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CONNECTICUT
SITING COUNCIL

ORIGINAL

November 10, 2014

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

Re: **EM-VER-014-130607 – 180 North Main Street, Branford, Connecticut**
EM-VER-103-130607 – West Rocks Road, Norwalk, Connecticut
TS-VER-072-130613 – 770 Long Cove Road, Ledyard, Connecticut
EM-VER-080-130613 – 119 Empire Avenue, Meriden, Connecticut
EM-VER-103-130620 – 11 Filbert Street, Norwalk, Connecticut
EM-VER-062-130703 – 150 Willow Street, Hamden, Connecticut
EM-VER-079-130715 – North Main Street, Marlborough, 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 these facilities please do not hesitate to contact me.

Sincerely,



Kenneth C. Baldwin

Copy to:

Sandy M. Carter

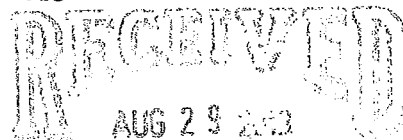
ROBINSON & COLE LLP

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

August 28, 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



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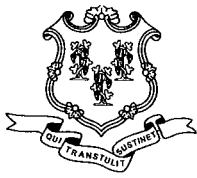
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STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

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July 11, 2013

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

RE: **EM-VER -014-130607** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 180 North Main Street, Branford, 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 the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated June 5, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

c: The Honorable Anthony "Unk" DaRos, First Selectman, Town of Branford
Daniel Shapiro, Chm, Inland Wetland Commission, Town of Branford
Laura Magaraci, Zoning Enforcement Officer, Town of Branford
Crown Castle





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

June 12, 2013

The Honorable Anthony "Unk" DaRos
First Selectman
Town of Branford
Town Hall
1019 Main Street
P. O. Box 150
Branford, CT 06405-0150

RE: **EM-VER -014-130607** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 180 North Main Street, Branford, Connecticut.

Dear First Selectman DaRos:

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

If you have any questions or comments regarding the proposal, please call me or inform the Council by June 26, 2013.

Thank you for your cooperation and consideration.

Very truly yours,

Melanie Bachman
Acting Executive Director

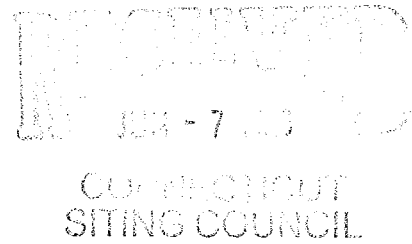
MB/jb

c: Daniel Shapiro, Chm, Inland Wetland Commission, Town of Branford
Laura Magaraci, Zoning Enforcement Officer, Town of Branford

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

Also admitted in Massachusetts

June 5, 2013



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

Re: **Notice of Exempt Modification – Facility Modification
180 North Main Street, Branford, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) wireless telecommunications antennas at various levels on the existing 110-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco’s use of this tower in 1990. Cellco now intends to remove two (2) of its existing antennas (one at the 103-foot level and one at the 97-foot level) and replace them with two (2) model BXA-70063-6CF LTE antennas. Both of the replacement antennas will be located at the 97-foot level. Attached behind Tab 1 are the specifications for Cellco’s replacement antennas.

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 Anthony DaRos, First Selectman for the Town of Branford. A copy of this letter is also being sent to Three M&M Limited Partnership, 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 antennas will be located at the 97-foot level on the 110-foot tower.



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Melanie Bachman
June 5, 2013
Page 2

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

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

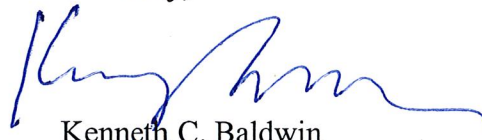
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A General Power Density table for Cellco's modified facility is included behind Tab 2.

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

6. The tower 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:

Anthony DaRos, Branford First Selectman
Three M&M Limited Partnership
Sandy M. Carter



BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

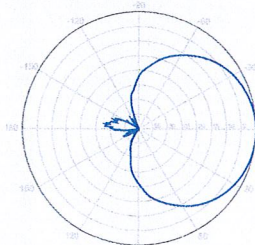
Replace "X" with desired electrical downtilt

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



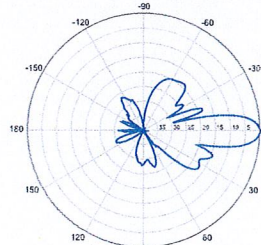
Electrical Characteristics	696-900 MHz		
Frequency bands	696-806 MHz	806-900 MHz	
Polarization	±45°		
Horizontal beamwidth	65°	63°	
Vertical beamwidth	13°	11°	
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10		
Impedance	50Ω		
VSWR	≤1.35:1		
Upper sidelobe 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



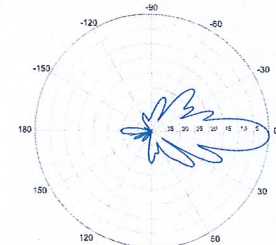
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

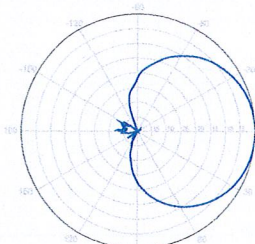


0° | Vertical | 750 MHz

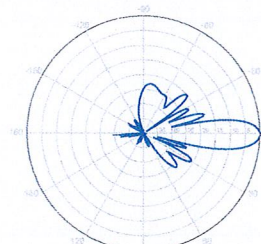
BXA-70063-6CF-EDIN-2



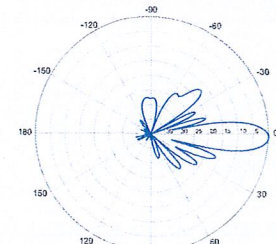
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



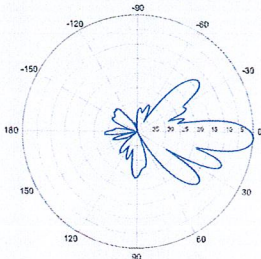
2° | Vertical | 850 MHz

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.

BXA-70063-6CF-EDIN-X

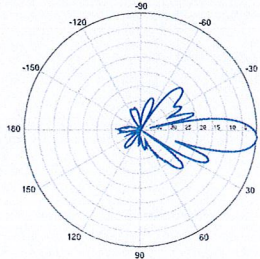
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



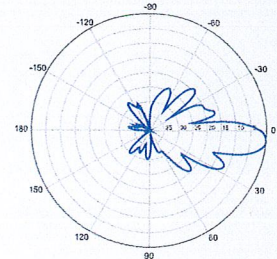
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

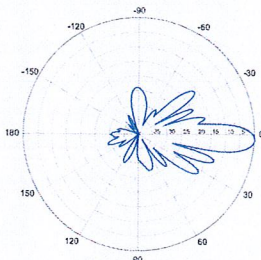


4° | Vertical | 750 MHz

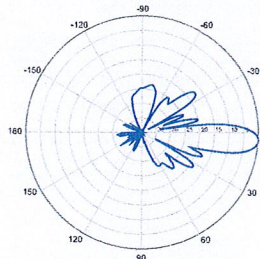
BXA-70063-6CF-EDIN-5



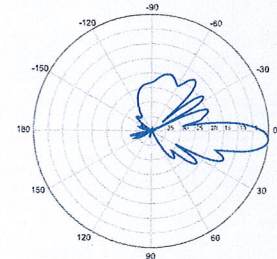
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

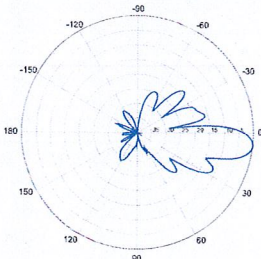


4° | Vertical | 850 MHz



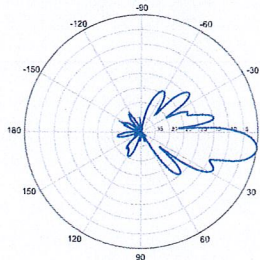
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



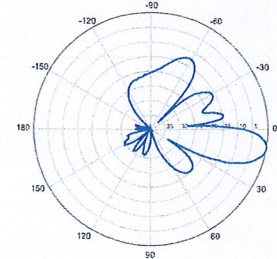
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

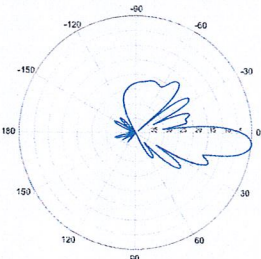


8° | Vertical | 750 MHz

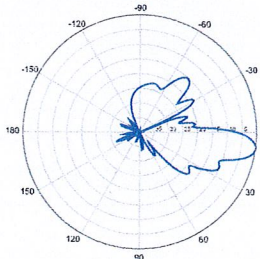
BXA-70063-6CF-EDIN-10



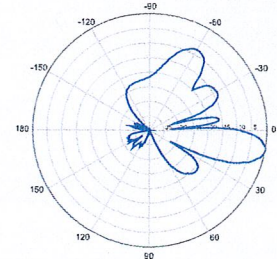
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 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.

General Power Density

Site Name: Branford, CT
 Cumulative Power Density

Operator	Operating Frequency (MHz)	Number of Trans	ERP Per Trans (watts)	Total ERP (watts)	Distance to Target (feet)	Calculated Power Density (mW/cm ²)	Maximum Permissible Exposure (mW/cm ²)	Fraction of MPE (%)
VZW PCS	1970	14	262	3668	97	0.1402	1.0	14.02%
VZW Cellular	869	9	265	2385	97	0.0912	0.5793333333	15.73%
VZW AWS	2145	1	1750	1750	97	0.0669	1.0	6.69%
VZW 700	698	1	863	863	97	0.0330	0.4653333333	7.09%

Total Percentage of Maximum Permissible Exposure

43.53%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
 mW/cm² = milliwatts per square centimeter
 ERP = Effective Radiated Power

Absolute worst case maximum values used.

April 10, 2013

Cheryl Schultz
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
(704) 405-6632



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

Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Co-Locate
Carrier Site Number: NA
Carrier Site Name: Branford, CT

Crown Castle Designation: Crown Castle BU Number: 806360
Crown Castle Site Name: NHV 113 943126
Crown Castle JDE Job Number: 230983
Crown Castle Work Order Number: 596589
Crown Castle Application Number: 185526 Rev. 1

Engineering Firm Designation: B+T Group Project Number: 87395.001.01

Site Data: 180 & 184 North Main Street, Branford, New Haven County, CT
Latitude 41° 17' 22.77", Longitude -72° 48' 42.22"
110 Foot - Monopole Tower

Dear Ms. Schultz,

B+T Group is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 536559, in accordance with application 185526, 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 + Abandoned + Proposed Equipment

Sufficient Capacity

Note: See Table 1 and Table 2 for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and the IBC 2006 (2005 CT State Building Code) based upon a wind speed of 85 mph fastest mile.

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

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

Respectfully submitted by:
B+T Engineering, Inc.

Venu Ambati
Project Engineer

Chad E. Tuttle, P.E.
President

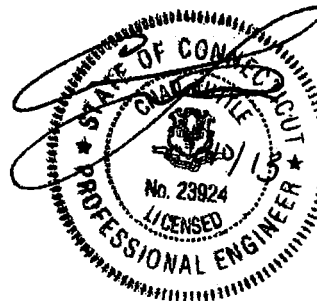


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Additional Calculations

1) INTRODUCTION

This tower is a 110 ft. Monopole tower designed by Valmont in May of 1990.

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 85 mph with no ice, 37.6 mph with 0.75 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
94.0	97.0	2	Antel	BXA-70063-6CF-EDIN-0	--	--	--

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
107.0	107.0	1	tower mounts	Platform Mount [LP 712-1]	--	--	1
97.0	97.0	1	tower mounts	Sector Mount [SM 201-3]			1
94.0	108.0	1	Gps	GPS_A			
	103.0	1	Antel	BXA-70063-4CF-EDIN-X	--	--	3
	97.0	1	Antel	BXA-70063-4CF-EDIN-X	--	--	
	103.0	1	Antel	LPA-171063-12CF-EDIN-2	12	1 1/4	1
			Antel	LPA-171063/8CFx2			
	97.0	1	Antel	BXA-70063-6CF-2			
			Antel	LPA-171063-12CF-EDIN-2			
			Antel	LPA-171063/8CFx2			
	6	Decibel	DB846F65ZAXY				
94.0	1	--	Platform Mount [LP 712-1]				
83.0	83.0	1	Decibel	DB225-A			
		1	--	Pipe Mount [PM 602-1]			
64.0	64.0	1	Decibel	DB225-A	--	--	2
		1	--	Pipe Mount [PM 602-1]			

- Notes:
 1) Existing Equipment
 2) Abandoned equipment consider in this analysis
 3) **Equipment to be removed**

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
110	110	4	--	PD10017	--	--
94	94	12	--	PD1132	--	--
79	79	1	--	1-DB-212-2	--	--
60	60	1	--	1-DB-212-2	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate Revision # 1	185526	CCI Sites
Tower Manufacturer Drawing	Valmont, Date:05/02/1990	971913	CCI Sites
Foundation mappings	SAC, Project No:990-10	217660	CCI Sites
Geotech Report	AET, Date:06/12/1990	262228	CCI Sites
Antenna Configuration	Crown CAD Package	Date:05/04/2013	CCI Sites

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	110 - 67.333	Pole	TP30.45x21.91x0.219	1	-6.716	1014.266	49.3	Pass
L2	67.333 - 29.4167	Pole	TP37.6x29.078x0.313	2	-11.826	1892.127	59.1	Pass
L3	29.4167 - 0	Pole	TP42.85x35.858x0.406	3	-19.237	2886.758	58.2	Pass
							Summary	
						Pole (L2)	59.1	Pass
						RATING =	59.1	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	58.0	Pass
1	Base Plate	Base	31.4	Pass
1	Base Foundation	Base	32.4	Pass

Structure Rating (max from all components) =	59.1%
---	--------------

Notes:

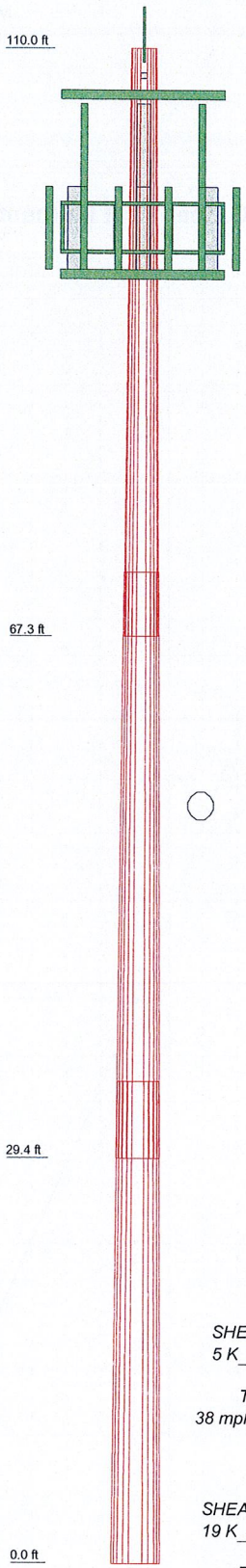
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	42.667	42.583	35.000
Number of Sides	12	12	12
Thickness (in)	0.219	0.313	0.406
Socket Length (ft)	4.667	5.583	35.858
Top Dia (in)	21.910	29.078	42.850
Bot Dia (in)	30.450	37.600	42.850
Grade		A572-65	
Weight (K)	2.7	4.8	6.1



DESIGNED APPURTENANCE LOADING

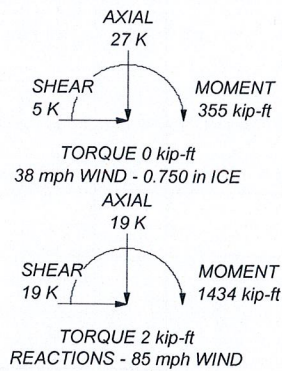
TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 1" x 8' (E)	111	BXA-70063-6CF-EDIN-0 w/ Mount Pipe (P)	94
Platform Mount [LP 712-1] (E)	107	BXA-70063-6CF-EDIN-0 w/ Mount Pipe (P)	94
Sector Mount [SM 201-3] (E (4 mount pipes))	97	Platform Mount [LP 712-1] (E)	94
LPA-171063/8CFx2 w/ Mount Pipe (E)	94	16' x 2" Pipe Mount (E)	94
LPA-171063/8CFx2 w/ Mount Pipe (E)	94	16' x 2" Pipe Mount (E)	94
LPA-171063-12CF-EDIN-2 w/ Mount Pipe (E)	94	16' x 2" Pipe Mount (E)	94
LPA-171063-12CF-EDIN-2 w/ Mount Pipe (E)	94	8' x 2" Pipe Mount (E)	94
LPA-171063-8CFx2 w/ Mount Pipe (E)	94	8' x 2" Pipe Mount (E)	94
LPA-171063/8CFx2 w/ Mount Pipe (E)	94	8' x 2" Pipe Mount (E)	94
(2) DB846F65ZAXY (E)	94	BXA-70063-6CF-2 w/ Mount Pipe (E)	94
(2) DB846F65ZAXY (E)	94	DB225-A (AB)	83
(2) DB846F65ZAXY (E)	94	Pipe Mount [PM 602-1] (E)	83
GPS_A (E)	94	DB225-A (Abandoned)	64
		Pipe Mount [PM 602-1] (E)	64


MATERIAL STRENGTH

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

TOWER DESIGN NOTES

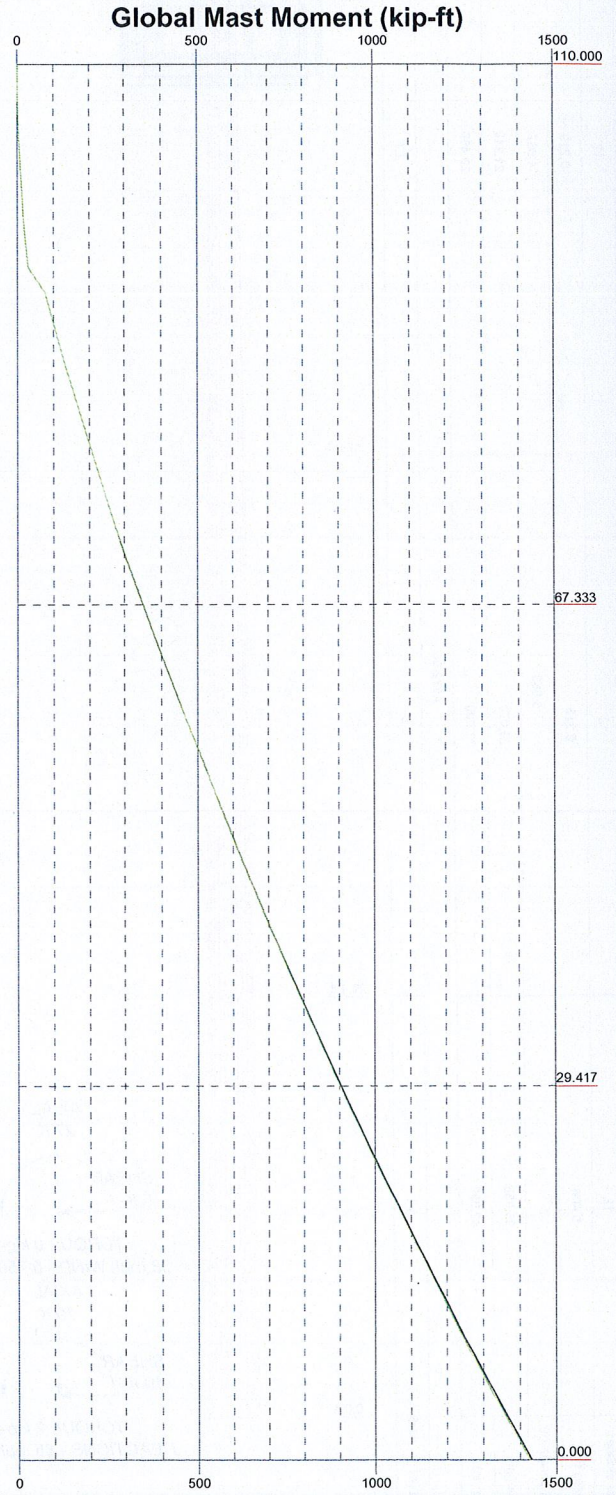
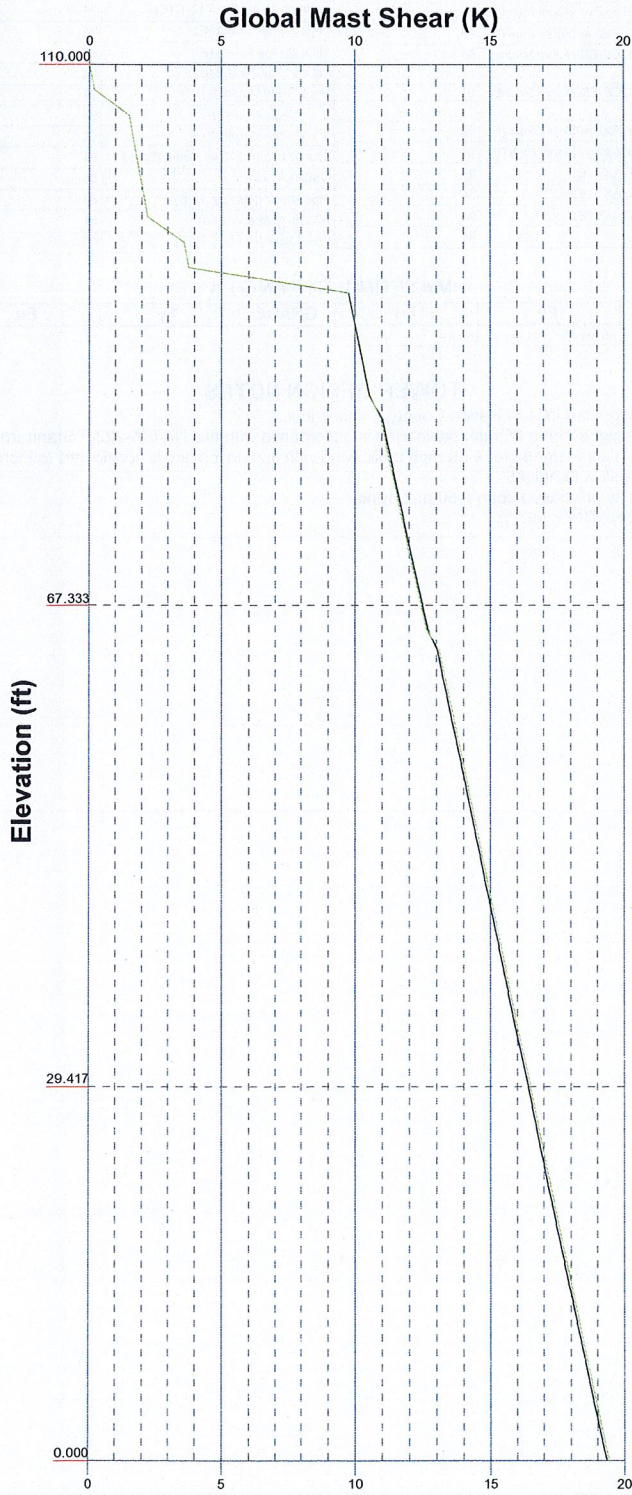
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 59.1%



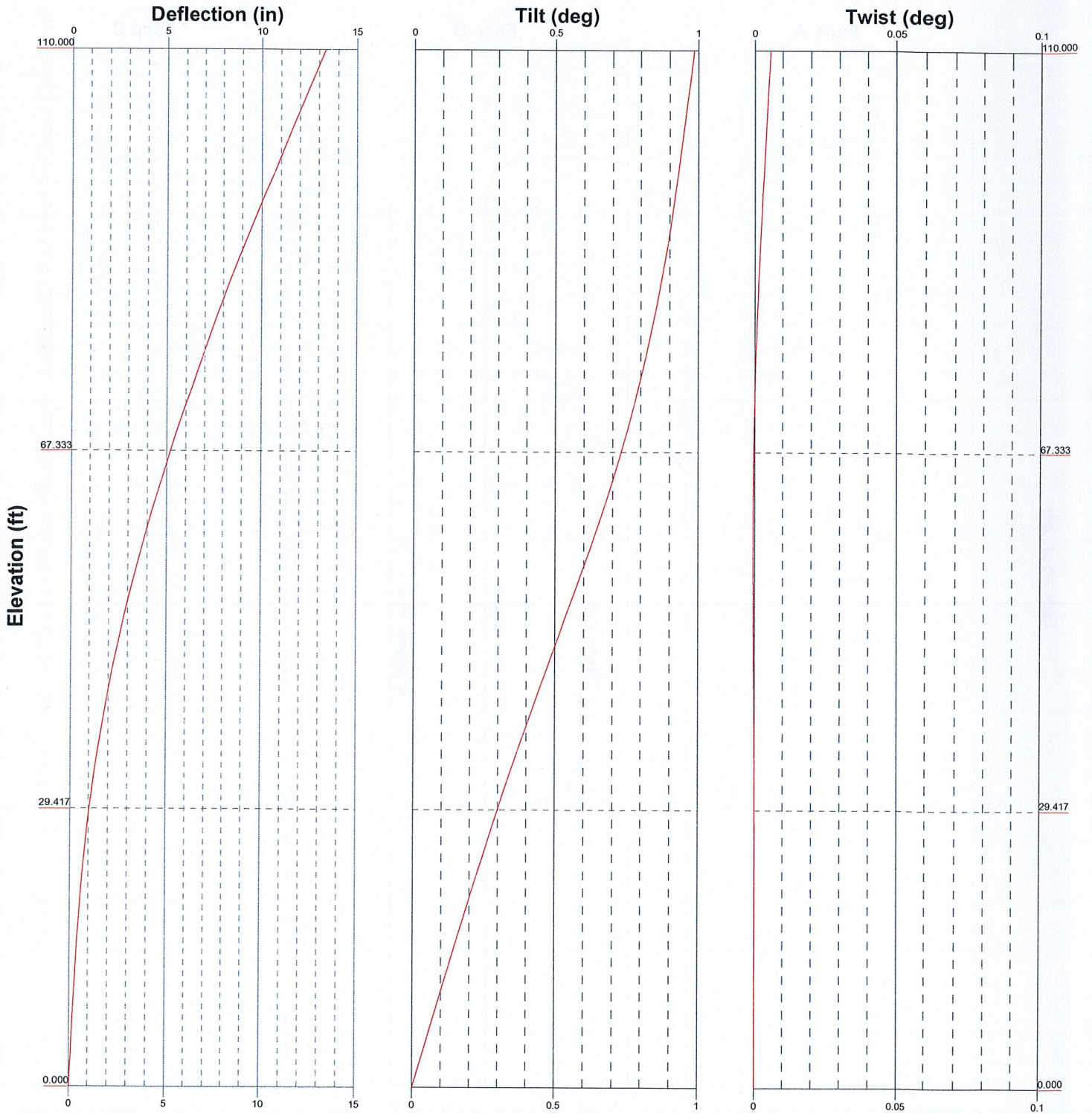
 B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job: 87395.001.01- NHV113 943126, CT (BU# 806366)		
	Project:	Client: Crown Castle	Drawn by: VenuAmbati
	Code: TIA/EIA-222-F	Date: 04/10/13	App'd:
	Path:	Scale: NTS	Dwg No. E-1
	<small>© Phoenix Group, Copyright 2013, 800502 NHV 113 943126 Engineering Project Tower 87395_001_01 NHV11324125C</small>		


Vx Vz

Mx Mz



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	Project:		
	Client: Crown Castle	Drawn by: VenuAmbati	App'd:
	Code: TIA/EIA-222-F	Date: 04/10/13	Scale: NTS
	Path:		Dwg No. E-4

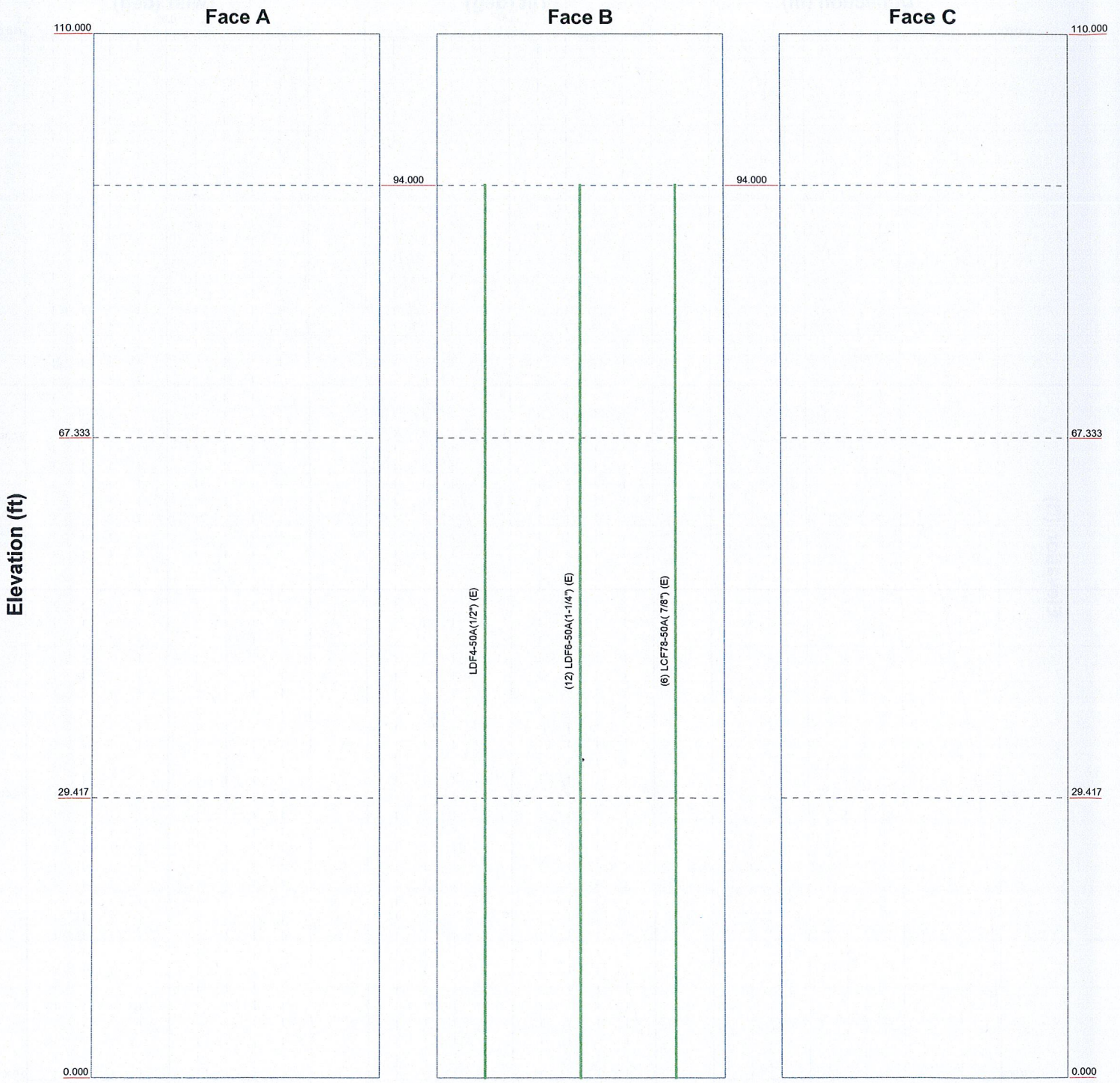


 <p>B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265</p>	Job: 87395.001.01- NHV113 943126, CT (BU# 80636)		
	Project:		
	Client: Crown Castle	Drawn by: VenuAmbati	App'd:
	Code: TIA/EIA-222-F	Date: 04/10/13	Scale: NTS
	Path:	Dwg No. E-5	

Feedline Distribution Chart

0' - 110'

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



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	Project:		
	Client: Crown Castle	Drawn by: VenuAmbati	App'd:
	Code: TIA/EIA-222-F	Date: 04/10/13	Scale: NTS
	Path:		Dwg No: E-7
© 2013 Crown Castle. All rights reserved. NHV 113 943126 Engineering Drawn: 04/10/13 09:51 NHV1132451200			

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	Project	Date 15:23:50 04/10/13
	Client Crown Castle	Designed by VenuAmbati

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 New Haven County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.750 in.

Ice thickness is considered to increase with height.

Ice density of 56.000 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50.000 °F.

Deflections calculated using a wind speed of 50 mph.

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	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	110.000-67.333	42.667	4.667	12	21.910	30.450	0.219	0.875	A572-65 (65 ksi)
L2	67.333-29.417	42.583	5.583	12	29.078	37.600	0.313	1.250	A572-65 (65 ksi)
L3	29.417-0.000	35.000		12	35.858	42.850	0.406	1.625	A572-65 (65 ksi)

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Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	22.683	15.282	917.783	7.765	11.349	80.866	1859.677	7.521	5.285	24.157
	31.524	21.299	2484.593	10.823	15.773	157.521	5034.460	10.483	7.574	34.617
L2	31.071	28.946	3057.174	10.298	15.063	202.965	6194.664	14.246	6.955	22.258
	38.926	37.521	6658.580	13.349	19.477	341.872	13492.089	18.466	9.239	29.566
L3	38.277	46.381	7440.257	12.692	18.574	400.568	15075.978	22.827	8.521	20.972
	44.362	55.528	12768.161	15.195	22.196	575.238	25871.756	27.329	10.395	25.584

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 110.000-67.33				1	1	1		
L2 67.333-29.417				1	1	1		
L3 29.417-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C _{AA}	Weight
				ft		ft ² /ft	klf
LDF4-50A(1/2") (E)	B	No	Inside Pole	94.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000
LDF6-50A(1-1/4") (E)	B	No	Inside Pole	94.000 - 0.000	12	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.001 0.001 0.001
LCF78-50A(7/8") (E)	B	No	Inside Pole	94.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000
+							

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	Client Crown Castle	Designed by VenuAmbati

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	110.000-67.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.270
		C	0.000	0.000	0.000	0.000	0.000
L2	67.333-29.417	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.383
		C	0.000	0.000	0.000	0.000	0.000
L3	29.417-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.297
		C	0.000	0.000	0.000	0.000	0.000

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} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	110.000-67.333	A	0.844	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.270
		C		0.000	0.000	0.000	0.000	0.000
L2	67.333-29.417	A	0.785	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.383
		C		0.000	0.000	0.000	0.000	0.000
L3	29.417-0.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.297
		C		0.000	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
L1	110.000-67.333	0.000	0.000	0.000	0.000
L2	67.333-29.417	0.000	0.000	0.000	0.000
L3	29.417-0.000	0.000	0.000	0.000	0.000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Lighting Rod 1" x 8' (E)	C	None		0.000	111.000	No Ice	0.800	0.030
						1/2" Ice	1.617	0.037
						1" Ice	2.450	0.050

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz Lateral	Vert						ft
							2" Ice	3.781	3.781	0.091
							4" Ice	5.858	5.858	0.242
+							No Ice	24.530	24.530	1.335
Platform Mount [LP 712-1] (E)	C	None			0.000	107.000	1/2" Ice	29.940	29.940	1.646
							1" Ice	35.350	35.350	1.956
							2" Ice	46.170	46.170	2.577
							4" Ice	67.810	67.810	3.820
&							No Ice	7.969	5.801	0.042
BXA-70063-6CF-2 w/ Mount Pipe (E)	B	From Leg	4.000		0.000	94.000	1/2" Ice	8.609	6.953	0.100
			0.000				1" Ice	9.216	7.819	0.170
			3.000				2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.803
LPA-171063/8CFx2 w/ Mount Pipe (E)	A	From Leg	4.000		0.000	94.000	No Ice	3.932	4.872	0.030
			0.000				1/2" Ice	4.357	5.537	0.070
			9.000				1" Ice	4.792	6.219	0.118
							2" Ice	5.693	7.636	0.235
							4" Ice	7.633	10.739	0.574
LPA-171063/8CFx2 w/ Mount Pipe (E)	A	From Leg	4.000		0.000	94.000	No Ice	3.932	4.872	0.030
			0.000				1/2" Ice	4.357	5.537	0.070
			3.000				1" Ice	4.792	6.219	0.118
							2" Ice	5.693	7.636	0.235
							4" Ice	7.633	10.739	0.574
LPA-171063-12CF-EDIN-2 w/ Mount Pipe (E)	B	From Leg	4.000		0.000	94.000	No Ice	6.232	7.754	0.038
			0.000				1/2" Ice	6.804	8.967	0.097
			9.000				1" Ice	7.345	9.913	0.168
							2" Ice	8.444	11.786	0.337
							4" Ice	10.993	15.992	0.816
LPA-171063-12CF-EDIN-2 w/ Mount Pipe (E)	B	From Leg	4.000		0.000	94.000	No Ice	6.232	7.754	0.038
			0.000				1/2" Ice	6.804	8.967	0.097
			3.000				1" Ice	7.345	9.913	0.168
							2" Ice	8.444	11.786	0.337
							4" Ice	10.993	15.992	0.816
LPA-171063/8CFx2 w/ Mount Pipe (E)	C	From Leg	4.000		0.000	94.000	No Ice	3.932	4.872	0.030
			0.000				1/2" Ice	4.357	5.537	0.070
			9.000				1" Ice	4.792	6.219	0.118
							2" Ice	5.693	7.636	0.235
							4" Ice	7.633	10.739	0.574
LPA-171063/8CFx2 w/ Mount Pipe (E)	C	From Leg	4.000		0.000	94.000	No Ice	3.932	4.872	0.030
			0.000				1/2" Ice	4.357	5.537	0.070
			3.000				1" Ice	4.792	6.219	0.118
							2" Ice	5.693	7.636	0.235
							4" Ice	7.633	10.739	0.574
(2) DB846F65ZAXY (E)	A	From Leg	4.000		0.000	94.000	No Ice	7.033	6.158	0.021
			0.000				1/2" Ice	7.536	6.619	0.070
			3.000				1" Ice	8.080	7.087	0.125
							2" Ice	9.195	8.106	0.254
							4" Ice	11.528	10.401	0.593
(2) DB846F65ZAXY (E)	B	From Leg	4.000		0.000	94.000	No Ice	7.033	6.158	0.021
			0.000				1/2" Ice	7.536	6.619	0.070
			3.000				1" Ice	8.080	7.087	0.125
							2" Ice	9.195	8.106	0.254
							4" Ice	11.528	10.401	0.593
(2) DB846F65ZAXY (E)	C	From Leg	4.000		0.000	94.000	No Ice	7.033	6.158	0.021
			0.000				1/2" Ice	7.536	6.619	0.070
			3.000				1" Ice	8.080	7.087	0.125

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	Client Crown Castle	Designed by VenuAmbati

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						Vert
			ft	ft						
GPS_A (E)	A	From Leg	4.000	0.000	0.000	94.000	2" Ice	9.195	8.106	0.254
			0.000				4" Ice	11.528	10.401	0.593
			14.000				No Ice	0.297	0.297	0.001
							1/2" Ice	0.374	0.374	0.005
							1" Ice	0.459	0.459	0.010
							2" Ice	0.655	0.655	0.025
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (P)	A	From Leg	4.000	0.000	0.000	94.000	4" Ice	1.151	1.151	0.079
			0.000				No Ice	7.969	5.801	0.042
			3.000				1/2" Ice	8.609	6.953	0.100
							1" Ice	9.216	7.819	0.170
							2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.803
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (P)	C	From Leg	4.000	0.000	0.000	94.000	No Ice	7.969	5.801	0.042
			0.000				1/2" Ice	8.609	6.953	0.100
			3.000				1" Ice	9.216	7.819	0.170
							2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.803
							No Ice	24.530	24.530	1.335
Platform Mount [LP 712-1] (E)	C	None			0.000	94.000	1/2" Ice	29.940	29.940	1.646
							1" Ice	35.350	35.350	1.956
							2" Ice	46.170	46.170	2.577
							4" Ice	67.810	67.810	3.820
							No Ice	3.800	3.800	0.059
							1/2" Ice	5.428	5.428	0.087
16' x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	0.000	94.000	1" Ice	7.073	7.073	0.125
			0.000				2" Ice	10.413	10.413	0.234
			15.000				4" Ice	15.459	15.459	0.579
							No Ice	3.800	3.800	0.059
							1/2" Ice	5.428	5.428	0.087
							1" Ice	7.073	7.073	0.125
16' x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	0.000	94.000	2" Ice	10.413	10.413	0.234
			0.000				4" Ice	15.459	15.459	0.579
			15.000				No Ice	3.800	3.800	0.059
							1/2" Ice	5.428	5.428	0.087
							1" Ice	7.073	7.073	0.125
							2" Ice	10.413	10.413	0.234
16' x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	0.000	94.000	4" Ice	15.459	15.459	0.579
			0.000				No Ice	3.800	3.800	0.059
			15.000				1/2" Ice	5.428	5.428	0.087
							1" Ice	7.073	7.073	0.125
							2" Ice	10.413	10.413	0.234
							4" Ice	15.459	15.459	0.579
8' x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	0.000	94.000	No Ice	1.900	1.900	0.029
			0.000				1/2" Ice	2.728	2.728	0.044
			12.000				1" Ice	3.401	3.401	0.063
							2" Ice	4.396	4.396	0.119
							4" Ice	6.498	6.498	0.300
							No Ice	1.900	1.900	0.029
8' x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	0.000	94.000	1/2" Ice	2.728	2.728	0.044
			0.000				1" Ice	3.401	3.401	0.063
			12.000				2" Ice	4.396	4.396	0.119
							4" Ice	6.498	6.498	0.300
							No Ice	1.900	1.900	0.029
							1/2" Ice	2.728	2.728	0.044
8' x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	0.000	94.000	1" Ice	3.401	3.401	0.063
			0.000				2" Ice	4.396	4.396	0.119
			12.000				4" Ice	6.498	6.498	0.300
							No Ice	1.900	1.900	0.029
							1/2" Ice	2.728	2.728	0.044
							1" Ice	3.401	3.401	0.063
Sector Mount [SM 201-3] (E (4 mount pipes))	C	None			0.000	97.000	2" Ice	4.396	4.396	0.119
							4" Ice	6.498	6.498	0.300
							No Ice	26.690	26.690	1.083
							1/2" Ice	37.600	37.600	1.490
							1" Ice	48.510	48.510	1.896
							2" Ice	70.330	70.330	2.709
		4" Ice	113.970	113.970	4.336					

