

RACHEL A. SCHWARTZMAN

Please Reply To: Bridgeport
Writer's Direct Dial: (203) 337-4110
E-Mail: rschwartzman@cohenandwolf.com

August 20, 2014

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06501

RECEIVED
AUG 21 2014
CONNECTICUT
SITING COUNCIL

Re: **EM-T-MOBILE-035-130205**
Metro Site ID CT11851C
— **126 Ledge Road, Darien, CT**
(a/k/a 130 Ledge Road, Darien, CT)
Notice of Construction Completion

ORIGINAL

Dear Attorney Bachman:

The Connecticut Siting Council ("Council") acknowledged the above referenced T-Mobile Northeast LLC ("T-Mobile") notice of exempt modification on February 22, 2013. T-Mobile hereby notifies the Council that construction of the acknowledged modifications were complete as of September 13, 2013.

Please don't hesitate to contact me with any questions.

Sincerely,

Rachel A. Schwartzman

cc: Samuel Simons, T-Mobile
Mark Richard, T-Mobile
Alex Giannaras, HPC Wireless
Julie Kohler, Esq.



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

February 22, 2013

Alex Giannaras
HPC Development LLC
46 Mill Plain Road, 2nd Floor
Danbury, CT 06811

RE: **EM-T-MOBILE-035-130205** – T-Mobile Northeast LLC notice of intent to modify an existing telecommunications facility located at 126 Ledge Road, Darien, Connecticut.

Dear Mr. Giannaras:

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

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

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated February 1, 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,

Linda Roberts
Executive Director

LR/CDM/jb

c: The Honorable Jayme J. Stevenson, First Selectman, Town of Darien
John Crary, Town Administrator, Town of Darien
David J. Keating, Zoning Enforcement Officer, Town of Darien
Crown Castle



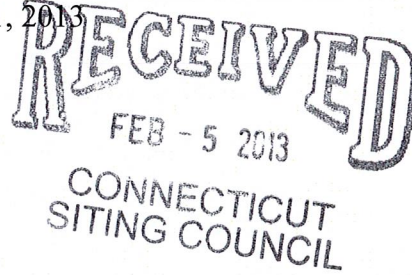
EM-T-MOBILE-035-130205

HPC Wireless Services
46 Mill Plain Rd.
Floor 2
Danbury, CT, 06811
P.: 203.797.1112



ORIGINAL

February 1, 2013



VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Linda Roberts, Executive Director

Re: T-Mobile Northeast LLC – exempt modification
126 Ledge Road, Darien, Connecticut

Dear Ms. Roberts:

This letter and attachments are submitted on behalf of T-Mobile Northeast LLC (“T-Mobile”). T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement LTE technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the First Selectman of the Town of Darien.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at 126 Ledge Road in the Town of Darien (coordinates 41°-04’-20.79” N, 73°-28’-41.34” W). Attached are a compound plan and elevation depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration. Also included is a power density report reflecting the modification to T-Mobile’s operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes (“C.G.S.”) Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. T-Mobile will replace its three (3) existing panel antennas with three (3) new antennas at a center line of approximately 110’. T-Mobile will also remove three (3) of

Ms. Linda Roberts

February 1, 2013

Page 2

six (6) TMAs. A hybrid cable will be run from the equipment to the antennas along the existing coaxial cable run. The proposed modifications will not extend the height of the approximately 117' structure.

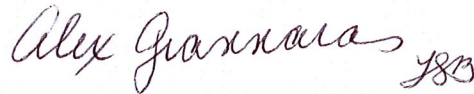
2. T-Mobile will add a related cabinet on its existing concrete pad with no effect on the site boundaries.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated on the attached report prepared by EBI Consulting, T-Mobile's operations at the site will result in a power density of approximately 0.964%; the combined site operations will result in a total power density of approximately 54.564%.

Please feel free to contact me by phone at (617) 281-0084 or by e-mail at agiannaras@hpcwireless.com with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

A handwritten signature in cursive script that reads "Alex Giannaras" followed by a small mark that appears to be "JRS".

Alex Giannaras

cc: Honorable Jayme Stevenson, First Selectman, Town of Darien
Crown Castle (underlying property owner)

Date: **January 23, 2013**

Patrick Byrum
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6532

RECEIVED
FEB - 5 2013

Tower Engineering Professionals
3703 Junction Blvd.
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: Structural Analysis Report

CONNECTICUT
SITING COUNCIL

ORIGINAL

Carrier Designation:

T-Mobile Co-Locate
Carrier Site Number:
Carrier Site Name:

CT11851C
CT11851C

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:

806352
BRG 302 943052
209237
569550
168181 Rev. 3

Engineering Firm Designation:

TEP Project Number:

806352.01S

Site Data:

126 Ledge Road, Darien, Fairfield County, CT 06820
Latitude 41° 4' 20.75", Longitude -73° 28' 41.4"
117 Foot - Monopole Tower

Dear Patrick Byrum,

Tower Engineering Professionals 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 516963, in accordance with application 168181, revision 3.

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:

LC4.7: Existing + Reserved + Proposed Equipment with Proposed Modifications **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

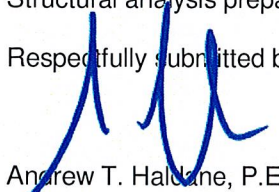
The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, and the 2005 Connecticut State Building Code (2003 International Building Code) based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawing for the determined available structural capacity to be effective.

We at Tower Engineering Professionals 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: Zachary Hurlocker, E.I. / DTS

Respectfully submitted by:



Andrew T. Halkane, P.E.



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1) INTRODUCTION

This tower is a 100-ft monopole tower designed by Valmont in January of 1992. The tower was originally designed for a wind speed of 90 mph per EIA/TIA-222-E for the appurtenances listed in Table 3. The tower was extended by 17-ft per reinforcement drawings by Valmont in July of 2007 bringing the total height to 117-ft. The tower has been modified per reinforcement drawings prepared by Tower Engineering Professionals in November of 2010. Proposed modifications designed by TEP in December of 2012 were included in this analysis. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch escalating 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
110.0	110.0	3	Ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	1
		3	Ericsson	KRY 112 144/1			

Notes:

- 1) See "Appendix B – Base Level Drawing" for assumed feed line configuration.

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
117.0	117.0	3	Alcatel Lucent	800 External Notch Filter	3	1/2	1
		9	RFS Celwave	ACU-A20-N			
		3	RFS Celwave	APXVSP18-C-A20 w/ Mount Pipe			
		1	Tower Mounts	Side Arm Mount [SO 102-3]			
115.0	115.0	3	Alcatel Lucent	TME-800MHZ RRH	-	-	1
		3	Alcatel Lucent	TME-PCS 1900MHz 4x45W-65MHz			
		1	Tower Mounts	Side Arm Mount [SO 102-3]			
110.0	110.0	3	Andrew	ETW190VS12UB	-	-	3
		3	RFS Celwave	APX16DWV-16DWVS-C w/ Mount Pipe			
		3	RFS Celwave	ATMAA1412D-1A20			
		1	Tower Mounts	Side Arm Mount [SO 102-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98.0	102.0	3	Andrew	LNX-6514DS-T4M w/ Mount Pipe	-	-	1
		6	Decibel	DB844G65ZAXY w/ Mount Pipe			
		6	RFS Celwave	FD9R6004/2C-3L			
		3	Ryma Wireless	MG D3-800TV w/ Mount Pipe			
	98.0	1	Tower Mounts	Platform Mount [LP 713-1]	12	7/8	2
93.0	95.0	1	Andrew	VHLP1-23	4	1/2	2
	94.0	1	Andrew	VHLP2-11			
		1	Andrew	VHLP2.5-11			
	93.0	1	Tower Mounts	Side Arm Mount [SO 102-3]			
	92.0	1	Andrew	VHLP1-23			
87.0	91.0	6	Powerwave Technologies	7770.00 w/ Mount Pipe	12 2 1	1-1/4 5/8 3/8	2
		2	Powerwave Technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	Powerwave Technologies	P65-17-XLH-RR w/ Mount Pipe			
		6	Ericsson	RRUS-11			
		6	Powerwave Technologies	LGP13519			
		6	Powerwave Technologies	LGP2140X			
		1	Raycap	DC6-48-60-18-8F			
	87.0	1	Tower Mounts	Platform Mount [LP 713-1]			
81.0	81.0	3	Kathrein	800 10504 w/ Mount Pipe	6	1-5/8	2
		1	Tower Mounts	Side Arm Mount [SO 102-3]			
70.0	72.0	3	Andrew	LBX-9012DS-VTM w/ Mount Pipe	9 6	7/8 5/16	2
		3	Argus Technologies	LLPX310R w/ Mount Pipe			
		3	Decibel	DB844H90E-XY w/ Mount Pipe			
		3	Samsung Telecomm.	FDD_R6_RRH			
		70.0	1	Tower Mounts	Platform Mount [LP 713-1]		
50.0	50.0	1	Tower Mounts	Side Arm Mount [SO 701-1]	-	-	2

- Notes:
 1) Reserved equipment
 2) Existing equipment
 3) 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)
97.0	97.0	2	Celwave	PD100	-	-
		6	Sinclair	SRL410C4R105		
		1	Tower Mounts	Cellular Platform		
84.0	84.0	2	Celwave	PD100	-	-
		6	Sinclair	SRL410C4R105		
		1	Tower Mounts	Cellular Platform		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Report	Clarence Welti Associates	217769	CCISites
Tower Foundation Drawings	SAC Engineering, Inc.	217771	CCISites
Tower Manufacturer Drawings	Valmont Industries, Inc.	217772	CCISites
Post-Modification Inspection	Tower Engineering Professionals	2785508	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	3396094	CCISites
Previous Structural Analysis Report	Tower Engineering Professionals	3387717	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.

For analysis of monopole shaft reinforcements, the plates are modeled as linear appurtenances along the exterior of the pole. The loads calculated from tnxTower are then exported to a proprietary calculation sheet created by Tower Engineering Professionals, Inc. that analyzes each reinforcing element along each critical axis and presents percent capacities for each element and the pole shaft along each critical axis. The actual percent capacity of the tower structure including the reinforcing elements is reported in Table 5 - Section Capacity (Summary).

3.2) Assumptions

- 1) The tower and foundation were built in accordance with the manufacturer's specifications.
- 2) The tower and foundation 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 "Appendix B – Base Level Drawing".
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
- 5) All tower components are in sufficient condition to carry their full design capacity.
- 6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
- 7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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	117 - 110	Pole	TP15.94x14.36x0.1875	1	Note 1	Note 1	9.9	Pass
L2	110 - 100	Pole	TP18.2x15.94x0.1875	2	Note 1	Note 1	27.4	Pass
L3	100 - 47.42	Pole	TP30.09x18.2x0.25	3	Note 1	Note 1	98.0	Pass
L4	52.00 - 0.00	Pole	TP40.3x28.5543x0.344	4	Note 1	Note 1	84.1	Pass
M1	35.00 - 0.00	Mod	(Sabre) MS-600	5	Note 1	Note 1	99.5	Pass
M2	65.00 - 35.00	Mod	(Sabre) MS-450	6	Note 1	Note 1	97.7	Pass
M3	2.00 - 0.00	Mod	(ts) 1.25x6.5-65ksi	7	Note 1	Note 1	64.2	Pass
M4	10.50 - 0.50	Mod	(Sabre) MS-450	8	Note 1	Note 1	92.1	Pass
M5	45.00 - 30.00	Mod	(Sabre) MS-450	9	Note 1	Note 1	81.2	Pass
M6	70.00 - 52.00	Mod	(Sabre) MS-450	10	Note 1	Note 1	87.8	Pass
							Summary	
							Pole (L3)	98.0 Pass
							Mod (M1)	99.5 Pass
							RATING =	99.5 Pass

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	92.6	Pass
1	Base Plate	-	67.9	Pass
1	Flange Connection	100	26.0	Pass
1	Flange Connection	110	6.3	Pass
1	Base Foundation	-	82.4	Pass

Structure Rating (max from all components) =	99.5%
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Notes:

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

4.1) Recommendations

- 1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
- 2) The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9	10	11
Length (ft)	7.00	10.00	31.50	5.00	16.08	8.50	8.50	3.50	22.50	7.00	2.00
Number of Sides	12	12	12	12	12	12	12	12	12	12	12
Thickness (in)	0.1875	0.1875	0.2500	0.4323	0.5821	0.5016	0.6403	0.6824	0.5085	0.4985	0.4982
Socket Length (ft)					4.58						
Top Dia (in)	14.3600	15.9400	18.2000	25.3225	26.4530	27.8899	30.3071	32.3850	33.1765	38.2647	39.8477
Bot Dia (in)	15.9400	18.2000	25.3225	26.4530	30.0900	30.3071	32.3850	33.1765	38.2647	39.8477	40.3000
Grade	A572-65										
Weight (lb)	215.2	346.8	1856.1	351.1	1233.9	919.2	990.9	427.0	2993.2	1019.3	1085.8996



DESIGNED APPURTENANCE LOADING

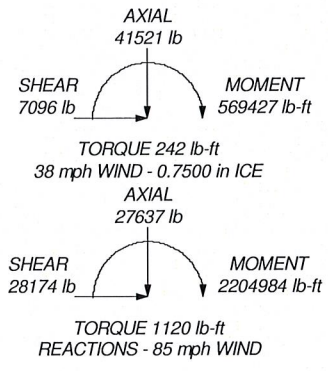
TYPE	ELEVATION	TYPE	ELEVATION
800 EXTERNAL NOTCH FILTER	117	2.4" x 6-ft pipe	93
800 EXTERNAL NOTCH FILTER	117	(2) 2.4" x 6-ft pipe	93
800 EXTERNAL NOTCH FILTER	117	VHLP2-11	93
(3) ACU-A20-N	117	VHLP1-23	93
(3) ACU-A20-N	117	VHLP2.5-11	93
(3) ACU-A20-N	117	VHLP1-23	93
APXVSP18-C-A20 w/ Mount Pipe	117	(2) LGP13519	87
APXVSP18-C-A20 w/ Mount Pipe	117	(2) LGP13519	87
APXVSP18-C-A20 w/ Mount Pipe	117	(2) RRRUS-11	87
Side Arm Mount [SO 102-3]	117	(2) RRRUS-11	87
TME-800MHZ RRH	115	(2) RRRUS-11	87
TME-800MHZ RRH	115	(2) 7770.00 w/ Mount Pipe	87
TME-800MHZ RRH	115	(2) 7770.00 w/ Mount Pipe	87
TME-PCS 1900MHz 4x45W-65MHz	115	(2) 7770.00 w/ Mount Pipe	87
TME-PCS 1900MHz 4x45W-65MHz	115	(2) LGP2140X	87
TME-PCS 1900MHz 4x45W-65MHz	115	(2) LGP2140X	87
Side Arm Mount [SO 102-3]	115	(2) LGP2140X	87
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	DC6-48-60-18-8F	87
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	Platform Mount [LP 713-1]	87
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	P65-17-XLH-RR w/ Mount Pipe	87
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	P65-16-XLH-RR w/ Mount Pipe	87
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	P65-16-XLH-RR w/ Mount Pipe	87
KRY 112 144/1	110	(2) LGP13519	87
KRY 112 144/1	110	800 10504 w/ Mount Pipe	81
KRY 112 144/1	110	800 10504 w/ Mount Pipe	81
KRY 112 144/1	110	800 10504 w/ Mount Pipe	81
Side Arm Mount [SO 102-3]	110	800 10504 w/ Mount Pipe	81
LNX-6514DS-T4M w/ Mount Pipe	98	Side Arm Mount [SO 102-3]	81
LNX-6514DS-T4M w/ Mount Pipe	98	LLPX310R w/ Mount Pipe	70
LNX-6514DS-T4M w/ Mount Pipe	98	LLPX310R w/ Mount Pipe	70
(2) DB844G65ZAXY w/ Mount Pipe	98	LBX-9012DS-VTM w/ Mount Pipe	70
(2) DB844G65ZAXY w/ Mount Pipe	98	LBX-9012DS-VTM w/ Mount Pipe	70
(2) DB844G65ZAXY w/ Mount Pipe	98	LBX-9012DS-VTM w/ Mount Pipe	70
MG D3-800TV w/ Mount Pipe	98	LBX-9012DS-VTM w/ Mount Pipe	70
MG D3-800TV w/ Mount Pipe	98	FDD_R6_RRH	70
MG D3-800TV w/ Mount Pipe	98	FDD_R6_RRH	70
MG D3-800TV w/ Mount Pipe	98	FDD_R6_RRH	70
(2) FD9R6004/2C-3L	98	FDD_R6_RRH	70
(2) FD9R6004/2C-3L	98	Platform Mount [LP 713-1]	70
(2) FD9R6004/2C-3L	98	DB844H90E-XY w/ Mount Pipe	70
(2) FD9R6004/2C-3L	98	DB844H90E-XY w/ Mount Pipe	70
Platform Mount [LP 713-1]	98	DB844H90E-XY w/ Mount Pipe	70
Side Arm Mount [SO 102-3]	93	LLPX310R w/ Mount Pipe	70
2.4" x 6-ft pipe	93	Side Arm Mount [SO 701-1]	50


MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	A572-65 (50% Density)	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield 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.



 Tower Engineering Professionals	Tower Engineering Professionals		Job: BRG 302 943052 (BU# 806352)		
	3703 Junction Blvd.		Project: TEP No. 806352.01S		
	Raleigh, NC 27603		Client: Crown Castle	Drawn by: Zachary R. Hurlocker, E.I.	App'd:
	Phone: (919) 661-6351		Code: TIA/EIA-222-F	Date: 01/23/13	Scale: NTS
	FAX: (919) 661-6350		Path:	Dwg No. E-1	

tnxTower Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job BRG 302 943052 (BU# 806352)	Page 1 of 32
	Project TEP No. 806352.01S	Date 11:56:04 01/23/13
	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in Fairfield County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °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	Retention 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	117.00-110.00	7.00	0.00	12	14.3600	15.9400	0.1875	0.7500	A572-65 (65 ksi)
L2	110.00-100.00	10.00	0.00	12	15.9400	18.2000	0.1875	0.7500	A572-65 (65 ksi)
L3	100.00-68.50	31.50	0.00	12	18.2000	25.3225	0.2500	1.0000	A572-65 (65 ksi)
L4	68.50-63.50	5.00	0.00	12	25.3225	26.4530	0.4323	1.7290	A572-65 (50% Density) (65 ksi)
L5	63.50-47.42	16.08	4.58	12	26.4530	30.0900	0.5821	2.3283	A572-65 (50% Density) (65 ksi)

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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
L6	47.42-43.50	8.50	0.00	12	27.8899	30.3071	0.5016	2.0063	A572-65 (50% Density) (65 ksi)
L7	43.50-35.00	8.50	0.00	12	30.3071	32.3850	0.6403	2.5614	A572-65 (50% Density) (65 ksi)
L8	35.00-31.50	3.50	0.00	12	32.3850	33.1765	0.6824	2.7297	A572-65 (50% Density) (65 ksi)
L9	31.50-9.00	22.50	0.00	12	33.1765	38.2647	0.5055	2.0220	A572-65 (50% Density) (65 ksi)
L10	9.00-2.00	7.00	0.00	12	38.2647	39.8477	0.4985	1.9938	A572-65 (50% Density) (65 ksi)
L11	2.00-0.00	2.00		12	39.8477	40.3000	0.4962	1.9849	A572-65 (50% Density) (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	I/Q in ²	w in	w/t
L1	14.8666	8.5566	219.3727	5.0738	7.4385	29.4916	444.5085	4.2113	3.3460	17.845
	16.5023	9.5106	301.2254	5.6394	8.2569	36.4816	610.3643	4.6808	3.7694	20.104
L2	16.5023	9.5106	301.2254	5.6394	8.2569	36.4816	610.3643	4.6808	3.7694	20.104
	18.8420	10.8750	450.3655	6.4485	9.4276	47.7710	912.5625	5.3524	4.3751	23.334
L3	18.8420	14.4498	594.2582	6.4261	9.4276	63.0339	1204.1282	7.1117	4.2076	16.83
	26.2157	20.1833	1619.4676	8.9759	13.1170	123.4630	3281.4804	9.9336	6.1164	24.466
L4	26.2157	34.6433	2739.4419	8.9107	13.1170	208.8462	5550.8519	17.0504	5.6280	13.02
	27.3862	36.2169	3129.9417	9.3154	13.7027	228.4187	6342.1105	17.8248	5.9310	13.721
L5	27.3862	48.4893	4142.4373	9.2618	13.7027	302.3091	8393.7010	23.8650	5.5294	9.5
	31.1515	55.3061	6146.6160	10.5638	15.5866	394.3521	12454.7104	27.2200	6.5042	11.174
L6	30.2222	44.2349	4235.2848	9.8050	14.4470	293.1604	8581.8352	21.7711	6.1303	12.222
	31.3762	48.1388	5458.5163	10.6704	15.6991	347.6966	11060.4338	23.6925	6.7781	13.513
L7	31.3762	61.1707	6871.7785	10.6207	15.6991	437.7186	13924.0862	30.1063	6.4062	10.004
	33.5274	65.4552	8419.2008	11.3646	16.7754	501.8769	17059.5833	32.2150	6.9630	10.874
L8	33.5274	69.6644	8936.8758	11.3495	16.7754	532.7360	18108.5333	34.2867	6.8503	10.038
	34.3468	71.4037	9623.0923	11.6329	17.1854	559.9565	19498.9940	35.1427	7.0624	10.349
L9	34.3468	53.1791	7245.2254	11.6962	17.1854	421.5912	14680.7910	26.1731	7.5366	14.909
	39.6145	61.4613	11184.9351	13.5178	19.8211	564.2937	22663.7108	30.2494	8.9002	17.607
L10	39.6145	60.6162	11035.2504	13.5203	19.8211	556.7420	22360.4090	29.8334	8.9191	17.893
	41.2534	63.1569	12481.8790	14.0870	20.6411	604.7095	25291.6709	31.0839	9.3433	18.744
L11	41.2534	62.8791	12428.3672	14.0878	20.6411	602.1170	25183.2415	30.9472	9.3493	18.84
	41.7216	63.6018	12861.8476	14.2497	20.8754	616.1246	26061.5903	31.3029	9.4705	19.085

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 117.00-110.00				1	1	1		
L2 110.00-100.00				1	1	1		

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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
L3 100.00-68.50				1	1	1		
L4 68.50-63.50				1	1	1.16484		
L5 63.50-47.42				1	1	0.869016		
L6 47.42-43.50				1	1	1.37614		
L7 43.50-35.00				1	1	1.08226		
L8 35.00-31.50				1	1	1.0166		
L9 31.50-9.00				1	1	1.36409		
L10 9.00-2.00				1	1	1.38288		
L11 2.00-0.00				1	1	1.38893		

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	plf

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	plf
Step Pegs (3/4" SR) 7-in w/15" step	B	No	CaAa (Out Of Face)	117.00 - 0.00	1	No Ice	0.03
						1/2" Ice	0.14
						1" Ice	0.23
						2" Ice	0.43
						4" Ice	0.83
Safety Line 3/8	B	No	CaAa (Out Of Face)	117.00 - 0.00	1	No Ice	0.04
						1/2" Ice	0.14
						1" Ice	0.24
						2" Ice	0.44
						4" Ice	0.84
SABRE Mods Sabre (PL 1 x 6)	A	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
Sabre (PL 1 x 6)	B	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
Sabre (PL 1 x 6)	C	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
Sabre (PL 1 x 4.5)	A	No	CaAa (Out Of Face)	65.00 - 35.00	1	No Ice	0.00

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
			Face)			1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	B	No	CaAa (Out Of Face)	65.00 - 35.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	C	No	CaAa (Out Of Face)	65.00 - 35.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Proposed Sabre (PL 1 x 4.5)	A	No	CaAa (Out Of Face)	10.50 - 0.50	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	A	No	CaAa (Out Of Face)	70.00 - 50.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	B	No	CaAa (Out Of Face)	70.00 - 50.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	C	No	CaAa (Out Of Face)	70.00 - 50.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	A	No	CaAa (Out Of Face)	45.00 - 30.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	B	No	CaAa (Out Of Face)	45.00 - 30.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
Sabre (PL 1 x 4.5)	C	No	CaAa (Out Of Face)	45.00 - 30.00	1	No Ice 0.00	15.31
						1/2" Ice 0.00	16.17
						1" Ice 0.00	17.36
						2" Ice 0.00	20.80
						4" Ice 0.00	31.82
*** ***							
2" Flexible Conduit	A	No	CaAa (Out Of Face)	70.00 - 0.00	1	No Ice 0.00	0.34
						1/2" Ice 0.00	1.87
						1" Ice 0.00	4.01
						2" Ice 0.00	10.11
						4" Ice 0.00	29.66
2" Flexible Conduit	A	No	CaAa (Out Of Face)	70.00 - 0.00	1	No Ice 0.20	0.34
						1/2" Ice 0.30	1.87
						1" Ice 0.40	4.01
						2" Ice 0.60	10.11

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A		Weight plf
						ft ² /ft		
9207(5/16")	A	No	Inside Pole	70.00 - 0.00	6	4" Ice	1.00	29.66
						No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
7983A(1/2")	A	No	CaAa (Out Of Face)	70.00 - 0.00	4	No Ice	0.00	0.08
						1/2" Ice	0.00	0.74
						1" Ice	0.00	2.01
						2" Ice	0.00	6.39
						4" Ice	0.00	22.47
7983A(1/2")	C	No	CaAa (Out Of Face)	93.00 - 70.00	3	No Ice	0.00	0.08
						1/2" Ice	0.00	0.74
						1" Ice	0.00	2.01
						2" Ice	0.00	6.39
						4" Ice	0.00	22.47
7983A(1/2")	C	No	CaAa (Out Of Face)	93.00 - 70.00	1	No Ice	0.06	0.08
						1/2" Ice	0.16	0.74
						1" Ice	0.26	2.01
						2" Ice	0.46	6.39
						4" Ice	0.86	22.47
* LDF5-50A(7/8")	A	No	Inside Pole	70.00 - 0.00	9	No Ice	0.00	0.33
1/2" Ice						0.00	0.33	
1" Ice						0.00	0.33	
2" Ice						0.00	0.33	
4" Ice						0.00	0.33	
* LDF6-50A(1-1/4")	B	No	Inside Pole	87.00 - 0.00	12	No Ice	0.00	0.66
1/2" Ice						0.00	0.66	
1" Ice						0.00	0.66	
2" Ice						0.00	0.66	
4" Ice						0.00	0.66	
FB-L98-002-XXX(3/8)	B	No	Inside Pole	87.00 - 0.00	1	No Ice	0.00	0.06
1/2" Ice						0.00	0.06	
1" Ice						0.00	0.06	
2" Ice						0.00	0.06	
4" Ice						0.00	0.06	
WR-VG82ST-BRDA(5/8")	B	No	Inside Pole	87.00 - 0.00	2	No Ice	0.00	0.31
1/2" Ice						0.00	0.31	
1" Ice						0.00	0.31	
2" Ice						0.00	0.31	
4" Ice						0.00	0.31	
2" Rigid Conduit	B	No	Inside Pole	87.00 - 0.00	1	No Ice	0.00	2.80
1/2" Ice						0.00	2.80	
1" Ice						0.00	2.80	
2" Ice						0.00	2.80	
4" Ice						0.00	2.80	
* HYBRIFLEX RRH 1-SECTOR(1/2")	B	No	CaAa (Out Of Face)	110.00 - 0.00	3	No Ice	0.00	0.15
1/2" Ice						0.00	0.83	
1" Ice						0.00	2.13	
2" Ice						0.00	6.55	
4" Ice						0.00	22.73	
HYBRIFLEX RRH 1-SECTOR(1/2")	B	No	CaAa (Out Of Face)	117.00 - 110.00	2	No Ice	0.00	0.15
1/2" Ice						0.00	0.83	
1" Ice						0.00	2.13	
2" Ice						0.00	6.55	
4" Ice						0.00	22.73	
HYBRIFLEX RRH 1-SECTOR(1/2")	B	No	CaAa (Out Of Face)	117.00 - 110.00	1	No Ice	0.06	0.15
1/2" Ice						0.16	0.83	

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{MA}		Weight plf
						ft ² /ft		
						1" Ice	0.26	2.13
						2" Ice	0.46	6.55
						4" Ice	0.86	22.73

MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	CaAa (Out Of Face)	81.00 - 0.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	2.37
						1" Ice	0.00	4.28
						2" Ice	0.00	9.93
						4" Ice	0.00	28.56
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	CaAa (Out Of Face)	110.00 - 81.00	1	No Ice	0.16	1.07
						1/2" Ice	0.26	2.37
						1" Ice	0.36	4.28
						2" Ice	0.56	9.93
						4" Ice	0.96	28.56
LDF6-50A(1-1/4")	B	No	Inside Pole	110.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
*								
AVA7-50(1-5/8)	A	No	CaAa (Out Of Face)	81.00 - 0.00	2	No Ice	0.20	0.70
						1/2" Ice	0.30	2.23
						1" Ice	0.40	4.38
						2" Ice	0.60	10.50
						4" Ice	1.00	30.07
AVA7-50(1-5/8)	A	No	CaAa (Out Of Face)	81.00 - 0.00	4	No Ice	0.00	0.70
						1/2" Ice	0.00	2.23
						1" Ice	0.00	4.38
						2" Ice	0.00	10.50
						4" Ice	0.00	30.07
*								
LDF5-50A(7/8")	C	No	Inside Pole	98.00 - 0.00	12	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R	A _F	C _{MA} In Face	C _{MA} Out Face	Weight lb
			ft ²	ft ²	ft ²	ft ²	
L1	117.00-110.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.942	7.03
		C	0.000	0.000	0.000	0.000	0.00
L2	110.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	2.350	99.94
		C	0.000	0.000	0.000	0.000	0.00
L3	100.00-68.50	A	0.000	0.000	0.000	5.325	86.85
		B	0.000	0.000	0.000	5.371	548.65
		C	0.000	0.000	0.000	1.334	147.52
L4	68.50-63.50	A	0.000	0.000	0.000	3.010	158.46
		B	0.000	0.000	0.000	0.362	206.49
		C	0.000	0.000	0.000	0.000	119.33
L5	63.50-47.42	A	0.000	0.000	0.000	9.680	642.46
		B	0.000	0.000	0.000	1.166	796.94
		C	0.000	0.000	0.000	0.000	516.62
L6	47.42-43.50	A	0.000	0.000	0.000	2.360	129.19

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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 lb
L7	43.50-35.00	B	0.000	0.000	0.000	0.284	166.85
		C	0.000	0.000	0.000	0.000	98.52
		A	0.000	0.000	0.000	5.117	360.49
L8	35.00-31.50	B	0.000	0.000	0.000	0.616	442.15
		C	0.000	0.000	0.000	0.000	293.97
		A	0.000	0.000	0.000	2.107	166.30
L9	31.50-9.00	B	0.000	0.000	0.000	0.254	199.93
		C	0.000	0.000	0.000	0.000	138.91
		A	0.000	0.000	0.000	13.545	770.50
L10	9.00-2.00	B	0.000	0.000	0.000	1.631	963.68
		C	0.000	0.000	0.000	0.000	571.44
		A	0.000	0.000	0.000	4.214	332.61
L11	2.00-0.00	B	0.000	0.000	0.000	0.507	292.66
		C	0.000	0.000	0.000	0.000	170.64
		A	0.000	0.000	0.000	1.204	87.37
		B	0.000	0.000	0.000	0.145	83.62
		C	0.000	0.000	0.000	0.000	48.75

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 lb
L1	117.00-110.00	A	0.870	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	4.595	57.45
		C		0.000	0.000	0.000	0.000	0.00
L2	110.00-100.00	A	0.862	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	7.520	197.85
		C		0.000	0.000	0.000	0.000	0.00
L3	100.00-68.50	A	0.839	0.000	0.000	0.000	9.769	331.25
		B		0.000	0.000	0.000	19.123	848.71
		C		0.000	0.000	0.000	5.191	289.85
L4	68.50-63.50	A	0.815	0.000	0.000	0.000	5.455	313.39
		B		0.000	0.000	0.000	1.993	262.43
		C		0.000	0.000	0.000	0.000	129.79
L5	63.50-47.42	A	0.798	0.000	0.000	0.000	17.378	1141.23
		B		0.000	0.000	0.000	6.298	985.48
		C		0.000	0.000	0.000	0.000	563.00
L6	47.42-43.50	A	0.779	0.000	0.000	0.000	4.237	247.98
		B		0.000	0.000	0.000	1.535	210.01
		C		0.000	0.000	0.000	0.000	107.01
L7	43.50-35.00	A	0.766	0.000	0.000	0.000	9.022	612.79
		B		0.000	0.000	0.000	3.219	538.55
		C		0.000	0.000	0.000	0.000	319.31
L8	35.00-31.50	A	0.751	0.000	0.000	0.000	3.683	268.11
		B		0.000	0.000	0.000	1.305	239.10
		C		0.000	0.000	0.000	0.000	149.60
L9	31.50-9.00	A	0.750	0.000	0.000	0.000	23.670	1395.93
		B		0.000	0.000	0.000	8.381	1184.68
		C		0.000	0.000	0.000	0.000	609.60
L10	9.00-2.00	A	0.750	0.000	0.000	0.000	7.364	536.00
		B		0.000	0.000	0.000	2.607	360.74
		C		0.000	0.000	0.000	0.000	181.83
L11	2.00-0.00	A	0.750	0.000	0.000	0.000	2.104	144.76
		B		0.000	0.000	0.000	0.745	103.07
		C		0.000	0.000	0.000	0.000	51.95

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Feed Line Center of Pressure

Section	Elevation	CP _X	CP _Z	CP _X Ice	CP _Z Ice
	ft	in	in	in	in
L1	117.00-110.00	0.1579	0.0912	0.5216	0.3011
L2	110.00-100.00	0.2620	0.1513	0.5994	0.3461
L3	100.00-68.50	0.1294	-0.1021	0.3296	0.0359
L4	68.50-63.50	0.0717	-0.6465	0.2952	-0.7629
L5	63.50-47.42	0.0732	-0.6597	0.3026	-0.7894
L6	47.42-43.50	0.0740	-0.6671	0.3088	-0.8057
L7	43.50-35.00	0.0749	-0.6745	0.3075	-0.8174
L8	35.00-31.50	0.0755	-0.6806	0.3089	-0.8287
L9	31.50-9.00	0.0768	-0.6919	0.3182	-0.8541
L10	9.00-2.00	0.0780	-0.7030	0.3278	-0.8798
L11	2.00-0.00	0.0784	-0.7060	0.3305	-0.8870

Discrete Tower Loads

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 lb	
800 EXTERNAL NOTCH FILTER	A	From Leg	2.00	-10.0000	117.00	No Ice	0.77	0.37	11.00
			0.00			1/2" Ice	0.89	0.46	16.81
			0.00			1" Ice	1.02	0.56	24.26
						2" Ice	1.30	0.79	44.81
						4" Ice	1.97	1.34	114.01
800 EXTERNAL NOTCH FILTER	B	From Leg	2.00	-40.0000	117.00	No Ice	0.77	0.37	11.00
			0.00			1/2" Ice	0.89	0.46	16.81
			0.00			1" Ice	1.02	0.56	24.26
						2" Ice	1.30	0.79	44.81
						4" Ice	1.97	1.34	114.01
800 EXTERNAL NOTCH FILTER	C	From Leg	2.00	-20.0000	117.00	No Ice	0.77	0.37	11.00
			0.00			1/2" Ice	0.89	0.46	16.81
			0.00			1" Ice	1.02	0.56	24.26
						2" Ice	1.30	0.79	44.81
						4" Ice	1.97	1.34	114.01
(3) ACU-A20-N	A	From Leg	2.00	-10.0000	117.00	No Ice	0.08	0.14	1.04
			0.00			1/2" Ice	0.12	0.19	2.32
			0.00			1" Ice	0.17	0.25	4.41
						2" Ice	0.30	0.40	11.80
						4" Ice	0.67	0.80	44.85
(3) ACU-A20-N	C	From Leg	2.00	-40.0000	117.00	No Ice	0.08	0.14	1.04
			0.00			1/2" Ice	0.12	0.19	2.32
			0.00			1" Ice	0.17	0.25	4.41
						2" Ice	0.30	0.40	11.80
						4" Ice	0.67	0.80	44.85
(3) ACU-A20-N	B	From Leg	2.00	-20.0000	117.00	No Ice	0.08	0.14	1.04
			0.00			1/2" Ice	0.12	0.19	2.32
			0.00			1" Ice	0.17	0.25	4.41
						2" Ice	0.30	0.40	11.80
						4" Ice	0.67	0.80	44.85

<i>tnxTower</i> Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job	BRG 302 943052 (BU# 806352)	Page	10 of 32
	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral Vert						
			ft	ft	°	ft	ft ²	ft ²	lb	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	2.00		0.0000	110.00	No Ice	6.83	5.64	112.18
			0.00				1/2" Ice	7.35	6.48	166.73
			0.00				1" Ice	7.86	7.26	231.26
							2" Ice	8.93	8.86	382.99
							4" Ice	11.18	12.29	806.74
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	2.00		0.0000	110.00	No Ice	6.83	5.64	112.18
			0.00				1/2" Ice	7.35	6.48	166.73
			0.00				1" Ice	7.86	7.26	231.26
							2" Ice	8.93	8.86	382.99
							4" Ice	11.18	12.29	806.74
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	2.00		0.0000	110.00	No Ice	6.83	5.64	112.18
			0.00				1/2" Ice	7.35	6.48	166.73
			0.00				1" Ice	7.86	7.26	231.26
							2" Ice	8.93	8.86	382.99
							4" Ice	11.18	12.29	806.74
KRY 112 144/1	A	From Face	2.00		0.0000	110.00	No Ice	0.41	0.19	11.02
			0.00				1/2" Ice	0.50	0.26	14.12
			0.00				1" Ice	0.60	0.33	18.44
							2" Ice	0.82	0.51	31.51
							4" Ice	1.36	0.97	80.86
KRY 112 144/1	B	From Face	2.00		0.0000	110.00	No Ice	0.41	0.19	11.02
			0.00				1/2" Ice	0.50	0.26	14.12
			0.00				1" Ice	0.60	0.33	18.44
							2" Ice	0.82	0.51	31.51
							4" Ice	1.36	0.97	80.86
KRY 112 144/1	C	From Face	2.00		0.0000	110.00	No Ice	0.41	0.19	11.02
			0.00				1/2" Ice	0.50	0.26	14.12
			0.00				1" Ice	0.60	0.33	18.44
							2" Ice	0.82	0.51	31.51
							4" Ice	1.36	0.97	80.86
Side Arm Mount [SO 102-3]	C	None			0.0000	110.00	No Ice	3.00	3.00	81.00
							1/2" Ice	3.48	3.48	111.00
							1" Ice	3.96	3.96	141.00
							2" Ice	4.92	4.92	201.00
							4" Ice	6.84	6.84	321.00

LNX-6514DS-T4M w/ Mount Pipe	A	From Centroid-Face	4.00		-30.0000	98.00	No Ice	8.68	7.42	79.33
			2.00				1/2" Ice	9.31	8.45	149.39
			4.00				1" Ice	9.93	9.34	229.86
							2" Ice	11.20	11.18	420.01
							4" Ice	13.85	15.22	938.26
LNX-6514DS-T4M w/ Mount Pipe	B	From Centroid-Face	4.00		-30.0000	98.00	No Ice	8.68	7.42	79.33
			2.00				1/2" Ice	9.31	8.45	149.39
			4.00				1" Ice	9.93	9.34	229.86
							2" Ice	11.20	11.18	420.01
							4" Ice	13.85	15.22	938.26
LNX-6514DS-T4M w/ Mount Pipe	C	From Centroid-Face	4.00		-30.0000	98.00	No Ice	8.68	7.42	79.33
			2.00				1/2" Ice	9.31	8.45	149.39
			4.00				1" Ice	9.93	9.34	229.86
							2" Ice	11.20	11.18	420.01
							4" Ice	13.85	15.22	938.26
(2) DB844G65ZAXY w/ Mount Pipe	A	From Centroid-Face	4.00		-30.0000	98.00	No Ice	4.90	4.92	34.25
			0.00				1/2" Ice	5.35	5.60	78.27
			4.00				1" Ice	5.80	6.28	131.11
							2" Ice	6.73	7.71	256.96
							4" Ice	8.73	10.83	616.61
(2) DB844G65ZAXY w/	B	From	4.00		-30.0000	98.00	No Ice	4.90	4.92	34.25

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	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

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 lb
Mount Pipe		Centroid-Fa ce	0.00 4.00			1/2" Ice 5.35 1" Ice 5.80 2" Ice 6.73 4" Ice 8.73	5.60 6.28 7.71 10.83	78.27 131.11 256.96 616.61
(2) DB844G65ZAXY w/ Mount Pipe	C	From Centroid-Fa ce	4.00 0.00 4.00	-30.0000	98.00	No Ice 4.90 1/2" Ice 5.35 1" Ice 5.80 2" Ice 6.73 4" Ice 8.73	4.92 5.60 6.28 7.71 10.83	34.25 78.27 131.11 256.96 616.61
MG D3-800TV w/ Mount Pipe	A	From Centroid-Fa ce	4.00 -2.00 4.00	-30.0000	98.00	No Ice 3.57 1/2" Ice 3.98 1" Ice 4.39 2" Ice 5.33 4" Ice 7.34	3.42 4.12 4.78 6.16 9.18	37.28 68.91 109.43 210.30 519.96
MG D3-800TV w/ Mount Pipe	B	From Centroid-Fa ce	4.00 -2.00 4.00	-30.0000	98.00	No Ice 3.57 1/2" Ice 3.98 1" Ice 4.39 2" Ice 5.33 4" Ice 7.34	3.42 4.12 4.78 6.16 9.18	37.28 68.91 109.43 210.30 519.96
MG D3-800TV w/ Mount Pipe	C	From Centroid-Fa ce	4.00 -2.00 4.00	-30.0000	98.00	No Ice 3.57 1/2" Ice 3.98 1" Ice 4.39 2" Ice 5.33 4" Ice 7.34	3.42 4.12 4.78 6.16 9.18	37.28 68.91 109.43 210.30 519.96
(2) FD9R6004/2C-3L	A	From Centroid-Fa ce	4.00 0.00 4.00	-30.0000	98.00	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.08 0.14 0.20 0.34 0.74	3.10 5.40 8.79 19.61 62.87
(2) FD9R6004/2C-3L	B	From Centroid-Fa ce	4.00 0.00 4.00	-30.0000	98.00	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.08 0.14 0.20 0.34 0.74	3.10 5.40 8.79 19.61 62.87
(2) FD9R6004/2C-3L	C	From Centroid-Fa ce	4.00 0.00 4.00	-30.0000	98.00	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.08 0.14 0.20 0.34 0.74	3.10 5.40 8.79 19.61 62.87
Platform Mount [LP 713-1]	C	None		0.0000	98.00	No Ice 31.27 1/2" Ice 39.68 1" Ice 48.09 2" Ice 64.91 4" Ice 98.55	31.27 39.68 48.09 64.91 98.55	1510.00 1929.00 2348.00 3186.00 4862.00

Side Arm Mount [SO 102-3]	C	None		0.0000	93.00	No Ice 3.00 1/2" Ice 3.48 1" Ice 3.96 2" Ice 4.92 4" Ice 6.84	3.00 3.48 3.96 4.92 6.84	81.00 111.00 141.00 201.00 321.00
2.4" x 6-ft pipe	A	From Leg	2.00 0.00 0.00	0.0000	93.00	No Ice 1.44 1/2" Ice 1.93 1" Ice 2.30 2" Ice 3.07 4" Ice 4.71	1.44 1.93 2.30 3.07 4.71	21.96 32.88 47.87 90.64 231.64
2.4" x 6-ft pipe	B	From Leg	2.00 0.00	0.0000	93.00	No Ice 1.44 1/2" Ice 1.93	1.44 1.93	21.96 32.88

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

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 lb
			0.00			1" Ice 2.30	2.30	47.87
						2" Ice 3.07	3.07	90.64
						4" Ice 4.71	4.71	231.64
(2) 2.4" x 6-ft pipe	C	From Leg	2.00	0.0000	93.00	No Ice 1.44	1.44	21.96
			0.00			1/2" Ice 1.93	1.93	32.88
			0.00			1" Ice 2.30	2.30	47.87
						2" Ice 3.07	3.07	90.64
						4" Ice 4.71	4.71	231.64

P65-17-XLH-RR w/ Mount Pipe	A	From Centroid-Face	4.00	15.0000	87.00	No Ice 11.70	8.94	91.85
			0.00			1/2" Ice 12.42	10.45	173.99
			4.00			1" Ice 13.15	11.99	271.15
						2" Ice 14.64	14.31	498.33
						4" Ice 17.91	19.14	1125.47
P65-16-XLH-RR w/ Mount Pipe	B	From Centroid-Face	4.00	15.0000	87.00	No Ice 8.64	6.36	78.55
			0.00			1/2" Ice 9.29	7.54	141.50
			4.00			1" Ice 9.91	8.43	216.37
						2" Ice 11.18	10.24	392.63
						4" Ice 13.83	14.10	885.51
P65-16-XLH-RR w/ Mount Pipe	C	From Centroid-Face	4.00	15.0000	87.00	No Ice 8.64	6.36	78.55
			0.00			1/2" Ice 9.29	7.54	141.50
			4.00			1" Ice 9.91	8.43	216.37
						2" Ice 11.18	10.24	392.63
						4" Ice 13.83	14.10	885.51
(2) LGP13519	A	From Centroid-Leg	4.00	22.0000	87.00	No Ice 0.34	0.21	5.30
			6.00			1/2" Ice 0.42	0.28	8.02
			4.00			1" Ice 0.51	0.36	11.91
						2" Ice 0.73	0.55	23.96
						4" Ice 1.25	1.03	70.63
(2) LGP13519	B	From Centroid-Leg	4.00	22.0000	87.00	No Ice 0.34	0.21	5.30
			6.00			1/2" Ice 0.42	0.28	8.02
			4.00			1" Ice 0.51	0.36	11.91
						2" Ice 0.73	0.55	23.96
						4" Ice 1.25	1.03	70.63
(2) LGP13519	C	From Centroid-Leg	4.00	22.0000	87.00	No Ice 0.34	0.21	5.30
			6.00			1/2" Ice 0.42	0.28	8.02
			4.00			1" Ice 0.51	0.36	11.91
						2" Ice 0.73	0.55	23.96
						4" Ice 1.25	1.03	70.63
(2) RRUS-11	A	From Centroid-Face	4.00	15.0000	87.00	No Ice 3.25	1.37	47.62
			0.00			1/2" Ice 3.49	1.55	68.42
			4.00			1" Ice 3.74	1.74	92.25
						2" Ice 4.27	2.14	149.81
						4" Ice 5.43	3.04	309.89
(2) RRUS-11	B	From Centroid-Face	4.00	15.0000	87.00	No Ice 3.25	1.37	47.62
			0.00			1/2" Ice 3.49	1.55	68.42
			4.00			1" Ice 3.74	1.74	92.25
						2" Ice 4.27	2.14	149.81
						4" Ice 5.43	3.04	309.89
(2) RRUS-11	C	From Centroid-Face	4.00	15.0000	87.00	No Ice 3.25	1.37	47.62
			0.00			1/2" Ice 3.49	1.55	68.42
			4.00			1" Ice 3.74	1.74	92.25
						2" Ice 4.27	2.14	149.81
						4" Ice 5.43	3.04	309.89
(2) 7770.00 w/ Mount Pipe	A	From Centroid-Leg	4.00	22.0000	87.00	No Ice 6.12	4.25	55.38
			0.00			1/2" Ice 6.63	5.01	100.55
			4.00			1" Ice 7.13	5.71	155.33

tnxTower Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job		BRG 302 943052 (BU# 806352)		Page		13 of 32	
	Project		TEP No. 806352.01S		Date		11:56:04 01/23/13	
	Client		Crown Castle		Designed by		Zachary R. Hurlocker, E.I.	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA}		Weight lb	
						Front ft ²	Side ft ²		
(2) 7770.00 w/ Mount Pipe	B	From Centroid-Le g	4.00 0.00 4.00	22.0000	87.00	2" Ice	8.16	7.16	286.50
						4" Ice	10.36	10.41	664.71
						No Ice	6.12	4.25	55.38
						1/2" Ice	6.63	5.01	100.55
						1" Ice	7.13	5.71	155.33
(2) 7770.00 w/ Mount Pipe	C	From Centroid-Le g	4.00 0.00 4.00	22.0000	87.00	2" Ice	8.16	7.16	286.50
						4" Ice	10.36	10.41	664.71
						No Ice	6.12	4.25	55.38
						1/2" Ice	6.63	5.01	100.55
						1" Ice	7.13	5.71	155.33
(2) LGP2140X	A	From Centroid-Le g	4.00 -6.00 4.00	22.0000	87.00	2" Ice	8.16	7.16	286.50
						4" Ice	10.36	10.41	664.71
						No Ice	1.26	0.38	14.10
						1/2" Ice	1.42	0.49	21.23
						1" Ice	1.58	0.62	30.24
(2) LGP2140X	B	From Centroid-Le g	4.00 -6.00 4.00	22.0000	87.00	2" Ice	1.94	0.89	54.70
						4" Ice	2.75	1.54	134.81
						No Ice	1.26	0.38	14.10
						1/2" Ice	1.42	0.49	21.23
						1" Ice	1.58	0.62	30.24
(2) LGP2140X	C	From Centroid-Le g	4.00 -6.00 4.00	22.0000	87.00	2" Ice	1.94	0.89	54.70
						4" Ice	2.75	1.54	134.81
						No Ice	1.26	0.38	14.10
						1/2" Ice	1.42	0.49	21.23
						1" Ice	1.58	0.62	30.24
DC6-48-60-18-8F	A	From Centroid-Face	4.00 0.00 4.00	15.0000	87.00	2" Ice	1.94	0.89	54.70
						4" Ice	2.75	1.54	134.81
						No Ice	1.27	1.27	20.00
						1/2" Ice	1.46	1.46	35.12
						1" Ice	1.66	1.66	52.57
Platform Mount [LP 713-1]	C	None		0.0000	87.00	2" Ice	2.09	2.09	95.09
						4" Ice	3.10	3.10	214.90
						No Ice	31.27	31.27	1510.00
						1/2" Ice	39.68	39.68	1929.00
						1" Ice	48.09	48.09	2348.00
*** 800 10504 w/ Mount Pipe	A	From Face	2.00 0.00 0.00	0.0000	81.00	2" Ice	64.91	64.91	3186.00
						4" Ice	98.55	98.55	4862.00
						No Ice	3.59	3.18	37.75
						1/2" Ice	4.01	3.91	68.19
						1" Ice	4.42	4.58	107.66
800 10504 w/ Mount Pipe	B	From Face	2.00 0.00 0.00	0.0000	81.00	2" Ice	5.34	5.98	206.58
						4" Ice	7.38	8.98	513.48
						No Ice	3.59	3.18	37.75
						1/2" Ice	4.01	3.91	68.19
						1" Ice	4.42	4.58	107.66
800 10504 w/ Mount Pipe	C	From Face	2.00 0.00 0.00	0.0000	81.00	2" Ice	5.34	5.98	206.58
						4" Ice	7.38	8.98	513.48
						No Ice	3.59	3.18	37.75
						1/2" Ice	4.01	3.91	68.19
						1" Ice	4.42	4.58	107.66
Side Arm Mount [SO 102-3]	C	None		0.0000	81.00	2" Ice	3.96	3.96	141.00
						4" Ice	7.38	8.98	513.48
						No Ice	3.00	3.00	81.00
						1/2" Ice	3.48	3.48	111.00
						1" Ice	3.96	3.96	141.00

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

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 lb	
						4" Ice	6.84	6.84	321.00

DB844H90E-XY w/ Mount Pipe	A	From Centroid-Le g	4.00 -6.00 2.00	30.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	4.92 5.60 6.28 7.71 10.83	32.25 69.80 115.95 227.74 556.54
DB844H90E-XY w/ Mount Pipe	B	From Centroid-Le g	4.00 -6.00 2.00	30.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	4.92 5.60 6.28 7.71 10.83	32.25 69.80 115.95 227.74 556.54
DB844H90E-XY w/ Mount Pipe	C	From Centroid-Le g	4.00 -6.00 2.00	30.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	4.92 5.60 6.28 7.71 10.83	32.25 69.80 115.95 227.74 556.54
LLPX310R w/ Mount Pipe	A	From Centroid-Le g	4.00 0.00 2.00	25.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.98 5.38 5.78 6.62 8.44	2.87 3.40 3.94 5.12 7.89	43.87 79.25 122.33 226.49 531.18
LLPX310R w/ Mount Pipe	B	From Centroid-Le g	4.00 0.00 2.00	35.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.98 5.38 5.78 6.62 8.44	2.87 3.40 3.94 5.12 7.89	43.87 79.25 122.33 226.49 531.18
LLPX310R w/ Mount Pipe	C	From Centroid-Le g	4.00 0.00 2.00	35.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.98 5.38 5.78 6.62 8.44	2.87 3.40 3.94 5.12 7.89	43.87 79.25 122.33 226.49 531.18
LBX-9012DS-VTM w/ Mount Pipe	A	From Centroid-Le g	4.00 6.00 2.00	30.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.44 5.91 6.39 7.37 9.45	4.00 4.67 5.33 6.71 9.86	45.16 86.88 137.66 259.73 614.09
LBX-9012DS-VTM w/ Mount Pipe	B	From Centroid-Le g	4.00 6.00 2.00	30.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.44 5.91 6.39 7.37 9.45	4.00 4.67 5.33 6.71 9.86	45.16 86.88 137.66 259.73 614.09
LBX-9012DS-VTM w/ Mount Pipe	C	From Centroid-Le g	4.00 6.00 2.00	30.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.44 5.91 6.39 7.37 9.45	4.00 4.67 5.33 6.71 9.86	45.16 86.88 137.66 259.73 614.09
FDD_R6_RRH	A	From Centroid-Le g	4.00 0.00 2.00	25.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14	33.00 44.50 58.31 93.60 200.35
FDD_R6_RRH	B	From Centroid-Le g	4.00 0.00 2.00	35.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14	33.00 44.50 58.31 93.60 200.35

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{MA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	lb	
FDD_R6_RRH	C	From Centroid-Leg	4.00	0.00	35.0000	70.00	No Ice	1.79	0.78	33.00
			0.00	2.00			1/2" Ice	1.97	0.92	44.50
							1" Ice	2.16	1.07	58.31
							2" Ice	2.57	1.39	93.60
							4" Ice	3.49	2.14	200.35
Platform Mount [LP 713-1]	C	None			0.0000	70.00	No Ice	31.27	31.27	1510.00
							1/2" Ice	39.68	39.68	1929.00
							1" Ice	48.09	48.09	2348.00
							2" Ice	64.91	64.91	3186.00
							4" Ice	98.55	98.55	4862.00
*** Side Arm Mount [SO 701-1]	A	From Leg	1.50	0.00	0.0000	50.00	No Ice	0.85	1.67	65.00
			0.00	0.00			1/2" Ice	1.14	2.34	79.00
							1" Ice	1.43	3.01	93.00
							2" Ice	2.01	4.35	121.00
							4" Ice	3.17	7.03	177.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz	Lateral							
			ft	ft	°	°	ft	ft	ft ²	lb		
VHLP2-11	A	Paraboloid w/Shroud (HP)	From Leg	2.00	0.00	48.0000		93.00	2.00	No Ice	3.72	30.00
				0.00	1.00					1/2" Ice	4.01	50.00
										1" Ice	4.30	70.00
										2" Ice	4.88	110.00
										4" Ice	6.04	190.00
VHLP1-23	B	Paraboloid w/Shroud (HP)	From Leg	2.00	0.00	-52.0000		93.00	1.27	No Ice	1.28	10.00
				0.00	2.00					1/2" Ice	1.45	20.00
										1" Ice	1.62	20.00
										2" Ice	1.96	40.00
										4" Ice	2.64	60.00
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Leg	2.00	-1.00	-2.0000		93.00	2.92	No Ice	6.68	47.60
				0.00	1.00					1/2" Ice	7.07	83.89
										1" Ice	7.46	120.17
										2" Ice	8.23	192.74
										4" Ice	9.78	337.88
VHLP1-23	C	Paraboloid w/Shroud (HP)	From Leg	2.00	0.00	90.0000		93.00	1.27	No Ice	1.28	10.00
				1.00	-1.00					1/2" Ice	1.45	20.00
										1" Ice	1.62	20.00
										2" Ice	1.96	40.00
										4" Ice	2.64	60.00

Load Combinations

tnxTower**Tower Engineering
Professionals**3703 Junction Blvd.
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350**Job**
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11:56:04 01/23/13**Client**
Crown Castle**Designed by**
Zachary R.
Hurlocker, E.I.

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
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	117 - 110	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	14	-1963.92	-31.41	-18.13
			Max. Mx	5	-765.80	-14995.70	372.58
			Max. My	8	-765.01	368.03	-15077.18
			Max. Vy	5	2615.77	-14995.70	372.58
			Max. Vx	8	2628.74	368.03	-15077.18
			Max. Torque	11			111.06
L2	110 - 100	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-3529.07	-104.49	-60.33
			Max. Mx	5	-1511.57	-55299.04	927.34
			Max. My	8	-1511.24	931.65	-55503.70
			Max. Vy	5	4423.43	-55299.04	927.34
			Max. Vx	8	4436.23	931.65	-55503.70
			Max. Torque	10			125.19
L3	100 - 68.5	Pole	Max Tension	1	0.00	0.00	0.00

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L4	68.5 - 63.5	Pole	Max. Compression	14	-20206.09	386.59	23.22
			Max. Mx	5	-10397.63	-516351.33	6895.07
			Max. My	8	-10403.36	8390.76	-514910.74
			Max. Vy	5	20785.10	-516351.33	6895.07
			Max. Vx	8	20742.63	8390.76	-514910.74
			Max. Torque	8			-1238.45
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21399.05	334.42	177.07
			Max. Mx	5	-11318.61	-621575.45	7951.69
			Max. My	8	-11323.89	9685.03	-619890.48
L5	63.5 - 47.42	Pole	Max. Vy	5	21321.61	-621575.45	7951.69
			Max. Vx	8	21279.15	9685.03	-619890.48
			Max. Torque	8			-1172.87
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24522.60	206.36	554.92
			Max. Mx	5	-13716.47	-873922.41	10385.09
			Max. My	8	-13721.05	12654.74	-871668.16
			Max. Vy	5	22584.64	-873922.41	10385.09
			Max. Vx	8	22542.13	12654.74	-871668.16
			Max. Torque	8			-1169.14
L6	47.42 - 43.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27614.18	109.43	1078.60
			Max. Mx	5	-16107.62	-1070570.9	12355.59
			Max. My	8	-16112.82	14847.56	-1067528.9
			Max. Vy	5	23622.82	-1070570.9	12355.59
			Max. Vx	8	23551.42	14847.56	-1067528.9
			Max. Torque	8			-1157.12
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30337.47	9.11	1375.01
			Max. Mx	5	-18323.79	-1275081.7	14155.25
L7	43.5 - 35	Pole	Max. My	8	-18328.16	17032.49	-1271367.1
			Max. Vy	5	24517.12	-1275081.7	14155.25
			Max. Vx	8	24445.81	17032.49	-1271367.1
			Max. Torque	8			-1154.16
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31531.60	-33.16	1499.99
			Max. Mx	5	-19304.92	-1361508.1	14895.80
			Max. My	8	-19308.98	17929.79	-1357515.5
			Max. Vy	5	24880.73	-1361508.1	14895.80
			Max. Vx	8	24809.46	17929.79	-1357515.5
L8	35 - 31.5	Pole	Max. Torque	8			-1147.82
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38485.69	-329.00	2414.62
			Max. Mx	5	-25080.28	-1946438.3	19662.20
			Max. My	8	-25081.52	23635.48	-1940616.4
			Max. Vy	5	27160.21	-1946438.3	19662.20
			Max. Torque	8			-1147.82
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38485.69	-329.00	2414.62
			Max. Mx	5	-25080.28	-1946438.3	19662.20
L9	31.5 - 9	Pole	Max. My	8	-25081.52	23635.48	-1940616.4
			Max. Vy	5	27160.21	-1946438.3	19662.20
			Max. Torque	8			-1147.82
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38485.69	-329.00	2414.62
			Max. Mx	5	-25080.28	-1946438.3	19662.20
			Max. My	8	-25081.52	23635.48	-1940616.4
			Max. Vy	5	27160.21	-1946438.3	19662.20
			Max. Torque	8			-1147.82
			Max Tension	1	0.00	0.00	0.00

