔	1.333	H1-3+VT ✔
L5	76.75 - 60.5 (5)	0.010	0.979	0.000	0.038	0.001	0.989 ✔	1.333	H1-3+VT ✔
L6	60.5 - 59.5 (6)	0.008	0.819	0.000	0.031	0.001	0.828 ✔	1.333	H1-3+VT ✔
L7	59.5 - 47 (7)	0.009	0.898	0.000	0.030	0.001	0.908 ✔	1.333	H1-3+VT ✔
L8	47 - 29.75 (8)	0.013	1.166	0.000	0.031	0.001	1.179 ✔	1.333	H1-3+VT ✔
L9	29.75 - 13.083 (9)	0.014	1.166	0.000	0.028	0.000	1.179 ✔	1.333	H1-3+VT ✔
L10	13.083 - 10 (10)	0.014	1.206	0.000	0.029	0.000	1.221 ✔	1.333	H1-3+VT ✔
L11	10 - 0 (11)	0.014	1.132	0.000	0.026	0.000	1.146 ✔	1.333	H1-3+VT ✔

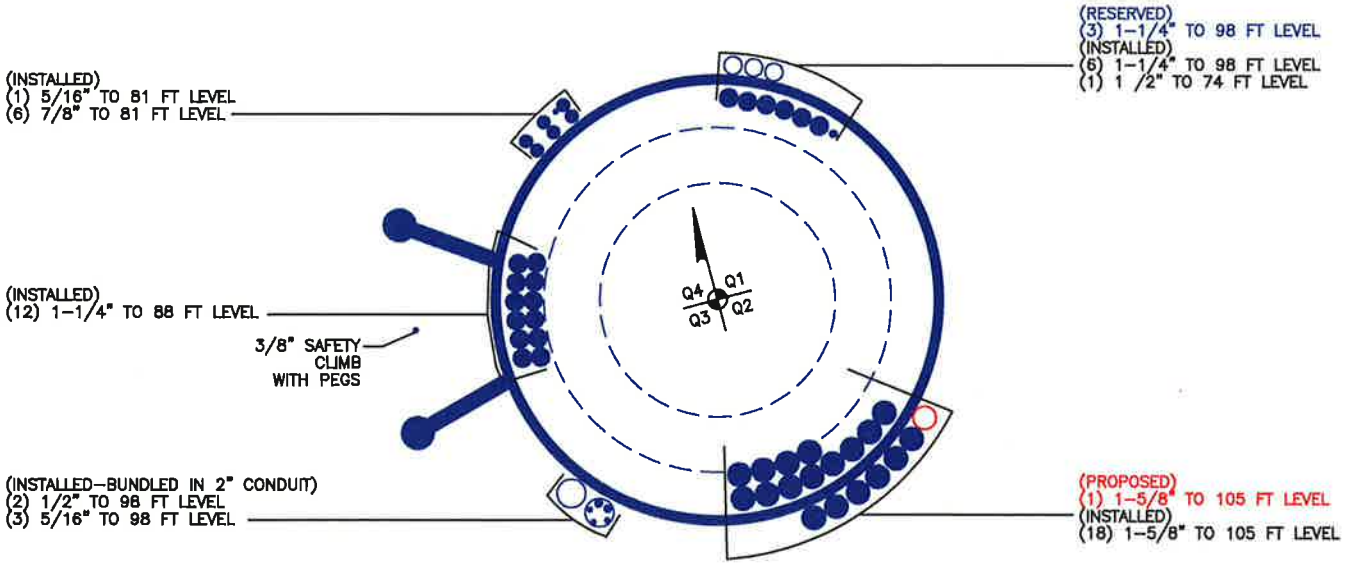
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	108 - 98.5	Pole	TP8.625x8.625x0.313	1	-1.570	228.444	**	**
L2	98.5 - 98	Pole	TP16.5x8.625x0.313	2	-1.575	228.444	**	**
L3	98 - 82.25	Pole	TP19.021x16.5x0.313	3	-7.267	964.692	**	**
L4	82.25 - 76.75	Pole	TP19.901x19.021x0.49	4	-8.941	1255.166	**	**
L5	76.75 - 60.5	Pole	TP22.502x19.901x0.683	5	-12.370	1702.881	**	**
L6	60.5 - 59.5	Pole	TP22.662x22.502x0.852	6	-12.664	2111.245	**	**
L7	59.5 - 47	Pole	TP24.663x22.662x0.826	7	-15.427	2287.734	**	**
L8	47 - 29.75	Pole	TP26.901x23.518x0.756	8	-22.309	2355.891	**	**
L9	29.75 - 13.083	Pole	TP29.651x26.901x0.739	9	-27.835	2740.835	**	**
L10	13.083 - 10	Pole	TP30.16x29.651x0.715	10	-28.893	2708.283	**	**
L11	10 - 0	Pole	TP31.81x30.16x0.753	11	-32.552	3107.623	**	**
							Summary	
						Pole (L10)	97.5	Pass
						RATING =	**97.5**	**Pass**