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
&								
DB225-A (AB)	B	From Leg	2.000 0.000 0.000	0.000	83.000	No Ice 3.210 1/2" Ice 5.778 1" Ice 8.346 2" Ice 13.482 4" Ice 23.754	3.210 5.778 8.346 13.482 23.754	0.037 0.048 0.059 0.081 0.126
Pipe Mount [PM 602-1] (E)	B	From Leg	1.000 0.000 0.000	0.000	83.000	No Ice 5.250 1/2" Ice 6.500 1" Ice 7.750 2" Ice 10.250 4" Ice 15.250	1.580 1.950 2.320 3.060 4.540	0.093 0.118 0.142 0.192 0.291
&								
DB225-A (Abandoned)	A	From Leg	2.000 0.000 0.000	0.000	64.000	No Ice 3.210 1/2" Ice 5.778 1" Ice 8.346 2" Ice 13.482 4" Ice 23.754	3.210 5.778 8.346 13.482 23.754	0.037 0.048 0.059 0.081 0.126
Pipe Mount [PM 602-1] (E)	A	From Leg	1.000 0.000 0.000	0.000	64.000	No Ice 5.250 1/2" Ice 6.500 1" Ice 7.750 2" Ice 10.250 4" Ice 15.250	1.580 1.950 2.320 3.060 4.540	0.093 0.118 0.142 0.192 0.291
&								

Load Combinations

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

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Comb. No.	Description
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	110 - 67.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-11.723	-0.775	-0.406
			Max. Mx	5	-6.718	-294.169	-0.285
			Max. My	8	-6.720	-0.434	-293.908
			Max. Vy	5	12.007	-294.169	-0.285
			Max. Vx	2	-11.957	-0.201	293.522
			Max. Torque	3			-1.758
			Max Tension	1	0.000	0.000	0.000
L2	67.333 - 29.4167	Pole	Max. Compression	14	-18.105	-0.775	0.078
			Max. Mx	5	-11.829	-811.878	-1.586
			Max. My	2	-11.826	1.382	813.769
			Max. Vy	5	15.842	-811.878	-1.586
			Max. Vx	2	-15.931	1.382	813.769
			Max. Torque	3			-1.758
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-26.756	-0.775	0.078
L3	29.4167 - 0	Pole	Max. Mx	5	-19.238	-1427.141	-3.103
			Max. My	2	-19.237	2.896	1432.161
			Max. Vy	5	19.351	-1427.141	-3.103
			Max. Vx	2	-19.439	2.896	1432.161
			Max. Torque	2			-1.555

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	20	26.756	-2.278	-3.959
	Max. H _x	11	19.246	19.342	0.043
	Max. H _z	2	19.246	0.043	19.431
	Max. M _x	2	1432.161	0.043	19.431
	Max. M _z	5	1427.141	-19.342	-0.043
	Max. Torsion	8	1.539	-0.043	-19.431
	Min. Vert	1	19.246	0.000	0.000
	Min. H _x	5	19.246	-19.342	-0.043
	Min. H _z	8	19.246	-0.043	-19.431

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Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M _x	8	-1431.877	-0.043	-19.431
	Min. M _z	11	-1426.437	19.342	0.043
	Min. Torsion	2	-1.555	0.043	19.431

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overtuning Moment, M _x kip-ft	Overtuning Moment, M _z kip-ft	Torque kip-ft
Dead Only	19.246	0.000	0.000	-0.140	-0.343	0.000
Dead+Wind 0 deg - No Ice	19.246	-0.043	-19.431	-1432.161	2.896	1.555
Dead+Wind 30 deg - No Ice	19.246	9.634	-16.806	-1238.687	-710.933	1.487
Dead+Wind 60 deg - No Ice	19.246	16.729	-9.678	-713.344	-1234.365	1.020
Dead+Wind 90 deg - No Ice	19.246	19.342	0.043	3.103	-1427.141	0.284
Dead+Wind 120 deg - No Ice	19.246	16.772	9.753	718.679	-1237.608	-0.522
Dead+Wind 150 deg - No Ice	19.246	9.708	16.849	1241.645	-716.554	-1.187
Dead+Wind 180 deg - No Ice	19.246	0.043	19.431	1431.877	-3.595	-1.539
Dead+Wind 210 deg - No Ice	19.246	-9.634	16.806	1238.401	710.234	-1.484
Dead+Wind 240 deg - No Ice	19.246	-16.729	9.678	713.057	1233.662	-1.033
Dead+Wind 270 deg - No Ice	19.246	-19.342	-0.043	-3.388	1426.437	-0.300
Dead+Wind 300 deg - No Ice	19.246	-16.772	-9.753	-718.962	1236.904	0.519
Dead+Wind 330 deg - No Ice	19.246	-9.708	-16.849	-1241.928	715.853	1.200
Dead+Ice+Temp	26.756	0.000	0.000	-0.078	-0.775	0.000
Dead+Wind 0 deg+Ice+Temp	26.756	-0.010	-4.565	-354.650	-0.123	0.463
Dead+Wind 30 deg+Ice+Temp	26.756	2.261	-3.949	-306.801	-176.672	0.416
Dead+Wind 60 deg+Ice+Temp	26.756	3.926	-2.274	-176.766	-306.099	0.257
Dead+Wind 90 deg+Ice+Temp	26.756	4.539	0.010	0.614	-353.726	0.030
Dead+Wind 120 deg+Ice+Temp	26.756	3.936	2.291	177.809	-306.790	-0.204
Dead+Wind 150 deg+Ice+Temp	26.756	2.278	3.959	307.339	-177.867	-0.384
Dead+Wind 180 deg+Ice+Temp	26.756	0.010	4.565	354.498	-1.504	-0.461
Dead+Wind 210 deg+Ice+Temp	26.756	-2.261	3.949	306.648	175.045	-0.415
Dead+Wind 240 deg+Ice+Temp	26.756	-3.926	2.274	176.613	304.473	-0.258
Dead+Wind 270 deg+Ice+Temp	26.756	-4.539	-0.010	-0.767	352.099	-0.032
Dead+Wind 300 deg+Ice+Temp	26.756	-3.936	-2.291	-177.961	305.163	0.204
Dead+Wind 330 deg+Ice+Temp	26.756	-2.278	-3.959	-307.492	176.241	0.385
Dead+Wind 0 deg - Service	19.246	-0.015	-6.724	-495.816	0.771	0.538
Dead+Wind 30 deg - Service	19.246	3.334	-5.815	-428.847	-246.311	0.516
Dead+Wind 60 deg - Service	19.246	5.789	-3.349	-247.006	-427.489	0.355
Dead+Wind 90 deg - Service	19.246	6.693	0.015	0.981	-494.216	0.101
Dead+Wind 120 deg - Service	19.246	5.804	3.375	248.668	-428.613	-0.181
Dead+Wind 150 deg - Service	19.246	3.359	5.830	429.686	-248.257	-0.413
Dead+Wind 180 deg - Service	19.246	0.015	6.724	495.532	-1.476	-0.536
Dead+Wind 210 deg - Service	19.246	-3.334	5.815	428.563	245.606	-0.515
Dead+Wind 240 deg - Service	19.246	-5.789	3.349	246.722	426.784	-0.357
Dead+Wind 270 deg - Service	19.246	-6.693	-0.015	-1.265	493.510	-0.102
Dead+Wind 300 deg - Service	19.246	-5.804	-3.375	-248.952	427.907	0.180
Dead+Wind 330 deg - Service	19.246	-3.359	-5.830	-429.970	247.552	0.415

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-19.246	0.000	0.000	19.246	0.000	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
2	-0.043	-19.246	-19.431	0.043	19.246	19.431	0.000%
3	9.634	-19.246	-16.806	-9.634	19.246	16.806	0.000%
4	16.729	-19.246	-9.678	-16.729	19.246	9.678	0.000%
5	19.342	-19.246	0.043	-19.342	19.246	-0.043	0.000%
6	16.772	-19.246	9.753	-16.772	19.246	-9.753	0.000%
7	9.708	-19.246	16.849	-9.708	19.246	-16.849	0.000%
8	0.043	-19.246	19.431	-0.043	19.246	-19.431	0.000%
9	-9.634	-19.246	16.806	9.634	19.246	-16.806	0.000%
10	-16.729	-19.246	9.678	16.729	19.246	-9.678	0.000%
11	-19.342	-19.246	-0.043	19.342	19.246	0.043	0.000%
12	-16.772	-19.246	-9.753	16.772	19.246	9.753	0.000%
13	-9.708	-19.246	-16.849	9.708	19.246	16.849	0.000%
14	0.000	-26.756	0.000	0.000	26.756	0.000	0.000%
15	-0.010	-26.756	-4.565	0.010	26.756	4.565	0.000%
16	2.261	-26.756	-3.949	-2.261	26.756	3.949	0.000%
17	3.926	-26.756	-2.274	-3.926	26.756	2.274	0.000%
18	4.539	-26.756	0.010	-4.539	26.756	-0.010	0.000%
19	3.936	-26.756	2.291	-3.936	26.756	-2.291	0.000%
20	2.278	-26.756	3.959	-2.278	26.756	-3.959	0.000%
21	0.010	-26.756	4.565	-0.010	26.756	-4.565	0.000%
22	-2.261	-26.756	3.949	2.261	26.756	-3.949	0.000%
23	-3.926	-26.756	2.274	3.926	26.756	-2.274	0.000%
24	-4.539	-26.756	-0.010	4.539	26.756	0.010	0.000%
25	-3.936	-26.756	-2.291	3.936	26.756	2.291	0.000%
26	-2.278	-26.756	-3.959	2.278	26.756	3.959	0.000%
27	-0.015	-19.246	-6.724	0.015	19.246	6.724	0.000%
28	3.334	-19.246	-5.815	-3.334	19.246	5.815	0.000%
29	5.789	-19.246	-3.349	-5.789	19.246	3.349	0.000%
30	6.693	-19.246	0.015	-6.693	19.246	-0.015	0.000%
31	5.804	-19.246	3.375	-5.804	19.246	-3.375	0.000%
32	3.359	-19.246	5.830	-3.359	19.246	-5.830	0.000%
33	0.015	-19.246	6.724	-0.015	19.246	-6.724	0.000%
34	-3.334	-19.246	5.815	3.334	19.246	-5.815	0.000%
35	-5.789	-19.246	3.349	5.789	19.246	-3.349	0.000%
36	-6.693	-19.246	-0.015	6.693	19.246	0.015	0.000%
37	-5.804	-19.246	-3.375	5.804	19.246	3.375	0.000%
38	-3.359	-19.246	-5.830	3.359	19.246	5.830	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.0000001
2	Yes	4	0.0000001	0.00013486
3	Yes	4	0.0000001	0.00079180
4	Yes	4	0.0000001	0.00066563
5	Yes	4	0.0000001	0.00004578
6	Yes	4	0.0000001	0.00069974
7	Yes	4	0.0000001	0.00077146
8	Yes	4	0.0000001	0.00014035
9	Yes	4	0.0000001	0.00065032
10	Yes	4	0.0000001	0.00076801
11	Yes	4	0.0000001	0.00004086
12	Yes	4	0.0000001	0.00073339
13	Yes	4	0.0000001	0.00067009
14	Yes	4	0.0000001	0.0000001

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15	Yes	4	0.0000001	0.00036979
16	Yes	4	0.0000001	0.00039272
17	Yes	4	0.0000001	0.00039045
18	Yes	4	0.0000001	0.00036958
19	Yes	4	0.0000001	0.00039167
20	Yes	4	0.0000001	0.00039343
21	Yes	4	0.0000001	0.00037006
22	Yes	4	0.0000001	0.00038844
23	Yes	4	0.0000001	0.00038875
24	Yes	4	0.0000001	0.00036610
25	Yes	4	0.0000001	0.00038889
26	Yes	4	0.0000001	0.00038909
27	Yes	4	0.0000001	0.0002580
28	Yes	4	0.0000001	0.00006563
29	Yes	4	0.0000001	0.00004458
30	Yes	4	0.0000001	0.00001016
31	Yes	4	0.0000001	0.00004783
32	Yes	4	0.0000001	0.00006087
33	Yes	4	0.0000001	0.00002613
34	Yes	4	0.0000001	0.00004401
35	Yes	4	0.0000001	0.00006060
36	Yes	4	0.0000001	0.00000989
37	Yes	4	0.0000001	0.00005330
38	Yes	4	0.0000001	0.00004471

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 67.333	13.348	32	0.987	0.004
L2	72 - 29.4167	5.950	32	0.775	0.002
L3	35 - 0	1.404	32	0.359	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
111.000	Lighting Rod 1" x 8'	32	13.348	0.987	0.004	42243
107.000	Platform Mount [LP 712-1]	32	12.723	0.975	0.004	42243
97.000	Sector Mount [SM 201-3]	32	10.660	0.933	0.004	16247
94.000	BXA-70063-6CF-2 w/ Mount Pipe	32	10.053	0.919	0.003	13201
83.000	DB225-A	32	7.909	0.858	0.003	7822
64.000	DB225-A	32	4.682	0.698	0.002	5178

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 67.333	38.524	7	2.848	0.013
L2	72 - 29.4167	17.182	7	2.239	0.006
L3	35 - 0	4.054	7	1.036	0.002

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
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Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
111.000	Lighting Rod 1" x 8'	7	38.524	2.848	0.013	14722
107.000	Platform Mount [LP 712-1]	7	36.722	2.814	0.012	14722
97.000	Sector Mount [SM 201-3]	7	30.771	2.693	0.011	5661
94.000	BXA-70063-6CF-2 w/ Mount Pipe	7	29.020	2.653	0.010	4600
83.000	DB225-A	7	22.834	2.478	0.008	2724
64.000	DB225-A	7	13.522	2.015	0.005	1801

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 P/P _a
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	42.667	0.000	0.0	36.863	20.641	-6.716	760.890	0.009
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	42.583	0.000	0.0	39.000	36.396	-11.826	1419.450	0.008
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	35.000	0.000	0.0	39.000	55.528	-19.237	2165.610	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} /F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} /F _{by}
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	294.293	23.877	36.863	0.648	0.000	0.000	36.863	0.000
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	814.652	30.397	39.000	0.779	0.000	0.000	39.000	0.000
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	1433.57	29.906	39.000	0.767	0.000	0.000	39.000	0.000

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	Client Crown Castle	Designed by VenuAmbati

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v /F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} /F _{vt}
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	12.032	0.583	26.000	0.046	0.059	0.002	26.000	0.000
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	15.947	0.438	26.000	0.034	1.187	0.021	26.000	0.001
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	19.454	0.350	26.000	0.027	1.187	0.012	26.000	0.000

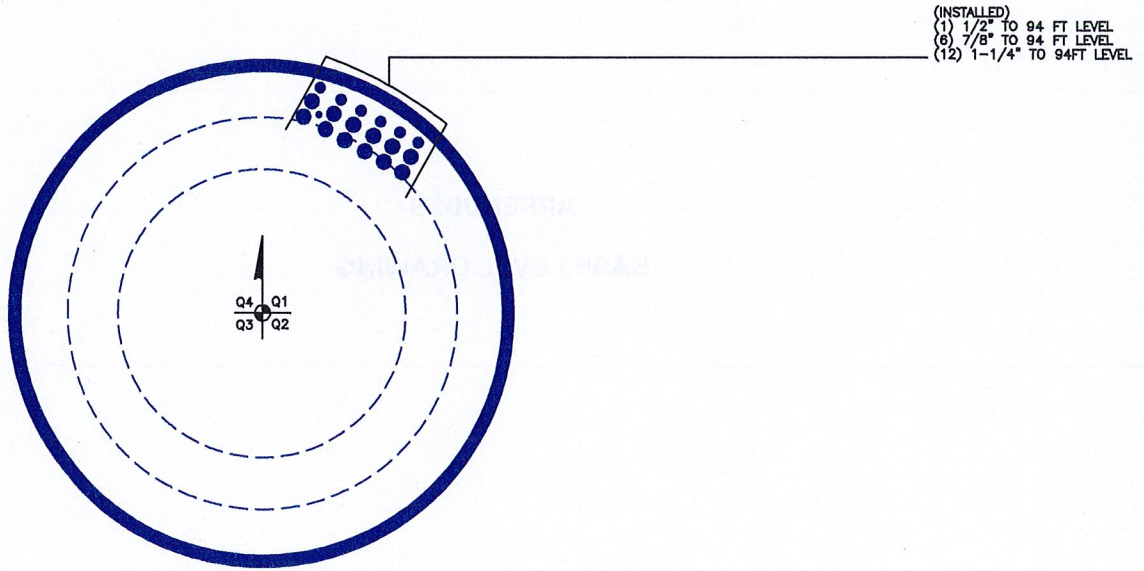
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	110 - 67.333 (1)	0.009	0.648	0.000	0.046	0.000	0.657	1.333	H1-3+VT ✓
L2	67.333 - 29.4167 (2)	0.008	0.779	0.000	0.034	0.001	0.788	1.333	H1-3+VT ✓
L3	29.4167 - 0 (3)	0.009	0.767	0.000	0.027	0.000	0.776	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	110 - 67.333	Pole	TP30.45x21.91x0.219	1	-6.716	1014.266	49.3	Pass	
L2	67.333 - 29.4167	Pole	TP37.6x29.078x0.313	2	-11.826	1892.127	59.1	Pass	
L3	29.4167 - 0	Pole	TP42.85x35.858x0.406	3	-19.237	2886.758	58.2	Pass	
							Summary		
							Pole (L2)	59.1	Pass
							RATING =	59.1	Pass

APPENDIX B
BASE LEVEL DRAWING



BUSINESS UNIT: 806360 TOWER ID: C_BASELEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#:	806360
Site Name:	NHV 113 943126, CT
App #:	185526, REV.1
Pole Manufacturer:	Other

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	50	in

Plate Data

Diam:	56.86	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.48	in

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	42.85	in
Thick:	0.406	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor

ASIF:	1.333
-------	-------

Reactions		
Moment:	1434	ft-kips
Axial:	19	kips
Shear:	19	kips

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

Anchor Rod Results

Maximum Rod Tension: 113.1 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 58.0% **Pass**

Rigid
Service, ASD
Fty*ASIF

Base Plate Results

Base Plate Stress: 18.8 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 31.4% **Pass**

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
25.77

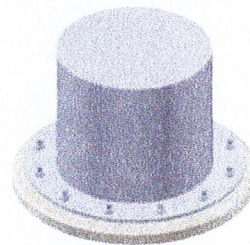
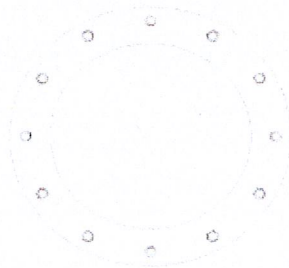
n/a

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

CAISSON Version 10.35 4:03:30 PM Wednesday, April 10, 2013
 B&T Engineering

 * CAISSON - Pier Foundations Analysis and Design - Copyright Power Line Systems, Inc. 1993-2010 *

Project Title: 87395.001.01- NHV113 943126,CT (BU# 806360)
 Project Notes: 110' Valmont Monopole- 6.5'Dia, 32.5' Depth (32' Bearing)

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)
6.00	0.50		

Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	3.00	0.00	155.0			
2	Clay	4.00	3.00	155.0	1300.0		
3	Clay	25.00	7.00	92.6	1300.0		

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
1434.0	19.0	19.00	7.34

Soil Interaction = (2/7.34) x 100 = 27.2%

***** RESULTS

Calculated Pier Properties

Length (ft)	Weight (kips)	End Bearing Pressure (psf)
32.500	137.837	672.0

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	3.00	155.0			0.00	2.00
Clay	3.50	4.00	155.0	1300.0		249.60	5.50
Clay	7.50	11.62	92.6	1300.0		725.03	13.31
Clay	19.12	13.38	92.6	1300.0		-834.96	25.81

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (kips)		Moment (ft-k)		Shear (kips)		Moment (ft-k)	
	(with Safety Factor)	(without Safety Factor)	(with Safety Factor)	(without Safety Factor)	(with Safety Factor)	(without Safety Factor)	(with Safety Factor)	(without Safety Factor)
0.00	139.7	139.7	10527.4	10527.4	19.0	19.0	1434.2	1434.2
3.25	139.7	139.7	10981.3	10981.3	19.0	19.0	1496.1	1496.1
6.50	-47.5	-47.5	11154.4	11154.4	-6.5	-6.5	1519.7	1519.7
9.75	-250.3	-250.3	10670.4	10670.4	-34.1	-34.1	1453.7	1453.7
13.00	-453.1	-453.1	9527.3	9527.3	-61.7	-61.7	1298.0	1298.0
16.25	-655.9	-655.9	7725.1	7725.1	-89.4	-89.4	1052.5	1052.5
19.50	-811.2	-811.2	5272.8	5272.8	-110.5	-110.5	718.4	718.4
22.75	-608.4	-608.4	2965.9	2965.9	-82.9	-82.9	404.1	404.1
26.00	-405.6	-405.6	1318.2	1318.2	-55.3	-55.3	179.6	179.6
29.25	-202.8	-202.8	329.5	329.5	-27.6	-27.6	44.9	44.9
32.50	0.0	0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0

Mmax = 1542.22 k-ft; Use this moment in the DSMC Sheet.

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#: 806360
Site Name: NHV 113 943126, CT
App #: 185526, REV.1

Enter Load Factors Below:

For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:	
Pier Diameter =	6.0 ft
Concrete Area =	4071.5 in ²
Reinforcement:	
Clear Cover to Tie =	3.00 in
Horiz. Tie Bar Size =	4
Vert. Cage Diameter =	5.30 ft
Vert. Cage Diameter =	63.59 in
Vertical Bar Size =	11
Bar Diameter =	1.41 in
Bar Area =	1.56 in ²
Number of Bars =	32
As Total =	49.92 in ²
A s/ Aconc, Rho:	0.0123 1.23%

ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

$$(3) * (\sqrt{f_c}) / F_y = 0.0027$$

$$200 / F_y = 0.0033$$

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	1.23%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = ($\phi=0.65$) Pn.		
Pn per ACI 318 (10-2)	6890.12	kips
at Mu=($\phi=0.65$)Mn=	3533.79	ft-kips
Max Tu, ($\phi=0.9$) Tn =	2695.68	kips
at Mu= $\phi=(0.90)$ Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	1542.22	ft-kips (* Note)
Max. Service Shaft P:	19	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:	2004.886 ft-kips
1.30	Pu:	24.7 kips

Material Properties

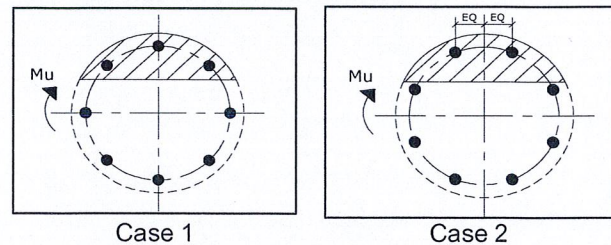
Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	
ACI 318 Code		
Select Analysis ACI Code=	2008	
Seismic Properties		
Seismic Design Category =	D	
Seismic Risk =	High	

Solve
(Run)

<-- Press Upon Completing All Input

Results:

Governing Orientation Case: 1



Dist. From Edge to Neutral Axis: 16.31 in

Extreme Steel Strain, ϵ_t : 0.0095

$\epsilon_t > 0.0050$, Tension Controlled

Reduction Factor, ϕ : 0.900

Output Note: Negative Pu=Tension

For Axial Compression, ϕ Pn = Pu: 24.70 kips

Drilled Shaft Moment Capacity, ϕ Mn: 6179.62 ft-kips

Drilled Shaft Superimposed Mu: 2004.89 ft-kips

(Mu/ ϕ Mn, Drilled Shaft Flexure CSR): 32.4%