STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

March 12, 2013

Kenneth C. Baldwin, Esq.
Robinson & Cole
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-011-130214** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 785 Park Avenue, Bloomfield, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated February 12, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

L Roberts

Linda Roberts
Executive Director

LR/CDM/jb

c: The Honorable Sydney Schulman, Mayor, Town of Bloomfield
Louie Chapman, Jr., Town Manager, Town of Bloomfield
Thomas B. Hooper, Director of Planning, Town of Bloomfield

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February 20, 2013

The Honorable Sydney Schulman
Mayor
Town of Bloomfield
Town Hall
800 Bloomfield Avenue
P. O. Box 337
Bloomfield, CT 06002-0337

RE: **EM-VER-011-130214** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 785 Park Avenue, Bloomfield, Connecticut.

Dear Mayor Schulman:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72, a copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by March 6, 2013.

Thank you for your cooperation and consideration.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/jb

c: Louie Chapman, Jr., Town Manager, Town of Bloomfield
Thomas B. Hooper, Director of Planning, Town of Bloomfield

CSC
CONNECTICUT SITING COUNCIL

ROBINSON & COL

EM-VER-011-130214

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
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Direct (860) 275-8345

Also admitted in Massachusetts

ORIGINAL

February 12, 2013

RECEIVED
FEB 14 2013
CONNECTICUT
SITING COUNCIL

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

Re: **Notice of Exempt Modification – Antenna Swap**
785 Park Avenue, Bloomfield, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 105-foot level on an existing 138-foot tower at the above-referenced address. The tower and underlying property are owned by the Town of Bloomfield. The Council approved Cellco's shared use of this tower in 2002. Cellco now intends to replace six (6) of its antennas with one (1) model BXA-80080-6CF cellular antenna; one (1) model BXA-80063-4BF cellular antenna; one (1) model BXA-80080-4CF cellular antenna; two (2) model BXA-171085-8BF AWS antennas; and one (1) model BXA-171063-8BF AWS antenna, at the same 105-foot level. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its antennas and one (1) HYBRIFLEX™ fiber cable. 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 Louie B. Chapman, Jr., Town Manager for the Town of Bloomfield.

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 105-foot level on the 138-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative 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 and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report 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:
Louie B. Chapman, Jr., Bloomfield Town Manager
Sandy M. Carter

Slant +/- 45° Dual Polarized, Panel 80° / 13.5 dBd

BXA-80080/6CF ___

When ordering replace "___" with connector type.

Mechanical specifications

Length	1844 mm	72.6 in
Width	285 mm	11.2 in
Depth	116 mm	4.6 in
Depth with z-bracket	156 mm	6.1 in
4) Weight	10 kg	22.0 lbs
Wind Area		
Fore/Aft	0.53 m^2	5.7 ft^2
Side	0.21 m^2	2.3 ft^2
Rated Wind Velocity (Safety factor 2.0)	>277 km/hr	>172 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	765 N	172 lbs
Side	366 N	82 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

Mounting brackets attach to a pipe diameter of Ø50-160 mm (2.0-6.3 in).

Mounting bracket kit #36210002
Downtilt bracket kit #36114003

Electrical specifications

	Frequency Range	806-900 MHz*
	Impedance	50Ω
3)	Connector(s)	NE or E-DIN 2 ports / center
1)	VSWR	≤ 1.4:1
	Polarization	Slant ± 45°
1)	Isolation Between Ports	< -30 dB
1)	Gain	13.5 dBd
2)	Power Rating	500 W
1)	Half Power Angle	
	H-Plane	80°
	E-Plane	11°
1)	Electrical Downtilt	0°
1)	Null Fill	5%
	Lightning Protection	Direct Ground

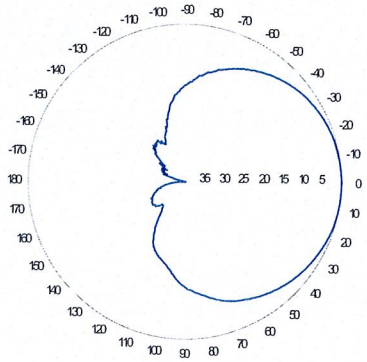
*Also available for 870-960 MHz. Consult your sales director for more information.

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

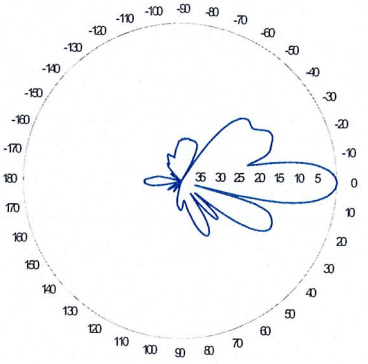
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector. E-DIN indicates an elongated DIN connector.
4) The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation pattern1)



Horizontal



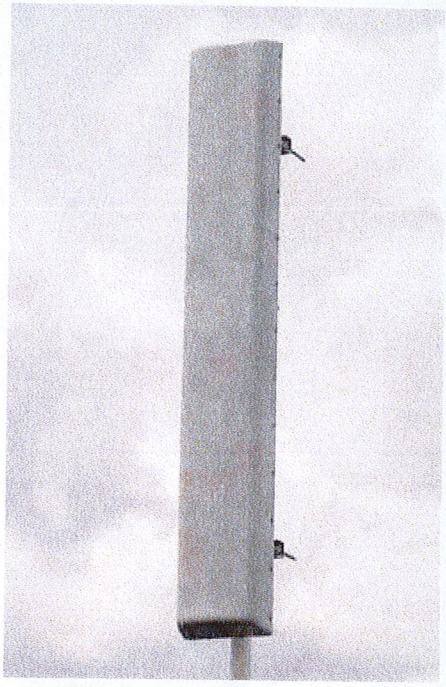
Vertical

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.

CF Denotes a Center-Fed Connector.

806-900 MHz



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad band-width and superior performance.
- Air as insulation for virtually no internal signal loss.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connectors only.

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc.
The Antenna Technology Company

Revision Date: 7/3/07

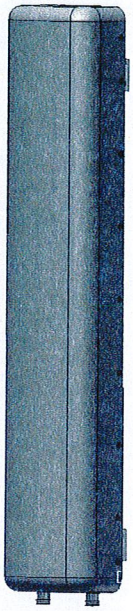
Amphenol ANTENNA SOLUTIONS

BXA-80063-4BF-EDIN-X

X-Pol | FET Panel | 63° | 13.0 dBd

Replace "X" with desired electrical downtilt.

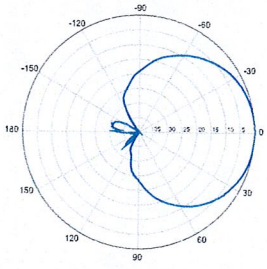
Antenna is also available with N connector(s). Replace "EDIN" with "N" in the model number when ordering.



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 N connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or N / Female / Bottom	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1134 x 285 x 135 mm	44.6 x 11.2 x 5.3 in
Depth with z-brackets	175 mm	6.9 in
Weight without mounting brackets	5.7 kg	12.6 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.32 m² Side: 0.15 m²	Front: 3.5 ft² Side: 1.7 ft²
Wind load @ 161 km/hr (100 mph)	Front: 469 N Side: 249 N	Front: 104 lbf Side: 53 lbf

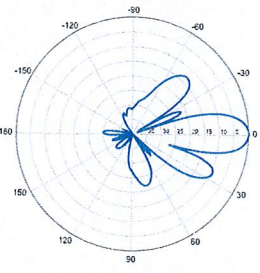
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-80063-4BF-EDIN-X-FP		

BXA-80063-4BF-EDIN-X



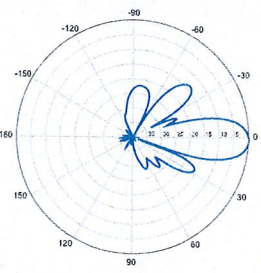
Horizontal

BXA-80063-4BF-EDIN-0



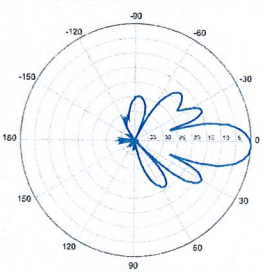
0° | Vertical

BXA-80063-4BF-EDIN-2



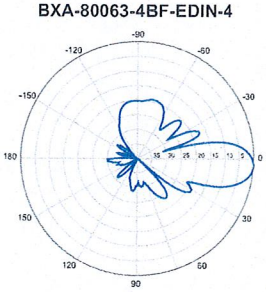
2° | Vertical

BXA-80063-4BF-EDIN-3



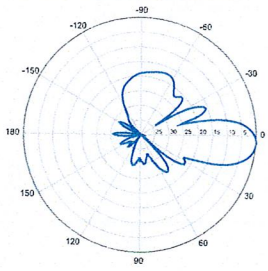
3° | Vertical

BXA-80063-4BF-EDIN-4



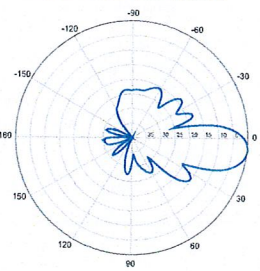
4° | Vertical

BXA-80063-4BF-EDIN-5



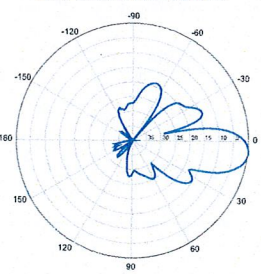
5° | Vertical

BXA-80063-4BF-EDIN-6



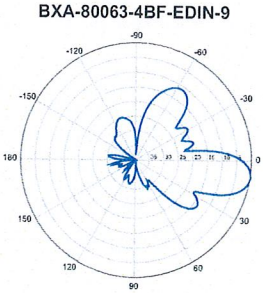
6° | Vertical

BXA-80063-4BF-EDIN-8



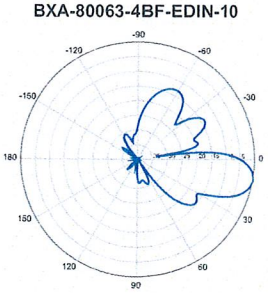
8° | Vertical

BXA-80063-4BF-EDIN-9



9° | Vertical

BXA-80063-4BF-EDIN-10

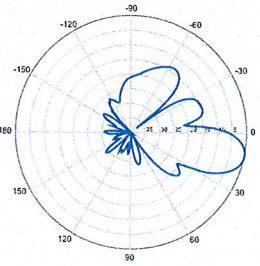


10° | Vertical

BXA-80063-4BF-EDIN-X

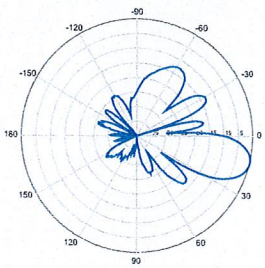
X-Pol | FET Panel | 63° | 13.0 dBd

BXA-80063-4BF-EDIN-12



12° | Vertical

BXA-80063-4BF-EDIN-14



14° | Vertical

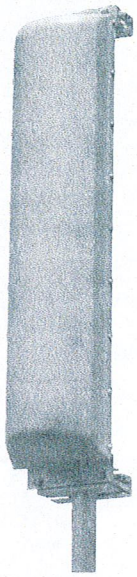
Amphenol ANTENNA SOLUTIONS

BXA-80080-4CF-EDIN-X

X-Pol | FET Panel | 80° | 12.0 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.

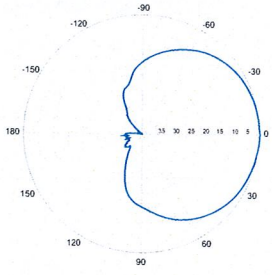


Electrical Characteristics	
Frequency bands	806-900 MHz*
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)
Polarization	±45°
Horizontal beamwidth	80°
Vertical beamwidth	15°
Gain	12.0 dBd (14.1 dBi)
Electrical downtilt (X)	0, 2, 4, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-13.1 dB
Front-to-back ratio (+/-30°)	-36.7 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	1206 x 204 x 151 mm	47.5 x 8.0 x 5.9 in
Depth with z-brackets	196 mm	7.7 in
Weight without mounting brackets	5.4 kg	12 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.25 m² Side: 0.18 m²	Front: 2.6 ft² Side: 1.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 351 N Side: 280 N	Front: 79 lbf Side: 61 lbf

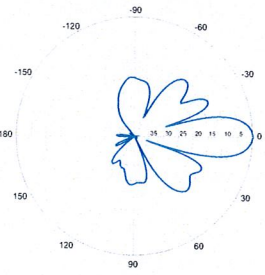
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	36210002	50-160 mm 2.0-6.3 in	4.5 kg 10 lbs
2-Point Downtilt Bracket Kit (0-20°)	36114003	50-160 mm 2.0-6.3 in	4.9 kg 11 lbs
Downtilt Mounting Applications	A mounting bracket and downtilt bracket kit must be ordered for downtilt applications		
Concealment Configurations	For concealment configurations, order BXA-80080-4CF-EDIN-X-FP		

BXA-80080-4CF-EDIN-X



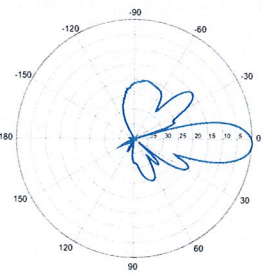
Horizontal

BXA-80080-4CF-EDIN-0



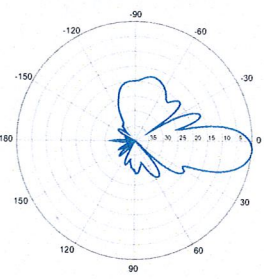
0° | Vertical

BXA-80080-4CF-EDIN-2



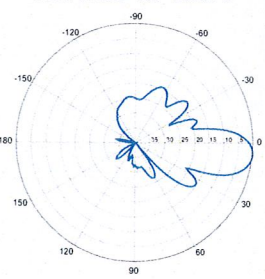
2° | Vertical

BXA-80080-4CF-EDIN-4



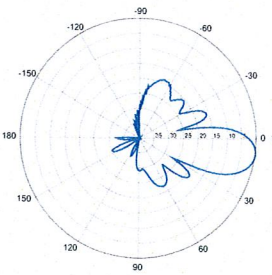
4° | Vertical

BXA-80080-4CF-EDIN-6



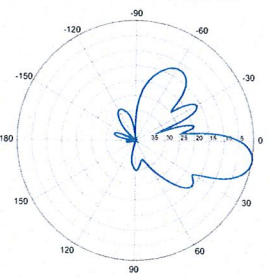
6° | Vertical

BXA-80080-4CF-EDIN-8



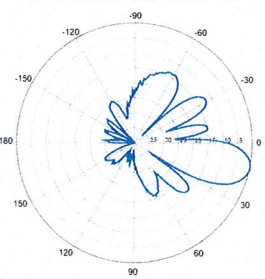
8° | Vertical

BXA-80080-4CF-EDIN-10



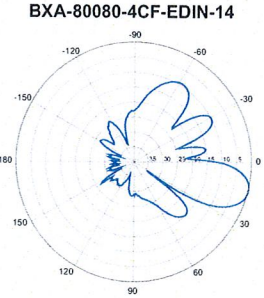
10° | Vertical

BXA-80080-4CF-EDIN-12



12° | Vertical

BXA-80080-4CF-EDIN-14



14° | Vertical

Amphenol ANTENNA SOLUTIONS

BXA-171085-8BF-EDIN-X

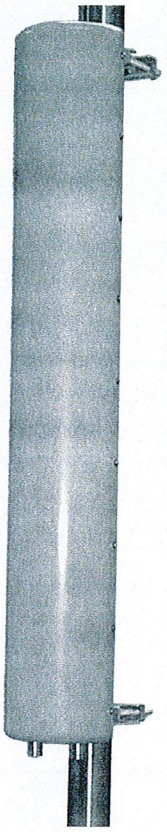
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 85° | 16.4 dBi

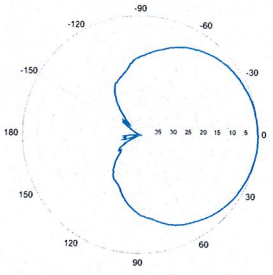
Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	88°	85°	80°
Vertical beamwidth	7°	7°	7°
Gain	13.5 dBd / 15.6 dBi	13.9 dBd / 16.0 dBi	14.3 dBd / 16.4 dBi
Electrical downtilt (X)	0, 2, 4		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in
Depth with t-brackets	133 mm	5.2 in
Weight without mounting brackets	4.8 kg	10.5 lbs
Survival wind speed	296 km/hr	184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 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-171085-8BF-EDIN-X-FP		

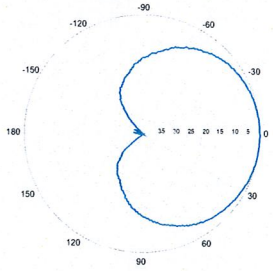


BXA-171085-8BF-EDIN-X



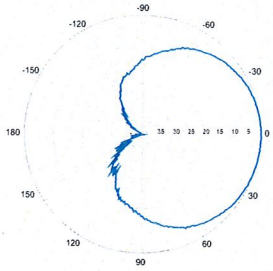
Horizontal | 1710-1880 MHz

BXA-171085-8BF-EDIN-X



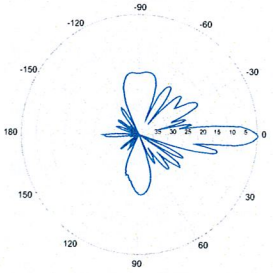
Horizontal | 1850-1990 MHz

BXA-171085-8BF-EDIN-X



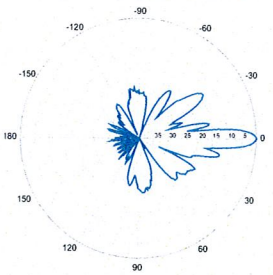
Horizontal | 1920-2170 MHz

BXA-171085-8BF-EDIN-0



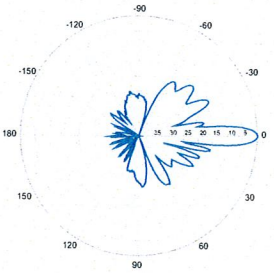
0° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171085-8BF-EDIN-0

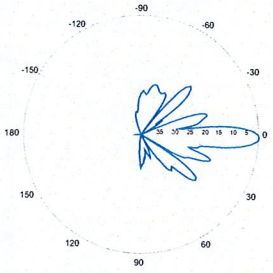


0° | Vertical | 1920-2170 MHz

BXA-171085-8BF-EDIN-X

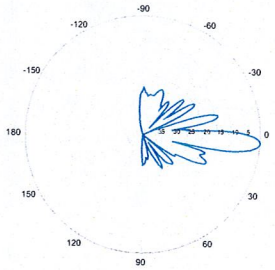
X-Pol | FET Panel | 85° | 16.4 dBi

BXA-171085-8BF-EDIN-2



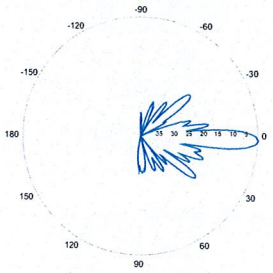
2° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-4



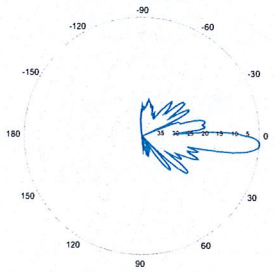
4° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-2



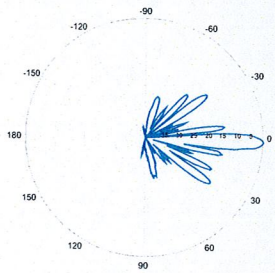
2° | Vertical | 1850-1990 MHz

BXA-171085-8BF-EDIN-4



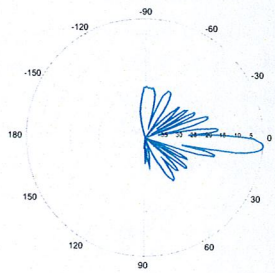
4° | Vertical | 1850-1990 MHz

BXA-171085-8BF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171085-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 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	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in
Depth with t-brackets	133 mm	5.2 in
Weight without mounting brackets	4.8 kg	10.5 lbs
Survival wind speed	296 km/hr	184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf

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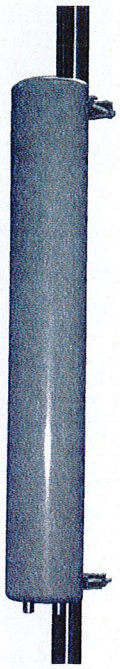
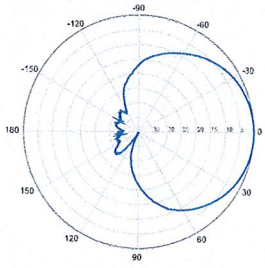
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

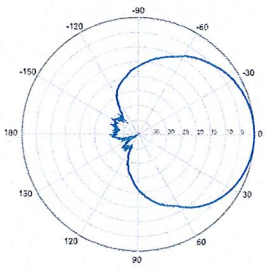


BXA-171063-8BF-EDIN-X



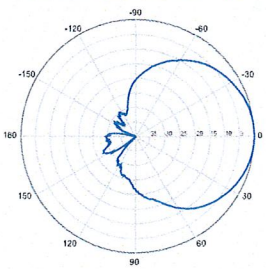
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



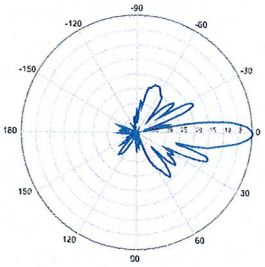
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



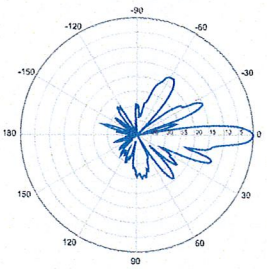
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



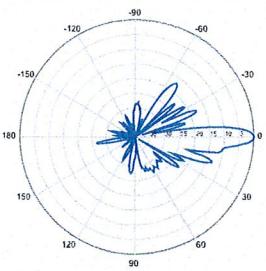
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0

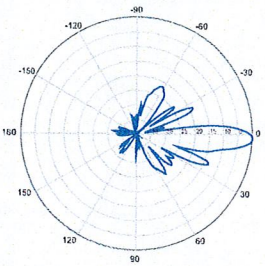


0° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-X

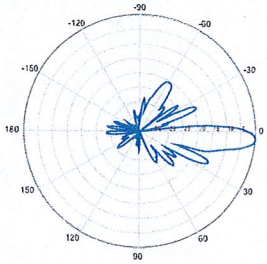
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



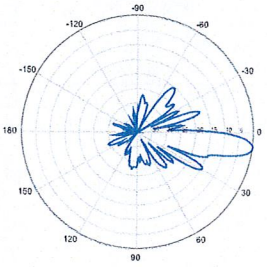
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



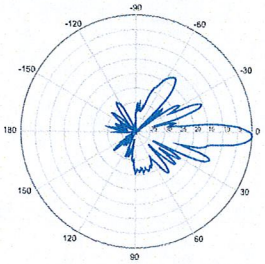
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



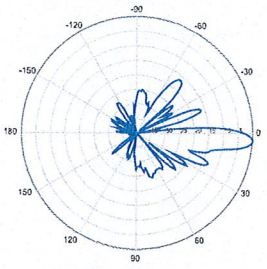
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



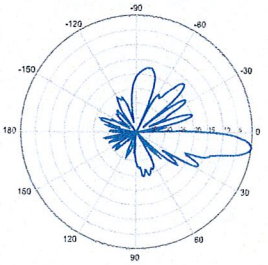
2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



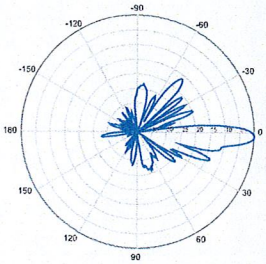
4° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-8



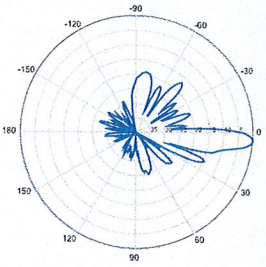
8° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-2



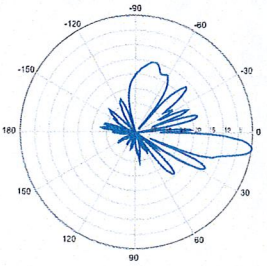
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8

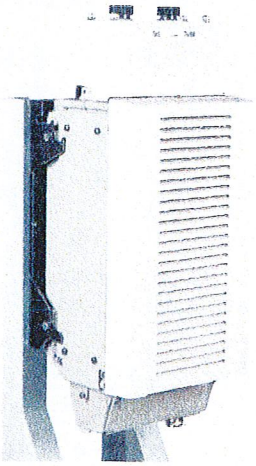


8° | Vertical | 1920-2170 MHz

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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



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

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

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

Fast, low-cost installation and deployment

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

Excellent RF performance

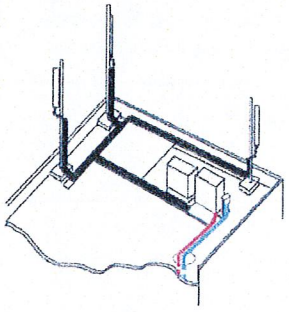
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

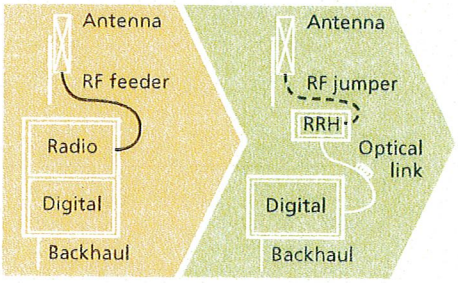
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

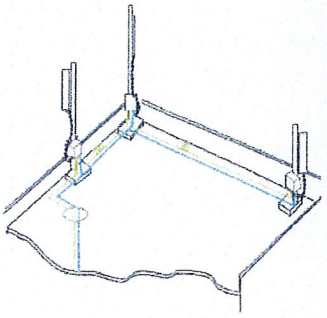
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

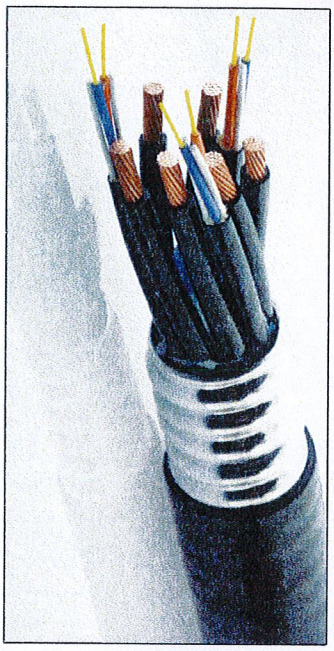


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

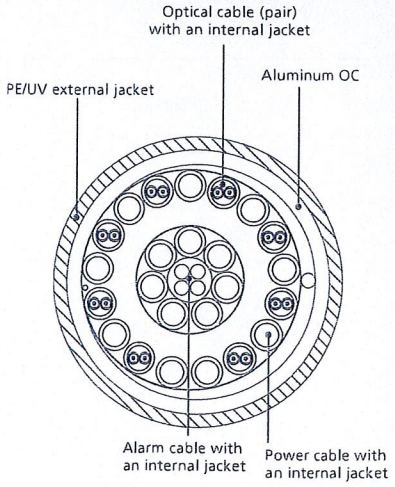


Figure 2: Construction Detail

* This data is provisional and subject to change.

	General	Power	Density					
Site Name: Bloomfield 3								
Tower Height: Verizon @ 105ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Police UHF	1.25	74.82	143.5	0.0016	406	0.2707	0.60%	
*Police Back up repeater	1	161.2	144	0.0028	453.83	0.3026	0.92%	
*Hartford Co. Fire	1	86.35	147.2	0.0014	33.94	0.2000	0.72%	
*State Police	1	89.36	72.8	0.0061	45.86	0.2000	3.03%	
*NPSAC	1	34.98	141.5	0.0006	821.01	0.5473	0.11%	
*RAFS	2	39.02	94	0.0032	460.06	0.3067	1.04%	
*Pocket (now MetroPCS)	3	631	125	0.0436	2130	1.0000	4.36%	
*Nextel	12	100	89	0.0545	851	0.5673	9.60%	
*Clearwire	2	153	115	0.0083	2496	1.0000	0.83%	
*Clearwire	1	211	115	0.0057	11 GHz	1.0000	0.57%	
*T-Mobile GSM	8	166	135	0.0262	1945	1.0000	2.62%	
*T-Mobile UMTS	2	692	135	0.0273	2100	1.0000	2.73%	
Verizon PCS	**11**	**258**	**105**	**0.0926**	**1970**	**1.0000**	**9.26%**	
Verizon Cellular	**9**	**262**	**105**	**0.0769**	**869**	**0.5793**	**13.28%**	
Verizon AWS	**1**	**1750**	**105**	**0.0571**	**2145**	**1.0000**	**5.71%**	
Verizon 700	**1**	**1050**	**105**	**0.0342**	**698**	**0.4653**	**7.36%**	
								62.74%
* Source: Siting Council								

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

138-ft Existing Summit Monopole

Proposed Verizon Wireless
Antenna Upgrade

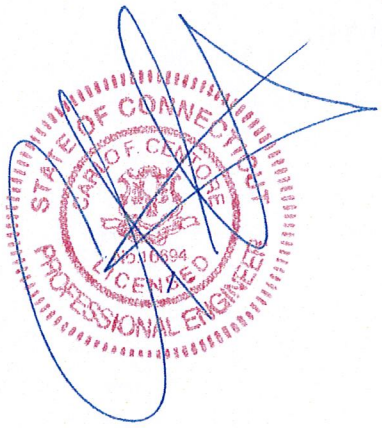
Verizon Site Ref: Bloomfield 3

785 Park Avenue
Bloomfield, CT

Centek Project No. 12124.CO25

~~Date: December 27, 2012~~

Rev 1: January 17, 2013



Prepared for:

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

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

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 upgrade proposed by Verizon Wireless on the existing monopole (tower) located in Bloomfield, CT.

The host tower is a 138-ft, three-section, eighteen sided, tapered monopole, originally manufactured by PennSummit Tubular, LLC and designed by Paul J. Ford and Company job no; 29202-0288, dated August 20, 2002. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned design documents. Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no. 12001.CO7 dated January 3, 2012, visual verification from grade conducted by Centek personnel on November 6, 2012 and a Verizon RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A607-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 24.00-in at the top and 43.58-in at the base.

Verizon proposes the removal of six (6) panel antennas and the installation of six (6) panel antennas, three (3) RRH's and one (1) distribution box mounted to the existing low profile platform. 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, proposed and future loads considered in this analysis consist of the following:

- TOWN (EXISTING):
  Antennas: One (1) 20-ft 8-bay dipole antenna pipe mounted with an elevation of 143-ft above existing grade.
  Coax Cables: Three (3) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- TOWN (EXISTING):
  Antennas: One (1) Motorola PTP400 microwave antenna pipe mounted with an elevation of 142-ft above existing grade.
  Coax Cables: One (1) Category 5e cable running on the inside of the existing tower.
- T-MOBILE (EXISTING):
  Antennas: Three (3) RFS APX16PV-16PVL-X panel antennas, three (3) RFS APX16DWV-16DWVS-E-ACU panel antennas, six (6) G200057A1 TMA's and three (3) RFS Twin AWS TMA's mounted on three (3) dual standoff mounts with a RAD center elevation of 138-ft above existing grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower and six (6) 1-5/8" ∅ coax cables running on the exterior of the tower.
- METROPCS (EXISTING):
  Antennas: Three (3) Kathrein 742-213 panel antenna flush mounted with a RAD center elevation of 125-ft above existing grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.

- CLEARWIRE (EXISTING):
  Antennas: Two (2) Argus LLPX310R and one (1) Kathrein 840-10054 panel antennas, three (3) Andrew VHLP1-23 microwave dishes, one (1) GPS antenna and six (6) RRU's mounted on a universal tri-bracket assembly with three (3) dual standoff mounts with an elevation of 115-ft above existing grade.
  Coax Cables: Two (2) 3" ∅ flex conduits running on the exterior of the tower as specified in Section 3 of this report.
- NEXTEL (EXISTING):
  Antennas: Twelve (12) Decibel DB844G65ZAXY panel antennas mounted on a 13-ft low profile platform with a RAD center elevation of 95-ft above the existing grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside the tower as specified in Section 3 of this report.
- TOWN (EXISTING):
  Antennas: Three (3) Motorola PTP400 microwave antennas on three (3) 4'-6" by 3" ∅ pipe mounts with an elevation of 83-ft above the existing grade.
  Coax Cables: Three (3) Category 5e (1 Wire) cables running on the inside of the existing tower.
- VERIZON (EXISTING TO REMAIN):
  Antennas: One (1) Antel BXA-70063-6CF panel antenna, two (2) Swedcom SLCP 2X6014 panel antennas, one (1) Antel BXA-171063-12BF panel antenna, two (2) Antel BXA-171085-12BF panel antennas and six (6) RFS FD9R6004/2C-3L Diplexers mounted on a low profile platform with a RAD center elevation of 105-ft above existing grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- VERIZON (EXISTING TO REMOVE):
  Antennas: Two (2) Antel LPA-80080-6CF, two (2) Antel LPA-80063-4CF and two (2) Antel LPA-80080-4CF panel antennas mounted on a low profile platform with a RAD center elevation of 105-ft above existing grade.
- **VERIZON (PROPOSED):**
  Antennas: One (1) RFS DB-T1-6Z-8AB-0Z main distribution box flush mounted with a RAD center elevation of 110-ft above existing grade.
  Coax Cables: One (1) 1-5/8" ∅ fiber line running on the exterior of the existing monopole.
- **VERIZON (PROPOSED):**
  Antennas: Two (2) Antel BXA-171085-8BF panel antennas, one (1) Antel BXA-171063-8BF panel antenna, one (1) Antel BXA-80080-6CF panel antenna, one (1) Antel BXA-80063-4BF panel antenna, one (1) Antel BXA-80080-4CF panel antenna and three (3) Alcatel-Lucent RRH2x40-AWS mounted to one (1) low profile platform with a RAD center elevation of 105-ft above existing grade.

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 existing coax cables to be installed as indicated in this report.

Analysis

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

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

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

Tower Loading

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

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Bloomfield; 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 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 were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **72.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L3)	0.00'-46.00'	72.3%	**PASS**

Foundation and Anchors

The existing foundation consists of a 6.0-ft ∅ x 45.5-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned PJF design report; project no. 29202-0288 dated August 20, 2002. The base of the tower is connected to the foundation by means of (16) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	21 kips
	Compression	31 kips
	Moment	1966 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	60.5%	**PASS**
	Lateral Deflection	1.18 in [1]	

Note 1: Lateral deflection limited to 1.86" per Paul J. Ford L-Pile report dated August 20, 2002.