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	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L10	9 - 2	Pole	Max. Vx	8	27089.93	23635.48	-1940616.4
			Max. Torque	8			1
			Max Tension	1	0.00	0.00	-1145.23
			Max. Compression	14	-40845.21	-429.63	0.00
			Max. Mx	5	-27058.92	-2139046.4	2903.14
			Max. My	2	-27059.28	-28438.90	21293.03
			Max. Vy	5	27891.53	-2139046.4	3
			Max. Vx	8	27821.70	25383.99	2132499.04
			Max. Torque	8			0
			Max. Tension	1	0.00	0.00	-1127.52
L11	2 - 0	Pole	Max. Compression	14	-41520.56	-459.13	3032.30
			Max. Mx	5	-27624.93	-2195023.2	21745.82
			Max. My	2	-27625.00	-29015.83	2188349.14
			Max. Vy	5	28102.80	-2195023.2	21745.82
			Max. Vx	8	28033.12	25880.92	-2188271.0
			Max. Torque	8			6
			Max. Tension	1	0.00	0.00	-1121.72
			Max. Compression	14	-41520.56	-459.13	3032.30
			Max. Mx	5	-27624.93	-2195023.2	21745.82
			Max. My	2	-27625.00	-29015.83	2188349.14

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	16	41520.56	-3573.32	6123.48
	Max. H _x	11	27636.88	28064.87	-212.29
	Max. H _z	2	27636.88	-284.99	28004.62
	Max. M _x	2	2188349.14	-284.99	28004.62
	Max. M _z	5	2195023.28	-28091.04	200.13
	Max. Torsion	3	891.31	-14200.81	24314.69
	Min. Vert	1	27636.88	0.00	0.00
	Min. H _x	5	27636.88	-28091.04	200.13
	Min. H _z	8	27636.88	251.44	-28021.39
	Min. M _x	8	-2188271.06	251.44	-28021.39
	Min. M _z	11	-2192615.92	28064.87	-212.29
	Min. Torsion	8	-1120.05	251.44	-28021.39

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
Dead Only	27636.88	0.00	0.00	-819.85	37.30	0.00
Dead+Wind 0 deg - No Ice	27636.88	284.99	-28004.62	-2188349.14	-29015.92	-768.81
Dead+Wind 30 deg - No Ice	27636.88	14200.81	-24314.69	-1901982.11	-1113842.58	-891.31
Dead+Wind 60 deg - No Ice	27636.88	24373.80	-14131.30	-1108351.34	-1906177.79	-803.85
Dead+Wind 90 deg - No Ice	27636.88	28091.04	-200.13	-21745.78	-2195023.28	-379.58
Dead+Wind 120 deg - No Ice	27636.88	24312.35	13772.88	1069425.04	-1898722.76	111.62

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	Project TEP No. 806352.01S	Date 11:56:04 01/23/13
	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 150 deg - No Ice	27636.88	13875.22	24209.31	1888640.29	-1079745.16	780.59
Dead+Wind 180 deg - No Ice	27636.88	-251.44	28021.39	2188271.06	25880.79	1120.05
Dead+Wind 210 deg - No Ice	27636.88	-14177.49	24311.27	1899985.67	1111710.72	1116.48
Dead+Wind 240 deg - No Ice	27636.88	-24364.90	14116.62	1105306.62	1905409.04	861.65
Dead+Wind 270 deg - No Ice	27636.88	-28064.87	212.29	21230.49	2192615.92	435.87
Dead+Wind 300 deg - No Ice	27636.88	-24278.51	-13789.78	-1072736.67	1895581.93	-211.55
Dead+Wind 330 deg - No Ice	27636.88	-13907.18	-24176.19	-1887146.11	1082908.44	-751.33
Dead+Ice+Temp	41520.56	0.00	0.00	-3032.30	-459.13	0.00
Dead+Wind 0 deg+Ice+Temp	41520.56	61.08	-7055.75	-566149.20	-6696.22	-133.79
Dead+Wind 30 deg+Ice+Temp	41520.56	3573.32	-6123.48	-492111.08	-286485.08	-193.39
Dead+Wind 60 deg+Ice+Temp	41520.56	6141.65	-3555.24	-287527.43	-490957.27	-207.06
Dead+Wind 90 deg+Ice+Temp	41520.56	7080.82	-42.22	-7521.16	-565620.56	-136.88
Dead+Wind 120 deg+Ice+Temp	41520.56	6129.54	3478.97	273371.32	-489523.82	-40.31
Dead+Wind 150 deg+Ice+Temp	41520.56	3504.43	6101.66	483483.00	-279296.16	111.58
Dead+Wind 180 deg+Ice+Temp	41520.56	-54.14	7059.86	560303.04	5114.67	209.01
Dead+Wind 210 deg+Ice+Temp	41520.56	-3568.51	6123.35	485854.06	285116.56	242.26
Dead+Wind 240 deg+Ice+Temp	41520.56	-6140.41	3552.14	280988.05	489931.57	219.62
Dead+Wind 270 deg+Ice+Temp	41520.56	-7075.66	45.37	1582.54	564215.45	151.84
Dead+Wind 300 deg+Ice+Temp	41520.56	-6122.33	-3482.12	-279926.57	487919.19	20.08
Dead+Wind 330 deg+Ice+Temp	41520.56	-3511.02	-6094.31	-489011.47	279038.40	-105.24
Dead+Wind 0 deg - Service	27636.88	98.61	-9690.18	-758503.62	-10021.94	-270.22
Dead+Wind 30 deg - Service	27636.88	4913.77	-8413.39	-659329.17	-385770.04	-311.08
Dead+Wind 60 deg - Service	27636.88	8433.84	-4889.72	-384442.66	-660208.93	-278.77
Dead+Wind 90 deg - Service	27636.88	9720.08	-69.25	-8077.88	-760246.61	-129.68
Dead+Wind 120 deg - Service	27636.88	8412.58	4765.70	369857.93	-657606.57	41.25
Dead+Wind 150 deg - Service	27636.88	4801.12	8376.93	653598.11	-373945.06	272.16
Dead+Wind 180 deg - Service	27636.88	-87.00	9695.98	757388.80	8996.30	389.39
Dead+Wind 210 deg - Service	27636.88	-4905.71	8412.21	657547.31	385090.73	388.60
Dead+Wind 240 deg - Service	27636.88	-8430.76	4884.64	382298.28	660000.56	300.33
Dead+Wind 270 deg - Service	27636.88	-9711.03	73.46	6811.01	759469.53	152.23
Dead+Wind 300 deg - Service	27636.88	-8400.87	-4771.55	-372091.94	656576.68	-74.17
Dead+Wind 330 deg - Service	27636.88	-4812.17	-8365.47	-654167.65	375100.65	-263.61

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-27636.88	0.00	0.00	27636.88	0.00	0.000%
2	284.99	-27636.88	-28004.61	-284.99	27636.88	28004.62	0.000%
3	14200.81	-27636.88	-24314.69	-14200.81	27636.88	24314.69	0.000%
4	24373.80	-27636.88	-14131.30	-24373.80	27636.88	14131.30	0.000%
5	28091.04	-27636.88	-200.13	-28091.04	27636.88	200.13	0.000%
6	24312.35	-27636.88	13772.88	-24312.35	27636.88	-13772.88	0.000%
7	13875.22	-27636.88	24209.31	-13875.22	27636.88	-24209.31	0.000%
8	-251.44	-27636.88	28021.39	251.44	27636.88	-28021.39	0.000%
9	-14177.49	-27636.88	24311.27	14177.49	27636.88	-24311.27	0.000%
10	-24364.90	-27636.88	14116.62	24364.90	27636.88	-14116.62	0.000%
11	-28064.87	-27636.88	212.29	28064.87	27636.88	-212.29	0.000%
12	-24278.51	-27636.88	-13789.78	24278.51	27636.88	13789.78	0.000%
13	-13907.18	-27636.88	-24176.19	13907.18	27636.88	24176.19	0.000%
14	0.00	-41520.56	0.00	0.00	41520.56	0.00	0.000%
15	61.08	-41520.56	-7055.75	-61.08	41520.56	7055.75	0.000%
16	3573.32	-41520.56	-6123.47	-3573.32	41520.56	6123.48	0.000%
17	6141.64	-41520.56	-3555.24	-6141.65	41520.56	3555.24	0.000%
18	7080.81	-41520.56	-42.22	-7080.82	41520.56	42.22	0.000%
19	6129.53	-41520.56	3478.97	-6129.54	41520.56	-3478.97	0.000%
20	3504.43	-41520.56	6101.65	-3504.43	41520.56	-6101.66	0.000%

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Load Comb.	Sum of Applied Forces				Sum of Reactions		% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
21	-54.14	-41520.56	7059.85	54.14	41520.56	-7059.86	0.000%
22	-3568.51	-41520.56	6123.35	3568.51	41520.56	-6123.35	0.000%
23	-6140.41	-41520.56	3552.14	6140.41	41520.56	-3552.14	0.000%
24	-7075.66	-41520.56	45.37	7075.66	41520.56	-45.37	0.000%
25	-6122.32	-41520.56	-3482.11	6122.33	41520.56	3482.12	0.000%
26	-3511.01	-41520.56	-6094.31	3511.02	41520.56	6094.31	0.000%
27	98.61	-27636.88	-9690.18	-98.61	27636.88	9690.18	0.000%
28	4913.77	-27636.88	-8413.39	-4913.77	27636.88	8413.39	0.000%
29	8433.84	-27636.88	-4889.72	-8433.84	27636.88	4889.72	0.000%
30	9720.08	-27636.88	-69.25	-9720.08	27636.88	69.25	0.000%
31	8412.58	-27636.88	4765.70	-8412.58	27636.88	-4765.70	0.000%
32	4801.11	-27636.88	8376.92	-4801.12	27636.88	-8376.93	0.000%
33	-87.00	-27636.88	9695.98	87.00	27636.88	-9695.98	0.000%
34	-4905.71	-27636.88	8412.20	4905.71	27636.88	-8412.21	0.000%
35	-8430.76	-27636.88	4884.64	8430.76	27636.88	-4884.64	0.000%
36	-9711.03	-27636.88	73.46	9711.03	27636.88	-73.46	0.000%
37	-8400.87	-27636.88	-4771.55	8400.87	27636.88	4771.55	0.000%
38	-4812.17	-27636.88	-8365.46	4812.17	27636.88	8365.47	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	0.00009347
3	Yes	5	0.00000001	0.00018060
4	Yes	5	0.00000001	0.00018677
5	Yes	4	0.00000001	0.00021421
6	Yes	5	0.00000001	0.00018066
7	Yes	5	0.00000001	0.00017292
8	Yes	4	0.00000001	0.00066737
9	Yes	5	0.00000001	0.00018959
10	Yes	5	0.00000001	0.00018068
11	Yes	4	0.00000001	0.00020836
12	Yes	5	0.00000001	0.00017484
13	Yes	5	0.00000001	0.00018467
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00012236
16	Yes	5	0.00000001	0.00013990
17	Yes	5	0.00000001	0.00014021
18	Yes	5	0.00000001	0.00012229
19	Yes	5	0.00000001	0.00013707
20	Yes	5	0.00000001	0.00013665
21	Yes	5	0.00000001	0.00012169
22	Yes	5	0.00000001	0.00013952
23	Yes	5	0.00000001	0.00013909
24	Yes	5	0.00000001	0.00012233
25	Yes	5	0.00000001	0.00013775
26	Yes	5	0.00000001	0.00013819
27	Yes	4	0.00000001	0.00006124
28	Yes	4	0.00000001	0.00055240
29	Yes	4	0.00000001	0.00059199
30	Yes	4	0.00000001	0.00004782
31	Yes	4	0.00000001	0.00056049
32	Yes	4	0.00000001	0.00051139
33	Yes	4	0.00000001	0.00011238

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34	Yes	4	0.00000001	0.00061083
35	Yes	4	0.00000001	0.00055418
36	Yes	4	0.00000001	0.00004750
37	Yes	4	0.00000001	0.00052453
38	Yes	4	0.00000001	0.00058613

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 lb	Allow. P _a lb	Ratio P P _a
L1	117 - 116	TP15.94x14.36x0.1875	7.00	0.00	0.0	39.000	8.6929	-263.74	339024.00	0.001
	116 - 115					39.000	8.8292	-288.43	344339.00	0.001
	115 - 114					39.000	8.9655	-653.06	349653.00	0.002
	114 - 113					39.000	9.1018	-678.70	354968.00	0.002
	113 - 112					39.000	9.2380	-704.83	360283.00	0.002
	112 - 111					39.000	9.3743	-731.44	365598.00	0.002
	111 - 110					39.000	9.5106	-758.55	370912.00	0.002
L2	110 - 109	TP18.2x15.94x0.1875	10.00	0.00	0.0	39.000	9.6470	-1147.44	376234.00	0.003
	109 - 108					39.000	9.7835	-1184.66	381555.00	0.003
	108 - 107					39.000	9.9199	-1222.47	386877.00	0.003
	107 - 106					39.000	10.0564	-1260.88	392198.00	0.003
	106 - 105					39.000	10.1928	-1299.87	397520.00	0.003
	105 - 104					39.000	10.3293	-1339.46	402841.00	0.003
	104 - 103					39.000	10.4657	-1379.63	408162.00	0.003
	103 - 102					39.000	10.6022	-1420.40	413484.00	0.003
	102 - 101					39.000	10.7386	-1461.76	418805.00	0.003
	101 - 100					39.000	10.8750	-1503.71	424127.00	0.004
L3	100 - 98.425	TP25.3225x18.2x0.25	31.50	0.00	0.0	39.000	14.7364	-1611.98	574721.00	0.003
	98.425 - 96.85					39.000	15.0231	-3420.56	585901.00	0.006
	96.85 - 95.275					39.000	15.3098	-3537.98	597082.00	0.006
	95.275 - 93.7					39.000	15.5965	-3700.09	608262.00	0.006
	93.7 - 92.125					39.000	15.8831	-3959.46	619443.00	0.006
	92.125 - 90.55					39.000	16.1698	-4092.30	630623.00	0.006
	90.55 - 88.975					39.000	16.4565	-4221.55	641804.00	0.007
	88.975 - 87.4					39.000	16.7432	-4351.23	652984.00	0.007
	87.4 - 85.825					39.000	17.0299	-6620.10	664165.00	0.010
	85.825 - 84.25					39.000	17.3165	-6767.07	675345.00	0.010
	84.25 - 82.675					39.000	17.6032	-6917.68	686525.00	0.010
	82.675 - 81.1					39.000	17.8899	-7071.75	697706.00	0.010
	81.1 - 79.525					39.000	18.1766	-7383.57	708886.00	0.010
	79.525 - 77.95					39.000	18.4633	-7545.48	720067.00	0.010
	77.95 - 76.375					39.000	18.7499	-7710.67	731247.00	0.011
	76.375 - 74.8					39.000	19.0366	-7879.05	742428.00	0.011
	74.8 - 73.225					39.000	19.3233	-8050.51	753608.00	0.011
73.225 - 71.65	39.000	19.6100	-8224.98	764789.00	0.011					
71.65 - 70.075	39.000	19.8966	-8402.39	775969.00	0.011					
70.075 - 68.5	39.000	20.1833	-10386.00	787150.00	0.013					
L4	68.5 - 67.5	TP26.453x25.3225x0.4323	5.00	0.00	0.0	39.000	34.9580	-10581.50	1363360.00	0.008
	67.5 - 66.5					39.000	35.2727	-10761.60	1375640.00	0.008
	66.5 - 65.5					39.000	35.5874	-10942.80	1387910.00	0.008
	65.5 - 64.5					39.000	35.9021	-11124.90	1400180.00	0.008
	64.5 - 63.5					39.000	36.2169	-11308.10	1412460.00	0.008
L5	63.5 - 62.4545	TP30.09x26.453x0.5821	16.08	0.00	0.0	39.000	48.9325	-11523.60	1908370.00	0.006
	62.4545 -					39.000	49.3757	-11737.90	1925650.00	0.006

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Section No.	Elevation ft	Size	L ft	L _u ft	KL/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
	61.4091									
	61.4091 - 60.3636					39.000	49.8189	-11953.00	1942940.00	0.006
	60.3636 - 59.3182					39.000	50.2621	-12169.20	1960220.00	0.006
	59.3182 - 58.2727					39.000	50.7053	-12386.20	1977510.00	0.006
	58.2727 - 57.2273					39.000	51.1485	-12604.20	1994790.00	0.006
	57.2273 - 56.1818					39.000	51.5917	-12823.10	2012080.00	0.006
	56.1818 - 55.1364					39.000	52.0349	-13042.90	2029360.00	0.006
	55.1364 - 54.0909					39.000	52.4781	-13263.60	2046650.00	0.006
	54.0909 - 53.0455					39.000	52.9213	-13485.20	2063930.00	0.007
	53.0455 - 52					39.000	53.3645	-13707.60	2081210.00	0.007
	52 - 47.42					39.000	55.3061	-8369.65	2156940.00	0.004
L6	52 - 47.42	TP30.3071x27.8899x0.5016	8.50	0.00	0.0	39.000	46.3384	-6819.66	1807200.00	0.004
	47.42 - 46.1133					39.000	46.9385	-15496.90	1830600.00	0.008
	46.1133 - 44.8067					39.000	47.5387	-15797.60	1854010.00	0.009
	44.8067 - 43.5					39.000	48.1388	-16100.10	1877410.00	0.009
L7	43.5 - 42.4375	TP32.385x30.3071x0.6404	8.50	0.00	0.0	39.000	61.7062	-16378.10	2406540.00	0.007
	42.4375 - 41.375					39.000	62.2418	-16651.70	2427430.00	0.007
	41.375 - 40.3125					39.000	62.7774	-16926.50	2448320.00	0.007
	40.3125 - 39.25					39.000	63.3129	-17202.50	2469200.00	0.007
	39.25 - 38.1875					39.000	63.8485	-17479.50	2490090.00	0.007
	38.1875 - 37.125					39.000	64.3840	-17757.70	2510980.00	0.007
	37.125 - 36.0625					39.000	64.9196	-18037.10	2531860.00	0.007
	36.0625 - 35					39.000	65.4552	-18317.60	2552750.00	0.007
L8	35 - 33.8333	TP33.1765x32.385x0.6824	3.50	0.00	0.0	39.000	70.2442	-18643.30	2739520.00	0.007
	33.8333 - 32.6667					39.000	70.8239	-18970.60	2762130.00	0.007
	32.6667 - 31.5					39.000	71.4037	-19299.20	2784740.00	0.007
L9	31.5 - 30.375	TP38.2647x33.1765x0.5055	22.50	0.00	0.0	39.000	53.5932	-19573.80	2090140.00	0.009
	30.375 - 29.25					39.000	54.0073	-19852.60	2106290.00	0.009
	29.25 - 28.125					39.000	54.4214	-20132.50	2122440.00	0.009
	28.125 - 27					39.000	54.8356	-20413.70	2138590.00	0.010
	27 - 25.875					39.000	55.2497	-20696.20	2154740.00	0.010
	25.875 - 24.75					39.000	55.6638	-20979.80	2170890.00	0.010
	24.75 - 23.625					39.000	56.0779	-21264.70	2187040.00	0.010
	23.625 - 22.5					39.000	56.4920	-21550.80	2203190.00	0.010
	22.5 - 21.375					39.000	56.9061	-21838.10	2219340.00	0.010
	21.375 - 20.25					39.000	57.3202	-22126.60	2235490.00	0.010
	20.25 - 19.125					39.000	57.7343	-22416.40	2251640.00	0.010
	19.125 - 18					39.000	58.1484	-22707.30	2267790.00	0.010
	18 - 16.875					39.000	58.5625	-22999.50	2283940.00	0.010
	16.875 - 15.75					39.000	58.9766	-23292.90	2300090.00	0.010
	15.75 - 14.625					39.000	59.3907	-23587.50	2316240.00	0.010
	14.625 - 13.5					39.000	59.8049	-23883.30	2332390.00	0.010
	13.5 - 12.375					39.000	60.2190	-24180.30	2348540.00	0.010
	12.375 - 11.25					39.000	60.6331	-24478.50	2364690.00	0.010
	11.25 - 10.125					39.000	61.0472	-24777.90	2380840.00	0.010
	10.125 - 9					39.000	61.4613	-25078.60	2396990.00	0.010

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
L10	9 - 8	TP39.8477x38.2647x0.4985	7.00	0.00	0.0	39.000	60.9791	-25359.70	2378190.00	0.011
	8 - 7					39.000	61.3421	-25640.40	2392340.00	0.011
	7 - 6					39.000	61.7051	-25922.10	2406500.00	0.011
	6 - 5					39.000	62.0680	-26204.80	2420650.00	0.011
	5 - 4					39.000	62.4310	-26488.40	2434810.00	0.011
	4 - 3					39.000	62.7940	-26773.00	2448960.00	0.011
	3 - 2					39.000	63.1569	-27058.50	2463120.00	0.011
L11	2 - 1	TP40.3x39.8477x0.4962	2.00	0.00	0.0	39.000	63.2404	-27341.20	2466380.00	0.011
	1 - 0					39.000	63.6018	-27624.80	2480470.00	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x lb-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y lb-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}	
L1	117 - 116	TP15.94x14.36x0.1875	1395.79	0.550	39.000	0.014	0.00	0.000	39.000	0.000	
	116 - 115		2855.63	1.091	39.000	0.028	0.00	0.000	39.000	0.000	
	115 - 114		5224.13	1.935	39.000	0.050	0.00	0.000	39.000	0.000	
	114 - 113		7658.69	2.752	39.000	0.071	0.00	0.000	39.000	0.000	
	113 - 112		10160.2	3.543	39.000	0.091	0.00	0.000	39.000	0.000	
			5								
	112 - 111		12729.7	4.311	39.000	0.111	0.00	0.000	39.000	0.000	
			5								
	111 - 110		15368.1	5.055	39.000	0.130	0.00	0.000	39.000	0.000	
			7								
L2	110 - 109	TP18.2x15.94x0.1875	19113.0	6.109	39.000	0.157	0.00	0.000	39.000	0.000	
	109 - 108		22931.5	7.126	39.000	0.183	0.00	0.000	39.000	0.000	
			0								
	108 - 107		26824.3	8.106	39.000	0.208	0.00	0.000	39.000	0.000	
			3								
	107 - 106		30792.5	9.053	39.000	0.232	0.00	0.000	39.000	0.000	
			8								
	106 - 105		34837.0	9.969	39.000	0.256	0.00	0.000	39.000	0.000	
			8								
	105 - 104		38958.8	10.854	39.000	0.278	0.00	0.000	39.000	0.000	
	3										
104 - 103	43158.7	11.711	39.000	0.300	0.00	0.000	39.000	0.000			
	5										
103 - 102	47437.8	12.541	39.000	0.322	0.00	0.000	39.000	0.000			
	3										
102 - 101	51796.8	13.346	39.000	0.342	0.00	0.000	39.000	0.000			
	3										
101 - 100	56236.9	14.127	39.000	0.362	0.00	0.000	39.000	0.000			
	2										
L3	100 - 98.425	TP25.3225x18.2x0.25	63403.3	11.602	39.000	0.297	0.00	□	39.000	0.000	
			3					39.0			
	98.425 - 96.85		87006.6	15.316	39.000	0.393	0.00	0.000	39.000	0.000	
			7								
	96.85 - 95.275		101425.00	17.187	39.000	0.441	0.00	0.000	39.000	0.000	
			00								
95.275 - 93.7	116325.00	18.989	39.000	0.487	0.00	0.000	39.000	0.000			
	00										
93.7 - 92.125	132384.17	20.833	39.000	0.534	0.00	0.000	39.000	0.000			
	17										
92.125 - 90.55	148960.00	22.613	39.000	0.580	0.00	0.000	39.000	0.000			

tnxTower Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job	BRG 302 943052 (BU# 806352)	Page	24 of 32
	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
			00							
	90.55 - 88.975		165744.	24.286	39.000	0.623	0.00	0.000	39.000	0.000
			17							
	88.975 - 87.4		182778.	25.868	39.000	0.663	0.00	0.000	39.000	0.000
			33							
	87.4 - 85.825		218635.	29.904	39.000	0.767	0.00	0.000	39.000	0.000
			83							
	85.825 - 84.25		243579.	32.215	39.000	0.826	0.00	0.000	39.000	0.000
			17							
	84.25 - 82.675		268745.	34.389	39.000	0.882	0.00	0.000	39.000	0.000
			00							
	82.675 - 81.1		294134.	36.434	39.000	0.934	0.00	0.000	39.000	0.000
			17							
	81.1 - 79.525		320552.	38.457	39.000	0.986	0.00	0.000	39.000	0.000
			50							
	79.525 - 77.95		347250.	40.370	39.000	1.035	0.00	0.000	39.000	0.000
			83							
	77.95 - 76.375		374175.	42.173	39.000	1.081	0.00	0.000	39.000	0.000
			83							
	76.375 - 74.8		401330.	43.874	39.000	1.125	0.00	0.000	39.000	0.000
			00							
	74.8 - 73.225		428713.	45.480	39.000	1.166	0.00	0.000	39.000	0.000
			33							
	73.225 - 71.65		456326.	46.998	39.000	1.205	0.00	0.000	39.000	0.000
			67							
	71.65 - 70.075		484172.	48.432	39.000	1.242	0.00	0.000	39.000	0.000
			50							
	70.075 - 68.5		519954.	50.537	39.000	1.296	0.00	0.000	39.000	0.000
			17							
L4	68.5 - 67.5	TP26.453x25.3225x0.4323	540877.	30.516	39.000	0.782	0.00	0.000	39.000	0.000
			50							
	67.5 - 66.5		561908.	31.135	39.000	0.798	0.00	0.000	39.000	0.000
			33							
	66.5 - 65.5		583048.	31.733	39.000	0.814	0.00	0.000	39.000	0.000
			33							
	65.5 - 64.5		604296.	32.310	39.000	0.828	0.00	0.000	39.000	0.000
			67							
	64.5 - 63.5		625655.	32.869	39.000	0.843	0.00	0.000	39.000	0.000
			00							
L5	63.5 - 62.4545	TP30.09x26.453x0.5821	648100.	25.257	39.000	0.648	0.00	0.000	39.000	0.000
			00							
	62.4545 - 61.4091		670662.	25.664	39.000	0.658	0.00	0.000	39.000	0.000
			50							
	61.4091 - 60.3636		693342.	26.057	39.000	0.668	0.00	0.000	39.000	0.000
			50							
	60.3636 - 59.3182		716140.	26.436	39.000	0.678	0.00	0.000	39.000	0.000
			83							
	59.3182 - 58.2727		739057.	26.802	39.000	0.687	0.00	0.000	39.000	0.000
			50							
	58.2727 - 57.2273		762095.	27.156	39.000	0.696	0.00	0.000	39.000	0.000
			00							
	57.2273 - 56.1818		785252.	27.498	39.000	0.705	0.00	0.000	39.000	0.000
			50							
	56.1818 - 55.1364		808530.	27.828	39.000	0.714	0.00	0.000	39.000	0.000
			83							
	55.1364 - 54.0909		831930.	28.147	39.000	0.722	0.00	0.000	39.000	0.000
			83							
	54.0909 - 53.0455		855450.	28.455	39.000	0.730	0.00	0.000	39.000	0.000
			00							
	53.0455 - 52		879100.	28.753	39.000	0.737	0.00	0.000	39.000	0.000

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	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
			00							
	52 - 47.42		553098.33	16.831	39.000	0.432	0.00	0.000	39.000	0.000
L6	52 - 47.42	TP30.3071x27.8899x0.5016	431383.33	16.078	39.000	0.412	0.00	0.000	39.000	0.000
	47.42 - 46.1133		1015008.33	36.861	39.000	0.945	0.00	0.000	39.000	0.000
	46.1133 - 44.8067		1045716.67	37.015	39.000	0.949	0.00	0.000	39.000	0.000
	44.8067 - 43.5		1076600.00	37.157	39.000	0.953	0.00	0.000	39.000	0.000
L7	43.5 - 42.4375	TP32.385x30.3071x0.6404	1101841.67	29.679	39.000	0.761	0.00	0.000	39.000	0.000
	42.4375 - 41.375		1127200.00	29.837	39.000	0.765	0.00	0.000	39.000	0.000
	41.375 - 40.3125		1152683.33	29.988	39.000	0.769	0.00	0.000	39.000	0.000
	40.3125 - 39.25		1178275.00	30.132	39.000	0.773	0.00	0.000	39.000	0.000
	39.25 - 38.1875		1203991.67	30.270	39.000	0.776	0.00	0.000	39.000	0.000
	38.1875 - 37.125		1229825.00	30.402	39.000	0.780	0.00	0.000	39.000	0.000
	37.125 - 36.0625		1255783.33	30.529	39.000	0.783	0.00	0.000	39.000	0.000
	36.0625 - 35		1281858.33	30.650	39.000	0.786	0.00	0.000	39.000	0.000
L8	35 - 33.8333	TP33.1765x32.385x0.6824	1310633.33	29.032	39.000	0.744	0.00	0.000	39.000	0.000
	33.8333 - 32.6667		1339541.67	29.183	39.000	0.748	0.00	0.000	39.000	0.000
	32.6667 - 31.5		1368600.00	29.329	39.000	0.752	0.00	0.000	39.000	0.000
L9	31.5 - 30.375	TP38.2647x33.1765x0.5055	1396741.67	39.140	39.000	1.004	0.00	0.000	39.000	0.000
	30.375 - 29.25		1425008.33	39.317	39.000	1.008	0.00	0.000	39.000	0.000
	29.25 - 28.125		1453408.33	39.488	39.000	1.013	0.00	0.000	39.000	0.000
	28.125 - 27		1481925.00	39.653	39.000	1.017	0.00	0.000	39.000	0.000
	27 - 25.875		1510566.67	39.811	39.000	1.021	0.00	0.000	39.000	0.000
	25.875 - 24.75		1539333.33	39.964	39.000	1.025	0.00	0.000	39.000	0.000
	24.75 - 23.625		1568225.00	40.110	39.000	1.028	0.00	0.000	39.000	0.000
	23.625 - 22.5		1597241.67	40.251	39.000	1.032	0.00	0.000	39.000	0.000
	22.5 - 21.375		1626391.67	40.387	39.000	1.036	0.00	0.000	39.000	0.000
	21.375 - 20.25		1655658.33	40.518	39.000	1.039	0.00	0.000	39.000	0.000
	20.25 - 19.125		1685066.67	40.644	39.000	1.042	0.00	0.000	39.000	0.000
	19.125 - 18		1714591.67	40.765	39.000	1.045	0.00	0.000	39.000	0.000
	18 - 16.875		1744250.00	40.882	39.000	1.048	0.00	0.000	39.000	0.000
	16.875 - 15.75		1774041.67	40.994	39.000	1.051	0.00	0.000	39.000	0.000

tnxTower Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job	BRG 302 943052 (BU# 806352)	Page	26 of 32
	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	15.75 - 14.625		.67 1803958	41.102	39.000	1.054	0.00	0.000	39.000	0.000
	14.625 - 13.5		.33 1834000	41.206	39.000	1.057	0.00	0.000	39.000	0.000
	13.5 - 12.375		.00 1864183	41.307	39.000	1.059	0.00	0.000	39.000	0.000
	12.375 - 11.25		.33 1894491	41.403	39.000	1.062	0.00	0.000	39.000	0.000
	11.25 - 10.125		.67 1924941	41.496	39.000	1.064	0.00	0.000	39.000	0.000
	10.125 - 9		.67 1955516	41.585	39.000	1.066	0.00	0.000	39.000	0.000
L10	9 - 8	TP39.8477x38.2647x0.4985	.67 1982816	42.227	39.000	1.083	0.00	0.000	39.000	0.000
	8 - 7		.67 2010225	42.302	39.000	1.085	0.00	0.000	39.000	0.000
	7 - 6		.00 2037733	42.375	39.000	1.087	0.00	0.000	39.000	0.000
	6 - 5		.33 2065341	42.445	39.000	1.088	0.00	0.000	39.000	0.000
	5 - 4		.67 2093066	42.513	39.000	1.090	0.00	0.000	39.000	0.000
	4 - 3		.67 2120883	42.578	39.000	1.092	0.00	0.000	39.000	0.000
	3 - 2		.33 2148816	42.642	39.000	1.093	0.00	0.000	39.000	0.000
L11	2 - 1	TP40.3x39.8477x0.4962	.67 2176850	42.886	39.000	1.100	0.00	0.000	39.000	0.000
	1 - 0		.00 2204983	42.946	39.000	1.101	0.00	0.000	39.000	0.000
			.33							

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	117 - 116	TP15.94x14.36x0.1875	1427.70	0.164	26.000	0.013	56.01	0.010	26.000	0.000
	116 - 115		1492.32	0.169	26.000	0.013	56.95	0.010	26.000	0.000
	115 - 114		2401.47	0.268	26.000	0.021	74.00	0.013	26.000	0.000
	114 - 113		2468.02	0.271	26.000	0.021	74.97	0.013	26.000	0.000
	113 - 112		2535.51	0.274	26.000	0.021	75.95	0.012	26.000	0.000
	112 - 111		2603.97	0.278	26.000	0.022	76.94	0.012	26.000	0.000
	111 - 110		2673.37	0.281	26.000	0.022	77.95	0.012	26.000	0.000
L2	110 - 109	TP18.2x15.94x0.1875	3781.78	0.392	26.000	0.031	79.69	0.012	26.000	0.000
	109 - 108		3855.77	0.394	26.000	0.031	81.46	0.012	26.000	0.000
	108 - 107		3930.70	0.396	26.000	0.031	83.26	0.012	26.000	0.000
	107 - 106		4006.57	0.398	26.000	0.031	85.08	0.012	26.000	0.000
	106 - 105		4083.38	0.401	26.000	0.031	86.92	0.012	26.000	0.000
	105 - 104		4161.12	0.403	26.000	0.031	88.79	0.012	26.000	0.000
	104 - 103		4239.80	0.405	26.000	0.032	90.68	0.012	26.000	0.000
	103 - 102		4319.41	0.407	26.000	0.032	92.60	0.012	26.000	0.000
	102 - 101		4399.95	0.410	26.000	0.032	94.54	0.011	26.000	0.000
	101 - 100		4481.42	0.412	26.000	0.032	96.51	0.011	26.000	0.000
L3	100 - 98.425	TP25.3225x18.2x0.25	4617.81	0.313	26.000	0.024	97.16	0.008	26.000	0.000
	98.425 - 96.85		9086.31	0.605	26.000	0.047	99.58	0.008	26.000	0.000

<i>inxTower</i> Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job	BRG 302 943052 (BU# 806352)	Page	27 of 32
	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_w ksi	Allow. F_w ksi	Ratio $\frac{f_w}{F_w}$
	96.85 - 95.275		9223.95	0.602	26.000	0.047	100.25	0.008	26.000	0.000
	95.275 - 93.7		9884.54	0.634	26.000	0.050	96.89	0.007	26.000	0.000
	93.7 - 92.125		10406.1	0.655	26.000	0.051	141.98	0.011	26.000	0.000
			0							
	92.125 - 90.55		10590.0	0.655	26.000	0.051	304.76	0.022	26.000	0.001
			0							
	90.55 - 88.975		10732.4	0.652	26.000	0.051	304.69	0.021	26.000	0.001
			0							
	88.975 - 87.4		10895.4	0.651	26.000	0.051	97.13	0.006	26.000	0.000
			0							
	87.4 - 85.825		15773.5	0.926	26.000	0.072	449.67	0.029	26.000	0.001
			0							
	85.825 - 84.25		15915.2	0.919	26.000	0.072	449.87	0.028	26.000	0.001
			0							
	84.25 - 82.675		16057.6	0.912	26.000	0.071	450.06	0.027	26.000	0.001
			0							
	82.675 - 81.1		16200.8	0.906	26.000	0.071	450.25	0.026	26.000	0.001
			0							
	81.1 - 79.525		16888.8	0.929	26.000	0.073	450.42	0.025	26.000	0.001
			0							
	79.525 - 77.95		17033.1	0.923	26.000	0.072	450.61	0.025	26.000	0.001
			0							
	77.95 - 76.375		17178.1	0.916	26.000	0.072	450.80	0.024	26.000	0.001
			0							
	76.375 - 74.8		17323.8	0.910	26.000	0.071	450.98	0.023	26.000	0.001
			0							
	74.8 - 73.225		17470.3	0.904	26.000	0.071	451.17	0.023	26.000	0.001
			0							
	73.225 - 71.65		17617.6	0.898	26.000	0.070	451.36	0.022	26.000	0.001
			0							
	71.65 - 70.075		17765.6	0.893	26.000	0.070	451.56	0.021	26.000	0.001
			0							
	70.075 - 68.5		20878.5	1.034	26.000	0.081	392.27	0.018	26.000	0.001
			0							
L4	68.5 - 67.5	TP26.453x25.3225x0.4323	20978.3	0.600	26.000	0.047	313.19	0.008	26.000	0.000
			0							
	67.5 - 66.5		21086.6	0.598	26.000	0.047	317.93	0.008	26.000	0.000
			0							
	66.5 - 65.5		21195.5	0.596	26.000	0.047	322.71	0.008	26.000	0.000
			0							
	65.5 - 64.5		21305.0	0.593	26.000	0.046	327.53	0.008	26.000	0.000
			0							
	64.5 - 63.5		21415.0	0.591	26.000	0.046	332.39	0.008	26.000	0.000
			0							
L5	63.5 - 62.4545	TP30.09x26.453x0.5821	21525.6	0.440	26.000	0.034	337.27	0.006	26.000	0.000
			0							
	62.4545 - 61.4091		21638.0	0.438	26.000	0.034	342.19	0.006	26.000	0.000
			0							
	61.4091 - 60.3636		21751.1	0.437	26.000	0.034	347.16	0.006	26.000	0.000
			0							
	60.3636 - 59.3182		21864.7	0.435	26.000	0.034	352.18	0.006	26.000	0.000
			0							
	59.3182 - 58.2727		21979.0	0.433	26.000	0.034	357.23	0.006	26.000	0.000
			0							
	58.2727 - 57.2273		22093.9	0.432	26.000	0.034	362.33	0.006	26.000	0.000
			0							
	57.2273 - 56.1818		22209.5	0.430	26.000	0.034	367.47	0.006	26.000	0.000
			0							
	56.1818 - 55.1364		22325.6	0.429	26.000	0.034	372.66	0.006	26.000	0.000
			0							

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	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	Actual V lb	Actual f _v ksi	Allow. F _v ksi	Ratio f _v / F _v	Actual T lb-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} / F _{vt}
	55.1364 - 54.0909		22442.4	0.428	26.000	0.033	377.89	0.006	26.000	0.000
	54.0909 - 53.0455		22559.8	0.426	26.000	0.033	383.16	0.006	26.000	0.000
	53.0455 - 52		22677.9	0.425	26.000	0.033	388.48	0.006	26.000	0.000
	52 - 47.42		13210.3	0.239	26.000	0.019	338.82	0.005	26.000	0.000
L6	52 - 47.42	TP30.3071x27.8899x0.5016	10099.4	0.218	26.000	0.017	209.40	0.004	26.000	0.000
	47.42 - 46.1133		23437.6	0.499	26.000	0.039	554.59	0.009	26.000	0.000
	46.1133 - 44.8067		23572.5	0.496	26.000	0.039	561.03	0.009	26.000	0.000
	44.8067 - 43.5		23708.8	0.493	26.000	0.038	567.56	0.009	26.000	0.000
L7	43.5 - 42.4375	TP32.385x30.3071x0.6404	23815.2	0.386	26.000	0.030	572.70	0.007	26.000	0.000
	42.4375 - 41.375		23925.8	0.384	26.000	0.030	577.90	0.007	26.000	0.000
	41.375 - 40.3125		24037.1	0.383	26.000	0.030	583.14	0.007	26.000	0.000
	40.3125 - 39.25		24149.0	0.381	26.000	0.030	588.43	0.007	26.000	0.000
	39.25 - 38.1875		24261.5	0.380	26.000	0.030	593.76	0.007	26.000	0.000
	38.1875 - 37.125		24374.7	0.379	26.000	0.030	599.14	0.007	26.000	0.000
	37.125 - 36.0625		24488.4	0.377	26.000	0.029	604.56	0.007	26.000	0.000
	36.0625 - 35		24602.8	0.376	26.000	0.029	610.03	0.007	26.000	0.000
L8	35 - 33.8333	TP33.1765x32.385x0.6824	24723.6	0.352	26.000	0.028	615.80	0.006	26.000	0.000
	33.8333 - 32.6667		24844.7	0.351	26.000	0.027	621.62	0.006	26.000	0.000
	32.6667 - 31.5		24966.3	0.350	26.000	0.027	627.49	0.006	26.000	0.000
L9	31.5 - 30.375	TP38.2647x33.1765x0.5055	25077.8	0.468	26.000	0.037	633.18	0.008	26.000	0.000
	30.375 - 29.25		25187.5	0.466	26.000	0.036	638.91	0.008	26.000	0.000
	29.25 - 28.125		25297.7	0.465	26.000	0.036	644.69	0.008	26.000	0.000
	28.125 - 27		25408.4	0.463	26.000	0.036	650.51	0.008	26.000	0.000
	27 - 25.875		25519.5	0.462	26.000	0.036	656.38	0.008	26.000	0.000
	25.875 - 24.75		25631.1	0.460	26.000	0.036	662.29	0.008	26.000	0.000
	24.75 - 23.625		25743.2	0.459	26.000	0.036	668.25	0.008	26.000	0.000
	23.625 - 22.5		25855.7	0.458	26.000	0.036	674.25	0.008	26.000	0.000
	22.5 - 21.375		25968.8	0.456	26.000	0.036	680.30	0.008	26.000	0.000
	21.375 - 20.25		26082.3	0.455	26.000	0.036	686.39	0.008	26.000	0.000
	20.25 - 19.125		26196.3	0.454	26.000	0.035	692.53	0.008	26.000	0.000

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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	19.125 - 18		26310.7	0.452	26.000	0.035	698.71	0.008	26.000	0.000
	18 - 16.875		26425.7	0.451	26.000	0.035	704.94	0.008	26.000	0.000
	16.875 - 15.75		26541.2	0.450	26.000	0.035	711.21	0.008	26.000	0.000
	15.75 - 14.625		26657.1	0.449	26.000	0.035	717.53	0.008	26.000	0.000
	14.625 - 13.5		26773.5	0.448	26.000	0.035	723.90	0.008	26.000	0.000
	13.5 - 12.375		26890.4	0.447	26.000	0.035	730.31	0.008	26.000	0.000
	12.375 - 11.25		27007.8	0.445	26.000	0.035	736.76	0.008	26.000	0.000
	11.25 - 10.125		27125.7	0.444	26.000	0.035	743.26	0.008	26.000	0.000
	10.125 - 9		27244.1	0.443	26.000	0.035	749.81	0.007	26.000	0.000
L10	9 - 8	TP39.8477x38.2647x0.4985	27346.4	0.448	26.000	0.035	755.67	0.008	26.000	0.000
	8 - 7		27450.2	0.447	26.000	0.035	761.57	0.008	26.000	0.000
	7 - 6		27554.4	0.447	26.000	0.035	767.50	0.008	26.000	0.000
	6 - 5		27659.0	0.446	26.000	0.035	773.47	0.007	26.000	0.000
	5 - 4		27763.9	0.445	26.000	0.035	779.47	0.007	26.000	0.000
	4 - 3		27869.1	0.444	26.000	0.035	785.51	0.007	26.000	0.000
	3 - 2		27974.8	0.443	26.000	0.035	791.59	0.007	26.000	0.000
L11	2 - 1	TP40.3x39.8477x0.4962	28080.1	0.444	26.000	0.035	797.70	0.007	26.000	0.000
	1 - 0		28185.8	0.443	26.000	0.035	803.85	0.007	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P	Ratio f_{bx}	Ratio f_{by}	Ratio f_v	Ratio f_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P_a	F_{bx}	F_{by}	F_v	F_{vt}			
L1	117 - 116	0.001	0.014	0.000	0.013	0.000	0.015	1.333	H1-3+VT
	116 - 115	0.001	0.028	0.000	0.013	0.000	0.029	1.333	H1-3+VT
	115 - 114	0.002	0.050	0.000	0.021	0.000	0.052	1.333	H1-3+VT
	114 - 113	0.002	0.071	0.000	0.021	0.000	0.073	1.333	H1-3+VT
	113 - 112	0.002	0.091	0.000	0.021	0.000	0.093	1.333	H1-3+VT
	112 - 111	0.002	0.111	0.000	0.022	0.000	0.113	1.333	H1-3+VT
	111 - 110	0.002	0.130	0.000	0.022	0.000	0.132	1.333	H1-3+VT
L2	110 - 109	0.003	0.157	0.000	0.031	0.000	0.160	1.333	H1-3+VT
	109 - 108	0.003	0.183	0.000	0.031	0.000	0.186	1.333	H1-3+VT
	108 - 107	0.003	0.208	0.000	0.031	0.000	0.211	1.333	H1-3+VT
	107 - 106	0.003	0.232	0.000	0.031	0.000	0.236	1.333	H1-3+VT
	106 - 105	0.003	0.256	0.000	0.031	0.000	0.259	1.333	H1-3+VT
	105 - 104	0.003	0.278	0.000	0.031	0.000	0.282	1.333	H1-3+VT

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	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P	f_{bx}	f_{by}	f_r	f_{vt}			
		P_a	F_{bx}	F_{by}	F_v	F_{vt}			
L3	104 - 103	0.003	0.300	0.000	0.032	0.000	0.304	1.333	H1-3+VT
	103 - 102	0.003	0.322	0.000	0.032	0.000	0.325	1.333	H1-3+VT
	102 - 101	0.003	0.342	0.000	0.032	0.000	0.346	1.333	H1-3+VT
	101 - 100	0.004	0.362	0.000	0.032	0.000	0.366	1.333	H1-3+VT
	100 - 98.425	0.003	0.297	0.000	0.024	0.000	0.300	1.333	H1-3+VT
	98.425 - 96.85	0.006	0.393	0.000	0.047	0.000	0.399	1.333	H1-3+VT
	96.85 - 95.275	0.006	0.441	0.000	0.047	0.000	0.447	1.333	H1-3+VT
	95.275 - 93.7	0.006	0.487	0.000	0.050	0.000	0.494	1.333	H1-3+VT
	93.7 - 92.125	0.006	0.534	0.000	0.051	0.000	0.541	1.333	H1-3+VT
	92.125 - 90.55	0.006	0.580	0.000	0.051	0.001	0.587	1.333	H1-3+VT
	90.55 - 88.975	0.007	0.623	0.000	0.051	0.001	0.630	1.333	H1-3+VT
	88.975 - 87.4	0.007	0.663	0.000	0.051	0.000	0.671	1.333	H1-3+VT
	87.4 - 85.825	0.010	0.767	0.000	0.072	0.001	0.778	1.333	H1-3+VT
	85.825 - 84.25	0.010	0.826	0.000	0.072	0.001	0.837	1.333	H1-3+VT
	84.25 - 82.675	0.010	0.882	0.000	0.071	0.001	0.893	1.333	H1-3+VT
	82.675 - 81.1	0.010	0.934	0.000	0.071	0.001	0.946	1.333	H1-3+VT
	81.1 - 79.525	0.010	0.986	0.000	0.073	0.001	0.998	1.333	H1-3+VT
	79.525 - 77.95	0.010	1.035	0.000	0.072	0.001	1.047	1.333	H1-3+VT
	77.95 - 76.375	0.011	1.081	0.000	0.072	0.001	1.093	1.333	H1-3+VT
	76.375 - 74.8	0.011	1.125	0.000	0.071	0.001	1.137	1.333	H1-3+VT
	74.8 - 73.225	0.011	1.166	0.000	0.071	0.001	1.178	1.333	H1-3+VT
	73.225 - 71.65	0.011	1.205	0.000	0.070	0.001	1.217	1.333	H1-3+VT
	71.65 - 70.075	0.011	1.242	0.000	0.070	0.001	1.254	1.333	H1-3+VT
L4	70.075 - 68.5	0.013	1.296	0.000	0.081	0.001	1.311	1.333	H1-3+VT
	68.5 - 67.5	0.008	0.782	0.000	0.047	0.000	0.791	1.333	H1-3+VT
	67.5 - 66.5	0.008	0.798	0.000	0.047	0.000	0.807	1.333	H1-3+VT
	66.5 - 65.5	0.008	0.814	0.000	0.047	0.000	0.822	1.333	H1-3+VT
	65.5 - 64.5	0.008	0.828	0.000	0.046	0.000	0.837	1.333	H1-3+VT
	64.5 - 63.5	0.008	0.843	0.000	0.046	0.000	0.851	1.333	H1-3+VT
L5	63.5 - 62.4545	0.006	0.648	0.000	0.034	0.000	0.654	1.333	H1-3+VT
	62.4545 - 61.4091	0.006	0.658	0.000	0.034	0.000	0.664	1.333	H1-3+VT
	61.4091 - 60.3636	0.006	0.668	0.000	0.034	0.000	0.675	1.333	H1-3+VT
	60.3636 - 59.3182	0.006	0.678	0.000	0.034	0.000	0.684	1.333	H1-3+VT
	59.3182 - 58.2727	0.006	0.687	0.000	0.034	0.000	0.694	1.333	H1-3+VT
	58.2727 - 57.2273	0.006	0.696	0.000	0.034	0.000	0.703	1.333	H1-3+VT
	57.2273 - 56.1818	0.006	0.705	0.000	0.034	0.000	0.712	1.333	H1-3+VT
	56.1818 - 55.1364	0.006	0.714	0.000	0.034	0.000	0.720	1.333	H1-3+VT
	55.1364 - 54.0909	0.006	0.722	0.000	0.033	0.000	0.728	1.333	H1-3+VT
	54.0909 - 53.0455	0.007	0.730	0.000	0.033	0.000	0.736	1.333	H1-3+VT
	53.0455 - 52	0.007	0.737	0.000	0.033	0.000	0.744	1.333	H1-3+VT
L6	52 - 47.42	0.004	0.432	0.000	0.019	0.000	0.436	1.333	H1-3+VT
	47.42 - 46.1133	0.004	0.412	0.000	0.017	0.000	0.416	1.333	H1-3+VT
	46.1133 - 44.8067	0.008	0.945	0.000	0.039	0.000	0.954	1.333	H1-3+VT
	44.8067 - 43.5	0.009	0.949	0.000	0.039	0.000	0.958	1.333	H1-3+VT
L7	43.5 - 42.4375	0.009	0.953	0.000	0.038	0.000	0.962	1.333	H1-3+VT
	42.4375 - 41.375	0.007	0.761	0.000	0.030	0.000	0.768	1.333	H1-3+VT
	41.375 - 40.3125	0.007	0.765	0.000	0.030	0.000	0.772	1.333	H1-3+VT
	40.3125 - 39.25	0.007	0.769	0.000	0.030	0.000	0.776	1.333	H1-3+VT

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	Project	TEP No. 806352.01S	Date	11:56:04 01/23/13
	Client	Crown Castle	Designed by	Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P	f _{bx}	f _{by}	f _v	f _{vt}			
		P _a	F _{bx}	F _{by}	F _v	F _{vt}			
	40.3125								
	40.3125 - 39.25	0.007	0.773	0.000	0.030	0.000	0.780	1.333	H1-3+VT
	39.25 - 38.1875	0.007	0.776	0.000	0.030	0.000	0.783	1.333	H1-3+VT
	38.1875 - 37.125	0.007	0.780	0.000	0.030	0.000	0.787	1.333	H1-3+VT
	37.125 - 36.0625	0.007	0.783	0.000	0.029	0.000	0.790	1.333	H1-3+VT
	36.0625 - 35	0.007	0.786	0.000	0.029	0.000	0.793	1.333	H1-3+VT
L8	35 - 33.8333	0.007	0.744	0.000	0.028	0.000	0.751	1.333	H1-3+VT
	33.8333 - 32.6667	0.007	0.748	0.000	0.027	0.000	0.755	1.333	H1-3+VT
	32.6667 - 31.5	0.007	0.752	0.000	0.027	0.000	0.759	1.333	H1-3+VT
L9	31.5 - 30.375	0.009	1.004	0.000	0.037	0.000	1.013	1.333	H1-3+VT
	30.375 - 29.25	0.009	1.008	0.000	0.036	0.000	1.018	1.333	H1-3+VT
	29.25 - 28.125	0.009	1.013	0.000	0.036	0.000	1.022	1.333	H1-3+VT
	28.125 - 27	0.010	1.017	0.000	0.036	0.000	1.027	1.333	H1-3+VT
	27 - 25.875	0.010	1.021	0.000	0.036	0.000	1.031	1.333	H1-3+VT
	25.875 - 24.75	0.010	1.025	0.000	0.036	0.000	1.035	1.333	H1-3+VT
	24.75 - 23.625	0.010	1.028	0.000	0.036	0.000	1.039	1.333	H1-3+VT
	23.625 - 22.5	0.010	1.032	0.000	0.036	0.000	1.042	1.333	H1-3+VT
	22.5 - 21.375	0.010	1.036	0.000	0.036	0.000	1.046	1.333	H1-3+VT
	21.375 - 20.25	0.010	1.039	0.000	0.036	0.000	1.049	1.333	H1-3+VT
	20.25 - 19.125	0.010	1.042	0.000	0.035	0.000	1.052	1.333	H1-3+VT
	19.125 - 18	0.010	1.045	0.000	0.035	0.000	1.056	1.333	H1-3+VT
	18 - 16.875	0.010	1.048	0.000	0.035	0.000	1.059	1.333	H1-3+VT
	16.875 - 15.75	0.010	1.051	0.000	0.035	0.000	1.062	1.333	H1-3+VT
	15.75 - 14.625	0.010	1.054	0.000	0.035	0.000	1.064	1.333	H1-3+VT
	14.625 - 13.5	0.010	1.057	0.000	0.035	0.000	1.067	1.333	H1-3+VT
	13.5 - 12.375	0.010	1.059	0.000	0.035	0.000	1.070	1.333	H1-3+VT
	12.375 - 11.25	0.010	1.062	0.000	0.035	0.000	1.072	1.333	H1-3+VT
	11.25 - 10.125	0.010	1.064	0.000	0.035	0.000	1.075	1.333	H1-3+VT
	10.125 - 9	0.010	1.066	0.000	0.035	0.000	1.077	1.333	H1-3+VT
L10	9 - 8	0.011	1.083	0.000	0.035	0.000	1.094	1.333	H1-3+VT
	8 - 7	0.011	1.085	0.000	0.035	0.000	1.096	1.333	H1-3+VT
	7 - 6	0.011	1.087	0.000	0.035	0.000	1.098	1.333	H1-3+VT
	6 - 5	0.011	1.088	0.000	0.035	0.000	1.099	1.333	H1-3+VT
	5 - 4	0.011	1.090	0.000	0.035	0.000	1.101	1.333	H1-3+VT
	4 - 3	0.011	1.092	0.000	0.035	0.000	1.103	1.333	H1-3+VT
	3 - 2	0.011	1.093	0.000	0.035	0.000	1.105	1.333	H1-3+VT
L11	2 - 1	0.011	1.100	0.000	0.035	0.000	1.111	1.333	H1-3+VT
	1 - 0	0.011	1.101	0.000	0.035	0.000	1.113	1.333	H1-3+VT

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
L1	117 - 110	Pole	TP15.94x14.36x0.1875	1	Note 1	Note 1	9.9	Pass
L2	110 - 100	Pole	TP18.2x15.94x0.1875	2	Note 1	Note 1	27.4	Pass
L3	100 - 47.42	Pole	TP30.09x18.2x0.25	3	Note 1	Note 1	98.0	Pass
L4	52.00 - 0.00	Pole	TP40.3x28.5543x0.344	4	Note 1	Note 1	84.1	Pass
M1	35.00 - 0.00	Mod	(Sabre) MS-600	5	Note 1	Note 1	99.5	Pass
M2	65.00 - 35.00	Mod	(Sabre) MS-450	6	Note 1	Note 1	97.7	Pass
M3	2.00 - 0.00	Mod	(ts) 1.25x6.5-65ksi	7	Note 1	Note 1	64.2	Pass

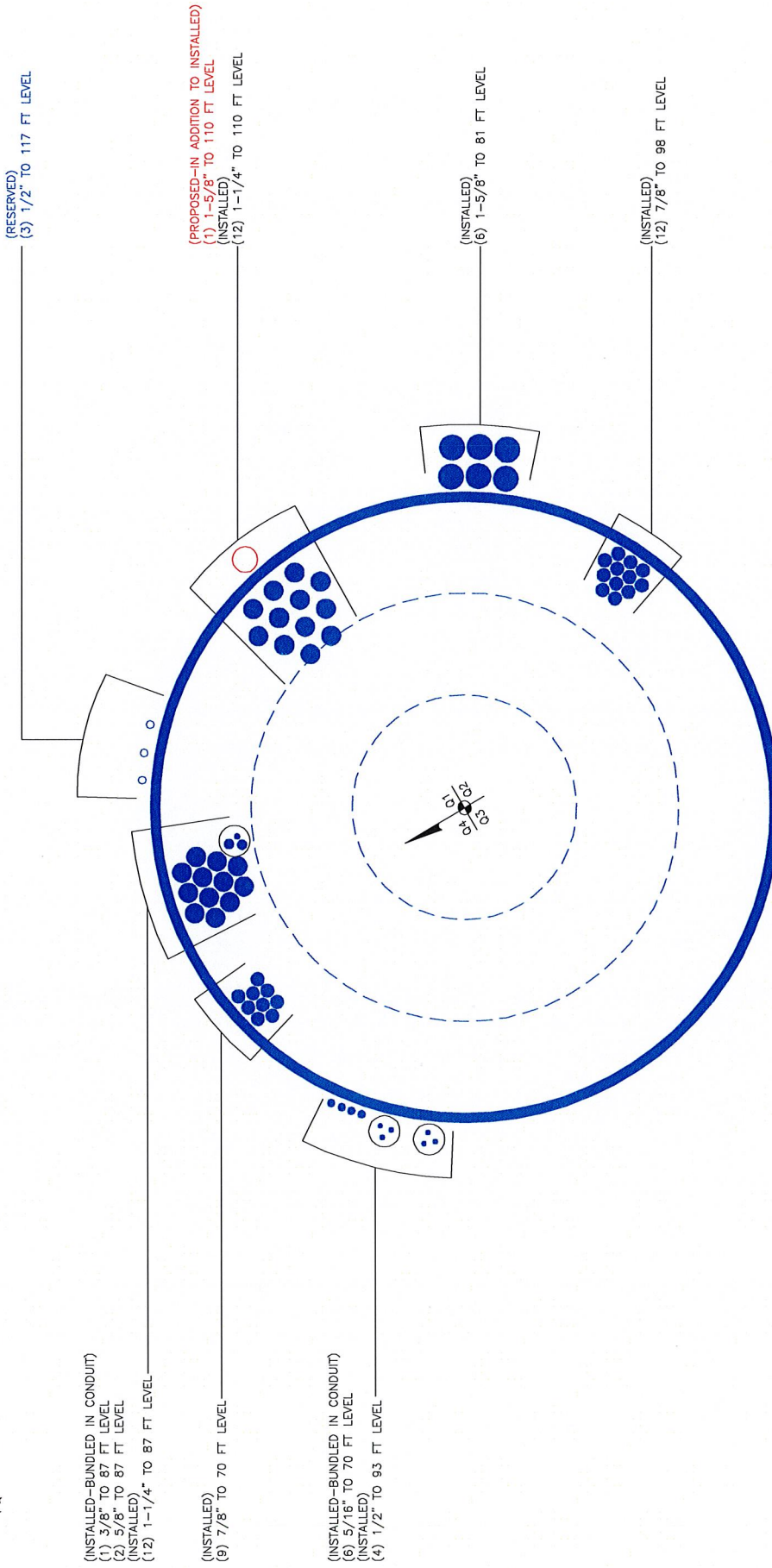
tnxTower Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job BRG 302 943052 (BU# 806352)	Page 32 of 32
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	Client Crown Castle	Designed by Zachary R. Hurlocker, E.I.

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail	
M4	10.50 - 0.50	Mod	(Sabre) MS-450	8	Note 1	Note 1	92.1	Pass	
M5	45.00 - 30.00	Mod	(Sabre) MS-450	9	Note 1	Note 1	81.2	Pass	
M6	70.00 - 52.00	Mod	(Sabre) MS-450	10	Note 1	Note 1	87.8	Pass	
							Summary		
							Pole (L3)	98.0	Pass
							Mod (M1)	99.5	Pass
							RATING =	99.5	Pass

Notes:

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

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS



Pole (L3)	98.0%
Mod (M1)	99.5%

806352_BRG 302 943052

TEP #: 806352.01S

Analysis: ZRH 1/21/2013

Check: DTS 1/23/2013

Monopole Shaft Reinforcement

Modification	Type	Effective	From (ft)	To (ft)	Effective	Location (° or flat/point #)	Flats/Points	Lateral Offset (in)
1	(Sabre) MS-600	x	0.00	35.00	x	159	Flats	0.00
2	(Sabre) MS-450	x	35.00	65.00		159	Flats	0.00
3	(ts) 1.25x6.5-65ksi	x	0.00	2.00	x	7	Points	0.00
4	(Sabre) MS-450		0.50	10.50		7	Flats	0.00
5	(Sabre) MS-450		30.00	45.00		3711	Flats	0.00
6	(Sabre) MS-450	x	52.00	70.00		3711	Flats	0.00

Modification Properties									
Modification	Unbraced Length (in)	Bolt Cap (k)	I _{xx} (in ⁴)	I _{yy} (in ⁴)	k	Drill Hole (in)	A _{gross} (in ²)	A _{net} (in ²)	Termination Length (ft)
(Sabre) MS-600	16.375	30	0.500	18.000	0.8	1.25	6.000	4.688	2.000
(Sabre) MS-450	20.625	30	0.375	7.594	0.8	1.25	4.500	3.188	1.500
(ts) 1.25x6.5-65ksi	0.000	W	28.607	1.058	0.8	0.00	8.125	8.125	3.250



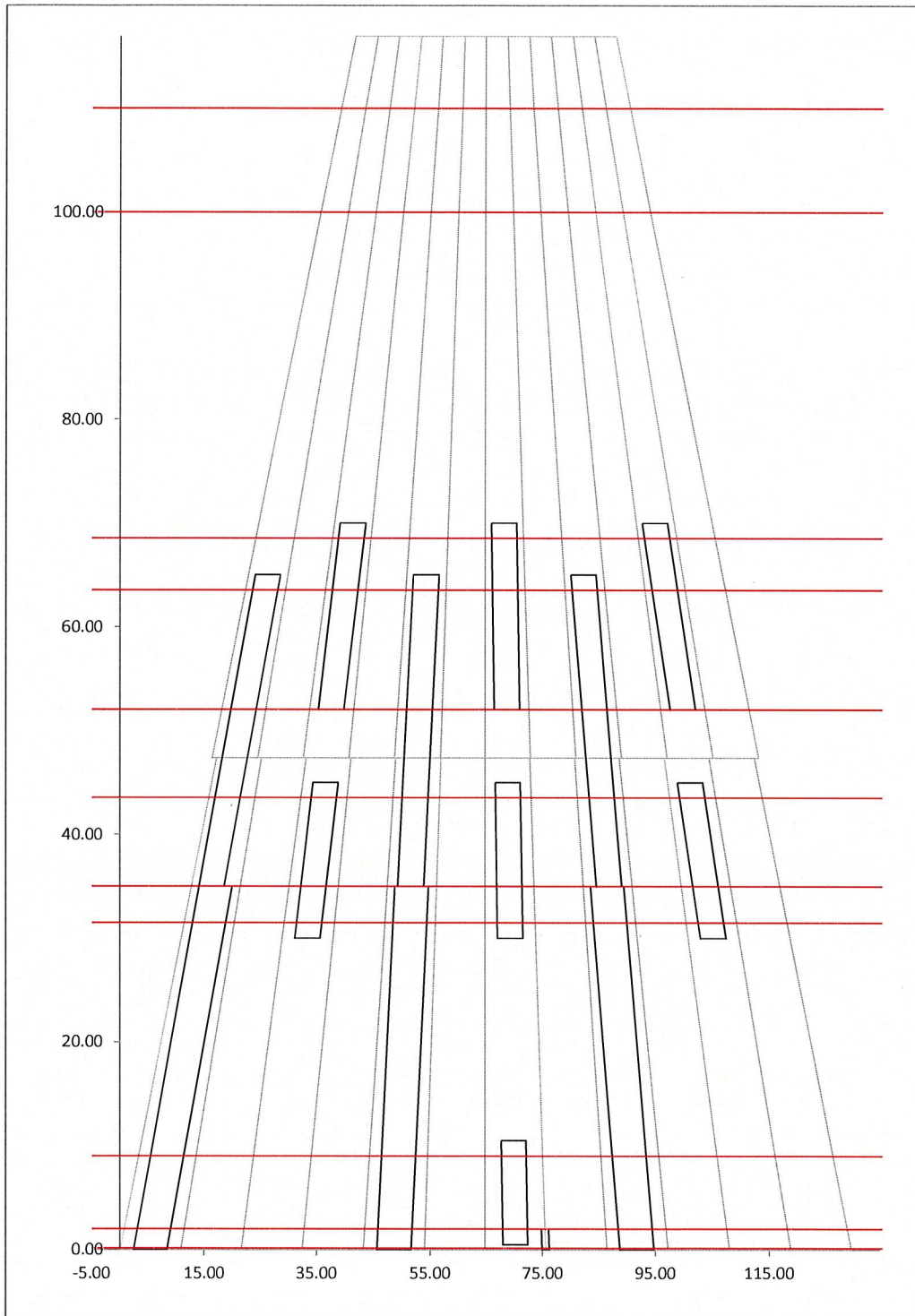
806352_BRG 302 943052

TEP #: 806352.01S

Analysis: ZRH 1/21/2013

Check: DTS 1/23/2013

Reinforcement Layout





806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 0.00-ft

Loads

Axial: 27,624.8 lb
 Moment: 2,204,983.3 lb-ft
 Shear: 28,185.8 lb
 Torsion: 803.9 lb-ft

OD: 40.30 in
 t: 0.3440 in
 t,eff: 0.4970 in

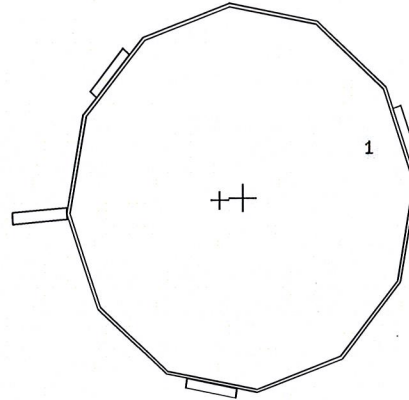
Equivalent Loads to Pole

Axial: 17,361.8 lb
 Moment: 1,515,237.4 lb-ft
 Shear: 17,714.3 lb
 Torsion: 803.8 lb-ft

Shear Flow

Controlling Mod: 1
 q: 0.263 k/in
 Bolt Capacity: 30.0 k/bolt
 Max Spacing: 114.17 in
 Capacity: **14.3%**

	(in ⁴)	Angle
I _{comp,min} :	12899.8	75.0°
I _{comp,cont} :	12926.7	70.5°



Pole Seg.	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Axial	Bending		
4	0.393	43.350	52.000	52.000	89.0°	84.1%
Mod	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Comp.	Tension		
1	0.393	41.113	41.734	41.667	70.5°	99.5%
3	0.393	32.995	52.000	52.000	165.0°	64.2%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 2.00-ft

Loads

Axial: 27,058.5 lb
 Moment: 2,148,816.7 lb-ft
 Shear: 27,974.8 lb
 Torsion: 791.6 lb-ft

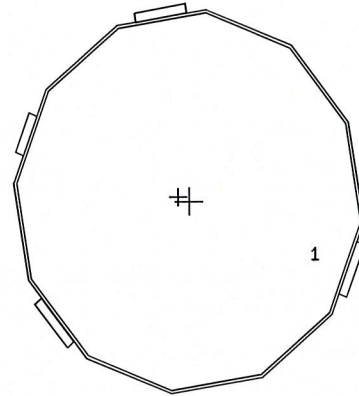
OD: 39.85 in
 t: 0.3440 in
 t_{eff}: 0.4992 in

Equivalent Loads to Pole

Axial: 17,861.2 lb
 Moment: 1,485,337.7 lb-ft
 Shear: 18,466.1 lb
 Torsion: 791.6 lb-ft

Shear Flow

Controlling Mod: 1
 q: 0.259 k/in
 Bolt Capacity: 30.0 k/bolt
 Max Spacing: 115.75 in
 Capacity: **14.1%**



	(in ⁴)	Angle
I _{comp,min} :	12518.1	90.0°
I _{comp,cont} :	12741.9	111.0°

Pole Seg.	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Bending			
4	0.409	42.830		52.000	52.000	104.5°	83.2%
Mod	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Comp.	Tension		
1	0.409	39.817		41.734	41.667	111.0°	96.4%
4	0.409	34.420		37.814	37.778	180.0°	92.1%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 9.00-ft

Loads

Axial: 25,078.6 lb
 Moment: 1,955,516.7 lb-ft
 Shear: 27,244.1 lb
 Torsion: 749.8 lb-ft

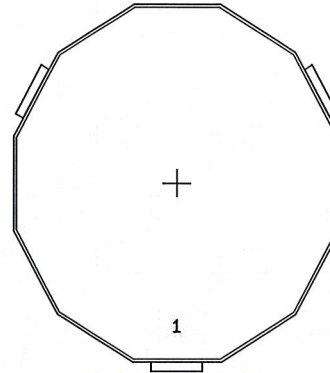
OD: 38.27 in
 t: 0.3440 in
 t_{eff}: 0.5062 in

Equivalent Loads to Pole

Axial: 17,548.3 lb
 Moment: 1,345,962.0 lb-ft
 Shear: 19,063.6 lb
 Torsion: 749.8 lb-ft

Shear Flow

Controlling Mod: 1
 q: 0.286 k/in
 Bolt Capacity: 30.0 k/bolt
 Max Spacing: 104.87 in
 Capacity: 15.6%



	(in ⁴)	Angle
I _{comp,min} :	11218.9	164.5°
I _{comp,cont} :	11218.9	180.0°

Pole Seg.	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Axial	Bending		
4	0.418	41.431	52.000	52.000	164.5°	80.5%

Mod	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Comp.	Tension		
1	0.418	41.067	41.734	41.667	180.0°	99.4%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 31.50-ft

Loads

Axial: 19,299.2 lb
 Moment: 1,368,600.0 lb-ft
 Shear: 24,966.3 lb
 Torsion: 627.5 lb-ft

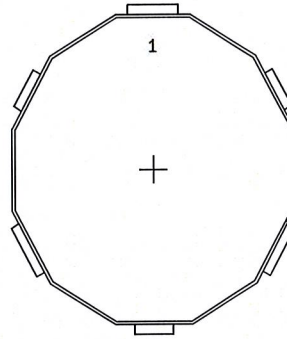
OD: 33.18 in
 t: 0.3440 in
 t,eff: 0.6831 in

Equivalent Loads to Pole

Axial: 10,336.1 lb
 Moment: 710,792.7 lb-ft
 Shear: 13,371.2 lb
 Torsion: 627.5 lb-ft

Shear Flow

Controlling Mod: 1
 q: 0.265 k/in
 Bolt Capacity: 30.0 k/bolt
 Max Spacing: 113.14 in
 Capacity: **14.5%**



	(in ⁴)	Angle
I _{comp,min} :	9656.0	174.5°
I _{comp,cont} :	9656.0	0.0°

Pole Seg.	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Bending			
4	0.285	29.215		52.000	52.000	134.5°	56.7%
Mod	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Comp.	Tension		
1	0.285	29.071		41.734	41.667	0.0°	70.3%
5	0.285	29.071		37.814	37.778	0.0°	77.6%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 35.00-ft

Loads

Axial: 18,317.6 lb
 Moment: 1,281,858.3 lb-ft
 Shear: 24,602.8 lb
 Torsion: 610.0 lb-ft

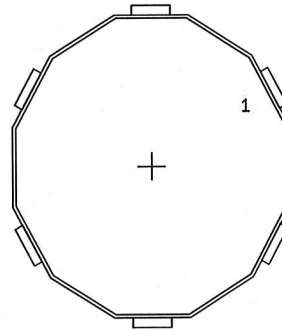
OD: 32.39 in
 t: 0.3440 in
 t_{eff}: 0.6410 in

Equivalent Loads to Pole

Axial: 10,398.1 lb
 Moment: 707,212.9 lb-ft
 Shear: 13,966.0 lb
 Torsion: 610.0 lb-ft

Shear Flow

Controlling Mod: 2
 q: 0.219 k/in
 Bolt Capacity: 30.0 k/bolt
 Max Spacing: 137.12 in
 Capacity: 15.0%



	(in ⁴)	Angle
I _{comp,min} :	8449.0	2.5°
I _{comp,cont} :	8449.0	60.0°

Pole Seg.	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Bending			
4	0.293	30.528		52.000	52.000	14.5°	59.3%
Mod	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Comp.	Tension		
2	0.293	30.399		37.814	37.778	60.0°	81.2%
5	0.293	30.399		37.814	37.778	60.0°	81.2%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 43.50-ft

Loads

Axial: 16,100.1 lb
 Moment: 1,076,600.0 lb-ft
 Shear: 23,708.8 lb
 Torsion: 567.6 lb-ft

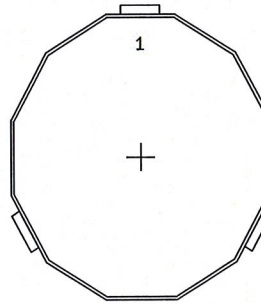
OD: 30.47 in
 t: 0.3440 in
 t_{eff}: 0.5013 in

Equivalent Loads to Pole

Axial: 11,458.5 lb
 Moment: 750,389.8 lb-ft
 Shear: 16,873.7 lb
 Torsion: 567.6 lb-ft

Shear Flow

Controlling Mod: 2
 q: 0.302 k/in
 Bolt Capacity: 30.0 k/bolt
 Max Spacing: 99.28 in
 Capacity: **20.8%**



	(in ⁴)	Angle
I _{comp,min} :	5556.6	175.5°
I _{comp,cont} :	5556.6	0.0°

Pole Seg.	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Axial	Bending		
4	0.344	36.675		52.000	52.000	164.5°	71.2%
Mod	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Comp.	Tension		
2	0.344	36.589		37.814	37.778	0.0°	97.7%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 52.00-ft

Loads

Axial:	13,707.6	lb
Moment:	879,100.0	lb-ft
Shear:	22,677.9	lb
Torsion:	388.5	lb-ft

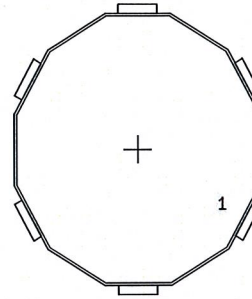
OD:	29.05 in
t:	0.2500 in
t _{eff} :	0.5821 in

Equivalent Loads to Pole

Axial:	6,328.3	lb
Moment:	390,806.1	lb-ft
Shear:	10,469.5	lb
Torsion:	388.5	lb-ft

Shear Flow

Controlling Mod:	2
q:	0.277 k/in
Bolt Capacity:	30.0 k/bolt
Max Spacing:	108.21 in
Capacity:	19.1%



	(in ⁴)	Angle
I _{comp,min} :	5531.4	125.5°
I _{comp,cont} :	5531.4	120.0°

Pole Seg.	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Axial	Bending		
3	0.273	28.682	52.000	52.000	134.5°	55.7%
Mod	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Comp.	Tension		
2	0.273	28.659	37.814	37.778	120.0°	76.5%
6	0.273	28.659	37.814	37.778	180.0°	76.5%



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TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 63.50-ft

Loads

Axial:	11,308.1	lb
Moment:	625,655.0	lb-ft
Shear:	21,415.0	lb
Torsion:	332.4	lb-ft

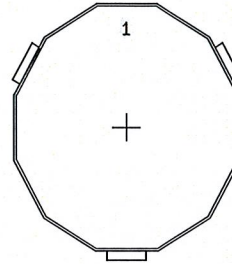
OD:	26.45 in
t:	0.2500 in
t _{eff} :	0.4322 in

Equivalent Loads to Pole

Axial:	6,891.4	lb
Moment:	369,452.7	lb-ft
Shear:	13,050.7	lb
Torsion:	332.4	lb-ft

Shear Flow

Controlling Mod:	6
q:	0.422 k/in
Bolt Capacity:	30.0 k/bolt
Max Spacing:	71.10 in
Capacity:	29.0%



	(in ⁴)	Angle
I _{comp,min} :	3135.2	101.0°
I _{comp,cont} :	3135.2	0.0°

Pole Seg.	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Axial	Bending		
3	0.327	32.791	52.000	52.000	134.5°	63.7%
Mod	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
6	Axial	Bending	Comp.	Tension		
	0.327	32.872	37.814	37.778	0.0°	87.8%



TOWER
ENGINEERING
PROFESSIONALS

806352_BRG 302 943052

TEP #: 806352.01S
Analysis: ZRH 1/21/2013
Check: DTS 1/23/2013

Elevation: 68.50-ft

Loads

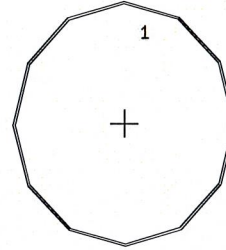
Axial: 10,386.0 lb
Moment: 519,954.2 lb-ft
Shear: 20,878.5 lb
Torsion: 392.3 lb-ft

OD: 25.32 in
t: 0.2500 in
t_{eff}: 0.2500 in

Equivalent Loads to Pole

Axial: 10,386.0 lb
Moment: 519,954.2 lb-ft
Shear: 20,878.5 lb
Torsion: 392.3 lb-ft

Shear Flow N/A



	(in ⁴)	Angle
I _{comp,min} :	1621.9	0.0°
I _{comp,cont} :	1621.9	14.5°

Pole Seg.	Axial	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
		Bending		Axial	Bending		
3	0.515	50.425		52.000	52.000	14.5°	98.0%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

Elevation: 100.00-ft

Loads

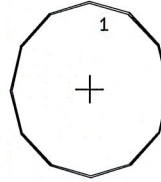
Axial: 1,503.7 lb
 Moment: 56,236.9 lb-ft
 Shear: 4,481.4 lb
 Torsion: 96.5 lb-ft

OD: 18.20 in
 t: 0.1875 in
 t_{eff}: 0.1875 in

Equivalent Loads to Pole

Axial: 1,503.7 lb
 Moment: 56,236.9 lb-ft
 Shear: 4,481.4 lb
 Torsion: 96.5 lb-ft

Shear Flow N/A



	(in ⁴)	Angle
I _{comp,min} :	451.0	0.0°
I _{comp,cont} :	451.0	14.5°

Pole Seg.	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Axial	Bending		
2	0.138	14.096	52.000	52.000	14.5°	27.4%



806352_BRG 302 943052

TEP #: 806352.01S
 Analysis: ZRH 1/21/2013
 Check: DTS 1/23/2013

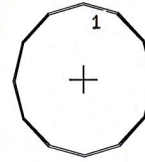
Elevation: 110.00-ft

Loads		
Axial:	758.6	lb
Moment:	15,368.2	lb-ft
Shear:	2,673.4	lb
Torsion:	78.0	lb-ft

OD:	15.94 in
t:	0.1875 in
t _{eff} :	0.1875 in

Equivalent Loads to Pole		
Axial:	758.6	lb
Moment:	15,368.2	lb-ft
Shear:	2,673.4	lb
Torsion:	77.9	lb-ft

Shear Flow N/A



	(in ⁴)	Angle
I _{comp,min} :	301.7	0.0°
I _{comp,cont} :	301.7	14.5°

Pole Seg.	Applied Stress (ksi)		Allowable Stress (ksi)		Angle	Capacity
	Axial	Bending	Axial	Bending		
1	0.080	5.044	52.000	52.000	14.5°	9.9%

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: 806352
 Site Name: BRG 302 943052
 App #: 168181 Rev.3

Pole Manufacturer:	Other
--------------------	-------

Bolt Data

Qty:	12		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		Bolt Fty:	44.00
N/A:			
Circle (in.):	22		

Plate Data

Diam:	28	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.17	in

Stiffener Data (Welding at Both Sides)

Config:	1	*
Weld Type:	Both	
Groove Depth:	0.25	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.1875	in
Fillet V. Weld:	0.1875	in
Width:	6	in
Height:	12	in
Thick:	1	in
Notch:	1	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data

Diam:	15.94	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	0	"0" IF Round
Fu:	80	ksi
Reinf. Fillet Weld:	0	"0" if None

Stress Increase Factor

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

Reactions

Moment:	15.36817	ft-kips
Axial:	0.75855	kips
Shear:	2.67337	kips
Elevation:	110	feet

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

Flange Bolt Results

Bolt Tension Capacity, B: 46.07 kips
 Max Bolt directly applied T: 2.73 Kips
 Min. PL "tc" for B cap. w/o Pry: Stiffened in
 Min PL "treq" for actual T w/ Pry: Stiffened in
 Min PL "t1" for actual T w/o Pry: Stiffened in
 T allowable: 46.07 kips <- B, Stiffened
 Prying Force, Q: 0.00 kips Stiffened
 Total Bolt Tension=T+Q: 2.73 kips
 Non-Prying Bolt Stress Ratio, T/B: 5.9% Pass

Stiffened
Service, ASD
Fty*ASIF

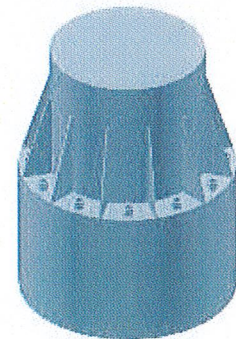
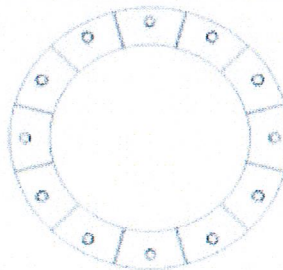
Exterior Flange Plate Results

Flexural Check
 Compression Side Plate Stress: 1.5 ksi
 Allowable Plate Stress: 36.0 ksi
 Compression Plate Stress Ratio: 4.2% Pass
 Stiffened
 Tension Side Stress Ratio, (treq/t)^2: N/A

Stiffened
Service, ASD
0.75*Fy*ASIF
Comp. Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld : 6.3% Pass
 Vertical Weld: 3.9% Pass
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: 0.7% Pass
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: 1.8% Pass
 Plate Comp. (AISC Bracket): 2.5% Pass
 Pole Results
 Pole Punching Shear Check: 1.4% Pass



* 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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: 806352
 Site Name: BRG 302 943052
 App #: 168181 Rev.3

Reactions		
Moment:	56.23692	ft-kips
Axial:	1.50371	kips
Shear:	4.48142	kips
Elevation:	100	feet

Pole Manufacturer:	Other
--------------------	-------

Bolt Data		
Qty:	12	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:		Bolt Fty: 44.00
N/A:		<-- Disregard
N/A:		<-- Disregard
Circle (in.):	22	

Plate Data		
Diam:	28	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.76	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Both	
Groove Depth:	0.25	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.1875	in
Fillet V. Weld:	0.1875	in
Width:	6	in
Height:	12	in
Thick:	1	in
Notch:	1	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	18.2	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	0	"0" IF Round
Fu:	80	ksi
Reinf. Fillet Weld:	0	"0" if None

Stress Increase Factor	
ASIF:	1.333

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

Flange Bolt Results

Bolt Tension Capacity, B: 46.07 kips
 Max Bolt directly applied T: 10.10 Kips
 Min. PL "tc" for B cap. w/o Pry: Stiffened in
 Min PL "treq" for actual T w/ Pry: Stiffened in
 Min PL "t1" for actual T w/o Pry: Stiffened in
 T allowable: 46.07 kips <-- B, Stiffened
 Prying Force, Q: 0.00 kips Stiffened
 Total Bolt Tension=T+Q: 10.10 kips
 Non-Prying Bolt Stress Ratio, T/B: 21.9% Pass

Stiffened
Service, ASD
Fty*ASIF

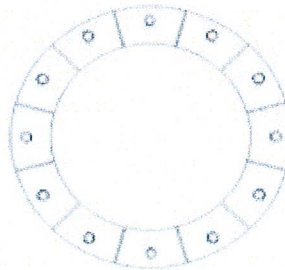
Exterior Flange Plate Results

Flexural Check: Stiffened
 Compression Side Plate Stress: 6.7 ksi Service, ASD
 Allowable Plate Stress: 36.0 ksi 0.75*Fy*ASIF
 Compression Plate Stress Ratio: 18.5% Pass Comp. Y.L. Length: N/A, Roark
 Stiffened
 Tension Side Stress Ratio, (treq/t)^2: N/A

Stiffened
Service, ASD
0.75*Fy*ASIF
Comp. Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld : 26.0% Pass
 Vertical Weld: 12.3% Pass
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: 1.9% Pass
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: 7.6% Pass
 Plate Comp. (AISC Bracket): 8.4% Pass
 Pole Results
 Pole Punching Shear Check: 3.9% Pass



* 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

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

TIA Rev F

Site Data

BU#: 806352
 Site Name: BRG 302 943052
 App #: 168181 Rev.3

Pole Manufacturer: *Other*

Reactions

Moment:	2204.984	ft-kips
Axial:	27.637	kips
Shear:	28.174	kips

Anchor Rod Data

Qty:	12		
Diam:	2.25		in
Rod Material:	A615-J		
Strength (Fu):	100		ksi
Yield (Fy):	75		ksi
Bolt Circle:	48.22		in

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

Anchor Rod Results

Maximum Rod Tension: 180.6 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 92.6% **Pass**

Rigid
Service, ASD
Fty*ASIF

Plate Data

Diam:	54.22		in
Thick:	2.5		in
Grade:	60		ksi
Single-Rod B-eff:	10.80		in

Base Plate Results

Base Plate Stress: 40.7 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 67.9% **Pass**

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length: 26.48

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

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

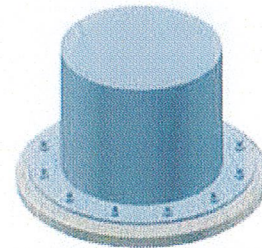
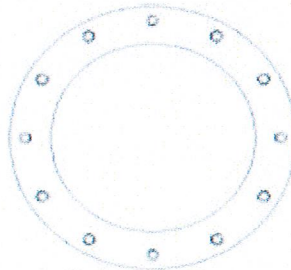
Pole Punching Shear Check: n/a

Pole Data

Diam:	40.3		in
Thick:	0.344		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



* 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

JOB: 806352.01S
 SHEET NUMBER: 1 OF 2
 CALCULATED BY: ZRH DATE 1/23/2013
 CHECKED BY: DTS DATE 1/23/2013

Pad and Pier Foundation for Monopole - TIA-222-F

Q _a , ALLOWABLE SOIL PRESS. (ksf)	6
NET or GROSS	NET
SOIL DENSITY (pcf)	134
TOWER ECCENTRICITY	1.50

F'c (ksi)	3
F'y (ksi)	60

Base Reactions LC1: Maximum Wind

M, MOMENT (k-ft)	2205.0
P _t , TOTAL DOWNLOAD (k)	27.6
H, HORIZONTAL SHEAR (k)	28.2

Base Reaction LC 2: Ice Wind + Ice

M (k-ft)	569.4
P _t (k)	41.5
H (k)	7.1

Try:	L (ft.)	B (ft.)	t (ft.)	Soil depth to TOP of mat (ft.)	Soil depth to BOT. of mat (ft.)	Pier dia./width (ft.)	Pier Height, h (cu.ft.)	Pier Shape
	23	20	5	0	5	5.00	0.67	Round

W _m , Weight of Mat (k) =	345.0
W _p , Weight of Pier (k) =	2.0
W ₂ , Weight of Pier (k) =	17
W _s , WEIGHT OF SOIL (k) =	0.0

Concrete Vol. (cu ft) 85.67

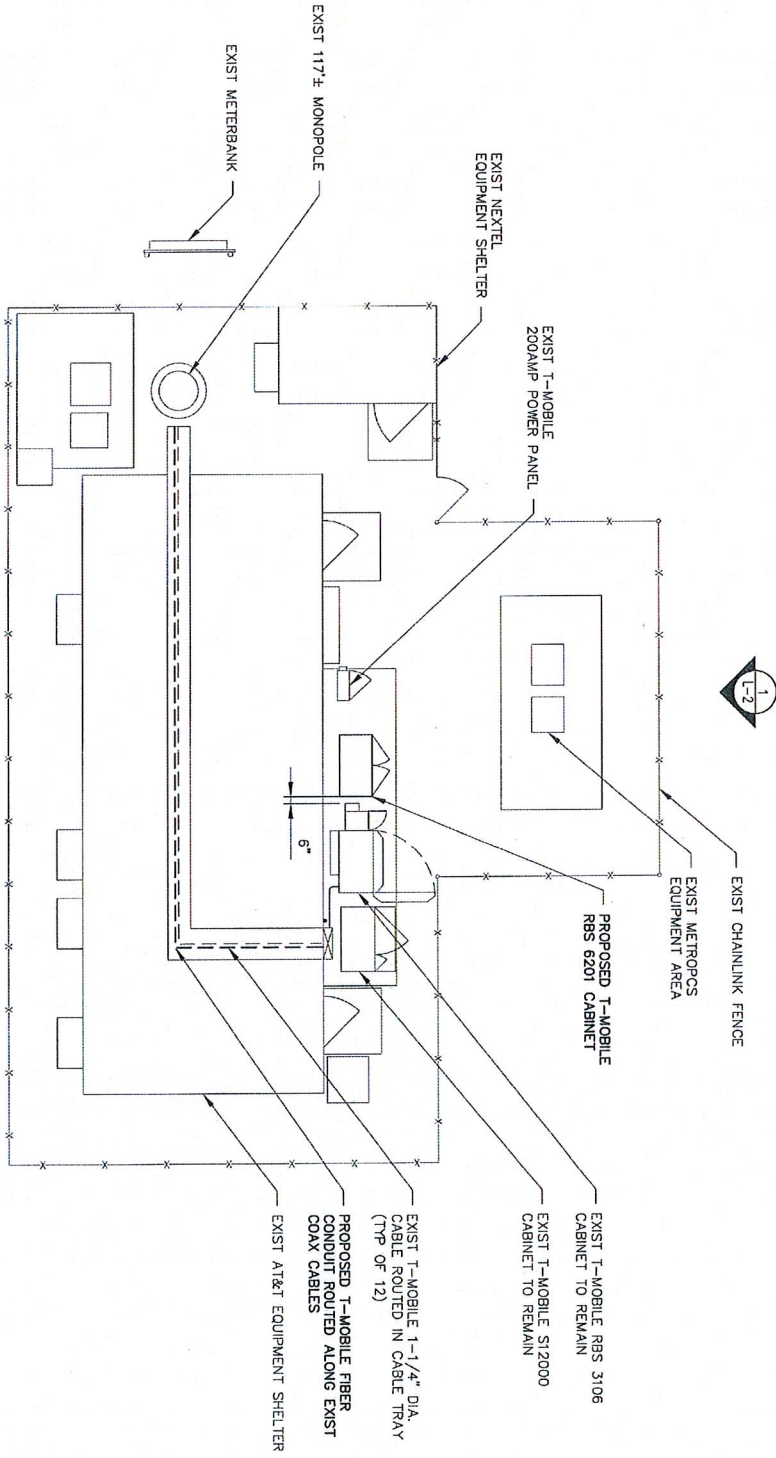
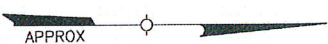
CHECK DESIGN CRITERIA

CHECK STABILITY:

	LC1	LC2
Mst = P * (L/2) + (Vf+s * L/2) =	4433.6 k-ft	4572.4 k-ft
Mot = M+H*(t+h) =	2434.6 k-ft	700 k-ft
SF = Mot/Mst =	1.82 > 1.5	6.53 > 1.5

Capacity: 82.4%

N



STRUCTURAL NOTE:
 EXIST MOUNTS, PLATFORMS AND TOWER
 STRUCTURE TO BE VERIFIED FOR STRUCTURAL
 SUITABILITY OF PROPOSED INSTALLATION BY A
 STATE LICENSED P.E.

1 SITE PLAN
 L-1 SCALE: 1/8" = 1'-0"



CONFIGURATION
 1C

TECTONIC

• PLANNING • SURVEYING
 • ENGINEERING • MANAGEMENT
TECTONIC Engineering & Surveying
 Consultants P.C.
 1200 Route 200
 North Easton, MA 01940
 Phone: (541) 567-8858
 Fax: (541) 567-8703

T-Mobile
 NORTHEAST LLC
 1200 Route 200
 North Easton, MA 01940
 Phone: (541) 567-8858
 Fax: (541) 567-8703

APPROVALS

T-MOBILE PROJECT NUMBER	DESIGNED BY
CONSTRUCTION	DATE
REV. DATE	REVISION
BY	DATE
DATE	FOR COMMENTS
DATE	SP

ISSUED BY	DATE
-----------	------



SITE REVISION
 CT11851C
 CROWN MONOPOLE DARIEN
 130 LEDGE ROAD
 DARIEN, CT 06820

SHEET TITLE	SHEET NUMBER
SITE PLAN	L-1

TECTONIC

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 • ENGINEERING • CONSTRUCTION MANAGEMENT
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1279 Route 200
 Westford, MA 01886
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..F.. Mobile..
 NORTHEAST LLC

T-MOBILE NETWORK, LLC Phone (978) 866-4500
 1000 Massachusetts Blvd
 Andover, MA 01810

APPROVALS

T-MOBILE _____
 LANDLORD _____
 CONSTRUCTION _____
 PROJECT NUMBER _____ DESIGNED BY _____
 REV. DATE _____ REASON _____ DRAWN BY _____
 07/23/14 FOR COMMENT MJB
 01/29/15 PER COMMENTS SP

ISSUED BY	DATE

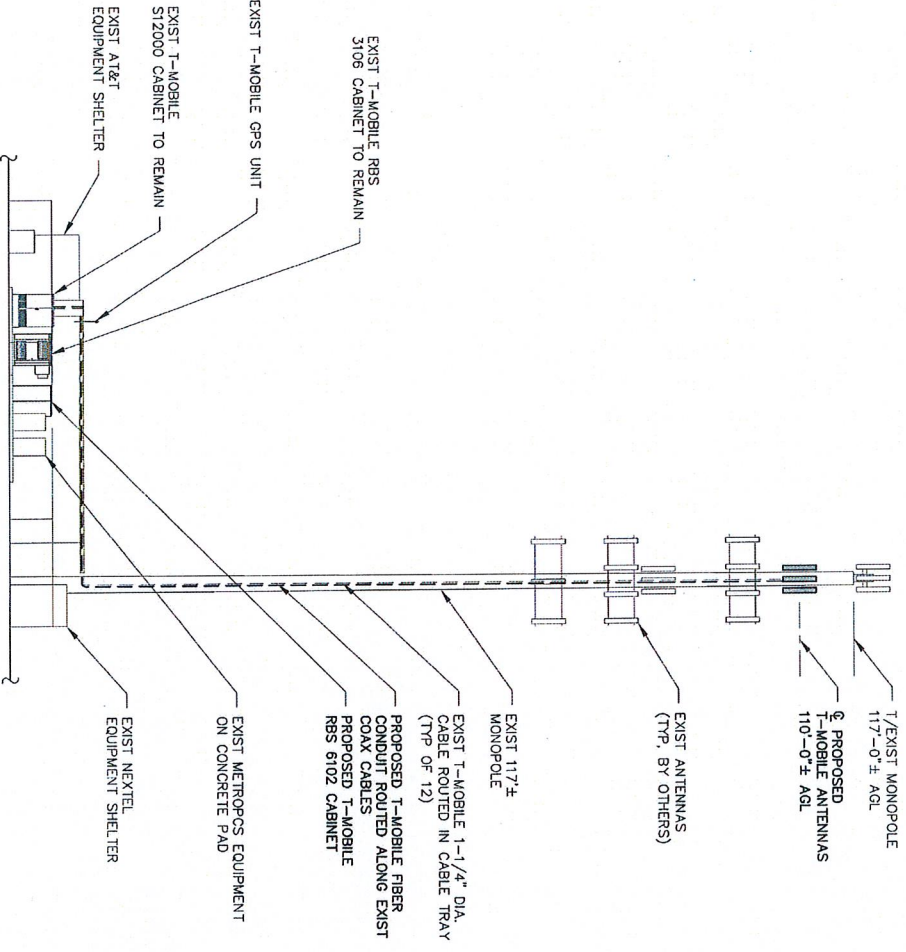


SEE INFORMATION
 CT11851C
 CROWN MONOPOLE DARIEN
 130 LEDGE ROAD
 DARIEN, CT 06820

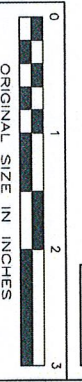
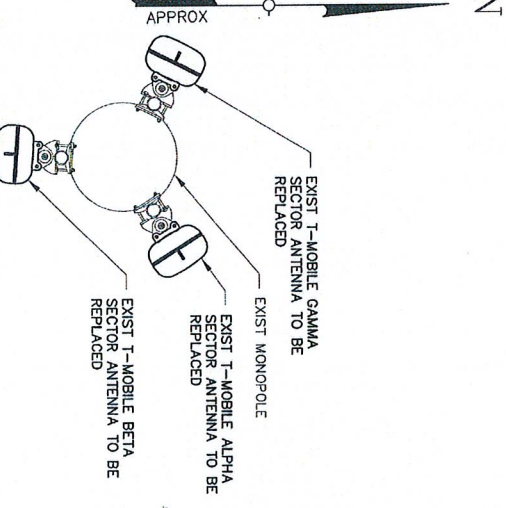
SHEET TITLE
**ELEVATION &
 ANTENNA PLAN**

SHEET NUMBER
L-2

1
 ELEVATION
 SCALE: 1/8" = 1'-0"



2
 ANTENNA PLAN
 SCALE: 1/2" = 1'-0"



CONFIGURATION
1C

STRUCTURAL NOTE:
 EXIST MOUNTS, PLATFORMS AND TOWER STRUCTURE
 TO BE VERIFIED FOR STRUCTURAL SUITABILITY OF
 PROPOSED INSTALLATION BY A STATE LICENSED P.E.



EBI Consulting

environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11851C

CT851 / Crown Darien MP
130 Ledge Road
Darien, CT 06820

January 22, 2013



January 22, 2013

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Re: Emissions Values for Site: **CT11851C - CT851 Crown Darien MP**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 130 Ledge Road, Darien, CT, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limit for the cellular band is $567 \mu\text{W}/\text{cm}^2$, and the general population exposure limit for the PCS band is $1000 \mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 130 Ledge Road, Darien, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is a 6 foot person standing at the base of the tower

For all calculations, all equipment was calculated using the following assumptions:

- 1) 2 GSM channels (1940.000 MHz—to 1950.000 MHz) were considered for each sector of the proposed installation.
- 2) 2 UMTS channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation
- 3) 2 LTE channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation
- 4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
- 6) The antenna used in this modeling is the Ericsson AIR21 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.6 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications



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- 7) The antenna mounting height centerline of the proposed antennas is **110 feet** above ground level (AGL)
- 8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT11851C - CT1851 Crown Darien MIP
Site Address	130 Ledge Road, Darien, CT 06820
Site Type	Monopole

Sector 1																	
Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	Antenna analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	110	104	None	0	0	48.326044	1.606277	0.16063%
1a	Ericsson	AIR21 B4A/B2P	Not Used	-	-	0	0	0	-3.95	110	104	None	0	0	0	0	0.00000%
1b	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	110	104	1-5/8"	0	0	24.163022	0.803139	0.08031%
1b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	110	104	1-5/8"	0	0	24.163022	0.803139	0.08031%
														Sector total Power Density Value: 0.321%			

Sector 2																	
Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	Antenna analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	110	104	None	0	0	48.326044	1.606277	0.16063%
1a	Ericsson	AIR21 B4A/B2P	Not Used	-	-	0	0	0	-3.95	110	104	None	0	0	0	0	0.00000%
1b	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	110	104	1-5/8"	0	0	24.163022	0.803139	0.08031%
1b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	110	104	1-5/8"	0	0	24.163022	0.803139	0.08031%
														Sector total Power Density Value: 0.321%			

Sector 3																	
Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	Antenna analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	110	104	None	0	0	48.326044	1.606277	0.16063%
1a	Ericsson	AIR21 B4A/B2P	Not Used	-	-	0	0	0	-3.95	110	104	None	0	0	0	0	0.00000%
1b	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	110	104	1-5/8"	0	0	24.163022	0.803139	0.08031%
1b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	110	104	1-5/8"	0	0	24.163022	0.803139	0.08031%
														Sector total Power Density Value: 0.321%			

Site Composite MPE %	
Carrier	MPE %
T-Mobile	0.964%
Field Readings as part of AT&T latest filing dated 06/01/2011 per CSC database	
Total Site MPE %	53.600%
	54.564%

Summary

All calculations performed for this analysis yielded results that were well within the allowable limits for general public exposure to RF Emissions.

The anticipated Maximum Composite contributions from the T-Mobile facility are **0.964% (0.321% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously.

The anticipated composite MPE value for this site assuming all carriers present is **54.564%** of the allowable FCC established general public limit. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were within the allowable 100% threshold standard per the federal government



Scott Heffernan
RF Engineering Director

EBI Consulting
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Burlington, MA 01803