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

October 9, 2012

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

RE: **EM-VER-139-120907** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 848 East Street South, Suffield, 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 less 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 September 5, 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,

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable Edward G. McAnaney, First Selectman, Town of Suffield
William Hawkins, AICP, Suffield Town Planner, Town of Suffield
Crown Castle

CONNECTICUT SITING COUNCIL

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September 18, 2012

The Honorable Edward G. McAnaney
First Selectman
Town of Suffield
Town Hall
83 Mountain Road/230C Mountain Road (town planner address)
Suffield, CT 06078

RE: **EM-VER-139-120907** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 848 East Street South, Suffield, Connecticut.

Dear First Selectman McAnaney:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by October 2, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: William Hawkins, AICP, Suffield Town Planner, Town of Suffield

ROBINSON & COLE

EM-VER-139-120907

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
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Direct (860) 275-8345

Also admitted in Massachusetts

September 5, 2012

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

Re: **Notice of Exempt Modification – Antenna Swap**
848 East Street South, Suffield, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 153-foot level on an existing 165.5-foot tower at the above-referenced address. The tower is owned by Crown Castle. Cellco's use of the tower was approved by the Council in 2007. Cellco now intends to replace six (6) of its antennas with three (3) model BXA-171063-12BF PCS antennas; two (2) model APX75-866514-CT2 LTE antennas; and one (1) model BXA-70080-6CF LTE antenna, all at the same 153-foot level. Cellco also intends to install six (6) coax cable diplexers behind its antennas. Attached behind Tab 1 are the specifications for the 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 Edward McAnaney, First Selectman of the Town of Suffield. The Town of Suffield is the owner of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and diplexers will be located at the 153-foot level on the existing 165.5-foot tower.

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative power density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed modifications. (See 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:
Edward McAnaney, Suffield First Selectman
Sandy M. Carter

BXA-171063-12BF-EDIN-X

Replace "X" with desired electrical downtilt.

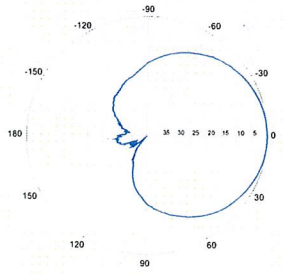
X-Pol | FET Panel | 63° | 19.0 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1820 x 154 x 105 mm	71.7 x 6.1 x 4.1 in
Depth with z-brackets	133 mm	5.2 in
Weight without mounting brackets	6.8 kg	15 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.28 m² Side: 0.19 m²	Front: 3.1 ft² Side: 2.1 ft²
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N	Front: 103 lbf Side: 68 lbf

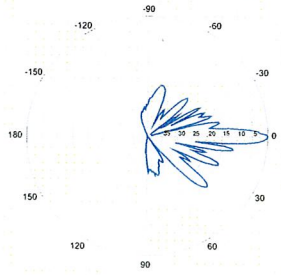
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12BF-EDIN-X-FP		

BXA-171063-12BF-EDIN-X



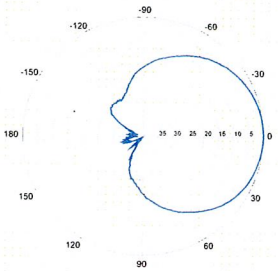
Horizontal | 1710-1880 MHz

BXA-171063-12BF-EDIN-0



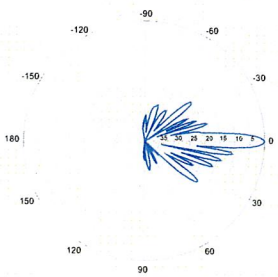
0° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-X



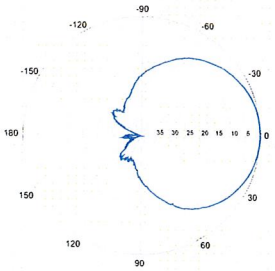
Horizontal | 1850-1990 MHz

BXA-171063-12BF-EDIN-0



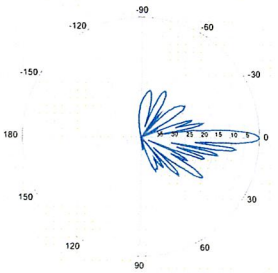
0° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171063-12BF-EDIN-0

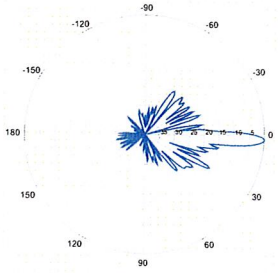


0° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-X

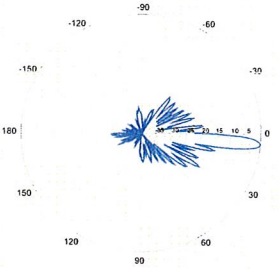
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12BF-EDIN-2



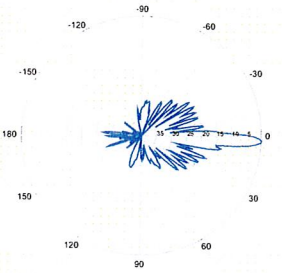
2° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-5



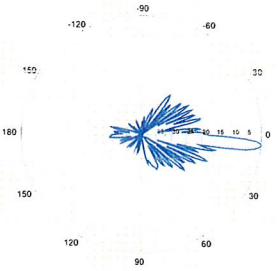
5° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-2



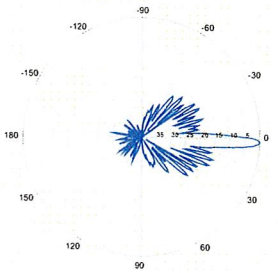
2° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-5



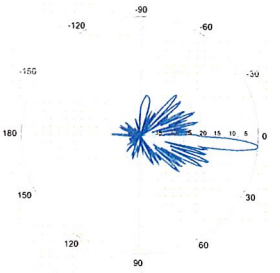
5° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-5



5° | Vertical | 1920-2170 MHz

Product Data Sheet **APX75-866514-CT2**

Optimizer® Dual Polarized Antenna, 698-896, 65deg, 16.1dBi, 2m, FET, 2deg

Product Description

Wideband antenna for dense networks where site aspect is essential.

Features/Benefits

- **Wideband performance 698-896 MHz**
- **High sidelobe suppression**
- **Null fill**
- **Dual polarization**
- **High front-to-back ratio**

Technical Specifications

Electrical Specifications

Frequency Range, MHz	698-896
Horizontal Beamwidth, deg	66 +/-5
Vertical Beamwidth, deg	9-12
Electrical Downtilt Range, deg	2
Gain, dBi (dBd)	16.1 (14)
1st Upper Sidelobe Suppression, dB	>18
Upper Sidelobe Suppression, dB	>18
Front-To-Back Ratio, dB	>30
Polarization	Slant +/-45 degrees
VSWR	1.40:1
Isolation between Ports, dB	>30
3rd Order IMP @ 2 x 43 dBm, dBc	>150
Impedance, Ohms	50
Maximum Power Input, W	500
Lightning Protection	Chassis Ground
Connector Type/Location	(2) 7-16 Long Neck DIN Female/Bottom

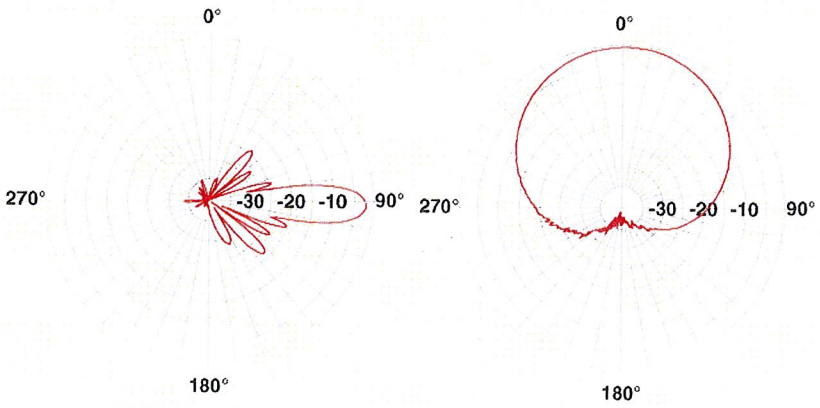
Mechanical Specifications

Dimensions - HxWxD, mm (in)	2082.8 x 311.2 x 120.7 (82 x 12.25 x 4.75)
Weight w/o Mtg Hardware, kg (lb)	14.0 (30.8)
Survival/Rated Wind Speed, km/h (mph)	200 (125) / 160 (100)
Operation temperature, °C (°F)	-40 to +60 (-40 to +140)
Radome Material/Color	ASA Plastic/Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Radiating Element Material	Brass
Reflector Material	Aluminum

Ordering Information

Mounting Hardware	APM40-3
Mounting Pipe Diameter, mm (in)	60-120 (2.36-4.72)
Mounting Hardware Weight, kg (lb)	5.4 (11.9)

Optimizer® Dual Polarized Antenna, 698-896, 65deg, 16.1dBi, 2m, FET, 2deg



Vertical Pattern **Horizontal Pattern**

Notes

For additional mounting information please click "External Document Link" below.