**See additional calculations

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876363 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforced Pole Stress and Effective Thickness Check

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	10	4	(1.25x5.25)	F	T&C
10	29.75	3	(1.25x5.25)	F	T&C
29.75	59.5	3	..25x4.375)	F	T&C
59.5	76.75	3	VS(1.25x4)	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		1				1					1					1	
				1							1					1	
				1							1					1	
				1							1					1	

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0	13.083	3	MP305	F	T&C
13.083	60.5	3	MP305	F	T&C
60.5	82.25	3	MP303	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1						1								1		
	1						1						1				
	1						1						1				

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
Model	*Wt*	*A*	*Ix*	*Iy*	*Y*	*X*	*Tw*	*W*	*Wf*	*Tf*	*Dh*	*Fy*	*Fu*	*Kx*	*Lx*	*Ky*	*Ly*	*PAll*	*PAll inc*	*Ptype ASD*	*phiPn*	*Ptype LRFD*
MP303	9.9	2.92	0.66	6.57	0.59	0	0.30	4.06	1.57	0.64	1.21875	65	80	0.80	18	1.00	18	96.4	128.6	Rupture	144.7	Rupture
MP305	19.2	5.65	2.15	20.79	0.79	0	0.5	5.33	2.09	0.91	1.21875	65	80	0.80	18	1.00	18	194.5	259.3	Rupture	291.8	Rupture
VS(1.25x5.25)	22.3	6.56	0.85	15.07	0.625	0	1.25	5.25	0	0	1.21875	65	80	0.80	18	1.00	18	198.4	264.6	Rupture	297.7	Rupture
VS(1.25x4.375)	18.6	5.47	0.71	8.72	0.625	0	1.25	4.375	0	0	1.21875	65	80	0.80	21	1.00	21	154.7	206.3	Rupture	232.0	Rupture
VS(1.25x4)	17.0	5.00	0.65	6.67	0.625	0	1.25	4	0	0	1.21875	65	80	0.80	21	1.00	21	135.9	181.3	Rupture	203.9	Rupture

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *85565.004.01*
Site Name: *Hartfor-NU,CT*
App #: *193728 REV#0*

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	978	ft-kips
Unfactored Axial, P:	33	kips
Unfactored Shear, V:	20	kips

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	38	in
Anchor Spacing:	6	in

Anchor Rod Results

TIA F --> Maximum Rod Tension	150.3 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	77.1% Pass

Plate Data		
W=Side:	36	in
Thick:	2.5	in
Grade:	55	ksi
Clip Distance:	0	in

Base Plate Results Flexural Check

Base Plate Stress:	45.0 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	81.8% Pass

PL Ref. Data	
Yield Line (in):	19.10
Max PL Length:	19.10

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

N/A - Unstiffened

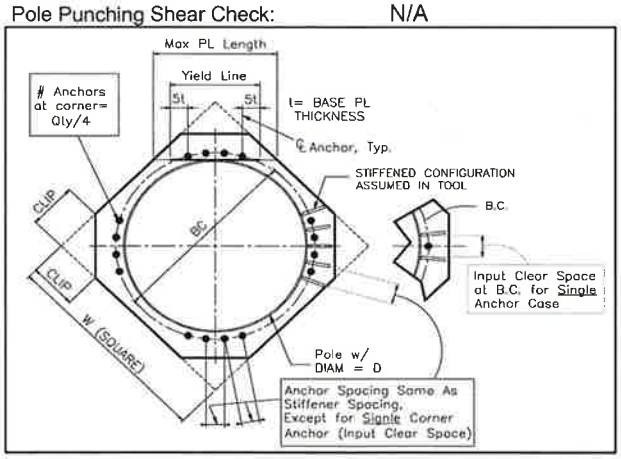
Stiffener Results

Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Diam:	31.81	in
Thick:	0.25	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round



Stress Increase Factor		
ASD ASIF:	1.333	

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *876363*
Site Name: *Hartford,CT*
App #: *193728 Revision # 0*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	0	in
Pier Dist. Above Grade:	6	in
Pad Bearing Depth, D:	7	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	21.5	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	5	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	25.00	ft^2
Pier Height:	4.50	ft
Soil (above pad) Height:	4.00	ft

