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

December 12, 2012

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

RE: **EM-VER-051-121114** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 3965 Congress Street, Fairfield, 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;
- Not more than 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 November 12, 2012. 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/jbw

c: The Honorable Michael C. Tetreau, First Selectman, Town of Fairfield
Joseph E. Devonshuk, Town Planner, Town of Fairfield

ROBINSON & COLE

EM-VER-051-121114

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

November 12, 2012

RECEIVED
NOV 14 2012
CONNECTICUT
SITING COUNCIL

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

Re: **Notice of Exempt Modification – Antenna Swap**
3965 Congress Street, Fairfield, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 80-foot level on an existing 150-foot tower at the above-referenced address. The tower and underlying property are owned by the Town of Fairfield. Cellco's use of the tower was approved by the Council in 2004. Cellco now intends to replace ten (10) of the twelve (12) existing antennas with four (4) model DB846F65ZAXY cellular antennas; three (3) model BXA-171063-8BF PCS antennas; and three (3) model BXA-70063-6CF LTE antennas, at the same 80-foot level on the tower. Cellco also intends to install six (6) coax cable diplexers behind its antennas. Attached behind Tab 1 are the specifications for Cellco's replacement antennas and cable diplexers.

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 Michael C. Tetreau, First Selectman of the Town of Fairfield.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas will be located at the 80-foot level on the existing 150-foot tower.

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

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 Far Field Approximation table for RF emissions from 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:
Michael C. Tetreau, Fairfield First Selectman
Sandy M. Carter

DB846F65ZAXY

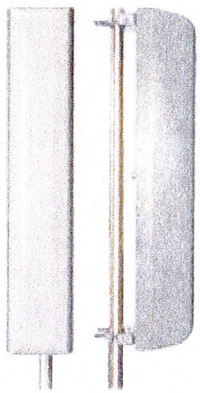
Directed Dipole Antenna

Decibel®
Base Station Antennas

- Exceptional azimuth roll off reducing soft hand offs and improving capacity
- Strong null filling for below horizon RF penetration
- Extremely rugged, reliable design yet lightweight for low tower loading
- Air dielectric feed system

ELECTRICAL

Frequency (MHz) :	806 - 896	870 - 960
Polarization :	Vertical	Vertical
Gain (dBd/dBi) :	14.5/16.6	14.8/16.9
Azimuth BW (Deg.):	65	60
Elevation BW (Deg.):	11	10.5
Beam Tilt (Deg.):	0	0
USLS* (dB) :	15	15
Front-To-Back Ratio* (dB) :	40	40
VSWR :	<1.33:1	<1.33:1
PIM3 @ 2 x 20w (dBc) :	-150	-150
Max. Input Power (Watts) :	500	500
Impedance (Ohms) :	50	50
Lightning Protection :	DC Ground	DC Ground



MECHANICAL

Weight :	9.5 kg (21 lb)
Dimensions (LxWxD) :	1,829 x 254 x 216 mm (72 x 10 x 8.5 in)
Max. Wind Area :	0.15 m² (1.6 ft²)
Max. Wind Load (@ 100 mph) :	386.9 N (87 lbf)
Max. Wind Speed :	241 km/h (150 mph)
Hardware Material :	Galvanized Steel
Connector Type :	7-16 DIN - Female (1, Back)
Color :	Light Gray
Standard Mounting Hardware :	DB380
Standard Downtilt Mounting Hardware :	DB5083

Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical

4/13/2007

dbtech@andrew.com

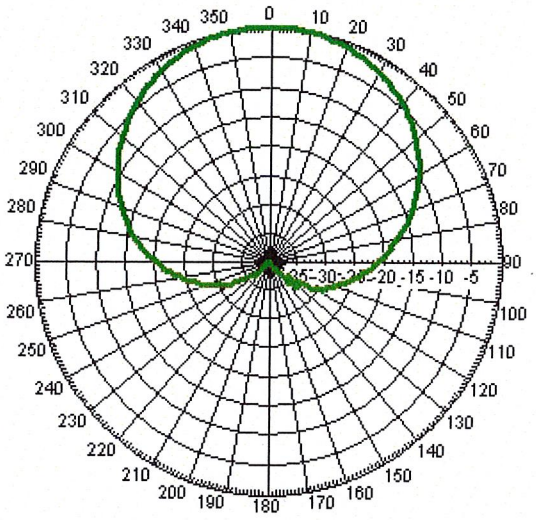
Information correct at date of issue but may be subject to change without notice.

DB846F65ZAXY

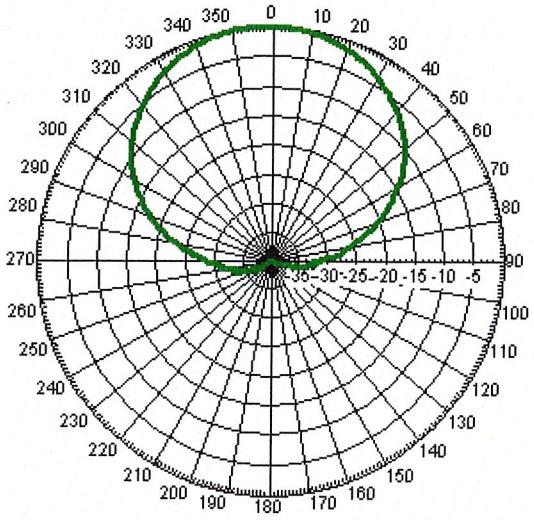
Directed Dipole Antenna

Decibel®
Base Station Antennas

AZIMUTH PATTERN

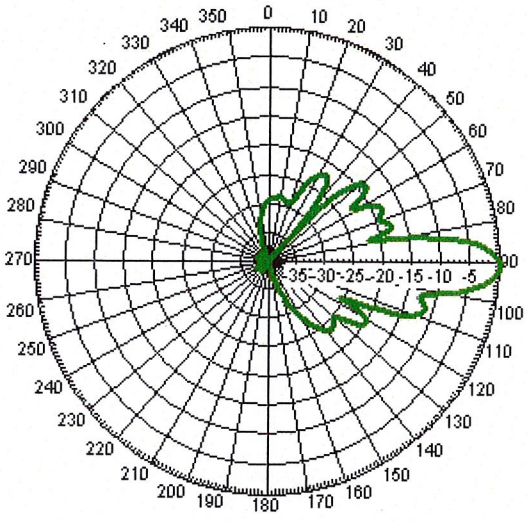


Freq: 850 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0

ELEVATION PATTERN



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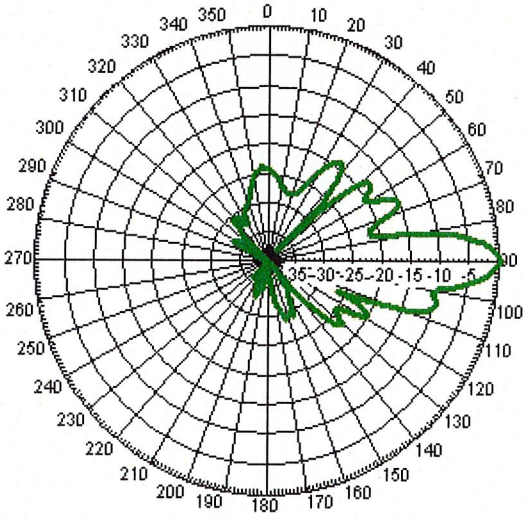

Freq: 940 MHz, Tilt: 0

Andrew Corporation
2601 Telecom Parkway
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Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical
4/13/2007
dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.

BXA-171063-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

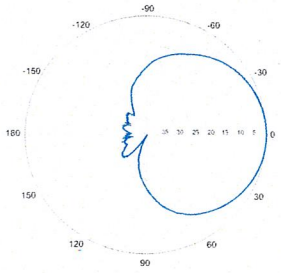
X-Pol | FET Panel | 63° | 17.4 dBi

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 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

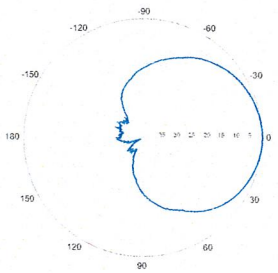
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

BXA-171063-8BF-EDIN-X



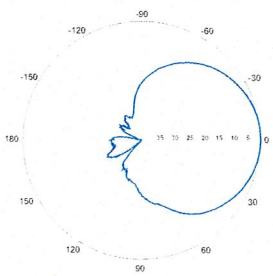
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



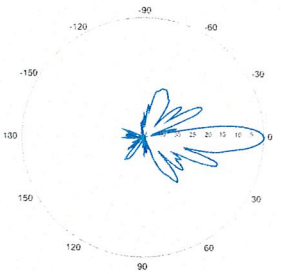
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



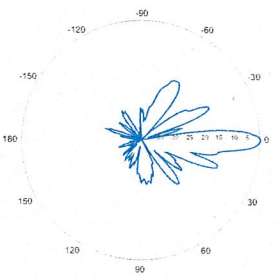
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



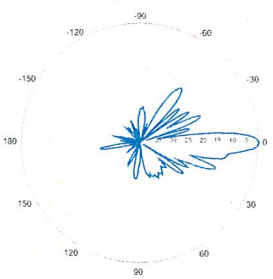
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0



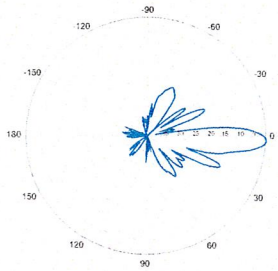
0° | Vertical | 1920-2170 MHz

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.

BXA-171063-8BF-EDIN-X

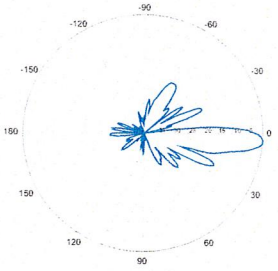
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



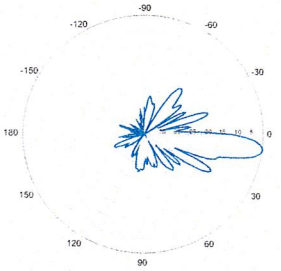
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



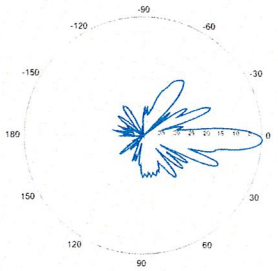
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



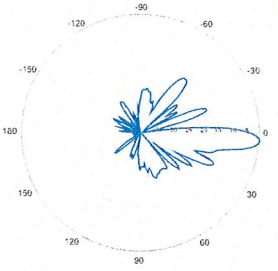
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



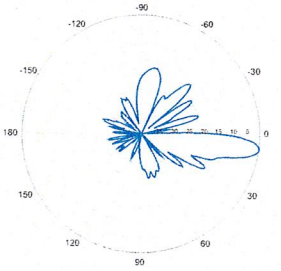
2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



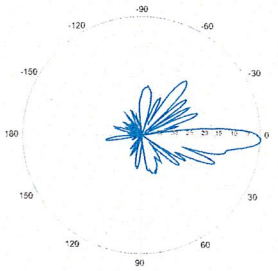
4° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-8



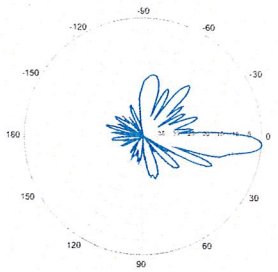
8° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-2



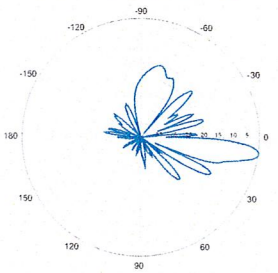
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1920-2170 MHz

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.

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

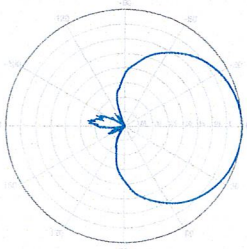
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

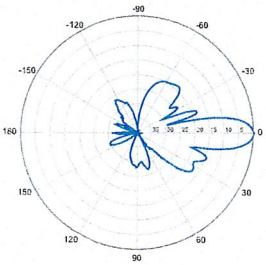
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



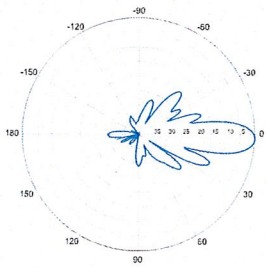
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

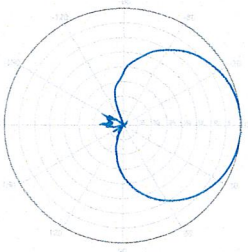


0° | Vertical | 750 MHz

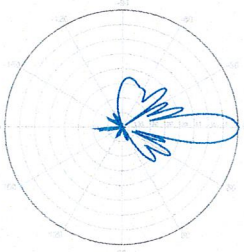
BXA-70063-6CF-EDIN-2



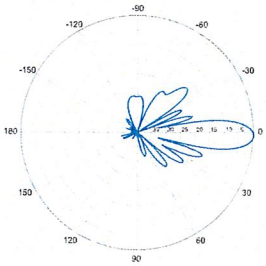
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

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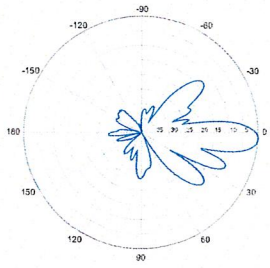
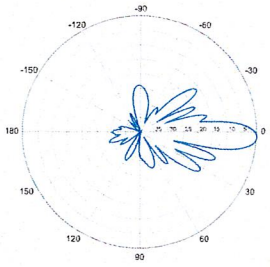
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

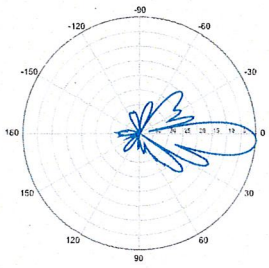


3° | Vertical | 750 MHz

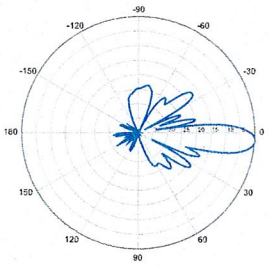


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

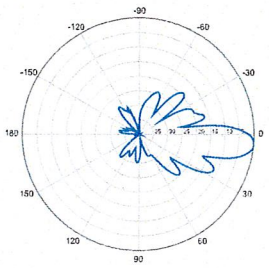


4° | Vertical | 750 MHz

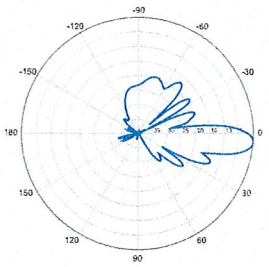


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5



5° | Vertical | 750 MHz



5° | Vertical | 850 MHz

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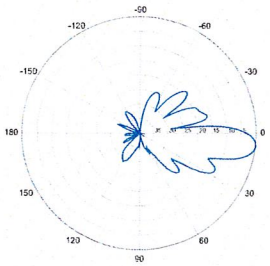
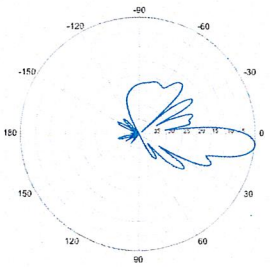


6° | Vertical | 750 MHz



6° | Vertical | 850 MHz

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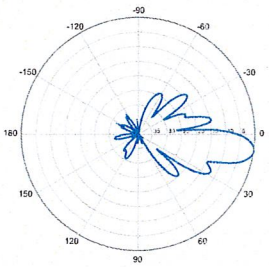
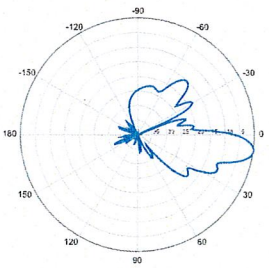
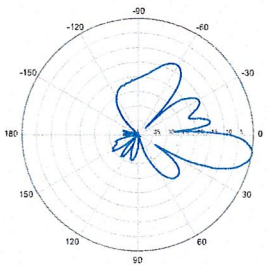


8° | Vertical | 750 MHz

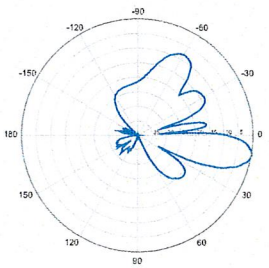


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

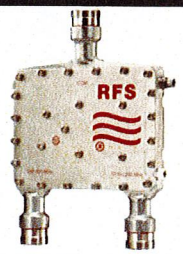
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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

Product Data Sheet **FD9R6004/2C-3L**

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- **LTE ready design**
- **Extremely Low Insertion Loss**
- **High level of Rejection between bands – Protection against interferences**
- **Extremely High Power Handling Capability**
- **Integrated DC block/bypass versions available**
- **Very compact & small size design – Easy installation and reduced tower load**
- **In-line long-neck connectors for easy connection & waterproofing**
- **Exceptional reliability & environmental protection (IP 67)**
- **Equipped with 1 * Breathable Vent – Prevent any humidity inside the product**
- **Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)**
- **Grounding already provided through the mounting bracket**
- **Kit available for easy dual mount**

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 57/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

Notes

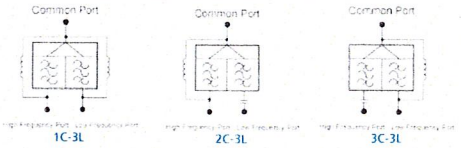
All information contained in the present datasheet is subject to confirmation at time of ordering

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Other Documentation

FD9R6004/2C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	**Description**	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 2m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

All information contained in the present datasheet is subject to confirmation at time of ordering

Far Field Approximation
with downtilt variation

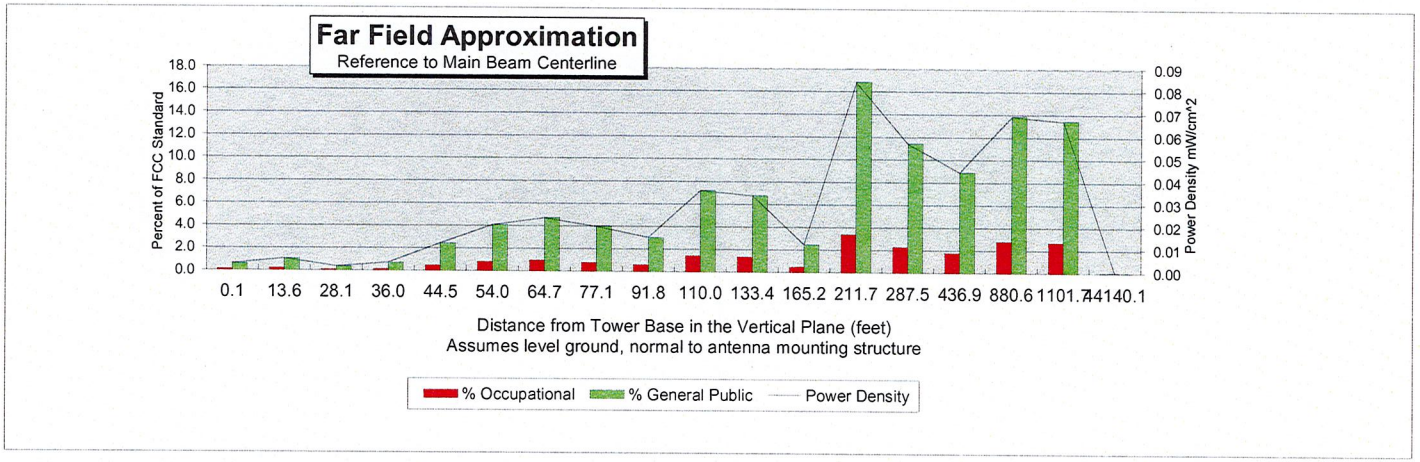
Estimated RF Emission

Composite Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	FAIRFIELD 2, CT
Site #:	
Date:	11/07/12
Name:	Mark Brauer
File Name:	FAIRFIELD 2, CT - FF Power

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**16.2**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**9350.0**



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

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	0.1	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	#####	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	#####	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	0	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.04	0.03	0.01	0.08	0.06	0.04	0.07	0.07	0.00	#NUM!
Percent of Occupational Standard	0.1	0.2	0.1	0.1	0.5	0.8	0.9	0.8	0.6	1.4	1.4	0.5	3.4	2.3	1.8	2.8	2.7	0.0	#NUM!
Percent of General Population Standard	0.6	1.0	0.4	0.7	2.4	4.1	4.7	4.0	3.0	7.2	6.8	2.5	16.9	11.4	8.9	13.9	13.5	0.0	#NUM!

Antenna Type BXA-70063-6CF
Max % 16.87%

Instructions:

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

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

150-ft Existing Valmont Monopole

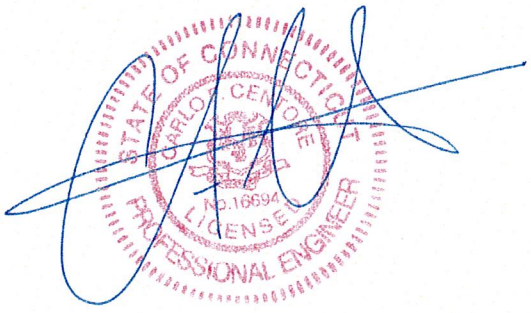
Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Fairfield 2

3965 Congress Street
Fairfield, CT

Centek Project No. 12001.CO92

Date: August 9, 2012



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 Fairfield, CT.

The host tower is a 150-ft tall, three-section, twelve sided, tapered monopole, originally designed and manufactured by Valmont Structures. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by Centek Engineering job no; 11021.CO19, dated June 3, 2011. Antenna and appurtenance information were obtained from the aforementioned Centek structural report, visual verification from grade conducted by Centek personnel on August 1, 2012 and a Verizon RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 23.33-in at the top and 50.9-in at the base.

Verizon proposes the removal of ten (10) panel antennas and the installation of ten (10) panel antennas and six (6) diplexers 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) DB810K Omni-directional whip antenna and two (2) 10-ft Dipole antennas mounted on the Nextel T-Arms with respective RAD center elevations of 157-ft and 154-ft above the existing tower base plate.
  Coax Cables: Three (3) 1-5/8"∅ coax cables running on the inside of the existing tower.
- NEXTEL (Existing to Remain):
  Antennas: Twelve (12) Andrew DB844H90E-XY panel antennas mounted on three (3) 12-ft T-Arms with a RAD center elevation of 149-ft above the existing tower base plate.
  Coax Cables: Twelve (12) 1-5/8" coax cables running on the inside of the existing tower.
- SPRINT (Existing):
  Antennas: Six (6) Andrew DB980H90E-M panel antennas mounted on a 13-ft platform with hand rails with a RAD center elevation of 138-ft above the existing tower base plate.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.

- AT&T (Existing):
  Antennas: Six (6) Powerwave 7770 panel antennas, three (3) Powerwave P65-16-XLH-RR panel antennas and twelve (12) Powerwave LGP21401 TMA's mounted on an existing low profile platform with a RAD center elevation of 127-ft above grade.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables running on the exterior of the existing tower.
- AT&T (Existing):
  Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted to one (1) universal ring mount with a RAD center elevation of 129-ft above grade level.
  Coax Cables: One (1) fiber cable and two (2) dc control cables running on the exterior of the existing tower.
- T-MOBILE (Existing):
  Antennas: Three (3) RFS APX16DWV-16DWV-S panel antennas and six (6) 10" by 8" by 3" TMA's mounted on a 13-ft platform with rails with a RAD center elevation of 113-ft above the existing tower base plate.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables running on the exterior of the existing tower.
- TOWN (Existing):
  Antennas: Two (2) Andrew APSA685 Omni-directional whip antennas (inverted), one (1) DB-222 dipole antenna and one (1) PD1142-2B Omni-directional whip antenna mounted on two (2) standoffs with an elevation of 104-ft above the existing tower base plate.
  Coax Cables: Four (4) 1-5/8"∅ coax cables running on the inside of the existing tower.
- TOWN (Existing):
  Antennas: Two (2) empty standoffs with a RAD center elevation of 104-ft above the existing tower base plate.
- UNKNOWN (Existing):
  Antennas: One (1) GPS antenna on a GPS Stand-off mount with a RAD center elevation of 40-ft above the existing tower base plate.
  Coax Cables: One (1) 1/2"∅ coax cable running on the exterior of the existing tower.
- VERIZON (EXISTING TO REMAIN):
  Antennas: Two (2) Andrew DB846F65ZAXY panel antennas mounted on an existing low profile platform with a RAD center elevation of 80-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the exterior of the existing tower.
- VERIZON (EXISTING TO REMOVE):
  Antennas: Four (4) Andrew DB844H80E-XY and six (6) Andrew 948F85T2E-M panel antennas mounted on an existing low profile platform with a RAD center elevation of 80-ft above grade.

- **VERIZON (PROPOSED):**
  Antennas: Three (3) Antel BXA-70063-6CF panel antennas, four (4) Andrew DB846F65ZAXY panel antennas, three (3) Antel BXA-171063-8BF panel antennas and six (6) RFS FD9R6004/2C-3L Diplexers mounted on an existing low profile platform with a RAD center elevation of 80-ft above 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 RISATower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

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

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

Tower Loading

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

Basic Wind Speed:	Fairfield; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Fairfield; v = 110 mph (3 second gust) equivalent to v = 90 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix K wind speed controls.	
Load Cases:	Load Case 1; 90 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; 78 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 78 mph wind speed velocity represents 75% of the wind pressure generated by the 90 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 **98.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L3)	0.00'-54.00'	98.5%	**PASS**

Note: The wall thickness of the bottom 31-ft of the monopole was increased in the RisaTower analysis to reflect the reinforcement design prepared by Walker Engineering job no. 0311-428RE dated July 29, 2004.

Foundation and Anchors

The existing foundation consists of a 6.5-ft ∅ x 26.5-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned Centek Engineering design report job no. 11021.CO19 dated June 3, 2011. The base of the tower is connected to the foundation by means of (16) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 9.2-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	39 kips
	Compression	41 kips
	Moment	3700 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	54.2%	**PASS**
	Lateral Deflection	0.35 in.(1)	**PASS**

(1) Lateral deflection typically limited to 1.0 in. for monopole tower structures. Based on service loads (V = 50 mph)

- 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	99.8%	**PASS**
Base Plate	Bending	61.6%	**PASS**

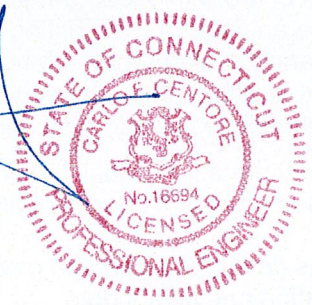
Conclusion

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

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:

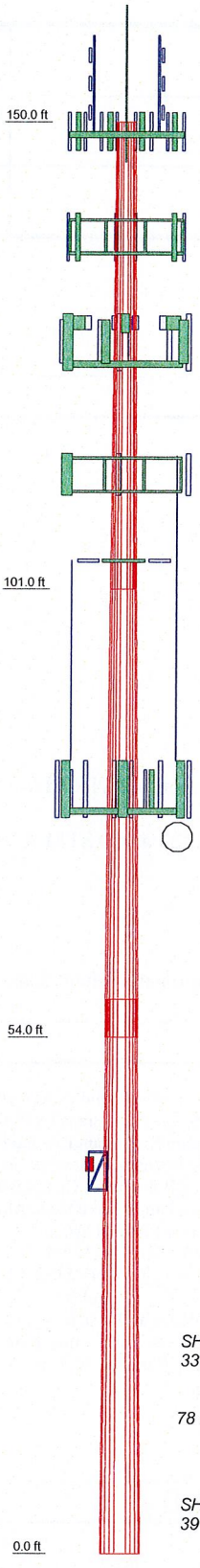
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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

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

RISATower Features:

- RISATower 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.
- RISATower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



Section	1	2	3
Length (ft)	49.000	50.000	58.000
Number of Sides	12	12	12
Thickness (in)	0.281	0.375	0.438
Socket Length (ft)	3.000	4.000	
Top Dia (in)	23.330	31.141	38.679
Bot Dia (in)	32.250	40.150	50.910
Grade	A572-65		
Weight (K)	4.2	7.2	12.3

23.7

AXIAL 54 K
SHEAR 33 K
MOMENT 3240 kip-ft
TORQUE 2 kip-ft
78 mph WIND - 0.500 in ICE

AXIAL 41 K
SHEAR 39 K
MOMENT 3700 kip-ft
TORQUE 2 kip-ft
REACTIONS - 90 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
10-ft Dipole (Town)	149	APX16DWV-16DWV-S-E-ACU (T-Mobile Existing)	113
10-ft Dipole (Town)	149	APX16DWV-16DWV-S-E-ACU (T-Mobile Existing)	113
DB810K (Town)	149	(2) 10"x8"x3" TMA (T-Mobile Existing)	113
(4) DB844H90E-XY (Nextel Existing)	149	(2) 10"x8"x3" TMA (T-Mobile Existing)	113
(4) DB844H90E-XY (Nextel Existing)	149	(2) 10"x8"x3" TMA (T-Mobile Existing)	113
(4) DB844H90E-XY (Nextel Existing)	149	13' Platform w/Rails (T-Mobile Existing)	113
Valmont T-Arm (1) (Nextel Existing)	149	4'-6" Standoff (Town - Existing)	104
Valmont T-Arm (1) (Nextel Existing)	149	4'-6" Standoff (Town - Existing)	104
Valmont T-Arm (1) (Nextel Existing)	149	4'-6" Standoff (Town - Existing)	104
(2) DB980H90E-M (Sprint Existing)	138	4'-6" Standoff (Town - Existing)	104
(2) DB980H90E-M (Sprint Existing)	138	1142-2B (Town - Existing)	104
(2) DB980H90E-M (Sprint Existing)	138	ASPA685 (Town - Existing)	104
13' Platform w/Rails (Sprint Existing)	138	DB222 (Town - Existing)	104
(2) RRUS-11 (ATI Existing)	129	ASPA685 (Town - Existing)	104
(2) RRUS-11 (ATI Existing)	129	DB846F65ZAXY (Verizon Proposed)	80
(2) RRUS-11 (ATI Existing)	129	BXA-171063/8BF (Verizon Proposed)	80
DC6-48-60-18-8F Surge Arrestor (ATI Existing)	129	BXA-70063/6CF (Verizon Proposed)	80
Valmont Uni-Tri Bracket (ATI Existing)	129	DB846F65ZAXY (Verizon Proposed)	80
7770.00 (ATI Existing)	127	DB846F65ZAXY (Verizon Proposed)	80
7770.00 (ATI Existing)	127	BXA-171063/8BF (Verizon Proposed)	80
P65-16-XLH-RR (ATI Existing)	127	BXA-70063/6CF (Verizon Proposed)	80
7770.00 (ATI Existing)	127	DB846F65ZAXY (Verizon Proposed)	80
7770.00 (ATI Existing)	127	DB846F65ZAXY (Verizon Existing)	80
P65-16-XLH-RR (ATI Existing)	127	BXA-171063/8BF (Verizon Proposed)	80
7770.00 (ATI Existing)	127	BXA-70063/6CF (Verizon Proposed)	80
7770.00 (ATI Existing)	127	DB846F65ZAXY (Verizon Existing)	80
P65-16-XLH-RR (ATI Existing)	127	Valmont 13' Low Profile Platform (Verizon Existing)	78
(4) LGP214nn TMA (ATI Existing)	127	Stand-off	40
(4) LGP214nn TMA (ATI Existing)	127	GPS (Existing)	40
(4) LGP214nn TMA (ATI Existing)	127		
Valmont 13' Low Profile Platform (ATI Existing)	125		
APX16DWV-16DWV-S-E-ACU (T-Mobile Existing)	113		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 78 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. Weld together tower sections have flange connections.
6. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.
9. TOWER RATING: 98.5%

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

Job: *12001.CO92 - Fairfield 2*		
Project: *150-ft Valmont Monopole - Fairfield, CT*		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 08/09/12	Scale: NTS
Path: J:\Jobs\12000\100.WNCO92 - Fairfield 2\Calcs\ERI Files\150' Monopole_Fairfield_CT.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:

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 90 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 78 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in 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	150.000-101.000	49.000	3.000	12	23.330	32.250	0.281	1.125	A572-65 (65 ksi)
L2	101.000-54.000	50.000	4.000	12	31.141	40.150	0.375	1.500	A572-65 (65 ksi)
L3	54.000-0.000	58.000		12	38.679	50.910	0.438	1.750	A572-65

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
									(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	24.153	20.877	1415.634	8.251	12.085	117.140	2868.457	10.275	5.499	19.547
	33.388	28.957	3777.344	11.445	16.706	226.114	7653.922	14.252	7.889	28.045
L2	32.799	37.150	4488.466	11.014	16.131	278.248	9094.850	18.284	7.341	19.576
	41.566	48.028	9698.480	14.239	20.798	466.325	19651.749	23.638	9.755	26.014
L3	40.917	53.873	10056.224	13.691	20.036	501.911	20376.636	26.515	9.194	21.014
	52.706	71.103	23119.814	18.069	26.371	876.701	46847.011	34.995	12.471	28.506

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 150.000-101.000				1	1	1		
L2 101.000-54.000				1	1	1		
L3 54.000-0.000				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 klf
1 5/8 (Town - Existing)	A	No	Inside Pole	149.000 - 3.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Nextel - Existing)	B	No	Inside Pole	149.000 - 3.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Sprint - Existing)	C	No	Inside Pole	138.000 - 3.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 1/4 (AT&T - Existing)	A	No	CaAa (Out Of Face)	125.000 - 3.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
1 1/4 (T-Mobile - Existing)	A	No	CaAa (Out Of Face)	110.000 - 3.000	2	No Ice	0.155	0.001
						1/2" Ice	0.255	0.002
1 1/4 (T-Mobile - Existing)	A	No	CaAa (Out Of Face)	110.000 - 3.000	10	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
1 5/8 (Verizon - Existing)	C	No	CaAa (Out Of Face)	77.000 - 3.000	2	No Ice	0.198	0.001
						1/2" Ice	0.298	0.003
1 5/8 (Verizon - Existing)	C	No	CaAa (Out Of Face)	77.000 - 3.000	10	No Ice	0.000	0.001
						1/2" Ice	0.000	0.003
7/8 (Town - Existing)	B	No	Inside Pole	104.000 - 3.000	4	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1/2 (GPS - Existing)	B	No	CaAa (Out Of Face)	40.000 - 3.000	1	No Ice	0.058	0.000
						1/2" Ice	0.158	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
RG6-Fiber	C	No	CaAa (Out Of	129.000 - 3.000	1	No Ice	0.000	0.001
(AT&T - Existing)			Face)			1/2" Ice	0.000	0.002
#8 AWG Copper WIre	C	No	CaAa (Out Of	129.000 - 3.000	2	No Ice	0.000	0.000
(AT&T - Existing)			Face)			1/2" Ice	0.000	0.000

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	150.000-101.000	A	0.000	0.000	0.000	2.790	0.411
		B	0.000	0.000	0.000	0.000	0.606
		C	0.000	0.000	0.000	0.000	0.493
L2	101.000-54.000	A	0.000	0.000	0.000	14.570	0.891
		B	0.000	0.000	0.000	0.000	0.688
		C	0.000	0.000	0.000	9.108	0.925
L3	54.000-0.000	A	0.000	0.000	0.000	15.810	0.967
		B	0.000	0.000	0.000	2.146	0.756
		C	0.000	0.000	0.000	20.196	1.329

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	150.000-101.000	A	0.500	0.000	0.000	0.000	4.590	0.906
		B		0.000	0.000	0.000	0.000	0.606
		C		0.000	0.000	0.000	0.000	0.531
L2	101.000-54.000	A	0.500	0.000	0.000	0.000	23.970	2.301
		B		0.000	0.000	0.000	0.000	0.688
		C		0.000	0.000	0.000	13.708	1.407
L3	54.000-0.000	A	0.500	0.000	0.000	0.000	26.010	2.497
		B		0.000	0.000	0.000	5.846	0.780
		C		0.000	0.000	0.000	30.396	2.324

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
10-ft Dipole	A	From Face	3.000	0.000	149.000	No Ice	3.150	3.150	0.032
(Town)			0.000 5.000			1/2" Ice	5.670	5.670	0.042
10-ft Dipole	B	From Face	3.000	0.000	149.000	No Ice	3.150	3.150	0.032
(Town)			0.000 5.000			1/2" Ice	5.670	5.670	0.042
DB810K	C	From Face	3.000	0.000	149.000	No Ice	4.075	4.075	0.035

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Town)			0.000	5.000			1/2" Ice	5.734	5.734	0.065
(4) DB844H90E-XY	A	From Face	3.000	0.000	0.000	149.000	No Ice	2.867	3.733	0.010
(Nextel Existing)			0.000	0.000			1/2" Ice	3.177	4.101	0.035
(4) DB844H90E-XY	B	From Face	3.000	0.000	0.000	149.000	No Ice	2.867	3.733	0.010
(Nextel Existing)			0.000	0.000			1/2" Ice	3.177	4.101	0.035
(4) DB844H90E-XY	C	From Face	3.000	0.000	0.000	149.000	No Ice	2.867	3.733	0.010
(Nextel Existing)			0.000	0.000			1/2" Ice	3.177	4.101	0.035
Valmont T-Arm (1)	A	None			0.000	149.000	No Ice	10.540	10.540	0.336
(Nextel Existing)							1/2" Ice	14.450	14.450	0.412
Valmont T-Arm (1)	B	None			0.000	149.000	No Ice	10.540	10.540	0.336
(Nextel Existing)							1/2" Ice	14.450	14.450	0.412
Valmont T-Arm (1)	C	None			0.000	149.000	No Ice	10.540	10.540	0.336
(Nextel Existing)							1/2" Ice	14.450	14.450	0.412
(2) DB980H90E-M	A	From Face	3.000	0.000	0.000	138.000	No Ice	3.799	2.194	0.009
(Sprint Existing)			0.000	0.000			1/2" Ice	4.178	2.556	0.029
(2) DB980H90E-M	B	From Face	3.000	0.000	0.000	138.000	No Ice	3.799	2.194	0.009
(Sprint Existing)			0.000	0.000			1/2" Ice	4.178	2.556	0.029
(2) DB980H90E-M	C	From Face	3.000	0.000	0.000	138.000	No Ice	3.799	2.194	0.009
(Sprint Existing)			0.000	0.000			1/2" Ice	4.178	2.556	0.029
13' Platform w/Rails	C	None			0.000	138.000	No Ice	17.200	17.200	2.000
(Sprint Existing)							1/2" Ice	22.300	22.300	3.000
(2) RRUS-11	A	From Face	0.500	0.000	0.000	129.000	No Ice	2.994	1.246	0.050
(AT&T Existing)			0.000	0.000			1/2" Ice	3.226	1.412	0.070
(2) RRUS-11	B	From Face	0.500	0.000	0.000	129.000	No Ice	2.994	1.246	0.050
(AT&T Existing)			0.000	0.000			1/2" Ice	3.226	1.412	0.070
(2) RRUS-11	C	From Face	0.500	0.000	0.000	129.000	No Ice	2.994	1.246	0.050
(AT&T Existing)			0.000	0.000			1/2" Ice	3.226	1.412	0.070
DC6-48-60-18-8F Surge	C	From Face	0.500	0.000	0.000	129.000	No Ice	2.228	2.228	0.020
Arrestor			0.000	0.000			1/2" Ice	2.447	2.447	0.039
(AT&T Existing)										
Valmont Uni-Tri Bracket	C	None			0.000	129.000	No Ice	1.750	1.750	0.290
(AT&T Existing)							1/2" Ice	1.940	1.940	0.306
7770.00	A	From Face	3.000	0.000	0.000	127.000	No Ice	5.882	2.928	0.035
(AT&T Existing)			-6.000	0.000			1/2" Ice	6.314	3.273	0.068
7770.00	A	From Face	3.000	0.000	0.000	127.000	No Ice	5.882	2.928	0.035
(AT&T Existing)			2.000	0.000			1/2" Ice	6.314	3.273	0.068
P65-16-XLH-RR	A	From Face	3.000	0.000	0.000	127.000	No Ice	8.400	4.700	0.060
(AT&T Existing)			6.000	0.000			1/2" Ice	8.949	5.147	0.107
7770.00	B	From Face	3.000	0.000	0.000	127.000	No Ice	5.882	2.928	0.035
(AT&T Existing)			-6.000	0.000			1/2" Ice	6.314	3.273	0.068
7770.00	B	From Face	3.000	0.000	0.000	127.000	No Ice	5.882	2.928	0.035
(AT&T Existing)			2.000	0.000			1/2" Ice	6.314	3.273	0.068

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
P65-16-XLH-RR	B	From Face	3.000	0.000	127.000	No Ice	8.400	4.700	0.060
(AT&T Existing)			6.000			1/2" Ice	8.949	5.147	0.107
			0.000						
7770.00	C	From Face	3.000	0.000	127.000	No Ice	5.882	2.928	0.035
(AT&T Existing)			-6.000			1/2" Ice	6.314	3.273	0.068
			0.000						
7770.00	C	From Face	3.000	0.000	127.000	No Ice	5.882	2.928	0.035
(AT&T Existing)			2.000			1/2" Ice	6.314	3.273	0.068
			0.000						
P65-16-XLH-RR	C	From Face	3.000	0.000	127.000	No Ice	8.400	4.700	0.060
(AT&T Existing)			6.000			1/2" Ice	8.949	5.147	0.107
			0.000						
(4) LGP214nn TMA	A	From Face	3.000	0.000	127.000	No Ice	0.000	0.233	0.014
(AT&T Existing)			0.000			1/2" Ice	0.000	0.313	0.021
			0.000						
(4) LGP214nn TMA	B	From Face	3.000	0.000	127.000	No Ice	0.000	0.233	0.014
(AT&T Existing)			0.000			1/2" Ice	0.000	0.313	0.021
			0.000						
(4) LGP214nn TMA	C	From Face	3.000	0.000	127.000	No Ice	0.000	0.233	0.014
(AT&T Existing)			0.000			1/2" Ice	0.000	0.313	0.021
			0.000						
Valmont 13' Low Profile Platform	C	None		0.000	125.000	No Ice	15.700	15.700	1.300
(AT&T Existing)						1/2" Ice	20.100	20.100	1.765
APX16DWV-16DWV-S-E-A CU	A	From Face	3.000	0.000	113.000	No Ice	6.699	2.003	0.040
(T-Mobile Existing)			6.000			1/2" Ice	7.131	2.326	0.071
			0.000						
APX16DWV-16DWV-S-E-A CU	B	From Face	3.000	0.000	113.000	No Ice	6.699	2.003	0.040
(T-Mobile Existing)			6.000			1/2" Ice	7.131	2.326	0.071
			0.000						
APX16DWV-16DWV-S-E-A CU	C	From Face	3.000	0.000	113.000	No Ice	6.699	2.003	0.040
(T-Mobile Existing)			6.000			1/2" Ice	7.131	2.326	0.071
			0.000						
(2) 10"x8"x3" TMA	A	From Face	3.000	0.000	113.000	No Ice	0.778	0.292	0.015
(T-Mobile Existing)			6.000			1/2" Ice	0.899	0.380	0.020
			0.000						
(2) 10"x8"x3" TMA	B	From Face	3.000	0.000	113.000	No Ice	0.778	0.292	0.015
(T-Mobile Existing)			6.000			1/2" Ice	0.899	0.380	0.020
			0.000						
(2) 10"x8"x3" TMA	C	From Face	3.000	0.000	113.000	No Ice	0.778	0.292	0.015
(T-Mobile Existing)			6.000			1/2" Ice	0.899	0.380	0.020
			0.000						
13' Platform w/Rails	C	None		0.000	113.000	No Ice	17.200	17.200	2.000
(T-Mobile Existing)						1/2" Ice	22.300	22.300	3.000
4'-6" Standoff	A	From Face	3.000	0.000	104.000	No Ice	2.100	0.156	0.040
(Town - Existing)			0.000			1/2" Ice	2.480	0.212	0.057
			0.000						
4'-6" Standoff	A	From Face	3.000	0.000	104.000	No Ice	2.100	0.156	0.040
(Town - Existing)			0.000			1/2" Ice	2.480	0.212	0.057
			0.000						
4'-6" Standoff	B	From Face	3.000	0.000	104.000	No Ice	2.100	0.156	0.040
(Town - Existing)			0.000			1/2" Ice	2.480	0.212	0.057
			0.000						
4'-6" Standoff	C	From Face	3.000	0.000	104.000	No Ice	2.100	0.156	0.040
(Town - Existing)			0.000			1/2" Ice	2.480	0.212	0.057
			0.000						
1142-2B	B	From Face	5.000	0.000	104.000	No Ice	1.120	1.120	0.010

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
(Town - Existing)			0.000 4.000			1/2" Ice	2.535	2.535	0.021
ASPA685	B	From Face	5.000	0.000	104.000	No Ice	5.250	5.250	0.022
(Town - Existing)			0.000 -10.500			1/2" Ice	7.379	7.379	0.060
DB222	A	From Face	5.000	0.000	104.000	No Ice	1.600	1.600	0.016
(Town - Existing)			0.000 5.000			1/2" Ice	2.880	2.880	0.021
ASPA685	A	From Face	5.000	0.000	104.000	No Ice	5.250	5.250	0.022
(Town - Existing)			0.000 -10.500			1/2" Ice	7.379	7.379	0.060
DB846F65ZAXY	A	From Face	3.000	0.000	80.000	No Ice	7.033	6.158	0.021
(Verizon Proposed)			-6.000 0.000			1/2" Ice	7.536	6.619	0.070
BXA-171063/8BF	A	From Face	3.000	0.000	80.000	No Ice	2.941	2.156	0.011
(Verizon Proposed)			-3.000 0.000			1/2" Ice	3.255	2.458	0.029
BXA-70063/6CF	A	From Face	3.000	0.000	80.000	No Ice	7.731	4.158	0.017
(Verizon Proposed)			0.000 0.000			1/2" Ice	8.268	4.595	0.059
DB846F65ZAXY	A	From Face	3.000	0.000	80.000	No Ice	7.033	6.158	0.021
(Verizon Proposed)			6.000 0.000			1/2" Ice	7.536	6.619	0.070
DB846F65ZAXY	B	From Face	3.000	0.000	80.000	No Ice	7.033	6.158	0.021
(Verizon Proposed)			-6.000 0.000			1/2" Ice	7.536	6.619	0.070
BXA-171063/8BF	B	From Face	3.000	0.000	80.000	No Ice	2.941	2.156	0.011
(Verizon Proposed)			-3.000 0.000			1/2" Ice	3.255	2.458	0.029
BXA-70063/6CF	B	From Face	3.000	0.000	80.000	No Ice	7.731	4.158	0.017
(Verizon Proposed)			0.000 0.000			1/2" Ice	8.268	4.595	0.059
DB846F65ZAXY	B	From Face	3.000	0.000	80.000	No Ice	7.033	6.158	0.021
(Verizon Proposed)			6.000 0.000			1/2" Ice	7.536	6.619	0.070
DB846F65ZAXY	C	From Face	3.000	0.000	80.000	No Ice	7.033	6.158	0.021
(Verizon Existing)			-6.000 0.000			1/2" Ice	7.536	6.619	0.070
BXA-171063/8BF	C	From Face	3.000	0.000	80.000	No Ice	2.941	2.156	0.011
(Verizon Proposed)			-3.000 0.000			1/2" Ice	3.255	2.458	0.029
BXA-70063/6CF	C	From Face	3.000	0.000	80.000	No Ice	7.731	4.158	0.017
(Verizon Proposed)			0.000 0.000			1/2" Ice	8.268	4.595	0.059
DB846F65ZAXY	C	From Face	3.000	0.000	80.000	No Ice	7.033	6.158	0.021
(Verizon Existing)			6.000 0.000			1/2" Ice	7.536	6.619	0.070
Valmont 13' Low Profile Platform	C	None		0.000	78.000	No Ice	15.700	15.700	1.300
(Verizon Existing)						1/2" Ice	20.100	20.100	1.765
Stand-off	A	From Face	1.000	0.000	40.000	No Ice	0.750	0.750	0.027
			0.000 0.000			1/2" Ice	0.950	0.950	0.036
GPS	A	From Face	2.000	0.000	40.000	No Ice	1.000	1.000	0.010
(Existing)			0.000 0.000			1/2" Ice	1.500	1.500	0.015

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	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	124.530	1.461	0.030	113.476	A	0.000	113.476	113.476	100.00	0.000	2.790
150.000-101.0					B	0.000	113.476		100.00	0.000	0.000
00					C	0.000	113.476		100.00	0.000	0.000
L2	77.089	1.274	0.026	140.671	A	0.000	140.671	140.671	100.00	0.000	14.570
101.000-54.00					B	0.000	140.671		100.00	0.000	0.000
0					C	0.000	140.671		100.00	0.000	9.108
L3	26.246	1	0.021	203.474	A	0.000	203.474	203.474	100.00	0.000	15.810
54.000-0.000					B	0.000	203.474		100.00	0.000	2.146
					C	0.000	203.474		100.00	0.000	20.196

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	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	124.530	1.461	0.023	0.500	117.559	A	0.000	117.559	117.559	100.00	0.000	4.590
150.000-101.000						B	0.000	117.559		100.00	0.000	0.000
						C	0.000	117.559		100.00	0.000	0.000
L2	77.089	1.274	0.020	0.500	144.587	A	0.000	144.587	144.587	100.00	0.000	23.970
101.000-54.000						B	0.000	144.587		100.00	0.000	0.000
						C	0.000	144.587		100.00	0.000	13.708
L3 54.000-0.000	26.246	1	0.016	0.500	207.974	A	0.000	207.974	207.974	100.00	0.000	26.010
						B	0.000	207.974		100.00	0.000	5.846
						C	0.000	207.974		100.00	0.000	30.396

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	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	124.530	1.461	0.009	113.476	A	0.000	113.476	113.476	100.00	0.000	2.790
150.000-101.0					B	0.000	113.476		100.00	0.000	0.000
00					C	0.000	113.476		100.00	0.000	0.000
L2	77.089	1.274	0.008	140.671	A	0.000	140.671	140.671	100.00	0.000	14.570
101.000-54.00					B	0.000	140.671		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	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
0					C	0.000	140.671		100.00	0.000	9.108
L3	26.246	1	0.007	203.474	A	0.000	203.474	203.474	100.00	0.000	15.810
54.000-0.000					B	0.000	203.474		100.00	0.000	2.146
					C	0.000	203.474		100.00	0.000	20.196

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 klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	6.118	0.125	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	7.496	0.159	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	8.917	0.165	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	1573.761 kip-ft	22.531		

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 klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	6.118	0.125	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	7.496	0.159	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	8.917	0.165	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	1573.761 kip-ft	22.531		

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 klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	6.118	0.125	C
150.000-101.0			B	1	1.03	1	1	1	113.476			

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 klf	Ctrl. Face
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	7.496	0.159	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	8.917	0.165	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	1573.761 kip-ft	22.531		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	6.118	0.125	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	7.496	0.159	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	8.917	0.165	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	1573.761 kip-ft	22.531		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	2.043	5.023	A	1	1.03	1	1	1	117.559	4.819	0.098	C
150.000-101.0			B	1	1.03	1	1	1	117.559			
00			C	1	1.03	1	1	1	117.559			
L2	4.396	8.318	A	1	1.03	1	1	1	144.587	6.223	0.132	C
101.000-54.00			B	1	1.03	1	1	1	144.587			
0			C	1	1.03	1	1	1	144.587			
L3	5.601	13.878	A	1	1.03	1	1	1	207.974	7.464	0.138	C
54.000-0.000			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12.040	27.219						OTM	1275.723 kip-ft	18.506		

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 klf	Ctrl. Face
L1	2.043	5.023	A	1	1.03	1	1	1	117.559	4.819	0.098	C
150.000-101.0			B	1	1.03	1	1	1	117.559			
00			C	1	1.03	1	1	1	117.559			
L2	4.396	8.318	A	1	1.03	1	1	1	144.587	6.223	0.132	C
101.000-54.00			B	1	1.03	1	1	1	144.587			
0			C	1	1.03	1	1	1	144.587			
L3	5.601	13.878	A	1	1.03	1	1	1	207.974	7.464	0.138	C
54.000-0.000			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12.040	27.219						OTM	1275.723 kip-ft	18.506		

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 klf	Ctrl. Face
L1	2.043	5.023	A	1	1.03	1	1	1	117.559	4.819	0.098	C
150.000-101.0			B	1	1.03	1	1	1	117.559			
00			C	1	1.03	1	1	1	117.559			
L2	4.396	8.318	A	1	1.03	1	1	1	144.587	6.223	0.132	C
101.000-54.00			B	1	1.03	1	1	1	144.587			
0			C	1	1.03	1	1	1	144.587			
L3	5.601	13.878	A	1	1.03	1	1	1	207.974	7.464	0.138	C
54.000-0.000			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12.040	27.219						OTM	1275.723 kip-ft	18.506		

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 klf	Ctrl. Face
L1	2.043	5.023	A	1	1.03	1	1	1	117.559	4.819	0.098	C
150.000-101.0			B	1	1.03	1	1	1	117.559			
00			C	1	1.03	1	1	1	117.559			
L2	4.396	8.318	A	1	1.03	1	1	1	144.587	6.223	0.132	C
101.000-54.00			B	1	1.03	1	1	1	144.587			
0			C	1	1.03	1	1	1	144.587			
L3	5.601	13.878	A	1	1.03	1	1	1	207.974	7.464	0.138	C
54.000-0.000			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12.040	27.219						OTM	1275.723 kip-ft	18.506		

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 klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	1.888	0.039	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	2.313	0.049	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	2.752	0.051	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	485.729 kip-ft	6.954		

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 klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	1.888	0.039	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	2.313	0.049	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	2.752	0.051	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	485.729 kip-ft	6.954		

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 klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	1.888	0.039	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	2.313	0.049	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	2.752	0.051	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	485.729 kip-ft	6.954		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.509	4.155	A	1	1.03	1	1	1	113.476	1.888	0.039	C
150.000-101.0			B	1	1.03	1	1	1	113.476			
00			C	1	1.03	1	1	1	113.476			
L2	2.505	7.246	A	1	1.03	1	1	1	140.671	2.313	0.049	C
101.000-54.00			B	1	1.03	1	1	1	140.671			
0			C	1	1.03	1	1	1	140.671			
L3	3.052	12.333	A	1	1.03	1	1	1	203.474	2.752	0.051	C
54.000-0.000			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7.066	23.733						OTM	485.729 kip-ft	6.954		

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	23.733					
Bracing Weight	0.000					
Total Member Self-Weight	23.733			-0.319	0.280	
Total Weight	40.535			-0.319	0.280	
Wind 0 deg - No Ice		-0.041	-39.101	-3573.660	4.540	-0.346
Wind 30 deg - No Ice		19.539	-33.842	-3092.793	-1785.161	-1.163
Wind 45 deg - No Ice		27.653	-27.619	-2524.041	-2526.919	-1.465
Wind 60 deg - No Ice		33.883	-19.515	-1783.301	-3096.453	-1.667
Wind 90 deg - No Ice		39.148	0.041	3.940	-3577.979	-1.726
Wind 120 deg - No Ice		33.924	19.586	1790.040	-3100.713	-1.321
Wind 135 deg - No Ice		27.711	27.677	2529.426	-2532.943	-0.975
Wind 150 deg - No Ice		19.609	33.883	3096.414	-1792.539	-0.563
Wind 180 deg - No Ice		0.041	39.101	3573.021	-3.980	0.346
Wind 210 deg - No Ice		-19.539	33.842	3092.154	1785.720	1.163
Wind 225 deg - No Ice		-27.653	27.619	2523.402	2527.479	1.465
Wind 240 deg - No Ice		-33.883	19.515	1782.662	3097.013	1.667
Wind 270 deg - No Ice		-39.148	-0.041	-4.579	3578.539	1.726
Wind 300 deg - No Ice		-33.924	-19.586	-1790.679	3101.273	1.321
Wind 315 deg - No Ice		-27.711	-27.677	-2530.065	2533.503	0.975
Wind 330 deg - No Ice		-19.609	-33.883	-3097.053	1793.098	0.563
Member Ice	3.485					
Total Weight Ice	53.972			-0.556	0.345	
Wind 0 deg - Ice		-0.036	-33.414	-3086.969	4.072	-0.299
Wind 30 deg - Ice		16.697	-28.919	-2671.604	-1541.786	-1.384
Wind 45 deg - Ice		23.631	-23.602	-2180.344	-2182.486	-1.802
Wind 60 deg - Ice		28.955	-16.676	-1540.535	-2674.431	-2.098
Wind 90 deg - Ice		33.455	0.036	3.171	-3090.372	-2.249
Wind 120 deg - Ice		28.991	16.738	1545.878	-2678.158	-1.798
Wind 135 deg - Ice		23.682	23.653	2184.503	-2187.757	-1.379
Wind 150 deg - Ice		16.759	28.955	2674.219	-1548.241	-0.865
Wind 180 deg - Ice		0.036	33.414	3085.856	-3.382	0.299
Wind 210 deg - Ice		-16.697	28.919	2670.492	1542.475	1.384

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		-23.631	23.602	2179.232	2183.176	1.802
Wind 240 deg - Ice		-28.955	16.676	1539.422	2675.120	2.098
Wind 270 deg - Ice		-33.455	-0.036	-4.283	3091.061	2.249
Wind 300 deg - Ice		-28.991	-16.738	-1546.990	2678.847	1.798
Wind 315 deg - Ice		-23.682	-23.653	-2185.615	2188.447	1.379
Wind 330 deg - Ice		-16.759	-28.955	-2675.331	1548.931	0.865
Total Weight	40.535			-0.319	0.280	
Wind 0 deg - Service		-0.013	-12.068	-1103.202	1.595	-0.107
Wind 30 deg - Service		6.030	-10.445	-954.787	-550.782	-0.359
Wind 45 deg - Service		8.535	-8.525	-779.246	-779.720	-0.452
Wind 60 deg - Service		10.458	-6.023	-550.622	-955.502	-0.515
Wind 90 deg - Service		12.083	0.013	0.995	-1104.121	-0.533
Wind 120 deg - Service		10.470	6.045	552.261	-956.817	-0.408
Wind 135 deg - Service		8.553	8.542	780.466	-781.579	-0.301
Wind 150 deg - Service		6.052	10.458	955.463	-553.059	-0.174
Wind 180 deg - Service		0.013	12.068	1102.564	-1.035	0.107
Wind 210 deg - Service		-6.030	10.445	954.148	551.342	0.359
Wind 225 deg - Service		-8.535	8.525	778.607	780.280	0.452
Wind 240 deg - Service		-10.458	6.023	549.984	956.062	0.515
Wind 270 deg - Service		-12.083	-0.013	-1.634	1104.681	0.533
Wind 300 deg - Service		-10.470	-6.045	-552.899	957.377	0.408
Wind 315 deg - Service		-8.553	-8.542	-781.105	782.139	0.301
Wind 330 deg - Service		-6.052	-10.458	-956.101	553.619	0.174

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	150 - 101	Pole	Max Tension	18	0.000	0.000	0.000
			Max. Compression	18	-18.409	0.000	-0.158
			Max. Mx	14	-11.751	526.199	0.073
			Max. My	10	-11.754	-0.016	-526.209
			Max. Vy	14	-18.759	526.199	0.073
			Max. Vx	2	-18.758	0.037	526.128
			Max. Torque	31			1.371
L2	101 - 54	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-33.319	0.209	0.478
			Max. Mx	14	-22.832	1671.848	2.229
			Max. My	2	-22.836	2.166	1669.666
			Max. Vy	14	-30.610	1671.848	2.229
			Max. Vx	2	-30.562	2.166	1669.666
			Max. Torque	31			-2.179
L3	54 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-53.972	0.345	0.556
			Max. Mx	14	-40.491	3697.002	4.722
			Max. My	2	-40.491	4.687	3691.983
			Max. Vy	14	-39.194	3697.002	4.722
			Max. Vx	2	-39.147	4.687	3691.983
			Max. Torque	31			-2.288

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	31	53.972	33.455	0.036
	Max. H_x	14	40.535	39.148	0.041
	Max. H_z	2	40.535	0.041	39.101
	Max. M_x	2	3691.983	0.041	39.101
	Max. M_z	6	3696.418	-39.148	-0.041
	Max. Torsion	23	2.285	-33.455	-0.036
	Min. Vert	1	40.535	0.000	0.000
	Min. H_x	6	40.535	-39.148	-0.041
	Min. H_z	10	40.535	-0.041	-39.101
	Min. M_x	10	-3691.313	-0.041	-39.101
	Min. M_z	14	-3697.002	39.148	0.041
	Min. Torsion	31	-2.286	33.455	0.036

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	40.535	0.000	0.000	-0.319	0.280	0.000
Dead+Wind 0 deg - No Ice	40.535	-0.041	-39.101	-3691.983	4.687	-0.361
Dead+Wind 30 deg - No Ice	40.535	19.539	-33.842	-3195.208	-1844.274	-1.181
Dead+Wind 45 deg - No Ice	40.535	27.653	-27.619	-2607.621	-2610.591	-1.484
Dead+Wind 60 deg - No Ice	40.535	33.883	-19.515	-1842.349	-3198.977	-1.685
Dead+Wind 90 deg - No Ice	40.535	39.148	0.041	4.069	-3696.418	-1.738
Dead+Wind 120 deg - No Ice	40.535	33.924	19.586	1849.296	-3203.347	-1.325
Dead+Wind 135 deg - No Ice	40.535	27.711	27.677	2613.159	-2616.782	-0.974
Dead+Wind 150 deg - No Ice	40.535	19.609	33.883	3198.921	-1851.869	-0.557
Dead+Wind 180 deg - No Ice	40.535	0.041	39.101	3691.313	-4.103	0.360
Dead+Wind 210 deg - No Ice	40.535	-19.539	33.842	3194.543	1844.850	1.181
Dead+Wind 225 deg - No Ice	40.535	-27.653	27.619	2606.960	2611.166	1.484
Dead+Wind 240 deg - No Ice	40.535	-33.883	19.515	1841.694	3199.553	1.686
Dead+Wind 270 deg - No Ice	40.535	-39.148	-0.041	-4.721	3697.002	1.738
Dead+Wind 300 deg - No Ice	40.535	-33.924	-19.586	-1849.953	3203.940	1.325
Dead+Wind 315 deg - No Ice	40.535	-27.711	-27.677	-2613.821	2617.376	0.974
Dead+Wind 330 deg - No Ice	40.535	-19.609	-33.883	-3199.587	1852.461	0.556
Dead+Ice+Temp	53.972	0.000	0.000	-0.556	0.345	0.000
Dead+Wind 0 deg+Ice+Temp	53.972	-0.036	-33.414	-3233.616	4.262	-0.316
Dead+Wind 30 deg+Ice+Temp	53.972	16.697	-28.919	-2798.527	-1615.029	-1.416
Dead+Wind 45 deg+Ice+Temp	53.972	23.631	-23.602	-2283.927	-2286.162	-1.838
Dead+Wind 60 deg+Ice+Temp	53.972	28.955	-16.676	-1613.721	-2801.467	-2.136
Dead+Wind 90 deg+Ice+Temp	53.972	33.455	0.036	3.316	-3237.142	-2.285
Dead+Wind 120 deg+Ice+Temp	53.972	28.991	16.738	1619.293	-2805.336	-1.821
Dead+Wind 135 deg+Ice+Temp	53.972	23.682	23.653	2288.248	-2291.643	-1.393
Dead+Wind 150 deg+Ice+Temp	53.972	16.759	28.955	2801.225	-1621.755	-0.870
Dead+Wind 180 deg+Ice+Temp	53.972	0.036	33.414	3232.423	-3.529	0.315
Dead+Wind 210 deg+Ice+Temp	53.972	-16.697	28.919	2797.342	1615.747	1.416
Dead+Wind 225 deg+Ice+Temp	53.972	-23.631	23.602	2282.751	2286.878	1.839
Dead+Wind 240 deg+Ice+Temp	53.972	-28.955	16.676	1612.552	2802.184	2.137
Dead+Wind 270 deg+Ice+Temp	53.972	-33.455	-0.036	-4.476	3237.875	2.286
Dead+Wind 300 deg+Ice+Temp	53.972	-28.991	-16.738	-1620.462	2806.083	1.821
Dead+Wind 315 deg+Ice+Temp	53.972	-23.682	-23.653	-2289.425	2292.392	1.393
Dead+Wind 330 deg+Ice+Temp	53.972	-16.759	-28.955	-2802.411	1622.502	0.869
Dead+Wind 0 deg - Service	40.535	-0.013	-12.068	-1141.216	1.652	-0.112
Dead+Wind 30 deg - Service	40.535	6.030	-10.445	-987.688	-569.754	-0.367
Dead+Wind 45 deg - Service	40.535	8.535	-8.525	-806.099	-806.579	-0.461
Dead+Wind 60 deg - Service	40.535	10.458	-6.023	-569.599	-988.416	-0.524
Dead+Wind 90 deg - Service	40.535	12.083	0.013	1.022	-1142.153	-0.541

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 120 deg - Service	40.535	10.470	6.045	571.280	-989.773	-0.412
Dead+Wind 135 deg - Service	40.535	8.553	8.542	807.347	-808.498	-0.303
Dead+Wind 150 deg - Service	40.535	6.052	10.458	988.373	-572.106	-0.173
Dead+Wind 180 deg - Service	40.535	0.013	12.068	1140.543	-1.064	0.112
Dead+Wind 210 deg - Service	40.535	-6.030	10.445	987.015	570.341	0.367
Dead+Wind 225 deg - Service	40.535	-8.535	8.525	805.427	807.165	0.461
Dead+Wind 240 deg - Service	40.535	-10.458	6.023	568.928	989.003	0.524
Dead+Wind 270 deg - Service	40.535	-12.083	-0.013	-1.694	1142.740	0.541
Dead+Wind 300 deg - Service	40.535	-10.470	-6.045	-571.951	990.361	0.412
Dead+Wind 315 deg - Service	40.535	-8.553	-8.542	-808.019	809.086	0.303
Dead+Wind 330 deg - Service	40.535	-6.052	-10.458	-989.045	572.694	0.173

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-40.535	0.000	0.000	40.535	0.000	0.000%
2	-0.041	-40.535	-39.101	0.041	40.535	39.101	0.000%
3	19.539	-40.535	-33.842	-19.539	40.535	33.842	0.000%
4	27.653	-40.535	-27.619	-27.653	40.535	27.619	0.000%
5	33.883	-40.535	-19.515	-33.883	40.535	19.515	0.000%
6	39.148	-40.535	0.041	-39.148	40.535	-0.041	0.000%
7	33.924	-40.535	19.586	-33.924	40.535	-19.586	0.000%
8	27.711	-40.535	27.677	-27.711	40.535	-27.677	0.000%
9	19.609	-40.535	33.883	-19.609	40.535	-33.883	0.000%
10	0.041	-40.535	39.101	-0.041	40.535	-39.101	0.000%
11	-19.539	-40.535	33.842	19.539	40.535	-33.842	0.000%
12	-27.653	-40.535	27.619	27.653	40.535	-27.619	0.000%
13	-33.883	-40.535	19.515	33.883	40.535	-19.515	0.000%
14	-39.148	-40.535	-0.041	39.148	40.535	0.041	0.000%
15	-33.924	-40.535	-19.586	33.924	40.535	19.586	0.000%
16	-27.711	-40.535	-27.677	27.711	40.535	27.677	0.000%
17	-19.609	-40.535	-33.883	19.609	40.535	33.883	0.000%
18	0.000	-53.972	0.000	0.000	53.972	0.000	0.000%
19	-0.036	-53.972	-33.414	0.036	53.972	33.414	0.000%
20	16.697	-53.972	-28.919	-16.697	53.972	28.919	0.000%
21	23.631	-53.972	-23.602	-23.631	53.972	23.602	0.000%
22	28.955	-53.972	-16.676	-28.955	53.972	16.676	0.000%
23	33.455	-53.972	0.036	-33.455	53.972	-0.036	0.000%
24	28.991	-53.972	16.738	-28.991	53.972	-16.738	0.000%
25	23.682	-53.972	23.653	-23.682	53.972	-23.653	0.000%
26	16.759	-53.972	28.955	-16.759	53.972	-28.955	0.000%
27	0.036	-53.972	33.414	-0.036	53.972	-33.414	0.000%
28	-16.697	-53.972	28.919	16.697	53.972	-28.919	0.000%
29	-23.631	-53.972	23.602	23.631	53.972	-23.602	0.000%
30	-28.955	-53.972	16.676	28.955	53.972	-16.676	0.000%
31	-33.455	-53.972	-0.036	33.455	53.972	0.036	0.000%
32	-28.991	-53.972	-16.738	28.991	53.972	16.738	0.000%
33	-23.682	-53.972	-23.653	23.682	53.972	23.653	0.000%
34	-16.759	-53.972	-28.955	16.759	53.972	28.955	0.000%
35	-0.013	-40.535	-12.068	0.013	40.535	12.068	0.000%
36	6.030	-40.535	-10.445	-6.030	40.535	10.445	0.000%
37	8.535	-40.535	-8.525	-8.535	40.535	8.525	0.000%
38	10.458	-40.535	-6.023	-10.458	40.535	6.023	0.000%
39	12.083	-40.535	0.013	-12.083	40.535	-0.013	0.000%
40	10.470	-40.535	6.045	-10.470	40.535	-6.045	0.000%
41	8.553	-40.535	8.542	-8.553	40.535	-8.542	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	6.052	-40.535	10.458	-6.052	40.535	-10.458	0.000%
43	0.013	-40.535	12.068	-0.013	40.535	-12.068	0.000%
44	-6.030	-40.535	10.445	6.030	40.535	-10.445	0.000%
45	-8.535	-40.535	8.525	8.535	40.535	-8.525	0.000%
46	-10.458	-40.535	6.023	10.458	40.535	-6.023	0.000%
47	-12.083	-40.535	-0.013	12.083	40.535	0.013	0.000%
48	-10.470	-40.535	-6.045	10.470	40.535	6.045	0.000%
49	-8.553	-40.535	-8.542	8.553	40.535	8.542	0.000%
50	-6.052	-40.535	-10.458	6.052	40.535	10.458	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	0.00019934
3	Yes	5	0.00000001	0.00046929
4	Yes	5	0.00000001	0.00052556
5	Yes	5	0.00000001	0.00048500
6	Yes	4	0.00000001	0.00044870
7	Yes	5	0.00000001	0.00046942
8	Yes	5	0.00000001	0.00052693
9	Yes	5	0.00000001	0.00048089
10	Yes	4	0.00000001	0.00017384
11	Yes	5	0.00000001	0.00048164
12	Yes	5	0.00000001	0.00052544
13	Yes	5	0.00000001	0.00046623
14	Yes	4	0.00000001	0.00051458
15	Yes	5	0.00000001	0.00048571
16	Yes	5	0.00000001	0.00052747
17	Yes	5	0.00000001	0.00047394
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00018367
20	Yes	6	0.00000001	0.00005701
21	Yes	6	0.00000001	0.00006496
22	Yes	6	0.00000001	0.00005921
23	Yes	5	0.00000001	0.00019109
24	Yes	6	0.00000001	0.00005686
25	Yes	6	0.00000001	0.00006512
26	Yes	6	0.00000001	0.00005865
27	Yes	5	0.00000001	0.00018343
28	Yes	6	0.00000001	0.00005864
29	Yes	6	0.00000001	0.00006492
30	Yes	5	0.00000001	0.00099774
31	Yes	5	0.00000001	0.00019260
32	Yes	6	0.00000001	0.00005937
33	Yes	6	0.00000001	0.00006522
34	Yes	6	0.00000001	0.00005749
35	Yes	4	0.00000001	0.00003924
36	Yes	4	0.00000001	0.00060786
37	Yes	4	0.00000001	0.00072489
38	Yes	4	0.00000001	0.00066036
39	Yes	4	0.00000001	0.00007649
40	Yes	4	0.00000001	0.00060617
41	Yes	4	0.00000001	0.00072679
42	Yes	4	0.00000001	0.00064244

43	Yes	4	0.00000001	0.00003831
44	Yes	4	0.00000001	0.00064822
45	Yes	4	0.00000001	0.00072445
46	Yes	4	0.00000001	0.00059900
47	Yes	4	0.00000001	0.00007945
48	Yes	4	0.00000001	0.00066016
49	Yes	4	0.00000001	0.00072955
50	Yes	4	0.00000001	0.00062056

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 101	31.850	48	1.719	0.001
L2	104 - 54	16.194	48	1.429	0.002
L3	58 - 0	5.094	48	0.819	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.000	10-ft Dipole	48	31.492	1.714	0.001	49207
138.000	(2) DB980H90E-M	48	27.573	1.663	0.002	20502
129.000	(2) RRUS-11	48	24.416	1.616	0.002	11715
127.000	7770.00	48	23.725	1.605	0.002	10696
125.000	Valmont 13' Low Profile Platform	48	23.038	1.593	0.002	9840
113.000	APX16DWV-16DWV-S-E-ACU	48	19.032	1.509	0.002	6648
104.000	4'-6" Standoff	48	16.194	1.429	0.002	5371
80.000	DB846F65ZAXY	48	9.584	1.137	0.001	3842
78.000	Valmont 13' Low Profile Platform	48	9.108	1.110	0.001	3754
40.000	Stand-off	48	2.716	0.559	0.000	4427

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 101	102.769	14	5.553	0.008
L2	104 - 54	52.300	15	4.616	0.008
L3	58 - 0	16.468	15	2.648	0.003

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
149.000	10-ft Dipole	14	101.616	5.538	0.008	15501
138.000	(2) DB980H90E-M	15	88.980	5.373	0.009	6457
129.000	(2) RRUS-11	15	78.807	5.221	0.009	3688
127.000	7770.00	15	76.579	5.184	0.009	3367
125.000	Valmont 13' Low Profile Platform	15	74.364	5.146	0.009	3097
113.000	APX16DWV-16DWV-S-E-ACU	15	61.452	4.875	0.009	2090
104.000	4'-6" Standoff	15	52.300	4.616	0.008	1686
80.000	DB846F65ZAXY	15	30.969	3.676	0.006	1199
78.000	Valmont 13' Low Profile Platform	15	29.431	3.586	0.006	1171
40.000	Stand-off	15	8.785	1.809	0.001	1373

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	150 - 101 (1)	TP32.25x23.33x0.281	49.000	0.000	0.0	39.000	28.462	-11.751	1110.020	0.011
L2	101 - 54 (2)	TP40.15x31.141x0.375	50.000	0.000	0.0	39.000	47.158	-22.830	1839.160	0.012
L3	54 - 0 (3)	TP50.91x38.679x0.438	58.000	0.000	0.0	39.000	71.103	-40.490	2773.020	0.015

Pole Bending Design Data

Section No.	Elevation	Size	Actual M_x	Actual f_{bx}	Allow. F_{bx}	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y	Actual f_{by}	Allow. F_{by}	Ratio $\frac{f_{by}}{F_{by}}$
	ft		kip-ft	ksi	ksi		kip-ft	ksi	ksi	
L1	150 - 101 (1)	TP32.25x23.33x0.281	526.235	28.911	39.000	0.741	0.000	0.000	39.000	0.000
L2	101 - 54 (2)	TP40.15x31.141x0.375	1673.100	44.665	39.000	1.145	0.000	0.000	39.000	0.000
L3	54 - 0 (3)	TP50.91x38.679x0.438	3699.667	50.640	39.000	1.298	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V	Actual f_v	Allow. F_v	Ratio $\frac{f_v}{F_v}$	Actual T	Actual f_{vt}	Allow. F_{vt}	Ratio $\frac{f_{vt}}{F_{vt}}$
	ft		K	ksi	ksi		kip-ft	ksi	ksi	
L1	150 - 101 (1)	TP32.25x23.33x0.281	18.760	0.659	26.000	0.052	0.272	0.007	26.000	0.000
L2	101 - 54 (2)	TP40.15x31.141x0.375	30.635	0.650	26.000	0.051	1.328	0.017	26.000	0.001
L3	54 - 0 (3)	TP50.91x38.679x0.438	39.218	0.552	26.000	0.043	1.325	0.009	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	150 - 101 (1)	0.011	0.741	0.000	0.052	0.000	0.753 ✓	1.333	H1-3+VT ✓
L2	101 - 54 (2)	0.012	1.145	0.000	0.051	0.001	1.158 ✓	1.333	H1-3+VT ✓
L3	54 - 0 (3)	0.015	1.298	0.000	0.043	0.000	1.314 ✓	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	150 - 101	Pole	TP32.25x23.33x0.281	1	-11.751	1479.657	56.5	Pass
L2	101 - 54	Pole	TP40.15x31.141x0.375	2	-22.830	2451.600	86.9	Pass
L3	54 - 0	Pole	TP50.91x38.679x0.438	3	-40.490	3696.436	98.5	Pass
							Summary	
						Pole (L3)	98.5	Pass
						RATING =	**98.5**	**Pass**

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	150-ft Valmont Monopole Fairfield, CT
Rev. 0: 8/9/12	Prepared by: T.J.L. Checked by: C.F.C. Job No. 12001.CO92

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 3700 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 39 \cdot kips$	(Input From RisaTower)
Axial Force =	$Axial := 41 \cdot kips$	(Input From RisaTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 16$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 57.85 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strenght =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yeild Strenght =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Base Plate Data:

Use ASTM A633 Gr. 60

Plate Yield Strength =	$Fy_{bp} := 60 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{bp} := 2.75 \cdot in$	(User Input)
Base Plate Diameter =	$D_{bp} := 63.85 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 49.6 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 28.925 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 11.07 \cdot in$ $d_7 = 11.07 \cdot in$

$d_2 = 20.45 \cdot in$ $d_8 = 0.00 \cdot in$

$d_3 = 26.72 \cdot in$ $d_9 = -11.07 \cdot in$

$d_4 = 28.93 \cdot in$ $d_{10} = -20.45 \cdot in$

$d_5 = 26.72 \cdot in$ $d_{11} = -26.72 \cdot in$

$d_6 = 20.45 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 24.8 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 1.92 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 4.12 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 1.92 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ etc

Effective Width of Baseplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 32.2 \cdot in$

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	150-ft Valmont Monopole Fairfield, CT
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Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i (d_i)^2 = 6.693 \times 10^3 \cdot in^2$

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 = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 189.3 \cdot kips$

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

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

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 97.2 \cdot \%$ 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"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.609 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 8.9 \cdot ksi$

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:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{l_p} + \frac{Axial}{N} = 194.4 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 59.9 \cdot ksi$$

$$K := 0.65$$

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

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

Allowable Compressive Stress =

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

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 99.8 \cdot \%$$

Condition 2 =

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

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 76.0 \cdot kips$ $C_7 = 76.0 \cdot kips$

$C_2 = 138.2 \cdot kips$ $C_8 = 2.6 \cdot kips$

$C_3 = 179.8 \cdot kips$ $C_9 = -70.9 \cdot kips$

$C_4 = 194.4 \cdot kips$ $C_{10} = -133.1 \cdot kips$

$C_5 = 179.8 \cdot kips$ $C_{11} = -174.7 \cdot kips$

$C_6 = 138.2 \cdot kips$ etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 36.8 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 59.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 61.6 \cdot \%$

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

Condition3 = "Ok"

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Subject: CAISSON FOUNDATION ANALYSIS

Location: Fairfield, CT

Rev. 0: 8/9/12

Prepared by: TJL Checked by: C.F.C.
Job No. 12001.CO92

Caisson Foundation:

Input Data:

Shear Force =	$S := 39k$	*USER INPUT-FROM PLS-Pole*
Overturning Moment =	$M := 3700ft \cdot k$	*USER INPUT-FROM PLS-Pole*
Applied Axial Load =	$A1 := 41k$	*USER INPUT-FROM PLS-Pole*
Bending Moment =	$Mu := 3875ft \cdot k$	*USER INPUT--FROM LPILE*
Moment Capacity =	$Mn := 9372ft \cdot k$	*USER INPUT--FROM LPILE*
Foundation Diameter =	$d := 6.6ft$	*USER INPUT*
Overall Length of Caisson =	$L_c := 26.5ft$	*USER INPUT*
Depth From Top of Caisson to Grade =	$L_{pag} := 1ft$	*USER INPUT*
Number of Rebar =	$n := 40$	*USER INPUT*
Area of Rebar =	$Ar := 1.56in^2$	*USER INPUT*
Rebar Yield Strength =	$fy := 60ksi$	*USER INPUT*
Concrete Comp Strength =	$f'c := 3.0ksi$	*USER INPUT*

Check Foundation Depth:

Depth of Caisson Below Ground Level = $LD := L_c - L_{pag} = 25.5ft$ (TIA/EIA-222-F 7.2.5)

Depth Required = $LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d}\right) + 2ft \cdot .5\left(\frac{M \cdot ft}{3 \cdot kd} + \frac{S \cdot ft}{2k} + \frac{S^2 ft^3}{18k^2 d^2}\right)^{.5} = 32.84ft$

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

$DepthCheck = "NO GOOD"$ Note: Result not applicable. Actual soil is better than normal soil as defined in TIA/EIA 222 F. Refer to L-Pile analysis.

Check Moment Capacity:

Factor of Safety = $FS := \frac{Mn}{Mu} = 2.4$

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

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

$FOSCheck = "OK"$

Check Axial Capacity:

Concrete Weight = $A2 := .150\frac{k}{ft^3} \cdot LD \cdot \pi\frac{d^2}{4} = 130.9 \cdot kips$

Total Axial Load = $AT := A1 + A2 = 171.9 \cdot kips$

Area of Concrete = $Ag := \pi \cdot \frac{d^2}{4} = 34.21ft^2$

Axial Capacity = $Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot f'c = 16147.5 \cdot kips$

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

$AxialCheck = "OK"$

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

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This program is licensed to:

TJL
Centek Engineering Inc

Path to file locations: J:\Jobs\1200100.WI\CO92 - Fairfield 2\Calcs\MathCad\Foundation\
Name of input data file: Caisson Analysis.lpd
Name of output file: Caisson Analysis.lpo
Name of plot output file: Caisson Analysis.lpp
Name of runtime file: Caisson Analysis.lpr

Time and Date of Analysis

Date: August 9, 2012 Time: 10:36:18

Problem Title

12001.CO92 - Fairfield 2

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 = 318.00 in

Depth of ground surface below top of pile = 12.00 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	78.00000000	1816972.	4778.4000	3122018.
2	318.0000	78.00000000	1816972.	4778.4000	3122018.

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 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 12.000 in
Distance from top of pile to bottom of layer = 48.000 in
p-y subgrade modulus k for top of soil layer = 10.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 10.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 48.000 in
Distance from top of pile to bottom of layer = 114.000 in
p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 114.000 in
Distance from top of pile to bottom of layer = 318.000 in
p-y subgrade modulus k for top of soil layer = 27.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 27.000 lbs/in**3

(Depth of lowest layer extends .00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	.05700
2	48.00	.05700
3	48.00	.06900
4	114.00	.06900
5	114.00	.06100
6	318.00	.06100

Shear Strength of Soils

Shear strength parameters with depth defined using 6 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	12.000	.00000	30.00	------	------
2	48.000	.00000	30.00	------	------
3	48.000	.00000	35.00	------	------
4	114.000	.00000	35.00	------	------
5	114.000	.00000	30.00	------	------
6	318.000	.00000	30.00	------	------

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 = 2

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 39000.000 lbs
Bending moment at pile head = 44400000.000 in-lbs
Axial load at pile head = 41000.000 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.

Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 12000.000 lbs
Bending moment at pile head = 13728000.000 in-lbs
Axial load at pile head = 41000.000 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 = 78.0000 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 = 40
Area of Single Bar = 1.56000 in**2
Number of Rows of Reinforcing Bars = 21
Area of Steel = 62.400 in**2
Area of Shaft = 4778.362 in**2
Percentage of Steel Reinforcement = 1.306 percent
Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 15769.70 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	35.000
2	3.120	34.569
3	3.120	33.287
4	3.120	31.185
5	3.120	28.316
6	3.120	24.749
7	3.120	20.572
8	3.120	15.890
9	3.120	10.816
10	3.120	5.475
11	3.120	0.000
12	3.120	-5.475
13	3.120	-10.816
14	3.120	-15.890
15	3.120	-20.572
16	3.120	-24.749
17	3.120	-28.316
18	3.120	-31.185
19	3.120	-33.287
20	3.120	-34.569

21 1.560 -35.000

Axial Thrust Force = 41000.00 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
5671494.	6.805793E+12	8.333333E-07	.00003506	42.07798836	107.56892	920.21805
11278153.	6.766892E+12	.00000167	.00006769	40.61118928	205.44308	1769.54082
16820362.	6.728145E+12	.00000250	.00010035	40.13927838	301.44177	2620.09768
22296656.	6.688997E+12	.00000333	.00013297	39.89043894	395.30948	3469.40910
22296656.	5.351197E+12	.00000417	.00009995	23.98887894	297.06900	6043.01046
22296656.	4.459331E+12	.00000500	.00011856	23.71164939	350.22296	7291.81084
22296656.	3.822284E+12	.00000583	.00013719	23.51903459	402.83352	8539.69665
22296656.	3.344498E+12	.00000667	.00015600	23.39999977	455.29120	9782.66671
22296656.	2.972887E+12	.00000750	.00017479	23.30481747	507.04517	11026.20220
22296656.	2.675599E+12	.00000833	.00019351	23.22077224	557.96853	12271.64671
22296656.	2.432362E+12	.00000917	.00021226	23.15577230	608.34403	13516.09053
22296656.	2.229666E+12	.00001000	.00023105	23.10508713	658.16882	14759.52473
22740478.	2.099121E+12	.00001083	.00024988	23.06544837	707.44022	16001.93830
24414400.	2.092663E+12	.00001167	.00026874	23.03451750	756.15536	17243.32158
26085253.	2.086820E+12	.00001250	.00028763	23.01058128	804.31135	18483.66428
27753014.	2.081476E+12	.00001333	.00030656	22.99235657	851.90534	19722.95546
29417654.	2.076540E+12	.00001417	.00032553	22.97886005	898.93430	20961.18500
31079148.	2.071943E+12	.00001500	.00034454	22.96932927	945.39527	22198.34177
32737471.	2.067630E+12	.00001583	.00036358	22.96316448	991.28529	23434.41364
34392593.	2.063556E+12	.00001667	.00038266	22.95988217	1036.60118	24669.39028
36044489.	2.059685E+12	.00001750	.00040178	22.95909414	1081.33985	25903.25973
37693127.	2.055989E+12	.00001833	.00042094	22.96048191	1125.49809	27136.01045
39338480.	2.052442E+12	.00001917	.00044014	22.96378282	1169.07265	28367.63072
40980521.	2.049026E+12	.00002000	.00045938	22.96878067	1212.06033	29598.10721
42619218.	2.045722E+12	.00002083	.00047865	22.97529182	1254.45778	30827.42786
44254539.	2.042517E+12	.00002167	.00049797	22.98316053	1296.26152	32055.58080
45886459.	2.039398E+12	.00002250	.00051733	22.99225894	1337.46829	33282.55104
47514938.	2.036354E+12	.00002333	.00053672	23.00247082	1378.07436	34508.32808
49139950.	2.033377E+12	.00002417	.00055616	23.01370320	1418.07635	35732.89634
50761461.	2.030458E+12	.00002500	.00057565	23.02587238	1457.47060	36956.24252
52379438.	2.027591E+12	.00002583	.00059517	23.03890631	1496.25343	38178.35269
53993846.	2.024769E+12	.00002667	.00061474	23.05274221	1534.42109	39399.21269
55604647.	2.021987E+12	.00002750	.00063435	23.06732431	1571.96970	40618.80886
57211815.	2.019241E+12	.00002833	.00065401	23.08260843	1608.89560	41837.12341
58815308.	2.016525E+12	.00002917	.00067371	23.09855041	1645.19473	43054.14278
60415089.	2.013836E+12	.00003000	.00069345	23.11511305	1680.86308	44269.85165
62011121.	2.011171E+12	.00003083	.00071324	23.13226381	1715.89656	45484.23411
63603367.	2.008527E+12	.00003167	.00073308	23.14997479	1750.29108	46697.27315
65191788.	2.005901E+12	.00003250	.00075297	23.16822043	1784.04240	47908.95224
68356994.	2.000693E+12	.00003417	.00079288	23.20622733	1849.59812	50328.16308
71506410.	1.995528E+12	.00003583	.00083299	23.24613342	1912.52829	52741.72636
74639691.	1.990392E+12	.00003750	.00087329	23.28782013	1972.79616	55149.49561
77756485.	1.985272E+12	.00003917	.00091381	23.33119681	2030.36361	57551.31562
80856415.	1.980157E+12	.00004083	.00095453	23.37619141	2085.19085	59947.02668
83421121.	1.962850E+12	.00004250	.00099304	23.36564246	2134.15545	60000.00000
85545048.	1.936869E+12	.00004417	.00102967	23.31333008	2178.13824	60000.00000
87305325.	1.904843E+12	.00004583	.00106466	23.22896639	2217.79779	60000.00000
88933076.	1.872275E+12	.00004750	.00109911	23.13923988	2254.64740	60000.00000
90345412.	1.837534E+12	.00004917	.00113256	23.03510097	2288.31567	60000.00000
91728051.	1.804486E+12	.00005083	.00116599	22.93760106	2319.93800	60000.00000
92831574.	1.768220E+12	.00005250	.00119791	22.81728771	2348.17781	60000.00000
93928885.	1.734072E+12	.00005417	.00122993	22.70639125	2374.65917	60000.00000
95019901.	1.701849E+12	.00005583	.00126206	22.60410503	2399.36398	60000.00000
95871927.	1.667338E+12	.00005750	.00129272	22.48203662	2421.14925	60000.00000
96700417.	1.634373E+12	.00005917	.00132335	22.36639801	2441.21662	60000.00000
97523662.	1.603129E+12	.00006083	.00135407	22.25873736	2459.64556	60000.00000
98341573.	1.573465E+12	.00006250	.00138490	22.15843865	2476.41952	60000.00000
99263122.	1.546958E+12	.00006417	.00141808	22.10000101	2492.58936	60000.00000
99669456.	1.513966E+12	.00006583	.00144718	21.98254922	2505.06602	60000.00000
1.002603E+08	1.485338E+12	.00006750	.00147612	21.86844018	2515.95564	60000.00000
1.008470E+08	1.458029E+12	.00006917	.00150515	21.76118401	2525.36558	60000.00000
1.014295E+08	1.431945E+12	.00007083	.00153427	21.66031811	2533.28095	60000.00000
1.020076E+08	1.407001E+12	.00007250	.00156349	21.56542405	2539.68651	60000.00000
1.024825E+08	1.381786E+12	.00007417	.00159179	21.46228471	2544.41641	60000.00000
1.028911E+08	1.356806E+12	.00007583	.00161952	21.35627452	2547.65307	60000.00000
1.032962E+08	1.332854E+12	.00007750	.00164734	21.25594327	2549.51245	60000.00000
1.036972E+08	1.309859E+12	.00007917	.00167524	21.16094461	2549.22320	60000.00000
1.040924E+08	1.287741E+12	.00008083	.00170324	21.07096472	2544.71208	60000.00000
1.044849E+08	1.266483E+12	.00008250	.00173132	20.98572001	2547.67415	60000.00000
1.048746E+08	1.246035E+12	.00008417	.00175950	20.90494081	2549.44091	60000.00000
1.052615E+08	1.226348E+12	.00008583	.00178777	20.82840863	2549.81719	60000.00000
1.055803E+08	1.206632E+12	.00008750	.00182000	20.79999992	2544.73421	60000.00000
1.059462E+08	1.188182E+12	.00008917	.00184821	20.72755203	2546.38895	60000.00000
1.061997E+08	1.169171E+12	.00009083	.00187451	20.63677016	2548.43988	60000.00000
1.064517E+08	1.150829E+12	.00009250	.00190088	20.55004236	2549.64533	60000.00000
1.067019E+08	1.133117E+12	.00009417	.00192733	20.46722218	2549.66078	60000.00000
1.069490E+08	1.115990E+12	.00009583	.00195390	20.38856998	2545.94955	60000.00000
1.071949E+08	1.099435E+12	.00009750	.00198054	20.31323031	2543.39132	60000.00000
1.074396E+08	1.083425E+12	.00009917	.00200724	20.24104276	2546.10055	60000.00000

1.079254E+08	1.052931E+12	.00010250	.00206082	20.10554293	2549.39665	60000.00000
1.084049E+08	1.024298E+12	.00010583	.00211470	19.98143354	2547.57842	60000.00000
1.088360E+08	9.969712E+11	.00010917	.00216808	19.86023918	2542.14046	60000.00000
1.091445E+08	9.701734E+11	.00011250	.00221931	19.72717318	2546.70943	60000.00000
1.094505E+08	9.448960E+11	.00011583	.00227072	19.60329857	2549.32933	60000.00000
1.094505E+08	9.184654E+11	.00011917	.00232375	19.49999884	2548.72474	60000.00000
1.101154E+08	8.989014E+11	.00012250	.00238362	19.45815638	2541.64281	60000.00000
1.104012E+08	8.773605E+11	.00012583	.00243415	19.34426585	2542.98940	60000.00000
1.106855E+08	8.569201E+11	.00012917	.00248481	19.23727003	2546.71965	60000.00000
1.109684E+08	8.374972E+11	.00013250	.00253561	19.13666680	2549.05830	60000.00000
1.112497E+08	8.190165E+11	.00013583	.00258654	19.04200056	2549.98433	60000.00000
1.115214E+08	8.013516E+11	.00013917	.00263804	18.95596084	2545.85309	60000.00000
1.117476E+08	7.841936E+11	.00014250	.00268934	18.87258509	2541.03429	60000.00000
1.118796E+08	7.671743E+11	.00014583	.00273982	18.78735897	2537.84066	60000.00000
1.119998E+08	7.508365E+11	.00014917	.00279106	18.71098951	2542.33964	60000.00000
1.121191E+08	7.352071E+11	.00015250	.00284240	18.63868573	2545.81803	60000.00000
1.122375E+08	7.202405E+11	.00015583	.00289386	18.57019660	2548.26096	60000.00000
1.123550E+08	7.058950E+11	.00015917	.00294543	18.50529894	2549.65325	60000.00000
1.124711E+08	6.921301E+11	.00016250	.00299715	18.44398579	2549.18117	60000.00000
1.125537E+08	6.787160E+11	.00016583	.00305122	18.39933291	2544.63668	60000.00000
1.126354E+08	6.658251E+11	.00016917	.00310541	18.35711852	2540.07204	60000.00000
1.127163E+08	6.534280E+11	.00017250	.00315971	18.31714734	2535.48889	60000.00000
1.127965E+08	6.414966E+11	.00017583	.00321411	18.27930084	2536.08607	60000.00000
1.128758E+08	6.300046E+11	.00017917	.00326862	18.24346974	2540.73564	60000.00000
1.129544E+08	6.189281E+11	.00018250	.00332324	18.20955643	2544.45925	60000.00000
1.131580E+08	6.089218E+11	.00018583	.00338217	18.20000008	2547.65936	60000.00000
1.134064E+08	5.995052E+11	.00018917	.00344283	18.20000008	2549.57550	60000.00000
1.136443E+08	5.903599E+11	.00019250	.00350350	18.20000008	2548.72471	60000.00000
1.138690E+08	5.814588E+11	.00019583	.00356417	18.20000008	2543.78409	60000.00000
1.138690E+08	5.717273E+11	.00019917	.00362402	18.19592974	2538.98566	60000.00000
1.138690E+08	5.623162E+11	.00020250	.00368156	18.18055031	2534.59369	60000.00000
1.138690E+08	5.532098E+11	.00020583	.00373938	18.16702124	2530.15290	60000.00000
1.138690E+08	5.443937E+11	.00020917	.00379416	18.13938662	2531.88415	60000.00000
1.138690E+08	5.358542E+11	.00021250	.00384826	18.10944137	2536.17802	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 112475.49353 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 = 39000.000 lbs
Specified moment at pile head = 44400000.000 in-lbs
Specified axial load at pile head = 41000.000 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	1.861	4.44E+07	39000.	-.011006	961.594	2.04E+12	0.000	0.000
25.440	1.588	4.54E+07	37510.	-.010447	982.990	2.04E+12	-213.391	427.392
50.880	1.329	4.63E+07	26741.	-.009875	1001.453	2.04E+12	-1280.672	3063.864
76.320	1.085	4.64E+07	-21695.	-.009295	1004.535	2.04E+12	-2524.018	7395.075
101.760	.856208	4.49E+07	-1.01E+05	-.008724	972.699	2.04E+12	-3639.420	13517.
127.200	.641228	4.13E+07	-1.74E+05	-.008185	894.984	2.05E+12	-2112.280	10475.
152.640	.439258	3.62E+07	-2.24E+05	-.007704	785.983	2.06E+12	-1748.687	12660.
178.080	.248643	3.00E+07	-2.61E+05	-.007295	652.935	2.07E+12	-1160.635	14844.
203.520	.067373	2.31E+07	-2.81E+05	-.006978	503.998	3.67E+12	-360.766	17028.
228.960	-.109038	1.59E+07	-2.78E+05	-.006900	350.295	6.73E+12	658.767	19212.
254.400	-.283914	9.20E+06	-2.46E+05	-.006853	206.006	6.78E+12	1910.320	21397.
279.840	-.457901	3.72E+06	-1.79E+05	-.006829	88.520	6.81E+12	3395.519	23581.
305.280	-.631517	4.61E+05	-70908.	-.006822	18.472	6.81E+12	5116.724	25765.

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 = 1.86063914 in
Computed slope at pile head = -.01100626
Maximum bending moment = 46495187. lbs-in
Maximum shear force = -282960.44896 lbs

Depth of maximum bending moment = 66.78000000 in
Depth of maximum shear force = 213.06000 in
Number of iterations = 22
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 12000.000 lbs
Specified moment at pile head = 13728000.000 in-lbs
Specified axial load at pile head = 41000.000 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	.353211	1.37E+07	12000.	-.001966	303.242	6.75E+12	0.000	0.000
25.440	.303861	1.40E+07	11715.	-.001914	309.811	6.74E+12	-40.839	427.392
50.880	.255857	1.43E+07	8859.368	-.001860	315.819	6.74E+12	-741.541	9216.484
76.320	.209225	1.43E+07	-14814.	-.001806	314.645	6.74E+12	-1085.429	16497.
101.760	.163955	1.35E+07	-44630.	-.001753	298.623	6.75E+12	-1225.971	23778.
127.200	.119976	1.21E+07	-64161.	-.001705	267.526	6.76E+12	-395.216	10475.
152.640	.077150	1.03E+07	-73210.	-.001663	229.953	6.77E+12	-307.135	12660.
178.080	.035309	8.37E+06	-79325.	-.001628	188.174	6.78E+12	-164.816	14844.
203.520	-.005735	6.32E+06	-81141.	-.001600	144.165	6.80E+12	30.712	17028.
228.960	-.046178	4.29E+06	-77312.	-.001580	100.643	6.81E+12	278.989	19212.
254.400	-.086211	2.44E+06	-66495.	-.001568	61.056	6.81E+12	580.069	21397.
279.840	-.126008	9.79E+05	-47343.	-.001562	29.587	6.81E+12	934.400	23581.
305.280	-.165708	1.20E+05	-18492.	-.001560	11.160	6.81E+12	1342.611	25765.

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. 2:

Pile-head deflection = .35321093 in
Computed slope at pile head = -.00196595
Maximum bending moment = 14363306. lbs-in
Maximum shear force = -81195.26165 lbs
Depth of maximum bending moment = 60.42000000 in
Depth of maximum shear force = 200.34000 in
Number of iterations = 5
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= 39000.	M= 4.44E+07	41000.0000	1.8606	4.6495E+07	-282960.
1	V= 12000.	M= 1.37E+07	41000.0000	.3532109	1.4363E+07	-81195.2616

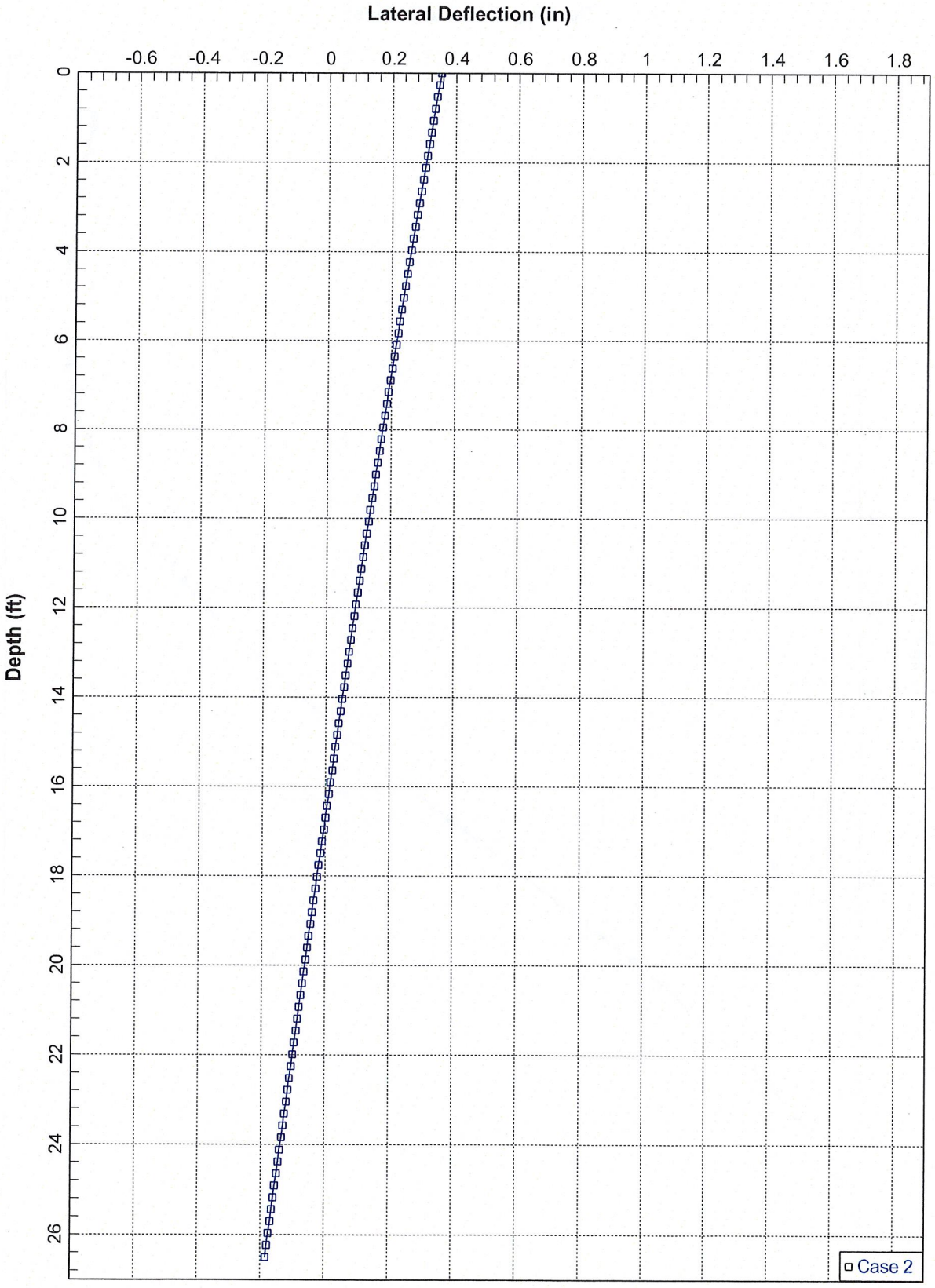
Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

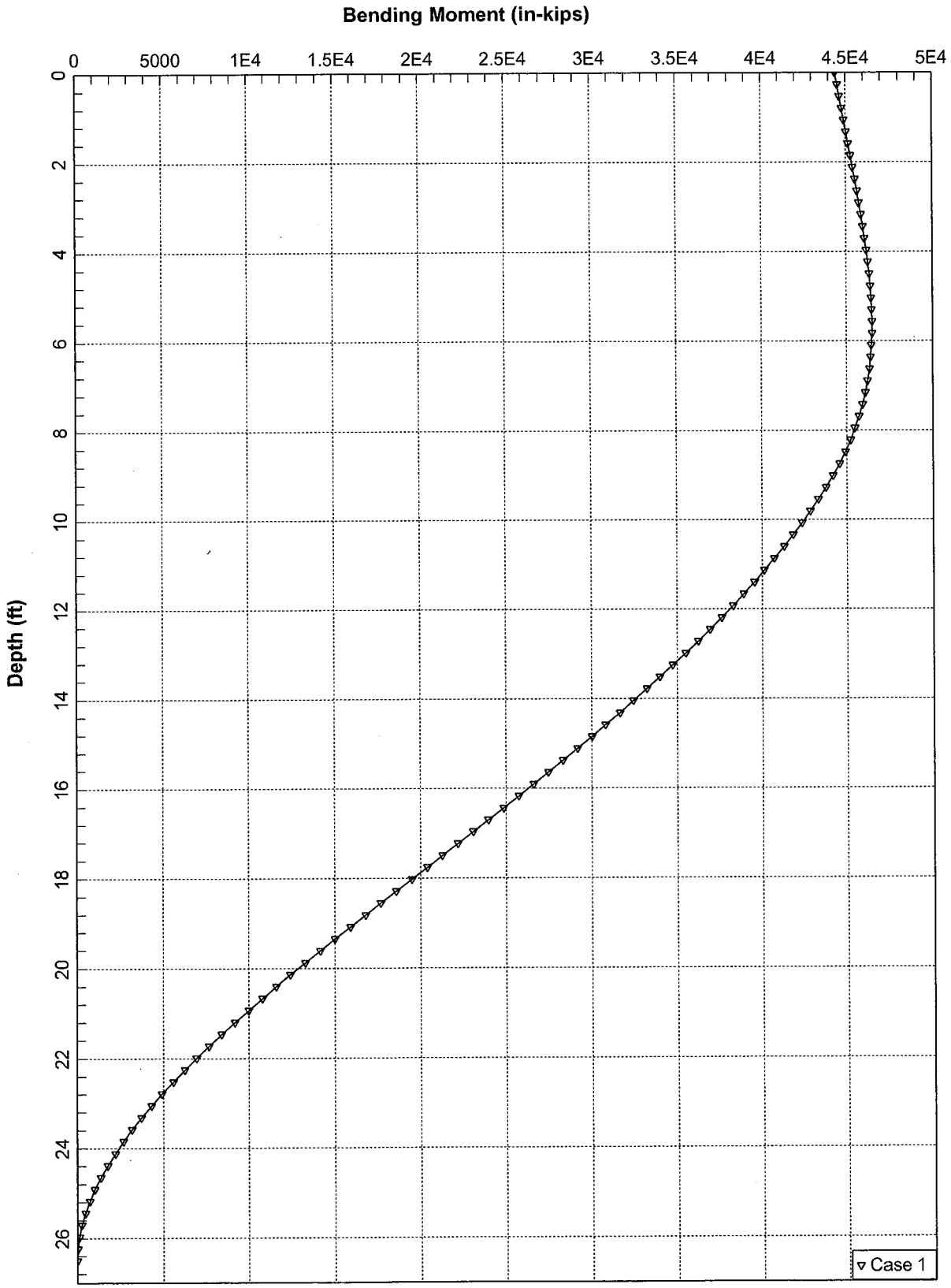
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
.00386211	3900.00006	677690.60551	1009812.	1.754718E+08
.01162610	11740.16983	2040052.	1009812.	1.754718E+08
.01842693	18607.72893	3233406.	1009812.	1.754718E+08
.02325220	23480.33966	4080104.	1009812.	1.754718E+08
.02699496	27259.83017	4736854.	1009812.	1.754718E+08
.03005303	30347.89876	5273458.	1009812.	1.754718E+08
.03263858	32958.82356	5727150.	1009812.	1.754718E+08
.03487917	35220.50949	6120114.	1009786.	1.754662E+08
.03685632	37215.45787	6466693.	1009744.	1.754568E+08
.03862549	39000.00000	6776689.	1009696.	1.754460E+08

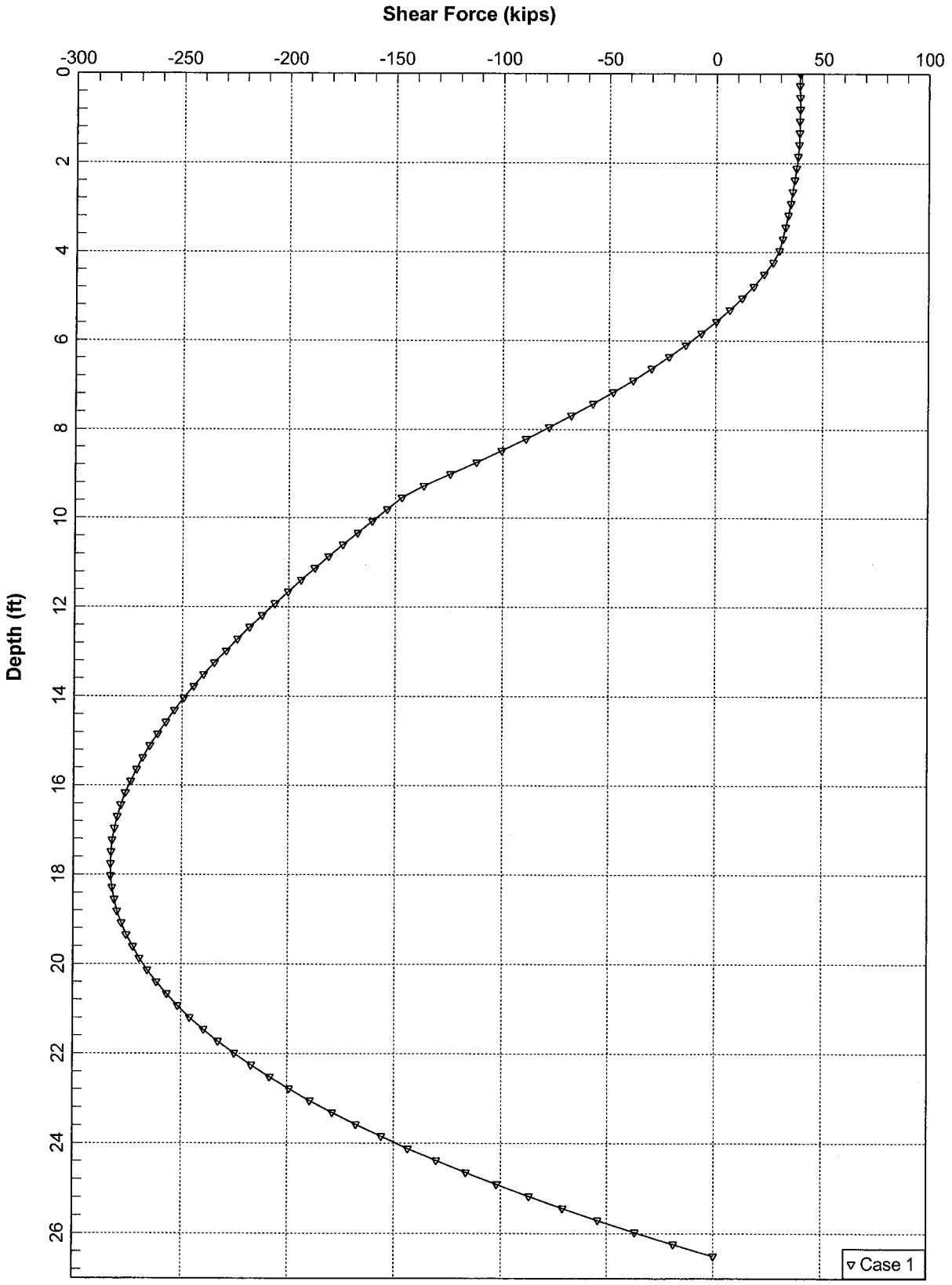
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
.00011519	20212.46336	4440000.	1.754718E+08	3.854526E+10
.00034749	60852.81103	13365732.	1.751210E+08	3.846364E+10
.00055215	96466.62142	21184184.	1.747108E+08	3.836670E+10
.00091523	122428.27624	26731464.	1.337672E+08	2.920724E+10
.00124665	144091.42953	31034268.	1.155831E+08	2.489417E+10
.00147953	162045.20273	34549916.	1.095250E+08	2.335199E+10
.00167036	177413.50578	37522353.	1.062125E+08	2.246359E+10
.00182135	190509.56787	40097195.	1.045982E+08	2.201513E+10
.00196269	202364.95818	42368367.	1.031058E+08	2.158687E+10
.00207542	212602.55609	44400000.	1.024385E+08	2.139329E+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)
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Case 2


Bending Moment (in-kips)
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
4.5E4
5E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Case 1


Shear Force (kips)
-300
-250
-200
-150
-100
-50
0
50
100
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Case 1

SITE NAME	FAIRFIELD 2 CT	ECP - CELL #	5	91
LATITUDE	41-11-16.35 N	LONGITUDE	73-17-51.42 W	
		SAVE BUTTON		
Additional Comments:		STRUCTURE TYPE	MONOPOLE	

700 Mhz - LTE ANTENNA ADD	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	BXA-70063-6CF_2	BXA-70063-6CF_2	BXA-70063-6CF_2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	160	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	80	80	80
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0	Cellular Modcell 4.0	Cellular Modcell 4.0
ANTENNA TYPE	DB844H80E-XY_0	DB844H80E-XY_0	DB846F65ZAXY_869_0
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	80	80	80
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0	Cellular Modcell 4.0	Cellular Modcell 4.0
ANTENNA TYPE	DB846F65ZAXY_869_0	DB846F65ZAXY_869_0	DB846F65ZAXY_869_0
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	160	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	80	80	80
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L
DIPLEX WITH LTE CABLE			

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0
ANTENNA TYPE	948F85T2E-M_2	948F85T2E-M_2	948F85T2E-M_2
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	80	80	80
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0
ANTENNA TYPE	BXA-171063-8BF	BXA-171063-8BF	BXA-171063-8BF
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	160	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	80	80	80
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	DIPLEX with Cellular Cable	DIPLEX with Cellular Cable	DIPLEX with Cellular Cable

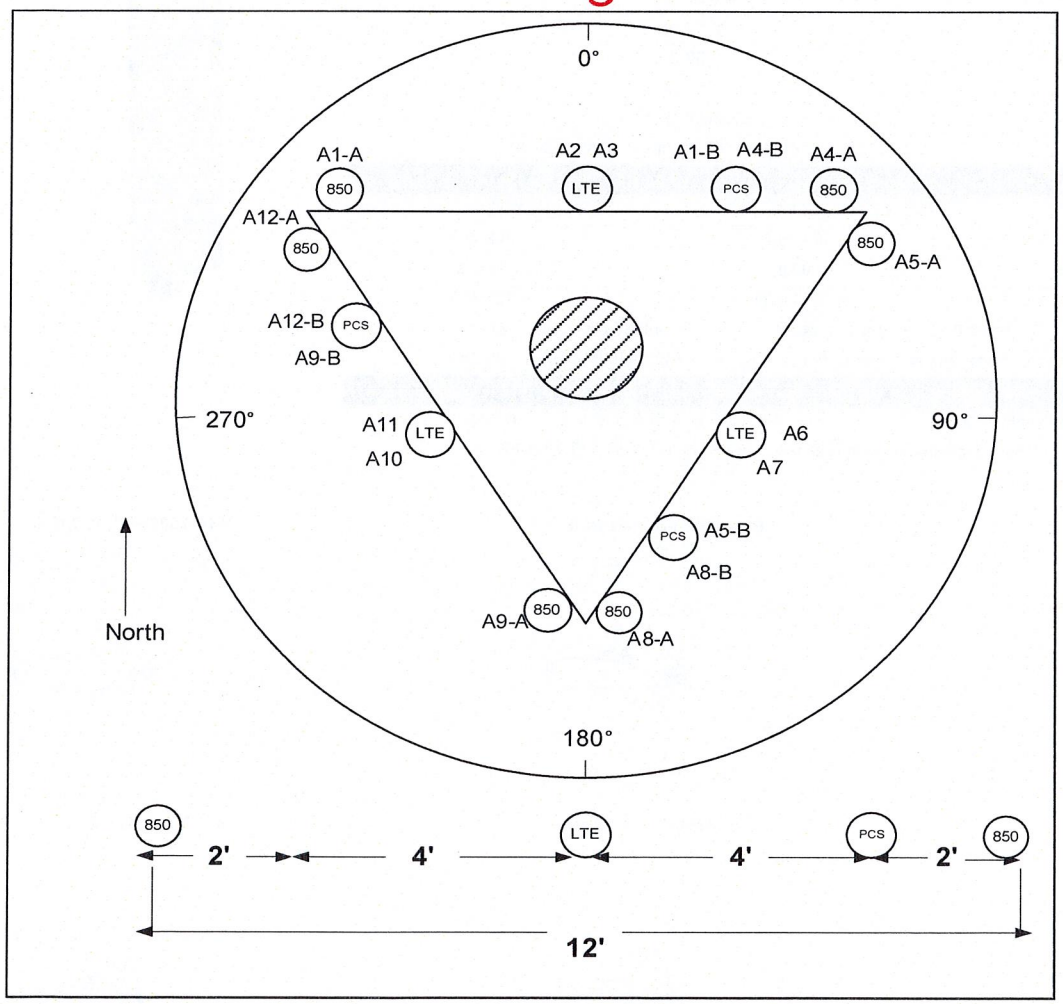
NUMBER OF CABLE'S NEEDED				ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES	12	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS	12	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE	12 +	TOP JUMPER #	12	+	6

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F / AWS-Band	700 Mhz C - E	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-21	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-17	RX - 776-787	LTE (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

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By: Dany Bustamante	Steve Weatherbee	DB	6/19/2012

Site Configuration



Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

Replace "X" with desired electrical downtilt.

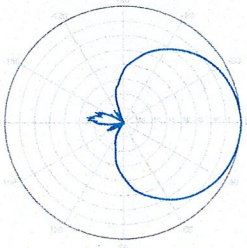
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	

Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m^2 Side: 0.24 m^2	Front: 5.5 ft^2 Side: 2.6 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

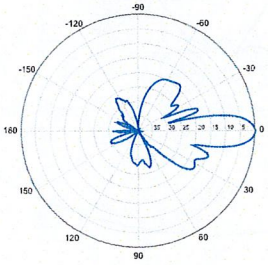
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



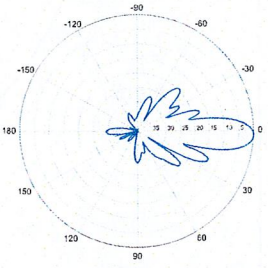
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

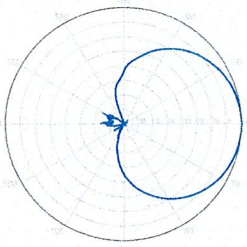


0° | Vertical | 750 MHz

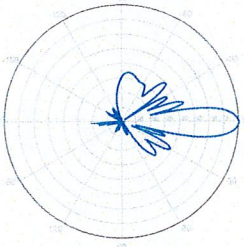
BXA-70063-6CF-EDIN-2



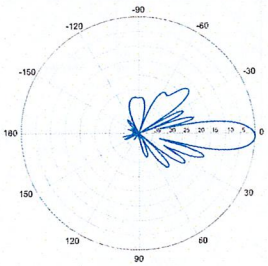
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

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.

