ROBINSON & COLE LLP

EM-VER-155-130306

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

ORIGINAL

March 4, 2013

RECEIVED
MAR - 6 2013
CONNECTICUT
SITING COUNCIL

Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
14-20 Isham Road, West Hartford, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas on an existing 100-foot tower on the roof of a 25-foot tall building at 14-20 Isham Road in West Hartford. Cellco's antennas are mounted 105 feet above ground level. The tower is owned by M&R Gassner Family II, LLC. The Council approved Cellco's shared use of this tower in 2008. Cellco now intends replace six (6) of its existing antennas with one (1) model BXA-80063-4CF cellular antenna; two (2) model SLCP 2X6014 cellular antennas; one (1) model BXA-171063-12CF AWS antenna; and two (2) model SACP 2X5516 AWS antennas, at the same level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its antennas and attach one (1) HYBRIFLEX™ fiber cable to the tower. Attached behind Tab 1 are the 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 Ronald Van Winkle, Town Manager for the Town of West Hartford. A copy of this letter is also being sent to M&R Gassner Family II, LLC, the owner of the property on which the building and roof-mounted tower are located.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be located at the same level on the 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 additional antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 2.

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

6. The tower, tower base and guy anchors, with certain modifications, can support Cellco's proposed modifications. (*See* Structural Analysis Report and Reinforcement Plans attached behind Tab 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:
Ronald Van Winkle, West Hartford Town Manager
M&R Gassner Family II, LLC
Sandy M. Carter

Amphenol ANTENNA SOLUTIONS

BXA-80063-4CF-EDIN-X

X-Pol | FET Panel | 63° | 13.0 dBd

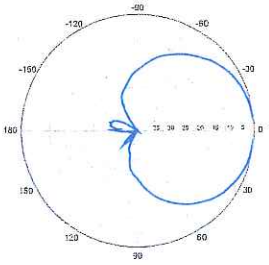
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics				
Frequency bands	806-900 MHz*			
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)			
Polarization	±45°			
Horizontal beamwidth	63°			
Vertical beamwidth	15°			
Gain	13.0 dBd (15.1 dBi)			
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14			
Impedance	50Ω			
VSWR	≤1.4:1			
Upper sidelobe suppression (0°)	-22.1 dB			
Front-to-back ratio (+/-30°)	-34.9 dB			
Null fill	5% (-26.02 dB)			
Isolation between ports	< -30 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	1205 x 285 x 133 mm		47.4 x 11.2 x 5.2 in	
Depth with z-brackets	173 mm		6.8 in	
Weight without mounting brackets	4.5 kg		9.9 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.34 m²	Side: 0.16 m²	Front: 3.7 ft²	Side: 1.7 ft²
Wind load @ 161 km/hr (100 mph)	Front: 498 N	Side: 260 N	Front: 111 lbf	Side: 55 lbf

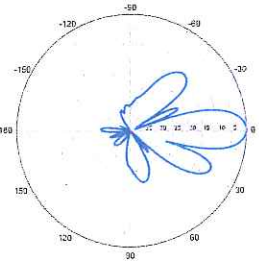
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-80063-4CF-EDIN-X-FP		

BXA-80063-4CF-EDIN-X



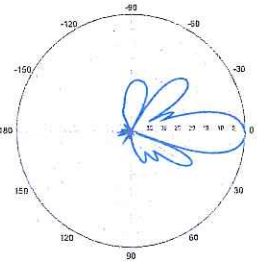
Horizontal

BXA-80063-4CF-EDIN-0



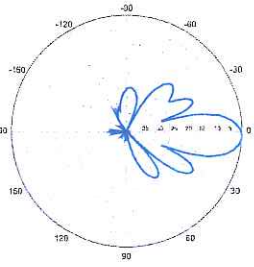
0° | Vertical

BXA-80063-4CF-EDIN-2



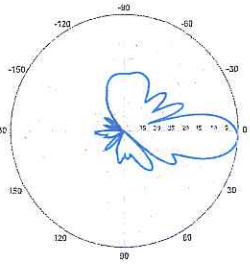
2° | Vertical

BXA-80063-4CF-EDIN-3



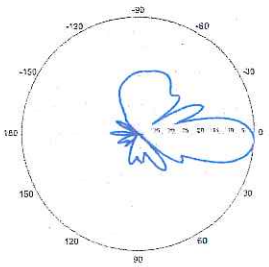
3° | Vertical

BXA-80063-4CF-EDIN-4



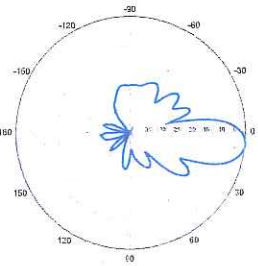
4° | Vertical

BXA-80063-4CF-EDIN-5



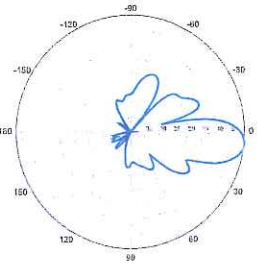
5° | Vertical

BXA-80063-4CF-EDIN-6



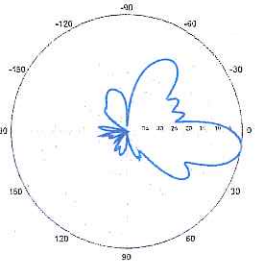
6° | Vertical

BXA-80063-4CF-EDIN-8



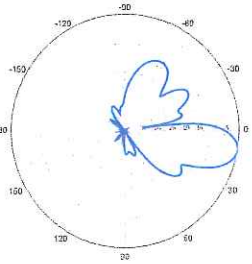
8° | Vertical

BXA-80063-4CF-EDIN-9



9° | Vertical

BXA-80063-4CF-EDIN-10

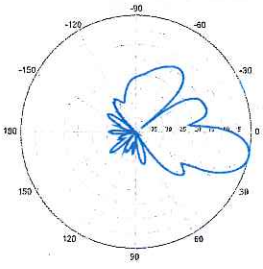


10° | Vertical

BXA-80063-4CF-EDIN-X

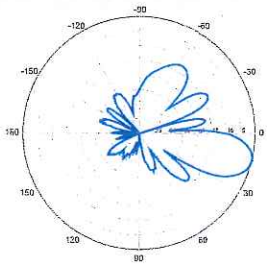
X-Pol | FET Panel | 63° | 13.0 dBd

BXA-80063-4CF-EDIN-12



12° | Vertical

BXA-80063-4CF-EDIN-14

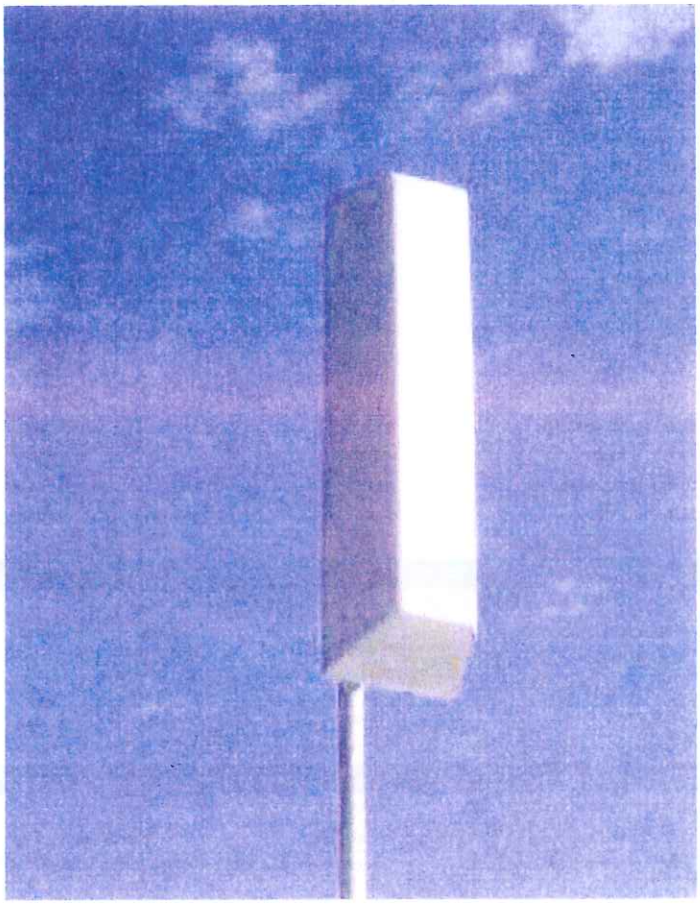


14° | Vertical

Swedcom

SLCP 2x6014

Dual (2x) Circularly Polarized log-periodic antenna



Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (700 - 800 MHz)
- Excellent Axial Ratio
- Optimized for 4G & 3G systems
- Low intermodulation
- Improved Side-to-side rejection
- Fading reduction
- Excellent isolation between ports

Electrical specifications

Frequency range:	700-800 MHz
Impedance:	50 ohm
Connector type:	7/16 Din
Return loss:	18 dB
Polarization:	Circular
Gain ea. port [Circular]:	2x14 dBdC
Gain ea. port [Linear]:	2x11 dBdL
Axial Ratio:	2 dB
Isolation between ports (TX band):	30 dB
Front-to-back ratio:	30 dB
Intermodulation (2x20W):	IM3 150 dB
	IM5 160 dB
	IM7/9 170 dB
Power rating:	2x 500 W
H-plane (-3 dB point):	2x 55°
V-plane (-3 dB point):	2x 16°
Lightning protection:	DC grounded

Mechanical specifications

Overall height:	53 in	[1346 mm]
Width:	14 in	[356 mm]
Depth:	11 in	[279 mm]
Weight (excluding brackets):	20 lbs	[9 Kg]
Wind load measured up to:	150 mph	[240 Km/h]
Wind area (side of antenna):	5.15 sq. ft.	[0.48 sq.m]
Lateral thrust at 113 mph/ 180 Km/h (worst case):	263 lbs	[1171 N]

Materials

Radiating Elements:	Aluminum
Transformer (Power distribution)	Ceramic PCB
Chassis:	Aluminum
Radome:	Grey Fiberglass/PVC
Mounting bolts:	Stainless steel

The SLCP 2x6014 is made in the U.S.A.

Amphenol ANTENNA SOLUTIONS

BXA-171063-12CF-EDIN-X

Replace "X" with desired electrical downtilt.

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

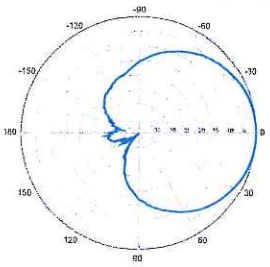
X-Pol | FET Panel | 63° | 19.0 dBi

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 or NE / Female / Center (Back)		
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

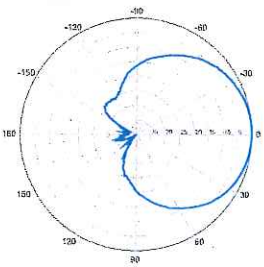
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



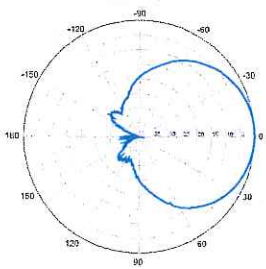
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



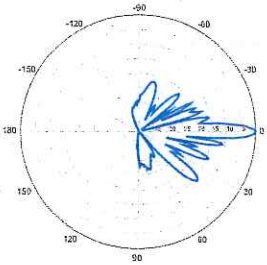
Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



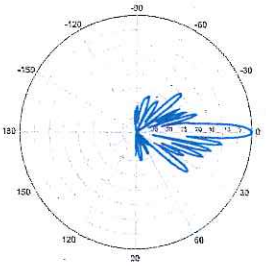
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



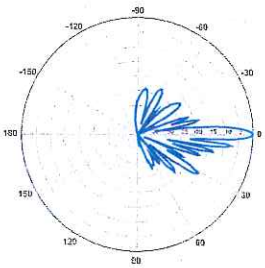
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0

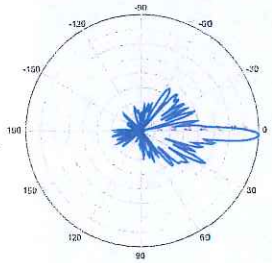


0° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-X

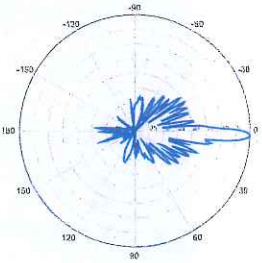
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



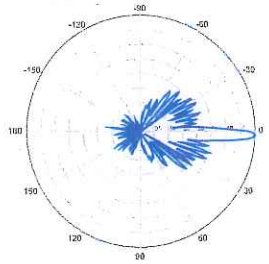
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



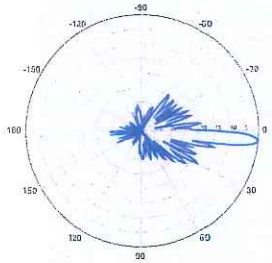
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



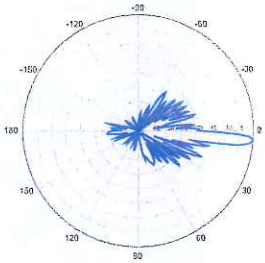
2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



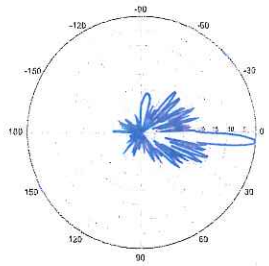
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5

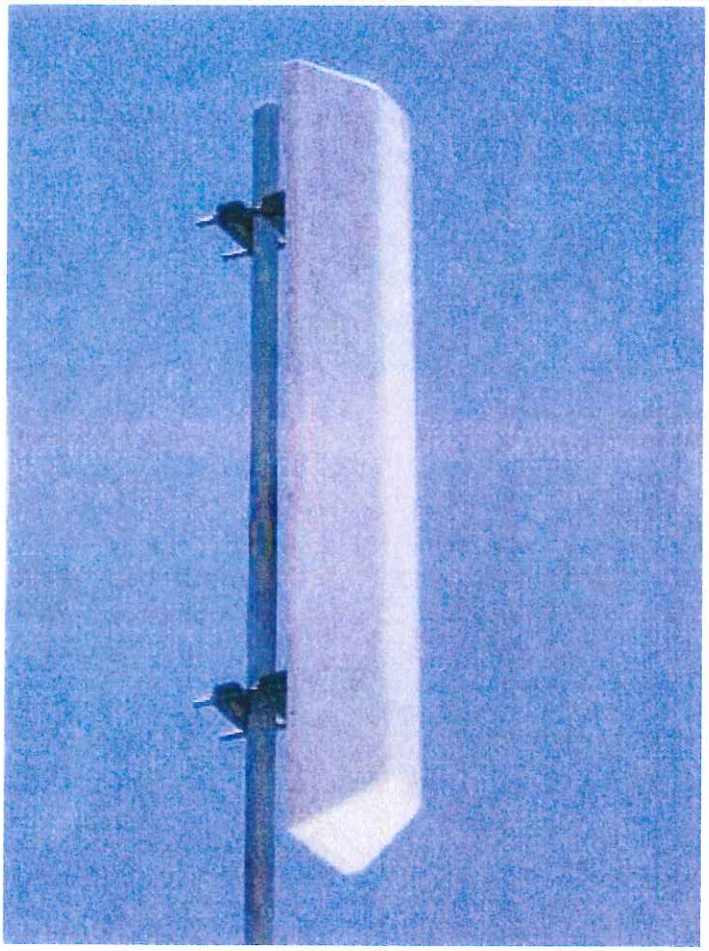


5° | Vertical | 1920-2170 MHz

Swedcom

SACP 2x5516

1710 -2170 MHz Dual (2x) CP log-periodic antenna



Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (1710 - 2170 MHz)
- Excellent Axial Ratio
- Optimized for 4G & 3G systems
- Low intermodulation
- Improved Side-to-side rejection
- Fading reduction
- Excellent isolation between ports

Electrical specifications

Frequency range:	**1710-2170 MHz**
Impedance:	**50 ohm**
Connector type:	**7/16 Din**
Return loss:	**18 dB**
Polarization:	**Circular**
Gain ea. port [Circular]:	**2x16 dBdC**
Gain ea. port [Linear]:	**2x13 dBdL**
Axial Ratio:	**2 dB**
Isolation between ports (TX band):	**28 dB**
Front-to-back ratio:	**30 dB**
Intermodulation (2x20W):	**IM3 150 dB**
	IM5 160 dB
	IM7/9 170 dB
Power rating:	**2x 300 W**
H-plane (-3 dB point):	**2x 55°**
V-plane (-3 dB point):	**2x 7°**
Lightning protection:	**DC grounded**

Mechanical specifications

Overall height:	**56 in**	**[1422 mm]**
Width:	**9.7 in**	**[246 mm]**
Depth:	**6.5 in**	**[165 mm]**
Weight (excluding brackets):	**16 lbs**	**[7.2 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (front of antenna):	**3.76 sq. ft.**	**[0.35 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**192 lbs**	**[855 N]**

Materials

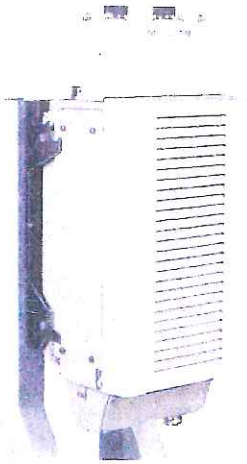
Radiating Elements:	**Silver plated brass**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Mounting bolts:	**Stainless steel**

The SACP 2x5516 is made in the U.S.A.

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

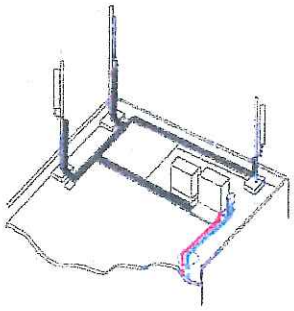
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

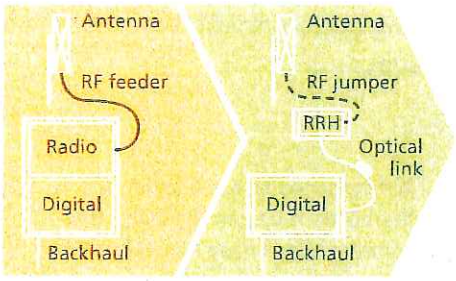
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

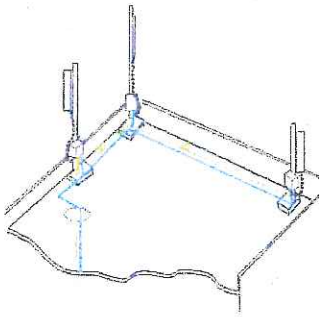
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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

CPG2809100912 (09)

Alcatel·Lucent

Alcatel-Lucent RRH2x40-07-U

REMOTE RADIO HEAD

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

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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

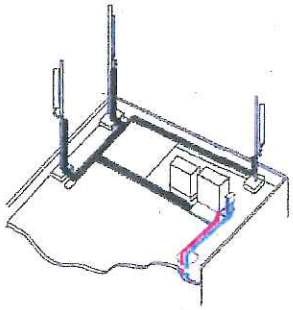
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and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

Features

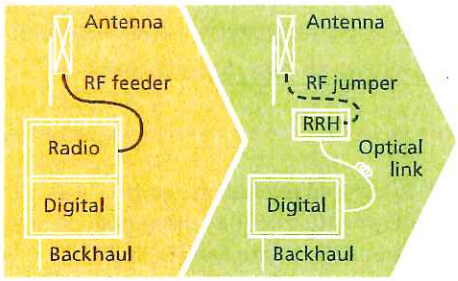
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly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

Benefits

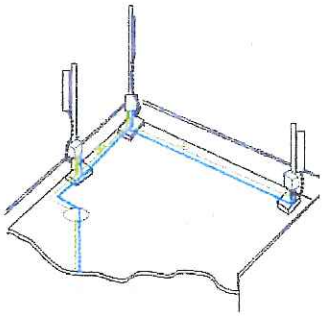
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48V

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Alarms and ports

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

CPG2809100913 (09)

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

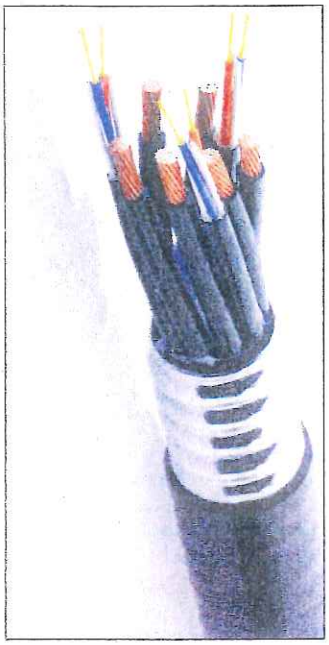


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

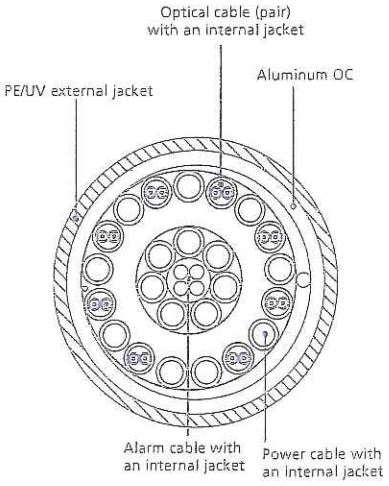


Figure 2: Construction Detail

* This data is provisional and subject to change.

	General	Power	Density					
Site Name: West Hartford Center								
Tower Height: Verizon @ 105ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Nextel	12	100	123	0.0285	851	0.5673	5.03%	
*Clearwire	2	153	123	0.0073	2496	1.0000	0.73%	
*Clearwire	1	211	128	0.0046	11 GHz	1.0000	0.46%	
*MetroPCS AWS	3	727	132	0.0450	2130	1.0000	4.50%	
*MetroPCS LTE	1	866	107	0.0272	2130	1.0000	2.72%	
Verizon PCS	**11**	**284**	**105**	**0.1019**	**1970**	**1.0000**	**10.19%**	
Verizon Cellular	**9**	**278**	**105**	**0.0816**	**869**	**0.5793**	**14.09%**	
Verizon AWS	**1**	**1750**	**105**	**0.0571**	**2145**	**1.0000**	**5.71%**	
Verizon 700	**1**	**1050**	**105**	**0.0342**	**698**	**0.4653**	**7.36%**	
								50.78%
* Source: Siting Council								

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

100-ft Existing Roof Top Mounted FWT
Guyed Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: West Hartford Center

14-20 Isham Road
West Hartford, CT 06107

CENTEK Project No. 12124.C054

Date: January 21, 2013

Prepared for:

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

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation/modification proposed by Verizon Wireless on the existing roof top mounted guyed lattice tower located in West Hartford, CT.

The host tower is a 100-ft, six-section, three legged guyed lattice tower with pin base originally designed by Paul J Ford and Company job no; 19-636-97R dated November 10, 1997 and manufactured by FWT. The tower type, geometry and structure member sizes were taken from the aforementioned original design documents and field verification. Guy anchorage to the existing host building roof top was taken from the original design documents prepared by Cianci & Cianci Structural Engineers job no; 97-113-01 dated October 22, 1997.

This analysis also takes into consideration a future 10-ft tower extension designed by GPD Group for MetroPCS job no. 2012707.31 dated October 19, 2012.

Antenna and appurtenance inventory were taken from a previous structural report prepared by Centek Engineering job no; 12001.CO93 dated August 15, 2012 and a Verizon RF data sheet.

The tower is made up of six (6) vertical sections consisting of A572-50 solid steel legs. Diagonal and horizontal bracing consists of A36 solid round and steel angle construction. The vertical tower legs are connected together with bolted flanges while bracing consists of fully welded connections. The width of the tower face is 3'-0-1/2".

Verizon proposes the replacement of six (6) panel antennas and six (6) diplexers with six (6) panel antennas and six (6) RRH's mounted to three (3) existing T-frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- METROPCS (Reserved):
  Antennas: Six (6) Andrew HBX-6516DS panel antennas and six (6) Andrew ATM200-A20 actuators mounted to three (3) 12-ft T-Frames with a RAD center elevation of 132-ft above existing grade (107-ft above tower base).
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Appurtenance: One (1) 18-ft Omni-directional whip antenna, one (1) 12-ft Omni-directional whip antenna, one (1) 6-ft Omni-directional whip antenna, one (1) 4-ft Omni-directional whip antenna and two (2) 4 Bay dipole antennas mounted to the top of the tower.
  Coax Cables: Three (3) 1-5/8" ∅ and four (4) 7/8" dia. coax cables running on the face of the existing tower as specified in Section 3 of this report.