Soil Parameters		
Unit Weight, γ:	115.0	pcf
Ultimate Bearing Capacity, qn:	6.90	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	32.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	5.18	ksf
Passive Pres. Coeff., Kp	3.25	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	27.0	kips
Pad Force Location Above D:	1.36	ft
ϕ(Passive Pressure Moment):	36.82	ft-kips
Factored O.T. M(WL), "1.6W":	2440.8	ft-kips
Factored OT (MW-Msoil), M1	2403.98	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	2.50	ft
Sum of Soil Wedges Wt:	25.84	kips
Soil Wedges ecc, K1:	8.97	ft
Ftg+Soil above Pad wt:	426.0	kips
Unfactored (Total ftg-soil Wt):	451.87	kips
1.2D. **No Soil Wedges.**	550.83	kips
0.9D. **With Soil Wedges**	436.38	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	33	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	20	kips
Unfactored WL Moment, M:	1658	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	39.6	kips
0.90	0.9D+1.6W, Pu:	29.7	kips
1.35	Vu:	27	kips
	Mu:	2238.3	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	550.83	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	2403.98	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	4.36	ft
Orthogonal qu=	2.16	ksf
qu/ϕ*qn Ratio=	**41.72%**	Pass

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	3.09	ft
Diagonal qu=	2.34	ksf
qu/ϕ*qn Ratio=	**45.30%**	Pass

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	436.38	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	2195.43	ft-kips

Orthogonal ecc3 = M2/P2 =	5.03	ft
Ortho Non Bearing Length,NBL=	10.06	ft
Orthogonal qu=	1.83	ksf
Diagonal qu=	2.11	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	1658.00		
M Orthogonal:	2894.19	**57.29%**	Pass
M Diagonal:	2860.88	**57.95%**	Pass

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *876363*
Site Name: *HARTFORD - NU (SSUSA*
App #: *156076 Rev:3*

Pole Manufacturer:	Other

Bolt Data			
Qty:	9		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty: 44.00
N/A:	55	<-- Disregard	
Circle (in.):	19.5		

Plate Data		
Diam:	24	in
Thick, t:	1	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	5.82	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	16.5	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	28.25	ft-kips
Axial:	1.575	kips
Shear:	4.442	kips
Elevation:	98	feet

If No stiffeners, Criteria: AISC ASD <-Only Applcable to Unstiffened Cases

Flange Bolt Results

			Rigid
Bolt Tension Capacity, **B**:	25.91	kips	Service, ASD
Max Bolt directly applied T:	7.55	Kips	Fty*ASIF
Min. PL "tc" for **B** cap. **w/o** Pry:	0.779	in	
Min PL "treq" for actual **T w/ Pry**:	0.309	in	
Min PL "t1" for actual **T w/o Pry**:	0.421	in	
T allowable w/o Prying:	25.91	kips	α'<0 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	7.55	kips	
Non-Prying Bolt Stress Ratio, T/B:	29.1%	Pass	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	7.8	ksi	Service ASD
Allowable Plate Stress:	50.0	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	15.7%	Pass	Comp. Y.L. Length:
No Prying			10.39
Tension Side Stress Ratio, (treq/t)^2:	9.5%	Pass	

n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *876363*
Site Name: *HARTFORD - NU (SSUSA*
App #: *156076 Rev:3*

Pole Manufacturer:	Other

Reactions		
Moment:	28.25	ft-kips
Axial:	1.575	kips
Shear:	4.442	kips
Elevation:	98	feet

If No stiffeners, Criteria: AISC ASD <-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	9		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty:
N/A:	55	<-- Disregard	44.00
Circle (in.):	19.5		

Plate Data		
Diam:	24	in
Thick, t:	1	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	5.82	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	16.5	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	25.91	kips	Rigid
Max Bolt directly applied T:	7.55	Kips	Service, ASD
Min. PL "tc" for **B** cap. **w/o** Pry:	0.779	in	Fty*ASIF
Min PL "treq" for actual **T w/ Pry**:	0.309	in	
Min PL "t1" for actual **T w/o Pry**:	0.421	in	
T allowable w/o Prying:	25.91	kips	α'<0 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	7.55	kips	
Non-Prying Bolt Stress Ratio, T/B:	29.1%	Pass	

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	7.8	ksi	Rigid
Allowable Plate Stress:	50.0	ksi	Service ASD
Compression Plate Stress Ratio:	15.7%	Pass	0.75*Fy*ASIF
No Prying			Comp. Y.L. Length:
Tension Side Stress Ratio, (treq/t)^2:	9.5%	Pass	10.39

n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes