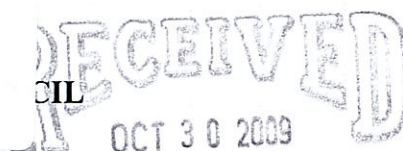


TS-CLEARWIRE-051-091030



In re:

Request of Clearwire Corporation for the :
Approval of the Shared Use of an Existing :
Tower Located at 281 Woodhouse Road, :
Fairfield, Connecticut. :

CONNECTICUT
SITING COUNCIL

October 30, 2009

ORIGINAL **TOWER SHARING APPLICATION**

Clearwire Corporation ("Clearwire") proposes herein to share an existing telecommunications tower (the "Tower") located at 281 Woodhouse Road in Fairfield, Connecticut (the "Facility"). Pursuant to Connecticut General Statutes §16-50aa (the "Statute"), Clearwire requests a finding from the Connecticut Siting Council (the "Council") that the shared use of this Facility is technically, legally, environmentally, and economically feasible, will meet public safety concerns, will avoid the unnecessary proliferation of towers and is in the public interest. Clearwire further requests an order approving the shared use of this Facility.

The purpose of this request is to use an existing telecommunications tower to develop Clearwire's 4G wireless broadband network to provide high-speed wireless data and to develop VoIP service within the State of Connecticut and in this area of Fairfield. Therefore, this application avoids the construction of an additional tower in Fairfield.

A. The Facility

The Facility is located at a latitude of 41° 11' 45.3" N and longitude of 73° 16' 52.9" W. The Tower is a 171-foot monopole. Multiple carriers are currently located on the Tower. A site plan is attached.

B. Proposed Project

Clearwire will install three (3) WiMAX antennas (Model No. LLPX310R), three (3) Dragonwave dishes (Model No. A-ANT-23G-2-C) and three (3) Samsung Remote Radio Heads (Model No. FDD_R6_RRH), one each per sector. Clearwire plans to utilize three (3) new tower

mounts with the centerline of the antennas at 128 feet. Six cables, 5/16" in diameter, will run to the new WiMAX antennas (two per panel). Additionally, 2 coax cables, 1/2" in diameter, will run to the new dishes (one per dish).

Clearwire will locate 2 equipment cabinets within the existing fenced compound on the proposed 7-foot by 7-foot (approximately) concrete pad. A proposed ice bridge will connect the equipment to the Tower. The proposed power and telephone conduits will be routed in an underground conduit from the existing meter board to the proposed equipment cabinets. No upgrades to the access road or parking area will be necessary.

C. Technical Feasibility

Consistent with the requirements of the Statute, it is technically feasible for Clearwire to collocate at this Facility. To analyze whether the Tower can support Clearwire's proposed modifications, Clearwire commissioned B&T Engineering, Inc. to perform a structural analysis of the Tower with Clearwire's proposed antennas. The structural analysis is attached. According to the Structural Analysis Report, dated September 23, 2009, "...the tower stress level for the structure and foundation, under the following load case ... LC1: Existing + Reserved + Proposed Equipment [is] Sufficient Capacity" (Page 1, Structural Analysis Report).

D. Legal Feasibility

The Council has the authority, pursuant to the Statute, to issue an order approving the shared use of this Tower. By issuing an order approving Clearwire's use of the Tower, Clearwire will be able to proceed with obtaining a building permit for its proposed installation on the Tower. Therefore, consistent with the Statute, Clearwire's proposal is legally feasible.

E. Economic Feasibility

Clearwire is a wireless telecommunications provider licensed by the Federal Communications Commission to provide service in areas of Connecticut, including but not limited to Fairfield County. Clearwire has entered into a lease with Crown Castle for the purpose of locating its antennas and associated equipment at the Facility so that it may provide wireless telecommunications service to this area of Fairfield. A redacted copy of the Letter of Authorization is attached. Therefore, the shared use of this Facility is economically feasible.

F. Environmental Feasibility

Pursuant to the Statute, the proposal will be environmentally feasible for the following reasons:

- The overall impact on the Town of Fairfield will be decreased with the sharing of a single tower versus the proliferation of towers.
- The proposal will not increase the height of the Tower.
- There will be little increase in the visibility of the Tower with the addition of Clearwire's antennas, Remote Radio Heads and dishes.
- There will be no impact on any wetlands or water resources as a result of Clearwire's modifications.
- There will be no increased impact on air quality because no air pollutants will be generated during the normal operation of the Facility.
- There will only be a brief, slight increase in noise pollution while the antennas are attached and the equipment buildings are installed.

- During construction, the proposed project will generate a small amount of traffic as workers arrive and depart and materials are delivered. Upon completion, traffic will be limited to an average of one monthly maintenance/inspection visit.

G. Public Safety Concerns / Benefits

There will be no adverse impact to the health and safety of the surrounding community or the workers at the Facility due to the addition of Clearwire's antennas to the Tower. Clearwire performed an analysis of the radio frequency fields emanating from the transmitting antennas on the Tower to ensure compliance with the National Council on Radiation Protection and Measurements' ("NCRP") standard for maximum permissible exposure (MPE) adopted by the Federal Communications Commission ("FCC"). The analysis, dated October 11, 2009, indicates that Clearwire's antennas will emit .000063% of the NCRP's standard for maximum permissible exposure. A cumulative power density analysis indicates that together, all of the antennas on the Tower will cumulatively emit 35.58% of the NCRP's standard for maximum permissible exposure. The power density analysis is attached. Therefore, the analysis demonstrates that the maximum level of radio-frequency energy emitted from the Tower will be well below the FCC's mandated radio frequency exposure limits.

Moreover, Clearwire expects to enhance safety in the Fairfield area by improving wireless communications for local residents and travelers. Clearwire is currently developing its 4G wireless broadband network to provide high-speed wireless data and its VoIP service within the State of Connecticut. Clearwire's 4G service leverages the WiMAX technology to enable enhanced wireless data communications. In order to provide reliable coverage to residents and travelers in this area of Fairfield and fulfill their coverage goals to comply with their FCC license, this site is a necessary part of Clearwire's network development.

Specifically, this proposal is designed to provide reliable wireless coverage for approximately 1 mile along the Merritt Parkway, approximately 0.9 miles along Burr Street and approximately 1.5 miles along Black Rock Turnpike. Clearwire's proposal will provide a reliable signal level for the vehicular traffic on the streets and highways as well as in the surrounding commercial and residential areas.

Conclusion

For the reasons stated above, the attachment of Clearwire's antennas, Remote Radio Heads and dishes to the Tower would meet all the requirements set forth in the Statute. This proposal is technically, legally, environmentally and economically feasible and meets all public safety concerns. Therefore, Clearwire respectfully requests that the Council approve this request for the shared use of the Tower located at 281 Woodhouse Road in Fairfield, Connecticut.

Clearwire Corporation

By: 
Thomas J. Regan
Brown Rudnick LLP
185 Asylum Street, CityPlace I
Hartford, CT 06103-3402
Email - tregan@brownrudnick.com
Phone - 860.509.6522
Fax - 860.509.6622

Certificate of Service

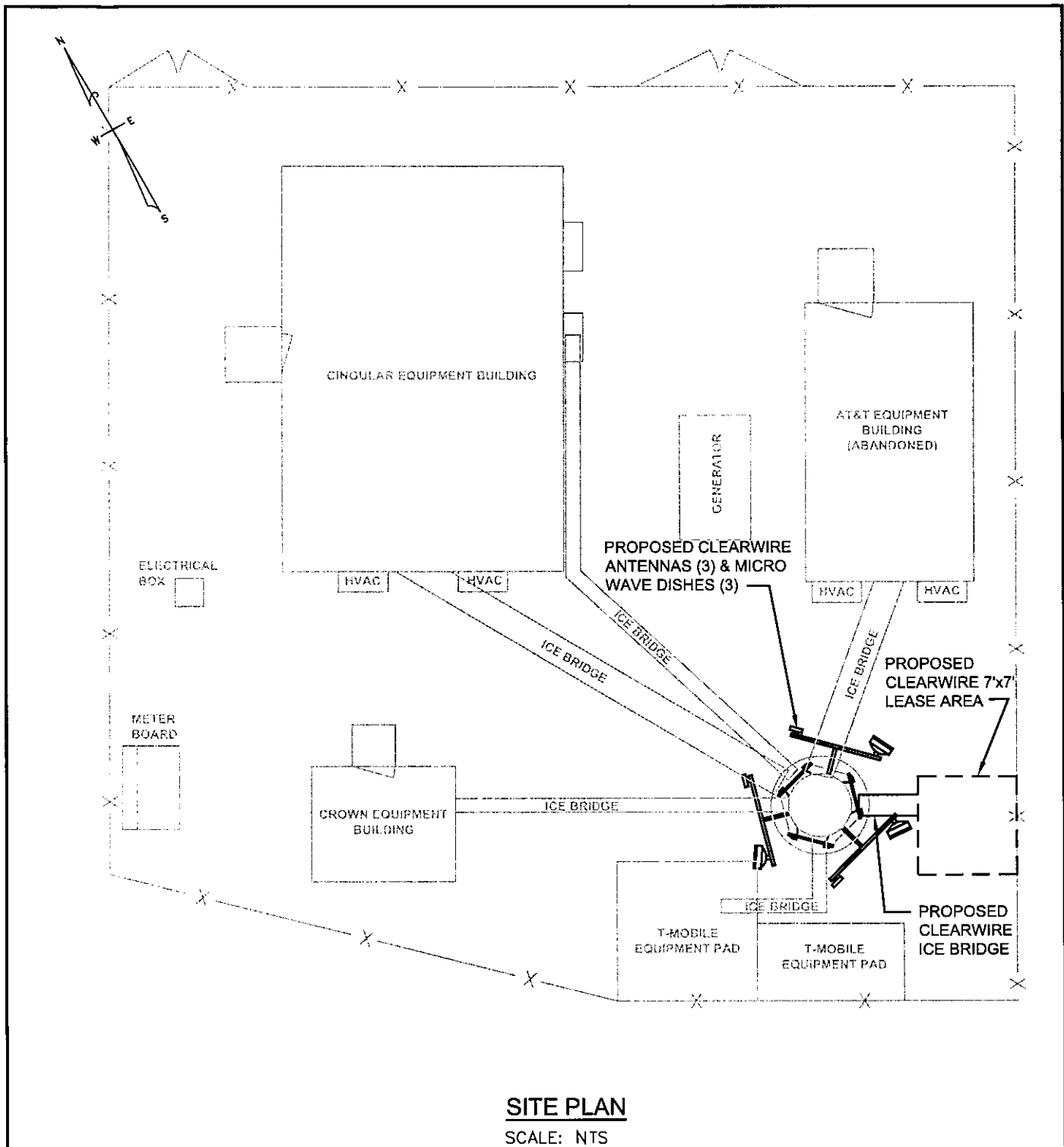
This is to certify that on this 30th day of October, 2009, the foregoing Tower Sharing Proposal was sent, via first class mail, to the following:

Town of Fairfield
First Selectman's Office
First Selectman Ken Flatto
John J. Sullivan Independence Hall
Second Floor
725 Old Post Road
Fairfield, CT 06824

By: _____

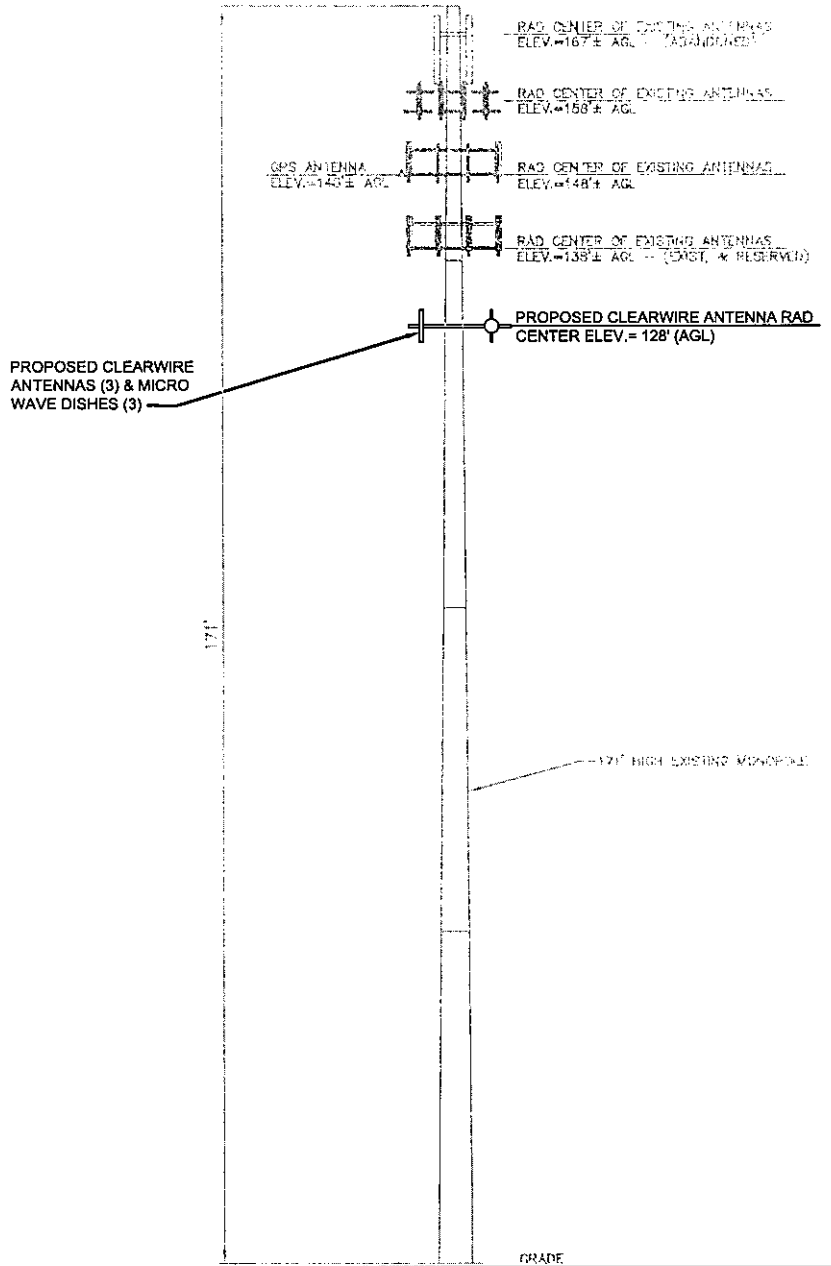

Thomas J. Regan

40265777 v1 - 025064/0017



ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATION OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITIES COMPANIES.

 DICESARE BENTLEY ENGINEERS / SURVEYORS / PLANNERS	clearwire® CLEAR WIRELESS, LLC 4400 CARILLION POINT KIRKLAND, WA 98033	PROJECT LOCATION: FAIRFIELD CT-BDR0058 281 WOODHOUSE ROAD FAIRFIELD, CT APPROVED BY:	SITE TYPE: MONOPOLE CO-LOCATION PROJECT MANAGER: PB DATE: 10/19/09	DRAWN BY: ACG REVISION: 0	DB PROJ. #: 09-083.12 L1



TOWER ELEVATION

SCALE: NTS

ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATION OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITIES COMPANIES.



clearwire®
CLEAR WIRELESS, LLC
4400 CARILLION POINT
KIRKLAND, WA 98033

PROJECT LOCATION:
**FAIRFIELD
CT-BDR0058**
281 WOODHOUSE ROAD
FAIRFIELD, CT
APPROVED BY:

SITE TYPE:
**MONOPOLE
CO-LOCATION**
PROJECT MANAGER:
PB
DATE:
10/19/09
DRAWN BY:
ACG
REVISION:
0

DB PROJ. #:
09-083.12

L1



Date: **September 23, 2009**

David Smith
Crown Castle USA Inc.
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6618

B&T Engineering, Inc.
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
ctuttle@btengineering.com

Subject: Structural Analysis Report

Carrier Designation:	Clearwire Co-Locate	
	Carrier Site Number:	CT-BDR0058
	Carrier Site Name:	N/A
Crown Castle Designation:	Crown Castle BU Number:	806355
	Crown Castle Site Name:	BRG 126 943086
	Crown Castle JDE Job Number:	123455
	Crown Castle Work Order Number:	289081
Engineering Firm Designation:	B&T Engineering, Inc. Project Number:	80964
Site Data:	281 Woodhouse Road, Fairfield, CT, Fairfield County	
	Latitude 41° 11' 45.3", Longitude -73° 16' 52.9"	
	171 Foot - Monopole Tower	

Dear David Smith,

B&T Engineering, Inc. 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 345972, in accordance with application 86688, revision 2.

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:

LC1: Existing + Reserved + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2003 IBC; 2003 IRC (State Building Code, 2005 CT supplement) 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 attached drawings for the determined available structural capacity to be effective.

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

Respectfully submitted by:

Terry Carter, E.I.
Project Engineer

Chad E. Tuttle, P.E.
President

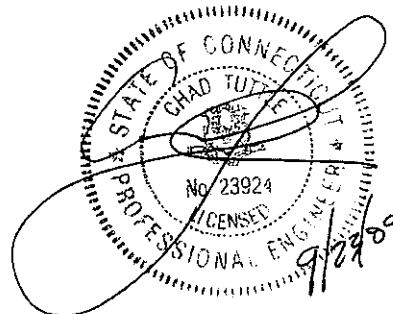


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4) ANALYSIS RESULTS

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7) APPENDIX C

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1) INTRODUCTION

This tower is a 171 ft Monopole tower designed by EEI in May of 1998. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 73.6 mph with 0.5 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
128	132	3	Dragonwave	A-ANT-23G-2-C	3 6	1/2 5/16	
	128	3	Argus Technologies	LLPX310R			
		3	Samsung Telecommunications	FDD_R6_RRH			
		3	Tower Mounts	Pipe Mount [PM 501-1]			

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
167	167	3	EMS Wireless	RV90-17-02DP	6	1 5/8	4
155	158				12	1 5/8	3
		6	Antel	WPA-80090/4CF	12	1 1/4	1
		6	Decibel	DB948F85T2E-M			
	155	1	Tower Mounts	Platform Mount [LP 302-1]	1 12	1/2 1 5/8	1
146	148	6	Powerwave	7770.00			
		6	Powerwave	LGP2140X TMA			
	146	1	Tower Mounts	Platform Mount [LP 302-1]	3	1 5/8	2
138	140	3	RFS/Celwave	APX16DWV-16DWV-S-E-A20			
		3	EMS Wireless	DR65-18-02DPL2Q			
		3	RFS/Celwave	ATMAA1412D-1A20			
		3	RFS/Celwave	ATMPP1412D-1CWA			
118	138	1	Tower Mounts	Platform Mount [LP 302-1]	9	1 5/8	1
	118	1	Tower Mounts	Side Arm Mount [SO 301-1]			1
		1	Tower Mounts	Side Arm Mount [SO 701-1]			
		1	Tower Mounts	T-Arm Mount [TA 601-1]			

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment
- 3) SLA Feedlines used with Existing Antennas.
- 4) Abandoned Equipments are used in this analysis

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)
160	160	1		AMPS Platform		
		12	Allgon	ALP 9212		
148	148	1		AMPS Platform		
		12	Allgon	ALP 11011		
138	138	1		AMPS Platform		
		6	Celwave	APN 199015		
128	128	1		AMPS Platform		
		12	Allgon	ALP 9212		
118	118	1		AMPS Platform		
		12	Allgon	ALP 9212		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Clearwire Co-Locate Revision #2	86688	Crown OTG
Tower Manufacturing Drawing	EEI, Job No. 3761	653293	Crown OTG
Foundation Drawing	EEI, Job No. 3761	1098364	Crown OTG
Geotechnical Report	Clarence Welti Association, Dated 05/15/98	1099974	Crown OTG
Antenna Configuration	Crown CAD Package	Date: 08/17/09	Crown OTG

3.1) Analysis Method

RISATower (version 5.3.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) This structural analysis **does not** include a grouted base plate.
- 2) Tower and structures were built in accordance with the manufacturer's specifications.
- 3) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 4) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 5) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section Capacity Table								
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L1	171 - 156.5	Pole	TP10.75x10.75x0.365	1	-0.639	333.179	17.4	Pass
L2	156.5 - 156	Pole	TP19.5x10.75x0.365	2	-0.639	625.462	10.2	Pass
L3	156 - 132.67	Pole	TP24.79x19.5x0.188	3	-7.028	735.448	45.9	Pass
L4	132.67 - 87.0867	Pole	TP34.63x23.584x0.375	4	-15.162	2052.540	63.0	Pass
L5	87.0867 - 43	Pole	TP43.75x32.796x0.438	5	-25.934	3029.762	68.0	Pass
L6	43 - 0	Pole	TP52.5x41.531x0.5	6	-42.269	4290.180	65.7	Pass
							Summary	
							Pole (L5)	68.0 Pass
							RATING =	68.0 Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Connection	156	3.0	Pass
1	Anchor Rods	Base	58.7	Pass
1	Base Plate	Base	71.7	Pass
1	Base Foundation	Base	52.8	Pass

Table 7 - Tower Deflections - LC1

Elevation	Dish Model	Diameter	Tilt (deg)	Twist (deg)
132	A-ANT-23G-2-C	2.175	1.634	.001

Structure Rating (max from all components) =	71.7%
---	--------------

Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Capacities up to 105% are considered acceptable based on analysis methods used.
- 3) The percent capacities shown above (excluding foundations) include the 1/3 increase in allowable stresses as allowed by TIA/EIA-222-F.

4.1) Recommendations

N/A

APPENDIX A
RISA TOWER OUTPUT

Section	1	2	3	4	5	6
Length (ft)	14,500	0,500	23,330	49,250	48,920	49,000
Number of Sides	1	18	18	18	18	18
Thickness (in)	0.365	0.365	0.188	0.375	0.438	0.500
Lap Splice (ft)					6,000	
Top Dia (in)	10,750	10,750	19,500	23,584	32,796	41,531
Bot Dia (in)	10,750	19,500	24,790	34,630	43,750	52,500
Grade	A53-B-35				A572-65	
Weight (K)	0.6	0.0	1.0	5.7	8.7	12.3

171.0 ft

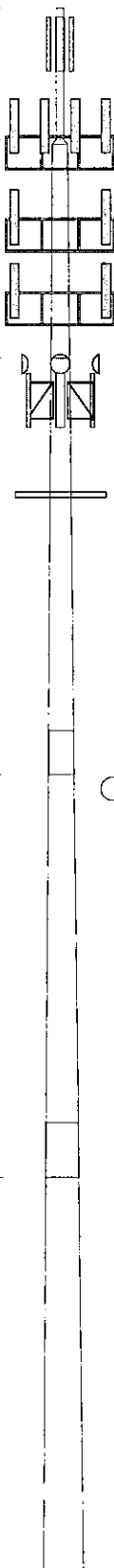
156.5 ft

132.7 ft

87.1 ft

43.0 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

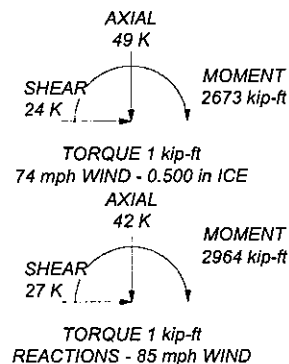
TYPE	ELEVATION	TYPE	ELEVATION
RV90-17-02DP w/Mount Pipe (Abandoned)	167	APX16DWV-16DWV-S-E-A20 (R)	140
RV90-17-02DP w/Mount Pipe (Abandoned)	167	APX16DWV-16DWV-S-E-A20 (R)	140
RV90-17-02DP w/Mount Pipe (Abandoned)	167	ATMAA1412D-1A20 (R)	140
(2) WPA-80090/4CF (E)	158	ATMAA1412D-1A20 (R)	140
(2) WPA-80090/4CF (E)	158	ATMAA1412D-1A20 (R)	140
(2) WPA-80090/4CF (E)	158	ATMAA1412D-1A20 (R)	140
(2) DB948F85T2E-M (E)	158	ATMPP1412D-1CWA (R)	140
(2) DB948F85T2E-M (E)	158	ATMPP1412D-1CWA (R)	140
(2) DB948F85T2E-M (E)	158	ATMPP1412D-1CWA (R)	140
Platform Mount [LP 302-1] (E)	155	Platform Mount [LP 302-1] (E)	138
(2) 7770.00 (E)	148	A-ANT-23G-2-C (P)	132
(2) 7770.00 (E)	148	A-ANT-23G-2-C (P)	132
(2) 7770.00 (E)	148	A-ANT-23G-2-C (P)	132
(2) 7770.00 (E)	148	FDD_R6_RRH (P)	128
(2) 7770.00 (E)	148	FDD_R6_RRH (P)	128
(2) 7770.00 (E)	148	FDD_R6_RRH (P)	128
(2) LGP2140X TMA (E)	148	Pipe Mount [PM 501-1] (P)	128
(2) LGP2140X TMA (E)	148	Pipe Mount [PM 501-1] (P)	128
(2) LGP2140X TMA (E)	148	Pipe Mount [PM 501-1] (P)	128
Platform Mount [LP 302-1] (E)	146	LLPX310R (P)	128
DR65-18-02DPL2Q (R)	140	LLPX310R (P)	128
DR65-18-02DPL2Q (R)	140	LLPX310R (P)	128
DR65-18-02DPL2Q (R)	140	LLPX310R (P)	128
APX16DWV-16DWV-S-E-A20 (R)	140	Side Arm Mount [SO 301-1] (E)	118
		T-Arm Mount [TA 601-1] (E)	118
		Side Arm Mount [SO 701-1] (E)	118

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A572-65	65 ksi	80 ksi

TOWER DESIGN NOTES

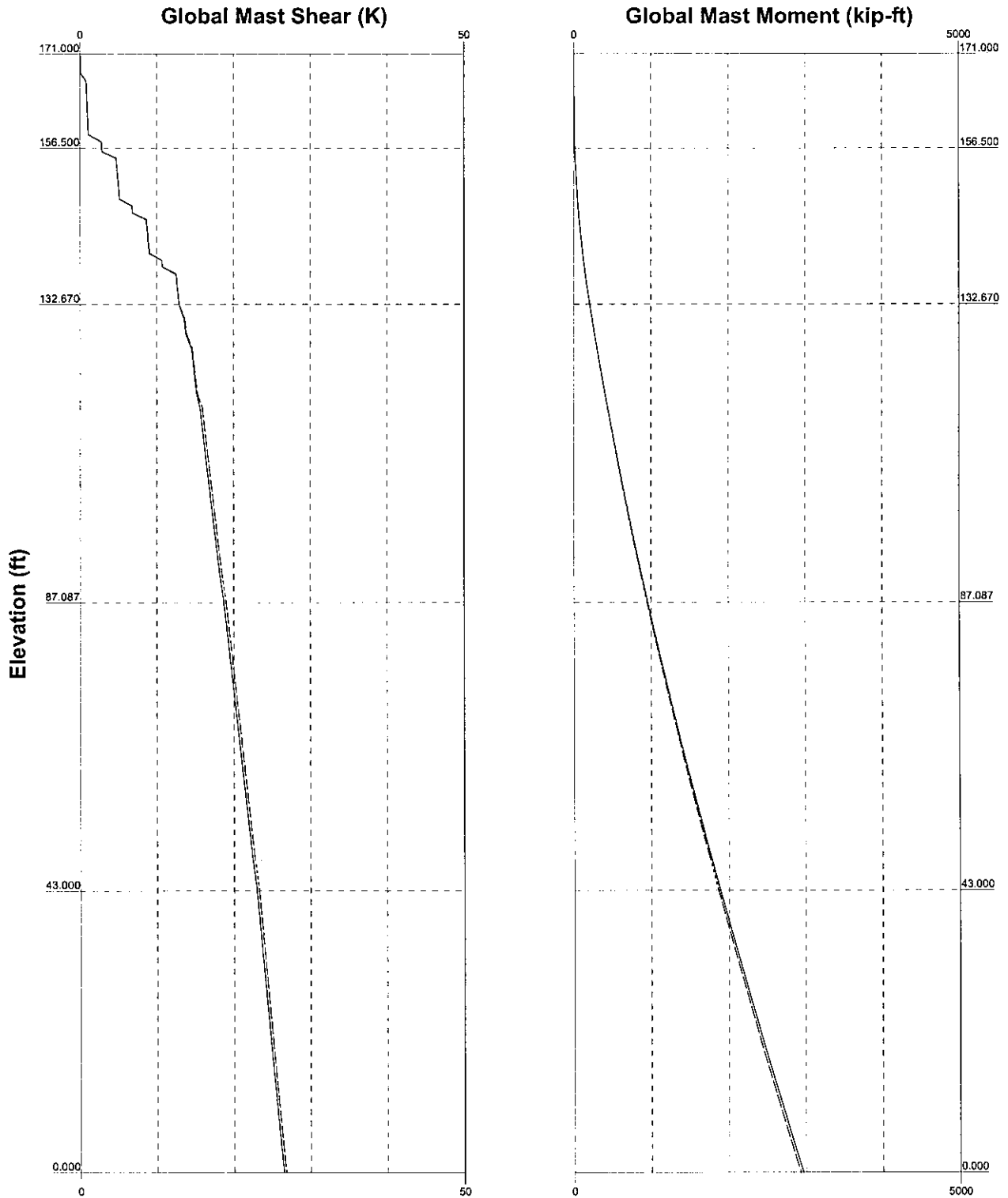
1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 68%



B & T Engineering 1717 South Boulder Tulsa, OK 74159 Phone: 918-587-4630 FAX: 918-295-0265	Job: 80964 - BRG 126 943086, CT (BU #806355)			
	Project: 171' EEI Monopole / App ID: 86688; Rev: 2			
	Client: Crown Castle USA, Inc.	Drawn by: Terry Carter	App'd:	
	Code: TIA/EIA-222-F	Date: 09/23/09	Scale: NTS	
	Path:		Dwg No. E-1	

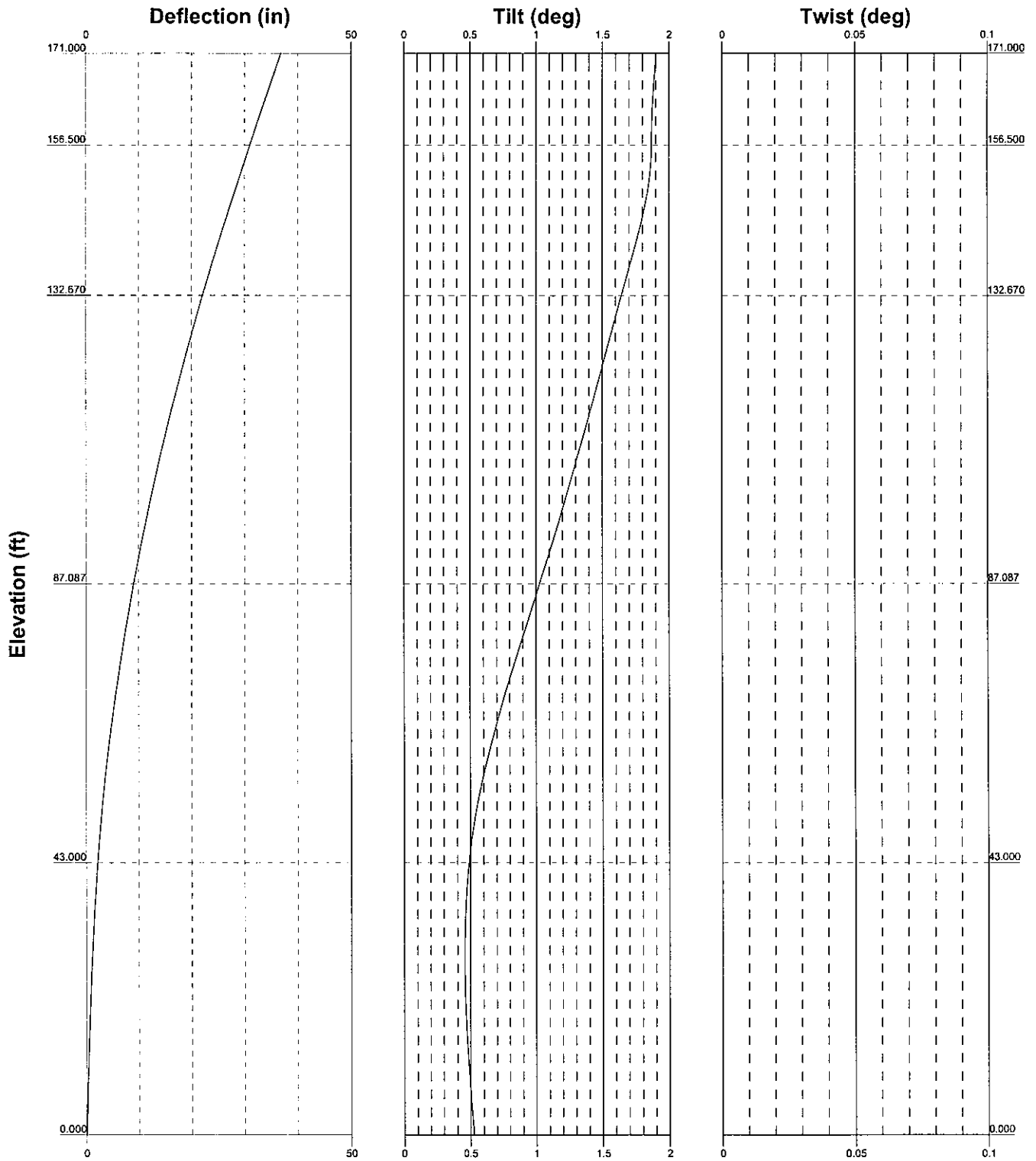
—— Vx Vz

—— Mx Mz



B & T Engineering
1717 South Boulder
Tulsa, OK 74159
Phone: 918-587-4630
FAX: 918-295-0265

Job: 80964 - BRG 126 943086, CT (BU #806355)	
Project: 171' EEI Monopole / App ID: 86688; Rev: 2	
Client: Crown Castle USA, Inc.	Drawn by: Terry Carter
Code: TIA/EIA-222-F	Date: 09/23/09
Path:	Scale: NTS
Dwg No. E-4	



	B & T Engineering		Job: 80964 - BRG 126 943086, CT (BU #806355)	
	1717 South Boulder		Project: 171' EET Monopole / App ID: 86688; Rev: 2	
	Tulsa, OK 74159		Client: Crown Castle USA, Inc. Drawn by: Terry Carter App'd:	
	Phone: 918-587-4630		Code: TIA/EIA-222-F Date: 09/23/09 Scale: NTS	
	FAX: 918-295-0265		Path: E-5	

Feedline Distribution Chart

0' - 171'

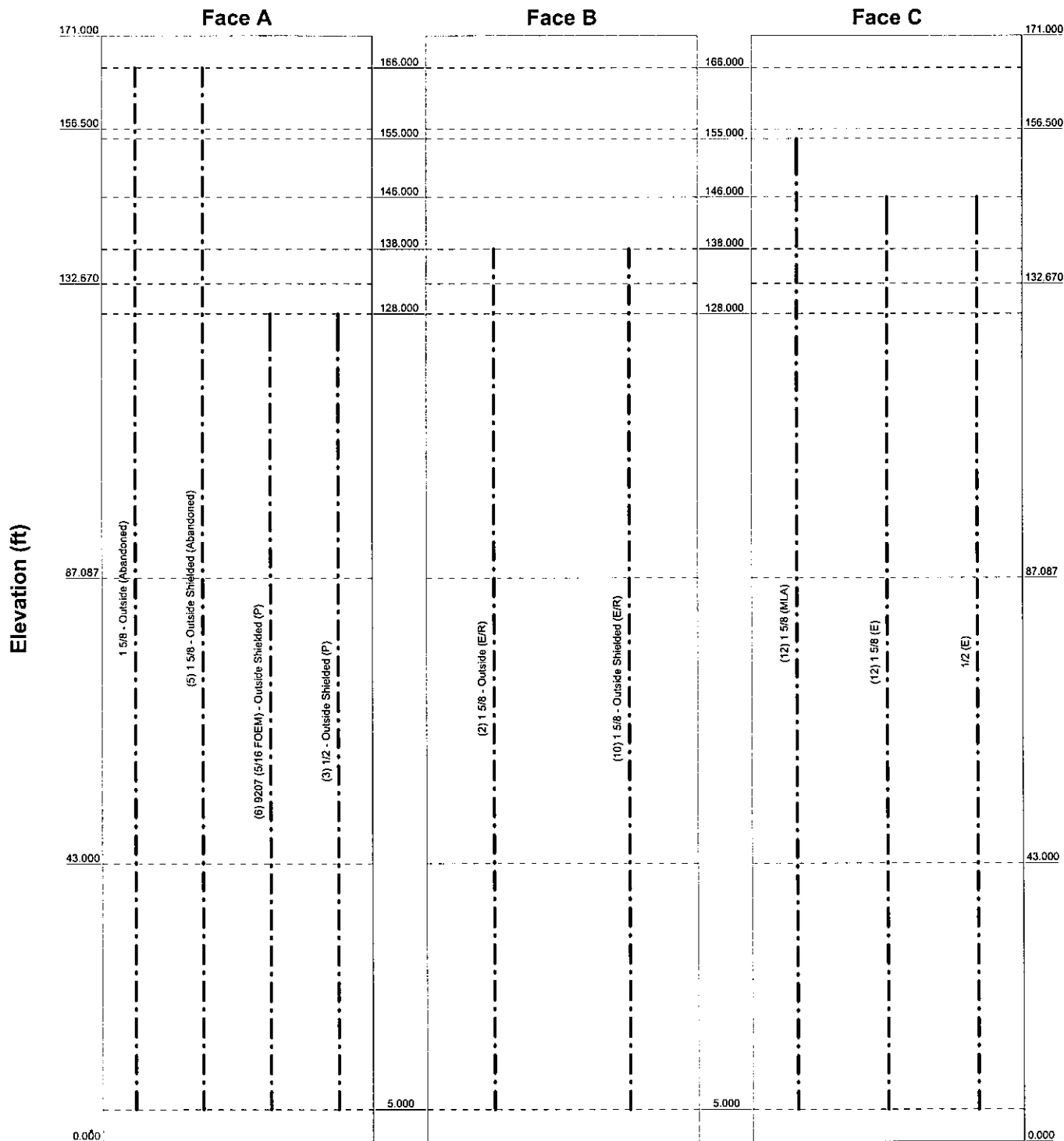
Round

Flat

App In Face

App Out Face

Truss Leg



B & T Engineering
 1717 South Boulder
 Tulsa, OK 74159
 Phone: 918-587-4630
 FAX: 918-295-0265

Job: **80964 - BRG 126 943086, CT (BU #806355)**
 Project: **171' EEI Monopole / App ID: 86688; Rev: 2**
 Client: **Crown Castle USA, Inc.** Drawn by: **Terry Carter** App'd:
 Code: **TIA/EIA-222-F** Date: **09/23/09** Scale: **NTS**
 Path: **E-7**

RISATower B & T Engineering 1717 South Boulder Tulsa, OK 74159 Phone: 918-587-4630 FAX: 918-295-0265	Job	80964 - BRG 126 943086, CT (BU #806355)	Page	1 of 13
	Project	171' EEI Monopole / App ID: 86688; Rev: 2	Date	11:35:41 09/23/09
	Client	Crown Castle USA, Inc.	Designed by	Terry Carter

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 0.500 in.

Ice density of 56 pcf.

A wind speed of 74 mph is used in combination with ice.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	171.000-156.500	14.500	0.000	Round	10.750	10.750	0.365		A53-B-35 (35 ksi)
L2	156.500-156.000	0.500	0.000	18	10.750	19.500	0.365	1.460	A572-65 (65 ksi)
L3	156.000-132.670	23.330	3.667	18	19.500	24.790	0.188	0.750	A572-65 (65 ksi)
L4	132.670-87.087	49.250	4.833	18	23.584	34.630	0.375	1.500	A572-65 (65 ksi)
L5	87.087-43.000	48.920	6.000	18	32.796	43.750	0.438	1.750	A572-65 (65 ksi)
L6	43.000-0.000	49.000		18	41.531	52.500	0.500	2.000	A572-65 (65 ksi)

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Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ³	w in	w/t
L1	10.750	11.902	160.659	3.676	5.375	29.890	320.880	5.951	0.000	0
	10.750	11.902	160.659	3.676	5.375	29.890	320.880	5.951	0.000	0
L2	10.916	12.031	163.929	3.687	5.461	30.018	328.074	6.017	1.250	3.424
	19.801	22.168	1025.469	6.793	9.906	103.520	2052.288	11.086	2.790	7.643
L3	19.801	11.493	541.578	6.856	9.906	54.672	1083.869	5.748	3.102	16.544
	25.172	14.642	1119.653	8.734	12.593	88.908	2240.779	7.322	4.033	21.51
L4	24.783	27.624	1879.844	8.239	11.980	156.909	3762.161	13.815	3.491	9.309
	35.164	40.772	6044.321	12.161	17.592	343.583	12096.596	20.390	5.435	14.493
L5	34.401	44.934	5944.079	11.487	16.660	356.780	11895.980	22.471	5.002	11.433
	44.425	60.145	14254.835	15.376	22.225	641.387	28528.426	30.078	6.930	15.84
L6	43.536	65.117	13850.526	14.566	21.098	656.485	27719.277	32.565	6.430	12.859
	53.310	82.524	28191.904	18.460	26.670	1057.064	56420.904	41.270	8.360	16.72

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 in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
L1				1	1	1		
171.000-156.500								
L2				1	1	1		
156.500-156.000								
L3				1	1	1		
156.000-132.670								
L4				1	1	1		
132.670-87.087								
L5				1	1	1		
87.087-43.000								
L6				1	1	1		
43.000-0.000								

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight klf
1 5/8 - Outside (Abandoned)	A	No	CaAa (Out Of Face)	166.000 - 5.000	1	No Ice 1/2" Ice	0.198 0.298
1 5/8 - Outside Shielded (Abandoned)	A	No	Inside Pole	166.000 - 5.000	5	No Ice 1/2" Ice	0.000 0.001

1 5/8	C	No	Inside Pole	155.000 - 5.000	12	No Ice	0.000

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft ² /ft	Weight klf
(MLA) ***						1/2" Ice	0.000	0.001
1 5/8 (E)	C	No	Inside Pole	146.000 - 5.000	12	No Ice	0.000	0.001
1/2 (E)	C	No	Inside Pole	146.000 - 5.000	1	1/2" Ice	0.000	0.001
***						No Ice	0.000	0.000
***						1/2" Ice	0.000	0.000
1 5/8 - Outside (E/R)	B	No	CaAa (Out Of Face)	138.000 - 5.000	2	No Ice	0.198	0.001
1 5/8 - Outside Shielded (E/R)	B	No	Inside Pole	138.000 - 5.000	10	1/2" Ice	0.298	0.003
***						No Ice	0.000	0.001
***						1/2" Ice	0.000	0.001
9207 (5/16 FOEM) - Outside Shielded (P)	A	No	Inside Pole	128.000 - 5.000	6	No Ice	0.000	0.001
1/2 - Outside Shielded (P)	A	No	Inside Pole	128.000 - 5.000	3	1/2" Ice	0.000	0.001
***						No Ice	0.000	0.000
***						1/2" Ice	0.000	0.000

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	171.000-156.500	A	0.000	0.000	0.000	1.881	0.059
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L2	156.500-156.000	A	0.000	0.000	0.000	0.099	0.003
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L3	156.000-132.670	A	0.000	0.000	0.000	4.619	0.146
		B	0.000	0.000	0.000	2.111	0.067
		C	0.000	0.000	0.000	0.000	0.448
L4	132.670-87.087	A	0.000	0.000	0.000	9.025	0.561
		B	0.000	0.000	0.000	18.051	0.569
		C	0.000	0.000	0.000	0.000	1.149
L5	87.087-43.000	A	0.000	0.000	0.000	8.729	0.573
		B	0.000	0.000	0.000	17.458	0.550
		C	0.000	0.000	0.000	0.000	1.111
L6	43.000-0.000	A	0.000	0.000	0.000	7.524	0.494
		B	0.000	0.000	0.000	15.048	0.474
		C	0.000	0.000	0.000	0.000	0.958

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	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	171.000-156.500	A	0.500	0.000	0.000	0.000	2.831	0.074
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L2	156.500-156.000	A	0.500	0.000	0.000	0.000	0.149	0.004
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L3	156.000-132.670	A	0.500	0.000	0.000	0.000	6.952	0.181

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Project

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Client

Crown Castle USA, Inc.

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L4	132.670-87.087	B	0.500	0.000	0.000	0.000	3.177	0.083
		C		0.000	0.000	0.000	0.000	0.448
		A		0.000	0.000	0.000	13.584	0.629
		B		0.000	0.000	0.000	27.168	0.707
L5	87.087-43.000	C	0.500	0.000	0.000	0.000	0.000	1.149
		A		0.000	0.000	0.000	13.138	0.639
		B		0.000	0.000	0.000	26.276	0.683
		C		0.000	0.000	0.000	0.000	1.111
L6	43.000-0.000	A	0.500	0.000	0.000	0.000	11.324	0.551
		B		0.000	0.000	0.000	22.648	0.589
		C		0.000	0.000	0.000	0.000	0.958

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	171.000-156.500	0.000	-0.170	0.000	-0.223
L2	156.500-156.000	0.000	-0.257	0.000	-0.343
L3	156.000-132.670	0.111	-0.193	0.151	-0.262
L4	132.670-87.087	0.414	0.000	0.554	0.000
L5	87.087-43.000	0.435	0.000	0.595	0.000
L6	43.000-0.000	0.397	0.000	0.554	0.000

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 K
RV90-17-02DP w/Mount Pipe (Abandoned)	C	From Leg	1.000 0.000 0.000	0.000	167.000	No Ice 1/2" Ice 5.572	3.636 4.703	0.044 0.082
RV90-17-02DP w/Mount Pipe (Abandoned)	A	From Leg	1.000 0.000 0.000	0.000	167.000	No Ice 1/2" Ice 5.572	3.636 4.703	0.044 0.082
RV90-17-02DP w/Mount Pipe (Abandoned)	B	From Leg	1.000 0.000 0.000	0.000	167.000	No Ice 1/2" Ice 5.572	3.636 4.703	0.044 0.082
*** (2) WPA-80090/4CF (E)	C	From Face	0.000 0.000 0.000	0.000	158.000	No Ice 1/2" Ice 4.097	2.709 3.014	0.012 0.037
(2) WPA-80090/4CF (E)	A	From Face	0.000 0.000 0.000	0.000	158.000	No Ice 1/2" Ice 4.097	2.709 3.014	0.012 0.037
(2) WPA-80090/4CF (E)	B	From Face	0.000 0.000 0.000	0.000	158.000	No Ice 1/2" Ice 4.097	2.709 3.014	0.012 0.037

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(2) DB948F85T2E-M (E)	C	From Face	0.000 0.000 0.000	0.000	158.000	No Ice 1/2" Ice	1.920 2.219	3.256 3.617	0.009 0.028
(2) DB948F85T2E-M (E)	A	From Face	0.000 0.000 0.000	0.000	158.000	No Ice 1/2" Ice	1.920 2.219	3.256 3.617	0.009 0.028
(2) DB948F85T2E-M (E)	B	From Face	0.000 0.000 0.000	0.000	158.000	No Ice 1/2" Ice	1.920 2.219	3.256 3.617	0.009 0.028
Platform Mount [LP 302-1] (E) ***	C	None		0.000	155.000	No Ice 1/2" Ice	33.030 44.600	33.030 44.600	1.709 2.193
(2) 7770.00 (E)	C	From Face	0.000 0.000 0.000	0.000	148.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) 7770.00 (E)	A	From Face	0.000 0.000 0.000	0.000	148.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) 7770.00 (E)	B	From Face	0.000 0.000 0.000	0.000	148.000	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) LGP2140X TMA (E)	C	From Face	0.000 0.000 0.000	0.000	148.000	No Ice 1/2" Ice	1.225 1.378	0.367 0.480	0.018 0.024
(2) LGP2140X TMA (E)	A	From Face	0.000 0.000 0.000	0.000	148.000	No Ice 1/2" Ice	1.225 1.378	0.367 0.480	0.018 0.024
(2) LGP2140X TMA (E)	B	From Face	0.000 0.000 0.000	0.000	148.000	No Ice 1/2" Ice	1.225 1.378	0.367 0.480	0.018 0.024
Platform Mount [LP 302-1] (E) ***	C	None		0.000	146.000	No Ice 1/2" Ice	33.030 44.600	33.030 44.600	1.709 2.193
DR65-18-02DPL2Q (R)	C	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	6.300 6.732	2.425 2.759	0.024 0.056
DR65-18-02DPL2Q (R)	A	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	6.300 6.732	2.425 2.759	0.024 0.056
DR65-18-02DPL2Q (R)	B	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	6.300 6.732	2.425 2.759	0.024 0.056
APX16DWV-16DWV-S-E-A 20 (R)	C	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	7.228 7.681	2.150 2.490	0.041 0.074
APX16DWV-16DWV-S-E-A 20 (R)	A	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	7.228 7.681	2.150 2.490	0.041 0.074
APX16DWV-16DWV-S-E-A 20 (R)	B	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	7.228 7.681	2.150 2.490	0.041 0.074
ATMAA1412D-1A20 (R)	C	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
ATMAA1412D-1A20 (R)	A	From Face	0.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021

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Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
A-ANT-23G-2-C (P)	C	Paraboloid w/o Radome	From Leg	3.000 0.000 0.000	0.000		132.000	2.175	No Ice 1/2" Ice	3.715 4.006 0.012 0.021
A-ANT-23G-2-C (P)	A	Paraboloid w/o Radome	From Leg	3.000 0.000 0.000	0.000		132.000	2.175	No Ice 1/2" Ice	3.715 4.006 0.012 0.021
A-ANT-23G-2-C (P)	B	Paraboloid w/o Radome	From Leg	3.000 0.000 0.000	0.000		132.000	2.175	No Ice 1/2" Ice	3.715 4.006 0.012 0.021

Load Combinations

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

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Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	171 - 156.5	Pole	Max Tension	15	0.000	0.000	-0.000
			Max. Compression	14	-1.391	-0.000	0.011
			Max. Mx	5	-0.641	-13.186	0.008
			Max. My	2	-0.638	-0.001	13.194
			Max. Vy	5	2.883	-13.186	0.008
			Max. Vx	2	-2.884	-0.001	13.194
			Max. Torque	24			-0.008
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-1.429	-0.000	0.012
			Max. Mx	5	-0.671	-14.634	0.012
L2	156.5 - 156	Pole	Max. My	2	-0.668	-0.002	14.643
			Max. Vy	5	2.911	-14.634	0.012
			Max. Vx	2	-2.912	-0.002	14.643
			Max. Torque	24			-0.008
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-10.800	-0.020	0.046
			Max. Mx	5	-7.038	-161.412	0.072
			Max. My	2	-7.028	-0.017	161.493
			Max. Vy	5	12.586	-161.412	0.072
			Max. Vx	2	-12.592	-0.017	161.493
L3	156 - 132.67	Pole	Max. Torque	19			0.036
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-20.062	-0.352	0.724
			Max. Mx	5	-15.190	-858.518	6.636
			Max. My	2	-15.162	-0.700	868.043
			Max. Vy	5	18.168	-858.518	6.636
			Max. Vx	2	-18.459	-0.700	868.043
			Max. Torque	20			0.329
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-31.636	-0.650	0.724
L4	132.67 - 87.0867	Pole	Max. Mx	5	-25.949	-1730.012	13.363
			Max. My	2	-25.934	-1.624	1751.902
			Max. Vy	5	22.363	-1730.012	13.363
			Max. Vx	2	-22.653	-1.624	1751.902
			Max. Torque	20			0.486
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-49.023	-1.023	0.724
			Max. Mx	5	-42.270	-2928.669	20.886
			Max. My	2	-42.269	-2.671	2964.431
			Max. Vy	5	26.502	-2928.669	20.886
L5	87.0867 - 43	Pole	Max. Vx	2	-26.783	-2.671	2964.431
			Max. Torque	20			0.647
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-49.023	-1.023	0.724
			Max. Mx	5	-42.270	-2928.669	20.886
			Max. My	2	-42.269	-2.671	2964.431
			Max. Vy	5	26.502	-2928.669	20.886
			Max. Vx	2	-26.783	-2.671	2964.431
			Max. Torque	20			0.647
			Max Tension	1	0.000	0.000	0.000
L6	43 - 0	Pole	Max. Compression	14	-49.023	-1.023	0.724
			Max. Mx	5	-42.270	-2928.669	20.886
			Max. My	2	-42.269	-2.671	2964.431
			Max. Vy	5	26.502	-2928.669	20.886
			Max. Vx	2	-26.783	-2.671	2964.431
			Max. Torque	20			0.647
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-49.023	-1.023	0.724
			Max. Mx	5	-42.270	-2928.669	20.886
			Max. My	2	-42.269	-2.671	2964.431

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	49.023	0.000	0.000
	Max. H ₁	11	42.285	26.477	0.115
	Max. H ₂	2	42.285	-0.018	26.758
	Max. M ₁	2	2964.431	-0.018	26.758
	Max. M ₂	5	2928.669	-26.477	0.150
	Max. Torsion	20	0.647	-11.532	-20.359

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Project

171' EEI Monopole / App ID: 86688; Rev: 2

Date

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Client

Crown Castle USA, Inc.

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Terry Carter

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. Vert	2	42.285	-0.018	26.758
	Min. H _x	5	42.285	-26.477	0.150
	Min. H _z	8	42.285	0.018	-26.702
	Min. M _x	8	-2955.663	0.018	-26.702
	Min. M _z	11	-2927.694	26.477	0.115
	Min. Torsion	26	-0.646	11.718	20.252

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	42.285	0.000	0.000	-0.547	-0.470	0.000
Dead+Wind 0 deg - No Ice	42.285	0.018	-26.758	-2964.431	-2.671	0.540
Dead+Wind 30 deg - No Ice	42.285	13.370	-23.030	-2547.757	-1482.296	0.348
Dead+Wind 60 deg - No Ice	42.285	22.979	-13.368	-1480.756	-2543.003	0.080
Dead+Wind 90 deg - No Ice	42.285	26.477	-0.150	-20.886	-2928.669	-0.209
Dead+Wind 120 deg - No Ice	42.285	23.010	13.364	1479.624	-2547.419	-0.461
Dead+Wind 150 deg - No Ice	42.285	13.109	23.145	2562.545	-1447.126	-0.590
Dead+Wind 180 deg - No Ice	42.285	-0.018	26.702	2955.663	1.697	-0.541
Dead+Wind 210 deg - No Ice	42.285	-13.140	23.163	2564.722	1449.932	-0.347
Dead+Wind 240 deg - No Ice	42.285	-23.028	13.395	1483.403	2548.621	-0.080
Dead+Wind 270 deg - No Ice	42.285	-26.477	-0.115	-16.518	2927.694	0.209
Dead+Wind 300 deg - No Ice	42.285	-22.961	-13.337	-1476.976	2539.850	0.460
Dead+Wind 330 deg - No Ice	42.285	-13.339	-23.012	-2545.578	1477.542	0.589
Dead+Ice	49.023	0.000	0.000	-0.724	-1.023	0.000
Dead+Wind 0 deg+Ice	49.023	0.017	-23.535	-2672.730	-3.169	0.607
Dead+Wind 30 deg+Ice	49.023	11.748	-20.269	-2299.046	-1335.416	0.406
Dead+Wind 60 deg+Ice	49.023	20.201	-11.761	-1335.676	-2292.277	0.111
Dead+Wind 90 deg+Ice	49.023	23.278	-0.124	-17.673	-2640.143	-0.214
Dead+Wind 120 deg+Ice	49.023	20.223	11.754	1333.588	-2295.566	-0.497
Dead+Wind 150 deg+Ice	49.023	11.532	20.359	2310.185	-1306.158	-0.647
Dead+Wind 180 deg+Ice	49.023	-0.017	23.490	2664.956	1.031	-0.607
Dead+Wind 210 deg+Ice	49.023	-11.562	20.376	2312.280	1307.656	-0.406
Dead+Wind 240 deg+Ice	49.023	-20.240	11.784	1337.222	2295.523	-0.111
Dead+Wind 270 deg+Ice	49.023	-23.278	-0.090	-13.472	2638.004	0.214
Dead+Wind 300 deg+Ice	49.023	-20.184	-11.732	-1332.040	2288.043	0.496
Dead+Wind 330 deg+Ice	49.023	-11.718	-20.252	-2296.950	1329.643	0.646
Dead+Wind 0 deg - Service	42.285	0.006	-9.281	-1030.929	-1.246	0.188
Dead+Wind 30 deg - Service	42.285	4.637	-7.988	-886.059	-515.597	0.121
Dead+Wind 60 deg - Service	42.285	7.970	-4.636	-515.123	-884.350	0.027
Dead+Wind 90 deg - Service	42.285	9.184	-0.052	-7.616	-1018.460	-0.074
Dead+Wind 120 deg - Service	42.285	7.981	4.635	513.969	-885.882	-0.160
Dead+Wind 150 deg - Service	42.285	4.547	8.027	890.414	-503.415	-0.204
Dead+Wind 180 deg - Service	42.285	-0.006	9.261	1027.122	0.267	-0.188
Dead+Wind 210 deg - Service	42.285	-4.558	8.034	891.170	503.746	-0.121
Dead+Wind 240 deg - Service	42.285	-7.987	4.646	515.278	885.659	-0.027
Dead+Wind 270 deg - Service	42.285	-9.184	-0.040	-6.103	1017.481	0.074
Dead+Wind 300 deg - Service	42.285	-7.964	-4.626	-513.814	882.615	0.160
Dead+Wind 330 deg - Service	42.285	-4.626	-7.982	-885.302	513.308	0.204

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Project

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Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-42.285	0.000	0.000	42.285	0.000	0.000%
2	0.018	-42.285	-26.760	-0.018	42.285	26.758	0.004%
3	13.370	-42.285	-23.030	-13.370	42.285	23.030	0.000%
4	22.979	-42.285	-13.368	-22.979	42.285	13.368	0.000%
5	26.479	-42.285	-0.150	-26.477	42.285	0.150	0.004%
6	23.010	-42.285	13.364	-23.010	42.285	-13.364	0.000%
7	13.109	-42.285	23.145	-13.109	42.285	-23.145	0.000%
8	-0.018	-42.285	26.704	0.018	42.285	-26.702	0.004%
9	-13.140	-42.285	23.163	13.140	42.285	-23.163	0.000%
10	-23.028	-42.285	13.396	23.028	42.285	-13.395	0.000%
11	-26.479	-42.285	-0.115	26.477	42.285	0.115	0.004%
12	-22.961	-42.285	-13.337	22.961	42.285	13.337	0.000%
13	-13.339	-42.285	-23.013	13.339	42.285	23.012	0.000%
14	0.000	-49.023	0.000	0.000	49.023	0.000	0.000%
15	0.017	-49.023	-23.538	-0.017	49.023	23.535	0.005%
16	11.748	-49.023	-20.269	-11.748	49.023	20.269	0.000%
17	20.201	-49.023	-11.761	-20.201	49.023	11.761	0.000%
18	23.280	-49.023	-0.124	-23.278	49.023	0.124	0.005%
19	20.223	-49.023	11.754	-20.223	49.023	-11.754	0.000%
20	11.532	-49.023	20.359	-11.532	49.023	-20.359	0.000%
21	-0.017	-49.023	23.493	0.017	49.023	-23.490	0.005%
22	-11.562	-49.023	20.376	11.562	49.023	-20.376	0.000%
23	-20.240	-49.023	11.784	20.240	49.023	-11.784	0.000%
24	-23.280	-49.023	-0.090	23.278	49.023	0.090	0.005%
25	-20.184	-49.023	-11.732	20.184	49.023	11.732	0.000%
26	-11.718	-49.023	-20.252	11.718	49.023	20.252	0.000%
27	0.006	-42.285	-9.281	-0.006	42.285	9.281	0.002%
28	4.637	-42.285	-7.988	-4.637	42.285	7.988	0.001%
29	7.970	-42.285	-4.636	-7.970	42.285	4.636	0.001%
30	9.184	-42.285	-0.052	-9.184	42.285	0.052	0.002%
31	7.981	-42.285	4.635	-7.981	42.285	-4.635	0.001%
32	4.547	-42.285	8.028	-4.547	42.285	-8.027	0.001%
33	-0.006	-42.285	9.262	0.006	42.285	-9.261	0.002%
34	-4.558	-42.285	8.034	4.558	42.285	-8.034	0.001%
35	-7.987	-42.285	4.646	7.987	42.285	-4.646	0.001%
36	-9.184	-42.285	-0.040	9.184	42.285	0.040	0.002%
37	-7.964	-42.285	-4.626	7.964	42.285	4.626	0.001%
38	-4.626	-42.285	-7.982	4.626	42.285	7.982	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	8	0.00006952	0.00008495
3	Yes	12	0.00000001	0.00013667
4	Yes	12	0.00000001	0.00013631
5	Yes	8	0.00006959	0.00012084
6	Yes	12	0.00000001	0.00013565
7	Yes	12	0.00000001	0.00013473
8	Yes	8	0.00006955	0.00007991
9	Yes	12	0.00000001	0.00013409
10	Yes	12	0.00000001	0.00013647

RISATower B & T Engineering 1717 South Boulder Tulsa, OK 74159 Phone: 918-587-4630 FAX: 918-295-0265	Job	80964 - BRG 126 943086, CT (BU #806355)	Page	11 of 13
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11	Yes	8	0.00006959	0.00011124
12	Yes	12	0.00000001	0.00013633
13	Yes	12	0.00000001	0.00013527
14	Yes	4	0.00000001	0.00000001
15	Yes	8	0.00009928	0.00009817
16	Yes	12	0.00000001	0.00014215
17	Yes	12	0.00000001	0.00014167
18	Yes	8	0.00009936	0.00012587
19	Yes	12	0.00000001	0.00014058
20	Yes	12	0.00000001	0.00014022
21	Yes	8	0.00009931	0.00009232
22	Yes	12	0.00000001	0.00013918
23	Yes	12	0.00000001	0.00014151
24	Yes	8	0.00009937	0.00011665
25	Yes	12	0.00000001	0.00014166
26	Yes	12	0.00000001	0.00014021
27	Yes	8	0.00007292	0.00003423
28	Yes	9	0.00000001	0.00009489
29	Yes	9	0.00000001	0.00009452
30	Yes	8	0.00007293	0.00003439
31	Yes	9	0.00000001	0.00009273
32	Yes	9	0.00000001	0.00009384
33	Yes	8	0.00007292	0.00003397
34	Yes	9	0.00000001	0.00009208
35	Yes	9	0.00000001	0.00009386
36	Yes	8	0.00007293	0.00003420
37	Yes	9	0.00000001	0.00009501
38	Yes	9	0.00000001	0.00009256

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	171 - 156.5	36.752	27	1.903	0.001
L2	156.5 - 156	31.001	27	1.867	0.001
L3	156 - 132.67	30.806	27	1.866	0.001
L4	136.337 - 87.0867	23.398	27	1.689	0.001
L5	91.92 - 43	10.159	27	1.097	0.000
L6	49 - 0	2.769	27	0.525	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
167.000	RV90-17-02DP w/Mount Pipe	27	35.155	1.891	0.001	30366
158.000	(2) WPA-80090/4CF	27	31.589	1.869	0.001	12541
155.000	Platform Mount [LP 302-1]	27	30.415	1.864	0.001	11643
148.000	(2) 7770.00	27	27.715	1.822	0.001	7824
146.000	Platform Mount [LP 302-1]	27	26.957	1.803	0.001	7035
140.000	DR65-18-02DPL2Q	27	24.724	1.735	0.001	5404
138.000	Platform Mount [LP 302-1]	27	23.996	1.710	0.001	5054
132.000	A-ANT-23G-2-C	27	21.873	1.634	0.001	4663
128.000	LLPX310R	27	20.509	1.583	0.001	4601
118.000	Side Arm Mount [SQ 301-1]	27	17.283	1.456	0.001	4455

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Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	171 - 156.5	105.306	2	5.444	0.002
L2	156.5 - 156	88.869	2	5.344	0.002
L3	156 - 132.67	88.311	2	5.342	0.002
L4	136.337 - 87.0867	67.118	2	4.840	0.002
L5	91.92 - 43	29.176	2	3.150	0.001
L6	49 - 0	7.959	2	1.510	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
167.000	RV90-17-02DP w/Mount Pipe	2	100.743	5.411	0.002	11145
158.000	(2) WPA-80090/4CF	2	90.550	5.351	0.002	4593
155.000	Platform Mount [LP 302-1]	2	87.195	5.337	0.002	4235
148.000	(2) 7770.00	2	79.472	5.219	0.002	2806
146.000	Platform Mount [LP 302-1]	2	77.301	5.165	0.002	2518
140.000	DR65-18-02DPL2Q	2	70.911	4.971	0.002	1925
138.000	Platform Mount [LP 302-1]	2	68.829	4.900	0.002	1798
132.000	A-ANT-23G-2-C	2	62.750	4.682	0.002	1655
128.000	LLPX310R	2	58.844	4.535	0.002	1631
118.000	Side Arm Mount [SO 301-1]	2	49.602	4.164	0.002	1575

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	171 - 156.5 (1)	TP10.75x10.75x0.365	14.500	0.000	0.0	21.000	11.902	-0.639	249.947	0.003
L2	156.5 - 156 (2)	TP19.5x10.75x0.365	0.500	0.000	0.0	39.000	12.031	-0.639	469.214	0.001
L3	156 - 132.67 (3)	TP24.79x19.5x0.188	23.330	0.000	0.0	39.000	14.147	-7.028	551.724	0.013
L4	132.67 - 87.0867 (4)	TP34.63x23.584x0.375	49.250	0.000	0.0	39.000	39.482	-15.162	1539.790	0.010
L5	87.0867 - 43 (5)	TP43.75x32.796x0.438	48.920	0.000	0.0	39.000	58.279	-25.934	2272.890	0.011
L6	43 - 0 (6)	TP52.5x41.531x0.5	49.000	0.000	0.0	39.000	82.524	-42.269	3218.440	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	171 - 156.5 (1)	TP10.75x10.75x0.365	13.197	-5.298	23.100	0.229	0.000	0.000	23.100	0.000
L2	156.5 - 156 (2)	TP19.5x10.75x0.365	13.194	-5.275	39.000	0.135	0.000	0.000	39.000	0.000
L3	156 - 132.67 (3)	TP24.79x19.5x0.188	161.493	-23.354	39.000	0.599	0.000	0.000	39.000	0.000
L4	132.67 -	TP34.63x23.584x0.375	868.042	-32.343	39.000	0.829	0.000	0.000	39.000	0.000

APPENDIX B
BASE LEVEL DRAWING

RISATower B & T Engineering 1717 South Boulder Tulsa, OK 74159 Phone: 918-587-4630 FAX: 918-295-0265	Job	80964 - BRG 126 943086, CT (BU #806355)	Page 13 of 13
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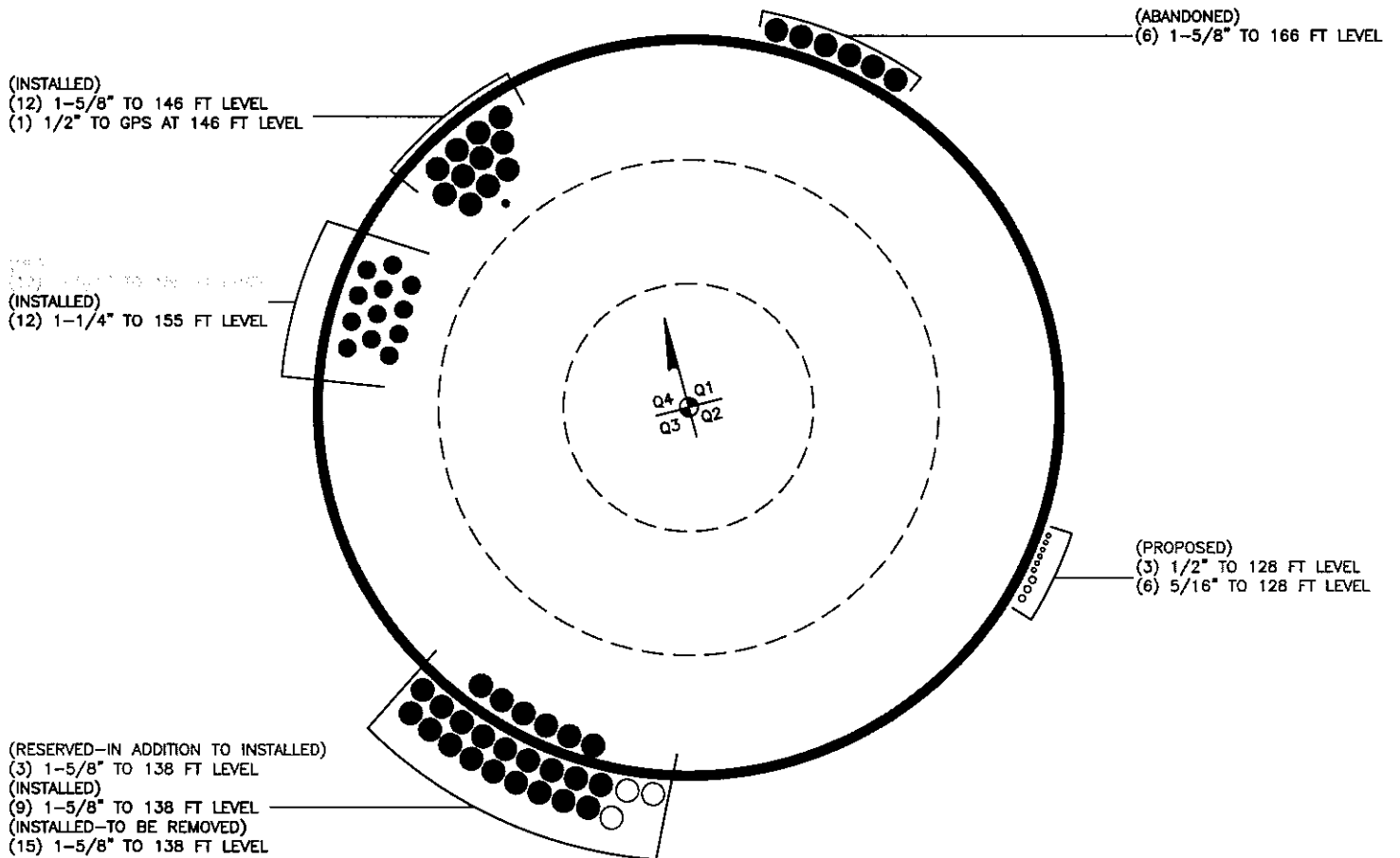
Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L5	87.0867 (4) 87.0867 - 43 (5)	TP43.75x32.796x0.438	1751.90 0	-34.920	39.000	0.895	0.000	0.000	39.000	0.000
L6	43 - 0 (6)	TP52.5x41.531x0.5	2964.43 3	-33.653	39.000	0.863	0.000	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	171 - 156.5 (1)	TP10.75x10.75x0.365	0.003	0.229	0.000	0.232 ✓	1.333	H1-3 ✓
L2	156.5 - 156 (2)	TP19.5x10.75x0.365	0.001	0.135	0.000	0.137 ✓	1.333	H1-3 ✓
L3	156 - 132.67 (3)	TP24.79x19.5x0.188	0.013	0.599	0.000	0.612 ✓	1.333	H1-3 ✓
L4	132.67 - 87.0867 (4)	TP34.63x23.584x0.375	0.010	0.829	0.000	0.839 ✓	1.333	H1-3 ✓
L5	87.0867 - 43 (5)	TP43.75x32.796x0.438	0.011	0.895	0.000	0.907 ✓	1.333	H1-3 ✓
L6	43 - 0 (6)	TP52.5x41.531x0.5	0.013	0.863	0.000	0.876 ✓	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail
L1	171 - 156.5	Pole	TP10.75x10.75x0.365	1	-0.639	333.179	17.4	Pass
L2	156.5 - 156	Pole	TP19.5x10.75x0.365	2	-0.639	625.462	10.2	Pass
L3	156 - 132.67	Pole	TP24.79x19.5x0.188	3	-7.028	735.448	45.9	Pass
L4	132.67 - 87.0867	Pole	TP34.63x23.584x0.375	4	-15.162	2052.540	63.0	Pass
L5	87.0867 - 43	Pole	TP43.75x32.796x0.438	5	-25.934	3029.762	68.0	Pass
L6	43 - 0	Pole	TP52.5x41.531x0.5	6	-42.269	4290.180	65.7	Pass
							Summary	
							Pole (L5)	68.0
							RATING =	68.0
								Pass



BUSINESS UNIT: 806355 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

Site Data

BU#:	806355
Site Name:	BRG 126 943086, CT
App #:	86688; Rev: 2
Connection Type:	Butt
Pole Manufacturer:	Other

Bolt Data

Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty:
N/A:	55	<-- Disregard	44.00
Circle (in.):	25.75		

Plate Data

Diam:	28.5	in
Thick, t:	1.5	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	2.58	in

Stiffener Data (Welding at Both Sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	60	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	6	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data

Diam:	19.5	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor

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

Reactions

Moment:	13.2	ft-kips
Axial:	0.64	kips
Shear:	2.88	kips
Elevation:	156	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:	1.00 Kips
Min. PL "tc" for B cap. w/o Pry:	2.177 in
Min PL "treq" for actual T w/ Pry:	0.255 in
Min PL "t1" for actual T w/o Pry:	0.320 in
T allowable with Prying:	31.95 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	1.00 kips
Prying Bolt Stress Ratio=(T+Q)/(B):	2.2% Pass

Exterior Flange Plate Results

Compression Side Plate Stress:	1.8 ksi
Allowable Plate Stress:	60.0 ksi
Compression Plate Stress Ratio:	3.0% Pass
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	2.9% Pass

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
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Rigid

Service, ASD

Fty*ASIF

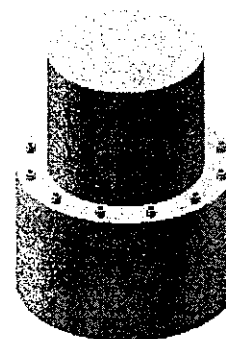
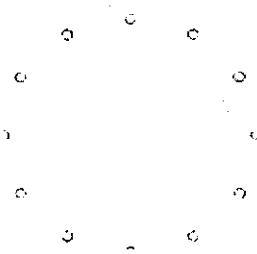
0≤α≤1 case

Rigid

Service ASD

0.75*Fy*ASIF

Comp. Y.L. Length:
16.82



* 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#: 806355
Site Name: BRG 126 943086, CT
App #: 86688; Rev: 2
Connection Type: But

Reactions

Moment:	2964	ft-kips
Axial:	42	kips
Shear:	27	kips

Anchor Rod Data

Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	150	ksi
Yield (Fy):	75	ksi
Bolt Circle:	61	in

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

Anchor Rod Results

Maximum Rod Tension: 114.5 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 58.7% Pass

Rigid
Service, ASD
Fty*ASIF

Plate Data

Diam:	67	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	8.33	in

Base Plate Results

Base Plate Stress: 43.0 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 71.7% Pass

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
31.06

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	60	<-- Disregard
Fillet H. Weld:	0.375	in
Fillet V. Weld:	0.375	in
Width:	3	in
Height:	5	in
Thick:	0.375	in
Notch:	0	in
Grade:	36	ksi
Weld str.:	70	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

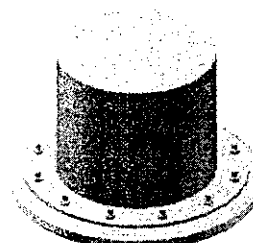
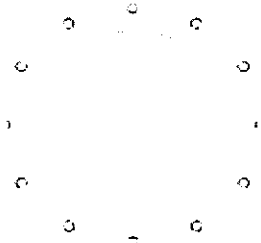
Pole Punching Shear Check: n/a

Pole Data

Diam:	52.5	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor

ASIF:	1.333	
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* 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

Slab Size

Program: P&P- Mono.xls

Date: 9/23/2009

File Name: 80964

Location: BRG 126 943086, CT

INPUT Bold Values Only are Input

22.00 Length, L (ft.)	Conc. Unit Weight	0.15 kcf
22.00 Width, B (ft.)	Soil Unit Weight	0.135 kcf
3.00 Thickness, T (ft)		
1.00 Height of Pier Above Grade, (ft.)		
9.00 Depth to Base, D (ft.)		
1.00 Round Pedestal =0, Else Square Pedestal		
7.00 Pedestal Diameter or Width, (ft.)		
36.00 Phi Angle, (deg.)	0.6283 Phi in Radians	
0.00 Cohesion, c (ksf)		
4000 Conc. f'c, (psi)		
1.30 USD Load Factor		
12.00 Net Allow Bearing Stress, include Code Increase when approp., (ksf)		
1.50 Allow O.T. Factor of Safety		
2964 Tower O.T. Moment, (ft.-kips)	O.T. Moment @ fdn Bas	3234.00 ft.-kips
42 Leg Download, kips		
0 Leg Uplift, kips		
27 Leg Shear, kips		

Check of Punching Shear

31.50 d, top of conc. To middle of bottom rebar mat, (in.)
 462.00 Bo, The circumference at d/2 from face of pier, (in.)
 54.6 Factored Leg Download, (kips)
 3129.4 Phi*Vn, Conc. 2-way Shear Resistance, (kips)

Check of One Way Shear Shear

312.2 Factored Shear at Face of Pier
 894.1 Phi*Vn, Conc. 1-way Shear Resistance, (kips)

Mat Thickness is acceptable

66.48 Concrete Volume (c.y.)

Slab Size

Program: P&P- Mono.xls
 File Name: 80964
 Location: BRG 126 943086, CT

Check Net Vert. Soil Pressure Eccentricity = 4.87 > 3.67 ft. (L/6)

Vert. Loads in kips

42.00 Tower

352.35 Soil

269.25 Conc

RESULTANT IS OUTSIDE MIDDLE THIRD OF THE PAD

L-PRIME= 18.38

663.60 Sum of the Verticals, (kips)

0.00 Net q-min. (ksf)

2.07 Net q-max, (ksf))

Status: OK 17.2%

2.84 O.T. Factor of Safety

Status: OK 52.8%

2.02 q-Bottom Design, (ksf)

The Net q-max minus the opposing effect of conc DW

1.26 q-TopDesign, (ksf)

Deadweight TO BE USED FOR CONCRETE SLAB DESIGN
 of top mat reinforcing steel

Conservatively assume maximum moment at the pier centerline with maximum mat edge distance

Pier Design, Max Moment = 37836 in.-kips

Pad Bottom Design, Moment Arm: 7.50 ft.

Pad Bottom Design, Max Moment: 3754 in.-kips

Pad Top Design, Moment Arm: 7.50 ft.

Pad Top Design, Max Moment: 2339 in.-kips

Use the above moments in the Pier, Pad Bottom & Top design sheets
 in this Workbook to determine reinforcing steel requirements.



3530 Toringdon Way
Suite 300
Charlotte, NC 28277

Tel: 704 405.6600
www.crowncastle.com

Wednesday October 28, 2009

RE: **Crown Castle USA Inc., Letter of Authorization (LOA)**

Crown Castle USA Inc., does hereby authorize **Clearwire** and its authorized contractors/agents to act as "Applicant" in the processing of all applications, permits, research and other related activities associated with the processing, planning, design review, permitting, entitlement and construction of additional equipment, antennas and site improvements for the **Crown Castle USA Inc.,** existing wireless communications facility described as follows:

Customer Site Name:	CT-BDRO058	Crown Castle Site ID Number:	BU# 806355
Site Address:	281 Woodhouse Road Fairfield, CT	Crown Site Name:	BRG 126 943086

This authorization is fully contingent upon **Clearwire** and **Clearwire's** authorized contractors/agents' compliance with the following conditions:

1. **Crown Castle USA Inc.,** must review the application prior to submittal. **Crown Castle USA Inc.,** must be provided all applications, narratives, drawings and attachments at least 72 hours in advance of their submittal to the locality. Use of email and electronic attachments is encouraged. A **Crown Castle USA Inc.,** Zoning Subject Matter Expert (SME) will review and provide written comment to the customer within 48 hours of receipt of a complete set of application materials. If **Crown Castle USA Inc.,** indicates that changes are required, submissions shall be altered in accordance with **Crown Castle USA Inc.,** comments prior to submission to the locality. Verification of corrections should also be accomplished via emails and attachments.
2. In no event may **Clearwire** encourage, suggest, participate in, or permit the imposition of any restrictions or additional obligations whatsoever on the tower site or **Crown Castle USA Inc.,** current or future use or ability to license space at the tower site, as part of or in exchange for obtaining any approval, permit, exception or variance.
3. A copy of the final permit and/or a written summary of the zoning/entitlement decision rendered by the locality and any/all conditions placed on that decision shall be communicated in detail to **Crown Castle USA Inc.,** well within the appeal period provided by the locality (typically 10-15 days).
4. All conditions of approval pertinent to the construction of the proposed project must be included in the construction drawings for the project. The conditions of approval pertinent to the construction of the project shall be copied verbatim from the zoning permit approval language, and shall be present in the drawings prior to submission for building permits and contractor bidding. **Crown Castle USA Inc.,** shall verify the inclusion of appropriate conditions of approval in the construction drawing redline process.
5. **Crown Castle USA Inc.,** will provide a Notice To Proceed (NTP) to construction to the customer upon receipt of the final approved zoning permit and the approved Building Permit.

Crown Castle USA Inc.,

Signature:

Printed Name: Paul Hughey

Title: Property Specialist

704 405-6571



To: HPC
From: Julius De La Cruz – Radio Frequency Engineer
Cc: Cameron Syme
Subject: Power Density Report for CT-BDR0058
Date: October 11, 2009

1. Introduction:

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a Self Support Tower at 281 Woodhouse Road, Fairfield, CT 06824. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location:

2: Discussion:

The following assumptions were used in the calculations:

- 1) The emissions from Clearwire transmitters are in the (2496 – 2960) Frequency Band
- 2) The emissions from the Clearwire Microwave dishes are in the 23 GHz Frequency Band
- 3) The model number for Clearwire Antenna is Argus LLPX310R
- 4) The model number for the Microwave dish is Andrew VHLP1-23 with 12" Diameter.
- 5) The Clearwire Panel antenna centerline is 128 feet.
- 6) The Clearwire Microwave dish centerline is 132 feet.
- 7) The Maximum Transmit power from any Clearwire panel antenna is 251 Watts Effective Isotropic Radiated Power (EiRP) assuming 2 channels per sector.
- 8) The Maximum Transmit power from any Clearwire Microwave Dish is 346 Watts Effective Isotropic Radiated Power (EiRP) assuming 1 channel per dish.
- 9) All antennas are simultaneously transmitting and receiving 24 hours per day.
- 10) The average ground level of the studied area does not change significantly with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were used with the above information to perform the calculations.

3: Conclusion:

Based on the above worst case assumptions, the power density calculation from the Clearwire antenna installation on a Self Support Tower at 281 Woodhouse Road, Fairfield, CT 06824 is 0.0000006 mW/cm². This value represents 0.000063% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm²) set forth in the FCC/ANSI/IEEE C95-1-1991. Furthermore, the proposed antenna location for Clearwire will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

The combined Power Density from all other carriers is 35.58 %. The combined Power Density for this site is 35.580063% of the M.P.E. standard.