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Compression	61.1%	**PASS**
Base Plate	Bending	57.4%	**PASS**

Conclusion

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

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

STATE OF CONNECTICUT
CARLO F. CENTORE
No 16694
LICENSED
PROFESSIONAL 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

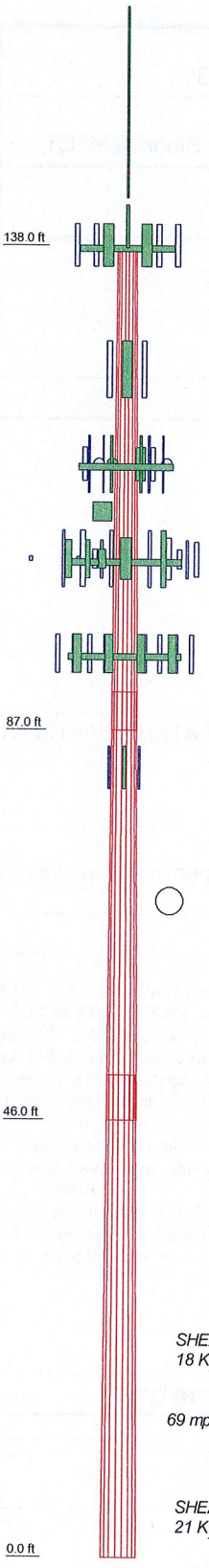
tnxTower is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, *tnxTower*, formerly RISATower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

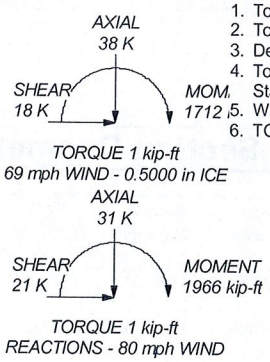
tnxTower Features:

- *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	1	2	3
Length (ft)	51.00	45.00	50.75
Number of Sides	18	18	18
Thickness (in)	0.1875	0.3750	0.4375
Socket Length (ft)	4.00	4.75	
Top Dia (in)	24.0000	30.6768	35.9654
Bot Dia (in)	31.6520	37.4280	43.5800
Grade		A607-65	
Weight (K)	2.9	6.1	9.4

Total Weight (K) 18.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
20' 8 Bay Di-Pole (Town - Existing)	143
PTP400 (Town - Existing)	142
4'6"x3" Pipe Mount (Town - Existing)	140
APX16PV-16PVL-X (T-Mobile - Existing)	138
(2) G20057A1 TMA (T-Mobile - Existing)	138
APX16PV-16PVL-X (T-Mobile - Existing)	138
(2) G20057A1 TMA (T-Mobile - Existing)	138
APX16PV-16PVL-X (T-Mobile - Existing)	138
(2) G20057A1 TMA (T-Mobile - Existing)	138
APX16DWV-16DWV-S-E-ACU (T-Mobile - Existing)	138
APX16DWV-16DWV-S-E-ACU (T-Mobile - Existing)	138
APX16DWV-16DWV-S-E-ACU (T-Mobile - Existing)	138
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	138
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	138
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	138
Valmont Uni-Tri Bracket (T-Mobile - Existing)	138
Dual Standoff Mount B1827 (T-Mobile - Existing)	138
Dual Standoff Mount B1827 (T-Mobile - Existing)	138
Dual Standoff Mount B1827 (T-Mobile - Existing)	138
742 213 w/mount pipe (MetroPCS - Existing)	125
742 213 w/mount pipe (MetroPCS - Existing)	125
742 213 w/mount pipe (MetroPCS - Existing)	125
LLPX310R (Clearwire - Existing)	115
LLPX310R (Clearwire - Existing)	115
840-10054 (Clearwire - Existing)	115
(2) RRU (Clearwire - Existing)	115
(2) RRU (Clearwire - Existing)	115
(2) RRU (Clearwire - Existing)	115
GPS (Clearwire - Existing)	115
Valmont Uni-Tri Bracket (Clearwire - Existing)	115
Dual Standoff Mount B1827 (Clearwire - Existing)	115

TYPE	ELEVATION
Dual Standoff Mount B1827 (Clearwire - Existing)	115
Dual Standoff Mount B1827 (Clearwire - Existing)	115
6'x3" Pipe Mount (Clearwire - Existing)	115
6'x3" Pipe Mount (Clearwire - Existing)	115
6'x3" Pipe Mount (Clearwire - Existing)	115
6'x3" Pipe Mount (Clearwire - Existing)	115
6'x3" Pipe Mount (Clearwire - Existing)	115
6'x3" Pipe Mount (Clearwire - Existing)	115
VHLP1-23 (Clearwire - Existing)	115
VHLP1-23 (Clearwire - Existing)	115
VHLP1-23 (Clearwire - Existing)	115
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	110
Valmont Uni-Tri Bracket (Verizon - Proposed)	110
SLCP 2x6014 (Verizon - Existing)	105
BXA-171063/8BF (Verizon - Proposed)	105
BXA-80063-4BF (Verizon - Proposed)	105
BXA-171085-12BF (Verizon - Existing)	105
SLCP 2x6014 (Verizon - Existing)	105
BXA-171085-8BF (Verizon - Proposed)	105
BXA-80080-4CF (Verizon - Proposed)	105
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	105
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	105
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	105
RRH2x40-AWS (Verizon - Proposed)	105
RRH2x40-AWS (Verizon - Proposed)	105
RRH2x40-AWS (Verizon - Proposed)	105
BXA-80080-6CF (Verizon - Proposed)	105
BXA-171063-12BF (Verizon - Existing)	105
13' Low Profile Platform (Verizon - Existing)	105
BXA-171085-12BF (Verizon - Existing)	105
BXA-70063/6CF (Verizon - Existing)	105
BXA-171085-8BF (Verizon - Proposed)	105
13' Low Profile Platform (Nextel - Existing)	95
(4) DB844G65ZAXY (Nextel - Existing)	95
(4) DB844G65ZAXY (Nextel - Existing)	95
(4) DB844G65ZAXY (Nextel - Existing)	95
4'6"x3" Pipe Mount (Town - Existing)	83
4'6"x3" Pipe Mount (Town - Existing)	83
4'6"x3" Pipe Mount (Town - Existing)	83
PTP400 (Town - Existing)	83
PTP400 (Town - Existing)	83
PTP400 (Town - Existing)	83

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 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 members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 72.3%

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

Job: **12124.CO25 - Bloomfield 3**		
Project: **138' Summit Monopole - 785 Park Ave., Bloomfield, CT**		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 01/17/13	Scale: NTS
Path: J:\Jobs\12124\WC\025-Bloomfield 3\Rev #1\Cat=ER Rad13ft Summit Monopole Bloomfield.eri		Dwg No. E-1

Tower Input Data

There is a pole section.
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 0.5000 in.
Ice density of 56.0 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 members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	138.00-87.00	51.00	4.00	18	24.0000	31.6520	0.1875	0.7500	A607-65 (65 ksi)
L2	87.00-46.00	45.00	4.75	18	30.6768	37.4280	0.3750	1.5000	A607-65 (65 ksi)
L3	46.00-0.00	50.75		18	35.9654	43.5800	0.4375	1.7500	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	24.3702	14.1714	1015.2211	8.4534	12.1920	83.2694	2031.7780	7.0871	3.8940	20.768
	32.1403	18.7253	2342.1146	11.1699	16.0792	145.6610	4687.3111	9.3644	5.2408	27.951
L2	31.7594	36.0668	4183.9142	10.7572	15.5838	268.4778	8373.3337	18.0368	4.7391	12.638
	38.0054	44.1023	7649.7241	13.1538	19.0134	402.3328	15309.5138	22.0554	5.9273	15.806
L3	37.2439	49.3349	7867.3820	12.6124	18.2704	430.6078	15745.1161	24.6721	5.5599	12.708
	44.2523	59.9088	14087.6435	15.3156	22.1386	636.3374	28193.8239	29.9601	6.9001	15.772

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 138.00-87.00				1	1	1		
L2 87.00-46.00				1	1	1		
L3 46.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (T-Mobile - Existing)	A	No	Inside Pole	138.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Verizon - Existing)	B	No	Inside Pole	105.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Nextel - Existing)	A	No	CaAa (Out Of Face)	95.00 - 85.00	2	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Nextel - Existing)	A	No	CaAa (Out Of Face)	95.00 - 85.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
1 5/8 (Nextel - Existing)	B	No	CaAa (Out Of Face)	95.00 - 85.00	2	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Nextel - Existing)	B	No	CaAa (Out Of Face)	95.00 - 85.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
1 5/8 (Nextel - Existing)	C	No	CaAa (Out Of Face)	95.00 - 85.00	2	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Nextel - Existing)	C	No	CaAa (Out Of Face)	95.00 - 85.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
1 5/8 (Nextel - Existing)	C	No	Inside Pole	85.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
CATEGORY 5e (1 WIRE) (Town - Existing)	C	No	Inside Pole	138.00 - 3.00	1	No Ice	0.00	0.21
						1/2" Ice	0.00	0.21
CATEGORY 5e (1 WIRE) (Town - Existing)	A	No	Inside Pole	85.00 - 3.00	3	No Ice	0.00	0.21
						1/2" Ice	0.00	0.21
1 5/8 (Town - Existing)	B	No	Inside Pole	138.00 - 3.00	3	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (MetroPCS - Existing)	C	No	Inside Pole	126.00 - 3.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile - Existing)	A	No	CaAa (Out Of Face)	138.00 - 3.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (T-Mobile - Existing)	A	No	CaAa (Out Of Face)	138.00 - 3.00	5	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Clearwire Bundle	C	No	CaAa (Out Of Face)	115.00 - 3.00	1	No Ice	0.30	2.50
(Clearwire - Existing)						1/2" Ice	0.40	3.00
HYBRIFLEX 1-5/8"	B	No	CaAa (Out Of Face)	105.00 - 3.00	1	No Ice	0.20	1.90
(Verizon - Proposed)						1/2" Ice	0.30	3.41

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	138.00-87.00	A	0.000	0.000	0.000	13.266	0.99
		B	0.000	0.000	0.000	6.732	0.45
		C	0.000	0.000	0.000	11.568	0.36
L2	87.00-46.00	A	0.000	0.000	0.000	8.910	0.80
		B	0.000	0.000	0.000	8.910	0.73
		C	0.000	0.000	0.000	13.092	0.86
L3	46.00-0.00	A	0.000	0.000	0.000	8.514	0.83
		B	0.000	0.000	0.000	8.514	0.75
		C	0.000	0.000	0.000	12.900	0.92

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	138.00-87.00	A	0.500	0.000	0.000	0.000	19.966	1.50
		B		0.000	0.000	0.000	10.132	0.53
		C		0.000	0.000	0.000	15.968	0.42
L2	87.00-46.00	A	0.500	0.000	0.000	0.000	13.410	1.18
		B		0.000	0.000	0.000	13.410	0.80
		C		0.000	0.000	0.000	17.592	0.89
L3	46.00-0.00	A	0.500	0.000	0.000	0.000	12.814	1.22
		B		0.000	0.000	0.000	12.814	0.82
		C		0.000	0.000	0.000	17.200	0.94

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	138.00-87.00	-0.1013	-0.0858	-0.1082	-0.1306
L2	87.00-46.00	-0.1049	0.0606	-0.0941	0.0544
L3	46.00-0.00	-0.1031	0.0595	-0.0945	0.0546

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
20' 8 Bay Di-Pole (Town - Existing)	C	From Face	1.00 0.00 10.00	0.0000	143.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	0.06 0.10
PTP400 (Town - Existing)	C	From Face	1.00 0.00 0.00	0.0000	142.00	No Ice 1/2" Ice	2.04 2.24	0.53 0.65	0.01 0.02
4'6"x3" Pipe Mount (Town - Existing)	C	From Face	1.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	1.30 1.57	1.30 1.57	0.03 0.05
APX16PV-16PVL-X (T-Mobile - Existing)	A	From Face	4.00 2.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	0.04 0.07
(2) G20057A1 TMA (T-Mobile - Existing)	A	From Face	4.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	0.01 0.02
APX16PV-16PVL-X (T-Mobile - Existing)	B	From Face	4.00 2.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	0.04 0.07
(2) G20057A1 TMA (T-Mobile - Existing)	B	From Face	4.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	0.01 0.02
APX16PV-16PVL-X (T-Mobile - Existing)	C	From Face	4.00 2.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	0.04 0.07
(2) G20057A1 TMA (T-Mobile - Existing)	C	From Face	4.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	0.01 0.02
APX16DWV-16DWV-S-E-A CU (T-Mobile - Existing)	A	From Face	4.00 -2.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	0.04 0.07
APX16DWV-16DWV-S-E-A CU (T-Mobile - Existing)	B	From Face	4.00 -2.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	0.04 0.07
APX16DWV-16DWV-S-E-A CU (T-Mobile - Existing)	C	From Face	4.00 -2.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	0.04 0.07
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	A	From Face	4.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	0.01 0.02
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	B	From Face	4.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	0.01 0.02
ATMAA1412D-1A20 TMA (T-Mobile - Existing)	C	From Face	4.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	0.01 0.02
Valmont Uni-Tri Bracket (T-Mobile - Existing)	C	From Face	2.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.75 1.94	1.75 1.94	0.29 0.31
Dual Standoff Mount B1827 (T-Mobile - Existing)	A	From Face	2.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.40 1.75	1.40 1.75	0.10 0.13
Dual Standoff Mount B1827 (T-Mobile - Existing)	B	From Face	2.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.40 1.75	1.40 1.75	0.10 0.13
Dual Standoff Mount B1827 (T-Mobile - Existing)	C	From Face	2.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	1.40 1.75	1.40 1.75	0.10 0.13

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
742 213 w/mount pipe	A	From Face	1.00	0.0000	125.00	No Ice	5.20	4.45	0.05
(MetroPCS - Existing)			0.00			1/2" Ice	5.71	5.72	0.09
			0.00						
742 213 w/mount pipe	B	From Face	1.00	0.0000	125.00	No Ice	5.20	4.45	0.05
(MetroPCS - Existing)			0.00			1/2" Ice	5.71	5.72	0.09
			0.00						
742 213 w/mount pipe	C	From Face	1.00	0.0000	125.00	No Ice	5.20	4.45	0.05
(MetroPCS - Existing)			0.00			1/2" Ice	5.71	5.72	0.09
			0.00						
LLPX310R	A	From Face	3.00	0.0000	115.00	No Ice	4.83	1.95	0.03
(Clearwire - Existing)			-1.50			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	B	From Face	3.00	0.0000	115.00	No Ice	4.83	1.95	0.03
(Clearwire - Existing)			-1.50			1/2" Ice	5.18	2.21	0.05
			0.00						
840-10054	C	From Face	3.00	0.0000	115.00	No Ice	5.19	1.36	0.00
(Clearwire - Existing)			-1.50			1/2" Ice	5.54	1.62	0.02
			0.00						
(2) RRU	A	From Face	3.00	0.0000	115.00	No Ice	1.80	0.78	0.03
(Clearwire - Existing)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
(2) RRU	B	From Face	3.00	0.0000	115.00	No Ice	1.80	0.78	0.03
(Clearwire - Existing)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
(2) RRU	C	From Face	3.00	0.0000	115.00	No Ice	1.80	0.78	0.03
(Clearwire - Existing)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
GPS	A	From Face	3.00	0.0000	115.00	No Ice	1.00	1.00	0.01
(Clearwire - Existing)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
Valmont Uni-Tri Bracket	C	None		0.0000	115.00	No Ice	1.75	1.75	0.29
(Clearwire - Existing)						1/2" Ice	1.94	1.94	0.31
Dual Standoff Mount B1827	A	None		0.0000	115.00	No Ice	1.40	1.40	0.10
(Clearwire - Existing)						1/2" Ice	1.75	1.75	0.13
Dual Standoff Mount B1827	B	None		0.0000	115.00	No Ice	1.40	1.40	0.10
(Clearwire - Existing)						1/2" Ice	1.75	1.75	0.13
Dual Standoff Mount B1827	C	None		0.0000	115.00	No Ice	1.40	1.40	0.10
(Clearwire - Existing)						1/2" Ice	1.75	1.75	0.13
6'x3" Pipe Mount	A	From Face	2.50	0.0000	115.00	No Ice	1.77	1.77	0.03
(Clearwire - Existing)			1.50			1/2" Ice	2.13	2.13	0.05
			0.00						
6'x3" Pipe Mount	B	From Face	2.50	0.0000	115.00	No Ice	1.77	1.77	0.03
(Clearwire - Existing)			1.50			1/2" Ice	2.13	2.13	0.05
			0.00						
6'x3" Pipe Mount	C	From Face	2.50	0.0000	115.00	No Ice	1.77	1.77	0.03
(Clearwire - Existing)			1.50			1/2" Ice	2.13	2.13	0.05
			0.00						
6'x3" Pipe Mount	A	From Face	2.50	0.0000	115.00	No Ice	1.77	1.77	0.03
(Clearwire - Existing)			-1.50			1/2" Ice	2.13	2.13	0.05
			0.00						
6'x3" Pipe Mount	B	From Face	2.50	0.0000	115.00	No Ice	1.77	1.77	0.03
(Clearwire - Existing)			-1.50			1/2" Ice	2.13	2.13	0.05
			0.00						
6'x3" Pipe Mount	C	From Face	2.50	0.0000	115.00	No Ice	1.77	1.77	0.03
(Clearwire - Existing)			-1.50			1/2" Ice	2.13	2.13	0.05
			0.00						
BXA-171085-12BF	A	From Face	4.00	0.0000	105.00	No Ice	4.73	3.57	0.02

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*
(Verizon - Existing)			-4.00 0.00			1/2" Ice	5.18	4.01	0.04
BXA-70063/6CF (Verizon - Existing)	A	From Face	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-171085-8BF (Verizon - Proposed)	A	From Face	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-80080-6CF (Verizon - Proposed)	A	From Face	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	5.77 6.22	4.56 5.00	0.02 0.05
BXA-171063-12BF (Verizon - Existing)	B	From Face	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
SLCP 2x6014 (Verizon - Existing)	B	From Face	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	7.21 7.65	5.67 6.09	0.02 0.07
BXA-171063/8BF (Verizon - Proposed)	B	From Face	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-80063-4BF (Verizon - Proposed)	B	From Face	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	4.86 5.22	2.38 2.66	0.01 0.04
BXA-171085-12BF (Verizon - Existing)	C	From Face	4.00 -4.00 0.00	0.0000	105.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
SLCP 2x6014 (Verizon - Existing)	C	From Face	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	7.21 7.65	5.67 6.09	0.02 0.07
BXA-171085-8BF (Verizon - Proposed)	C	From Face	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-80080-4CF (Verizon - Proposed)	C	From Face	4.00 6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	3.69 4.06	2.79 3.10	0.01 0.04
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	A	From Face	4.00 -6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	A	From Face	4.00 -6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	A	From Face	4.00 -6.00 0.00	0.0000	105.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01
RRH2x40-AWS (Verizon - Proposed)	A	From Face	4.00 2.50 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 Face	4.00 2.50 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 Face	4.00 2.50 0.00	0.0000	105.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	C	From Face	0.00 2.50 0.00	0.0000	110.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08
Valmont Uni-Tri Bracket	C	From Face	0.00	0.0000	110.00	No Ice	1.75	1.75	0.29

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Verizon - Proposed)			0.00 0.00			1/2" Ice	1.94	1.94	0.31
13' Low Profile Platform	C	None		0.0000	105.00	No Ice	15.70	15.70	1.30
(Verizon - Existing)						1/2" Ice	20.10	20.10	1.76
(4) DB844G65ZAXY	A	From Face	4.00	0.0000	95.00	No Ice	4.67	3.73	0.02
(Nextel - Existing)			0.00 0.00			1/2" Ice	5.05	4.10	0.05
(4) DB844G65ZAXY	B	From Face	4.00	0.0000	95.00	No Ice	4.67	3.73	0.02
(Nextel - Existing)			0.00 0.00			1/2" Ice	5.05	4.10	0.05
(4) DB844G65ZAXY	C	From Face	4.00	0.0000	95.00	No Ice	4.67	3.73	0.02
(Nextel - Existing)			0.00 0.00			1/2" Ice	5.05	4.10	0.05
13' Low Profile Platform	C	None		0.0000	95.00	No Ice	15.70	15.70	1.30
(Nextel - Existing)						1/2" Ice	20.10	20.10	1.76
PTP400	A	From Face	1.00	0.0000	83.00	No Ice	2.04	0.53	0.01
(Town - Existing)			0.00 0.00			1/2" Ice	2.24	0.65	0.02
PTP400	B	From Face	1.00	0.0000	83.00	No Ice	2.04	0.53	0.01
(Town - Existing)			0.00 0.00			1/2" Ice	2.24	0.65	0.02
PTP400	C	From Face	1.00	0.0000	83.00	No Ice	2.04	0.53	0.01
(Town - Existing)			0.00 0.00			1/2" Ice	2.24	0.65	0.02
4'6"x3" Pipe Mount	A	From Face	0.50	0.0000	83.00	No Ice	1.30	1.30	0.03
(Town - Existing)			0.00 0.00			1/2" Ice	1.57	1.57	0.05
4'6"x3" Pipe Mount	B	From Face	0.50	0.0000	83.00	No Ice	1.30	1.30	0.03
(Town - Existing)			0.00 0.00			1/2" Ice	1.57	1.57	0.05
4'6"x3" Pipe Mount	C	From Face	0.50	0.0000	83.00	No Ice	1.30	1.30	0.03
(Town - Existing)			0.00 0.00			1/2" Ice	1.57	1.57	0.05