DB846F65ZAXY

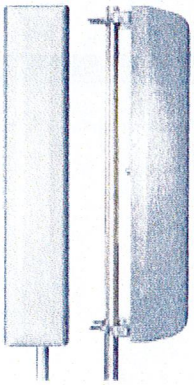
Directed Dipole Antenna

Base Station Antenna
Directed Dipole™

- Exceptional azimuth roll off reducing soft hand offs and improving capacity
- Strong null filling for below horizon RF penetration
- Extremely rugged, reliable design yet lightweight for low tower loading
- Air dielectric feed system

ELECTRICAL

Frequency (MHz) :	806 - 896	870 - 960
Polarization :	Vertical	Vertical
Gain (dBd/dBi) :	14.5/16.6	14.8/16.9
Azimuth BW (Deg.):	65	60
Elevation BW (Deg.):	11	10.5
Beam Tilt (Deg.):	0	0
USLS* (dB) :	15	15
Front-To-Back Ratio* (dB) :	40	40
VSWR :	<1.33:1	<1.33:1
PIM3 @ 2 x 20w (dBc) :	-150	-150
Max. Input Power (Watts) :	500	500
Impedance (Ohms) :	50	50
Lightning Protection :	DC Ground	DC Ground



MECHANICAL

Weight :	9.5 kg (21 lb)
Dimensions (LxWxD) :	1,829 x 254 x 216 mm (72 x 10 x 8.5 in)
Max. Wind Area :	0.15 m² (1.6 ft²)
Max. Wind Load (@ 100 mph) :	386.9 N (87 lbf)
Max. Wind Speed :	241 km/h (150 mph)
Hardware Material :	Galvanized Steel
Connector Type :	7-16 DIN - Female (1, Back)
Color :	Light Gray
Standard Mounting Hardware :	DB380
Standard Downtilt Mounting Hardware :	DB5083

Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical

10/10/2007

dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.

BXA-171063-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

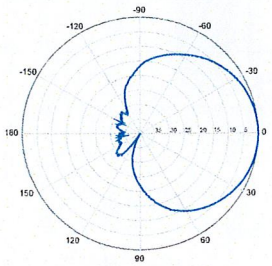
X-Pol | FET Panel | 63° | 17.4 dBi

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 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

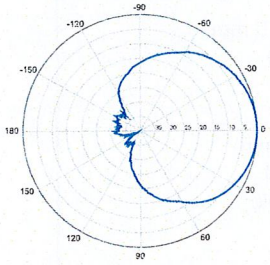
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

BXA-171063-8BF-EDIN-X



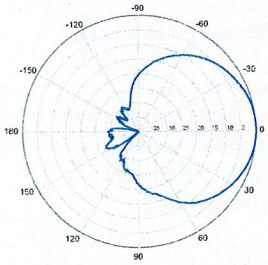
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



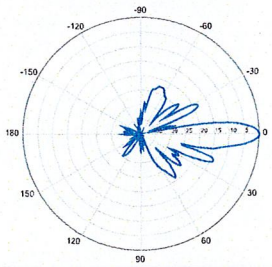
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



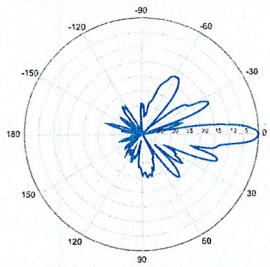
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



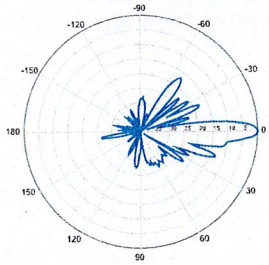
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1920-2170 MHz

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Product Data Sheet **FD9R6004/2C-3L**

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.

Features/Benefits

- **LTE ready design**
- **Extremely Low Insertion Loss**
- **High level of Rejection between bands – Protection against interferences**
- **Extremely High Power Handling Capability**
- **Integrated DC block/bypass versions available**
- **Very compact & small size design – Easy installation and reduced tower load**
- **In-line long-neck connectors for easy connection & waterproofing**
- **Exceptional reliability & environmental protection (IP 67)**
- **Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)**
- **Grounding already provided through the mounting bracket**
- **Kit available for easy dual mount**

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Frequency Band, MHz	698-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710 - 2170 MHz path, with mounting hardware SEM2-1A
Mounting	Wall, pole
Frequency Range Low Frequency Path, MHz	698-960
Frequency Range High Frequency Path, MHz	1710-2200
Return Loss All Ports, Min, dB	19
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss 698-960 MHz Path, Typ, dB	0.07
Insertion Loss 1710-2200MHz path, Typ, dB	0.13
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 60/70@1710-2200MHz
Rejection between Bands, Min, dB	60
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Application	LTE 700MHz, GSM900/3G/UMTS, GSM900/GSM1800, Cellular 800/PCS
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

Notes

All information contained in the present datasheet is subject to confirmation at time of ordering

Far Field Approximation
with downtilt variation

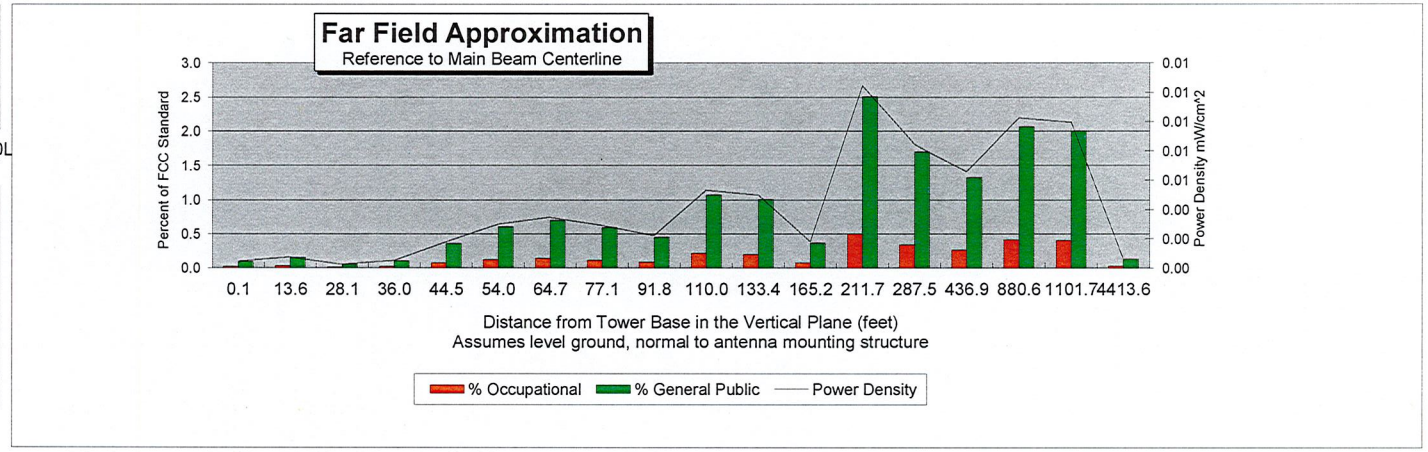
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Fairfield 2, CT
Site #:	
Date:	11/21/12
Name:	Mark Brauer
File Name:	Fairfield 2, CT - FF Power 700L

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**18.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**898.0**



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

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	1.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	4414.2	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	4413.6	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	0	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.3	0.3	0.4	0.4	0.0	#NUM!
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.4	0.6	0.7	0.6	0.4	1.1	1.0	0.4	2.5	1.7	1.3	2.1	2.0	0.1	#NUM!

Max % MPE 2.51%

Instructions:

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

Far Field Approximation
with downtilt variation

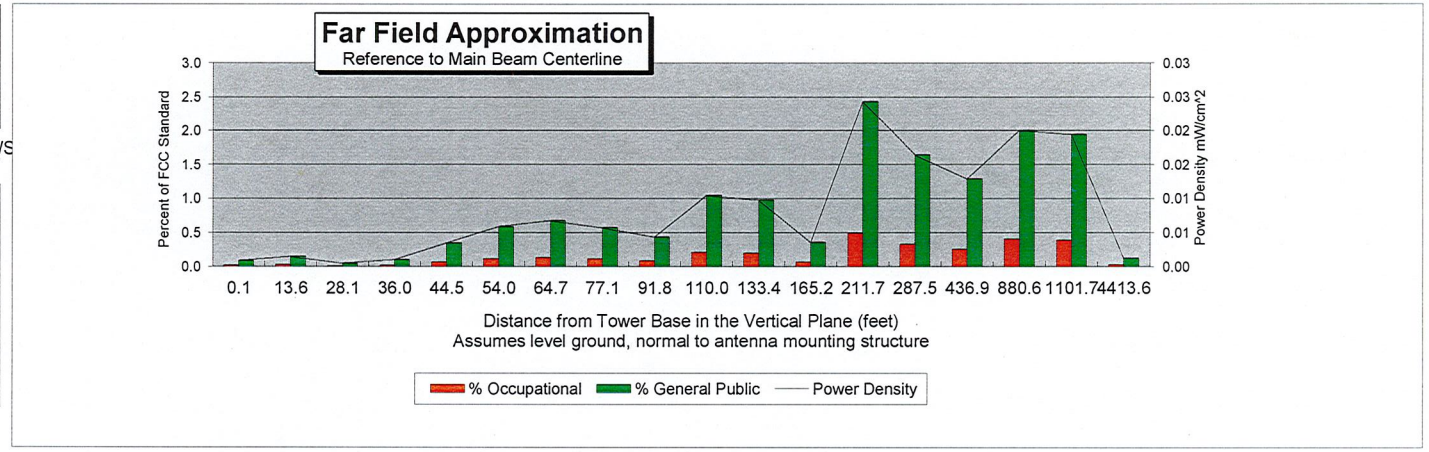
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Fairfield 2, CT
Site #:	
Date:	09/30/09
Name:	Mark Brauer
File Name:	Fairfield 2, CT - FF Power AWS

Operating Freq. (MHz)	**2110.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**18.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1750.0**



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

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	1.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	4414.2	3600.00
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	4413.6	3599.2
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	0	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.01	0.02	0.02	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.3	0.3	0.4	0.4	0.0	0.0
Percent of General Population Standard	0.1	0.1	0.1	0.1	0.3	0.6	0.7	0.6	0.4	1.0	1.0	0.4	2.4	1.6	1.3	2.0	1.9	0.1	0.0

Max % MPE 2.43%

Instructions:

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

Far Field Approximation
with downtilt variation

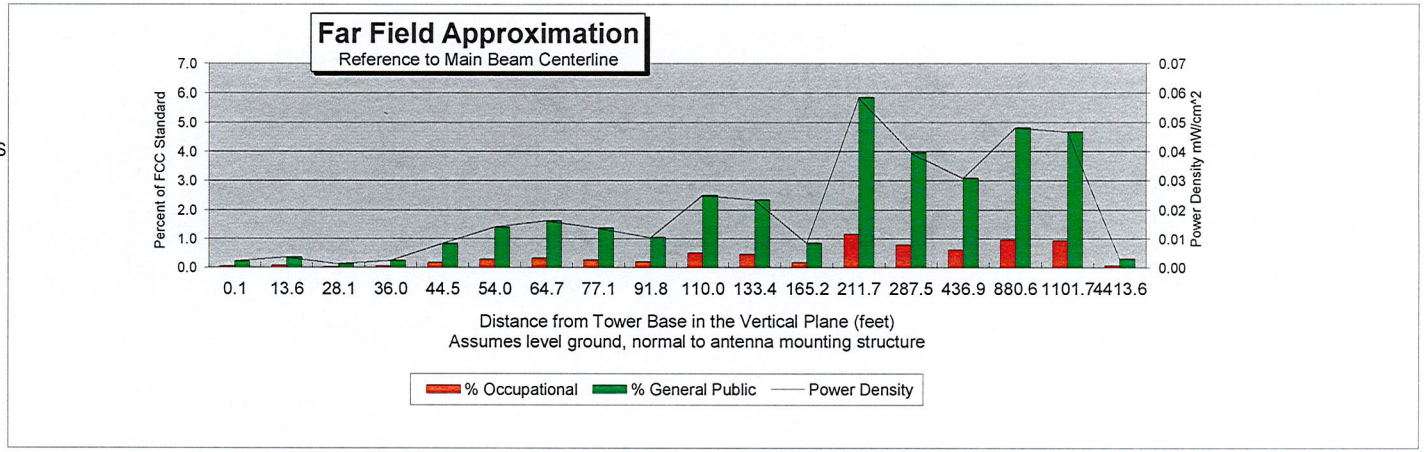
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Fairfield 2, CT
Site #:	
Date:	11/21/12
Name:	Mark Brauer
File Name:	Fairfield 2, CT - FF Power PCS

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**18.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**4213.0**



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

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	1.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	4414.2	3600.00
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	4413.6	3599.2
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	0	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.03	0.02	0.01	0.06	0.04	0.03	0.05	0.05	0.00	0.00
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.2	1.2	0.8	0.6	1.0	0.9	0.1	0.0
Percent of General Population Standard	0.2	0.4	0.1	0.2	0.8	1.4	1.6	1.4	1.0	2.5	2.4	0.9	5.9	4.0	3.1	4.8	4.7	0.3	0.0

Max % MPE 5.85%

Instructions:

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

Far Field Approximation
with downtilt variation

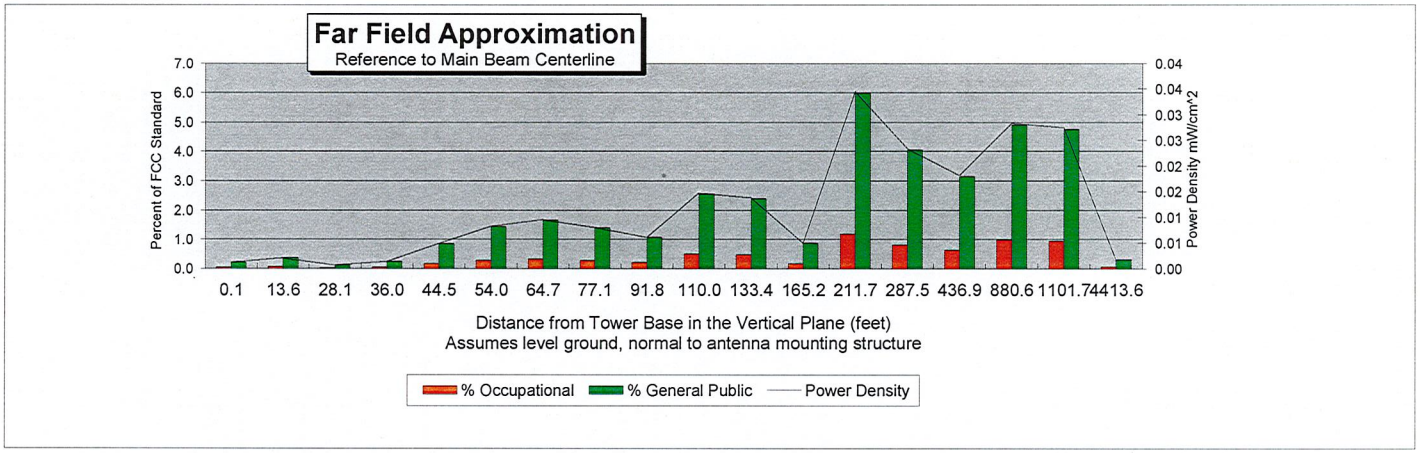
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Fairfield 2, CT
Site #:	
Date:	11/21/12
Name:	Mark Brauer
File Name:	Fairfield 2, CT - FF Power Cell

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**18.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**2489.0**



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

Enter Main Beam Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	1.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	4414.2	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	4413.6	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	0	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.03	0.03	0.00	#NUM!
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.2	1.2	0.8	0.6	1.0	1.0	0.1	#NUM!
Percent of General Population Standard	0.2	0.4	0.1	0.2	0.9	1.4	1.7	1.4	1.1	2.6	2.4	0.9	6.0	4.0	3.1	4.9	4.8	0.3	#NUM!

Max % MPE 5.97%

Instructions:

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

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
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Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

August 28, 2013

RECEIVED
AUG 29 2013
CONNECTICUT
SITING COUNCIL

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

Re: **EM-VER-100-120416 – 38 Lower Road, North Canaan, Connecticut**
EM-VER-051-121114 – 3965 Congress Street, Fairfield, Connecticut
EM-VER-135-130603 – 1590 Newfield Avenue, Stamford, Connecticut
EM-VER-014-130607 – 180 North Main Street, Branford, Connecticut
EM-VER-033-130618 – 179 Shunpike Road, Cromwell, Connecticut
EM-VER-041-130524 – 135 Honey Hill Road, East Haddam, Connecticut
EM-VER-027-130603 – 48 Cow Hill Road, Clinton, Connecticut
EM-VER-076-130425 – 252 Ridge Road, Madison, Connecticut

Completion of Construction Activity

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

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

Law Offices
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PROVIDENCE
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NEW LONDON
STAMFORD
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