- NEXTEL / CLEARWIRE (Existing):
  Antennas: Nine (9) Decibel DB844H65E-XY panel antennas, three (3) Argus LLPX310R panel antennas, three (3) RRU's, and two (2) 2.5' ∅ microwave dishes mounted to three (3) 12-ft boom gates with a RAD center elevation of 123-ft above existing grade (98-ft above tower base).
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables, two (2) 1/2" ∅ coax cables and one (1) 3" ∅ flex conduit running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antennas: One (1) ANT-150D6-9 yagi antenna leg mounted with an elevation of 69-ft above existing grade (44-ft above tower base).
  Coax Cables: One (1) 1/2" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antennas: One (1) ANT-150D6-9 yagi antenna leg mounted with an elevation of 55-ft above existing grade (30-ft above tower base).
  Coax Cables: One (1) 1/2" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antennas: Four (4) GPS antennas mounted on standoff arms with an elevation of 31-ft above existing grade (6-ft above tower base).
  Coax Cables: Four (4) 1/2" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
  Antennas: One (1) Antel BXA-70063-6CF, two (2) Swedcom SLCP 2X6015, one (1) Antel BXA-171063-8BF and two (2) Swedcom SACP 2X5516 panel antennas mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Existing to Remove):**
  Antennas: Two (2) Antel LPA-80063-4CF panel antennas, four (4) Swedcom SC-E 6014 REV2 panel antennas and six (6) RFS FD9R6004/2C-3L diplexers mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).
- **VERIZON (Proposed):**
  Antennas: One (1) Antel BXA-171063-12CF panel antenna, two (2) Swedcom SACP 2X5516 panel antennas, one (1) Antel BXA-80063-4CF panel antenna, two (2) Swedcom SLCP 2X6014 panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads, three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).

- **VERIZON (Proposed):**
  Antennas: One (1) RFS DB-T1-6Z-8AB-0Z main distribution box flush mounted to a leg of the existing tower with a RAD center elevation of 109-ft above existing grade (84-ft above tower base).
  Coax Cables: One (1) 1-5/8" Ø fiber line running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

Analysis

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

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

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

Tower Loading

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

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	West Hartford; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA-222-F wind speed controls.	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

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

Tower Capacity

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

Calculated stresses **with the proposed tower reinforcements as detailed in section 4 of this report** were found to be within allowable limits. In Load Case 2, per RISATower "Section Capacity Table", this tower was found to be at **97.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal (T4)	65'-85' AGL (40'-60' ATB)	58.6%	**PASS**
Leg (T3)	85'-105' AGL (60'-80 ATB')	97.4%	**PASS**
Guy A (T2)	105'-125' AGL (80'-100' ATB)	61.6%	**PASS**
Guy B (T2)	105'-125' AGL (80'-100' ATB)	66.6%	**PASS**
Guy C (T2)	105'-125' AGL (80'-100' ATB)	65.2%	**PASS**

Note 1: Tower is located on a roof. Base elevation taken as 25'-0" AGL.
Note 2: AGL denotes Above Grade Level.
Note 3: ATB denotes Above Tower Base.

Existing Guy Anchors and Tower Base

Guy forces are transferred to the existing building structure via three (3) 7/8" ∅ and three (3) 3/4" ∅ galvanized steel guy wires with turnbuckles. All guy anchorage posts are positively attached to the existing building structure. Connections to the existing building were originally designed by Cianci & Cianci Structural Engineers job no; 97-113-01 dated October 22, 1997.

Review of the guy anchor and tower base connections consisted of comparison of the proposed reactions and the design reactions obtained from the aforementioned design documents:

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

  The guy anchor bolts and tower base **were found** to be within allowable limits.

Tower Component	Original Design Reaction (kips)	Proposed Reaction (kips)	Stress Ratio (percentage of capacity)	Result
Tower Base	106 (Vert)	103 (Vert)	97.2%	**PASS**
	1.6 (Horz)	1 (Horz)	62.5%	**PASS**
Guy Anchor A @ 45' radius	40.3 (Vert)	38 (Vert)	94.3%	**PASS**
	28.1 (Horz)	25 (Horz)	89.0%	**PASS**
Guy Anchor B @ 39 radius	51.6 (Vert)	44 (Vert)	85.3%	**PASS**
	32.0 (Horz)	25 (Horz)	78.1%	**PASS**
Guy Anchor C @ 37.5' radius	43.7 (Vert)	42 (Vert)	96.1%	**PASS**
	28.6 (Horz)	25 (Horz)	87.4%	**PASS**

Conclusions

This analysis shows that the subject tower **with the proposed reinforcements detailed in Section 4 of this report is adequate** to support the proposed Verizon Wireless equipment upgrade.

The following reinforcements are required prior to the installation of the proposed antenna upgrade. (Refer to section 4 of this report for details of reinforcement):

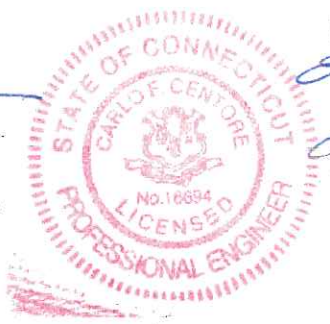
1. Replace three (3) existing 3/4" ∅ guy wires at 117-ft AGL with a 7/8" ∅ EHS guy wires (Initial tension = 10% of breaking strength / adjusted for ambient temperature).

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:

Timothy J. Lynn, EIT
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

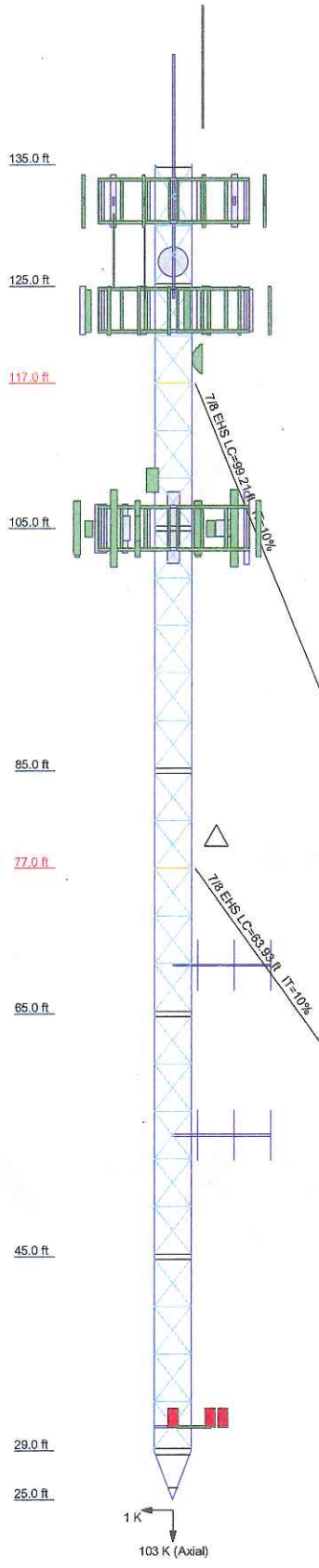
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

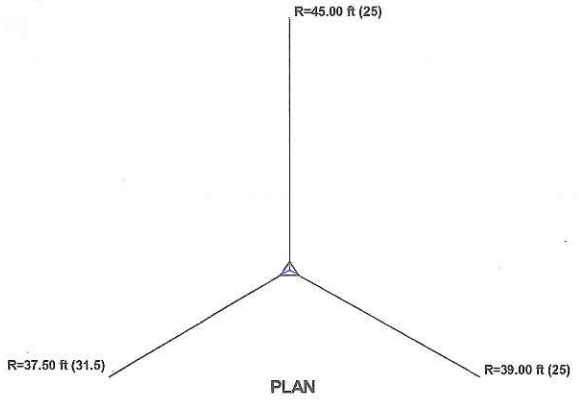
tnxTower is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, *tnxTower*, formerly RISATower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

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

Section	T7	T6	T5	T4	T3	T2	T1
Legs		SR 2		SR 2 1/4		SR 2	3.042
Leg Grade				A572-50			
Diagonals	N.A.			SR 7/8			2 @ 4.79167
Diagonal Grade	N.A.			A36			
Top Girts	A		L2x2x1/8		L2x2x3/16		SR 7/8
Bottom Girts	12x3/8		L2x2x1/8		L2x2x3/16		SR 7/8
Horizontals	N.A.		L2x2x1/8		L2x2x3/16		N.A.
Top Guy Pull-Offs			N.A.	L3x3x1/4	N.A.	L3x3x1/4	
Face Width (ft)		4 @ 3.89583		20 @ 3.91667			
# Panels @ (ft)	B						2 @ 4.79167
Weight (K)	0.2	0.8	1.0	1.2	1.0	1.1	0.5
	5.8						





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' x 3" Dia Omni	137	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	109
(2) HBX-6516DS (MetroPCS - Reserved)	132	RRH2x40-AWS (Verizon - Proposed)	105
(2) HBX-6516DS (MetroPCS - Reserved)	132	RRH2x40-07-U (Verizon - Proposed)	105
(2) HBX-6516DS (MetroPCS - Reserved)	132	RRH2x40-07-U (Verizon - Proposed)	105
(2) ATM200-A20 Actuator (MetroPCS - Reserved)	132	RRH2x40-07-U (Verizon - Proposed)	105
(2) ATM200-A20 Actuator (MetroPCS - Reserved)	132	BXA-171063-12CF (Verizon - Proposed)	105
(2) ATM200-A20 Actuator (MetroPCS - Reserved)	132	BXA-70063/6CF (Verizon - Existing)	105
(2) ATM200-A20 Actuator (MetroPCS - Reserved)	132	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
Pirod 12' PCS T-Frame (1) 104569 (MetroPCS - Reserved)	132	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
Pirod 12' PCS T-Frame (1) 104569 (MetroPCS - Reserved)	132	BXA-171063/8BF (Verizon - Existing)	105
Pirod 12' PCS T-Frame (1) 104569 (MetroPCS - Reserved)	132	BXA-80063-4CF (Verizon - Proposed)	105
4-Bay Dipole	129	SACP 2X5516 (Verizon - Proposed)	105
4-Bay Dipole	129	SLCP 2x6015 (Verizon - Existing)	105
6' x 3" Dia Omni	128	SACP 2X5516 (Verizon - Existing)	105
4' x 3" DIA Omni	127	SLCP 2x6014 (Verizon - Proposed)	105
A-ANT-23G-2 (Clearwire)	127	RRH2x40-AWS (Verizon - Proposed)	105
18' x 3" Dia Omni	125	RRH2x40-AWS (Verizon - Proposed)	105
Rohn 6' x 12' Boom Gate (1) (Nextel)	123	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
RRU (Clearwire)	123	ANT150D6-9	69
RRU (Clearwire)	123	ANT150D6-9	55
Rohn 6' x 12' Boom Gate (1) (Nextel)	123	GPS	31
Rohn 6' x 12' Boom Gate (1) (Nextel)	123	GPS	31
(3) DB844H65E-XY (Nextel)	123	GPS	31
(3) DB844H65E-XY (Nextel)	123	3' Pipe Mount Side Arm	31
(3) DB844H65E-XY (Nextel)	123	3' Pipe Mount Side Arm	31
LLPX310R (Clearwire)	123	3' Pipe Mount Side Arm	31
LLPX310R (Clearwire)	123	3' Pipe Mount Side Arm	31
LLPX310R (Clearwire)	123	GPS	31
RRU (Clearwire)	123		
A-ANT-23G-2 (Clearwire)	119		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L3x3x1/8	B	1 @ 2.78842

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

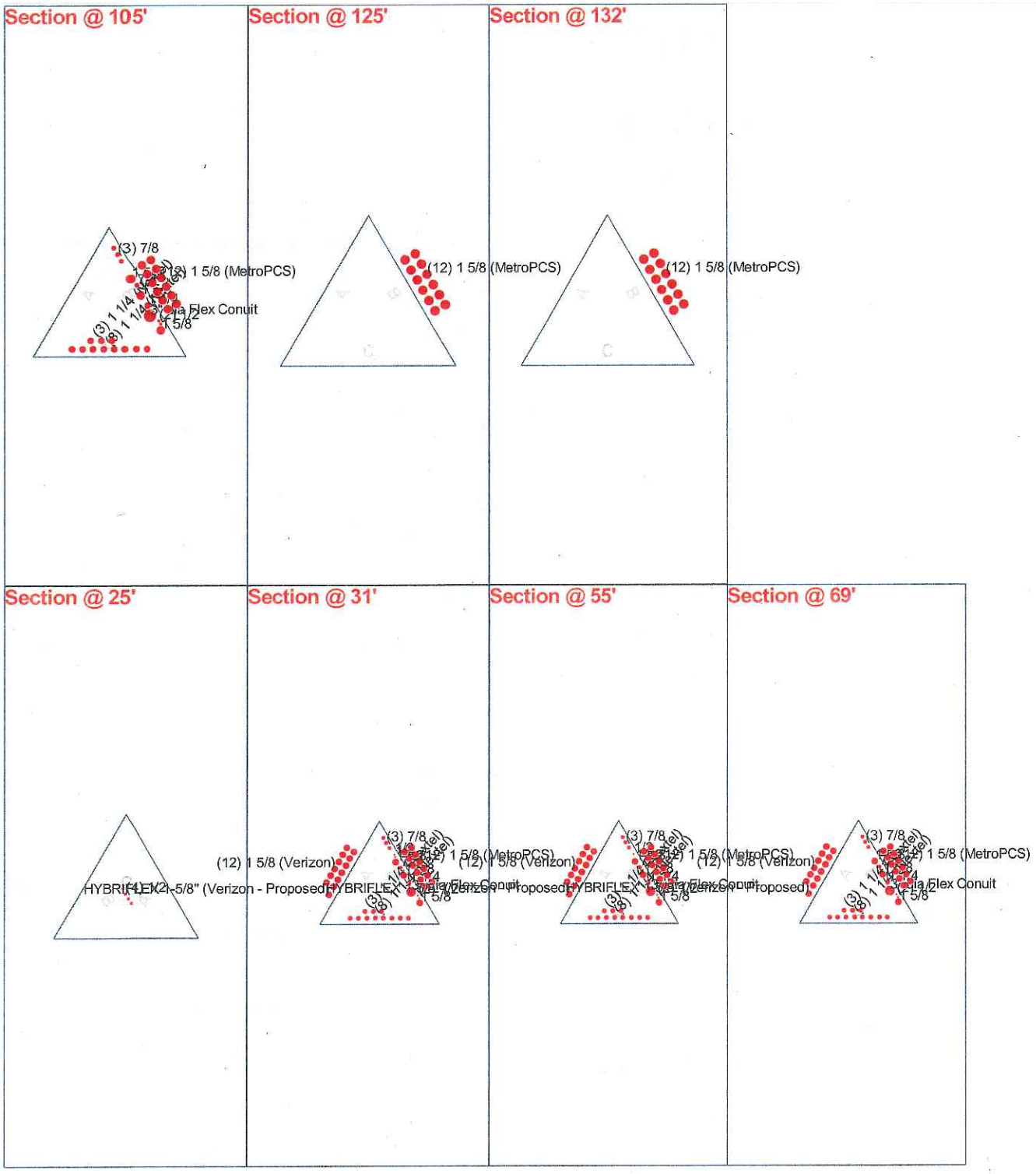
1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower is located on the roof of a building approximately 25'-0" above grade level.
5. TOWER RATING: 97.4%

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

Job: *12124.CO54 - West Hartford Center*		
Project: *100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT*		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS
Path: J:\Jobs\12124\WO054 - West Hartford Center\Cad\ERI\Rev#one\100 FWT Guyed Tow West Hartford, CT .eri		Dwg No. E-1

Feedline Plan
25' - 135'

Round Flat App In Face App Out Face

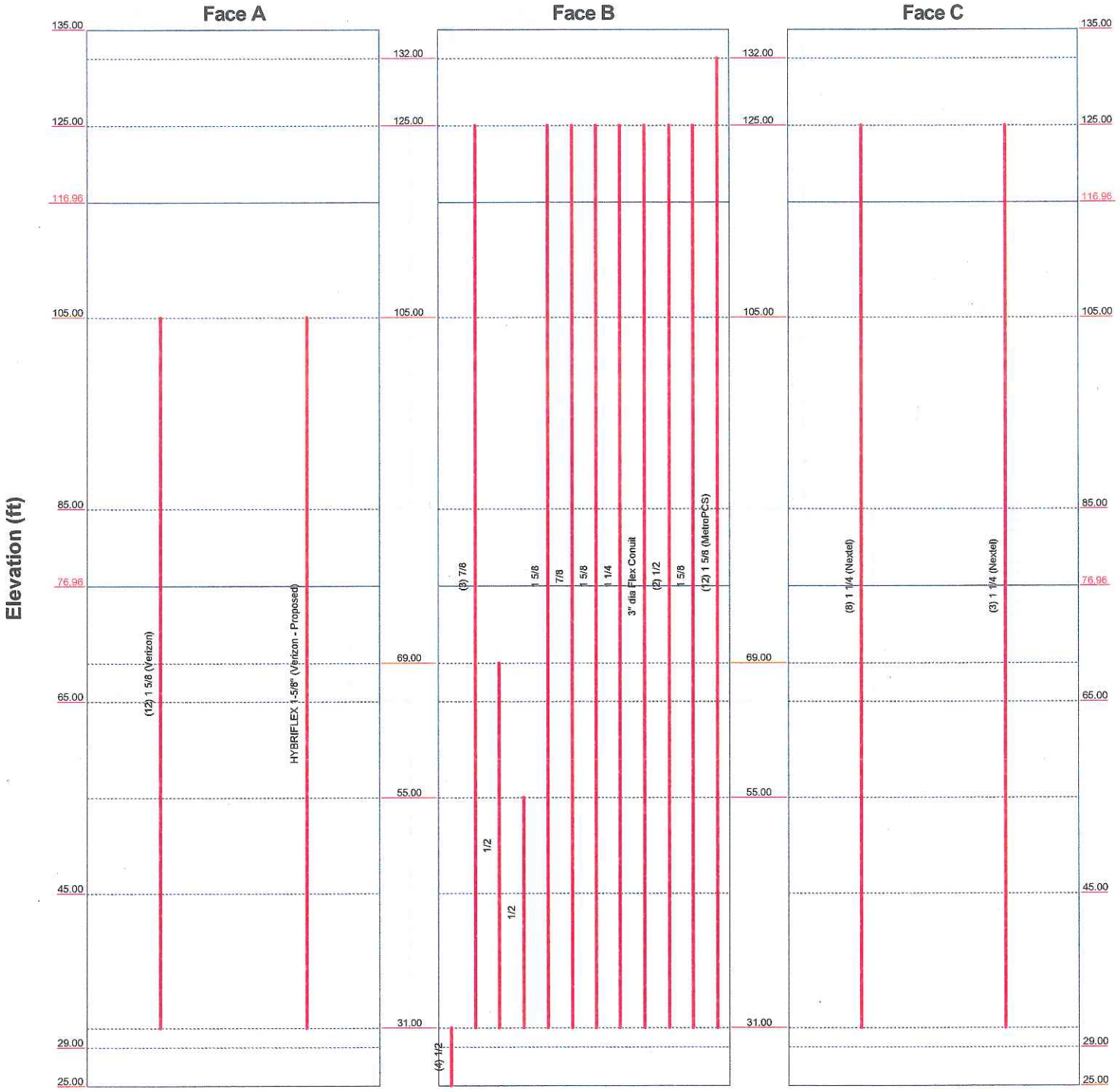


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***12124.CO54 - West Hartford Center***		
Project: ***100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 01/18/13	Scale: NTS
Path: J:\Job\12121-200\W\CO54 - West Hartford Center\Cad\RFR\Reinforced\100_FWT_Guyed_Twr_West Hartford_CT_.rdl		Dwg No. E-7

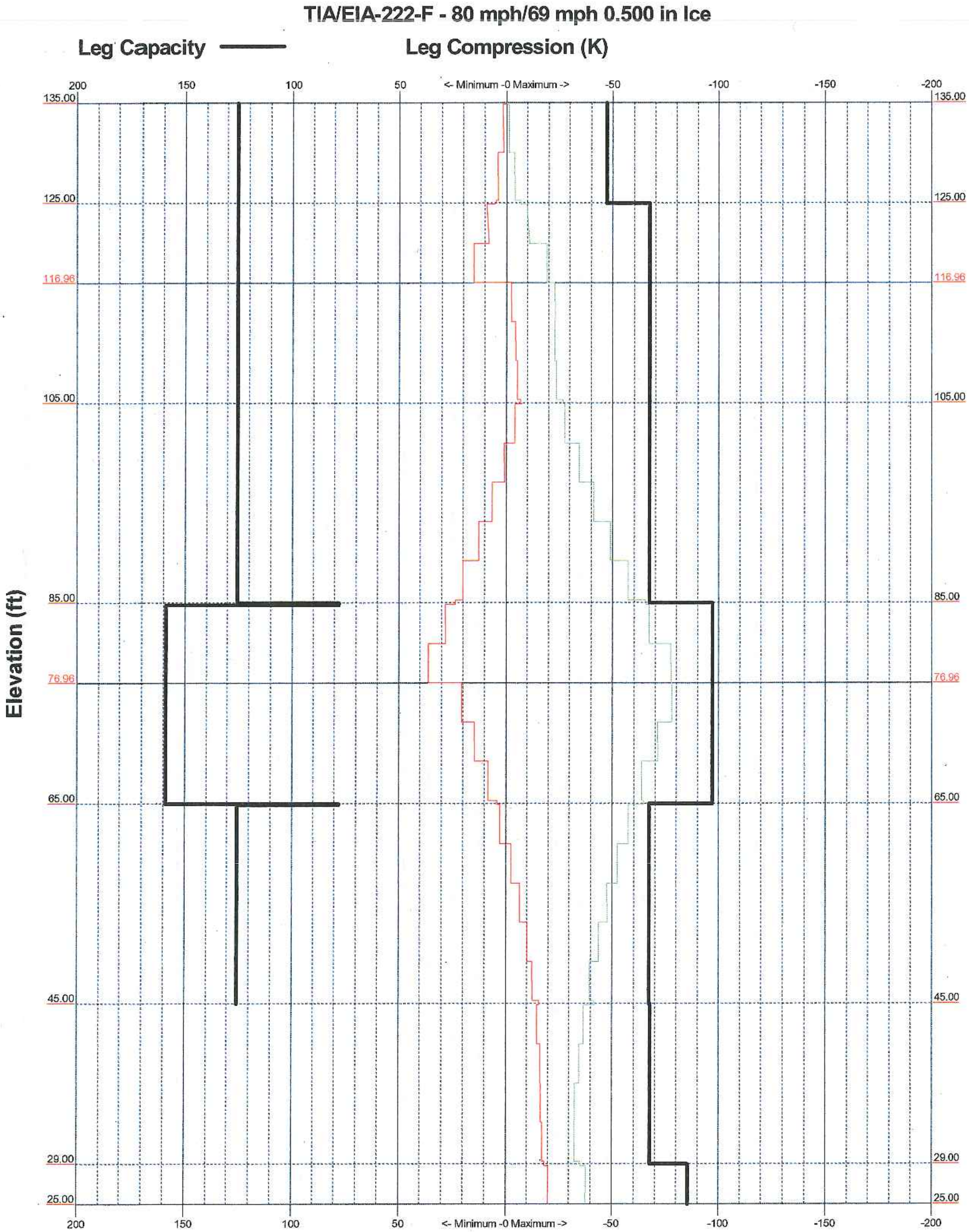
Feedline Distribution Chart
25' - 135'

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



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

Job: *12124.CO54 - West Hartford Center*		
Project: *100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT*		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 01/18/13	Scale: NTS
Path: J:\Jobs\12124\00\CO54 - West Hartford Center\Cad\RF\Revisions\100_FWT_Guyed_Tor West Hartford_CT_.dwg		Dwg No. E-7