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
VHLP1-23	A	Paraboloid w/o	From	3.00	Worst		115.00	1.27	No Ice	1.28	0.01
(Clearwire - Existing)		Radome	Face	1.50 0.00					1/2" Ice	1.45	0.01
VHLP1-23	B	Paraboloid w/o	From	3.00	Worst		115.00	1.27	No Ice	1.28	0.01
(Clearwire - Existing)		Radome	Face	1.50 0.00					1/2" Ice	1.45	0.01
VHLP1-23	C	Paraboloid w/o	From	3.00	Worst		115.00	1.27	No Ice	1.28	0.01
(Clearwire - Existing)		Radome	Face	1.50 0.00					1/2" Ice	1.45	0.01

Tower Pressures - No Ice

$G_H = 1.690$

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
L1	111.74	1.417	23.16	118.260	A	0.000	118.260	118.260	100.00	0.000	13.266
138.00-87.00					B	0.000	118.260		100.00	0.000	6.732
					C	0.000	118.260		100.00	0.000	11.568
L2 87.00-46.00	66.34	1.221	19.91	117.371	A	0.000	117.371	117.371	100.00	0.000	8.910
					B	0.000	117.371		100.00	0.000	8.910
					C	0.000	117.371		100.00	0.000	13.092
L3 46.00-0.00	22.41	1	16.47	153.828	A	0.000	153.828	153.828	100.00	0.000	8.514
					B	0.000	153.828		100.00	0.000	8.514
					C	0.000	153.828		100.00	0.000	12.900

Tower Pressure - With Ice

$G_H = 1.690$

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
L1 138.00-87.00	111.74	1.417	17.37	0.5000	122.510	A	0.000	122.510	122.510	100.00	0.000	19.966
						B	0.000	122.510		100.00	0.000	10.132
						C	0.000	122.510		100.00	0.000	15.968
L2 87.00-46.00	66.34	1.221	14.94	0.5000	120.788	A	0.000	120.788	120.788	100.00	0.000	13.410
						B	0.000	120.788		100.00	0.000	13.410
						C	0.000	120.788		100.00	0.000	17.592
L3 46.00-0.00	22.41	1	12.35	0.5000	157.661	A	0.000	157.661	157.661	100.00	0.000	12.814
						B	0.000	157.661		100.00	0.000	12.814
						C	0.000	157.661		100.00	0.000	17.200

Tower Pressure - Service

$G_H = 1.690$

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
L1	111.74	1.417	9.05	118.260	A	0.000	118.260	118.260	100.00	0.000	13.266
138.00-87.00					B	0.000	118.260		100.00	0.000	6.732
					C	0.000	118.260		100.00	0.000	11.568
L2 87.00-46.00	66.34	1.221	7.78	117.371	A	0.000	117.371	117.371	100.00	0.000	8.910
					B	0.000	117.371		100.00	0.000	8.910
					C	0.000	117.371		100.00	0.000	13.092
L3 46.00-0.00	22.41	1	6.43	153.828	A	0.000	153.828	153.828	100.00	0.000	8.514

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
					B	0.000	153.828		100.00	0.000	8.514
					C	0.000	153.828		100.00	0.000	12.900

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
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	4.24	83.22	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	3.61	87.99	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	3.62	78.63	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	794.65 kip-ft	11.47		

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
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	4.24	83.22	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	3.61	87.99	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	3.62	78.63	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	794.65 kip-ft	11.47		

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
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	4.24	83.22	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	3.61	87.99	C

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
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	3.62	78.63	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	794.65 kip-ft	11.47		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	4.24	83.22	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	3.61	87.99	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	3.62	78.63	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	794.65 kip-ft	11.47		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	2.44	3.75	A	1	0.65	1	1	1	122.510	3.69	72.35	C
138.00-87.00			B	1	0.65	1	1	1	122.510			
			C	1	0.65	1	1	1	122.510			
L2	2.88	7.02	A	1	0.65	1	1	1	120.788	3.10	75.67	C
87.00-46.00			B	1	0.65	1	1	1	120.788			
			C	1	0.65	1	1	1	120.788			
L3 46.00-0.00	2.98	10.59	A	1	0.65	1	1	1	157.661	3.03	65.95	C
			B	1	0.65	1	1	1	157.661			
			C	1	0.65	1	1	1	157.661			
Sum Weight:	8.31	21.35						OTM	686.13 kip-ft	9.83		

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
L1	2.44	3.75	A	1	0.65	1	1	1	122.510	3.69	72.35	C
138.00-87.00			B	1	0.65	1	1	1	122.510			
			C	1	0.65	1	1	1	122.510			
L2	2.88	7.02	A	1	0.65	1	1	1	120.788	3.10	75.67	C
87.00-46.00			B	1	0.65	1	1	1	120.788			
			C	1	0.65	1	1	1	120.788			
L3 46.00-0.00	2.98	10.59	A	1	0.65	1	1	1	157.661	3.03	65.95	C
			B	1	0.65	1	1	1	157.661			
			C	1	0.65	1	1	1	157.661			
Sum Weight:	8.31	21.35						OTM	686.13 kip-ft	9.83		

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
L1	2.44	3.75	A	1	0.65	1	1	1	122.510	3.69	72.35	C
138.00-87.00			B	1	0.65	1	1	1	122.510			
			C	1	0.65	1	1	1	122.510			
L2	2.88	7.02	A	1	0.65	1	1	1	120.788	3.10	75.67	C
87.00-46.00			B	1	0.65	1	1	1	120.788			
			C	1	0.65	1	1	1	120.788			
L3 46.00-0.00	2.98	10.59	A	1	0.65	1	1	1	157.661	3.03	65.95	C
			B	1	0.65	1	1	1	157.661			
			C	1	0.65	1	1	1	157.661			
Sum Weight:	8.31	21.35						OTM	686.13 kip-ft	9.83		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	2.44	3.75	A	1	0.65	1	1	1	122.510	3.69	72.35	C
138.00-87.00			B	1	0.65	1	1	1	122.510			
			C	1	0.65	1	1	1	122.510			
L2	2.88	7.02	A	1	0.65	1	1	1	120.788	3.10	75.67	C
87.00-46.00			B	1	0.65	1	1	1	120.788			
			C	1	0.65	1	1	1	120.788			
L3 46.00-0.00	2.98	10.59	A	1	0.65	1	1	1	157.661	3.03	65.95	C
			B	1	0.65	1	1	1	157.661			
			C	1	0.65	1	1	1	157.661			
Sum Weight:	8.31	21.35						OTM	686.13 kip-ft	9.83		

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
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	1.66	32.51	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	1.41	34.37	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	1.41	30.71	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	310.41 kip-ft	4.48		

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
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	1.66	32.51	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	1.41	34.37	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	1.41	30.71	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	310.41 kip-ft	4.48		

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 ft²	F K	w plf	Ctrl. Face
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	1.66	32.51	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	1.41	34.37	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	1.41	30.71	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	310.41 kip-ft	4.48		

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 ft²	F K	w plf	Ctrl. Face
L1	1.80	2.85	A	1	0.65	1	1	1	118.260	1.66	32.51	C
138.00-87.00			B	1	0.65	1	1	1	118.260			
			C	1	0.65	1	1	1	118.260			
L2	2.39	6.14	A	1	0.65	1	1	1	117.371	1.41	34.37	C
87.00-46.00			B	1	0.65	1	1	1	117.371			
			C	1	0.65	1	1	1	117.371			
L3 46.00-0.00	2.51	9.43	A	1	0.65	1	1	1	153.828	1.41	30.71	C
			B	1	0.65	1	1	1	153.828			
			C	1	0.65	1	1	1	153.828			
Sum Weight:	6.69	18.43						OTM	310.41 kip-ft	4.48		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	18.43					
Bracing Weight	0.00					
Total Member Self-Weight	18.43			0.45	0.44	
Total Weight	30.96			0.45	0.44	
Wind 0 deg - No Ice		-0.04	-21.47	-1909.27	4.72	-0.85
Wind 30 deg - No Ice		10.64	-18.58	-1651.28	-942.71	-0.26
Wind 45 deg - No Ice		15.07	-15.15	-1346.90	-1335.59	0.07
Wind 60 deg - No Ice		18.47	-10.70	-950.70	-1637.42	0.40
Wind 90 deg - No Ice		21.35	0.04	4.73	-1893.27	0.95
Wind 120 deg - No Ice		18.51	10.77	959.02	-1641.71	1.25
Wind 135 deg - No Ice		15.13	15.21	1353.85	-1341.65	1.28
Wind 150 deg - No Ice		10.71	18.62	1656.45	-950.13	1.21
Wind 180 deg - No Ice		0.04	21.47	1910.16	-3.85	0.85
Wind 210 deg - No Ice		-10.64	18.58	1652.17	943.58	0.26
Wind 225 deg - No Ice		-15.07	15.15	1347.79	1336.46	-0.07
Wind 240 deg - No Ice		-18.47	10.70	951.59	1638.29	-0.40
Wind 270 deg - No Ice		-21.35	-0.04	-3.84	1894.14	-0.95
Wind 300 deg - No Ice		-18.51	-10.77	-958.13	1642.58	-1.25
Wind 315 deg - No Ice		-15.13	-15.21	-1352.96	1342.52	-1.28
Wind 330 deg - No Ice		-10.71	-18.62	-1655.56	951.00	-1.21
Member Ice	2.93					
Total Weight Ice	38.27			-0.85	0.46	
Wind 0 deg - Ice		-0.03	-18.42	-1647.03	3.95	-0.82
Wind 30 deg - Ice		9.14	-15.94	-1424.74	-813.47	-0.27
Wind 45 deg - Ice		12.94	-13.00	-1162.41	-1152.41	0.04
Wind 60 deg - Ice		15.86	-9.18	-820.92	-1412.79	0.35
Wind 90 deg - Ice		18.33	0.03	2.64	-1633.43	0.88
Wind 120 deg - Ice		15.89	9.24	825.26	-1416.27	1.17
Wind 135 deg - Ice		12.99	13.05	1165.64	-1157.34	1.20
Wind 150 deg - Ice		9.19	15.97	1426.53	-819.50	1.15
Wind 180 deg - Ice		0.03	18.42	1645.33	-3.03	0.82
Wind 210 deg - Ice		-9.14	15.94	1423.04	814.39	0.27

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 225 deg - Ice		-12.94	13.00	1160.71	1153.33	-0.04
Wind 240 deg - Ice		-15.86	9.18	819.22	1413.71	-0.35
Wind 270 deg - Ice		-18.33	-0.03	-4.34	1634.36	-0.88
Wind 300 deg - Ice		-15.89	-9.24	-826.96	1417.20	-1.17
Wind 315 deg - Ice		-12.99	-13.05	-1167.34	1158.26	-1.20
Wind 330 deg - Ice		-9.19	-15.97	-1428.22	820.43	-1.15
Total Weight	30.96			0.45	0.44	
Wind 0 deg - Service		-0.02	-8.39	-744.71	2.01	-0.33
Wind 30 deg - Service		4.16	-7.26	-643.93	-368.08	-0.10
Wind 45 deg - Service		5.89	-5.92	-525.03	-521.55	0.03
Wind 60 deg - Service		7.22	-4.18	-370.27	-639.46	0.16
Wind 90 deg - Service		8.34	0.02	2.95	-739.40	0.37
Wind 120 deg - Service		7.23	4.21	375.72	-641.13	0.49
Wind 135 deg - Service		5.91	5.94	529.95	-523.92	0.50
Wind 150 deg - Service		4.18	7.27	648.15	-370.98	0.47
Wind 180 deg - Service		0.02	8.39	747.26	-1.34	0.33
Wind 210 deg - Service		-4.16	7.26	646.48	368.75	0.10
Wind 225 deg - Service		-5.89	5.92	527.58	522.21	-0.03
Wind 240 deg - Service		-7.22	4.18	372.82	640.12	-0.16
Wind 270 deg - Service		-8.34	-0.02	-0.40	740.06	-0.37
Wind 300 deg - Service		-7.23	-4.21	-373.17	641.79	-0.49
Wind 315 deg - Service		-5.91	-5.94	-527.40	524.58	-0.50
Wind 330 deg - Service		-4.18	-7.27	-645.60	371.65	-0.47

Load Combinations

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

Comb. No.	Description
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	138 - 87	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-14.07	0.51	-0.79
			Max. Mx	14	-9.23	303.12	-0.39
			Max. My	10	-9.22	-0.25	-308.94
			Max. Vy	14	-14.00	303.12	-0.39
			Max. Vx	10	14.13	-0.25	-308.94
			Max. Torque	8			-1.25
L2	87 - 46	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-23.55	0.49	-0.10
			Max. Mx	14	-17.46	949.53	1.51
			Max. My	10	-17.45	-1.89	-960.17
			Max. Vy	14	-17.89	949.53	1.51
			Max. Vx	10	18.01	-1.89	-960.17
			Max. Torque	8			-1.28
L3	46 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-38.27	0.46	0.84
			Max. Mx	14	-30.94	1948.98	3.93
			Max. My	10	-30.94	-3.96	-1965.55
			Max. Vy	14	-21.38	1948.98	3.93
			Max. Vx	10	21.50	-3.96	-1965.55
			Max. Torque	8			-1.32

Maximum Reactions

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

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	38.27	0.03	18.42
	Max. H_x	14	30.96	21.35	0.04
	Max. H_z	2	30.96	0.04	21.47
	Max. M_x	2	1964.58	0.04	21.47
	Max. M_z	6	1948.07	-21.35	-0.04
	Max. Torsion	16	1.30	15.13	15.21
	Min. Vert	1	30.96	0.00	0.00
	Min. H_x	6	30.96	-21.35	-0.04
	Min. H_z	10	30.96	-0.04	-21.47
	Min. M_x	10	-1965.55	-0.04	-21.47
	Min. M_z	14	-1948.98	21.35	0.04
	Min. Torsion	8	-1.32	-15.13	-15.21

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	30.96	0.00	0.00	0.46	0.44	-0.00
Dead+Wind 0 deg - No Ice	30.96	-0.04	-21.47	-1964.58	4.87	-0.84
Dead+Wind 30 deg - No Ice	30.96	10.64	-18.58	-1699.11	-969.98	-0.23
Dead+Wind 45 deg - No Ice	30.96	15.07	-15.15	-1385.92	-1374.24	0.11
Dead+Wind 60 deg - No Ice	30.96	18.47	-10.70	-978.24	-1684.81	0.45
Dead+Wind 90 deg - No Ice	30.96	21.35	0.04	4.90	-1948.07	1.01
Dead+Wind 120 deg - No Ice	30.96	18.51	10.77	986.84	-1689.22	1.30
Dead+Wind 135 deg - No Ice	30.96	15.13	15.21	1393.12	-1380.47	1.32
Dead+Wind 150 deg - No Ice	30.96	10.71	18.62	1704.49	-977.62	1.24
Dead+Wind 180 deg - No Ice	30.96	0.04	21.47	1965.55	-3.96	0.84
Dead+Wind 210 deg - No Ice	30.96	-10.64	18.58	1700.08	970.89	0.22
Dead+Wind 225 deg - No Ice	30.96	-15.07	15.15	1386.89	1375.15	-0.13
Dead+Wind 240 deg - No Ice	30.96	-18.47	10.70	979.21	1685.72	-0.46
Dead+Wind 270 deg - No Ice	30.96	-21.35	-0.04	-3.93	1948.98	-1.01
Dead+Wind 300 deg - No Ice	30.96	-18.51	-10.77	-985.88	1690.12	-1.29
Dead+Wind 315 deg - No Ice	30.96	-15.13	-15.21	-1392.15	1381.38	-1.30
Dead+Wind 330 deg - No Ice	30.96	-10.71	-18.62	-1703.52	978.52	-1.23
Dead+Ice+Temp	38.27	0.00	0.00	-0.84	0.46	-0.00
Dead+Wind 0 deg+Ice+Temp	38.27	-0.03	-18.42	-1712.10	4.12	-0.81
Dead+Wind 30 deg+Ice+Temp	38.27	9.14	-15.94	-1481.03	-845.56	-0.23
Dead+Wind 45 deg+Ice+Temp	38.27	12.94	-13.00	-1208.33	-1197.89	0.09
Dead+Wind 60 deg+Ice+Temp	38.27	15.86	-9.18	-853.34	-1468.56	0.41
Dead+Wind 90 deg+Ice+Temp	38.27	18.33	0.03	2.78	-1697.92	0.95
Dead+Wind 120 deg+Ice+Temp	38.27	15.89	9.24	857.93	-1472.18	1.23
Dead+Wind 135 deg+Ice+Temp	38.27	12.99	13.05	1211.76	-1203.02	1.25
Dead+Wind 150 deg+Ice+Temp	38.27	9.19	15.97	1482.96	-851.85	1.18
Dead+Wind 180 deg+Ice+Temp	38.27	0.03	18.42	1710.41	-3.13	0.81
Dead+Wind 210 deg+Ice+Temp	38.27	-9.14	15.94	1479.34	846.55	0.22
Dead+Wind 225 deg+Ice+Temp	38.27	-12.94	13.00	1206.64	1198.89	-0.10
Dead+Wind 240 deg+Ice+Temp	38.27	-15.86	9.18	851.65	1469.55	-0.42
Dead+Wind 270 deg+Ice+Temp	38.27	-18.33	-0.03	-4.48	1698.91	-0.95
Dead+Wind 300 deg+Ice+Temp	38.27	-15.89	-9.24	-859.62	1473.17	-1.22
Dead+Wind 315 deg+Ice+Temp	38.27	-12.99	-13.05	-1213.46	1204.01	-1.24
Dead+Wind 330 deg+Ice+Temp	38.27	-9.19	-15.97	-1484.65	852.83	-1.17
Dead+Wind 0 deg - Service	30.96	-0.02	-8.39	-767.58	2.18	-0.33
Dead+Wind 30 deg - Service	30.96	4.16	-7.26	-663.82	-378.85	-0.09
Dead+Wind 45 deg - Service	30.96	5.89	-5.92	-541.40	-536.85	0.05
Dead+Wind 60 deg - Service	30.96	7.22	-4.18	-382.05	-658.24	0.18
Dead+Wind 90 deg - Service	30.96	8.34	0.02	2.21	-761.14	0.40

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+Wind 120 deg - Service	30.96	7.23	4.21	386.01	-659.96	0.51
Dead+Wind 135 deg - Service	30.96	5.91	5.94	544.81	-539.29	0.52
Dead+Wind 150 deg - Service	30.96	4.18	7.27	666.51	-381.83	0.49
Dead+Wind 180 deg - Service	30.96	0.02	8.39	768.55	-1.27	0.33
Dead+Wind 210 deg - Service	30.96	-4.16	7.26	664.79	379.76	0.09
Dead+Wind 225 deg - Service	30.96	-5.89	5.92	542.37	537.76	-0.05
Dead+Wind 240 deg - Service	30.96	-7.22	4.18	383.03	659.15	-0.18
Dead+Wind 270 deg - Service	30.96	-8.34	-0.02	-1.24	762.05	-0.40
Dead+Wind 300 deg - Service	30.96	-7.23	-4.21	-385.04	660.88	-0.51
Dead+Wind 315 deg - Service	30.96	-5.91	-5.94	-543.84	540.20	-0.51
Dead+Wind 330 deg - Service	30.96	-4.18	-7.27	-665.54	382.75	-0.48

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-30.96	0.00	0.00	30.96	0.00	0.000%
2	-0.04	-30.96	-21.47	0.04	30.96	21.47	0.000%
3	10.64	-30.96	-18.58	-10.64	30.96	18.58	0.000%
4	15.07	-30.96	-15.15	-15.07	30.96	15.15	0.000%
5	18.47	-30.96	-10.70	-18.47	30.96	10.70	0.000%
6	21.35	-30.96	0.04	-21.35	30.96	-0.04	0.000%
7	18.51	-30.96	10.77	-18.51	30.96	-10.77	0.000%
8	15.13	-30.96	15.21	-15.13	30.96	-15.21	0.000%
9	10.71	-30.96	18.62	-10.71	30.96	-18.62	0.000%
10	0.04	-30.96	21.47	-0.04	30.96	-21.47	0.000%
11	-10.64	-30.96	18.58	10.64	30.96	-18.58	0.000%
12	-15.07	-30.96	15.15	15.07	30.96	-15.15	0.000%
13	-18.47	-30.96	10.70	18.47	30.96	-10.70	0.000%
14	-21.35	-30.96	-0.04	21.35	30.96	0.04	0.000%
15	-18.51	-30.96	-10.77	18.51	30.96	10.77	0.000%
16	-15.13	-30.96	-15.21	15.13	30.96	15.21	0.000%
17	-10.71	-30.96	-18.62	10.71	30.96	18.62	0.000%
18	0.00	-38.27	0.00	0.00	38.27	0.00	0.000%
19	-0.03	-38.27	-18.42	0.03	38.27	18.42	0.000%
20	9.14	-38.27	-15.94	-9.14	38.27	15.94	0.000%
21	12.94	-38.27	-13.00	-12.94	38.27	13.00	0.000%
22	15.86	-38.27	-9.18	-15.86	38.27	9.18	0.000%
23	18.33	-38.27	0.03	-18.33	38.27	-0.03	0.000%
24	15.89	-38.27	9.24	-15.89	38.27	-9.24	0.000%
25	12.99	-38.27	13.05	-12.99	38.27	-13.05	0.000%
26	9.19	-38.27	15.97	-9.19	38.27	-15.97	0.000%
27	0.03	-38.27	18.42	-0.03	38.27	-18.42	0.000%
28	-9.14	-38.27	15.94	9.14	38.27	-15.94	0.000%
29	-12.94	-38.27	13.00	12.94	38.27	-13.00	0.000%
30	-15.86	-38.27	9.18	15.86	38.27	-9.18	0.000%
31	-18.33	-38.27	-0.03	18.33	38.27	0.03	0.000%
32	-15.89	-38.27	-9.24	15.89	38.27	9.24	0.000%
33	-12.99	-38.27	-13.05	12.99	38.27	13.05	0.000%
34	-9.19	-38.27	-15.97	9.19	38.27	15.97	0.000%
35	-0.02	-30.96	-8.39	0.02	30.96	8.39	0.000%
36	4.16	-30.96	-7.26	-4.16	30.96	7.26	0.000%
37	5.89	-30.96	-5.92	-5.89	30.96	5.92	0.000%
38	7.22	-30.96	-4.18	-7.22	30.96	4.18	0.000%
39	8.34	-30.96	0.02	-8.34	30.96	-0.02	0.000%
40	7.23	-30.96	4.21	-7.23	30.96	-4.21	0.000%
41	5.91	-30.96	5.94	-5.91	30.96	-5.94	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
42	4.18	-30.96	7.27	-4.18	30.96	-7.27	0.000%
43	0.02	-30.96	8.39	-0.02	30.96	-8.39	0.000%
44	-4.16	-30.96	7.26	4.16	30.96	-7.26	0.000%
45	-5.89	-30.96	5.92	5.89	30.96	-5.92	0.000%
46	-7.22	-30.96	4.18	7.22	30.96	-4.18	0.000%
47	-8.34	-30.96	-0.02	8.34	30.96	0.02	0.000%
48	-7.23	-30.96	-4.21	7.23	30.96	4.21	0.000%
49	-5.91	-30.96	-5.94	5.91	30.96	5.94	0.000%
50	-4.18	-30.96	-7.27	4.18	30.96	7.27	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00022533
3	Yes	5	0.00000001	0.00012144
4	Yes	5	0.00000001	0.00013817
5	Yes	5	0.00000001	0.00011983
6	Yes	4	0.00000001	0.00028443
7	Yes	5	0.00000001	0.00012951
8	Yes	5	0.00000001	0.00014034
9	Yes	5	0.00000001	0.00011908
10	Yes	4	0.00000001	0.00018584
11	Yes	5	0.00000001	0.00012370
12	Yes	5	0.00000001	0.00013882
13	Yes	5	0.00000001	0.00012462
14	Yes	4	0.00000001	0.00024564
15	Yes	5	0.00000001	0.00011831
16	Yes	5	0.00000001	0.00014031
17	Yes	5	0.00000001	0.00012943
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00010091
20	Yes	5	0.00000001	0.00026909
21	Yes	5	0.00000001	0.00030498
22	Yes	5	0.00000001	0.00026747
23	Yes	5	0.00000001	0.00010075
24	Yes	5	0.00000001	0.00028001
25	Yes	5	0.00000001	0.00030836
26	Yes	5	0.00000001	0.00026696
27	Yes	5	0.00000001	0.00010074
28	Yes	5	0.00000001	0.00027213
29	Yes	5	0.00000001	0.00030577
30	Yes	5	0.00000001	0.00027308
31	Yes	5	0.00000001	0.00010055
32	Yes	5	0.00000001	0.00026672
33	Yes	5	0.00000001	0.00030891
34	Yes	5	0.00000001	0.00028047
35	Yes	4	0.00000001	0.00004692
36	Yes	4	0.00000001	0.00030869
37	Yes	4	0.00000001	0.00036028
38	Yes	4	0.00000001	0.00030074
39	Yes	4	0.00000001	0.00005815
40	Yes	4	0.00000001	0.00035383
41	Yes	4	0.00000001	0.00037311
42	Yes	4	0.00000001	0.00029564

43	Yes	4	0.00000001	0.00004420
44	Yes	4	0.00000001	0.00032223
45	Yes	4	0.00000001	0.00036526
46	Yes	4	0.00000001	0.00032836
47	Yes	4	0.00000001	0.00005533
48	Yes	4	0.00000001	0.00029235
49	Yes	4	0.00000001	0.00037256
50	Yes	4	0.00000001	0.00035222

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	138 - 87	26.323	43	1.5161	0.0056
L2	91 - 46	12.404	43	1.1972	0.0021
L3	50.75 - 0	4.079	43	0.7234	0.0008

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
143.00	20' 8 Bay Di-Pole	43	26.323	1.5161	0.0057	50773
142.00	PTP400	43	26.323	1.5161	0.0057	50773
140.00	4'6"x3" Pipe Mount	43	26.323	1.5161	0.0057	50773
138.00	APX16PV-16PVL-X	43	26.323	1.5161	0.0057	50773
125.00	742 213 w/mount pipe	43	22.264	1.4430	0.0046	19528
115.00	VHLP1-23	43	19.207	1.3820	0.0037	11037
110.00	DB-T1-6Z-8AB-0Z	43	17.716	1.3488	0.0033	9066
105.00	BXA-171085-12BF	43	16.258	1.3132	0.0030	7692
95.00	(4) DB844G65ZAXY	43	13.466	1.2331	0.0023	5903
83.00	PTP400	43	10.388	1.1178	0.0018	4779

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	138 - 87	67.164	10	3.8586	0.0143
L2	91 - 46	31.691	10	3.0575	0.0053
L3	50.75 - 0	10.429	10	1.8491	0.0022

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
143.00	20' 8 Bay Di-Pole	10	67.164	3.8586	0.0146	20206
142.00	PTP400	10	67.164	3.8586	0.0146	20206
140.00	4'6"x3" Pipe Mount	10	67.164	3.8586	0.0146	20206
138.00	APX16PV-16PVL-X	10	67.164	3.8586	0.0146	20206
125.00	742 213 w/mount pipe	10	56.824	3.6764	0.0117	7770
115.00	VHLP1-23	10	49.035	3.5240	0.0096	4390
110.00	DB-T1-6Z-8AB-0Z	10	45.236	3.4406	0.0086	3606
105.00	BXA-171085-12BF	10	41.521	3.3510	0.0076	3058
95.00	(4) DB844G65ZAXY	10	34.402	3.1487	0.0060	2346
83.00	PTP400	10	26.546	2.8559	0.0045	1891

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	138 - 87 (1)	TP31.652x24x0.1875	51.00	0.00	0.0	37.373	18.3681	-9.22	686.46	0.013
L2	87 - 46 (2)	TP37.428x30.6768x0.375	45.00	0.00	0.0	39.000	43.2541	-17.45	1686.91	0.010
L3	46 - 0 (3)	TP43.58x35.9654x0.4375	50.75	0.00	0.0	39.000	59.9088	-30.94	2336.44	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	138 - 87 (1)	TP31.652x24x0.1875	308.94	26.454	37.373	0.708	0.00	0.000	37.373	0.000
L2	87 - 46 (2)	TP37.428x30.6768x0.375	960.17	29.778	39.000	0.764	0.00	0.000	39.000	0.000
L3	46 - 0 (3)	TP43.58x35.9654x0.4375	1965.55	37.066	39.000	0.950	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	138 - 87 (1)	TP31.652x24x0.1875	14.13	0.769	26.000	0.059	0.78	0.033	26.000	0.001
L2	87 - 46 (2)	TP37.428x30.6768x0.375	18.01	0.416	26.000	0.032	0.81	0.012	26.000	0.000
L3	46 - 0 (3)	TP43.58x35.9654x0.4375	21.50	0.359	26.000	0.028	0.84	0.008	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	138 - 87 (1)	0.013	0.708	0.000	0.059	0.001	0.722 ✓	1.333	H1-3+VT ✓
L2	87 - 46 (2)	0.010	0.764	0.000	0.032	0.000	0.774 ✓	1.333	H1-3+VT ✓
L3	46 - 0 (3)	0.013	0.950	0.000	0.028	0.000	0.964 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	138 - 87	Pole	TP31.652x24x0.1875	1	-9.22	915.06	54.2	Pass
L2	87 - 46	Pole	TP37.428x30.6768x0.375	2	-17.45	2248.65	58.1	Pass
L3	46 - 0	Pole	TP43.58x35.9654x0.4375	3	-30.94	3114.47	72.3	Pass
							Summary	
						Pole (L3)	72.3	Pass
						RATING =	**72.3**	**Pass**

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Subject:		Anchor Bolt and Baseplate Analysis
Location:		138-ft Summit Monopole Bloomfield, CT
Rev. 1: 1/17/13		Prepared by: T.J.L. Checked by: C.F.C. Job No. 12124.CO25

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 1966·ft·kips	(Input From RisaTower)
Shear Force =	Shear := 21·kips	(Input From RisaTower)
Axial Force =	Axial := 31·kips	(Input From RisaTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	N := 16	(User Input)
Bolt "Column" Distance =	l := 3.0·in	(User Input)
Bolt Ultimate Strength =	F_u := 100·ksi	(User Input)
Bolt Yield Strength =	F_y := 75·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25·in	(User Input)
Threads per Inch =	n := 4.5	(User Input)

Base Plate Data:

Use ASTM A572 Gr. 55

Plate Yield Strength =	Fy_{bp} := 55·ksi	(User Input)
Base Plate Thickness =	t_{bp} := 3.0·in	(User Input)

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Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 24.875in$ (User Input)

$d_2 := 23.375in$ (User Input)

$d_3 := 8.875in$ (User Input)

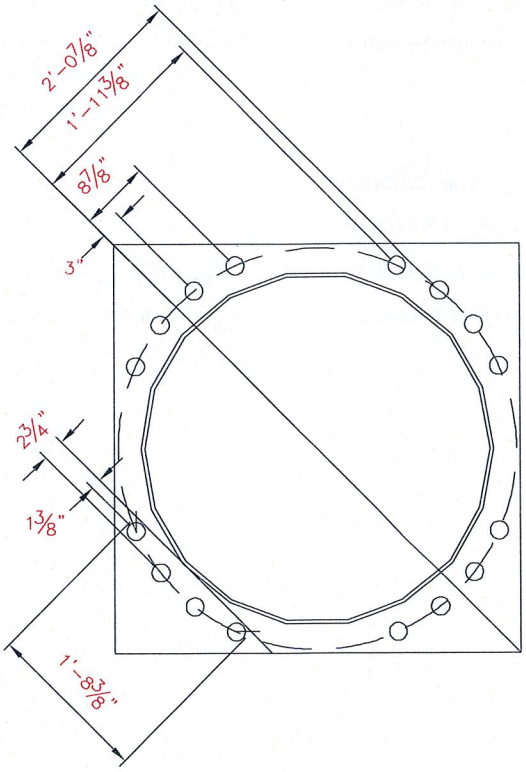
$d_4 := 3.0in$ (User Input)

Critical Distances For Bending in Plate:

$ma_1 := 2.75in$ (User Input)

$ma_2 := 1.375in$ (User Input)

Effective Width of Baseplate for Bending = $B_{eff} := 20.375in$ (User Input)



ANCHOR BOLT AND PLATE GEOMETRY

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Subject: Anchor Bolt and Baseplate Analysis

Location: 138-ft Summit Monopole, Bloomfield, CT

Rev. 1: 1/17/13

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 12124.CO25

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 4 \right] = 5012 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N} = 115.2 \cdot kips$

Allowable Tensile Force (Gross Area) = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u \right) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Allowable Tensile Force (Net Area) = $T_{ALL.Net} := 1.333 \cdot \left(0.60 \cdot A_n \cdot F_y \right) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 59.1 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed" \right)$

Condition1 = "OK" Note Shear stress is negligible

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N} \right) \cdot l = 0.328 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 4.8 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot ksi$$

Check Anchor Bolt Compression/Combined Stress:

Applied Compressive Force =

$$C_{Max} := OM \cdot \frac{d_1}{I_p} + \frac{Axial}{N} = 119 \cdot kips$$

Applied Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 36.7 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^2}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} = 45 \cdot ksi$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 61.1 \cdot \%$$

Condition 2 =

$$Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, "OK", "Overstressed"\right)$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial}{N} = 119.034 \cdot kips$

$C_2 := \frac{OM \cdot d_2}{I_p} + \frac{Axial}{N} = 111.973 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{6 \cdot \left(2C_1 \cdot ma_1 + 2C_2 \cdot ma_2\right)}{B_{eff} \, t_{bp}^{\,2}} = 31.5 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 54.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 57.4 \cdot \%$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

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Subject: CAISSON FOUNDATION

Location: 138-ft Summit Monopole
Bloomfield, CT

Rev. 1: 1/17/13

Prepared by: T.J.L.. Checked by: C.F.C.
Job No. 12124.CO25

Caisson Foundation:

Input Data:

Shear Force = $S := 21k$ *USER INPUT-FROM RISATower*

Overturning Moment = $M := 1966ft \cdot k$ *USER INPUT-FROM RISATower*

Applied Axial Load = $A1 := 31k$ *USER INPUT-FROM RISATower*

Bending Moment = $Mu := 2152ft \cdot k$ *USER INPUT--FROM LPILE*

Moment Capacity = $Mn := 4619ft \cdot k$ *USER INPUT--FROM LPILE*

Foundation Diameter = $d := 6.0ft$ *USER INPUT*

Overall Length of Caisson = $L_c := 45.5ft$ *USER INPUT*

Depth From Top of Caisson to Grade = $L_{pag} := 0.5ft$ *USER INPUT*

Number of Rebar = $n := 20$ *USER INPUT*

Area of Rebar = $Ar := 1.560in^2$ *USER INPUT*

Rebar Yield Strength = $fy := 60ksi$ *USER INPUT*

Concrete Comp Strength = $f'c := 3ksi$ *USER INPUT*

Check Foundation Depth:

Depth of Caisson Below Ground Level = $LD := L_c - L_{pag} = 45ft$ (TIA/EIA-222-F 7.2.5)

Depth Required = $LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d}\right) + 2ft \cdot .5\left(\frac{M \cdot ft}{3 \cdot k \cdot d} + \frac{S \cdot ft}{2k} + \frac{S^2 ft^3}{18k^2 d^2}\right)^{.5} = 25.11ft$

$DepthCheck := if(LD1 \le LD, "OK", "NO\ GOOD")$

DepthCheck = "OK"

Check Moment Capacity:

Factor of Safety = $FS := \frac{Mn}{Mu} = 2.15$

Factor of Safety Required = $FS_{reqd} := 1.3$

$FOSCheck := if(FS \ge FS_{reqd}, "OK", "NO\ GOOD")$

FOSCheck = "OK"

Check Axial Capacity:

Concrete Weight = $A2 := .150\frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4} = 190.9 \cdot kips$

Total Axial Load = $AT := A1 + A2 = 221.9 \cdot kips$

Area of Concrete = $Ag := \pi \cdot \frac{d^2}{4} = 28.27ft^2$

Axial Capacity = $Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot f'c = 12174.8 \cdot kips$

$AxialCheck := if(AT \le Po, "OK", "NO\ GOOD")$

AxialCheck = "OK"

LPILE Plus for Windows, Version 5.0 (5.0.39)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

TJL
Centek Engineering Inc

Path to file locations: J:\Jobs\1212400.WI\CO25- Bloomfield 3\Rev (1)\Calcs\MathCad\Foundation\
Name of input data file: Bloomfield Caisson Analysis.lpd
Name of output file: Bloomfield Caisson Analysis.lpo
Name of plot output file: Bloomfield Caisson Analysis.lpp
Name of runtime file: Bloomfield Caisson Analysis.lpr