External Document Links

APM40 Series Datasheet
APM40 Series Installation Instructions

BXA-70080-6CF-EDIN-X

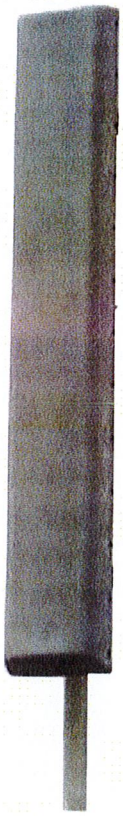
X-Pol | FET Panel | 80° | 13.5 dBd

Replace "X" with desired electrical downtilt.

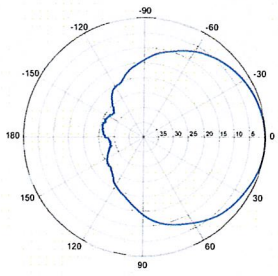
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	82°	80°
Vertical beamwidth	12°	10°
Gain	13.0 dBd (15.1 dBi)	13.5 dBd (15.6 dBi)
Electrical downtilt (X)	0, 2, 4, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.6 dB
Front-to-back ratio (+/-30°)	-26.9 dB	-25.6 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -30 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 204 x 151 mm	71.0 x 8.0 x 5.9 in
Depth with z-brackets	191 mm	7.5 in
Weight without mounting brackets	8.2 kg	18 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.37 m² Side: 0.27 m²	Front: 3.9 ft² Side: 2.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 531 N Side: 475 N	Front: 119 lbf Side: 104 lbf

Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-6CF-EDIN-X-FP		

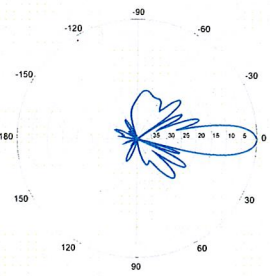


BXA-70080-6CF-EDIN-X



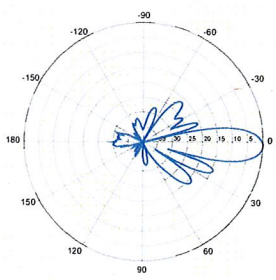
Horizontal | 750 MHz

BXA-70080-6CF-EDIN-0



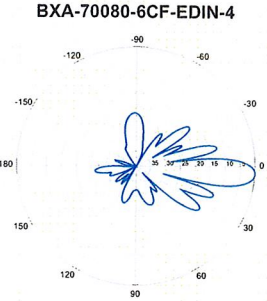
0° | Vertical | 750 MHz

BXA-70080-6CF-EDIN-2

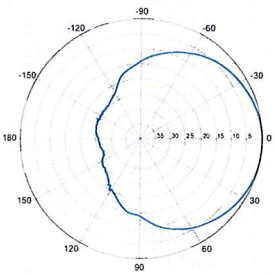


2° | Vertical | 750 MHz

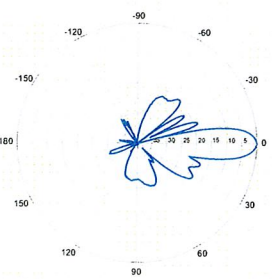
BXA-70080-6CF-EDIN-4



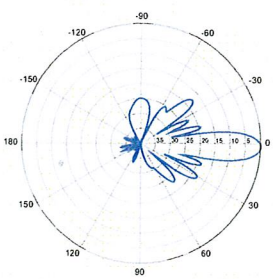
4° | Vertical | 750 MHz



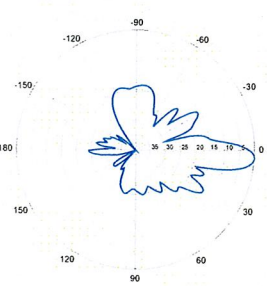
Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

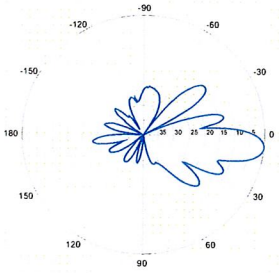


4° | Vertical | 850 MHz

BXA-70080-6CF-EDIN-X

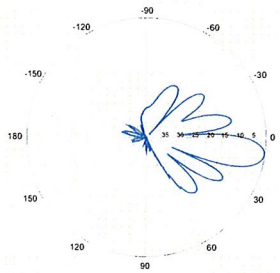
X-Pol | FET Panel | 80° | 13.5 dBd

BXA-70080-6CF-EDIN-6



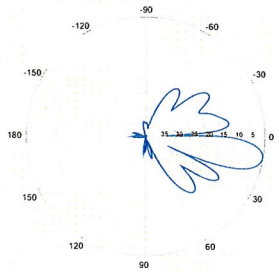
6° | Vertical | 750 MHz

BXA-70080-6CF-EDIN-8

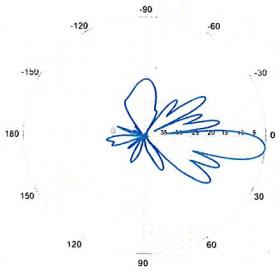


8° | Vertical | 750 MHz

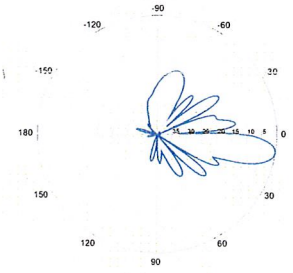
BXA-70080-6CF-EDIN-10



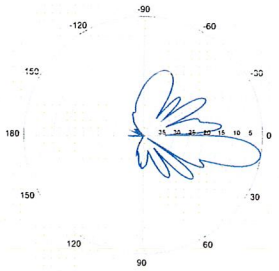
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



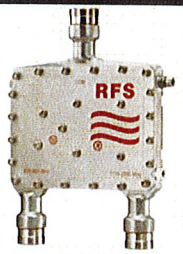
10° | Vertical | 850 MHz

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

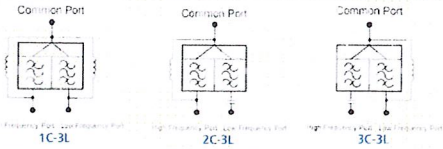
Notes

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)	

	General	Power	Density					
Site Name: Suffield 4								
Tower Height: Verizon @ 153Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile GSM	8	153	165	0.0162	1945	1.0000	1.62%	
*T-Mobile UMTS	2	610	165	0.0161	2100	1.0000	1.61%	
*Clearwire	2	153	136	0.0059	2496	1.0000	0.59%	
*Clearwire	1	211	136	0.0041	11 GHz	1.0000	0.41%	
*Pocket	3	631	145	0.0324	2130	1.0000	3.24%	
Verizon PCS	**11**	**237**	**153**	**0.0400**	**1970**	**1.0000**	**4.00%**	
Verizon Cellular	**9**	**248**	**153**	**0.0343**	**869**	**0.5793**	**5.92%**	
Verizon AWS	**1**	**574**	**153**	**0.0088**	**2145**	**1.0000**	**0.88%**	
Verizon 700	**1**	**817**	**153**	**0.0125**	**698**	**0.4653**	**2.70%**	
								20.97%
* Source: Siting Council								

Date: **July 11, 2012**

Eva Morales
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	 Suffield 4
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	801487 CT SUFFIELD 3 CAC 801487 194903 509056 154325 Rev. 1
Engineering Firm Designation:	**Crown Castle Project Number:**	509056
Site Data:	**848 East Street, Suffield, Hartford County, CT** **Latitude *41° 57' 25.2"*, Longitude *-72° 37' 32.6"*** **165.5 Foot - Monopole Tower**	

Dear Eva Morales,

Crown Castle is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 509056, in accordance with application 154325, revision 1.