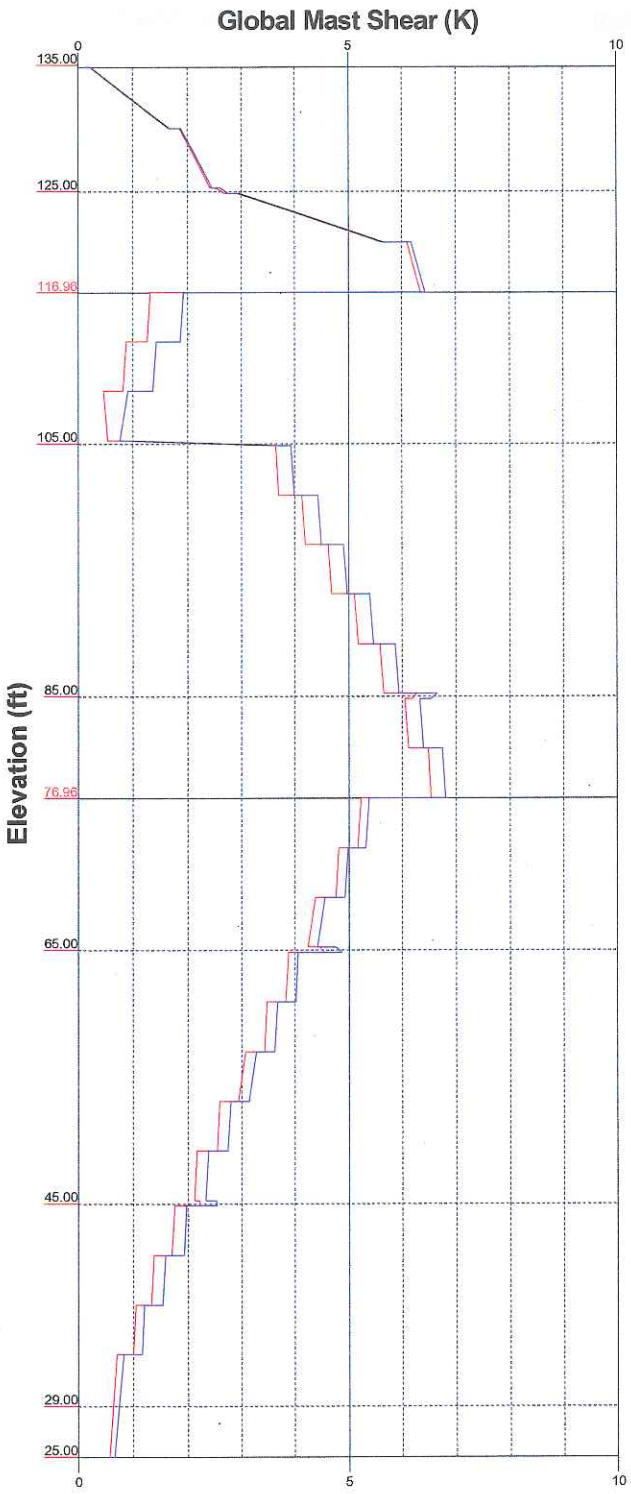
Centek Engineering Inc.	Job: 12124.CO54 - West Hartford Center		
63-2 North Branford Rd.	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT		
Branford, CT 06405	Client: Verizon Wireless	Drawn by: TJL	App'd:
Phone: (203) 488-0580	Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS
FAX: (203) 488-8587	Path:		Dwg No. E-3

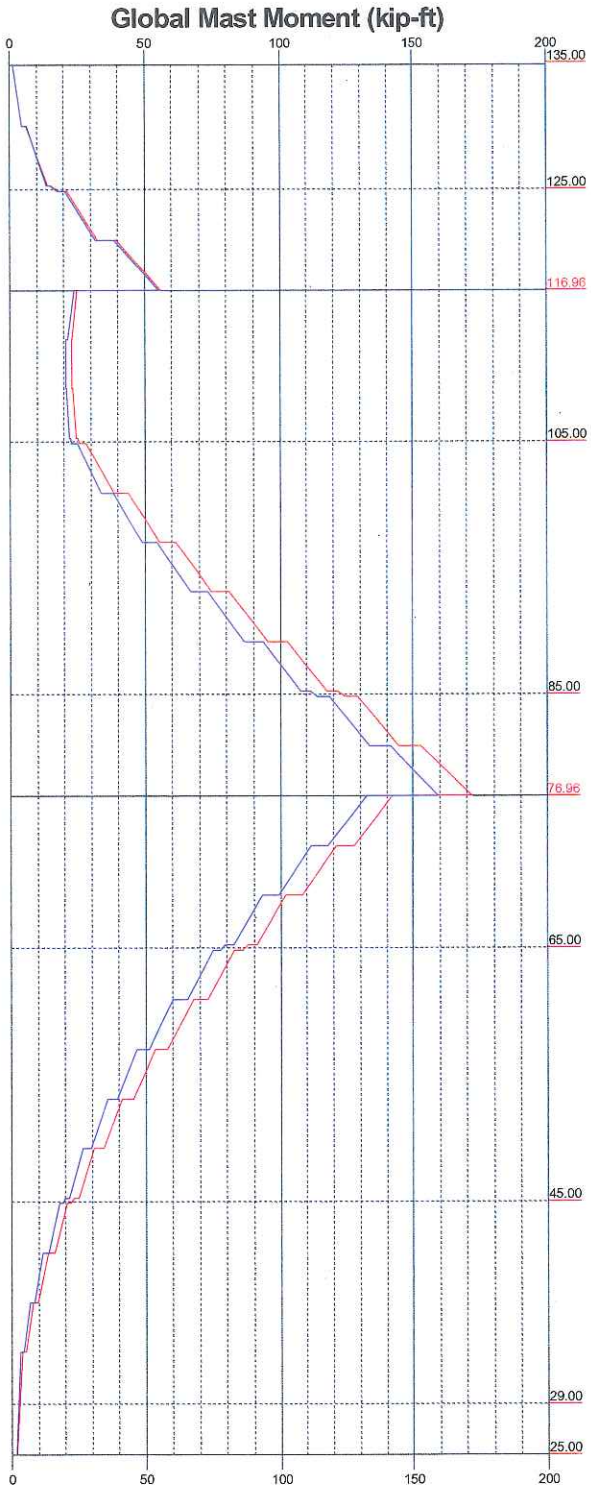
TIA/EIA-222-F - 80 mph/69 mph 0.500 in Ice

Vx Vz

Maximum Values

Mx Mz

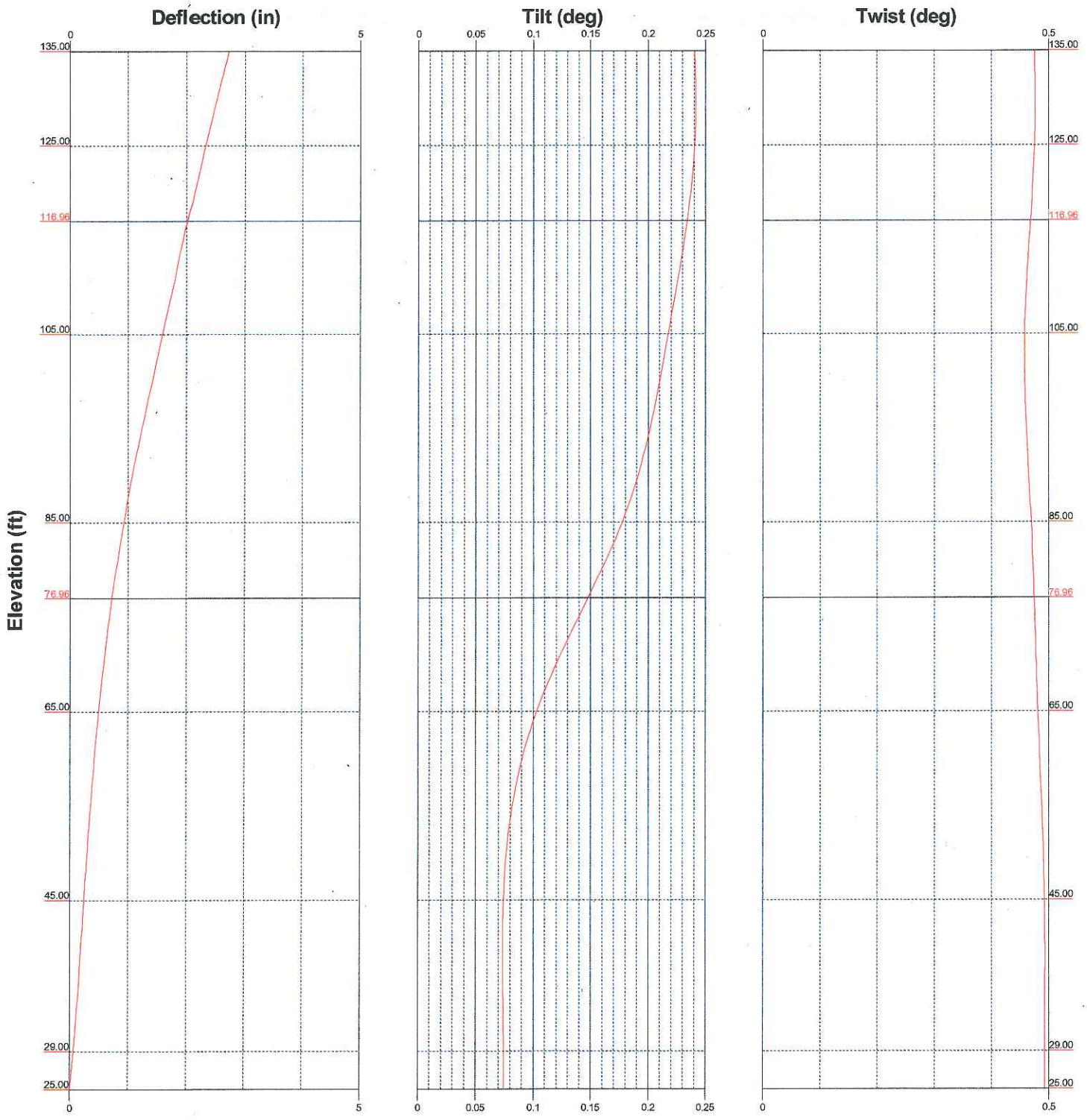




Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***12124.CO54 - West Hartford Center***		
	Project: ***100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT***		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS
	Path:		Dwg No. E-4

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

Maximum Values

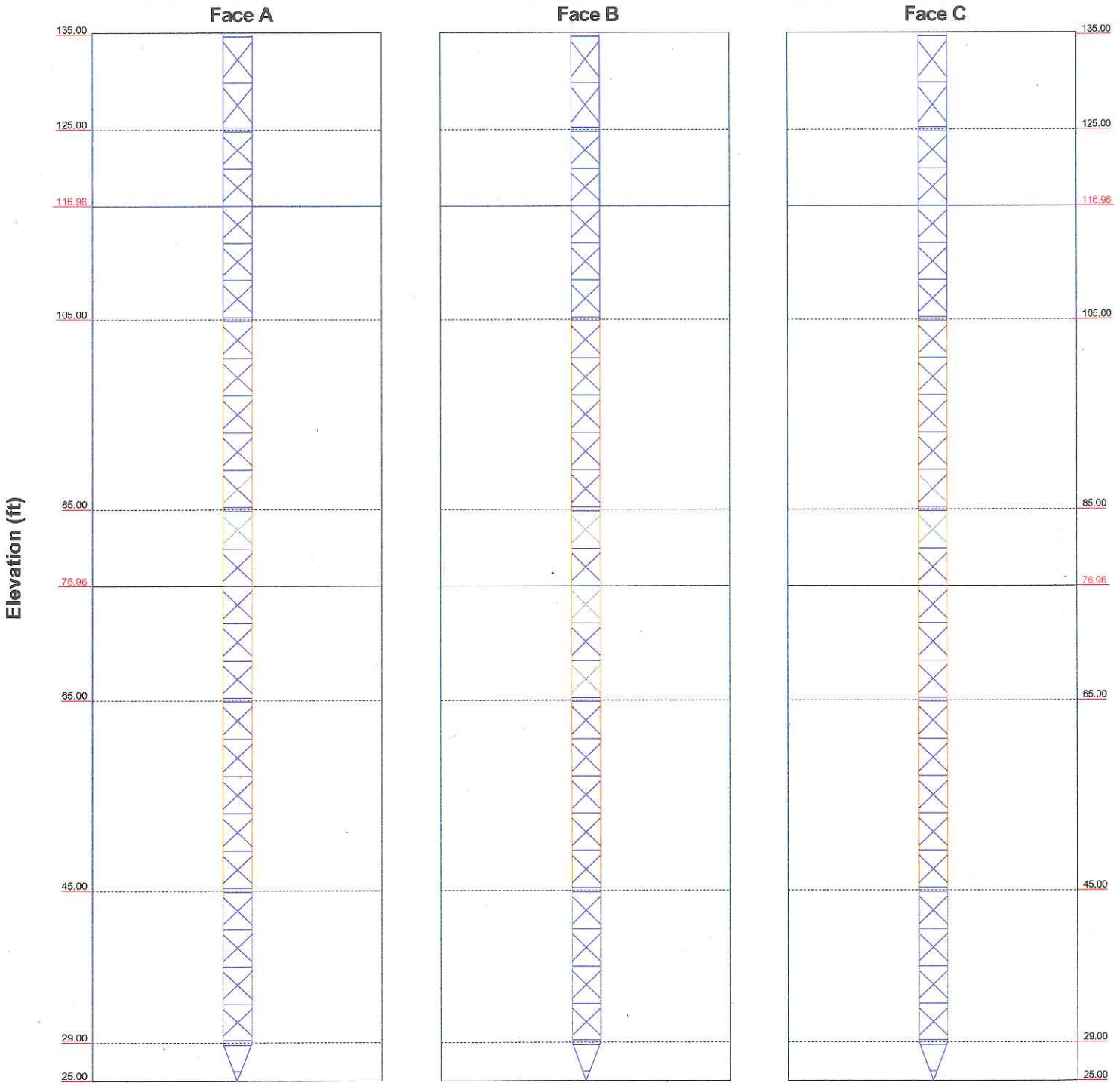


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: *12124.CO54 - West Hartford Center*		
Project: *100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT*		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS
Path: J:\Job\12124\CO54\WC054 - West Hartford Center\Cad\ERI\Reliance\100_FWT_Guyed_Tnr_West Hartford_CT_.eri		Dwg No. E-5

Stress Distribution Chart
25' - 135'

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

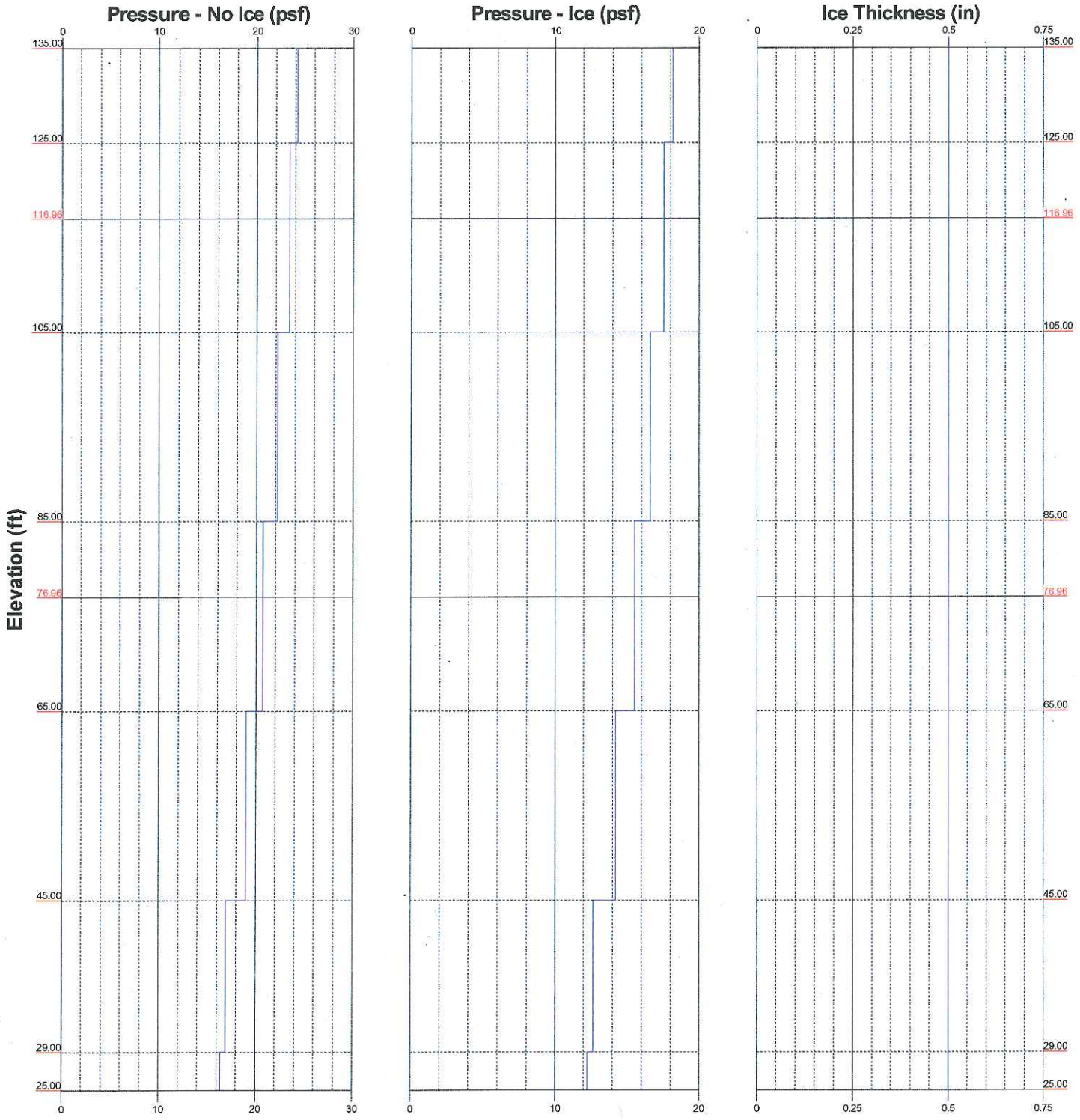


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: *12124.CO54 - West Hartford Center*		
Project: *100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT*		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS
Path: J:\Jobs\12124\CO54 - West Hartford Center\Civil\SRI\Reinforced\100_FWT_Guyed_Twr_West Hartford_CT_.eri		Dwg No. E-8

Wind Pressures and Ice Thickness

TIA/EIA-222-F - 80 mph/69 mph 0.500 in Ice



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

Job: *12124.CO54 - West Hartford Center*			
Project: *100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT*			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS	
Path: J:\Jobs\12124.00 WG\CO54 - West Hartford Center\Cnet\ERI\Reinforce\100_FWT_Guyed_Tow West Hartford_CT_.er		Dwg No. E-9	

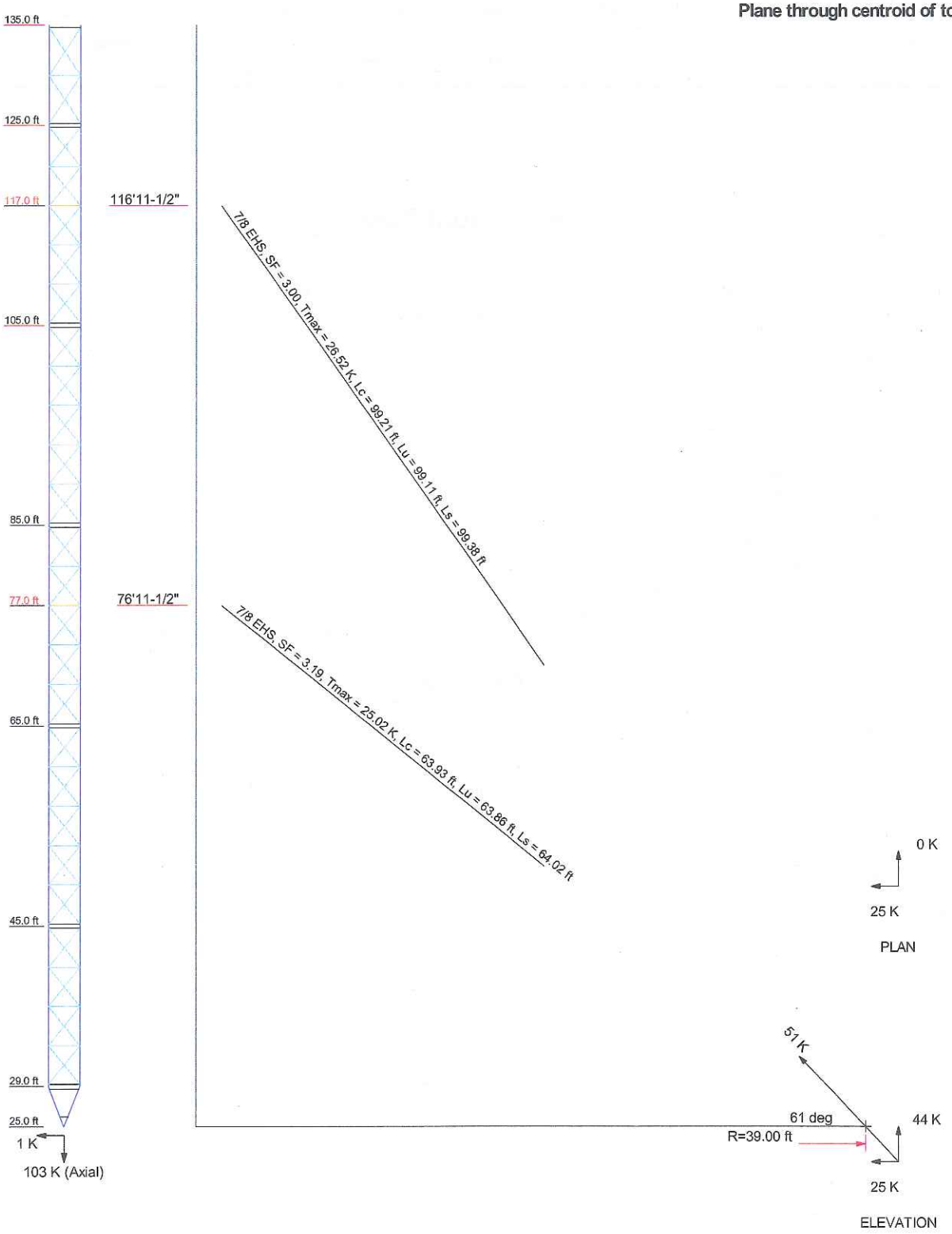
Guy Tensions and Tower Reactions

TIA/EIA-222-F - 80 mph/69 mph 0.500 in Ice

Maximum Values

Anchor 'B'@39 ft Azimuth 120 deg Elev 25 ft

Plane through centroid of tower



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: *12124.CO54 - West Hartford Center*		
	Project: *100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT*		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 01/21/13	Scale: NTS
	Path: J:\Job\12124\00\WO54 - West Hartford Center\Civil\ERI\Reinforce\E130 FWT Guyed Tor West Hartford, CT .eri		Dwg No. E-6

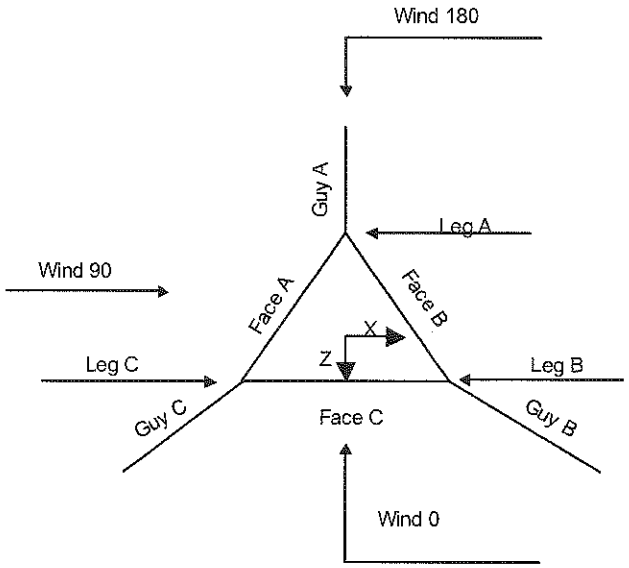
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 135.00 ft above the ground line.
The base of the tower is set at an elevation of 25.00 ft above the ground line.
The face width of the tower is 3.04 ft at the top and tapered at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Tower is located on the roof of a building approximately 25'-0" above grade level..
Pressures are calculated at each section.
Safety factor used in guy design is 2.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	*Tower Elevation*	*Assembly Database*	*Description*	*Section Width*	*Number of Sections*	*Section Length*
	ft			*ft*		*ft*
T1	135.00-125.00			3.04	1	10.00
T2	125.00-105.00			3.04	1	20.00
T3	105.00-85.00			3.04	1	20.00
T4	85.00-65.00			3.04	1	20.00
T5	65.00-45.00			3.04	1	20.00
T6	45.00-29.00			3.04	1	16.00
T7	29.00-25.00			3.04	1	4.00

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation*	*Diagonal Spacing*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset*	*Bottom Girt Offset*
	ft	*ft*				*in*	*in*
T1	135.00-125.00	4.79	X Brace	No	Yes	2.500	2.500
T2	125.00-105.00	3.92	X Brace	No	Yes	2.500	2.500
T3	105.00-85.00	3.92	X Brace	No	Yes	2.500	2.500

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T4	85.00-65.00	3.92	X Brace	No	Yes	2.500	2.500
T5	65.00-45.00	3.92	X Brace	No	Yes	2.500	2.500
T6	45.00-29.00	3.90	X Brace	No	Yes	2.500	2.500
T7	29.00-25.00	2.79	X Brace	No	Yes	2.539	12.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 135.00-125.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T2 125.00-105.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T3 105.00-85.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T4 85.00-65.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T5 65.00-45.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T6 45.00-29.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T7 29.00-25.00	Solid Round	2	A572-50 (50 ksi)	Flat Bar		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 135.00-125.00	Solid Round	7/8	A36 (36 ksi)	Solid Round	7/8	A36 (36 ksi)
T2 125.00-105.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T3 105.00-85.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 85.00-65.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T5 65.00-45.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 45.00-29.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T7 29.00-25.00	Single Angle	L3x3x1/8	A36 (36 ksi)	Flat Bar	12x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 135.00-125.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T2 125.00-105.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T3 105.00-85.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 85.00-65.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T5 65.00-45.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 45.00-29.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T7 29.00-25.00	1	Single Angle	L2x2x1/4	A36 (36 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 135.00-125.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000
T2 125.00-105.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000
T3 105.00-85.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000
T4 85.00-65.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000
T5 65.00-45.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000
T6 45.00-29.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000
T7 29.00-25.00	0.00	0.000	A36 (36 ksi)	1	1	1	36.000	36.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 135.00-125.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 125.00-105.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 105.00-85.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T4	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
85.00-65.00				1	1	1	1	1	1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
65.00-45.00				1	1	1	1	1	1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
45.00-29.00				1	1	1	1	1	1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
29.00-25.00				1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
135.00-125.00														
T2	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
125.00-105.00														
T3	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
105.00-85.00														
T4 85.00-65.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 65.00-45.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 45.00-29.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 29.00-25.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Connection Offsets Diagonal Vert. Top in	Diagonal Horiz. Top in	Diagonal Vert. Bot. in	Diagonal Horiz. Bot. in	K-Bracing Vert. Top in	K-Bracing Horiz. Top in	K-Bracing Vert. Bot. in	K-Bracing Horiz. Bot. in
T1	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
135.00-125.00								
T2	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
125.00-105.00								
T3	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
105.00-85.00								
T4 85.00-65.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T5 65.00-45.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T6 45.00-29.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T7 29.00-25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1	Flange	0.750	0	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
135.00-125.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2	Flange	0.750	0	0.000	0	0.000	0	0.000	0	0.625	0	0.000	0	0.625	0
125.00-105.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
105.00-85.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 85.00-65.00	Flange	0.750	3	0.000	0	0.500	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 65.00-45.00	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 45.00-29.00	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 29.00-25.00	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
116.958	EHS	A	7/8	7.97	10%	19000	1.581	101.53	45.00	0.0000	25.00	100%
		B	7/8	7.97	10%	19000	1.581	99.12	39.00	0.0000	25.00	100%
		C	7/8	7.97	10%	19000	1.581	92.55	37.50	0.0000	31.50	100%
76.9583	EHS	A	7/8	7.97	10%	19000	1.581	67.54	45.00	0.0000	25.00	100%
		B	7/8	7.97	10%	19000	1.581	63.87	39.00	0.0000	25.00	100%
		C	7/8	7.97	10%	19000	1.581	57.78	37.50	0.0000	31.50	100%

Guy Data *(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
116.958	Corner						

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
76.9583	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
116.96	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Single Angle	L3x3x1/4
76.96	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Single Angle	L3x3x1/4

Guy Data (cont'd)

Guy Elevation ft	Cable Weight A K	Cable Weight B K	Cable Weight C K	Cable Weight D K	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
116.958	0.16	0.16	0.15		1.01 1.7 sec/pulse	0.97 1.7 sec/pulse	0.84 1.6 sec/pulse	
76.9583	0.11	0.10	0.09		0.45 1.2 sec/pulse	0.40 1.1 sec/pulse	0.33 1.0 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
116.958	Yes	Yes			1	1	1	1
76.9583	No	No			1	1	1	1

Guy Data (cont'd)

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
116.958	0.000 A325N	0	0.000	1	0.625 A325N	0	0.000	0.75	0.625 A325N	0	0.000	0.75
76.9583	0.000 A325N	0	0.000	1	0.625 A325N	0	0.000	0.75	0.625 A325N	0	0.000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
116.958	A	70.98	20	15	0.500
	B	70.98	20	15	0.500
	C	74.23	21	15	0.500
76.9583	A	50.98	19	14	0.500
	B	50.98	19	14	0.500
	C	54.23	19	14	0.500

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom K	F_x K	F_y K	F_z K	M_x kip-ft	M_y kip-ft	M_z kip-ft
116.958	A	64.8146	8.12 7.97	0.00	7.36	-3.42	-12.92	0.00	0.00
	B	67.9517	8.12 7.97	2.61	7.53	1.51	6.61	0.00	-11.46
	C	67.3025	8.10 7.97	-2.69	7.49	1.55	6.58	-0.00	11.39
			Sum:	-0.07	22.38	-0.36	0.27	0.00	-0.07
76.9583	A	50.2302	8.05 7.97	0.00	6.21	-5.12	-10.91	0.00	0.00
	B	54.3671	8.05 7.97	4.04	6.56	2.33	5.76	0.00	-9.98
	C	51.8222	8.04 7.97	-4.29	6.34	2.47	5.57	-0.00	9.64
			Sum:	-0.24	19.11	-0.32	0.42	0.00	-0.34

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom K	F_x K	F_y K	F_z K	M_x kip-ft	M_y kip-ft	M_z kip-ft
116.958	A	64.8146	11.00 10.78	0.00	9.98	-4.63	-17.52	0.00	0.00
	B	67.9517	11.00 10.77	3.54	10.21	2.04	8.97	0.00	-15.53
	C	67.3025	10.98 10.78	-3.64	10.15	2.10	8.91	-0.00	15.44
			Sum:	-0.10	30.34	-0.49	0.36	0.00	-0.09
76.9583	A	50.2302	10.92 10.79	0.00	8.43	-6.94	-14.80	0.00	0.00
	B	54.3671	10.92 10.79	5.48	8.90	3.16	7.81	0.00	-13.53

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
	C	51.8222	10.90 10.79	-5.81	8.60	3.35	7.55	-0.00	13.08
			Sum:	-0.33	25.92	-0.43	0.57	0.00	-0.46

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
116.958	A	64.8146	8.12 7.97	0.00	7.36	-3.42	-12.92	0.00	0.00
	B	67.9517	8.12 7.97	2.61	7.53	1.51	6.61	0.00	-11.46
	C	67.3025	8.10 7.97	-2.69	7.49	1.55	6.58	-0.00	11.39
			Sum:	-0.07	22.38	-0.36	0.27	0.00	-0.07
76.9583	A	50.2302	8.05 7.97	0.00	6.21	-5.12	-10.91	0.00	0.00
	B	54.3671	8.05 7.97	4.04	6.56	2.33	5.76	0.00	-9.98
	C	51.8222	8.04 7.97	-4.29	6.34	2.47	5.57	-0.00	9.64
			Sum:	-0.24	19.11	-0.32	0.42	0.00	-0.34

Guy-Tensioning Information

				Temperature At Time Of Tensioning													
				0 F		20 F		40 F		60 F		80 F		100 F		120 F	
Guy Elevation		H	V	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept
ft		ft	ft	K	ft	K	ft	K	ft	K	ft	K	ft	K	ft	K	ft
116.958	A	43.24	91.96	8.583	0.94	8.379	0.96	8.174	0.99	7.970	1.01	7.766	1.04	7.562	1.07	7.358	1.10
	B	37.24	91.96	8.448	0.91	8.288	0.93	8.129	0.95	7.970	0.97	7.811	0.99	7.652	1.01	7.493	1.03
	C	35.74	85.46	8.475	0.79	8.307	0.81	8.138	0.83	7.970	0.84	7.802	0.86	7.634	0.88	7.466	0.90
76.9583	A	43.24	51.96	9.357	0.38	8.894	0.40	8.432	0.43	7.970	0.45	7.509	0.48	7.049	0.51	6.590	0.54
	B	37.24	51.96	9.121	0.35	8.737	0.37	8.353	0.38	7.970	0.40	7.587	0.42	7.204	0.45	6.822	0.47
	C	35.74	45.46	9.267	0.28	8.834	0.30	8.402	0.31	7.970	0.33	7.539	0.35	7.108	0.37	6.678	0.39

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon)	A	Yes	Ar (CfAe)	105.00 - 31.00	1.000	0	12	6	0.500	1.980		1.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 1/4 (Nextel)	C	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0	8	8	1.000	1.550		0.66
1 1/4 (Nextel)	C	Yes	Ar (CfAe)	125.00 - 31.00	-3.000	0.05	3	3	1.000	1.550		0.66
1/2	B	Yes	Ar (CfAe)	31.00 - 25.00	0.000	0	4	4	0.580	0.580		0.25
7/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	-0.31	3	3	0.750	1.110		0.54
1/2	B	Yes	Ar (CfAe)	69.00 - 31.00	-1.000	-0.19	1	1	0.580	0.580		0.25
1/2	B	Yes	Ar (CfAe)	55.00 - 31.00	-1.000	-0.17	1	1	0.580	0.580		0.25
1 5/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	-0.13	1	1	1.980	1.980		1.04
7/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	-0.07	1	1	1.110	1.110		0.54
1 5/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0	1	1	1.980	1.980		1.04
1 1/4	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.08	1	1	1.550	1.550		0.66
3" dia Flex Conuit	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.15	1	1	3.000	3.000		5.00
1/2	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.22	2	2	0.400	0.580		0.25
1 5/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.27	1	1	1.980	1.980		1.04
HYBRIFLEX 1-5/8" (Verizon - Proposed)	A	Yes	Ar (CfAe)	105.00 - 31.00	1.000	-0.25	1	1	1.980	1.980		1.90
1 5/8 (MetroPCS)	B	Yes	Ar (CfAe)	132.00 - 31.00	1.000	0	12	6	0.500	1.980		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	135.00-125.00	A	0.000	0.000	0.000	0.000	0.00
		B	6.930	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	0.000	0.00
T2	125.00-105.00	A	0.000	0.000	0.000	0.000	0.00
		B	46.617	0.000	0.000	0.000	0.48
		C	28.417	0.000	0.000	0.000	0.15
T3	105.00-85.00	A	23.100	0.000	0.000	0.000	0.29
		B	46.617	0.000	0.000	0.000	0.48
		C	28.417	0.000	0.000	0.000	0.15
T4	85.00-65.00	A	23.100	0.000	0.000	0.000	0.29
		B	46.810	0.000	0.000	0.000	0.48
		C	28.417	0.000	0.000	0.000	0.15
T5	65.00-45.00	A	23.100	0.000	0.000	0.000	0.29
		B	48.067	0.000	0.000	0.000	0.49
		C	28.417	0.000	0.000	0.000	0.15
T6	45.00-29.00	A	16.170	0.000	0.000	0.000	0.20
		B	34.372	0.000	0.000	0.000	0.34
		C	19.892	0.000	0.000	0.000	0.10
T7	29.00-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.773	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	135.00-125.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		1.738	7.233	0.000	0.000	0.21
		C		0.000	0.000	0.000	0.000	0.00
T2	125.00-105.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		40.450	28.500	0.000	0.000	1.10
		C		8.500	38.250	0.000	0.000	0.52
T3	105.00-85.00	A	0.500	9.933	20.667	0.000	0.000	0.67
		B		40.450	28.500	0.000	0.000	1.10
		C		8.500	38.250	0.000	0.000	0.52
T4	85.00-65.00	A	0.500	9.933	20.667	0.000	0.000	0.67
		B		40.977	28.500	0.000	0.000	1.10
		C		8.500	38.250	0.000	0.000	0.52
T5	65.00-45.00	A	0.500	9.933	20.667	0.000	0.000	0.67
		B		44.400	28.500	0.000	0.000	1.12
		C		8.500	38.250	0.000	0.000	0.52
T6	45.00-29.00	A	0.500	6.953	14.467	0.000	0.000	0.47
		B		32.265	20.530	0.000	0.000	0.80
		C		5.950	26.775	0.000	0.000	0.36
T7	29.00-25.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.527	1.160	0.000	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	135.00-125.00	A	0.000	0.000	0.000	0.000
		B	0.478	1.401	0.115	0.150
		C	0.000	0.000	0.000	0.000
T2	125.00-105.00	A	0.000	0.000	0.000	0.000
		B	2.771	10.505	2.525	3.735
		C	1.689	7.123	1.539	2.532
T3	105.00-85.00	A	1.373	4.662	1.155	1.530
		B	2.771	10.505	2.331	3.447
		C	1.689	7.123	1.421	2.337
T4	85.00-65.00	A	1.373	4.662	1.251	1.658
		B	2.782	10.586	2.536	3.763
		C	1.689	7.123	1.539	2.532
T5	65.00-45.00	A	1.373	4.662	1.155	1.530
		B	2.857	11.107	2.403	3.645
		C	1.689	7.123	1.421	2.337
T6	45.00-29.00	A	0.958	3.277	0.842	1.116
		B	2.036	8.077	1.790	2.750
		C	1.178	5.006	1.036	1.704
T7	29.00-25.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.066	0.149	0.356
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	135.00-125.00	3.244	-1.873	1.862	-1.075
T2	125.00-105.00	3.565	-0.159	2.500	0.133
T3	105.00-85.00	0.964	-1.065	0.808	-0.443
T4	85.00-65.00	0.944	-1.050	0.800	-0.456
T5	65.00-45.00	1.002	-1.160	0.875	-0.615
T6	45.00-29.00	1.002	-1.154	0.876	-0.647
T7	29.00-25.00	0.607	-0.350	0.507	-0.293

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Rohn 6' x 12' Boom Gate (1)	A	From Leg	2.00	0.0000	123.00	No Ice	16.60	16.60	0.70
(Nextel)			0.00			1/2" Ice	25.00	25.00	1.10
			0.00						
Rohn 6' x 12' Boom Gate (1)	B	From Leg	2.00	0.0000	123.00	No Ice	16.60	16.60	0.70
(Nextel)			0.00			1/2" Ice	25.00	25.00	1.10
			0.00						
Rohn 6' x 12' Boom Gate (1)	C	From Leg	2.00	0.0000	123.00	No Ice	16.60	16.60	0.70
(Nextel)			0.00			1/2" Ice	25.00	25.00	1.10
			0.00						
(3) DB844H65E-XY	A	From Leg	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
(Nextel)			-2.50			1/2" Ice	3.18	4.57	0.04
			0.00						
(3) DB844H65E-XY	B	From Leg	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
(Nextel)			-2.50			1/2" Ice	3.18	4.57	0.04
			0.00						
(3) DB844H65E-XY	C	From Leg	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
(Nextel)			-2.50			1/2" Ice	3.18	4.57	0.04
			0.00						
LLPX310R	A	From Leg	3.00	0.0000	123.00	No Ice	4.83	1.95	0.03
(Clearwire)			6.00			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	B	From Leg	3.00	0.0000	123.00	No Ice	4.83	1.95	0.03
(Clearwire)			6.00			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	C	From Leg	3.00	0.0000	123.00	No Ice	4.83	1.95	0.03
(Clearwire)			6.00			1/2" Ice	5.18	2.21	0.05
			0.00						
RRU	A	From Leg	0.00	0.0000	123.00	No Ice	1.80	0.78	0.03
(Clearwire)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
RRU	B	From Leg	0.00	0.0000	123.00	No Ice	1.80	0.78	0.03
(Clearwire)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
RRU	C	From Leg	0.00	0.0000	123.00	No Ice	1.80	0.78	0.03
(Clearwire)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
Pirod 12' T-Frame Sector Mount (1)	A	From Leg	2.00	0.0000	105.00	No Ice	13.60	13.60	0.47
			0.00			1/2" Ice	18.40	18.40	0.60
(Verizon - Existing)			0.00						

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
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	0.47 0.60
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	0.47 0.60
BXA-171063-12CF (Verizon - Proposed)	A	From Leg	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Existing)	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063/8BF (Verizon - Existing)	A	From Leg	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.94 3.26	2.16 2.46	0.01 0.03
BXA-80063-4CF (Verizon - Proposed)	A	From Leg	4.00 -6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	5.16 5.55	2.52 2.82	0.01 0.04
SACP 2X5516 (Verizon - Proposed)	B	From Leg	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	5.28 5.71	3.67 4.03	0.00 0.03
SLCP 2x6015 (Verizon - Existing)	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	10.48 11.07	8.23 8.81	0.03 0.10
SACP 2X5516 (Verizon - Existing)	B	From Leg	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	5.28 5.71	3.67 4.03	0.00 0.03
SLCP 2x6014 (Verizon - Proposed)	B	From Leg	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	7.21 7.65	5.67 6.09	0.02 0.07
SACP 2X5516 (Verizon - Proposed)	C	From Leg	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	5.28 5.71	3.67 4.03	0.00 0.03
SLCP 2x6015 (Verizon - Existing)	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	10.48 11.07	8.23 8.81	0.03 0.10
SACP 2X5516 (Verizon - Existing)	C	From Leg	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	5.28 5.71	3.67 4.03	0.00 0.03
SLCP 2x6014 (Verizon - Proposed)	C	From Leg	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	7.21 7.65	5.67 6.09	0.02 0.07
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	C	From Leg	0.00 0.50 0.00	0.0000	109.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08
RRH2x40-AWS (Verizon - Proposed)	A	From Leg	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon - Proposed)	B	From Leg	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon - Proposed)	C	From Leg	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-07-U (Verizon - Proposed)	A	From Leg	4.00 4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07

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
RRH2x40-07-U	B	From Leg	4.00	0.0000	105.00	No Ice	2.25	1.23	0.05
(Verizon - Proposed)			4.00			1/2" Ice	2.45	1.39	0.07
			0.00						
RRH2x40-07-U	C	From Leg	4.00	0.0000	105.00	No Ice	2.25	1.23	0.05
(Verizon - Proposed)			4.00			1/2" Ice	2.45	1.39	0.07
			0.00						
18' x 3" Dia Omni	A	From Leg	1.00	0.0000	125.00	No Ice	5.40	5.40	0.05
			0.00			1/2" Ice	7.23	7.23	0.09
			9.00						
12' x 3" Dia Omni	B	From Leg	1.00	0.0000	137.00	No Ice	3.60	3.60	0.04
			0.00			1/2" Ice	4.83	4.83	0.06
			6.00						
6' x 3" Dia Omni	C	From Leg	4.00	0.0000	128.00	No Ice	1.77	1.77	0.02
			0.00			1/2" Ice	2.13	2.13	0.03
			0.00						
4' x 3" DIA Omni	C	From Leg	1.00	0.0000	127.00	No Ice	1.00	1.00	0.02
			0.00			1/2" Ice	1.25	1.25	0.02
			0.00						
4-Bay Dipole	A	From Leg	1.00	0.0000	129.00	No Ice	3.15	3.15	0.03
			0.00			1/2" Ice	5.67	5.67	0.04
			0.00						
4-Bay Dipole	A	From Leg	1.00	0.0000	129.00	No Ice	3.15	3.15	0.03
			0.00			1/2" Ice	5.67	5.67	0.04
			0.00						
ANT150D6-9	A	From Leg	1.00	0.0000	69.00	No Ice	4.00	4.00	0.03
			0.00			1/2" Ice	4.60	4.60	0.03
			0.00						
ANT150D6-9	A	From Leg	1.00	0.0000	55.00	No Ice	4.00	4.00	0.03
			0.00			1/2" Ice	4.60	4.60	0.03
			0.00						
GPS	A	From Leg	3.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
GPS	A	From Leg	0.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			3.00			1/2" Ice	1.50	1.50	0.01
			0.00						
GPS	B	From Leg	3.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
GPS	B	From Leg	0.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			3.00			1/2" Ice	1.50	1.50	0.01
			0.00						
3' Pipe Mount Side Arm	A	From Leg	1.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			0.00			1/2" Ice	0.69	0.69	0.05
			0.00						
3' Pipe Mount Side Arm	A	From Leg	0.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			1.00			1/2" Ice	0.69	0.69	0.05
			0.00						
3' Pipe Mount Side Arm	B	From Leg	1.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			0.00			1/2" Ice	0.69	0.69	0.05
			0.00						
3' Pipe Mount Side Arm	B	From Leg	0.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			1.00			1/2" Ice	0.69	0.69	0.05
			0.00						
(2) HBX-6516DS	A	From Leg	4.00	0.0000	132.00	No Ice	3.33	1.99	0.01
(MetroPCS - Reserved)			0.00			1/2" Ice	3.66	2.31	0.03
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) HBX-6516DS	B	From Leg	4.00	0.0000	132.00	No Ice	3.33	1.99	0.01
(MetroPCS - Reserved)			0.00			1/2" Ice	3.66	2.31	0.03
			0.00						
(2) HBX-6516DS	C	From Leg	4.00	0.0000	132.00	No Ice	3.33	1.99	0.01
(MetroPCS - Reserved)			0.00			1/2" Ice	3.66	2.31	0.03
			0.00						
(2) ATM200-A20 Actuator	A	From Leg	4.00	0.0000	132.00	No Ice	0.22	0.16	0.00
(MetroPCS - Reserved)			0.00			1/2" Ice	0.29	0.23	0.00
			0.00						
(2) ATM200-A20 Actuator	B	From Leg	4.00	0.0000	132.00	No Ice	0.22	0.16	0.00
(MetroPCS - Reserved)			0.00			1/2" Ice	0.29	0.23	0.00
			0.00						
(2) ATM200-A20 Actuator	C	From Leg	4.00	0.0000	132.00	No Ice	0.22	0.16	0.00
(MetroPCS - Reserved)			0.00			1/2" Ice	0.29	0.23	0.00
			0.00						
Pirod 12' PCS T-Frame (1)	A	From Leg	2.00	0.0000	132.00	No Ice	9.80	9.80	0.26
104569			0.00			1/2" Ice	14.80	14.80	0.36
(MetroPCS - Reserved)			0.00						
Pirod 12' PCS T-Frame (1)	B	From Leg	2.00	0.0000	132.00	No Ice	9.80	9.80	0.26
104569			0.00			1/2" Ice	14.80	14.80	0.36
(MetroPCS - Reserved)			0.00						
Pirod 12' PCS T-Frame (1)	C	From Leg	2.00	0.0000	132.00	No Ice	9.80	9.80	0.26
104569			0.00			1/2" Ice	14.80	14.80	0.36
(MetroPCS - Reserved)			0.00						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
A-ANT-23G-2	B	Paraboloid w/o Radome	From Leg	0.00	Worst		119.00	2.50	No Ice	4.91	0.04
(Clearwire)				0.00					1/2" Ice	5.24	0.07
				0.00							
A-ANT-23G-2	A	Paraboloid w/o Radome	From Leg	0.00	Worst		127.00	2.50	No Ice	4.91	0.04
(Clearwire)				0.00					1/2" Ice	5.24	0.07
				0.00							

Tower Pressures - No Ice

$G_H = 1.155$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	130.00	1.48	24	32.087	A	0.479	5.170	3.333	59.00	0.000	0.000
135.00-125.00					B	0.364	11.622		27.81	0.000	0.000
					C	0.479	5.170		59.00	0.000	0.000
T2	115.00	1.429	23	64.173	A	3.115	9.740	6.667	51.86	0.000	0.000
125.00-105.00					B	0.590	53.586		12.31	0.000	0.000
					C	1.576	36.467		17.52	0.000	0.000
T3	95.00	1.353	22	64.173	A	1.720	31.467	6.667	20.09	0.000	0.000
105.00-85.00					B	0.544	53.586		12.32	0.000	0.000
					C	1.454	36.467		17.58	0.000	0.000
T4 85.00-65.00	75.00	1.264	21	64.590	A	1.841	32.300	7.500	21.97	0.000	0.000
					B	0.557	54.601		13.60	0.000	0.000
					C	1.553	37.301		19.30	0.000	0.000
T5 65.00-45.00	55.00	1.157	19	64.173	A	1.720	31.467	6.667	20.09	0.000	0.000
					B	0.472	54.949		12.03	0.000	0.000
					C	1.454	36.467		17.58	0.000	0.000
T6 45.00-29.00	37.00	1.033	17	51.339	A	1.554	22.995	5.333	21.72	0.000	0.000
					B	0.606	40.119		13.10	0.000	0.000
					C	1.360	26.497		19.15	0.000	0.000
T7 29.00-25.00	27.00	1	16	6.797	A	1.272	1.456	1.456	53.37	0.000	0.000
					B	1.123	2.230		43.43	0.000	0.000
					C	1.272	1.456		53.37	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.155$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	130.00	1.48	18	0.500	32.920	A	0.479	9.176	5.000	51.78	0.000	0.000
135.00-125.00						B	7.563	9.513		29.28	0.000	0.000
						C	0.479	9.176		51.78	0.000	0.000
T2	115.00	1.429	18	0.500	65.840	A	3.115	18.023	10.000	47.31	0.000	0.000
125.00-105.00						B	27.880	47.967		13.18	0.000	0.000
						C	38.833	19.400		17.17	0.000	0.000
T3 105.00-85.00	95.00	1.353	17	0.500	65.840	A	22.012	23.294	10.000	22.07	0.000	0.000
						B	27.928	47.967		13.18	0.000	0.000
						C	38.788	19.400		17.19	0.000	0.000
T4 85.00-65.00	75.00	1.264	16	0.500	66.257	A	22.102	24.117	10.833	23.44	0.000	0.000
						B	27.829	49.236		14.06	0.000	0.000
						C	38.810	20.222		18.35	0.000	0.000
T5 65.00-45.00	55.00	1.157	14	0.500	65.840	A	22.012	23.294	10.000	22.07	0.000	0.000
						B	27.730	51.315		12.65	0.000	0.000
						C	38.788	19.400		17.19	0.000	0.000
T6 45.00-29.00	37.00	1.033	13	0.500	52.672	A	15.747	18.124	8.000	23.62	0.000	0.000
						B	20.176	38.636		13.60	0.000	0.000
						C	27.467	15.392		18.67	0.000	0.000
T7 29.00-25.00	27.00	1	12	0.500	7.154	A	1.272	2.460	2.184	58.52	0.000	0.000
						B	2.077	2.921		43.71	0.000	0.000
						C	1.272	2.460		58.52	0.000	0.000

Tower Pressure - Service

$G_H = 1.155$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	130.00	1.48	9	32.087	A	0.479	5.170	3.333	59.00	0.000	0.000
135.00-125.00					B	0.364	11.622		27.81	0.000	0.000
					C	0.479	5.170		59.00	0.000	0.000
T2	115.00	1.429	9	64.173	A	3.115	9.740	6.667	51.86	0.000	0.000
125.00-105.00					B	0.590	53.586		12.31	0.000	0.000
					C	1.576	36.467		17.52	0.000	0.000
T3	95.00	1.353	9	64.173	A	1.720	31.467	6.667	20.09	0.000	0.000
105.00-85.00					B	0.544	53.586		12.32	0.000	0.000
					C	1.454	36.467		17.58	0.000	0.000
T4 85.00-65.00	75.00	1.264	8	64.590	A	1.841	32.300	7.500	21.97	0.000	0.000
					B	0.557	54.601		13.60	0.000	0.000
					C	1.553	37.301		19.30	0.000	0.000
T5 65.00-45.00	55.00	1.157	7	64.173	A	1.720	31.467	6.667	20.09	0.000	0.000
					B	0.472	54.949		12.03	0.000	0.000
					C	1.454	36.467		17.58	0.000	0.000
T6 45.00-29.00	37.00	1.033	7	51.339	A	1.554	22.995	5.333	21.72	0.000	0.000
					B	0.606	40.119		13.10	0.000	0.000
					C	1.360	26.497		19.15	0.000	0.000
T7 29.00-25.00	27.00	1	6	6.797	A	1.272	1.456	1.456	53.37	0.000	0.000
					B	1.123	2.230		43.43	0.000	0.000
					C	1.272	1.456		53.37	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	1	1	3.508	0.46	46.37	B
135.00-125.00			B	0.374	2.119	0.641	1	1	7.816			
			C	0.176	2.678	0.586	1	1	3.508			
T2	0.62	1.06	A	0.2	2.595	0.59	1	1	8.866	2.54	126.95	B
125.00-105.00			B	0.844	1.855	0.933	1	1	50.610			
			C	0.593	1.809	0.749	1	1	28.898			
T3	0.91	1.03	A	0.517	1.879	0.706	1	1	23.948	2.40	119.97	B
105.00-85.00			B	0.843	1.855	0.933	1	1	50.532			
			C	0.591	1.81	0.748	1	1	28.735			
T4	0.91	1.23	A	0.529	1.866	0.712	1	1	24.855	2.32	116.06	B
85.00-65.00			B	0.854	1.866	0.942	1	1	51.986			
			C	0.602	1.803	0.755	1	1	29.698			
T5	0.92	0.99	A	0.517	1.879	0.706	1	1	23.948	2.17	108.30	B
65.00-45.00			B	0.864	1.877	0.95	1	1	52.695			
			C	0.591	1.81	0.748	1	1	28.735			
T6	0.65	0.79	A	0.478	1.93	0.687	1	1	17.343	1.29	80.46	B
45.00-29.00			B	0.793	1.811	0.891	1	1	36.349			
			C	0.543	1.851	0.72	1	1	20.442			
T7	0.00	0.20	A	0.401	2.061	0.652	1	1	2.222	0.10	24.12	B
29.00-25.00			B	0.493	1.909	0.694	1	1	2.671			
			C	0.401	2.061	0.652	1	1	2.222			
Sum Weight:	4.10	5.80								11.27		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	0.825	1	3.424	0.46	45.99	B
135.00-125.00			B	0.374	2.119	0.641	0.825	1	7.752			
			C	0.176	2.678	0.586	0.825	1	3.424			
T2	0.62	1.06	A	0.2	2.595	0.59	0.825	1	8.321	2.53	126.69	B
125.00-105.00			B	0.844	1.855	0.933	0.825	1	50.507			
			C	0.593	1.809	0.749	0.825	1	28.622			
T3	0.91	1.03	A	0.517	1.879	0.706	0.825	1	23.647	2.39	119.74	B
105.00-85.00			B	0.843	1.855	0.933	0.825	1	50.437			
			C	0.591	1.81	0.748	0.825	1	28.481			
T4	0.91	1.23	A	0.529	1.866	0.712	0.825	1	24.532	2.32	115.84	B
85.00-65.00			B	0.854	1.866	0.942	0.825	1	51.889			
			C	0.602	1.803	0.755	0.825	1	29.426			
T5	0.92	0.99	A	0.517	1.879	0.706	0.825	1	23.647	2.16	108.13	B
65.00-45.00			B	0.864	1.877	0.95	0.825	1	52.612			
			C	0.591	1.81	0.748	0.825	1	28.481			
T6	0.65	0.79	A	0.478	1.93	0.687	0.825	1	17.071	1.28	80.23	B
45.00-29.00			B	0.793	1.811	0.891	0.825	1	36.243			
			C	0.543	1.851	0.72	0.825	1	20.204			
T7	0.00	0.20	A	0.401	2.061	0.652	0.825	1	1.999	0.09	22.35	B
29.00-25.00			B	0.493	1.909	0.694	0.825	1	2.474			
			C	0.401	2.061	0.652	0.825	1	1.999			
Sum Weight:	4.10	5.80								11.24		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	0.8	1	3.412	0.46	45.94	B
135.00-125.00			B	0.374	2.119	0.641	0.8	1	7.743			
			C	0.176	2.678	0.586	0.8	1	3.412			
T2	0.62	1.06	A	0.2	2.595	0.59	0.8	1	8.243	2.53	126.65	B
125.00-105.00			B	0.844	1.855	0.933	0.8	1	50.492			
			C	0.593	1.809	0.749	0.8	1	28.583			
T3	0.91	1.03	A	0.517	1.879	0.706	0.8	1	23.604	2.39	119.71	B
105.00-85.00			B	0.843	1.855	0.933	0.8	1	50.423			
			C	0.591	1.81	0.748	0.8	1	28.444			
T4	0.91	1.23	A	0.529	1.866	0.712	0.8	1	24.486	2.32	115.81	B
85.00-65.00			B	0.854	1.866	0.942	0.8	1	51.875			
			C	0.602	1.803	0.755	0.8	1	29.388			
T5	0.92	0.99	A	0.517	1.879	0.706	0.8	1	23.604	2.16	108.10	B
65.00-45.00			B	0.864	1.877	0.95	0.8	1	52.600			
			C	0.591	1.81	0.748	0.8	1	28.444			
T6	0.65	0.79	A	0.478	1.93	0.687	0.8	1	17.032	1.28	80.19	B
45.00-29.00			B	0.793	1.811	0.891	0.8	1	36.227			
			C	0.543	1.851	0.72	0.8	1	20.170			
T7	0.00	0.20	A	0.401	2.061	0.652	0.8	1	1.968	0.09	22.10	B
29.00-25.00			B	0.493	1.909	0.694	0.8	1	2.446			
			C	0.401	2.061	0.652	0.8	1	1.968			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	4.10	5.80								11.24		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	0.85	1	3.436	0.46	46.05	B
135.00-125.00			B	0.374	2.119	0.641	0.85	1	7.761			
			C	0.176	2.678	0.586	0.85	1	3.436			
T2	0.62	1.06	A	0.2	2.595	0.59	0.85	1	8.399	2.53	126.72	B
125.00-105.00			B	0.844	1.855	0.933	0.85	1	50.522			
			C	0.593	1.809	0.749	0.85	1	28.662			
T3	0.91	1.03	A	0.517	1.879	0.706	0.85	1	23.690	2.40	119.78	B
105.00-85.00			B	0.843	1.855	0.933	0.85	1	50.451			
			C	0.591	1.81	0.748	0.85	1	28.517			
T4	0.91	1.23	A	0.529	1.866	0.712	0.85	1	24.578	2.32	115.87	B
85.00-65.00			B	0.854	1.866	0.942	0.85	1	51.903			
			C	0.602	1.803	0.755	0.85	1	29.465			
T5	0.92	0.99	A	0.517	1.879	0.706	0.85	1	23.690	2.16	108.15	B
65.00-45.00			B	0.864	1.877	0.95	0.85	1	52.624			
			C	0.591	1.81	0.748	0.85	1	28.517			
T6	0.65	0.79	A	0.478	1.93	0.687	0.85	1	17.110	1.28	80.26	B
45.00-29.00			B	0.793	1.811	0.891	0.85	1	36.258			
			C	0.543	1.851	0.72	0.85	1	20.238			
T7	0.00	0.20	A	0.401	2.061	0.652	0.85	1	2.031	0.09	22.60	B
29.00-25.00			B	0.493	1.909	0.694	0.85	1	2.502			
			C	0.401	2.061	0.652	0.85	1	2.031			
Sum Weight:	4.10	5.80								11.25		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.21	0.63	A	0.293	2.314	0.614	1	1	6.112	0.56	56.33	B
135.00-125.00			B	0.519	1.877	0.707	1	1	14.291			
			C	0.293	2.314	0.614	1	1	6.112			
T2	1.61	1.37	A	0.321	2.242	0.623	1	1	14.335	2.67*	133.52	B
125.00-105.00			B	1	2.1	1	1	1	75.847			
			C	0.884	1.903	0.969	1	1	57.630			
T3	2.28	1.34	A	0.688	1.776	0.811	1	1	40.914	2.53*	126.42	B
105.00-85.00			B	1	2.1	1	1	1	75.895			
			C	0.884	1.902	0.968	1	1	57.573			
T4	2.29	1.55	A	0.698	1.776	0.818	1	1	41.833	2.38*	118.91	B
85.00-65.00			B	1	2.1	1	1	1	77.065			
			C	0.891	1.911	0.975	1	1	58.524			
T5	2.31	1.29	A	0.688	1.776	0.811	1	1	40.914	2.16*	108.15	B
65.00-45.00			B	1	2.1	1	1	1	79.046			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.884	1.902	0.968	1	1	57.573			
T6	1.63	1.04	A	0.643	1.784	0.781	1	1	29.901	1.55*	96.57	B
45.00-29.00			B	1	2.1	1	1	1	58.813			
			C	0.814	1.827	0.908	1	1	41.437			
T7	0.01	0.25	A	0.522	1.873	0.709	1	1	3.016	0.11	28.16	B
29.00-25.00			B	0.699	1.776	0.819	1	1	4.468			
			C	0.522	1.873	0.709	1	1	3.016			
Sum Weight:	10.35	7.46			*2A_g limit					11.96		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.21	0.63	A	0.293	2.314	0.614	0.825	1	6.028	0.51	51.11	B
135.00-125.00			B	0.519	1.877	0.707	0.825	1	12.968			
			C	0.293	2.314	0.614	0.825	1	6.028			
T2	1.61	1.37	A	0.321	2.242	0.623	0.825	1	13.790	2.67*	133.52	B
125.00-105.00			B	1	2.1	1	0.825	1	70.968			
			C	0.884	1.903	0.969	0.825	1	50.834			
T3	2.28	1.34	A	0.688	1.776	0.811	0.825	1	37.062	2.53*	126.42	B
105.00-85.00			B	1	2.1	1	0.825	1	71.008			
			C	0.884	1.902	0.968	0.825	1	50.785			
T4	2.29	1.55	A	0.698	1.776	0.818	0.825	1	37.965	2.38*	118.91	B
85.00-65.00			B	1	2.1	1	0.825	1	72.195			
			C	0.891	1.911	0.975	0.825	1	51.732			
T5	2.31	1.29	A	0.688	1.776	0.811	0.825	1	37.062	2.16*	108.15	B
65.00-45.00			B	1	2.1	1	0.825	1	74.193			
			C	0.884	1.902	0.968	0.825	1	50.785			
T6	1.63	1.04	A	0.643	1.784	0.781	0.825	1	27.145	1.55*	96.57	B
45.00-29.00			B	1	2.1	1	0.825	1	55.282			
			C	0.814	1.827	0.908	0.825	1	36.630			
T7	0.01	0.25	A	0.522	1.873	0.709	0.825	1	2.793	0.10	25.87	B
29.00-25.00			B	0.699	1.776	0.819	0.825	1	4.105			
			C	0.522	1.873	0.709	0.825	1	2.793			
Sum Weight:	10.35	7.46			*2A_g limit					11.90		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.21	0.63	A	0.293	2.314	0.614	0.8	1	6.017	0.50	50.37	B
135.00-125.00			B	0.519	1.877	0.707	0.8	1	12.779			
			C	0.293	2.314	0.614	0.8	1	6.017			
T2	1.61	1.37	A	0.321	2.242	0.623	0.8	1	13.712	2.67*	133.52	B
125.00-105.00			B	1	2.1	1	0.8	1	70.271			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.884	1.903	0.969	0.8	1	49.863			
T3	2.28	1.34	A	0.688	1.776	0.811	0.8	1	36.512	2.53*	126.42	B
105.00-85.00			B	1	2.1	1	0.8	1	70.309			
			C	0.884	1.902	0.968	0.8	1	49.816			
T4	2.29	1.55	A	0.698	1.776	0.818	0.8	1	37.412	2.38*	118.91	B
85.00-65.00			B	1	2.1	1	0.8	1	71.500			
			C	0.891	1.911	0.975	0.8	1	50.762			
T5	2.31	1.29	A	0.688	1.776	0.811	0.8	1	36.512	2.16*	108.15	B
65.00-45.00			B	1	2.1	1	0.8	1	73.500			
			C	0.884	1.902	0.968	0.8	1	49.816			
T6	1.63	1.04	A	0.643	1.784	0.781	0.8	1	26.751	1.55*	96.57	B
45.00-29.00			B	1	2.1	1	0.8	1	54.777			
			C	0.814	1.827	0.908	0.8	1	35.944			
T7	0.01	0.25	A	0.522	1.873	0.709	0.8	1	2.762	0.10	25.54	B
29.00-25.00			B	0.699	1.776	0.819	0.8	1	4.053			
			C	0.522	1.873	0.709	0.8	1	2.762			
Sum Weight:	10.35	7.46			*$2A_g$ limit					11.89		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	0.63	A	0.293	2.314	0.614	0.85	1	6.040	0.52	51.86	B
135.00-125.00			B	0.519	1.877	0.707	0.85	1	13.157			
			C	0.293	2.314	0.614	0.85	1	6.040			
T2	1.61	1.37	A	0.321	2.242	0.623	0.85	1	13.868	2.67*	133.52	B
125.00-105.00			B	1	2.1	1	0.85	1	71.665			
			C	0.884	1.903	0.969	0.85	1	51.805			
T3	2.28	1.34	A	0.688	1.776	0.811	0.85	1	37.613	2.53*	126.42	B
105.00-85.00			B	1	2.1	1	0.85	1	71.706			
			C	0.884	1.902	0.968	0.85	1	51.755			
T4	2.29	1.55	A	0.698	1.776	0.818	0.85	1	38.517	2.38*	118.91	B
85.00-65.00			B	1	2.1	1	0.85	1	72.891			
			C	0.891	1.911	0.975	0.85	1	52.702			
T5	2.31	1.29	A	0.688	1.776	0.811	0.85	1	37.613	2.16*	108.15	B
65.00-45.00			B	1	2.1	1	0.85	1	74.886			
			C	0.884	1.902	0.968	0.85	1	51.755			
T6	1.63	1.04	A	0.643	1.784	0.781	0.85	1	27.538	1.55*	96.57	B
45.00-29.00			B	1	2.1	1	0.85	1	55.786			
			C	0.814	1.827	0.908	0.85	1	37.317			
T7	0.01	0.25	A	0.522	1.873	0.709	0.85	1	2.825	0.10	26.20	B
29.00-25.00			B	0.699	1.776	0.819	0.85	1	4.157			
			C	0.522	1.873	0.709	0.85	1	2.825			
Sum Weight:	10.35	7.46			*$2A_g$ limit					11.91		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	1	1	3.508	0.18	18.11	B
135.00-125.00			B	0.374	2.119	0.641	1	1	7.816			
			C	0.176	2.678	0.586	1	1	3.508			
T2	0.62	1.06	A	0.2	2.595	0.59	1	1	8.866	0.99	49.59	B
125.00-105.00			B	0.844	1.855	0.933	1	1	50.610			
			C	0.593	1.809	0.749	1	1	28.898			
T3	0.91	1.03	A	0.517	1.879	0.706	1	1	23.948	0.94	46.86	B
105.00-85.00			B	0.843	1.855	0.933	1	1	50.532			
			C	0.591	1.81	0.748	1	1	28.735			
T4	0.91	1.23	A	0.529	1.866	0.712	1	1	24.855	0.91	45.34	B
85.00-65.00			B	0.854	1.866	0.942	1	1	51.986			
			C	0.602	1.803	0.755	1	1	29.698			
T5	0.92	0.99	A	0.517	1.879	0.706	1	1	23.948	0.85	42.30	B
65.00-45.00			B	0.864	1.877	0.95	1	1	52.695			
			C	0.591	1.81	0.748	1	1	28.735			
T6	0.65	0.79	A	0.478	1.93	0.687	1	1	17.343	0.50	31.43	B
45.00-29.00			B	0.793	1.811	0.891	1	1	36.349			
			C	0.543	1.851	0.72	1	1	20.442			
T7	0.00	0.20	A	0.401	2.061	0.652	1	1	2.222	0.04	9.42	B
29.00-25.00			B	0.493	1.909	0.694	1	1	2.671			
			C	0.401	2.061	0.652	1	1	2.222			
Sum Weight:	4.10	5.80								4.40		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	0.825	1	3.424	0.18	17.97	B
135.00-125.00			B	0.374	2.119	0.641	0.825	1	7.752			
			C	0.176	2.678	0.586	0.825	1	3.424			
T2	0.62	1.06	A	0.2	2.595	0.59	0.825	1	8.321	0.99	49.49	B
125.00-105.00			B	0.844	1.855	0.933	0.825	1	50.507			
			C	0.593	1.809	0.749	0.825	1	28.622			
T3	0.91	1.03	A	0.517	1.879	0.706	0.825	1	23.647	0.94	46.77	B
105.00-85.00			B	0.843	1.855	0.933	0.825	1	50.437			
			C	0.591	1.81	0.748	0.825	1	28.481			
T4	0.91	1.23	A	0.529	1.866	0.712	0.825	1	24.532	0.91	45.25	B
85.00-65.00			B	0.854	1.866	0.942	0.825	1	51.889			
			C	0.602	1.803	0.755	0.825	1	29.426			
T5	0.92	0.99	A	0.517	1.879	0.706	0.825	1	23.647	0.84	42.24	B
65.00-45.00			B	0.864	1.877	0.95	0.825	1	52.612			
			C	0.591	1.81	0.748	0.825	1	28.481			
T6	0.65	0.79	A	0.478	1.93	0.687	0.825	1	17.071	0.50	31.34	B
45.00-29.00			B	0.793	1.811	0.891	0.825	1	36.243			
			C	0.543	1.851	0.72	0.825	1	20.204			
T7	0.00	0.20	A	0.401	2.061	0.652	0.825	1	1.999	0.03	8.73	B
29.00-25.00			B	0.493	1.909	0.694	0.825	1	2.474			
			C	0.401	2.061	0.652	0.825	1	1.999			
Sum Weight:	4.10	5.80								4.39		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	0.8	1	3.412	0.18	17.94	B
135.00-125.00			B	0.374	2.119	0.641	0.8	1	7.743			
			C	0.176	2.678	0.586	0.8	1	3.412			
T2	0.62	1.06	A	0.2	2.595	0.59	0.8	1	8.243	0.99	49.47	B
125.00-105.00			B	0.844	1.855	0.933	0.8	1	50.492			
			C	0.593	1.809	0.749	0.8	1	28.583			
T3	0.91	1.03	A	0.517	1.879	0.706	0.8	1	23.604	0.94	46.76	B
105.00-85.00			B	0.843	1.855	0.933	0.8	1	50.423			
			C	0.591	1.81	0.748	0.8	1	28.444			
T4	0.91	1.23	A	0.529	1.866	0.712	0.8	1	24.486	0.90	45.24	B
85.00-65.00			B	0.854	1.866	0.942	0.8	1	51.875			
			C	0.602	1.803	0.755	0.8	1	29.388			
T5	0.92	0.99	A	0.517	1.879	0.706	0.8	1	23.604	0.84	42.23	B
65.00-45.00			B	0.864	1.877	0.95	0.8	1	52.600			
			C	0.591	1.81	0.748	0.8	1	28.444			
T6	0.65	0.79	A	0.478	1.93	0.687	0.8	1	17.032	0.50	31.33	B
45.00-29.00			B	0.793	1.811	0.891	0.8	1	36.227			
			C	0.543	1.851	0.72	0.8	1	20.170			
T7	0.00	0.20	A	0.401	2.061	0.652	0.8	1	1.968	0.03	8.63	B
29.00-25.00			B	0.493	1.909	0.694	0.8	1	2.446			
			C	0.401	2.061	0.652	0.8	1	1.968			
Sum Weight:	4.10	5.80								4.39		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.09	0.50	A	0.176	2.678	0.586	0.85	1	3.436	0.18	17.99	B
135.00-125.00			B	0.374	2.119	0.641	0.85	1	7.761			
			C	0.176	2.678	0.586	0.85	1	3.436			
T2	0.62	1.06	A	0.2	2.595	0.59	0.85	1	8.399	0.99	49.50	B
125.00-105.00			B	0.844	1.855	0.933	0.85	1	50.522			
			C	0.593	1.809	0.749	0.85	1	28.662			
T3	0.91	1.03	A	0.517	1.879	0.706	0.85	1	23.690	0.94	46.79	B
105.00-85.00			B	0.843	1.855	0.933	0.85	1	50.451			
			C	0.591	1.81	0.748	0.85	1	28.517			
T4	0.91	1.23	A	0.529	1.866	0.712	0.85	1	24.578	0.91	45.26	B
85.00-65.00			B	0.854	1.866	0.942	0.85	1	51.903			
			C	0.602	1.803	0.755	0.85	1	29.465			
T5	0.92	0.99	A	0.517	1.879	0.706	0.85	1	23.690	0.84	42.25	B
65.00-45.00			B	0.864	1.877	0.95	0.85	1	52.624			
			C	0.591	1.81	0.748	0.85	1	28.517			
T6	0.65	0.79	A	0.478	1.93	0.687	0.85	1	17.110	0.50	31.35	B
45.00-29.00			B	0.793	1.811	0.891	0.85	1	36.258			
			C	0.543	1.851	0.72	0.85	1	20.238			
T7	0.00	0.20	A	0.401	2.061	0.652	0.85	1	2.031	0.04	8.83	B
29.00-25.00			B	0.493	1.909	0.694	0.85	1	2.502			
			C	0.401	2.061	0.652	0.85	1	2.031			
Sum Weight:	4.10	5.80								4.39		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Torques kip-ft
Leg Weight	3.71			
Bracing Weight	2.09			
Total Member Self-Weight	5.80			
Guy Weight	0.76			
Total Weight	16.16			
Wind 0 deg - No Ice		0.04	-19.68	0.08
Wind 30 deg - No Ice		9.87	-17.04	-0.36
Wind 45 deg - No Ice		13.93	-13.92	-0.54
Wind 60 deg - No Ice		17.04	-9.86	-0.69
Wind 90 deg - No Ice		19.67	-0.04	-0.84
Wind 120 deg - No Ice		17.04	9.81	-0.77
Wind 135 deg - No Ice		13.88	13.87	-0.65
Wind 150 deg - No Ice		9.80	17.00	-0.49
Wind 180 deg - No Ice		-0.04	19.65	-0.07
Wind 210 deg - No Ice		-9.87	17.04	0.36
Wind 225 deg - No Ice		-13.93	13.92	0.54
Wind 240 deg - No Ice		-17.08	9.87	0.69
Wind 270 deg - No Ice		-19.67	0.04	0.84
Wind 300 deg - No Ice		-17.01	-9.79	0.76
Wind 315 deg - No Ice		-13.88	-13.87	0.65
Wind 330 deg - No Ice		-9.80	-17.00	0.49
Member Ice	1.67			
Guy Ice	0.41			
Total Weight Ice	27.86			
Wind 0 deg - Ice		0.03	-19.93	0.15
Wind 30 deg - Ice		9.97	-17.23	-0.26
Wind 45 deg - Ice		14.08	-14.07	-0.44
Wind 60 deg - Ice		17.22	-9.96	-0.59
Wind 90 deg - Ice		19.89	-0.03	-0.77
Wind 120 deg - Ice		17.26	9.94	-0.74
Wind 135 deg - Ice		14.04	14.03	-0.64
Wind 150 deg - Ice		9.92	17.20	-0.50
Wind 180 deg - Ice		-0.03	19.86	-0.14
Wind 210 deg - Ice		-9.97	17.23	0.26
Wind 225 deg - Ice		-14.08	14.07	0.44
Wind 240 deg - Ice		-17.29	9.99	0.59
Wind 270 deg - Ice		-19.89	0.03	0.77
Wind 300 deg - Ice		-17.20	-9.91	0.73
Wind 315 deg - Ice		-14.04	-14.03	0.64
Wind 330 deg - Ice		-9.92	-17.20	0.50
Total Weight	16.16			
Wind 0 deg - Service		0.01	-7.69	0.03
Wind 30 deg - Service		3.85	-6.66	-0.14
Wind 45 deg - Service		5.44	-5.44	-0.21
Wind 60 deg - Service		6.66	-3.85	-0.27
Wind 90 deg - Service		7.68	-0.01	-0.33
Wind 120 deg - Service		6.66	3.83	-0.30
Wind 135 deg - Service		5.42	5.42	-0.25
Wind 150 deg - Service		3.83	6.64	-0.19
Wind 180 deg - Service		-0.01	7.67	-0.03
Wind 210 deg - Service		-3.85	6.66	0.14
Wind 225 deg - Service		-5.44	5.44	0.21
Wind 240 deg - Service		-6.67	3.86	0.27
Wind 270 deg - Service		-7.68	0.01	0.33

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Torques kip-ft
Wind 300 deg - Service		-6.64	-3.82	0.30
Wind 315 deg - Service		-5.42	-5.42	0.25
Wind 330 deg - Service		-3.83	-6.64	0.19

Load Combinations

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

Comb. No.	Description
47	Dead+Wind 270 deg - Service+Guy
48	Dead+Wind 300 deg - Service+Guy
49	Dead+Wind 315 deg - Service+Guy
50	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	135 - 125	Leg	Max Tension	22	4.94	0.06	-0.04
			Max. Compression	19	-6.63	-0.01	0.50
			Max. Mx	23	-2.97	-0.75	-0.29
			Max. My	19	-3.52	0.00	0.89
			Max. Vy	31	-1.33	0.19	0.26
			Max. Vx	27	1.13	-0.32	-0.32
		Diagonal	Max Tension	17	1.68	-0.00	0.00
			Max. Compression	26	-2.20	0.00	0.00
			Max. Mx	32	1.00	-0.00	0.00
			Max. My	32	-2.02	-0.00	0.00
			Max. Vy	32	0.00	-0.00	0.00
			Max. Vx	32	-0.00	-0.00	0.00
		Horizontal	Max Tension	27	0.85	0.00	0.00
			Max. Compression	17	-0.36	0.00	0.00
			Max. Mx	18	0.84	-0.01	0.00
			Max. My	31	0.63	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Top Girt	Max Tension	27	0.31	0.00	0.00
			Max. Compression	2	-0.14	0.00	0.00
			Max. Mx	18	0.30	0.00	0.00
			Max. My	31	0.24	0.00	-0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
		Bottom Girt	Max Tension	27	1.15	0.00	0.00
			Max. Compression	13	-1.06	0.00	0.00
			Max. Mx	18	0.32	0.00	0.00
			Max. My	31	0.10	0.00	-0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
T2	125 - 105	Leg	Max Tension	22	15.15	1.34	-0.88
			Max. Compression	19	-26.90	0.07	0.74
			Max. Mx	22	15.13	-1.67	1.05
			Max. My	19	-19.15	0.05	1.96
			Max. Vy	31	-1.46	0.50	0.32
			Max. Vx	19	1.35	-0.01	1.78
		Diagonal	Max Tension	16	4.28	-0.00	0.00
			Max. Compression	25	-4.44	0.00	0.00
			Max. Mx	24	-1.66	-0.00	-0.00
			Max. My	32	-3.17	-0.00	0.00
			Max. Vy	24	0.00	-0.00	-0.00
			Max. Vx	24	0.00	-0.00	-0.00
		Horizontal	Max Tension	19	2.45	0.00	0.00
			Max. Compression	2	-1.20	0.00	0.00
			Max. Mx	18	1.94	-0.01	0.00
			Max. My	31	0.52	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Top Girt	Max Tension	24	1.49	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	10	-0.82	0.00	0.00
			Max. Mx	18	0.55	-0.01	0.00
			Max. My	31	0.56	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Bottom Girt	Max Tension	24	1.61	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	0.90	-0.01	0.00
			Max. My	31	1.24	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Guy A	Bottom Tension	26	24.31		
			Top Tension	26	24.53		
			Top Cable Vert	26	22.23		
			Top Cable Norm	26	10.36		
			Top Cable Tan	26	0.02		
			Bot Cable Vert	26	-21.88		
			Bot Cable Norm	26	10.59		
			Bot Cable Tan	26	0.17		
		Guy B	Bottom Tension	31	26.30		
			Top Tension	31	26.52		
			Top Cable Vert	31	24.60		
			Top Cable Norm	31	9.92		
			Top Cable Tan	31	0.02		
			Bot Cable Vert	31	-24.27		
			Bot Cable Norm	31	10.15		
			Bot Cable Tan	31	0.18		
		Guy C	Bottom Tension	23	25.77		
			Top Tension	23	25.97		
			Top Cable Vert	23	23.98		
			Top Cable Norm	23	9.98		
			Top Cable Tan	23	0.02		
			Bot Cable Vert	23	-23.66		
			Bot Cable Norm	23	10.20		
			Bot Cable Tan	23	0.17		
		Top Guy Pull-Off	Max Tension	30	5.35	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	3.19	-0.01	0.00
			Max. My	31	4.09	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T3	105 - 85	Leg	Max Tension	15	23.55	-0.07	-0.04
			Max. Compression	19	-65.55	-0.01	1.72
			Max. Mx	24	-54.99	1.85	0.91
			Max. My	19	-57.43	0.10	-2.14
			Max. Vy	31	-2.68	-0.18	0.90
			Max. Vx	19	-2.70	0.46	-0.41
		Diagonal	Max Tension	15	2.87	0.00	0.00
			Max. Compression	19	-5.99	0.00	0.00
			Max. Mx	24	1.02	-0.01	-0.00
			Max. My	19	-5.99	0.00	-0.00
			Max. Vy	24	0.01	-0.01	-0.00
			Max. Vx	19	-0.00	0.00	-0.00
		Horizontal	Max Tension	23	3.72	0.00	0.00
			Max. Compression	2	-0.10	0.00	0.00
			Max. Mx	18	2.11	-0.01	0.00
			Max. My	31	2.44	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Top Girt	Max Tension	19	1.85	0.00	0.00
			Max. Compression	15	-0.01	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	18	1.10	-0.01	0.00
			Max. My	31	1.18	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Bottom Girt	Max Tension	21	3.93	0.00	0.00
			Max. Compression	2	-2.17	0.00	0.00
			Max. Mx	18	1.12	-0.01	0.00
			Max. My	31	1.59	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T4	85 - 65	Leg	Max Tension	15	36.11	1.36	0.69
			Max. Compression	19	-78.04	0.06	1.36
			Max. Mx	31	22.74	2.49	0.47
			Max. My	2	-63.01	-0.14	2.72
			Max. Vy	31	-2.68	0.38	0.85
			Max. Vx	19	-2.70	0.53	0.15
		Diagonal	Max Tension	15	3.71	0.00	0.00
			Max. Compression	19	-6.67	0.00	0.00
			Max. Mx	24	1.19	-0.01	0.00
			Max. My	19	-6.67	0.01	-0.00
			Max. Vy	24	0.01	-0.01	0.00
			Max. Vx	19	-0.00	0.01	-0.00
		Horizontal	Max Tension	20	4.64	0.00	0.00
			Max. Compression	2	-1.99	0.00	0.00
			Max. Mx	18	1.80	-0.01	0.00
			Max. My	31	2.13	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Top Girt	Max Tension	19	2.01	0.00	0.00
			Max. Compression	15	-0.45	0.00	0.00
			Max. Mx	18	0.93	-0.01	0.00
			Max. My	31	0.94	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	2.11	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	1.32	-0.01	0.00
			Max. My	31	1.56	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Guy A	Bottom Tension	26	21.67		
			Top Tension	26	21.80		
			Top Cable Vert	26	16.80		
			Top Cable Norm	26	13.89		
			Top Cable Tan	26	0.01		
			Bot Cable Vert	26	-16.56		
			Bot Cable Norm	26	13.98		
			Bot Cable Tan	26	0.09		
		Guy B	Bottom Tension	34	24.90		
			Top Tension	34	25.02		
			Top Cable Vert	34	20.36		
			Top Cable Norm	34	14.55		
			Top Cable Tan	34	0.03		
			Bot Cable Vert	34	-20.14		
			Bot Cable Norm	34	14.64		
			Bot Cable Tan	34	0.11		
		Guy C	Bottom Tension	20	23.67		
			Top Tension	20	23.78		
			Top Cable Vert	20	18.72		
			Top Cable Norm	20	14.66		
			Top Cable Tan	20	0.03		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Bot Cable Vert	20	-18.51		
			Bot Cable Norm	20	14.74		
			Bot Cable Tan	20	0.10		
		Top Guy Pull-Off	Max Tension	19	7.50	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	5.09	-0.01	0.00
			Max. My	31	6.52	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T5	65 - 45	Leg	Max Tension	5	3.99	0.29	-0.16
			Max. Compression	19	-64.73	0.00	1.65
			Max. Mx	30	-61.42	1.60	-0.95
			Max. My	19	-64.72	0.01	1.92
			Max. Vy	23	-1.91	0.10	1.25
			Max. Vx	19	1.91	-0.97	-0.65
		Diagonal	Max Tension	15	1.16	0.00	0.00
			Max. Compression	19	-5.45	0.00	0.00
			Max. Mx	24	-4.87	-0.01	0.00
			Max. My	25	-5.30	0.00	0.00
			Max. Vy	24	0.01	-0.01	0.00
			Max. Vx	25	0.00	0.00	0.00
		Horizontal	Max Tension	19	4.10	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	2.65	-0.00	0.00
			Max. My	31	3.39	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Top Girt	Max Tension	20	3.25	0.00	0.00
			Max. Compression	2	-0.37	0.00	0.00
			Max. Mx	18	1.36	-0.00	0.00
			Max. My	31	1.93	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	2.27	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	2.22	-0.00	0.00
			Max. My	31	1.77	0.00	0.00
			Max. Vy	24	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T6	45 - 29	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-41.84	0.00	1.43
			Max. Mx	30	-27.78	-1.38	-0.56
			Max. My	19	-41.84	0.00	1.58
			Max. Vy	30	7.38	0.59	-0.35
			Max. Vx	19	8.82	-0.00	0.67
		Diagonal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-4.02	0.00	0.00
			Max. Mx	24	-3.02	-0.01	0.00
			Max. My	19	-4.01	0.00	-0.00
			Max. Vy	24	0.00	-0.01	0.00
			Max. Vx	34	-0.00	0.00	0.00
		Horizontal	Max Tension	19	3.72	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	3.18	-0.00	0.00
			Max. My	31	3.43	0.00	0.00
			Max. Vy	24	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Top Girt	Max Tension	19	2.35	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	1.10	-0.00	0.00
			Max. My	31	1.85	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	24	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	6.17	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	5.92	-0.00	0.00
			Max. My	31	5.66	0.00	0.00
			Max. Vy	24	0.01	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T7	29 - 25	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-37.93	0.10	0.00
			Max. Mx	19	-35.37	1.17	0.01
			Max. My	19	-34.25	0.86	0.13
			Max. Vy	19	5.95	-0.50	-0.12
			Max. Vx	27	0.09	-0.30	-0.03
		Top Girt	Max Tension	19	3.83	0.22	-0.10
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	19	3.78	0.22	-0.09
			Max. My	19	3.83	0.22	-0.10
			Max. Vy	19	0.08	0.22	-0.09
			Max. Vx	19	0.03	0.01	-0.00
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	24	-0.27	-0.06	0.00
			Max. Mx	14	-0.24	-0.10	-0.00
			Max. My	2	-0.22	-0.08	-0.00
			Max. Vy	14	0.10	-0.09	-0.00
			Max. Vx	17	0.01	-0.07	-0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Mast	Max. Vert	19	102.77	0.06	-0.85
	Max. H_x	7	84.30	0.66	0.18
	Max. H_z	31	92.88	-0.38	0.26
	Max. M_x	1	0.00	0.03	-0.04
	Max. M_z	1	0.00	0.03	-0.04
	Max. Torsion	1	0.00	0.03	-0.04
	Min. Vert	46	56.17	0.07	-0.09
	Min. H_x	13	86.32	-0.65	0.22
	Min. H_z	2	89.04	0.04	-0.86
	Min. M_x	1	0.00	0.03	-0.04
	Min. M_z	1	0.00	0.03	-0.04
	Min. Torsion	1	0.00	0.03	-0.04
Guy C @ 37.5 ft Elev 31.5 ft Azimuth 240 deg	Max. Vert	13	-0.39	-0.09	0.05
	Max. H_x	13	-0.39	-0.09	0.05
	Max. H_z	20	-42.12	-21.43	12.72
	Min. Vert	23	-42.15	-21.71	12.24
	Min. H_x	23	-42.15	-21.71	12.24
	Min. H_z	12	-0.48	-0.15	0.05
Guy B @ 39 ft Elev 25 ft Azimuth 120 deg	Max. Vert	7	-0.52	0.13	0.08
	Max. H_x	31	-44.27	21.52	12.11
	Max. H_z	34	-44.37	21.30	12.66

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. Vert	34	-44.37	21.30	12.66
	Min. H_x	7	-0.52	0.13	0.08
	Min. H_z	8	-0.61	0.20	0.07
Guy A @ 45 ft Elev 25 ft Azimuth 0 deg	Max. Vert	2	-0.34	0.00	-0.10
	Max. H_x	30	-33.06	0.43	-21.22
	Max. H_z	2	-0.34	0.00	-0.10
	Min. Vert	26	-38.45	-0.26	-24.56
	Min. H_x	24	-33.10	-0.42	-21.26
	Min. H_z	26	-38.45	-0.26	-24.56

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	56.84	-0.03	0.04	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice+Guy	89.04	-0.04	0.86	0.00	0.00	0.00
Dead+Wind 30 deg - No Ice+Guy	80.00	-0.02	0.62	0.00	0.00	0.00
Dead+Wind 45 deg - No Ice+Guy	70.28	0.00	0.39	0.00	0.00	0.00
Dead+Wind 60 deg - No Ice+Guy	63.26	-0.07	0.05	0.00	0.00	0.00
Dead+Wind 90 deg - No Ice+Guy	77.18	-0.49	-0.20	0.00	0.00	0.00
Dead+Wind 120 deg - No Ice+Guy	84.30	-0.66	-0.18	0.00	0.00	0.00
Dead+Wind 135 deg - No Ice+Guy	81.74	-0.61	-0.12	0.00	0.00	0.00
Dead+Wind 150 deg - No Ice+Guy	75.41	-0.48	-0.01	0.00	0.00	0.00
Dead+Wind 180 deg - No Ice+Guy	60.00	-0.02	0.18	0.00	0.00	0.00
Dead+Wind 210 deg - No Ice+Guy	76.46	0.45	-0.04	0.00	0.00	0.00
Dead+Wind 225 deg - No Ice+Guy	83.38	0.59	-0.15	0.00	0.00	0.00
Dead+Wind 240 deg - No Ice+Guy	86.32	0.65	-0.22	0.00	0.00	0.00
Dead+Wind 270 deg - No Ice+Guy	79.16	0.48	-0.23	0.00	0.00	0.00
Dead+Wind 300 deg - No Ice+Guy	62.10	0.03	0.06	0.00	0.00	0.00
Dead+Wind 315 deg - No Ice+Guy	71.19	-0.07	0.41	0.00	0.00	0.00
Dead+Wind 330 deg - No Ice+Guy	80.91	-0.06	0.65	0.00	0.00	0.00
Dead+Ice+Temp+Guy	71.02	-0.05	0.06	0.00	0.00	0.00
Dead+Wind 0 deg+Ice+Temp+Guy	102.77	-0.06	0.85	0.00	0.00	0.00
Dead+Wind 30 deg+Ice+Temp+Guy	94.05	0.04	0.60	0.00	0.00	0.00
Dead+Wind 45 deg+Ice+Temp+Guy	85.14	0.09	0.36	0.00	0.00	0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 60 deg+Ice+Temp+Guy	79.39	0.00	0.03	0.00	0.00	0.00
Dead+Wind 90 deg+Ice+Temp+Guy	91.26	-0.43	-0.23	0.00	0.00	0.00
Dead+Wind 120 deg+Ice+Temp+Guy	98.11	-0.64	-0.14	0.00	0.00	0.00
Dead+Wind 135 deg+Ice+Temp+Guy	95.48	-0.60	-0.03	0.00	0.00	0.00
Dead+Wind 150 deg+Ice+Temp+Guy	89.50	-0.50	0.10	0.00	0.00	0.00
Dead+Wind 180 deg+Ice+Temp+Guy	75.94	-0.05	0.31	0.00	0.00	0.00
Dead+Wind 210 deg+Ice+Temp+Guy	90.21	0.43	0.08	0.00	0.00	0.00
Dead+Wind 225 deg+Ice+Temp+Guy	96.84	0.54	-0.06	0.00	0.00	0.00
Dead+Wind 240 deg+Ice+Temp+Guy	99.87	0.60	-0.18	0.00	0.00	0.00
Dead+Wind 270 deg+Ice+Temp+Guy	92.88	0.38	-0.26	0.00	0.00	0.00
Dead+Wind 300 deg+Ice+Temp+Guy	78.15	-0.08	0.04	0.00	0.00	0.00
Dead+Wind 315 deg+Ice+Temp+Guy	85.85	-0.19	0.40	0.00	0.00	0.00
Dead+Wind 330 deg+Ice+Temp+Guy	94.93	-0.15	0.62	0.00	0.00	0.00
Dead+Wind 0 deg - Service+Guy	57.04	-0.03	-0.07	0.00	0.00	0.00
Dead+Wind 30 deg - Service+Guy	57.44	-0.01	-0.04	0.00	0.00	0.00
Dead+Wind 45 deg - Service+Guy	57.58	-0.00	-0.03	0.00	0.00	0.00
Dead+Wind 60 deg - Service+Guy	57.66	0.01	-0.00	0.00	0.00	0.00
Dead+Wind 90 deg - Service+Guy	57.64	0.01	0.05	0.00	0.00	0.00
Dead+Wind 120 deg - Service+Guy	57.40	0.02	0.10	0.00	0.00	0.00
Dead+Wind 135 deg - Service+Guy	57.25	0.01	0.12	0.00	0.00	0.00
Dead+Wind 150 deg - Service+Guy	57.10	-0.00	0.13	0.00	0.00	0.00
Dead+Wind 180 deg - Service+Guy	56.73	-0.03	0.14	0.00	0.00	0.00
Dead+Wind 210 deg - Service+Guy	56.39	-0.05	0.13	0.00	0.00	0.00
Dead+Wind 225 deg - Service+Guy	56.25	-0.06	0.11	0.00	0.00	0.00
Dead+Wind 240 deg - Service+Guy	56.17	-0.07	0.09	0.00	0.00	0.00
Dead+Wind 270 deg - Service+Guy	56.22	-0.07	0.04	0.00	0.00	0.00
Dead+Wind 300 deg - Service+Guy	56.43	-0.07	-0.01	0.00	0.00	0.00
Dead+Wind 315 deg - Service+Guy	56.58	-0.06	-0.03	0.00	0.00	0.00
Dead+Wind 330 deg - Service+Guy	56.73	-0.05	-0.05	0.00	0.00	0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-16.16	0.00	-0.00	16.16	-0.00	0.001%
2	0.04	-16.16	-20.47	-0.04	16.16	20.46	0.029%
3	10.27	-16.15	-17.72	-10.27	16.15	17.72	0.030%
4	14.50	-16.14	-14.48	-14.50	16.14	14.48	0.012%
5	17.75	-16.14	-10.25	-17.75	16.14	10.25	0.002%
6	20.48	-16.16	-0.04	-20.48	16.16	0.04	0.010%
7	17.74	-16.18	10.21	-17.74	16.18	-10.20	0.006%
8	14.45	-16.18	14.43	-14.45	16.18	-14.43	0.019%
9	10.20	-16.17	17.69	-10.20	16.17	-17.69	0.021%
10	-0.04	-16.16	20.43	0.04	16.16	-20.43	0.001%
11	-10.27	-16.18	17.72	10.26	16.18	-17.72	0.027%
12	-14.50	-16.19	14.48	14.50	16.19	-14.48	0.030%
13	-17.78	-16.19	10.27	17.78	16.19	-10.27	0.012%
14	-20.48	-16.17	0.04	20.48	16.17	-0.04	0.016%
15	-17.71	-16.15	-10.19	17.71	16.15	10.19	0.003%
16	-14.45	-16.15	-14.43	14.45	16.15	14.42	0.016%
17	-10.20	-16.15	-17.69	10.20	16.15	17.68	0.024%
18	0.00	-27.86	0.00	-0.00	27.86	0.00	0.000%
19	0.03	-27.86	-21.20	-0.03	27.86	21.19	0.023%
20	10.62	-27.84	-18.33	-10.62	27.84	18.32	0.022%
21	15.00	-27.83	-14.97	-15.00	27.82	14.97	0.012%
22	18.35	-27.82	-10.59	-18.35	27.82	10.59	0.001%
23	21.20	-27.85	-0.03	-21.19	27.85	0.03	0.013%
24	18.39	-27.89	10.58	-18.38	27.89	-10.58	0.012%
25	14.96	-27.89	14.93	-14.95	27.89	-14.93	0.020%
26	10.57	-27.88	18.30	-10.56	27.88	-18.30	0.015%
27	-0.03	-27.86	21.13	0.03	27.86	-21.13	0.001%
28	-10.62	-27.89	18.33	10.61	27.89	-18.33	0.020%
29	-15.00	-27.90	14.97	14.99	27.90	-14.97	0.022%
30	-18.41	-27.90	10.63	18.41	27.90	-10.62	0.021%
31	-21.20	-27.87	0.03	21.19	27.87	-0.03	0.020%
32	-18.33	-27.84	-10.54	18.33	27.84	10.54	0.002%
33	-14.96	-27.84	-14.93	14.96	27.84	14.93	0.013%
34	-10.57	-27.85	-18.30	10.57	27.85	18.29	0.025%
35	0.01	-16.16	-8.00	-0.01	16.16	8.00	0.001%
36	4.01	-16.16	-6.92	-4.01	16.16	6.92	0.001%
37	5.67	-16.15	-5.66	-5.67	16.15	5.66	0.001%
38	6.93	-16.15	-4.00	-6.93	16.15	4.00	0.002%
39	8.00	-16.16	-0.01	-8.00	16.16	0.01	0.002%
40	6.93	-16.17	3.99	-6.93	16.17	-3.99	0.001%
41	5.64	-16.17	5.64	-5.64	16.17	-5.64	0.002%
42	3.99	-16.17	6.91	-3.99	16.17	-6.91	0.001%
43	-0.01	-16.16	7.98	0.01	16.16	-7.98	0.000%
44	-4.01	-16.17	6.92	4.01	16.17	-6.92	0.001%
45	-5.67	-16.17	5.66	5.67	16.17	-5.66	0.001%
46	-6.94	-16.17	4.01	6.94	16.17	-4.01	0.001%
47	-8.00	-16.17	0.01	8.00	16.16	-0.01	0.002%
48	-6.92	-16.16	-3.98	6.92	16.16	3.98	0.002%
49	-5.64	-16.16	-5.64	5.64	16.16	5.64	0.001%
50	-3.99	-16.16	-6.91	3.99	16.16	6.91	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	18	0.00000001	0.00000000
2	Yes	30	0.00014625	0.00016614
3	Yes	29	0.00019611	0.00018648
4	Yes	31	0.00000001	0.00012058
5	Yes	33	0.00000001	0.00013612
6	Yes	33	0.00000001	0.00018468
7	Yes	36	0.00000001	0.00018953
8	Yes	31	0.00000001	0.00019283
9	Yes	29	0.00000001	0.00017239
10	Yes	28	0.00000001	0.00010387
11	Yes	29	0.00019010	0.00017768
12	Yes	31	0.00017006	0.00018564
13	Yes	36	0.00000001	0.00018737
14	Yes	34	0.00000001	0.00017372
15	Yes	36	0.00000001	0.00012270
16	Yes	32	0.00016788	0.00014920
17	Yes	31	0.00014333	0.00015850
18	Yes	15	0.00000001	0.00000000
19	Yes	30	0.00015289	0.00016577
20	Yes	28	0.00018527	0.00017737
21	Yes	28	0.00018484	0.00013750
22	Yes	30	0.00000001	0.00012409
23	Yes	30	0.00000001	0.00016814
24	Yes	32	0.00000001	0.00019329
25	Yes	29	0.00016257	0.00018854
26	Yes	28	0.00000001	0.00016198
27	Yes	27	0.00000001	0.00012965
28	Yes	28	0.00017991	0.00016720
29	Yes	30	0.00016528	0.00016559
30	Yes	32	0.00015073	0.00019133
31	Yes	31	0.00016335	0.00018249
32	Yes	32	0.00019898	0.00013032
33	Yes	30	0.00016677	0.00014507
34	Yes	29	0.00019570	0.00019688
35	Yes	32	0.00000001	0.00007210
36	Yes	34	0.00000001	0.00006563
37	Yes	35	0.00000001	0.00006563
38	Yes	35	0.00000001	0.00007304
39	Yes	36	0.00000001	0.00008387
40	Yes	39	0.00000001	0.00019177
41	Yes	35	0.00000001	0.00007922
42	Yes	34	0.00000001	0.00007003
43	Yes	28	0.00000001	0.00008966
44	Yes	34	0.00000001	0.00006302
45	Yes	36	0.00000001	0.00006448
46	Yes	38	0.00000001	0.00019436
47	Yes	37	0.00000001	0.00008396
48	Yes	37	0.00000001	0.00006873
49	Yes	37	0.00000001	0.00006237
50	Yes	36	0.00000001	0.00006404

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	135 - 125	2.714	48	0.2423	0.4772

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T2	125 - 105	2.310	48	0.2394	0.4734
T3	105 - 85	1.593	49	0.2198	0.4594
T4	85 - 65	0.927	49	0.1765	0.4707
T5	65 - 45	0.501	49	0.1040	0.4838
T6	45 - 29	0.249	49	0.0768	0.4912
T7	29 - 25	0.064	49	0.0757	0.4926

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	12' x 3" Dia Omni	48	2.714	0.2423	0.4772	48158
132.00	(2) HBX-6516DS	48	2.590	0.2417	0.4764	48158
129.00	4-Bay Dipole	48	2.468	0.2409	0.4753	40205
128.00	6' x 3" Dia Omni	48	2.428	0.2406	0.4749	34835
127.00	A-ANT-23G-2	48	2.388	0.2403	0.4745	31254
125.00	18' x 3" Dia Omni	48	2.310	0.2394	0.4734	27882
123.00	Rohn 6' x 12' Boom Gate (1)	48	2.233	0.2383	0.4720	28472
119.00	A-ANT-23G-2	49	2.085	0.2355	0.4687	38268
116.96	Guy	49	2.012	0.2338	0.4669	47662
109.00	DB-T1-6Z-8AB-0Z	49	1.732	0.2251	0.4609	809807
105.00	Pirod 12' T-Frame Sector Mount (1)	49	1.593	0.2198	0.4594	157170
76.96	Guy	49	0.725	0.1468	0.4767	17108
69.00	ANT150D6-9	49	0.567	0.1167	0.4817	21717
55.00	ANT150D6-9	49	0.361	0.0841	0.4884	40744
31.00	GPS	49	0.092	0.0758	0.4925	21394

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	135 - 125	12.146	19	1.0451	1.0088
T2	125 - 105	10.407	19	1.0369	0.9972
T3	105 - 85	7.257	19	0.9615	0.9545
T4	85 - 65	4.401	2	0.7760	0.9942
T5	65 - 45	2.458	2	0.5079	1.0366
T6	45 - 29	1.184	13	0.3776	1.0621
T7	29 - 25	0.298	13	0.3569	1.0691

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	12' x 3" Dia Omni	19	12.146	1.0451	1.0088	14481
132.00	(2) HBX-6516DS	19	11.617	1.0436	1.0064	14481
129.00	4-Bay Dipole	19	11.092	1.0415	1.0033	12088

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
128.00	6' x 3" Dia Omni	19	10.919	1.0406	1.0021	10465
127.00	A-ANT-23G-2	19	10.747	1.0395	1.0006	9372
125.00	18' x 3" Dia Omni	19	10.407	1.0369	0.9972	8293
123.00	Rohn 6' x 12' Boom Gate (1)	19	10.074	1.0334	0.9930	8343
119.00	A-ANT-23G-2	19	9.424	1.0240	0.9828	10560
116.96	Guy	19	9.100	1.0179	0.9772	12513
109.00	DB-T1-6Z-8AB-0Z	19	7.867	0.9844	0.9585	42875
105.00	Pirod 12' T-Frame Sector Mount (1)	19	7.257	0.9615	0.9545	84920
76.96	Guy	2	3.513	0.6663	1.0139	4920
69.00	ANT150D6-9	2	2.781	0.5566	1.0296	6258
55.00	ANT150D6-9	2	1.757	0.4215	1.0517	9072
31.00	GPS	13	0.433	0.3586	1.0684	4732

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load / Allowable	Allowable Ratio	Criteria
	ft			in		K	K			
T3	105	Leg	A325N	0.750	3	0.00	19.41	0.000 ✓	1.333	Bolt Tension
T4	85	Leg	A325N	0.750	3	7.85	19.42	0.404 ✓	1.333	Bolt Tension
T5	65	Leg	A325N	0.750	3	1.33	19.42	0.069 ✓	1.333	Bolt Tension
T6	45	Leg	A325N	0.750	3	0.00	19.43	0.000 ✓	1.333	Bolt Tension
T7	29	Leg	A325N	0.750	3	0.00	18.99	0.000 ✓	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation	Size	Initial Tension	Breaking Load	Actual T	Allowable T_a	Required S.F.	Actual S.F.
	ft		K	K	K	K		
T2	116.96 (A) (282)	7/8 EHS	7.97	79.70	24.53	39.85	2.000	3.249 ✓
	116.96 (B) (281)	7/8 EHS	7.97	79.70	26.52	39.85	2.000	3.005 ✓
	116.96 (C) (280)	7/8 EHS	7.97	79.70	25.97	39.85	2.000	3.069 ✓
T4	76.96 (A) (285)	7/8 EHS	7.97	79.70	21.80	39.85	2.000	3.656 ✓
	76.96 (B) (284)	7/8 EHS	7.97	79.70	25.02	39.85	2.000	3.185 ✓
	76.96 (C) (283)	7/8 EHS	7.97	79.70	23.78	39.85	2.000	3.352 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	2	10.00	4.79	115.0 K=1.00	1.00	11.292	3.142	-6.63	35.47	0.187 ✓
T2	125 - 105	2	20.00	3.92	94.0 K=1.00	1.00	16.065	3.142	-26.90	50.47	0.533 ✓
T3	105 - 85	2	20.00	3.92	94.0 K=1.00	1.00	16.065	3.142	-65.55	50.47	1.299 ✓
T4	85 - 65	2 1/4	20.00	3.92	83.6 K=1.00	1.00	18.292	3.976	-78.04	72.73	1.073 ✓
T5	65 - 45	2	20.00	3.92	94.0 K=1.00	1.00	16.065	3.142	-64.73	50.47	1.283 ✓
T6	45 - 29	2	16.00	3.90	93.5 K=1.00	1.00	16.175	3.142	-41.84	50.82	0.823 ✓
T7	29 - 25	2	4.37	3.05	73.1 K=1.00	1.00	20.359	3.142	-37.93	63.96	0.593 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	7/8	4.86	2.43	100.0 K=0.75	12.978	0.601	-2.20	7.80	0.282 ✓
T2	125 - 105	7/8	4.21	2.11	89.9 K=0.78	14.219	0.601	-4.44	8.55	0.519 ✓
T3	105 - 85	7/8	4.21	2.11	89.9 K=0.78	14.219	0.601	-5.99	8.55	0.701 ✓
T4	85 - 65	7/8	4.21	2.11	89.9 K=0.78	14.219	0.601	-6.67	8.55	0.781 ✓
T5	65 - 45	7/8	4.21	2.11	89.9 K=0.78	14.219	0.601	-5.45	8.55	0.638 ✓
T6	45 - 29	7/8	4.20	2.10	89.9 K=0.78	14.222	0.601	-4.02	8.55	0.470 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.36	8.93	0.040 ✓
T2	125 - 105	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-1.20	8.93	0.135 ✓

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 $\frac{P}{P_a}$
T3	105 - 85	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.10	8.93	0.011 ✓
T4	85 - 65	L2x2x3/16	3.04	2.85	103.5 K=1.19	12.534	0.715	-1.99	8.96	0.222 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	7/8	3.04	2.88	110.4 K=0.70	11.616	0.601	-0.14	6.99	0.020 ✓
T2	125 - 105	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.82	8.93	0.092 ✓
T3	105 - 85	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.01	8.93	0.001 ✓
T4	85 - 65	L2x2x3/16	3.04	2.85	103.5 K=1.19	12.534	0.715	-0.45	8.96	0.050 ✓
T5	65 - 45	L2x2x1/8	3.04	2.88	103.4 K=1.19	12.338	0.484	-0.37	5.98	0.063 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	7/8	3.04	2.88	110.4 K=0.70	11.616	0.601	-1.06	6.99	0.152 ✓
T3	105 - 85	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-2.17	8.93	0.243 ✓
T7	29 - 25	12x3/8	0.76	0.59	65.8 K=1.00	16.857	4.500	-0.27	75.86	0.004 ✓

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	125 - 105	L3x3x1/4	3.04	2.88	37.1 K=2.12	21.600	1.440	0.00	22.34	0.000*
T4	85 - 65	L3x3x1/4	3.04	2.85	36.8 K=1.00	21.600	1.440	0.00	25.39	0.000*

* DL controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T2	125 - 105	L3x3x1/4	-0.01	-0.077	21.600	0.004	-0.01	-0.152	21.600	0.007
T4	85 - 65	L3x3x1/4	-0.01	-0.077	21.600	0.004	-0.01	-0.152	21.600	0.007

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	125 - 105	L3x3x1/4	0.000	0.004	0.007	0.011* ✓	1.000	H1-3 ✓
T4	85 - 65	L3x3x1/4	0.000	0.004	0.007	0.011* ✓	1.000	H1-3 ✓

* DL controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	2	10.00	4.79	115.0	30.000	3.142	4.94	94.25	0.052 ✓
T2	125 - 105	2	20.00	3.92	94.0	30.000	3.142	15.15	94.25	0.161 ✓
T3	105 - 85	2	20.00	3.92	94.0	30.000	3.142	23.55	94.25	0.250 ✓
T4	85 - 65	2 1/4	20.00	3.92	83.6	30.000	3.976	36.11	119.28	0.303 ✓
T5	65 - 45	2	20.00	3.92	94.0	30.000	3.142	3.99	94.25	0.042 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	7/8	4.86	2.43	133.3	21.600	0.601	1.68	12.99	0.130

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	125 - 105	7/8	4.21	2.11	115.6	21.600	0.601	4.28	12.99	0.329
T3	105 - 85	7/8	4.21	2.11	115.6	21.600	0.601	2.87	12.99	0.221
T4	85 - 65	7/8	4.21	2.11	115.6	21.600	0.601	3.71	12.99	0.286
T5	65 - 45	7/8	4.21	2.11	115.6	21.600	0.601	1.16	12.99	0.089

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	0.85	15.44	0.055*
T2	125 - 105	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	1.94	15.44	0.126*
T3	105 - 85	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	3.72	15.44	0.241
T4	85 - 65	L2x2x3/16	3.04	2.85	55.5	21.600	0.715	4.64	15.44	0.301
T5	65 - 45	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	4.10	10.46	0.392
T6	45 - 29	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	3.72	10.46	0.355

* DL controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	7/8	3.04	2.88	157.7	21.600	0.601	0.30	12.99	0.023*
T2	125 - 105	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	1.49	15.44	0.097
T3	105 - 85	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	1.85	15.44	0.120
T4	85 - 65	L2x2x3/16	3.04	2.85	55.5	21.600	0.715	2.01	15.44	0.130
T5	65 - 45	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	3.25	10.46	0.310
T6	45 - 29	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	2.35	10.46	0.225

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 $\frac{P}{P_a}$
T7	29 - 25	L3x3x1/8	2.88	2.71	34.3	21.600	0.734	3.83	15.86	0.242 ✓

* DL controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	135 - 125	7/8	3.04	2.88	157.7	21.600	0.601	1.15	12.99	0.089 ✓
T2	125 - 105	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	1.61	15.44	0.104 ✓
T3	105 - 85	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	3.93	15.44	0.254 ✓
T4	85 - 65	L2x2x3/16	3.04	2.85	55.5	21.600	0.715	2.11	15.44	0.136 ✓
T5	65 - 45	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	2.27	10.46	0.217 ✓
T6	45 - 29	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	6.17	10.46	0.590 ✓

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	125 - 105	L3x3x1/4	3.04	2.88	37.1	21.600	1.440	5.35	31.10	0.172
T4	85 - 65	L3x3x1/4	3.04	2.85	36.8	21.600	1.440	7.50	31.10	0.241

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T2	125 - 105	L3x3x1/4	-0.01	0.077	23.760	0.003	-0.01	0.149	23.760	0.006
T4	85 - 65	L3x3x1/4	-0.01	0.077	23.760	0.003	-0.01	0.149	23.760	0.006

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	125 - 105	L3x3x1/4	0.172	0.003	0.006	0.182	1.333	H2-1
T4	85 - 65	L3x3x1/4	0.241	0.003	0.006	0.251	1.333	H2-1

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	135 - 125	Leg	2	3	-6.63	47.29	14.0	Pass
T2	125 - 105	Leg	2	27	-26.90	67.27	40.0	Pass
T3	105 - 85	Leg	2	78	-65.55	67.27	97.4	Pass
T4	85 - 65	Leg	2 1/4	129	-78.04	96.95	80.5	Pass
T5	65 - 45	Leg	2	180	-64.73	67.27	96.2	Pass
T6	45 - 29	Leg	2	231	-41.84	67.74	61.8	Pass
T7	29 - 25	Leg	2	273	-37.93	85.26	44.5	Pass
T1	135 - 125	Diagonal	7/8	12	-2.20	10.40	21.1	Pass
T2	125 - 105	Diagonal	7/8	63	-4.44	11.40	38.9	Pass
T3	105 - 85	Diagonal	7/8	89	-5.99	11.40	52.6	Pass
T4	85 - 65	Diagonal	7/8	176	-6.67	11.40	58.6	Pass
T5	65 - 45	Diagonal	7/8	225	-5.45	11.40	47.9	Pass
T6	45 - 29	Diagonal	7/8	267	-4.02	11.40	35.2	Pass
T1	135 - 125	Horizontal	L2x2x3/16	17	0.85	15.44	5.5	Pass
T2	125 - 105	Horizontal	L2x2x3/16	41	1.94	15.44	12.6	Pass
T3	105 - 85	Horizontal	L2x2x3/16	92	3.72	20.59	18.1	Pass
T4	85 - 65	Horizontal	L2x2x3/16	143	4.64	20.59	22.5	Pass
T5	65 - 45	Horizontal	L2x2x1/8	221	4.10	13.95	29.4	Pass
T6	45 - 29	Horizontal	L2x2x1/8	263	3.72	13.95	26.7	Pass
T1	135 - 125	Top Girt	7/8	5	0.30	12.99	2.3	Pass
T2	125 - 105	Top Girt	L2x2x3/16	30	1.49	20.59	7.2	Pass
T3	105 - 85	Top Girt	L2x2x3/16	79	1.85	20.59	9.0	Pass
T4	85 - 65	Top Girt	L2x2x3/16	130	2.01	20.59	9.8	Pass
T5	65 - 45	Top Girt	L2x2x1/8	182	3.25	13.95	23.3	Pass
T6	45 - 29	Top Girt	L2x2x1/8	233	2.35	13.95	16.9	Pass
T7	29 - 25	Top Girt	L3x3x1/8	275	3.83	21.14	18.1	Pass
T1	135 - 125	Bottom Girt	7/8	8	-1.06	9.31	11.4	Pass
T2	125 - 105	Bottom Girt	L2x2x3/16	32	1.61	20.59	7.8	Pass
T3	105 - 85	Bottom Girt	L2x2x3/16	83	3.93	20.59	19.1	Pass
T4	85 - 65	Bottom Girt	L2x2x3/16	133	2.11	20.59	10.2	Pass
T5	65 - 45	Bottom Girt	L2x2x1/8	184	2.27	13.95	16.3	Pass
T6	45 - 29	Bottom Girt	L2x2x1/8	237	6.17	13.95	44.2	Pass
T7	29 - 25	Bottom Girt	12x3/8	277	-0.27	101.12	0.3	Pass
T2	125 - 105	Guy A@116.958	7/8	282	24.53	39.85	61.6	Pass
T4	85 - 65	Guy A@76.9583	7/8	285	21.80	39.85	54.7	Pass
T2	125 - 105	Guy B@116.958	7/8	281	26.52	39.85	66.6	Pass
T4	85 - 65	Guy B@76.9583	7/8	284	25.02	39.85	62.8	Pass
T2	125 - 105	Guy C@116.958	7/8	280	25.97	39.85	65.2	Pass
T4	85 - 65	Guy C@76.9583	7/8	283	23.78	39.85	59.7	Pass
T2	125 - 105	Top Guy Pull-Off@116.958	L3x3x1/4	59	5.35	41.46	13.6	Pass
T4	85 - 65	Top Guy Pull-Off@76.9583	L3x3x1/4	161	7.50	41.46	18.8	Pass

Summary		
Leg (T3)	97.4	Pass
Diagonal (T4)	58.6	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
						Horizontal (T5)	29.4	Pass
						Top Girt (T5)	23.3	Pass
						Bottom Girt (T6)	44.2	Pass
						Guy A (T2)	61.6	Pass
						Guy B (T2)	66.6	Pass
						Guy C (T2)	65.2	Pass
						Top Guy Pull-Off (T4)	18.8	Pass
						Bolt Checks	30.3	Pass
						RATING =	**97.4**	**Pass**

DESIGN BASIS

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

1. DESIGN CRITERIA:

   - WIND SPEED OF 80 MPH (FASTEST MILE) AND 69 MPH (FASTEST MILE) CONCURRENT WITH 0.5" OF RADIAL ICE PER EIA/TIA 222 F-96.
   - SEISMIC LOAD: PER ASCE 7-95 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES (DOES NOT GOVERN).

GENERAL NOTES:

1. PROVIDE TEMPORARY ANCHORS, GUYING AND/OR BRACING AS REQUIRED TO SAFELY CONDUCT THE WORK.
2. ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
3. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIE-DOWNS, WHICH MIGHT BE NECESSARY.
5. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH TOWER OWNER.
6. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK SCOPE AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
7. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
8. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
10. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
11. TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
12. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.
13. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	01/18/13	TJL	CFC	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

VERIZON WIRELESS

WEST HARTFORD CENTER
100-FT GUYED LATTICE TOWER
REINFORCEMENT DESIGN

29 ISHAM ROAD
WEST HARTFORD, CT 06107

DATE:	1/18/13
SCALE:	AS SHOWN
JOB NO.	12124.0054

GENERAL NOTES

SHEET NO.
N-1
Sheet No. 1 of 1

STRUCTURAL STEEL

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

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992, (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36, (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND/HALF ROUND SHAPES)---ASTM A500 GRADE C, (FY = 46 KSI)
   E. PIPE---ASTM A53 GRADE B, (FY = 35 KSI MIN)
   F. CONNECTION BOLTS---ASTM A490-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

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

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

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

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

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

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

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

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

10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED

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

12. CONNECTION ANGLES WHERE APPLICABLE SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

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

14. CONNECTIONS SHALL CONFORM TO ALL REQUIREMENTS OF THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR SHELTERS", LATEST EDITION, AND THE "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS", LATEST EDITION.

15. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.

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

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

18. FABRICATE BEAMS WITH MILL CAMBER UP.

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

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

21. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.

22. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

GUY CABLE ASSEMBLY NOTES

1. GUY CABLES SHALL BE EXTRA HIGH STRENGTH GUY STRAND (EHS), CLASS A GALVANIZED, LEFT HAND LAY ONLY PER ASTM A-475 SPECIFICATION.

2. GUY CABLE HARDWARE SHALL BE RATED TO CAPACITY OF CONNECTING CABLE.

3. SUBMIT CUT SHEETS/PRODUCT SPECIFICATION INFORMATION OF ALL CABLE AND HARDWARE TO ENGINEER PRIOR TO COMMENCEMENT OF WORK.

4. PROVIDE NEW HARDWARE AT REPLACEMENT GUY WIRE CONNECTION TO ROOF. CONTRACTOR SHALL NOT UNDER ANY CIRCUMSTANCE RE-USE PRE-FORMED GUY GRIPS.

5. INITITAL TENSION OF ALL GUY WIRES TO BE 10% OF BREAKING STRENGTH PER EIA/TIA-222-F STANDARD SECTION 10.2.1 WITH ADJUSTMENT MADE BASED ON THE SITE AMBIENT TEMPERATURE.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFG

REV	DATE	DRAWN	CHK'D	DESCRIPTION
A	01/18/13	TJL	CFG	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

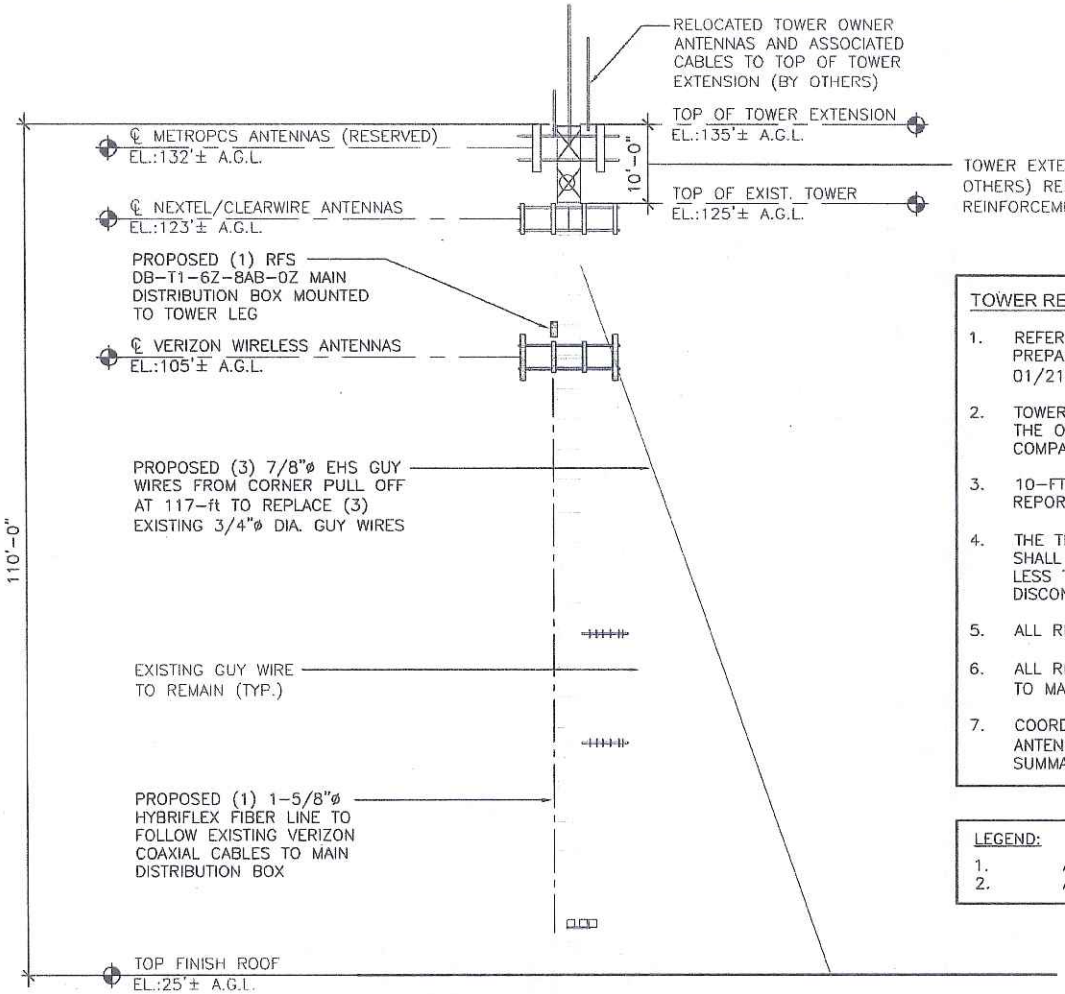
VERIZON WIRELESS

WEST HARTFORD CENTER
100-FT GUYED LATTICE TOWER
REINFORCEMENT DESIGN
20 ISHAM ROAD
WEST HARTFORD, CT 06107

DATE: 1/18/13
SCALE: AS SHOWN
JOB NO. 12124.0054

STRUCTURAL STEEL NOTES

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



1 / S-1 TOWER ELEVATION
SCALE: NOT TO SCALE

TOWER REINFORCEMENT NOTES:

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN REPORT PREPARED BY CENTEK ENGINEERING, INC., FOR VERIZON WIRELESS, DATED 01/21/13.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DOCUMENTS PREPARED BY PAUL J FORD AND COMPANY JOB NO. 19-636-97R DATED NOVEMBER 10, 1997.
3. 10-FT TOWER EXTENSION PREPARED FOR METROPCS PER GPD STRUCTURAL REPORT JOB NO. 2012707.31 DATED OCTOBER 19, 2012.
4. THE TEMPORARY DETACHMENT AND/OR REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE CONDUCTED ON DAYS WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.
5. ALL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.
6. ALL REPLACEMENT MEMBERS SHALL BE INSTALLED WITH A325-N BOLTS (SIZE TO MATCH EXISTING).
7. COORDINATE INSTALLATION OF REINFORCEMENT WITH EXISTING ANTENNAS/APPURTENANCES. REFER TO RISA TOWER OUTPUT GRAPHIC SUMMARY FOR INFORMATION.

LEGEND:
1. A.G.L.= ABOVE GROUND LEVEL
2. A.T.B.= ABOVE TOWER BASE

MAX. TOWER STEEL USAGE w/ ABOVE REINFORCEMENTS:
LOAD CASE #2 = 97.4%
LEG T3 60'-80' ATB)

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: CFC

REV	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	01/16/13	TJL	CFC	ISSUED FOR CONSTRUCTION

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

VERIZON WIRELESS
WEST HARTFORD CENTER
100-FT GUYED LATTICE TOWER
REINFORCEMENT DESIGN
80 SHAW ROAD
WEST HARTFORD, CT 06107

DATE: 1/16/13
SCALE: AS SHOWN
JOB NO. 12124.0054

TOWER REINFORCEMENT ELEVATION AND NOTES

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

SITE NAME	WEST HARTFORD CENTER CT	ECP - CELL #	AWS1	8	290
LATITUDE	41-45-41.60 N	LONGITUDE	72-44-25.35 W		
Additional Comments: AWS antenna add with associated AWS and 700 RRH and fiber / power cables, remove diplexers		SAVE BUTTON			
		STRUCTURE TYPE	LATTICE		

AWS - LTE ANTENNA ADD	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	2100 MHz eNodeB		2100 MHz eNodeB		2100 MHz eNodeB	
ANTENNA TYPE	BXA-171063-12CF-EDIN-2		SACP 2X5516		SACP 2X5516	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	1				DB-T1-6Z-8AB-0Z	

700 Mhz - LTE Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ		SLCP 2X6015		SLCP 2X6015	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

700 Mhz - LTE Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ		SLCP 2X6015		SLCP 2X6015	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-700	1	ALU RH_2X40-700	1	ALU RH_2X40-700

850 Celluar - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	LPA-80063/4CF		SC-E 6014 REV2		SC-E 6014 REV2	
QTY OF ANTENNAS PER FACE	2		2		2	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L

850 Celluar - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-80063/4		SLCP 2X6014		SLCP 2X6014	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	0		0		0	
DIPLEX WITH LTE CABLE						

1900 PCS - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	BXA-171063-8BF-EDIN-2		SACP 2X5516		SACP 2X5516	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		2		2	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Mod 4.0B	PCS Mod 4.0B	PCS Mod 4.0B
ANTENNA TYPE	BXA-171063-8BF-EDIN-2	SACP 2X5516	SACP 2X5516
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	60	180	290
DOWN TILT (MECH/DEG)	0	2	2
RAD CTR (FT AGL)	100	100	100
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	REMOVE DIPLEXERS	REMOVE DIPLEXERS	REMOVE DIPLEXERS

NUMBER OF CABLE'S NEEDED								Fiber Lines Model number			
TOTAL # FIBER LINES	1	TOTAL # OF MAINLINES			12			FIBER LINE MODEL #			HB158-1-08U8-S8J18
TOTAL # TOP JUMPERS	12	TOTAL # OF TOP JUMPERS			12			FIBER TOP JUMPER MODEL #			HB114-1-08U4-S4J18
Equipment Cable Ordering		MAIN CABLE #	12	+				TOP JUMPER #	12	+	
TX / RX FREQUENCIES								TX POWER OUTPUT			
Cellular A-Band		PCS F / AWS-Band		700 Mhz C - E				Cellular (Watts)			20
TX - 869-880,890-891.5 MHz		TX - 1970-1975 / 2145-21		TX - 746-757				PCS (Watts)			16
RX - 824-835,845-846.5 MHz		RX - 1890-1895 / 1745-17		RX - 776-787				LTE/ AWS (Watts)			40
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/ WHITE	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/ ORANGE	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE
A3	700	Tx4/Rx1	RED/RED/ ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE
A4-B	1900	Tx4/Rx1	RED/RED/ WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/ BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/ BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN
RF ENGINEER				RF MANAGER				INITIALS			DATE
Prepared By: Mark Brauer				Robert Hesselbach				MB			1/7/2013

BXA-171063-12CF-EDIN-X

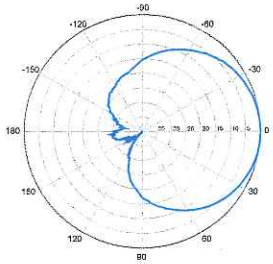
Replace "X" with desired electrical downtilt.

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 / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1840 x 154 x 105 mm	72.4 x 6.1 x 4.1 in	
Depth with z-brackets	133 mm	5.2 in	
Weight without mounting brackets	6.8 kg	15 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	

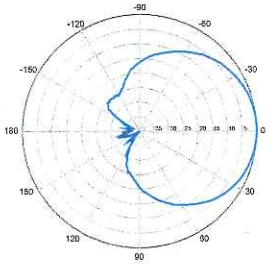
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



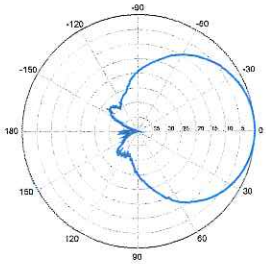
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



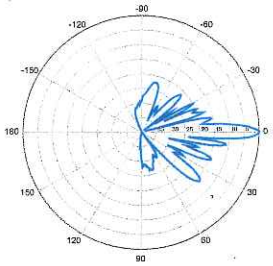
Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



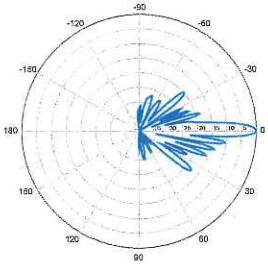
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



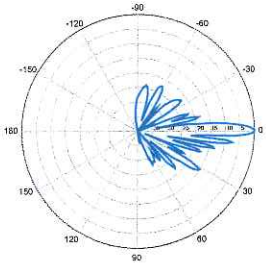
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0

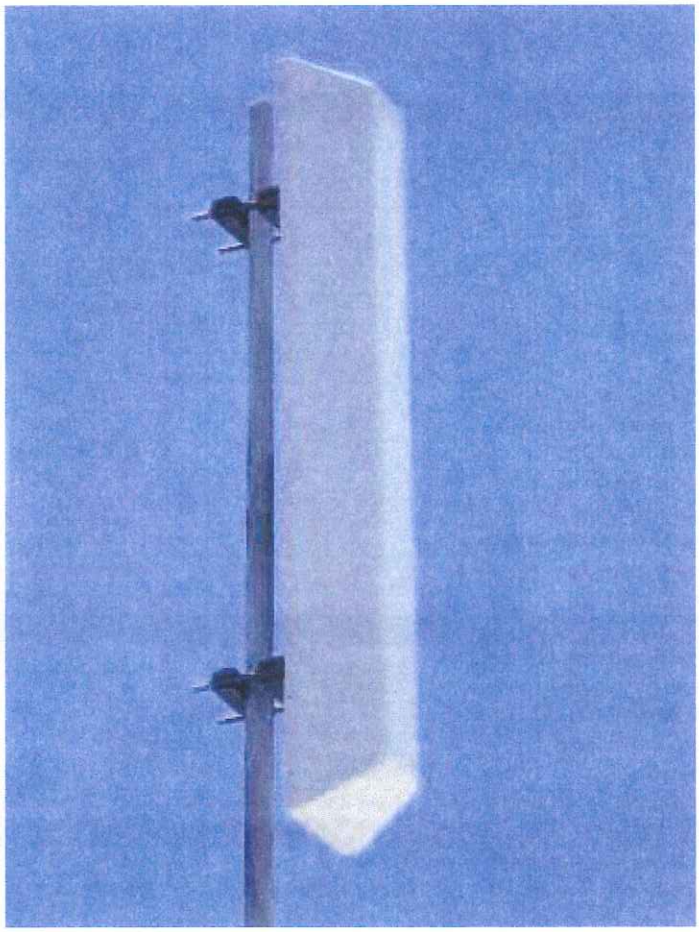


0° | Vertical | 1920-2170 MHz

Swedcom

SACP 2x5516

1710 -2170 MHz Dual (2x) CP log-periodic antenna



Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (1710 - 2170 MHz)
- Excellent Axial Ratio
- Optimized for 4G & 3G systems
- Low intermodulation
- Improved Side-to-side rejection
- Fading reduction
- Excellent isolation between ports

Electrical specifications

Frequency range:	**1710-2170 MHz**
Impedance:	**50 ohm**
Connector type:	**7/16 Din**
Return loss:	**18 dB**
Polarization:	**Circular**
Gain ea. port [Circular]:	**2x16 dBdC**
Gain ea. port [Linear]:	**2x13 dBdL**
Axial Ratio:	**2 dB**
Isolation between ports (TX band):	**28 dB**
Front-to-back ratio:	**30 dB**
Intermodulation (2x20W):	**IM3 150 dB**
	IM5 160 dB
	IM7/9 170 dB
Power rating:	**2x 300 W**
H-plane (-3 dB point):	**2x 55°**
V-plane (-3 dB point):	**2x 7°**
Lightning protection:	**DC grounded**

Mechanical specifications

Overall height:	**56 in**	**[1422 mm]**
Width:	**9.7 in**	**[246 mm]**
Depth:	**6.5 in**	**[165 mm]**
Weight (excluding brackets):	**16 lbs**	**[7.2 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (front of antenna):	**3.76 sq. ft.**	**[0.35 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**192 lbs**	**[855 N]**

Materials

Radiating Elements:	**Silver plated brass**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Mounting bolts:	**Stainless steel**

The SACP 2x5516 is made in the U.S.A.

Amphenol ANTENNA SOLUTIONS

BXA-80063-4CF-EDIN-X

X-Pol | FET Panel | 63° | 13.0 dBd

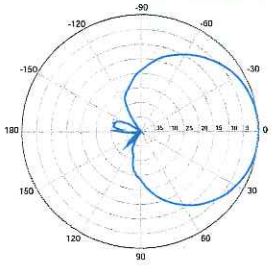
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics				
Frequency bands	806-900 MHz*			
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)			
Polarization	±45°			
Horizontal beamwidth	63°			
Vertical beamwidth	15°			
Gain	13.0 dBd (15.1 dBi)			
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14			
Impedance	50Ω			
VSWR	≤1.4:1			
Upper sidelobe suppression (0°)	-22.1 dB			
Front-to-back ratio (+/-30°)	-34.9 dB			
Null fill	5% (-26.02 dB)			
Isolation between ports	< -30 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	1205 x 285 x 133 mm		47.4 x 11.2 x 5.2 in	
Depth with z-brackets	173 mm		6.8 in	
Weight without mounting brackets	4.5 kg		9.9 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.34 m^2	Side: 0.16 m^2	Front: 3.7 ft^2	Side: 1.7 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 498 N	Side: 260 N	Front: 111 lbf	Side: 55 lbf

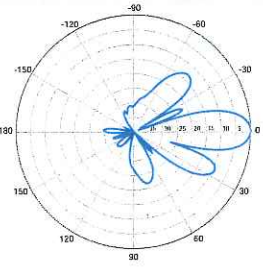
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-80063-4CF-EDIN-X-FP		

BXA-80063-4CF-EDIN-X



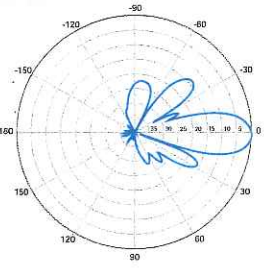
Horizontal

BXA-80063-4CF-EDIN-0



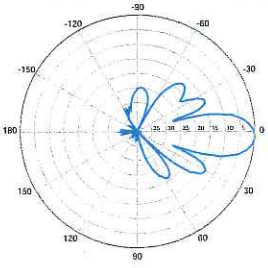
0° | Vertical

BXA-80063-4CF-EDIN-2



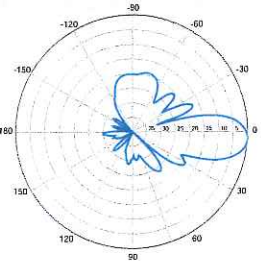
2° | Vertical

BXA-80063-4CF-EDIN-3



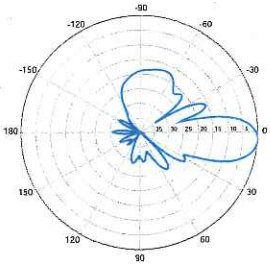
3° | Vertical

BXA-80063-4CF-EDIN-4



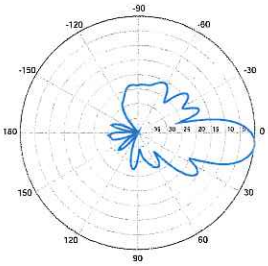
4° | Vertical

BXA-80063-4CF-EDIN-5



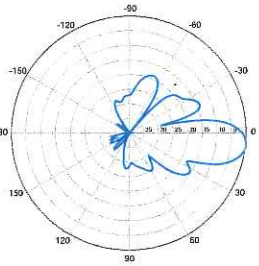
5° | Vertical

BXA-80063-4CF-EDIN-6



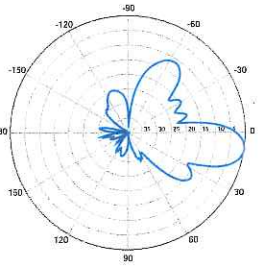
6° | Vertical

BXA-80063-4CF-EDIN-8



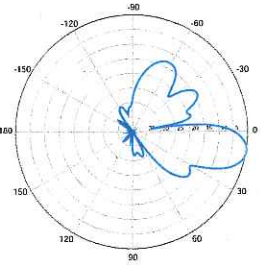
8° | Vertical

BXA-80063-4CF-EDIN-9



9° | Vertical

BXA-80063-4CF-EDIN-10



10° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

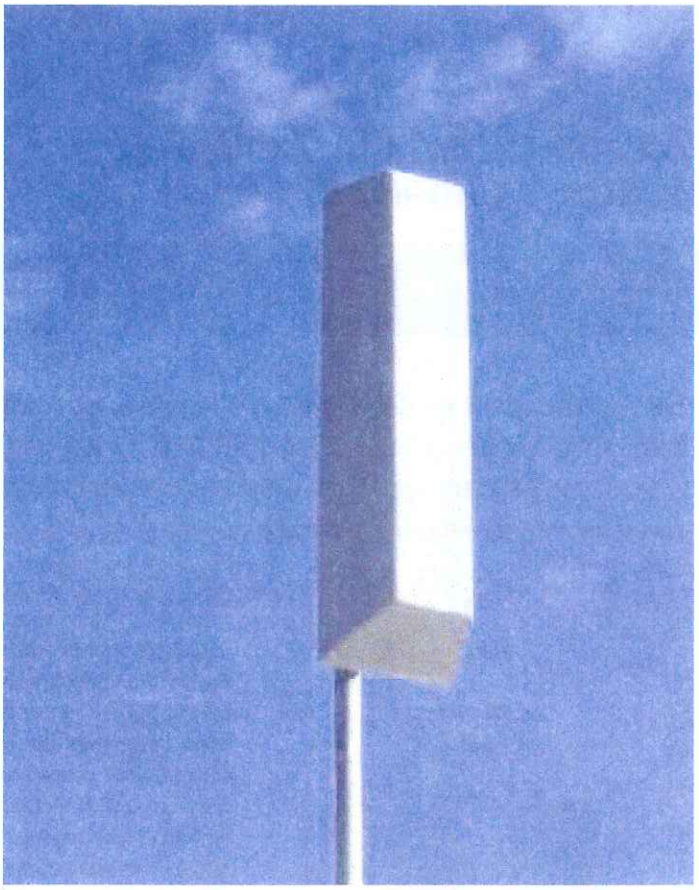
Swedcom

SLCP 2x6014

Dual (2x) Circularly Polarized log-periodic antenna

Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (700 - 800 MHz)
- Excellent Axial Ratio
- Optimized for 4G & 3G systems
- Low intermodulation
- Improved Side-to-side rejection
- Fading reduction
- Excellent isolation between ports



Electrical specifications

Frequency range:	**700-800 MHz**
Impedance:	**50 ohm**
Connector type:	**7/16 Din**
Return loss:	**18 dB**
Polarization:	**Circular**
Gain ea. port [Circular]:	**2x14 dBdC**
Gain ea. port [Linear]:	**2x11 dBdL**
Axial Ratio:	**2 dB**
Isolation between ports (TX band):	**30 dB**
Front-to-back ratio:	**30 dB**
Intermodulation (2x20W):	**IM3 150 dB**
	IM5 160 dB
	IM7/9 170 dB
Power rating:	**2x 500 W**
H-plane (-3 dB point):	**2x 55°**
V-plane (-3 dB point):	**2x 16°**
Lightning protection:	**DC grounded**

Mechanical specifications

Overall height:	**53 in**	**[1346 mm]**
Width:	**14 in**	**[356 mm]**
Depth:	**11 in**	**[279 mm]**
Weight (excluding brackets):	**20 lbs**	**[9 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (side of antenna):	**5.15 sq. ft.**	**[0.48 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**263 lbs**	**[1171 N]**

Materials

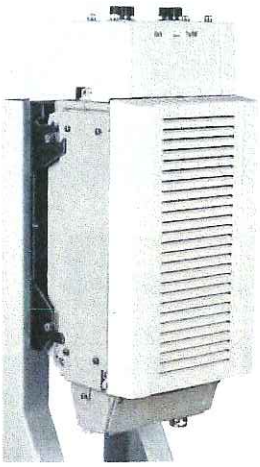
Radiating Elements:	**Aluminum**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Mounting bolts:	**Stainless steel**

The SLCP 2x6014 is made in the U.S.A.

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

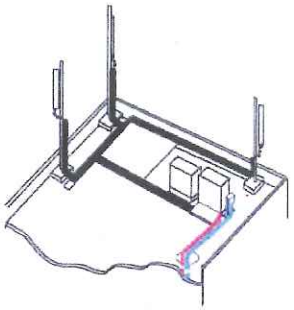
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

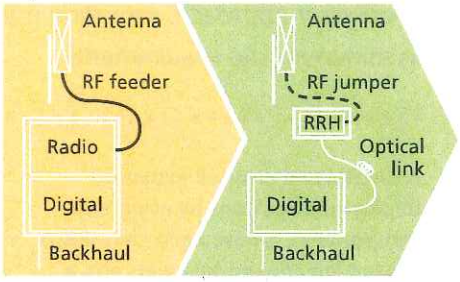
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

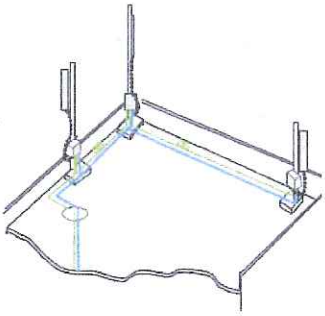
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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

CPG2809100912 (09)

Alcatel·Lucent

Alcatel-Lucent RRH2x40-07-U

REMOTE RADIO HEAD

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

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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

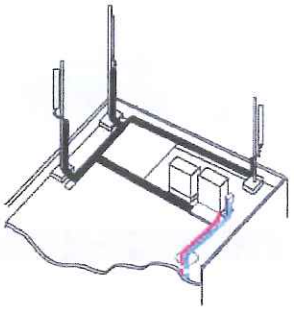
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and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

Features

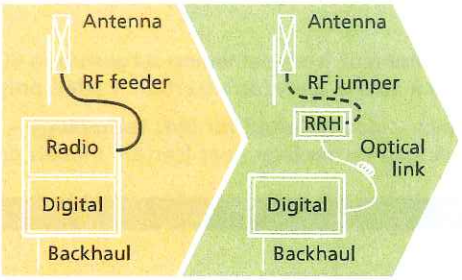
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly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

Benefits

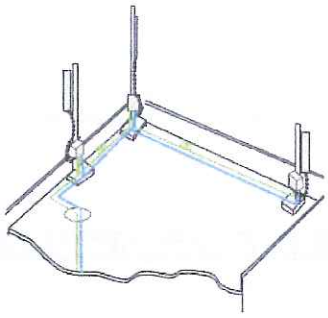
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48V

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Alarms and ports

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

Alcatel·Lucent

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

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

Features/Benefits

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

Technical Specifications

Mechanical Specifications

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

Electrical Specifications

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

* This data is provisional and subject to change.

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

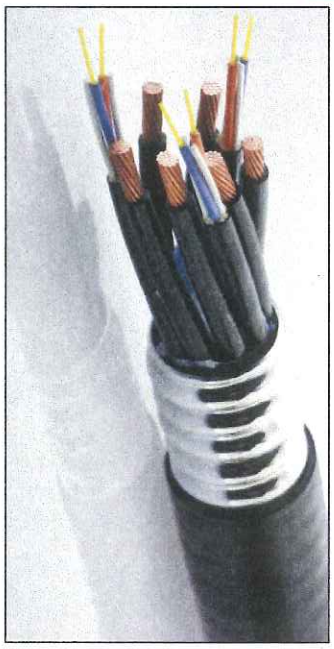


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

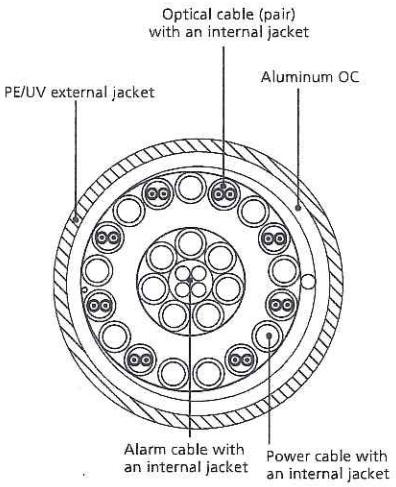


Figure 2: Construction Detail

* This data is provisional and subject to change.