Time and Date of Analysis

Date: January 17, 2013 Time: 12:39:57

Problem Title

12124.CO25 - Bloomfield 3

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 8

Pile Structural Properties and Geometry

Pile Length = 546.00 in

Depth of ground surface below top of pile = 66.00 in

Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in

1	0.0000	72.00000000	1319167.	4071.0000	3122019.
2	546.0000	72.00000000	1319167.	4071.0000	3122019.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 2 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 66.000 in
Distance from top of pile to bottom of layer = 126.000 in
p-y subgrade modulus k for top of soil layer = 60.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 60.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 126.000 in
Distance from top of pile to bottom of layer = 900.000 in
p-y subgrade modulus k for top of soil layer = 60.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 60.000 lbs/in**3

(Depth of lowest layer extends 354.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 4 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	66.00	.03300
2	126.00	.03300
3	126.00	.03900
4	900.00	.03900

Shear Strength of Soils

Shear strength parameters with depth defined using 4 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	66.000	.00000	30.00	------	------
2	126.000	.00000	30.00	------	------
3	126.000	.00000	22.00	------	------
4	900.000	.00000	22.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 21000.000 lbs
Bending moment at pile head = 23592000.000 in-lbs
Axial load at pile head = 31000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 72.0000 in

Material Properties:

Compressive Strength of Concrete = 3.000 kip/in**2
Yield Stress of Reinforcement = 60. kip/in**2
Modulus of Elasticity of Reinforcement = 29000. kip/in**2
Number of Reinforcing Bars = 20
Area of Single Bar = 1.56000 in**2
Number of Rows of Reinforcing Bars = 11
Area of Steel = 31.200 in**2
Area of Shaft = 4071.504 in**2
Percentage of Steel Reinforcement = .766 percent
Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 12174.78 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	32.000
2	3.120	30.434
3	3.120	25.889
4	3.120	18.809
5	3.120	9.889
6	3.120	0.000
7	3.120	-9.889
8	3.120	-18.809
9	3.120	-25.889
10	3.120	-30.434
11	1.560	-32.000

Axial Thrust Force = 31000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
3834961.	4.601954E+12	8.333333E-07	.00003239	38.86304462	99.43283619	842.52358
7626453.	4.575872E+12	.00000167	.00006250	37.50063050	190.01361	1619.19714
11374794.	4.549918E+12	.00000250	.00009266	37.06297767	279.01113	2397.06588
15078929.	4.523679E+12	.00000333	.00012277	36.83172405	366.17742	3173.73332
15078929.	3.618943E+12	.00000417	.00008247	19.79315436	245.64345	5824.99385
15078929.	3.015786E+12	.00000500	.00009730	19.46080077	288.35345	7038.18389
15078929.	2.584959E+12	.00000583	.00011216	19.22699583	330.72546	8250.76654
15078929.	2.261839E+12	.00000667	.00012725	19.08778059	373.39787	9456.36242
15078929.	2.010524E+12	.00000750	.00014210	18.94725430	414.95910	10668.97219
15078929.	1.809471E+12	.00000833	.00015698	18.83756053	456.18456	11880.92287
15078929.	1.644974E+12	.00000917	.00017188	18.75031149	497.07289	13092.20886
15078929.	1.507893E+12	.00001000	.00018680	18.67991316	537.62264	14302.82518
15078929.	1.391901E+12	.00001083	.00020174	18.62249672	577.83247	15512.76561
15078929.	1.292480E+12	.00001167	.00021671	18.57529628	617.70092	16722.02476
15078929.	1.206314E+12	.00001250	.00023170	18.53628623	657.22661	17930.59624
15078929.	1.130920E+12	.00001333	.00024672	18.50394309	696.40796	19138.47534
15078929.	1.064395E+12	.00001417	.00026176	18.47710598	735.24354	20345.65563
15078929.	1.005262E+12	.00001500	.00027682	18.45487154	773.73188	21552.13088
15658919.	9.889843E+11	.00001583	.00029191	18.43652737	811.87149	22757.89452
16441400.	9.864840E+11	.00001667	.00030703	18.42150056	849.66075	23962.94139
17222751.	9.841572E+11	.00001750	.00032216	18.40932977	887.09811	25167.26514
18002966.	9.819800E+11	.00001833	.00033733	18.39964163	924.18217	26370.85720

18782033.	9.799322E+11	.00001917	.00035252	18.39211857	960.91108	27573.71409
19559945.	9.779972E+11	.00002000	.00036773	18.38650310	997.28332	28775.82820
20336696.	9.761614E+11	.00002083	.00038297	18.38258064	1033.29740	29977.19086
21112274.	9.744126E+11	.00002167	.00039824	18.38016236	1068.95144	31177.79798
21886671.	9.727409E+11	.00002250	.00041353	18.37909377	1104.24387	32377.64132
22659881.	9.711378E+11	.00002333	.00042885	18.37924182	1139.17304	33576.71303
23431892.	9.695955E+11	.00002417	.00044420	18.38048851	1173.73710	34775.00763
24202698.	9.681079E+11	.00002500	.00045957	18.38273728	1207.93449	35972.51547
24972287.	9.666692E+11	.00002583	.00047497	18.38589799	1241.76324	37169.23142
25740649.	9.652743E+11	.00002667	.00049040	18.38989556	1275.22161	38365.14743
26507776.	9.639191E+11	.00002750	.00050585	18.39466345	1308.30776	39560.25590
27273661.	9.625998E+11	.00002833	.00052134	18.40014589	1341.02002	40754.54680
28038289.	9.613127E+11	.00002917	.00053685	18.40628707	1373.35626	41948.01552
28801653.	9.600551E+11	.00003000	.00055239	18.41304410	1405.31475	43140.65164
29563744.	9.588241E+11	.00003083	.00056796	18.42037618	1436.89358	44332.44696
30324551.	9.576174E+11	.00003167	.00058356	18.42824686	1468.09075	45523.39330
31084061.	9.564326E+11	.00003250	.00059919	18.43662179	1498.90417	46713.48397
32599152.	9.541215E+11	.00003417	.00063054	18.45477712	1559.37201	49091.05834
34108936.	9.518773E+11	.00003583	.00066201	18.47464693	1618.28082	51465.09607
35613316.	9.496884E+11	.00003750	.00069360	18.49606812	1675.61345	53835.52592
37112203.	9.475456E+11	.00003917	.00072532	18.51891196	1731.35252	56202.26917
38605497.	9.454408E+11	.00004083	.00075718	18.54307115	1785.47997	58565.24658
40021172.	9.416746E+11	.00004250	.00078865	18.55642426	1837.12578	60000.00000
41113834.	9.308793E+11	.00004417	.00081792	18.51905143	1883.43452	60000.00000
42048726.	9.174267E+11	.00004583	.00084616	18.46165001	1926.56575	60000.00000
42980151.	9.048453E+11	.00004750	.00087449	18.41022027	1968.39335	60000.00000
43608146.	8.869453E+11	.00004917	.00090041	18.31349123	2005.28276	60000.00000
44217893.	8.698602E+11	.00005083	.00092628	18.22191846	2040.87877	60000.00000
44825201.	8.538134E+11	.00005250	.00095222	18.13751900	2075.36904	60000.00000
45430053.	8.387087E+11	.00005417	.00097823	18.05965340	2108.74482	60000.00000
45924377.	8.225262E+11	.00005583	.00100500	17.99999893	2141.85861	60000.00000
46464285.	8.080745E+11	.00005750	.00103148	17.93878233	2173.33163	60000.00000
46816779.	7.912695E+11	.00005917	.00105474	17.82653511	2199.78997	60000.00000
47167677.	7.753591E+11	.00006083	.00107805	17.72138822	2225.34985	60000.00000
47516957.	7.602713E+11	.00006250	.00110142	17.62278378	2250.00441	60000.00000
47864605.	7.459419E+11	.00006417	.00112486	17.53022397	2273.74685	60000.00000
48210592.	7.323128E+11	.00006583	.00114835	17.44325817	2296.56995	60000.00000
48554915.	7.193321E+11	.00006750	.00117190	17.36148727	2318.46687	60000.00000
48897546.	7.069525E+11	.00006917	.00119551	17.28454435	2339.43013	60000.00000
49238461.	6.951312E+11	.00007083	.00121919	17.21209896	2359.45229	60000.00000
49532433.	6.832060E+11	.00007250	.00124226	17.13459384	2377.97716	60000.00000
49711586.	6.702686E+11	.00007417	.00126369	17.03858364	2394.28833	60000.00000
49889577.	6.578845E+11	.00007583	.00128518	16.94743788	2409.82327	60000.00000
50066388.	6.460179E+11	.00007750	.00130672	16.86084759	2424.57640	60000.00000
50320848.	6.356318E+11	.00007917	.00133000	16.80000007	2439.65845	60000.00000
50450828.	6.241340E+11	.00008083	.00135507	16.76372588	2454.86274	60000.00000
50619217.	6.135663E+11	.00008250	.00137610	16.68004739	2466.66076	60000.00000
50786506.	6.034040E+11	.00008417	.00139719	16.60028279	2477.70480	60000.00000
50952685.	5.936235E+11	.00008583	.00141833	16.52421105	2487.98925	60000.00000
51117727.	5.842026E+11	.00008750	.00143952	16.45162404	2497.50821	60000.00000
51281637.	5.751212E+11	.00008917	.00146076	16.38233721	2506.25604	60000.00000
51444405.	5.663604E+11	.00009083	.00148205	16.31617677	2514.22682	60000.00000
51606001.	5.579027E+11	.00009250	.00150340	16.25297534	2521.41434	60000.00000
51766427.	5.497320E+11	.00009417	.00152480	16.19258702	2527.81258	60000.00000
51925672.	5.418331E+11	.00009583	.00154626	16.13487232	2533.41526	60000.00000
52083712.	5.341919E+11	.00009750	.00156777	16.07969820	2538.21592	60000.00000
52240536.	5.267953E+11	.00009917	.00158934	16.02694452	2542.20808	60000.00000
52550499.	5.126878E+11	.00010250	.00163265	15.92825854	2547.74022	60000.00000
52713270.	4.980781E+11	.00010583	.00167245	15.80270112	2549.89487	60000.00000
52844855.	4.840750E+11	.00010917	.00171178	15.68040955	2545.27744	60000.00000
52844855.	4.697320E+11	.00011250	.00175500	15.59999907	2545.65388	60000.00000
53140253.	4.587648E+11	.00011583	.00179977	15.53761089	2549.23330	60000.00000
53256429.	4.469071E+11	.00011917	.00183811	15.42469418	2549.25367	60000.00000
53369842.	4.356722E+11	.00012250	.00187672	15.32013953	2543.53406	60000.00000
53481968.	4.250223E+11	.00012583	.00191548	15.22237837	2543.56139	60000.00000
53592769.	4.149118E+11	.00012917	.00195441	15.13090861	2547.32547	60000.00000
53702224.	4.052998E+11	.00013250	.00199350	15.04528391	2549.46972	60000.00000
53809987.	3.961471E+11	.00013583	.00203279	14.96530259	2548.95942	60000.00000
53915416.	3.874162E+11	.00013917	.00207233	14.89098608	2543.77756	60000.00000
54019899.	3.790870E+11	.00014250	.00211200	14.82106197	2539.10430	60000.00000
54123419.	3.711320E+11	.00014583	.00215181	14.75524700	2543.76925	60000.00000
54225967.	3.635260E+11	.00014917	.00219175	14.69328582	2547.15341	60000.00000
54327508.	3.562460E+11	.00015250	.00223183	14.63494027	2549.23631	60000.00000
54428024.	3.492707E+11	.00015583	.00227205	14.57999790	2549.99691	60000.00000
54526284.	3.425735E+11	.00015917	.00231254	14.52905953	2545.66966	60000.00000
54623800.	3.361465E+11	.00016250	.00235315	14.48091280	2541.00272	60000.00000
54720664.	3.299739E+11	.00016583	.00239386	14.43533456	2536.31738	60000.00000
54853459.	3.242569E+11	.00016917	.00243600	14.40000021	2540.87810	60000.00000
55142332.	3.196657E+11	.00017250	.00248400	14.40000021	2545.65390	60000.00000
55423428.	3.152043E+11	.00017583	.00253200	14.40000021	2548.67933	60000.00000
55423428.	3.093401E+11	.00017917	.00257323	14.36223686	2549.81969	60000.00000
55423428.	3.036900E+11	.00018250	.00260859	14.29366028	2549.34425	60000.00000
55423428.	2.982427E+11	.00018583	.00264414	14.22853625	2546.26703	60000.00000
55423428.	2.929873E+11	.00018917	.00267972	14.16594207	2543.18203	60000.00000
55423428.	2.879139E+11	.00019250	.00271536	14.10575116	2540.08907	60000.00000
55423428.	2.830132E+11	.00019583	.00275104	14.04784119	2536.98815	60000.00000
55423428.	2.782766E+11	.00019917	.00278676	13.99209845	2533.87923	60000.00000
55423428.	2.736959E+11	.00020250	.00282253	13.93841994	2532.71500	60000.00000

55423428.	2.692636E+11	.00020583	.00285835	13.88670266	2536.11186	60000.00000
55423428.	2.649726E+11	.00020917	.00289421	13.83686078	2539.14723	60000.00000
55423428.	2.608161E+11	.00021250	.00293078	13.79189193	2541.93384	60000.00000
55423428.	2.567881E+11	.00021583	.00296807	13.75169313	2544.41582	60000.00000
55423428.	2.528826E+11	.00021917	.00300543	13.71299207	2546.44981	60000.00000
55423428.	2.490941E+11	.00022250	.00304285	13.67572653	2548.03051	60000.00000
55423428.	2.454174E+11	.00022583	.00308033	13.63983643	2549.15244	60000.00000
55423428.	2.418477E+11	.00022917	.00311787	13.60526597	2549.81001	60000.00000
55432189.	2.384180E+11	.00023250	.00315550	13.57204092	2549.71146	60000.00000
55462860.	2.319005E+11	.00023917	.00323121	13.51028574	2544.14923	60000.00000
55493235.	2.257352E+11	.00024583	.00330706	13.45244443	2538.56265	60000.00000
55523319.	2.198943E+11	.00025250	.00338305	13.39821875	2532.95122	60000.00000
55553111.	2.143528E+11	.00025917	.00345919	13.34734046	2527.31444	60000.00000
55582592.	2.090881E+11	.00026583	.00353547	13.29956496	2525.91272	60000.00000
55595367.	2.040197E+11	.00027250	.00361570	13.26860583	2533.77811	60000.00000
55599228.	1.991614E+11	.00027917	.00369811	13.24694860	2540.51793	60000.00000
55602365.	1.945272E+11	.00028583	.00378082	13.22735345	2545.49892	60000.00000
55604741.	1.901017E+11	.00029250	.00386384	13.20971954	2548.66805	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 55423.42750 in-kip

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Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 21000.000 lbs
Specified moment at pile head = 23592000.000 in-lbs
Specified axial load at pile head = 31000.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in	Es*h F/L
0.000	1.182	2.36E+07	21000.	-.007739	651.439	9.69E+11	0.000	0.000
43.680	.867531	2.45E+07	21000.	-.006654	676.738	9.68E+11	0.000	0.000
87.360	.601357	2.54E+07	18172.	-.005526	701.480	9.66E+11	-265.961	2414.785
131.040	.385322	2.58E+07	-4447.558	-.004363	711.804	9.65E+11	-566.782	8031.284
174.720	.220095	2.50E+07	-33415.	-.003209	690.093	9.67E+11	-728.515	18073.
218.400	.103998	2.29E+07	-65146.	-.002124	631.306	9.71E+11	-696.452	36564.
262.080	.032601	1.94E+07	-90923.	-.001173	537.168	9.78E+11	-414.268	69382.
305.760	-.001081	1.52E+07	-98554.	-.000430	422.328	2.80E+12	16.572	83692.
349.440	-.016732	1.10E+07	-92569.	-.000299	307.562	4.55E+12	211.683	69075.
393.120	-.027760	7.18E+06	-81113.	-.000212	203.625	4.58E+12	307.991	60578.
436.800	-.035771	3.96E+06	-65536.	-.000160	115.730	4.60E+12	417.424	63714.
480.480	-.042110	1.54E+06	-44301.	-.000134	49.644	4.60E+12	557.390	72271.
524.160	-.047775	1.85E+05	-16575.	-.000127	12.659	4.60E+12	715.601	81784.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.18205749 in
Computed slope at pile head = -.00773945
Maximum bending moment = 25819058. lbs-in
Maximum shear force = -98554.46288 lbs
Depth of maximum bending moment = 125.58000 in
Depth of maximum shear force = 305.76000 in
Number of iterations = 36
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in

Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 21000.	M= 2.36E+07	31000.0000	1.1821	2.5819E+07	-98554.4629