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

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a wind speed of 80 mph fastest mile.

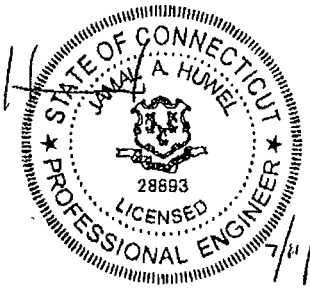
All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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

Structural analysis prepared by: Clinton Crouch, Engineer I / RJ

Respectfully submitted by:

Jamal A. Huwel, P.E.
Manager Engineering



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1) INTRODUCTION

This tower is a 165.5 ft Monopole tower designed by FWT INC. in May of 2000. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
153.0	153.0	3	antel	BXA-171063-12BF w/ Mount Pipe	-	-	-
		1	antel	BXA-70080-6CF-EDIN-4 w/ Mount Pipe			
		2	rfs celwave	APX75-866514-CT2 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
164.0	164.0	6	andrew	ONEBASE TWIN DUAL DUPLEX TMA	12	1-5/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe			
		1	tower mounts	T-Arm Mount [TA 602-3]			
153.0	153.0	6	antel	LPA-185080/12CFx2 w/ Mount Pipe	-	-	2
		6	antel	LPA-80080/6CF w/Mount Pipe	12	1-5/8	1
		1	tower mounts	Platform Mount [LP 303-1]			
145.0	145.0	3	kathrein	742 213 w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 501-3]			
136.0	138.0	1	dragonwave	A-ANT-18G-2-C	3 2	1/2 1/4	1
		1	dragonwave	A-ANT-23G-1-C			
		2	dragonwave	HORIZON COMPACT			
	136.0	1	tower mounts	Side Arm Mount [SO 103-3]			
		2	argus technologies	LLPX310R w/ Mount Pipe			
	134.0	1	kathrein	840 10054 w/ Mount Pipe			
		3	samsung telecommunications	WIMAX DAP HEAD			

Notes:
1) Existing Equipment
2) Existing equipment to be removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
167	167	12	Swedcom	ALP-9212-N	-	-
155	155	12	Swedcom	ALP-9212-N	-	-
145	145	12	Swedcom	ALP-9212-N	-	-
135	135	12	Swedcom	ALP-9212-N	-	-
125	125	12	Swedcom	ALP-9212-N	-	-
115	115	12	Swedcom	ALP-9212-N	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clough, Harbour & Associates	2373668	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FWT	1118795	CCISITES
4-TOWER MANUFACTURER DRAWINGS	FWT	961597	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	165.5 - 136.83	Pole	TP24.279x17x0.1875	1	-4.01	720.46	34.4	Pass
L2	136.83 - 95.5	Pole	TP34.4x23.0992x0.3125	2	-9.46	1698.78	47.8	Pass
L3	95.5 - 47	Pole	TP46.09x32.6322x0.375	3	-18.65	2734.46	49.6	Pass
L4	47 - 0	Pole	TP57.275x43.8165x0.375	4	-32.22	3504.06	54.2	Pass
							Summary	
						Pole (L4)	54.2	Pass
						Rating =	54.2	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	51.6	Pass
1	Base Plate	0	26.1	Pass
1,2	Base Foundation	0	95.6	Pass
Structure Rating (max from all components) =				**95.6%**

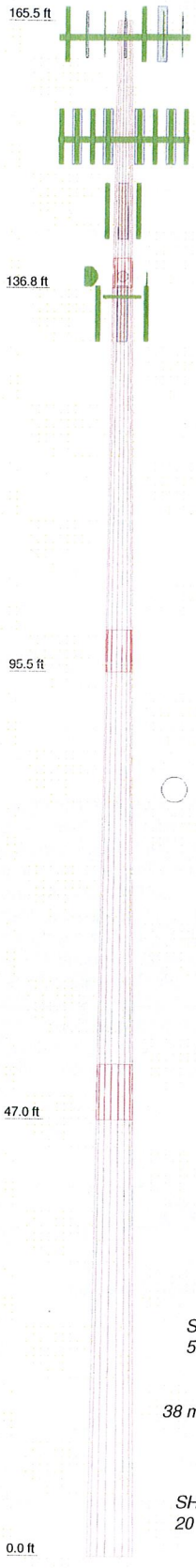
Notes:
1) See additional documentation in "Appendix C -- Additional Calculations" for calculations supporting the % capacity consumed.
2) It is unknown whether the foundation is a drilled shaft or pier and pad. Both designs were analyzed and determined to be sufficient.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

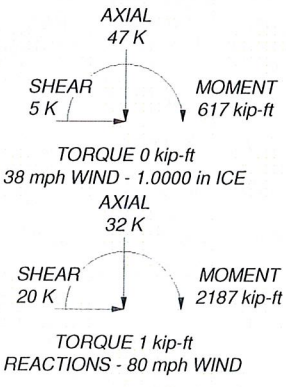
APPENDIX A

TNXTOWER OUTPUT



Section	1	2	3	4
Length (ft)	28.67	44.50	53.00	53.00
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.3125	0.3750	0.3750
Socket Length (ft)	3.17	4.50	6.00	
Top Dia (in)	17.0000	23.0992	32.6322	43.8165
Bot Dia (in)	24.2790	34.4000	46.0900	57.2750
Grade			A572-65	
Weight (K)	1.2	4.3	8.4	10.8

Total Weight: 24.6 K



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) ONEBASE TWIN DUAL DUPLEX TMA	164	BXA-171063-12BF w/ Mount Pipe	153
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	164	BXA-70080-6CF-EDIN-4 w/ Mount Pipe	153
(2) ONEBASE TWIN DUAL DUPLEX TMA	164	(2) FD9R6004/2C-3L	153
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	164	(2) LPA-80080/6CF w/ Mount Pipe	153
(2) ONEBASE TWIN DUAL DUPLEX TMA	164	BXA-171063-12BF w/ Mount Pipe	153
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	164	APX75-866514-CT2 w/ Mount Pipe	153
T-Arm Mount [TA 602-3]	164	(2) FD9R6004/2C-3L	153
5' x 2' Pipe Mount	164	Platform Mount [LP 303-1]	153
5' x 2' Pipe Mount	164	742 213 w/ Mount Pipe	145
5' x 2' Pipe Mount	164	742 213 w/ Mount Pipe	145
5' x 2' Pipe Mount	164	742 213 w/ Mount Pipe	145
5' x 2' Pipe Mount	164	840 10054 w/ Mount Pipe	136
5' x 2' Pipe Mount	164	HORIZON COMPACT	136
(2) LPA-80080/6CF w/ Mount Pipe	153	WIMAX DAP HEAD	136
BXA-171063-12BF w/ Mount Pipe	153	LLPX310R w/ Mount Pipe	136
APX75-866514-CT2 w/ Mount Pipe	153	WIMAX DAP HEAD	136
(2) FD9R6004/2C-3L	153	LLPX310R w/ Mount Pipe	136
(2) LPA-80080/6CF w/ Mount Pipe	153	HORIZON COMPACT	136
		WIMAX DAP HEAD	136
		Side Arm Mount [SO 101-3]	136
		5' x 2' Pipe Mount	136
		A-ANT-23G-1-C	136
		A-ANT-18G-2-C	136

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 54.2%

CROWN CASTLE
We Are Solutions

Crown Castle
2000 Corporate Drive
Canonsburgh, PA 15317
Phone: (724) 416-2000
FAX: (724) 416-2254

Job: **BU # 801487**			
Project:			
Client: Crown Castle USA, Inc.	Drawn by: RJenabzadeh	App'd:	
Code: TIA/EIA-222-F	Date: 07/11/12	Scale: NTS	
Path: R:\SA Models - Letters\Work Area\CCrouch\801487\801487.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:

3) Tower is located in Hartford County, Connecticut.
4) Basic wind speed of 80 mph.
5) Nominal ice thickness of 1.0000 in.
6) Ice density of 56 pcf.
7) A wind speed of 38 mph is used in combination with ice.
8) Temperature drop of 50 °F.
9) Deflections calculated using a wind speed of 50 mph.
10) A non-linear (P-delta) analysis was used.
11) Pressures are calculated at each section.
12) Stress ratio used in pole design is 1.333.
13) 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	165.50-136.83	28.67	3.17	18	17.0000	24.2790	0.1875	0.7500	A572-65 (65 ksi)
L2	136.83-95.50	44.50	4.50	18	23.0992	34.4000	0.3125	1.2500	A572-65 (65 ksi)
L3	95.50-47.00	53.00	6.00	18	32.6322	46.0900	0.3750	1.5000	A572-65 (65 ksi)
L4	47.00-0.00	53.00		18	43.8165	57.2750	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	17.2623	10.0055	357.3078	5.9684	8.6360	41.3742	715.0858	5.0037	2.6620	14.197
	24.6535	14.3375	1051.3254	8.5525	12.3337	85.2398	2104.0342	7.1701	3.9431	21.03
L2	24.2730	22.6015	1482.6447	8.0893	11.7344	126.3505	2967.2402	11.3029	3.5155	11.249

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
	34.9307	33.8105	4963.4065	12.1011	17.4752	284.0257	9933.3440	16.9085	5.5044	17.614
L3	34.2959	38.3942	5047.2688	11.4513	16.5772	304.4711	10101.178 9	19.2007	5.0833	13.555
	46.8010	54.4123	14366.527 6	16.2288	23.4137	613.5944	28751.959 1	27.2113	7.4518	19.872
L4	46.0395	51.7062	12327.908 7	15.4217	22.2588	553.8450	24672.038 8	25.8580	7.0517	18.805
	58.1586	67.7252	27702.083 9	20.1995	29.0957	952.1023	55440.618 8	33.8690	9.4204	25.121

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 165.50-136.83				1	1	1		
L2 136.83-95.50				1	1	1		
L3 95.50-47.00				1	1	1		
L4 47.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
AL7-50(1 5/8)	B	No	Inside Pole	164.00 - 0.00	12	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
***						1" Ice	0.00	0.52
AVA7-50(1-5/8")	C	No	Inside Pole	153.00 - 0.00	12	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70
***						1" Ice	0.00	0.70
CR 50 1873(1-5/8")	C	No	Inside Pole	145.00 - 0.00	6	No Ice	0.00	0.83
						1/2" Ice	0.00	0.83
***						1" Ice	0.00	0.83
FSJ1-50A(1/4")	C	No	CaAa (Out Of Face)	136.00 - 0.00	2	No Ice	0.00	0.04
						1/2" Ice	0.00	0.53
						1" Ice	0.00	1.62
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	136.00 - 0.00	3	No Ice	0.00	0.14
						1/2" Ice	0.00	0.76
						1" Ice	0.00	2.00
3/4" conduit	C	No	CaAa (Out Of Face)	136.00 - 0.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	4.94
						1" Ice	0.00	7.69
3/4" conduit	C	No	CaAa (Out Of Face)	136.00 - 0.00	1	No Ice	0.30	2.80
						1/2" Ice	0.40	4.94
						1" Ice	0.50	7.69

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	165.50-136.83	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.17
		C	0.000	0.000	0.000	0.000	0.18
L2	136.83-95.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.26

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
		C	0.000	0.000	0.000	12.150	0.80
L3	95.50-47.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.30
		C	0.000	0.000	0.000	14.550	0.95
L4	47.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.29
		C	0.000	0.000	0.000	14.100	0.92

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	165.50-136.83	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.17
		C		0.000	0.000	0.000	0.000	0.18
L2	136.83-95.50	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.26
		C		0.000	0.000	0.000	20.250	1.55
L3	95.50-47.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	24.250	1.84
L4	47.00-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.29
		C		0.000	0.000	0.000	23.500	1.79

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	165.50-136.83	0.0000	0.0000	0.0000	0.0000
L2	136.83-95.50	-0.3419	0.1974	-0.5029	0.2903
L3	95.50-47.00	-0.3575	0.2064	-0.5411	0.3124
L4	47.00-0.00	-0.3642	0.2102	-0.5619	0.3244

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
(2) ONEBASE TWIN DUAL DUPLEX TMA	A	From Leg	4.00	0.00	0.0000	164.00	No Ice	0.67	0.31	0.01
			4.00				1/2" Ice	0.79	0.39	0.02
			0.00				1" Ice	0.91	0.49	0.02
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	164.00	No Ice	6.94	3.29	0.06
			4.00				1/2" Ice	7.44	4.00	0.10
			0.00				1" Ice	7.94	4.66	0.16
(2) ONEBASE TWIN DUAL DUPLEX TMA	B	From Leg	4.00	0.00	0.0000	164.00	No Ice	0.67	0.31	0.01
			4.00				1/2" Ice	0.79	0.39	0.02
			0.00				1" Ice	0.91	0.49	0.02
APX16DWV-16DWV-S-E-	B	From Leg	4.00	0.00	0.0000	164.00	No Ice	6.94	3.29	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ACU w/ Mount Pipe			4.00 0.00			1/2" Ice 1" Ice	7.44 7.94	4.00 4.66	0.10 0.16
(2) ONEBASE TWIN DUAL DUPLEX TMA	C	From Leg	4.00 4.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	0.67 0.79 0.91	0.31 0.39 0.49	0.01 0.02 0.02
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	C	From Leg	4.00 4.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.10 0.16
T-Arm Mount [TA 602-3]	C	None		0.0000	164.00	No Ice 1/2" Ice 1" Ice	11.59 15.44 19.29	11.59 15.44 19.29	0.77 0.99 1.21
5' x 2' Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
5' x 2' Pipe Mount	B	From Leg	4.00 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
5' x 2' Pipe Mount	C	From Leg	4.00 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
5' x 2' Pipe Mount	A	From Leg	4.00 -4.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
5' x 2' Pipe Mount	B	From Leg	4.00 -4.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
5' x 2' Pipe Mount	C	From Leg	4.00 -4.00 0.00	0.0000	164.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
***									
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice 1" Ice	4.56 5.11 5.61	10.73 11.99 12.97	0.05 0.11 0.19
BXA-171063-12BF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.08 0.14
APX75-866514-CT2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice 1" Ice	10.00 10.72 11.43	6.57 7.88 9.02	0.06 0.13 0.21
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice 1" Ice	0.37 0.45 0.54	0.08 0.14 0.20	0.00 0.01 0.01
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice 1" Ice	4.56 5.11 5.61	10.73 11.99 12.97	0.05 0.11 0.19
BXA-171063-12BF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.08 0.14
BXA-70080-6CF-EDIN-4	B	From Leg	4.00	0.0000	153.00	No Ice	6.01	6.20	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
w/ Mount Pipe			0.00			1/2"	6.56	7.36	0.10
			0.00			Ice	7.08	8.23	0.16
						1" Ice			
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	153.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00	0.0000	153.00	No Ice	4.56	10.73	0.05
			0.00			1/2"	5.11	11.99	0.11
			0.00			Ice	5.61	12.97	0.19
						1" Ice			
BXA-171063-12BF w/ Mount Pipe	C	From Leg	4.00	0.0000	153.00	No Ice	4.97	5.23	0.04
			0.00			1/2"	5.52	6.39	0.08
			0.00			Ice	6.04	7.26	0.14
						1" Ice			
APX75-866514-CT2 w/ Mount Pipe	C	From Leg	4.00	0.0000	153.00	No Ice	10.00	6.57	0.06
			0.00			1/2"	10.72	7.88	0.13
			0.00			Ice	11.43	9.02	0.21
						1" Ice			
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	153.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice			
Platform Mount [LP 303-1]	C	None		0.0000	153.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice			
***									
742 213 w/ Mount Pipe	A	From Leg	1.00	0.0000	145.00	No Ice	5.37	4.62	0.05
			0.00			1/2"	5.95	6.00	0.09
			0.00			Ice	6.50	6.98	0.14
						1" Ice			
742 213 w/ Mount Pipe	B	From Leg	1.00	0.0000	145.00	No Ice	5.37	4.62	0.05
			0.00			1/2"	5.95	6.00	0.09
			0.00			Ice	6.50	6.98	0.14
						1" Ice			
742 213 w/ Mount Pipe	C	From Leg	1.00	0.0000	145.00	No Ice	5.37	4.62	0.05
			0.00			1/2"	5.95	6.00	0.09
			0.00			Ice	6.50	6.98	0.14
						1" Ice			
***									
840 10054 w/ Mount Pipe	A	From Leg	2.00	0.0000	136.00	No Ice	5.41	2.39	0.05
			0.00			1/2"	5.83	2.92	0.09
			-2.00			Ice	6.26	3.47	0.13
						1" Ice			
HORIZON COMPACT	A	From Leg	2.00	0.0000	136.00	No Ice	0.84	0.43	0.01
			0.00			1/2"	0.97	0.52	0.02
			2.00			Ice	1.10	0.63	0.03
						1" Ice			
WIMAX DAP HEAD	A	From Leg	2.00	0.0000	136.00	No Ice	1.80	0.78	0.03
			0.00			1/2"	1.99	0.92	0.04
			-2.00			Ice	2.18	1.07	0.06
						1" Ice			
LLPX310R w/ Mount Pipe	B	From Leg	2.00	0.0000	136.00	No Ice	5.07	2.98	0.05
			0.00			1/2"	5.48	3.53	0.08
			-2.00			Ice	5.91	4.09	0.13
						1" Ice			
WIMAX DAP HEAD	B	From Leg	2.00	0.0000	136.00	No Ice	1.80	0.78	0.03
			0.00			1/2"	1.99	0.92	0.04
			-2.00			Ice	2.18	1.07	0.06
						1" Ice			
LLPX310R w/ Mount Pipe	C	From Leg	2.00	0.0000	136.00	No Ice	5.07	2.98	0.05
			0.00			1/2"	5.48	3.53	0.08
			-2.00			Ice	5.91	4.09	0.13
						1" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
HORIZON COMPACT	C	From Leg	2.00 0.00 2.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
WIMAX DAP HEAD	C	From Leg	2.00 0.00 -2.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
Side Arm Mount [SO 101-3]	C	None		0.0000	136.00	No Ice 1/2" Ice 1" Ice	7.50 8.90 10.30	7.50 8.90 10.30	0.25 0.33 0.41
5' x 2' Pipe Mount	B	From Leg	2.00 0.00 0.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
A-ANT-23G-1-C	A	Paraboloid w/Shroud (HP)	From Leg	2.00 0.00 2.00	0.0000		136.00	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.01 0.01
A-ANT-18G-2-C	C	Paraboloid w/Shroud (HP)	From Leg	2.00 0.00 2.00	0.0000		136.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.03 0.36

Load Combinations

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

Comb. No.	Description
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	165.5 - 136.83	Pole	Max Tension	15	0.00	-0.00	-0.00
			Max. Compression	14	-8.40	0.24	0.11
			Max. Mx	11	-4.03	115.07	-0.88
			Max. My	2	-4.02	-0.85	116.09
			Max. Vy	5	7.92	-114.91	0.97
			Max. Vx	8	8.00	1.01	-115.99
			Max. Torque	13			0.24
L2	136.83 - 95.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.85	2.16	-1.02
			Max. Mx	5	-9.48	-534.12	6.53
			Max. My	8	-9.47	6.76	-539.30
			Max. Vy	5	12.19	-534.12	6.53
			Max. Vx	8	12.28	6.76	-539.30
			Max. Torque	13			0.42
L3	95.5 - 47	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.01	3.86	-2.00
			Max. Mx	5	-18.65	-1197.80	13.25
			Max. My	8	-18.65	13.82	-1208.14
			Max. Vy	5	16.09	-1197.80	13.25
			Max. Vx	8	16.19	13.82	-1208.14
			Max. Torque	13			0.55
L4	47 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-46.59	6.21	-3.36
			Max. Mx	5	-32.22	-2160.44	20.63
			Max. My	8	-32.22	21.77	-2176.72
			Max. Vy	5	20.27	-2160.44	20.63
			Max. Vx	8	20.36	21.77	-2176.72
			Max. Torque	13			0.71

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	46.59	-0.04	5.40
	Max. H_x	11	32.23	20.22	-0.12
	Max. H_z	2	32.23	-0.17	20.34
	Max. M_x	2	2174.64	-0.17	20.34

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. M_z	5	2160.44	-20.26	0.14
	Max. Torsion	13	0.71	10.03	17.55
	Min. Vert	1	32.23	0.00	0.00
	Min. H_x	5	32.23	-20.26	0.14
	Min. H_z	8	32.23	0.14	-20.35
	Min. M_x	8	-2176.72	0.14	-20.35
	Min. M_z	11	-2157.70	20.22	-0.12
	Min. Torsion	7	-0.71	-10.00	-17.59

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	32.23	0.00	0.00	0.71	1.33	0.00
Dead+Wind 0 deg - No Ice	32.23	0.17	-20.34	-2174.64	-24.28	-0.50
Dead+Wind 30 deg - No Ice	32.23	10.24	-17.68	-1892.33	-1096.27	-0.28
Dead+Wind 60 deg - No Ice	32.23	17.59	-10.28	-1103.79	-1877.68	-0.02
Dead+Wind 90 deg - No Ice	32.23	20.26	-0.14	-20.63	-2160.44	0.25
Dead+Wind 120 deg - No Ice	32.23	17.49	10.05	1069.53	-1863.51	0.50
Dead+Wind 150 deg - No Ice	32.23	10.00	17.59	1879.39	-1060.81	0.71
Dead+Wind 180 deg - No Ice	32.23	-0.14	20.35	2176.72	21.77	0.57
Dead+Wind 210 deg - No Ice	32.23	-10.21	17.67	1891.80	1095.25	0.29
Dead+Wind 240 deg - No Ice	32.23	-17.55	10.28	1104.31	1875.19	-0.00
Dead+Wind 270 deg - No Ice	32.23	-20.22	0.12	18.76	2157.70	-0.26
Dead+Wind 300 deg - No Ice	32.23	-17.47	-10.06	-1070.22	1863.08	-0.55
Dead+Wind 330 deg - No Ice	32.23	-10.03	-17.55	-1873.61	1067.26	-0.71
Dead+Ice+Temp	46.59	-0.00	0.00	3.36	6.21	-0.00
Dead+Wind 0 deg+Ice+Temp	46.59	0.04	-5.40	-605.11	0.05	-0.17
Dead+Wind 30 deg+Ice+Temp	46.59	2.72	-4.69	-525.78	-300.44	-0.10
Dead+Wind 60 deg+Ice+Temp	46.59	4.67	-2.73	-304.91	-519.68	-0.01
Dead+Wind 90 deg+Ice+Temp	46.59	5.38	-0.03	-1.75	-599.24	0.08
Dead+Wind 120 deg+Ice+Temp	46.59	4.65	2.67	303.19	-516.39	0.16
Dead+Wind 150 deg+Ice+Temp	46.59	2.66	4.67	529.30	-291.94	0.22
Dead+Wind 180 deg+Ice+Temp	46.59	-0.03	5.40	612.14	11.20	0.18
Dead+Wind 210 deg+Ice+Temp	46.59	-2.71	4.69	532.12	312.09	0.10
Dead+Wind 240 deg+Ice+Temp	46.59	-4.66	2.73	311.53	530.92	0.01
Dead+Wind 270 deg+Ice+Temp	46.59	-5.37	0.03	7.66	610.43	-0.08
Dead+Wind 300 deg+Ice+Temp	46.59	-4.65	-2.68	-296.89	528.19	-0.17
Dead+Wind 330 deg+Ice+Temp	46.59	-2.67	-4.66	-521.31	305.51	-0.22
Dead+Wind 0 deg - Service	32.23	0.07	-7.95	-849.49	-8.66	-0.20
Dead+Wind 30 deg - Service	32.23	4.00	-6.91	-739.15	-427.63	-0.11
Dead+Wind 60 deg - Service	32.23	6.87	-4.02	-430.96	-733.03	-0.01
Dead+Wind 90 deg - Service	32.23	7.91	-0.06	-7.62	-843.54	0.10
Dead+Wind 120 deg - Service	32.23	6.83	3.92	418.45	-727.48	0.20
Dead+Wind 150 deg - Service	32.23	3.91	6.87	734.97	-413.76	0.28
Dead+Wind 180 deg - Service	32.23	-0.05	7.95	851.19	9.34	0.22
Dead+Wind 210 deg - Service	32.23	-3.99	6.90	739.83	428.90	0.11
Dead+Wind 240 deg -	32.23	-6.86	4.01	432.05	733.73	-0.00

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
Service						
Dead+Wind 270 deg - Service	32.23	-7.90	0.05	7.78	844.13	-0.10
Dead+Wind 300 deg - Service	32.23	-6.83	-3.93	-417.83	728.98	-0.22
Dead+Wind 330 deg - Service	32.23	-3.92	-6.86	-731.82	417.95	-0.28

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-32.23	0.00	0.00	32.23	0.00	0.000%
2	0.17	-32.23	-20.34	-0.17	32.23	20.34	0.000%
3	10.24	-32.23	-17.68	-10.24	32.23	17.68	0.000%
4	17.59	-32.23	-10.28	-17.59	32.23	10.28	0.000%
5	20.26	-32.23	-0.14	-20.26	32.23	0.14	0.000%
6	17.49	-32.23	10.05	-17.49	32.23	-10.05	0.000%
7	10.00	-32.23	17.59	-10.00	32.23	-17.59	0.000%
8	-0.14	-32.23	20.35	0.14	32.23	-20.35	0.000%
9	-10.21	-32.23	17.67	10.21	32.23	-17.67	0.000%
10	-17.55	-32.23	10.28	17.55	32.23	-10.28	0.000%
11	-20.22	-32.23	0.12	20.22	32.23	-0.12	0.000%
12	-17.47	-32.23	-10.06	17.47	32.23	10.06	0.000%
13	-10.03	-32.23	-17.55	10.03	32.23	17.55	0.000%
14	0.00	-46.59	0.00	0.00	46.59	-0.00	0.000%
15	0.04	-46.59	-5.40	-0.04	46.59	5.40	0.000%
16	2.72	-46.59	-4.69	-2.72	46.59	4.69	0.000%
17	4.67	-46.59	-2.73	-4.67	46.59	2.73	0.000%
18	5.38	-46.59	-0.03	-5.38	46.59	0.03	0.000%
19	4.65	-46.59	2.67	-4.65	46.59	-2.67	0.000%
20	2.66	-46.59	4.67	-2.66	46.59	-4.67	0.000%
21	-0.03	-46.59	5.40	0.03	46.59	-5.40	0.000%
22	-2.71	-46.59	4.69	2.71	46.59	-4.69	0.000%
23	-4.66	-46.59	2.73	4.66	46.59	-2.73	0.000%
24	-5.37	-46.59	0.03	5.37	46.59	-0.03	0.000%
25	-4.65	-46.59	-2.68	4.65	46.59	2.68	0.000%
26	-2.67	-46.59	-4.66	2.67	46.59	4.66	0.000%
27	0.07	-32.23	-7.95	-0.07	32.23	7.95	0.000%
28	4.00	-32.23	-6.91	-4.00	32.23	6.91	0.000%
29	6.87	-32.23	-4.02	-6.87	32.23	4.02	0.000%
30	7.91	-32.23	-0.06	-7.91	32.23	0.06	0.000%
31	6.83	-32.23	3.92	-6.83	32.23	-3.92	0.000%
32	3.91	-32.23	6.87	-3.91	32.23	-6.87	0.000%
33	-0.05	-32.23	7.95	0.05	32.23	-7.95	0.000%
34	-3.99	-32.23	6.90	3.99	32.23	-6.90	0.000%
35	-6.86	-32.23	4.01	6.86	32.23	-4.01	0.000%
36	-7.90	-32.23	0.05	7.90	32.23	-0.05	0.000%
37	-6.83	-32.23	-3.93	6.83	32.23	3.93	0.000%
38	-3.92	-32.23	-6.86	3.92	32.23	6.86	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	0.00006021
3	Yes	5	0.00000001	0.00013822
4	Yes	5	0.00000001	0.00013885
5	Yes	4	0.00000001	0.00009107
6	Yes	5	0.00000001	0.00013403

7	Yes	5	0.00000001	0.00013040
8	Yes	4	0.00000001	0.00023737
9	Yes	5	0.00000001	0.00014004
10	Yes	5	0.00000001	0.00013846
11	Yes	4	0.00000001	0.00014403
12	Yes	5	0.00000001	0.00013084
13	Yes	5	0.00000001	0.00013592
14	Yes	4	0.00000001	0.00001386
15	Yes	4	0.00000001	0.00099353
16	Yes	5	0.00000001	0.00006985
17	Yes	5	0.00000001	0.00006976
18	Yes	4	0.00000001	0.00098177
19	Yes	5	0.00000001	0.00006917
20	Yes	5	0.00000001	0.00006910
21	Yes	5	0.00000001	0.00005890
22	Yes	5	0.00000001	0.00007242
23	Yes	5	0.00000001	0.00007207
24	Yes	5	0.00000001	0.00005871
25	Yes	5	0.00000001	0.00006978
26	Yes	5	0.00000001	0.00007032
27	Yes	4	0.00000001	0.00001918
28	Yes	4	0.00000001	0.00036644
29	Yes	4	0.00000001	0.00037087
30	Yes	4	0.00000001	0.00001690
31	Yes	4	0.00000001	0.00035834
32	Yes	4	0.00000001	0.00033722
33	Yes	4	0.00000001	0.00003730
34	Yes	4	0.00000001	0.00037942
35	Yes	4	0.00000001	0.00037095
36	Yes	4	0.00000001	0.00002288
37	Yes	4	0.00000001	0.00034082
38	Yes	4	0.00000001	0.00036854

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	165.5 - 136.83	29.005	34	1.6181	0.0015
L2	140 - 95.5	20.591	34	1.4707	0.0013
L3	100 - 47	10.103	34	0.9933	0.0006
L4	53 - 0	2.764	34	0.4876	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	(2) ONEBASE TWIN DUAL DUPLEX TMA	34	28.495	1.6115	0.0015	25926
153.00	(2) LPA-80080/6CF w/ Mount Pipe	34	24.785	1.5586	0.0015	10370
145.00	742 213 w/ Mount Pipe	34	22.168	1.5093	0.0014	6323
138.00	A-ANT-23G-1-C	34	19.976	1.4532	0.0013	5111
136.00	840 10054 w/ Mount Pipe	34	19.370	1.4345	0.0013	5070

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	165.5 - 136.83	74.096	3	4.1357	0.0037
L2	140 - 95.5	52.617	3	3.7592	0.0034
L3	100 - 47	25.828	3	2.5396	0.0015
L4	53 - 0	7.068	3	1.2469	0.0006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	(2) ONEBASE TWIN DUAL DUPLEX TMA	3	72.794	4.1187	0.0037	10252
153.00	(2) LPA-80080/6CF w/ Mount Pipe	3	63.324	3.9836	0.0037	4100
145.00	742 213 w/ Mount Pipe	3	56.643	3.8578	0.0037	2499
138.00	A-ANT-23G-1-C	3	51.047	3.7144	0.0035	2019
136.00	840 10054 w/ Mount Pipe	3	49.501	3.6666	0.0034	2002

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	165.5 - 136.83 (1)	TP24.279x17x0.1875	28.67	0.00	0.0	39.000	13.8585	-4.01	540.48	0.007
L2	136.83 - 95.5 (2)	TP34.4x23.0992x0.3125	44.50	0.00	0.0	39.000	32.6770	-9.46	1274.40	0.007
L3	95.5 - 47 (3)	TP46.09x32.6322x0.375	53.00	0.00	0.0	39.000	52.5989	-18.65	2051.36	0.009
L4	47 - 0 (4)	TP57.275x43.8165x0.375	53.00	0.00	0.0	38.814	67.7252	-32.22	2628.70	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	165.5 - 136.83 (1)	TP24.279x17x0.1875	116.57	17.569	39.000	0.450	0.00	0.000	39.000	0.000
L2	136.83 - 95.5 (2)	TP34.4x23.0992x0.3125	542.71	24.555	39.000	0.630	0.00	0.000	39.000	0.000
L3	95.5 - 47 (3)	TP46.09x32.6322x0.375	1214.88	25.433	39.000	0.652	0.00	0.000	39.000	0.000
L4	47 - 0 (4)	TP57.275x43.8165x0.375	2186.94	27.564	38.814	0.710	0.00	0.000	38.814	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	165.5 - 136.83 (1)	TP24.279x17x0.1875	8.04	0.580	26.000	0.045	0.07	0.005	26.000	0.000
L2	136.83 - 95.5 (2)	TP34.4x23.0992x0.3125	12.37	0.378	26.000	0.029	0.13	0.003	26.000	0.000
L3	95.5 - 47 (3)	TP46.09x32.6322x0.375	16.27	0.309	26.000	0.024	0.20	0.002	26.000	0.000
L4	47 - 0 (4)	TP57.275x43.8165x0.375	20.45	0.302	26.000	0.023	0.28	0.002	26.000	0.000

Pole Interaction Design Data

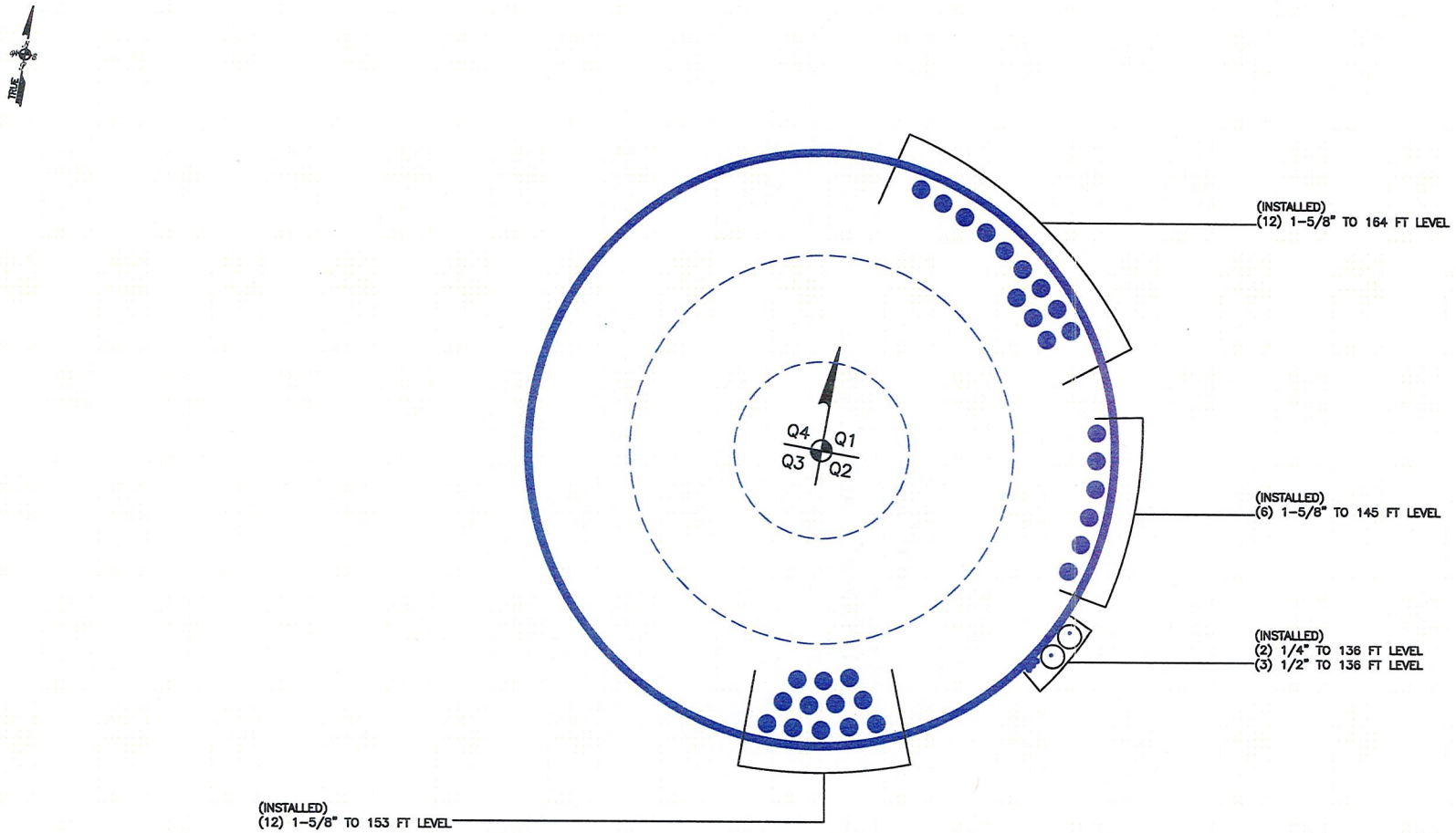
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	165.5 - 136.83 (1)	0.007	0.450	0.000	0.045	0.000	0.458 ✓	1.333	H1-3+VT ✓
L2	136.83 - 95.5 (2)	0.007	0.630	0.000	0.029	0.000	0.637 ✓	1.333	H1-3+VT ✓
L3	95.5 - 47 (3)	0.009	0.652	0.000	0.024	0.000	0.661 ✓	1.333	H1-3+VT ✓
L4	47 - 0 (4)	0.012	0.710	0.000	0.023	0.000	0.723 ✓	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	165.5 - 136.83	Pole	TP24.279x17x0.1875	1	-4.01	720.46	34.4	Pass
L2	136.83 - 95.5	Pole	TP34.4x23.0992x0.3125	2	-9.46	1698.78	47.8	Pass
L3	95.5 - 47	Pole	TP46.09x32.6322x0.375	3	-18.65	2734.46	49.6	Pass
L4	47 - 0	Pole	TP57.275x43.8165x0.375	4	-32.22	3504.06	54.2	Pass
							Summary	
						Pole (L4)	54.2	Pass
						RATING =	**54.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 801487 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *801487*
Site Name: *CT SUFFIELD 3 CAC 801487*
App #: *154325*

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	7.5	ft
Concrete Area =	6361.7	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.78	ft
Vert. Cage Diameter =	81.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	21	
As Total=	32.76	in^2
A s/ Aconc, Rho:	0.0051	0.51%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.51%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	9414.32	kips
at Mu=(ϕ=0.65)Mn=	6167.15	ft-kips
Max Tu, (φ=0.9) Tn =	1769.04	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2310.181	ft-kips (* Note)
Max. Service Shaft P:	32	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.30	Mu:	3003.235	ft-kips
1.30	Pu:	41.6	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

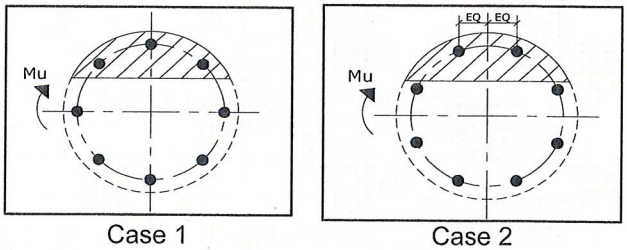
Seismic Properties

Seismic Design Category = C
Seismic Risk = **Moderate**

Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**13.57**	in
Extreme Steel Strain, εt:	**0.0158**	

εt > 0.0050, Tension Controlled

Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	41.60	kips
Drilled Shaft Moment Capacity, φMn:	**5667.97**	ft-kips
Drilled Shaft Superimposed Mu:	**3003.24**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**53.0%**

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#: *801487*
Site Name: *CT SUFFIELD 3 CAC 801*
App #: *154325*

Pole Manufacturer:	*Other*

Reactions		
Moment:	2187	ft-kips
Axial:	32	kips
Shear:	20	kips

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	64	in

Plate Data		
Diam:	70	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.36	in

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

Pole Data		
Diam:	57.275	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	100.5 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	51.6% Pass	Fty*ASIF

Base Plate Results

	Flexural Check	
Base Plate Stress:	15.7 ksi	Rigid
Allowable Plate Stress:	60.0 ksi	Service ASD
Base Plate Stress Ratio:	26.1% Pass	0.75*Fy*ASIF
		Y.L. Length: 28.56

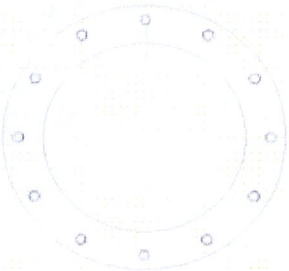
n/a

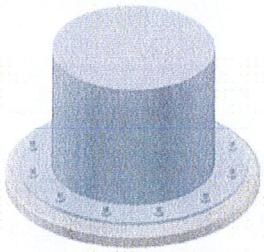
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

Monopole Pier and Pad Foundation

BU # : 801487
Site Name: CT SUFFIELD 3 CAC
App. Number: 154325, Rev. 1

TIA-222 Revision: F

Design Reactions		
Shear, **S**:	20	kips
Moment, **M**:	2187	ft-kips
Tower Height, **H**:	165.5	ft
Tower Weight, **Wt**:	32	kips
Base Diameter, **BD**:	4.773	ft

Foundation Dimensions		
Depth, **D**:	6.5	ft
Pad Width, **W**:	30	ft
Neglected Depth, **N**:	6.5	ft
Thickness, **T**:	2.50	ft
Pier Diameter, **Pd**:	7.50	ft
Ext. Above Grade, **E**:	0.50	ft
BP Dist. Above Pier:	3	in.
Clear Cover, **Cc**:	3.0	in

Soil Properties		
Soil Unit Weight, **γ**:	0.120	kcf
Ult. Bearing Capacity, Bc:	6.0	ksf
Angle of Friction, **Φ**:	0	deg
Cohesion, **Co**:	0.000	ksf
Passive Pressure, **Pp**:	0.000	kcf
Base Friction, **μ**:	0.35	

Material Properties		
Rebar Yield Strength, **Fy**:	60000	psi
Concrete Strength, **F'c**:	3000	psi
Concrete Unit Weight, **δc**:	0.150	kcf
Seismic Zone, **z**:	1	

Rebar Properties		
Pier Rebar Size, **Sp**:	9	
Pier Rebar Quanity, **mp**:	38	32
Pad Rebar Size, **Spad**:	9	
Pad Rebar Quanity, **mpad**:	29	28
Pier Tie Size, **St**:	5	3
Tie Quanity, **mt**:	9	5

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	7.5	6.273	**OK**
Overturning (ft-kips)	6473.74	2187.00	**33.8%**
Shear Capacity (kips)	141.77	20.00	**14.1%**
Bearing (ksf)	4.50	1.54	**34.3%**
Pad Shear - 1-way (kips)	1042.53	593.37	**56.9%**
Pad Shear - 2-way (kips)	2118.62	1087.94	**51.4%**
Pier Rebar Area (in^2)	38.00	31.81	**OK**
Pad Rebar Area (in^2)	29.00	27.74	**95.6%**
Pier Moment Capacity (k-ft)	5028.73	2277.00	**45.3%**
Pier Bar Spacing (in)	5.82	18 > s > 2	**OK**
Pad Bar Spacing (in)	11.47	12 > s > 4.5	**OK**

☐ Modifications

Monopole Drilled Pier

Checks capacity of a single drilled shaft foundation for a monopole

BU#: 801487
Site Name: *CT SUFFIELD 3 CAC 801487*
App Number: *154325*

ACI 318 Version:	2002

Design Reactions		
Shear, **S**:	20.00	kips
Moment, **Mt**:	2187.00	ft-kips
Tower Weight, **Wt**:	32.00	kips
Tower Height, **H**:	166	ft
Base Diameter, **BD**:	57.3	in

Foundation Dimensions		
Caisson Diameter, **CD**:	7.5	ft
Ext. Above Grade, **E**:	0.5	ft
Depth Below Grade, **L**:	23.5	ft
Neglected Depth, **N**:	3.5	ft
Rebar Size, **Sp**:	11	
Rebar Quantity, **mp**:	21	
Tie Size, **tp**:	5	

Material Properties		
Rebar Tensile, **Fy**:	60	ksi
Concrete Strength, **F'c**:	3000	psi
Concrete Density, **δx**:	123	pcf
Clear Cover, **cc**:	3	in

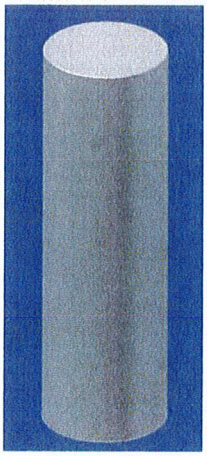
Soil Properties		
Soil Unit Weight, γ:	103	pcf
Seismic Design Cat, **z**:	C	

Caisson Analysis		
Depth to Zero Shear:	5.7	ft
Max Factored Moment:	3003.24	ft-kips
Overturning FOS:	3.95	

Depth		Shear		Moment	
2.4	ft	20	kips	2248.8	ft-kips
4.8	ft	10.9	kips	2293.2	ft-kips
7.2	ft	-17.6	kips	2286.4	ft-kips

Design Checks	*Capacity/ Availability*	*Demand/ Limits*	*Check*
Minimum Req'd Dia. 1 (ft):	7.50	1.43	**OK**
Minimum Req'd Dia. 2 (ft):	7.50	6.27	**OK**
Bearing (ksf):	20.00	0.72	**OK**
Rebar Area (in²):	32.76	0.00	**OK**
Pier moment capacity (k-ft):	5667.97	3003.24	**OK**
Rebar spacing (in):	11.16	2 < Bs <18	**OK**
Development Length (in):	210.39	12.00	**OK**
Soil moment capacity (FOS):	3.95	2.00	**OK**

☐ **Assume 0.33% Minimum Steel?**



Steel: 53.0%

Soil: 50.6%

CAISSON Version 10.40 10:42:36 AM Wednesday, July 11, 2012
Crown Castle USA

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*****************************************************************************************
*                                                                                       *
* CAISSON - Pier Foundations Analysis and Design -  Copyright Power Line Systems, Inc. 1993-2010 *
*                                                                                       *
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Project Title: BU# 801487
Project Notes:

Calculation Method: Full 8CD

******* I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
7.50	0.50	3.00	60.00

Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	2.00	0.00	115.0			
2	Clay	1.50	2.00	120.0			
3	Clay	2.80	3.50	120.0	750.0		
4	Sand	11.70	6.30	120.0		3.255	32.00
5	Sand	26.70	18.00	60.0		3.255	32.00

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
2187.0	32.0	20.00	3.95

******* R E S U L T S

Calculated Pier Properties

Length (ft)	Weight (kips)	End Bearing Pressure (psf)
24.000	159.043	724.3

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.50	2.00	115.0			0.00	1.50
Clay	2.50	1.50	120.0			0.00	3.25
Clay	4.00	2.80	120.0	750.0		126.00	5.40
Sand	6.80	10.53	120.0		3.255	1063.19	12.87
Sand	17.33	1.17	120.0		3.255	-177.57	17.92
Sand	18.50	5.50	60.0		3.255	-932.50	21.32

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)
0.00	79.1	8692.9	20.0	2200.7
2.40	79.1	8882.8	20.0	2248.8
4.80	43.1	9058.3	10.9	2293.2
7.20	-69.4	9031.3	-17.6	2286.4
9.60	-234.3	8677.0	-59.3	2196.7
12.00	-449.8	7866.2	-113.9	1991.4
14.40	-715.9	6477.4	-181.2	1639.9
16.80	-1032.7	4389.3	-261.4	1111.2
19.20	-821.2	2011.4	-207.9	509.2
21.60	-423.3	513.0	-107.2	129.9
24.00	-0.0	0.0	-0.0	0.0

ROBINSON & COLE LLP

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Also admitted in Massachusetts

July 3, 2013

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

Re: **EM-VER-052-121004- Rattlesnake Mountain, Farmington, Connecticut**
EM-VER-084-121004- 1052 Boston Post Road, Milford, Connecticut
EM-VER-084-120928- 423 Oronoque Road, Milford, Connecticut
EM-VER- 085-120913- 88 Main Street, Monroe, Connecticut
EM-VER- 130-120828- 111 Upper Fish Rock Road, Southbury, Connecticut
EM-VER-139-120907- 898 East South Street, Suffield, Connecticut
EM-VER-167-121024- 50 Woodfield Road, Woodbridge, 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

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