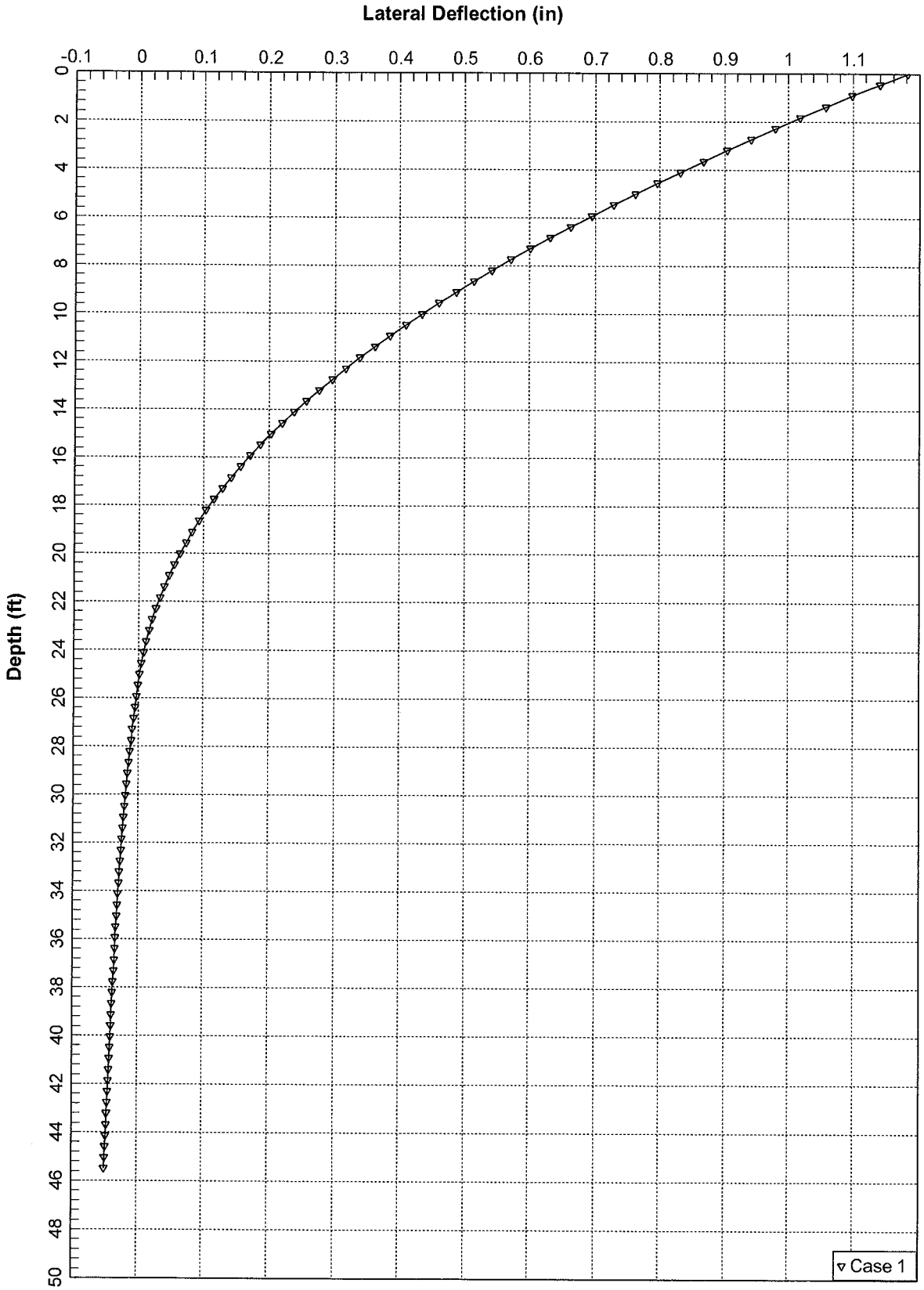
Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

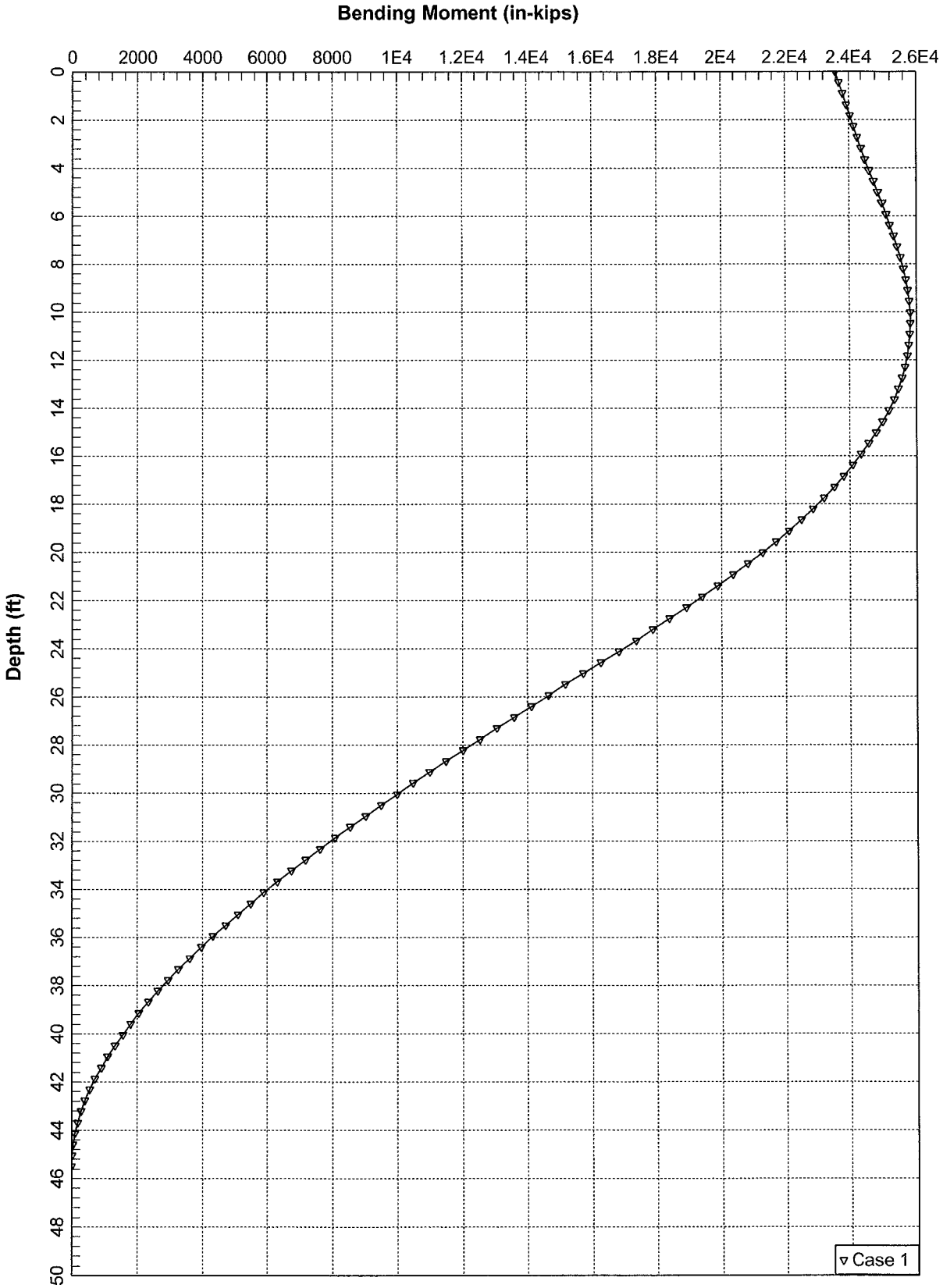
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
.00218548	2100.00003	358530.73992	960889.47808	1.640516E+08
.00657894	6321.62991	1079285.	960889.47808	1.640516E+08
.01042737	10019.54635	1710626.	960889.47808	1.640516E+08
.01315787	12643.25982	2158570.	960889.47808	1.640516E+08
.01527582	14678.37009	2506022.	960889.47808	1.640516E+08
.01700630	16341.17626	2789911.	960889.47808	1.640516E+08
.01846941	17747.05884	3029936.	960889.47808	1.640516E+08
.01973681	18964.88973	3237855.	960889.47808	1.640516E+08
.02085473	20039.09270	3421253.	960889.47808	1.640516E+08
.02185475	21000.00000	3585307.	960889.47808	1.640516E+08

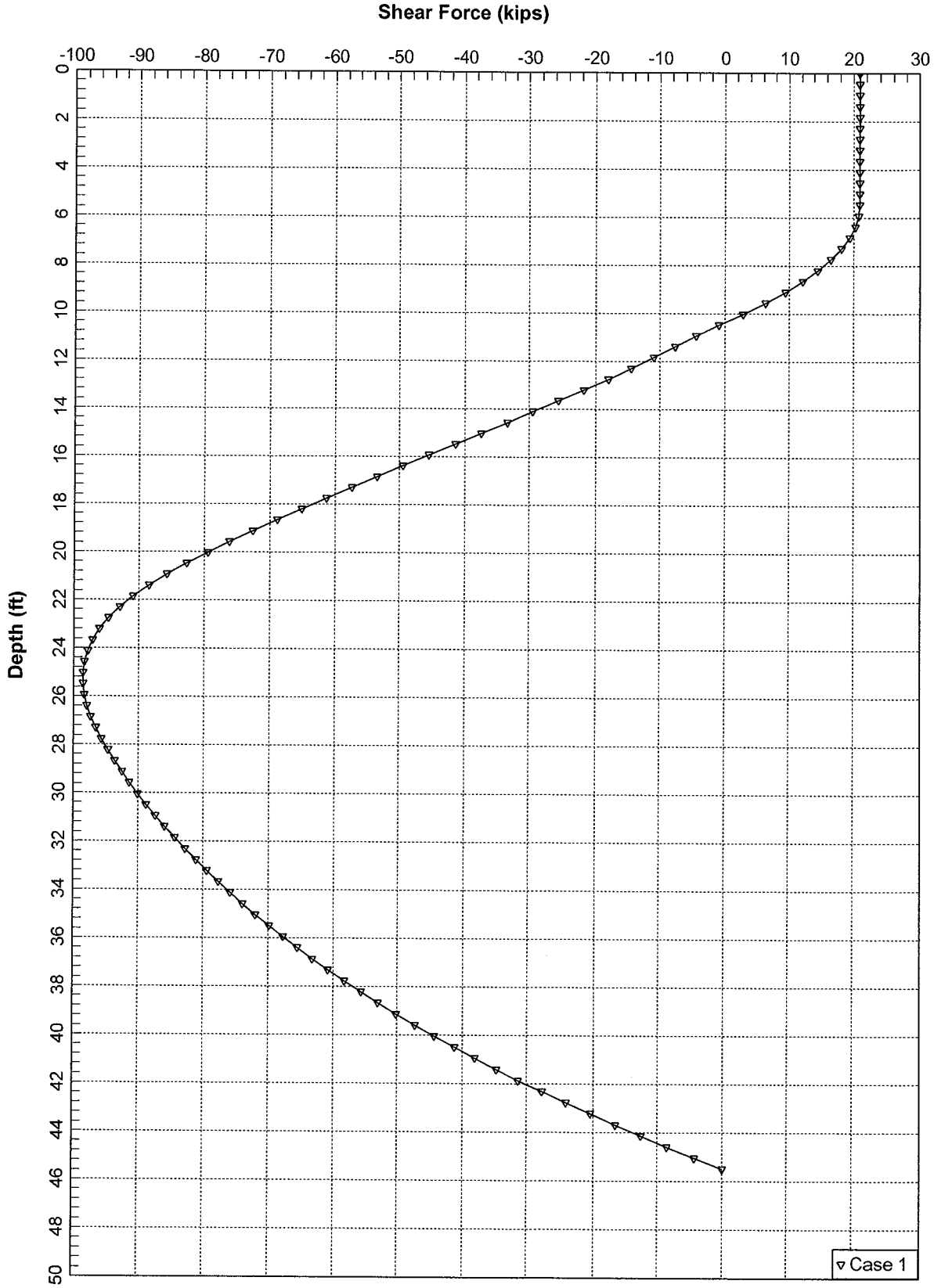
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
.00005615	9212.15352	2359200.	1.640516E+08	4.201304E+10
.00016945	27737.38161	7101900.	1.636933E+08	4.191214E+10
.00026969	43974.74932	11256245.	1.630550E+08	4.173729E+10
.00034211	55478.89288	14203799.	1.621668E+08	4.151823E+10
.00041390	64431.41794	16490100.	1.556677E+08	3.984045E+10
.00091774	74630.01379	18358144.	81319393.	2.000366E+10
.00116273	83862.15270	19937553.	72125518.	1.714726E+10
.00134718	91999.63452	21305699.	68290560.	1.581504E+10
.00148058	98660.14855	22512489.	66635966.	1.520514E+10
.00160365	104814.75435	23592000.	65359963.	1.471140E+10

K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.


Lateral Deflection (in)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
Case 1


Bending Moment (in-kips)
0
2000
4000
6000
8000
1E4
1.2E4
1.4E4
1.6E4
1.8E4
2E4
2.2E4
2.4E4
2.6E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
Case 1


Shear Force (kips)
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
Case 1

SITE NAME	BLOOMFIELD 3 CT	ECP - CELL #	8	96
LATITUDE		LONGITUDE		
Additional Comments: LTE AWS. Add 1 fiber line (8 pair hybrid), 3 RRH's, 1 Main Distribution Box. 12 antennas, 13 lines.		SAVE BUTTON		
		STRUCTURE TYPE	MONOPOLE ON ROOF	

AWS - LTE ANTENNA ADD	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	2100 MHz eNodeB	2100 MHz eNodeB	2100 MHz eNodeB
ANTENNA TYPE	BXA-171085-8BF-EDIN-0	BXA-171063-8BF-EDIN-0	BXA-171085-8BF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	105	105	105
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 MHz eNodeB	700 MHz eNodeB	700 MHz eNodeB
ANTENNA TYPE	BXA-70063-6CF-EDIN-2	SLCP 2X6014	SLCP 2X6014
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	4	2
RAD CTR (FT AGL)	105	105	105
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

700 Mhz - LTE Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz eNodeB	700 MHz eNodeB	700 MHz eNodeB
ANTENNA TYPE	BXA-70063-6CF-EDIN-2	SLCP 2X6014	SLCP 2X6014
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	4	2
RAD CTR (FT AGL)	105	105	105
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0B	Cellular Modcell 4.0B	Cellular Modcell 4.0B
ANTENNA TYPE	LPA-80080-6CF-EDIN-2	LPA-80063-4CF-EDIN-0	LPA-80080-4CF-EDIN-0
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	105	105	105
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2	2	2

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0B	Cellular Modcell 4.0B	Cellular Modcell 4.0B
ANTENNA TYPE	BXA-80080-6CF-EDIN-2	BXA-80063-4BF-EDIN-0	BXA-80080-4CF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	105	105	105
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2	2	2
DIPLEX WITH LTE CABLE			

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0B	PCS Modcell 4.0B	PCS Modcell 4.0B
ANTENNA TYPE	BXA-171085-12BF-EDIN-0	BXA-171063-12BF-EDIN-0	BXA-171085-12BF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	105	105	105
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0B	PCS Modcell 4.0B	PCS Modcell 4.0B
ANTENNA TYPE	BXA-171085-12BF-EDIN-0	BXA-171063-12BF-EDIN-0	BXA-171085-12BF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	105	105	105
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	DIPLEX WITH CELLULAR CABL	DIPLEX WITH CELLULAR CABLE	DIPLEX WITH CELLULAR CABLE

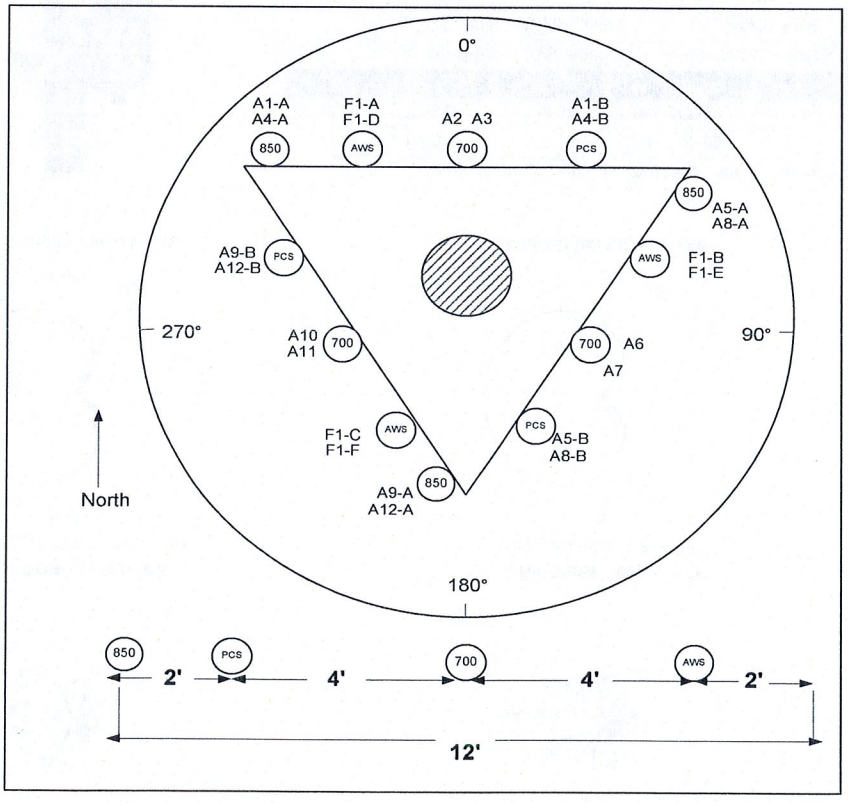
NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE		TOTAL # OF MAINLINES			12	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			24	TOP JUMPER (FT)			
		MAIN CABLE #	12	+	0	TOP JUMPER #	18	+	6
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES			1	FIBER LINE MODEL #			HB158-1-08U8-S8J18
JUMPER SIZE	1 1/4"	TOTAL # OF TOP JUMPERS			3	TOP JUMPER MODEL #			HB114-1-08U4-S4J18
Fiber Cable Ordering		FIBER CABLE #	0	+	1	TOP JUMPER #	0	+	3

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F / AWS-Band	700 Mhz C - Block	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-2155	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-1755	RX - 776-787	700 Mhz / 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: Jay Latorre	Robert Hesselbach	JL	1/17/2013

Site Configuration



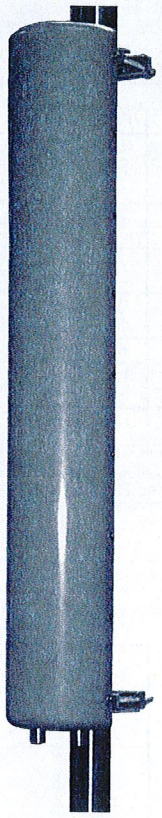
BXA-171085-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

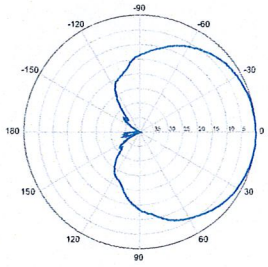
X-Pol | FET Panel | 85° | 16.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	88°	85°	80°
Vertical beamwidth	7°	7°	7°
Gain	13.5 dBd / 15.6 dBi	13.9 dBd / 16.0 dBi	14.3 dBd / 16.4 dBi
Electrical downtilt (X)	0, 2, 4		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in	
Depth with t-brackets	133 mm	5.2 in	
Weight without mounting brackets	4.8 kg	10.5 lbs	
Survival wind speed	296 km/hr	184 mph	
Wind area	Front: 0.19 m^2 Side: 0.14 m^2	Front: 2.0 ft^2 Side: 1.5 ft^2	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 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-171085-8BF-EDIN-X-FP		

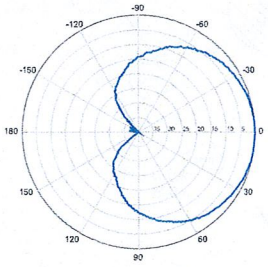


BXA-171085-8BF-EDIN-X



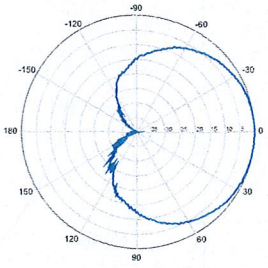
Horizontal | 1710-1880 MHz

BXA-171085-8BF-EDIN-X



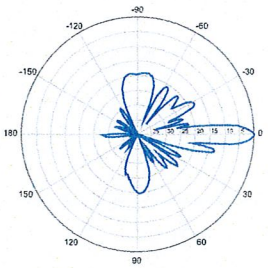
Horizontal | 1850-1990 MHz

BXA-171085-8BF-EDIN-X



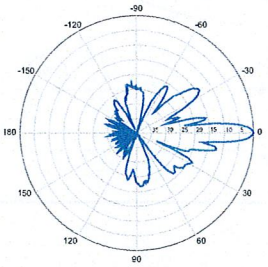
Horizontal | 1920-2170 MHz

BXA-171085-8BF-EDIN-0



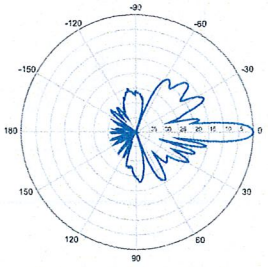
0° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171085-8BF-EDIN-0



0° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-X

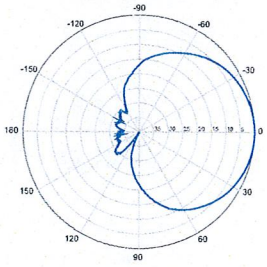
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 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	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1232 x 154 x 105 mm		48.5 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.8 kg		10.5 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²		Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N		Front: 63 lbf Side: 50 lbf

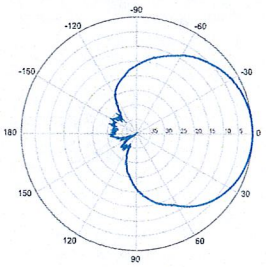
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

BXA-171063-8BF-EDIN-X



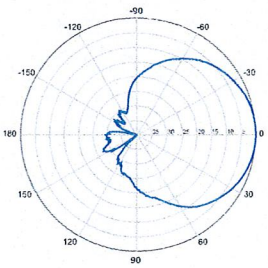
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



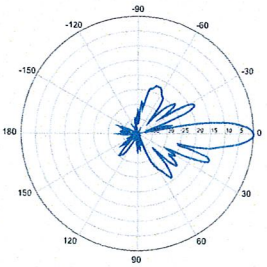
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



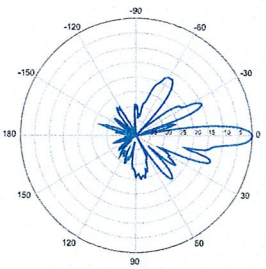
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



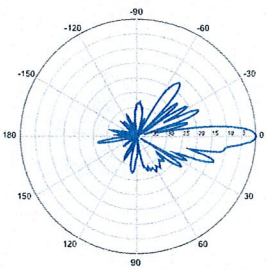
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1920-2170 MHz

Amphenol ANTENNA SOLUTIONS

BXA-80080-6CF-EDIN-X

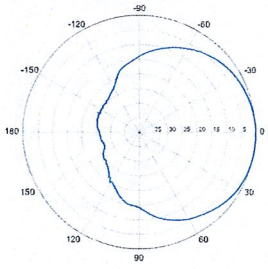
X-Pol | FET Panel | 80° | 13.5 dBd

Replace "X" with desired electrical downtilt

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

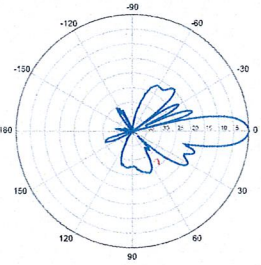
Electrical Characteristics				
Frequency bands	806-900 MHz*			
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)			
Polarization	±45°			
Horizontal beamwidth	80°			
Vertical beamwidth	10°			
Gain	13.5 dBd (15.6 dBi)			
Electrical downtilt (X)	0, 2, 4, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.4:1			
Upper sidelobe suppression (0°)	-18.6 dB			
Front-to-back ratio (+/-30°)	-25.6 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	1804 x 204 x 151 mm		71.0 x 8.0 x 5.9 in	
Depth with z-brackets	191 mm		7.5 in	
Weight without mounting brackets	8.2 kg		18 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.37 m^2	Side: 0.27 m^2	Front: 3.9 ft^2	Side: 2.9 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 531 N	Side: 475 N	Front: 119 lbf	Side: 104 lbf
Mounting Options	**Part Number**	**Fits Pipe Diameter**		**Weight**
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-80080-6CF-EDIN-X-FP			

BXA-80080-6CF-EDIN-X



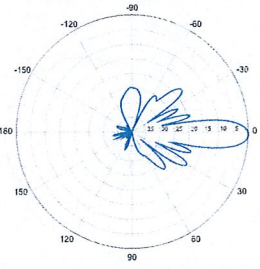
Horizontal

BXA-80080-6CF-EDIN-0



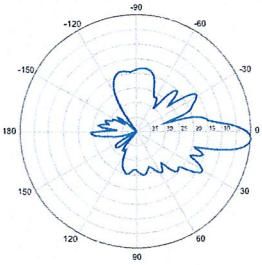
0° | Vertical

BXA-80080-6CF-EDIN-2



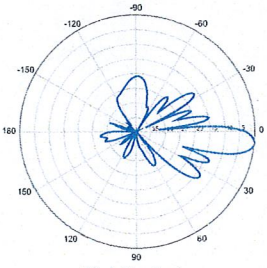
2° | Vertical

BXA-80080-6CF-EDIN-4



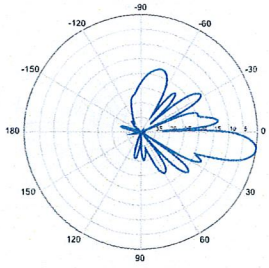
4° | Vertical

BXA-80080-6CF-EDIN-6



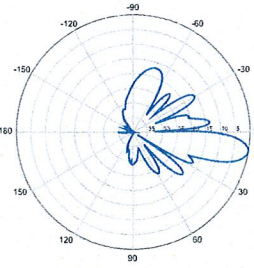
6° | Vertical

BXA-80080-6CF-EDIN-8



8° | Vertical

BXA-80080-6CF-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.

Amphenol ANTENNA SOLUTIONS

BXA-80063-4BF-EDIN-X

X-Pol | FET Panel | 63° | 13.0 dBd

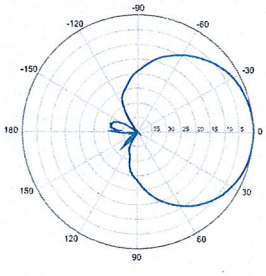
Replace "X" with desired electrical downtilt.

Antenna is also available with N connector(s). Replace "EDIN" with "N" 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 N connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or N / Female / Bottom	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1134 x 285 x 135 mm	44.6 x 11.2 x 5.3 in
Depth with z-brackets	175 mm	6.9 in
Weight without mounting brackets	5.7 kg	12.6 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.32 m^2 Side: 0.15 m^2	Front: 3.5 ft^2 Side: 1.7 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 469 N Side: 249 N	Front: 104 lbf Side: 53 lbf

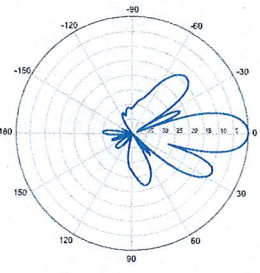
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-80063-4BF-EDIN-X-FP		

BXA-80063-4BF-EDIN-X



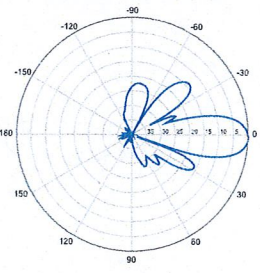
Horizontal

BXA-80063-4BF-EDIN-0



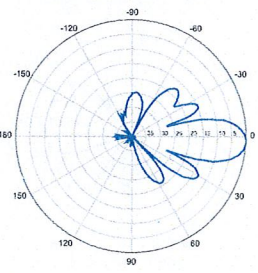
0° | Vertical

BXA-80063-4BF-EDIN-2



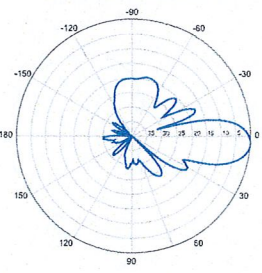
2° | Vertical

BXA-80063-4BF-EDIN-3



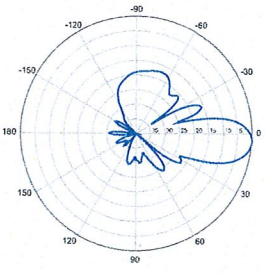
3° | Vertical

BXA-80063-4BF-EDIN-4



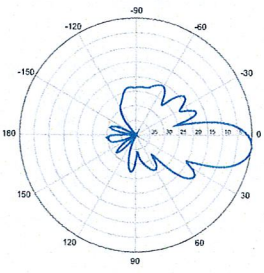
4° | Vertical

BXA-80063-4BF-EDIN-5



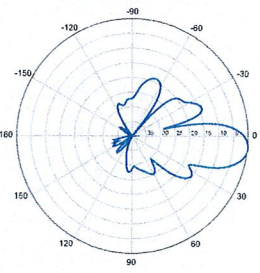
5° | Vertical

BXA-80063-4BF-EDIN-6



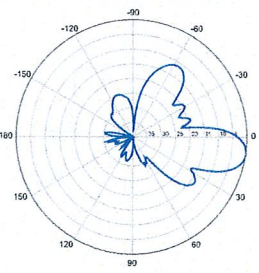
6° | Vertical

BXA-80063-4BF-EDIN-8



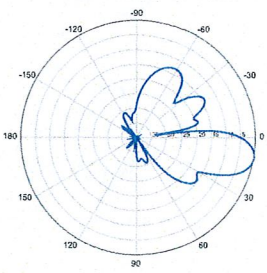
8° | Vertical

BXA-80063-4BF-EDIN-9



9° | Vertical

BXA-80063-4BF-EDIN-10



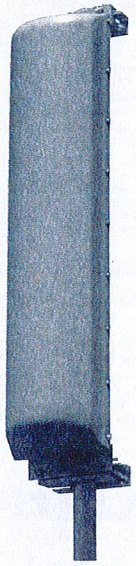
10° | Vertical

BXA-80080-4CF-EDIN-X

X-Pol | FET Panel | 80° | 12.0 dBd

Replace "X" with desired electrical downtilt.

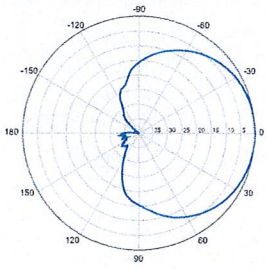
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.



Electrical Characteristics				
Frequency bands	806-900 MHz*			
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)			
Polarization	±45°			
Horizontal beamwidth	80°			
Vertical beamwidth	15°			
Gain	12.0 dBd (14.1 dBi)			
Electrical downtilt (X)	0, 2, 4, 6, 8, 10, 12, 14			
Impedance	50Ω			
VSWR	≤1.4:1			
Upper sidelobe suppression (0°)	-13.1 dB			
Front-to-back ratio (+/-30°)	-36.7 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	1206 x 204 x 151 mm		47.5 x 8.0 x 5.9 in	
Depth with z-brackets	196 mm		7.7 in	
Weight without mounting brackets	5.4 kg		12 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.25 m²	Side: 0.18 m²	Front: 2.6 ft²	Side: 1.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 351 N	Side: 280 N	Front: 79 lbf	Side: 61 lbf

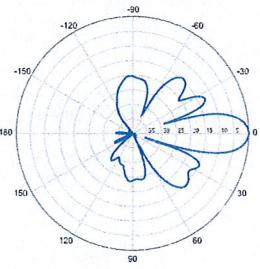
Mounting Options	Part Number	Fits Pipe Diameter		Weight	
2-Point Mounting Bracket Kit	36210002	50-160 mm	2.0-6.3 in	4.5 kg	10 lbs
2-Point Downtilt Bracket Kit (0-20°)	36114003	50-160 mm	2.0-6.3 in	4.9 kg	11 lbs
Downtilt Mounting Applications	A mounting bracket and downtilt bracket kit must be ordered for downtilt applications				
Concealment Configurations	For concealment configurations, order BXA-80080-4CF-EDIN-X-FP				

BXA-80080-4CF-EDIN-X



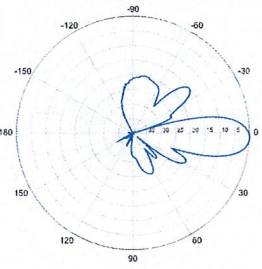
Horizontal

BXA-80080-4CF-EDIN-0



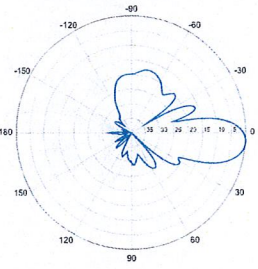
0° | Vertical

BXA-80080-4CF-EDIN-2



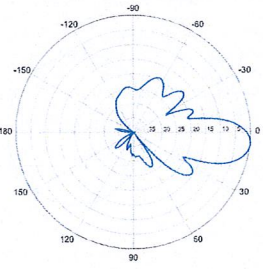
2° | Vertical

BXA-80080-4CF-EDIN-4



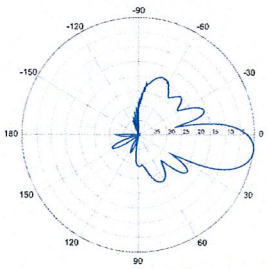
4° | Vertical

BXA-80080-4CF-EDIN-6



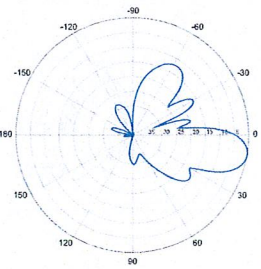
6° | Vertical

BXA-80080-4CF-EDIN-8



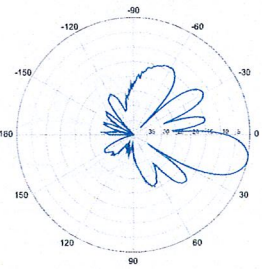
8° | Vertical

BXA-80080-4CF-EDIN-10



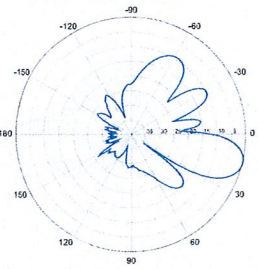
10° | Vertical

BXA-80080-4CF-EDIN-12



12° | Vertical

BXA-80080-4CF-EDIN-14

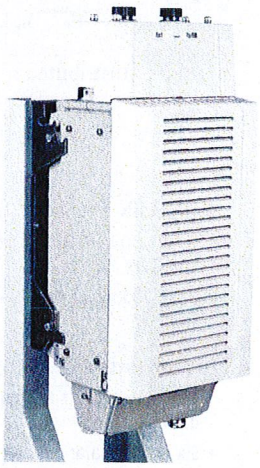


14° | Vertical

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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



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

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

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

Fast, low-cost installation and deployment

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

Excellent RF performance

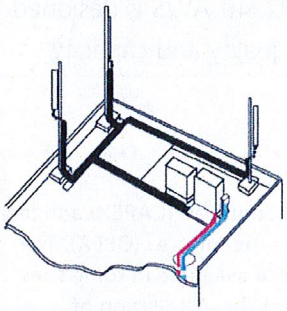
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

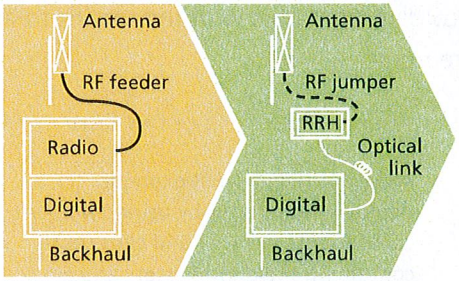
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

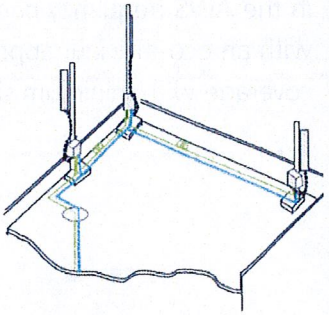
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

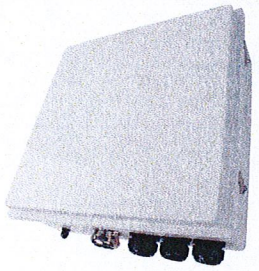
Alcatel·Lucent

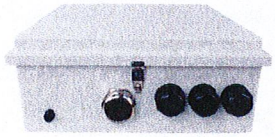
Product Data Sheet DB-B1 and DB-T1 Series

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.

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Also admitted in Massachusetts

June 20, 2014

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

Re: **Completion of Construction Activity**

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the Cellco Partnership d/b/a Verizon Wireless telecommunications facility modifications listed below has been completed.

EM-VER-007-130226 – 260 Beckley Road, Berlin, Connecticut
EM-VER-011-130125 – 811 Blue Hills Avenue, Bloomfield, Connecticut
EM-VER-011-130214 – 785 Park Avenue, Bloomfield, Connecticut
EM-VER-012-130107 – 130 Vernon Road, Bolton, Connecticut
EM-VER-043-130220 – 148 Roberts Road, East Hartford, Connecticut
EM-VER-057-130214 – Butternut Hollow Road, Greenwich, Connecticut
EM-VER-059-130220 – 68 Groton Long Point Road, Groton, Connecticut
EM-VER-062-130128 – 265 Benham Street, Hamden, Connecticut
EM-VER-062-130220 – 890 Evergreen Avenue, Hamden, Connecticut
EM-VER-064-130125 – 590-600 Asylum Avenue, Hartford, Connecticut
EM-VER-064-130220 – 439-455 Homestead Avenue, Hartford, Connecticut
EM-VER-077-130220A – 60 Adams Street, Manchester, Connecticut
EM-VER-077-130220B – 266 Center Street, Manchester, Connecticut
EM-VER-080-130128 – 38 Elm Street, Meriden, Connecticut
EM-VER-096-130125 – 586 Danbury Road, New Milford, Connecticut
EM-VER-094-130114 – 605 Willard Avenue, Newington, Connecticut
EM-VER-094-130220 – 123 Costello Road, Newington, Connecticut
EM-VER-144-130227 – Indian Ledge Road, Trumbull, Connecticut
EM-VER-146-130123 – 777 Talcottville Road, Vernon, Connecticut
EM-VER-152-130301 – 41 Manitock Hill Road, Waterford, Connecticut
EM-VER-156-130227 – 85 Plainfield Avenue, West Haven, Connecticut

EM-VER-164-130128 – 482 Pigeon Hill Road, Windsor, Connecticut
EM-VER-169-130220 – 445 Prospect Street, Woodstock, Connecticut

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter