

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

ORIGINAL

February 17, 2009

RECEIVED
FEB 19 2009

CONNECTICUT
SITING COUNCIL

Michael Perrone
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Cellco Partnership d/b/a Verizon Wireless
Exempt Modification Approval**

Dear Mr. Perrone:

Enclosed you will find a letter from Aaron C. Poot, P.E. with Crown Castle, confirming that the Verizon Wireless antenna installation was completed in accordance with the requirements of the Structural Analysis submitted as a part of the referenced exempt modification filing. The attached letter relates specifically to the following Siting Council filing.

1. EM-VER-038-080522
Durham- Old Blue Hills Road, Durham, CT

If you have any questions regarding any of these materials, please do not hesitate to contact me or Rachel Mayo.

Sincerely,



Kenneth C. Baldwin



Law Offices

BOSTON

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

SARASOTA

www.rc.com

Enclosures

Copy to:

Sandy M. Carter
Brian Ragozzine
Mark Gauger

HART1-1528475-1

Date: February 10, 2009

Veronica Harris
Crown Castle USA Inc.
1200 McArthur Blvd
Mahwah, NJ 07430



Crown Castle USA Inc.
2000 Corporate Drive
Canonsburg, PA 15137
(724) 416 2885

Subject: Structural Analysis Report

Carrier Designation: VERIZON WIRELESS Co-Locate
Carrier Site Number: HRT 106
Carrier Site Name: Durham, CT

Crown Castle Designation: **Crown Castle BU Number:** 806364
Crown Castle Site Name: HRT 106(B) 943202
Crown Castle JDE Job Number: 101930
Crown Castle Work Order Number: 253068

Engineering Firm Designation: **Crown Castle USA Inc. Project Number:** 253068

Site Data: **101 R OLD BLUE HILL ROAD, DURHAM, Middlesex County, CT**
Latitude 41° 27' 33.67", Longitude -72° 39' 45.83"
120 Foot - Monopole Tower

Dear Veronica Harris,

Crown Castle USA 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 253068, in accordance with application 59383, revision 5.

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 local code requirements 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.

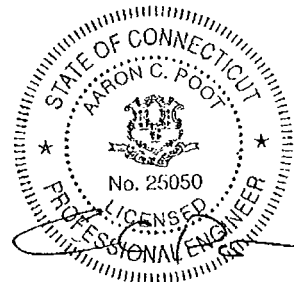
We at Crown Castle USA Inc. appreciate the opportunity of providing our continuing professional services to you and Crown Castle USA Inc. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Gursimran Singh, Engineer I

Respectfully submitted by:

A handwritten signature in black ink, appearing to read 'A.C. Poot'.

Aaron C. Poot, P.E.
Engineering Supervisor



2/12/09

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 5 - Tower Component Stresses vs. Capacity

4.1) Recommendations

5) APPENDIX A

RISATower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by VALMONT in March of 1994. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E. The monopole was extended 20 feet in 2004 by Vertical Structures.

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
98	100	6	antel	LPA-80080/6CF w/ Mount Pipe	12	1-5/8	

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			
118	125	1	decibel	DB809MT3-XT	2	7/8	1			
	123	1	decibel	DB201-A						
	118	2	tower mounts	Side Arm Mount [SO 701-1]						
115	115	12	decibel	DB844G90A-XY w/Mount Pipe	12	1-5/8	3			
		12	decibel	DB844H90 w/Mount Pipe	12	1-1/4	1			
		1	tower mounts	Platform Mount [LP 304-1]						
107	107	1	andrew	KP6-17B	1	1/2	1			
		1	tower mounts	Pipe Mount [PM 601-1]						
98	100	6	decibel	DB950F85T2E-M w/Mount Pipe	3	1-5/8	1			
		3	swedcom	ALP 9212-N w/Mount Pipe				12	7/8	4
		6	swedcom	ALP 9212-N w/Mount Pipe						
	98	1	tower mounts	Platform Mount [LP 602-1]			1			
87	89	6	decibel	DB980H90E-M w/Mount Pipe	6	7/8	1			
		3	decibel	DB980H65E-M w/Mount Pipe	3	7/8	2			
	87	-	-	-	9	1-5/8	5			
	87	1	tower mounts	Platform Mount [LP 602-1]			1			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
73	79	2	decibel	DB809K-YP	2	7/8	1
	74	6	powerwave technologies	7770.00 w/ Mount Pipe	12	7/8	2
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21903			
73	1	tower mounts	Platform Mount [LP 702-1]			1	
50	57	1	rfs celwave	PD1142-1	3 1	7/8 1/2	1
	54	1	decibel	ASP-655			
	53	1	rfs celwave	PD1121-6			
	50	1	decibel	DB492A			
		1	tower mounts	Side Arm Mount [SO 701-3]			
40	41	1	tekelec systemes	EPSILON GPS ANTENNA 35 DB	1	1/2	1
	40	1	tower mounts	Side Arm Mount [SO 701-1]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) SLA equipment controlling
 4) Equipment to be Replaced; not included in this analysis
 5) SLA Feedlines Controlling

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	97	12	Generic	8RL41OC4R105		
87	87	9	Generic	8RL41OC4R105		
75	75	1	Generic	A8P710		
		1	Telewave	450F6		
50	50	1	Generic	A8P701		
		1	Generic	A8P710		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	262150	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering	297341	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	262153	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Valmont	942187	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Vertical Structures	946871	CCISITES

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) Tower and structures were built in accordance with the manufacturer's specifications.
 - 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
 - 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
 - 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
 - 5) The base plate grout was not considered in this analysis.
- This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle USA Inc. 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	120 - 100	Pole	TP20.263x15.403x0.1875	1	-3.85	630.11	30.5	Pass	
L2	100 - 47.0833	Pole	TP33.13x20.263x0.281	2	-12.98	1488.95	93.2	Pass	
L3	47.0833 - 0	Pole	TP44x31.3725x0.375	3	-24.24	2738.53	88.4	Pass	
							Summary		
							Pole (L2)	93.2	Pass
							RATING =	93.2	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	82.9	Pass
1	Base Plate	0	53.9	Pass
1	Base Foundation	0	40.7	Pass

Structure Rating (max from all components) =	93.2%
-----------------------------------------------------	--------------

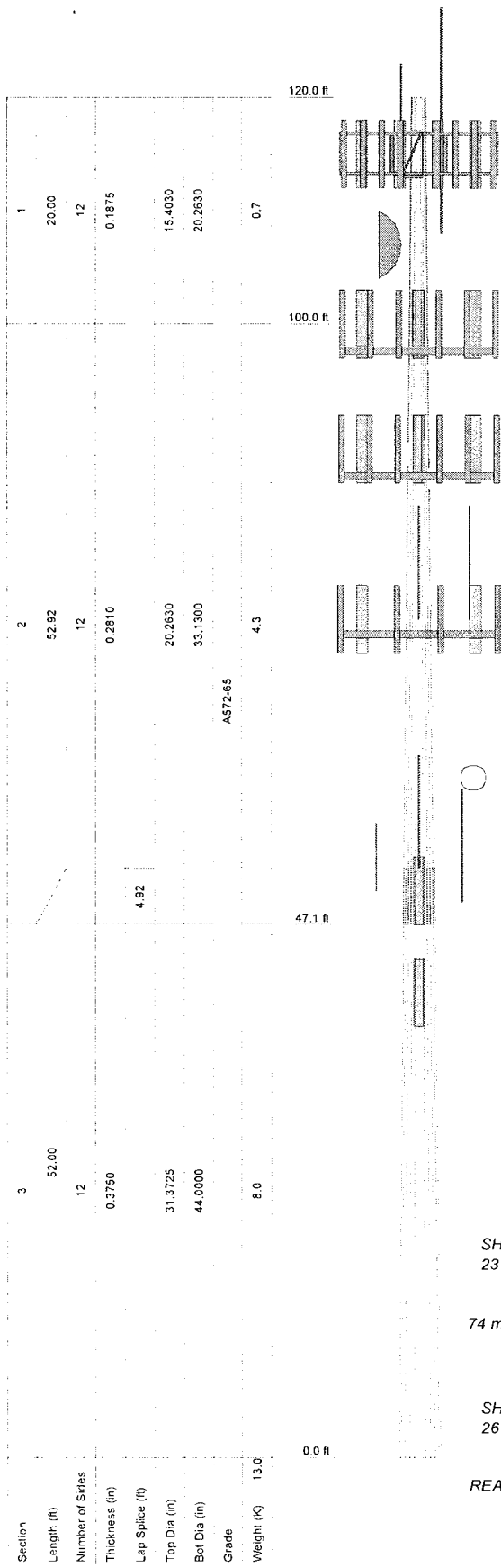
Notes:

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

4.1) Recommendations

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

APPENDIX A
RISA TOWER OUTPUT



DESIGNED APPURTENANCE LOADING

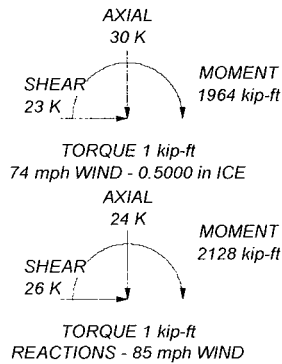
TYPE	ELEVATION	TYPE	ELEVATION
DB809MT3-XT	118	DB980H65E-M w/ Mount Pipe	87
DB201-A	118	Platform Mount [LP 602-1]	87
Side Arm Mount [SO 701-1]	118	(2) DB980H90E-M w/ Mount Pipe	87
Side Arm Mount [SO 701-1]	118	DB809K-YP	73
(4) DB844G90A-XY w/ Mount Pipe	115	(2) 7770.00 w/ Mount Pipe	73
(4) DB844G90A-XY w/ Mount Pipe	115	(2) 7770.00 w/ Mount Pipe	73
(4) DB844G90A-XY w/ Mount Pipe	115	(2) 7770.00 w/ Mount Pipe	73
Platform Mount [LP 304-1]	115	(2) LGP21401	73
Pipe Mount [PM 601-1]	107	(2) LGP21401	73
KP6-17B	107	(2) LGP21401	73
ALP 9212-N w/ Mount Pipe	98	(2) LGP21903	73
ALP 9212-N w/ Mount Pipe	98	(2) LGP21903	73
(2) DB950F85T2E-M w/ Mount Pipe	98	(2) LGP21903	73
(2) DB950F85T2E-M w/ Mount Pipe	98	Platform Mount [LP 702-1]	73
(2) DB950F85T2E-M w/ Mount Pipe	98	4" x 3" Pipe Mount	73
(2) LPA-80080/6CF w/ Mount Pipe	98	DB809K-YP	73
(2) LPA-80080/6CF w/ Mount Pipe	98	ASP-655	50
(2) LPA-80080/6CF w/ Mount Pipe	98	PD1142-1	50
Platform Mount [LP 602-1]	98	PD1121-6	50
ALP 9212-N w/ Mount Pipe	98	Side Arm Mount [SO 701-3]	50
(2) DB980H90E-M w/ Mount Pipe	87	DB492A	50
(2) DB980H90E-M w/ Mount Pipe	87	Side Arm Mount [SO 701-1]	40
DB980H65E-M w/ Mount Pipe	87	EPSILON GPS ANTENNA 35 DB	40
DB980H65E-M w/ Mount Pipe	87		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex 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: 93.2%



Section	Length (ft)	Number of Sides	Thickness (in)	Lap Splice (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	20.00	12	0.1875		15.4030	20.2630	A572-65	0.7
2	52.92	12	0.2810	4.92	20.2630	33.1300	A572-65	4.3
3	52.00	12	0.3750		31.3725	44.0000	A572-65	8.0

<p>Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866</p>	Job: BU #806364
	Project:
	Client: Crown Castle Drawn by: Eng 1 App'd:
	Code: TIA/EIA-222-F Date: 02/12/09 Scale: NTS
	Path: R:\SA Models - Letters\Work Area\GSingh\806364\806364.dwg Dwg No: E-1

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 1 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

Tower Input Data

There is a pole section.

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

The following design criteria apply:

Tower is located in Middlesex County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 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 Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification <input checked="" type="checkbox"/> Use Code Stress Ratios <input checked="" type="checkbox"/> Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC 6D+W Combination	Distribute Leg Loads As Uniform Assume Legs Pinned <input checked="" type="checkbox"/> Assume Rigid Index Plate <input checked="" type="checkbox"/> Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension <input checked="" type="checkbox"/> Bypass Mast Stability Checks <input checked="" type="checkbox"/> Use Azimuth Dish Coefficients <input checked="" type="checkbox"/> Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing	Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation <input checked="" type="checkbox"/> Consider Feedline Torque Include Angle Block Shear Check Poles <input checked="" type="checkbox"/> Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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	120.00-100.00	20.00	0.00	12	15.4030	20.2630	0.1875	0.7500	A572-65 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2810	1.1240	A572-65 (65 ksi)
L3	47.08-0.00	52.00		12	31.3725	44.0000	0.3750	1.5000	A572-65 (65 ksi)

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 2 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ²	J in ⁴	I/Q in ²	w in	w/t
L1	15.9464	9.1864	271.4575	5.4471	7.9788	34.0225	550.0464	4.5212	3.6255	19.336
L2	20.9778	18.0801	921.4356	7.1536	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283
L3	34.2987	29.7224	4093.6867	11.7599	17.1613	238.5412	8294.9191	14.6285	8.1258	28.917
	33.7153	37.4295	4590.4196	11.0971	16.2509	282.4709	9301.4345	18.4216	7.4028	19.741
	45.5522	52.6772	12796.1526	15.6177	22.7920	561.4318	25928.4743	25.9261	10.7870	28.765

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	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 120.00-100.00				1	1	1		
L2 100.00-47.08				1	1	1		
L3 47.08-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _r A ₁	Weight
						ft ² /ft	plf
73							
LDF5-50A (7/8 FOAM)	B	No	Inside Pole	73.00 - 8.00	14	No Ice 1/2" Ice	0.00 0.00
87							
LDF7-50A (1-5/8 FOAM)	B	No	Inside Pole	87.00 - 8.00	9	No Ice 1/2" Ice	0.00 0.00
40							
LDF4-50A (1/2 FOAM)	B	No	Inside Pole	40.00 - 8.00	1	No Ice 1/2" Ice	0.00 0.00
98							
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	98.00 - 8.00	15	No Ice 1/2" Ice	0.00 0.00
115							
LDF7-50A (1-5/8 FOAM)	A	No	Inside Pole	115.00 - 8.00	12	No Ice 1/2" Ice	0.00 0.00
50							
LDF4-50A (1/2 FOAM)	A	No	Inside Pole	50.00 - 8.00	1	No Ice 1/2" Ice	0.00 0.00
LDF5-50A (7/8 FOAM)	A	No	Inside Pole	50.00 - 8.00	3	No Ice 1/2" Ice	0.00 0.00
107							
LDF4-50A (1/2 FOAM)	A	No	Inside Pole	107.00 - 8.00	1	No Ice 1/2" Ice	0.00 0.00
118							
LDF5-50A (7/8 FOAM)	A	No	Inside Pole	118.00 - 8.00	2	No Ice 1/2" Ice	0.00 0.00

Feed Line/Linear Appurtenances Section Areas

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 3 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_T ft ²	C_{iA_1} In Face ft ²	C_{iA_1} Out Face ft ²	Weight K
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	0.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	0.57
		B	0.000	0.000	0.000	0.000	0.41
		C	0.000	0.000	0.000	0.000	0.63
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	0.46
		B	0.000	0.000	0.000	0.000	0.47
		C	0.000	0.000	0.000	0.000	0.48

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_T ft ²	C_{iA_1} In Face ft ²	C_{iA_1} Out Face ft ²	Weight K
L1	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.16
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	100.00-47.08	A	0.500	0.000	0.000	0.000	0.000	0.57
		B		0.000	0.000	0.000	0.000	0.41
		C		0.000	0.000	0.000	0.000	0.63
L3	47.08-0.00	A	0.500	0.000	0.000	0.000	0.000	0.46
		B		0.000	0.000	0.000	0.000	0.47
		C		0.000	0.000	0.000	0.000	0.48

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	120.00-100.00	0.0000	0.0000	0.0000	0.0000
L2	100.00-47.08	0.0000	0.0000	0.0000	0.0000
L3	47.08-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C_{iA_1} Front ft ²	C_{iA_1} Side ft ²	Weight K	
DB809MT3-XT	A	From Leg	3.00	0.0000	118.00	No Ice	2.84	2.84	0.03
			0.00			1/2" Ice	4.29	4.29	0.05
			7.00						
DB201-A	C	From Leg	3.00	0.0000	118.00	No Ice	1.10	1.10	0.03
			0.00			1/2" Ice	1.98	1.98	0.03
			5.00						

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job		BU #806364		Page		4 of 12	
	Project				Date		09:11:17 02/12/09	
	Client		Crown Castle		Designed by		Eng 1	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _v A _v		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
Side Arm Mount [SO 701-1]	A	From Leg	0.00		0.0000	118.00	No Ice 1/2" Ice	0.85 1.14	1.67 2.34	0.07 0.08
Side Arm Mount [SO 701-1]	C	From Leg	0.00		0.0000	118.00	No Ice 1/2" Ice	0.85 1.14	1.67 2.34	0.07 0.08
**										
(4) DB844G90A-XY w/Mount Pipe	A	From Leg	4.00		0.0000	115.00	No Ice 1/2" Ice	3.77 4.42	5.40 6.49	0.04 0.08
(4) DB844G90A-XY w/Mount Pipe	B	From Leg	4.00		0.0000	115.00	No Ice 1/2" Ice	3.77 4.42	5.40 6.49	0.04 0.08
(4) DB844G90A-XY w/Mount Pipe	C	From Leg	4.00		0.0000	115.00	No Ice 1/2" Ice	3.77 4.42	5.40 6.49	0.04 0.08
Platform Mount [LP 304-1]	C	None			0.0000	115.00	No Ice 1/2" Ice	17.46 22.44	17.46 22.44	1.35 1.62
**										
Pipe Mount [PM 601-1]	C	From Leg	1.00		0.0000	107.00	No Ice 1/2" Ice	3.00 3.74	0.90 1.12	0.07 0.08
**										
ALP 9212-N w/Mount Pipe	A	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	6.42 7.11	7.45 8.59	0.04 0.10
ALP 9212-N w/Mount Pipe	B	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	6.42 7.11	7.45 8.59	0.04 0.10
ALP 9212-N w/Mount Pipe	C	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	6.42 7.11	7.45 8.59	0.04 0.10
(2) DB950F85T2E-M w/Mount Pipe	A	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	3.01 3.58	5.85 6.96	0.04 0.08
(2) DB950F85T2E-M w/Mount Pipe	B	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	3.01 3.58	5.85 6.96	0.04 0.08
(2) DB950F85T2E-M w/Mount Pipe	C	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	3.01 3.58	5.85 6.96	0.04 0.08
(2) LPA-80080/6CF w/Mount Pipe	A	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	4.56 5.11	10.73 11.99	0.05 0.11
(2) LPA-80080/6CF w/Mount Pipe	B	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	4.56 5.11	10.73 11.99	0.05 0.11
(2) LPA-80080/6CF w/Mount Pipe	C	From Leg	4.00		0.0000	98.00	No Ice 1/2" Ice	4.56 5.11	10.73 11.99	0.05 0.11
Platform Mount [LP 602-1]	C	None			0.0000	98.00	No Ice 1/2" Ice	32.03 38.71	32.03 38.71	1.34 1.80
**										
(2) DB980H90E-M w/Mount Pipe	A	From Leg	4.00		0.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	0.03 0.07
(2) DB980H90E-M w/Mount	B	From Leg	4.00		0.0000	87.00	No Ice	4.27	3.86	0.03

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job		BU #806364		Page		5 of 12	
	Project				Date		09:11:17 02/12/09	
	Client		Crown Castle		Designed by		Eng 1	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _v A _t Front ft ²	C _v A _t Side ft ²	Weight K	
Pipe			0.00 2.00		1/2" Ice	4.86	4.95	0.07	
(2) DB980H90E-M w/Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	0.03 0.07
DB980H65E-M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice	4.04 4.50	3.62 4.48	0.03 0.06
DB980H65E-M w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice	4.04 4.50	3.62 4.48	0.03 0.06
DB980H65E-M w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice	4.04 4.50	3.62 4.48	0.03 0.06
Platform Mount [LP 602-1]	C	None		0.0000	87.00	No Ice 1/2" Ice	32.03 38.71	32.03 38.71	1.34 1.80
** DB809K-YP	A	From Leg	4.00 0.00 6.00	0.0000	73.00	No Ice 1/2" Ice	2.67 3.76	2.67 3.76	0.03 0.05
DB809K-YP	B	From Leg	4.00 0.00 6.00	0.0000	73.00	No Ice 1/2" Ice	2.67 3.76	2.67 3.76	0.03 0.05
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	6.12 6.63	4.25 5.01	0.06 0.10
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	6.12 6.63	4.25 5.01	0.06 0.10
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	6.12 6.63	4.25 5.01	0.06 0.10
(2) LGP21401	A	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	1.29 1.45	0.23 0.31	0.01 0.02
(2) LGP21401	B	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	1.29 1.45	0.23 0.31	0.01 0.02
(2) LGP21401	C	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	1.29 1.45	0.23 0.31	0.01 0.02
(2) LGP21903	A	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	0.27 0.34	0.18 0.25	0.01 0.01
(2) LGP21903	B	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	0.27 0.34	0.18 0.25	0.01 0.01
(2) LGP21903	C	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	0.27 0.34	0.18 0.25	0.01 0.01
Platform Mount [LP 702-1]	C	None		0.0000	73.00	No Ice 1/2" Ice	24.53 29.94	24.53 29.94	1.34 1.65
4'6"x3" Pipe Mount	C	From Leg	4.00 0.00 1.00	0.0000	73.00	No Ice 1/2" Ice	1.30 1.57	1.30 1.57	0.03 0.05
** DB492A	A	From Leg	3.00	0.0000	50.00	No Ice	1.10	1.10	0.01

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 6 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C _v A ₁ Front	C _v A ₁ Side	Weight
			ft	°	ft	ft ²	ft ²	K
			0.00		1/2" Ice	1.98	1.98	0.01
ASP-655	B	From Leg	0.00	0.0000	50.00	No Ice	0.56	0.00
			3.00			1/2" Ice	1.02	0.01
			4.00					
PD1142-1	A	From Leg	0.00	0.0000	50.00	No Ice	1.32	0.01
			3.00			1/2" Ice	3.21	0.02
			7.00					
PD1121-6	C	From Leg	0.00	0.0000	50.00	No Ice	0.23	0.00
			3.00			1/2" Ice	0.41	0.00
Side Arm Mount [SO 701-3]	C	None		0.0000	50.00	No Ice	2.83	0.20
						1/2" Ice	3.92	0.24
**								
EPSILON GPS ANTENNA 35 DB	A	From Leg	0.00	0.0000	40.00	No Ice	0.13	0.00
			3.00			1/2" Ice	0.19	0.00
			1.00					
Side Arm Mount [SO 701-1]	A	None		0.0000	40.00	No Ice	0.85	0.07
						1/2" Ice	1.14	0.08

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				ft	°	°	ft	ft	ft ²	K	
KP6-17B	C	Grid	From Leg	1.00	0.0000		107.00	6.00	No Ice	22.62	0.20
				0.00					1/2" Ice	29.05	0.35
				0.00							

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

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job	BU #806364	Page	7 of 12
	Project		Date	09:11:17 02/12/09
	Client	Crown Castle	Designed by	Eng 1

Comb. No.	Description
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 K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 100	Pole	Max. Tension	5	0.00	0.00	-0.00
			Max. Compression	14	-4.38	0.82	-0.24
			Max. Mx	11	-2.65	76.39	-0.59
			Max. My	8	-2.68	1.12	-74.35
			Max. Vy	18	6.08	-75.40	5.30
			Max. Vx	15	-5.72	-8.33	73.21
			Max. Torque	22			-1.23
			Max. Tension	1	0.00	0.00	0.00
L2	100 - 47.0833	Pole	Max. Compression	14	-18.69	0.80	-0.23
			Max. Mx	11	-12.99	880.58	-4.84
			Max. My	8	-13.01	6.87	-868.40
			Max. Vy	11	-21.20	880.58	-4.84
			Max. Vx	8	20.99	6.87	-868.40
			Max. Torque	22			-1.23
			Max. Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.32	0.80	-0.11
L3	47.0833 - 0	Pole	Max. Mx	11	-24.24	2118.82	-9.33
			Max. My	8	-24.24	12.95	-2095.73
			Max. Vy	5	26.25	-2117.72	5.71
			Max. Vx	8	26.05	12.95	-2095.73
			Max. Torque	22			-1.28

Maximum Reactions

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job	BU #806364	Page	8 of 12
	Project		Date	09:11:17 02/12/09
	Client	Crown Castle	Designed by	Eng 1

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	18	30.32	-23.07	0.79
	Max. H _x	11	24.27	26.22	-0.09
	Max. H _y	2	24.27	-0.09	26.01
	Max. M _x	2	2094.21	-0.09	26.01
	Max. M _y	5	2117.72	-26.23	0.05
	Max. Torsion	18	1.16	-23.07	0.79
	Min. Vert	1	24.27	0.00	0.00
	Min. H _x	5	24.27	-26.23	0.05
	Min. H _y	8	24.27	0.11	-26.02
	Min. M _x	8	-2095.73	0.11	-26.02
	Min. M _y	11	-2118.82	26.22	-0.09
	Min. Torsion	22	-1.28	11.37	-19.53

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead Only	24.27	0.00	0.00	0.09	0.54	0.00
Dead+Wind 0 deg - No Ice	24.27	0.09	-26.01	-2094.21	-8.67	-0.53
Dead+Wind 30 deg - No Ice	24.27	13.16	-22.65	-1827.61	-1063.62	-0.85
Dead+Wind 60 deg - No Ice	24.27	22.74	-13.11	-1058.63	-1837.10	-0.73
Dead+Wind 90 deg - No Ice	24.27	26.23	-0.05	-5.71	-2117.72	-0.41
Dead+Wind 120 deg - No Ice	24.27	22.60	12.93	1039.25	-1821.66	-0.20
Dead+Wind 150 deg - No Ice	24.27	12.91	22.44	1804.21	-1036.90	0.04
Dead+Wind 180 deg - No Ice	24.27	-0.11	26.02	2095.73	12.95	0.52
Dead+Wind 210 deg - No Ice	24.27	-13.19	22.64	1826.07	1067.69	0.80
Dead+Wind 240 deg - No Ice	24.27	-22.79	13.14	1062.00	1843.73	0.73
Dead+Wind 270 deg - No Ice	24.27	-26.22	0.09	9.33	2118.82	0.46
Dead+Wind 300 deg - No Ice	24.27	-22.62	-12.91	-1036.99	1825.51	0.21
Dead+Wind 330 deg - No Ice	24.27	-13.00	-22.39	-1798.49	1047.60	-0.04
Dead+Ice+Temp	30.32	0.00	0.00	0.11	0.80	0.00
Dead+Wind 0 deg+Ice+Temp	30.32	1.26	-22.73	-1902.52	-139.86	-0.41
Dead+Wind 30 deg+Ice+Temp	30.32	12.22	-19.55	-1633.13	-1045.52	-0.51
Dead+Wind 60 deg+Ice+Temp	30.32	20.17	-11.63	-980.28	-1701.59	-0.96
Dead+Wind 90 deg+Ice+Temp	30.32	23.07	-0.79	-87.26	-1940.50	-1.16
Dead+Wind 120 deg+Ice+Temp	30.32	20.35	10.27	829.58	-1721.56	-0.56
Dead+Wind 150 deg+Ice+Temp	30.32	11.04	19.11	1584.18	-914.78	0.11
Dead+Wind 180 deg+Ice+Temp	30.32	-0.18	22.34	1859.38	20.58	0.86
Dead+Wind 210 deg+Ice+Temp	30.32	-11.37	19.53	1630.80	953.03	1.28
Dead+Wind 240 deg+Ice+Temp	30.32	-19.76	11.39	954.25	1657.76	0.96
Dead+Wind 270 deg+Ice+Temp	30.32	-22.63	0.07	7.24	1892.87	0.39
Dead+Wind 300 deg+Ice+Temp	30.32	-19.47	-11.01	-912.41	1625.20	0.11
Dead+Wind 330 deg+Ice+Temp	30.32	-11.06	-19.10	-1582.70	918.61	-0.11
Dead+Wind 0 deg - Service	24.27	0.03	-9.00	-725.37	-2.64	-0.19
Dead+Wind 30 deg - Service	24.27	4.55	-7.84	-633.04	-368.08	-0.30
Dead+Wind 60 deg - Service	24.27	7.87	-4.54	-366.66	-636.02	-0.25
Dead+Wind 90 deg - Service	24.27	9.07	-0.02	-1.92	-733.23	-0.14
Dead+Wind 120 deg - Service	24.27	7.82	4.47	360.05	-630.65	-0.07
Dead+Wind 150 deg - Service	24.27	4.47	7.76	625.02	-358.81	0.01
Dead+Wind 180 deg - Service	24.27	-0.04	9.00	726.01	4.86	0.18
Dead+Wind 210 deg - Service	24.27	-4.56	7.83	632.62	370.22	0.28
Dead+Wind 240 deg - Service	24.27	-7.89	4.55	367.95	639.06	0.25
Dead+Wind 270 deg - Service	24.27	-9.07	0.03	3.29	734.35	0.16
Dead+Wind 300 deg - Service	24.27	-7.83	-4.47	-359.15	632.72	0.07
Dead+Wind 330 deg - Service	24.27	-4.50	-7.75	-622.92	363.25	-0.01

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 9 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

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	0.00	-24.27	0.00	0.00	24.27	0.00	0.000%
2	0.09	-24.27	-26.01	-0.09	24.27	26.01	0.000%
3	13.16	-24.27	-22.65	-13.16	24.27	22.65	0.000%
4	22.74	-24.27	-13.11	-22.74	24.27	13.11	0.000%
5	26.23	-24.27	-0.05	-26.23	24.27	0.05	0.000%
6	22.60	-24.27	12.93	-22.60	24.27	-12.93	0.000%
7	12.91	-24.27	22.44	-12.91	24.27	-22.44	0.000%
8	-0.11	-24.27	26.02	0.11	24.27	-26.02	0.000%
9	-13.19	-24.27	22.64	13.19	24.27	-22.64	0.000%
10	-22.79	-24.27	13.14	22.79	24.27	-13.14	0.000%
11	-26.22	-24.27	0.09	26.22	24.27	-0.09	0.000%
12	-22.62	-24.27	-12.91	22.62	24.27	12.91	0.000%
13	-13.00	-24.27	-22.39	13.00	24.27	22.39	0.000%
14	0.00	-30.32	0.00	0.00	30.32	0.00	0.000%
15	1.26	-30.32	-22.73	-1.26	30.32	22.73	0.000%
16	12.22	-30.32	-19.55	-12.22	30.32	19.55	0.000%
17	20.17	-30.32	-11.63	-20.17	30.32	11.63	0.000%
18	23.07	-30.32	-0.79	-23.07	30.32	0.79	0.000%
19	20.35	-30.32	10.27	-20.35	30.32	-10.27	0.000%
20	11.04	-30.32	19.11	-11.04	30.32	-19.11	0.000%
21	-0.18	-30.32	22.34	0.18	30.32	-22.34	0.000%
22	-11.37	-30.32	19.53	11.37	30.32	-19.53	0.000%
23	-19.76	-30.32	11.39	19.76	30.32	-11.39	0.000%
24	-22.63	-30.32	0.07	22.63	30.32	-0.07	0.000%
25	-19.47	-30.32	-11.01	19.47	30.32	11.01	0.000%
26	-11.06	-30.32	-19.10	11.06	30.32	19.10	0.000%
27	0.03	-24.27	-9.00	-0.03	24.27	9.00	0.000%
28	4.55	-24.27	-7.84	-4.55	24.27	7.84	0.000%
29	7.87	-24.27	-4.54	-7.87	24.27	4.54	0.000%
30	9.07	-24.27	-0.02	-9.07	24.27	0.02	0.000%
31	7.82	-24.27	4.47	-7.82	24.27	-4.47	0.000%
32	4.47	-24.27	7.76	-4.47	24.27	-7.76	0.000%
33	-0.04	-24.27	9.00	0.04	24.27	-9.00	0.000%
34	-4.56	-24.27	7.83	4.56	24.27	-7.83	0.000%
35	-7.89	-24.27	4.55	7.89	24.27	-4.55	0.000%
36	-9.07	-24.27	0.03	9.07	24.27	-0.03	0.000%
37	-7.83	-24.27	-4.47	7.83	24.27	4.47	0.000%
38	-4.50	-24.27	-7.75	4.50	24.27	7.75	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	0.00053238
3	Yes	5	0.00000001	0.00030024
4	Yes	5	0.00000001	0.00032328
5	Yes	4	0.00000001	0.00018621
6	Yes	5	0.00000001	0.00030983
7	Yes	5	0.00000001	0.00029706
8	Yes	4	0.00000001	0.00083947

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 10 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

9	Yes	5	0.0000001	0.00032848
10	Yes	5	0.0000001	0.00030836
11	Yes	4	0.0000001	0.00008952
12	Yes	5	0.0000001	0.00030513
13	Yes	5	0.0000001	0.00031103
14	Yes	4	0.0000001	0.00000001
15	Yes	5	0.0000001	0.00015552
16	Yes	5	0.0000001	0.00081833
17	Yes	5	0.0000001	0.00084184
18	Yes	5	0.0000001	0.00017156
19	Yes	5	0.0000001	0.00070265
20	Yes	5	0.0000001	0.00068015
21	Yes	5	0.0000001	0.00013281
22	Yes	5	0.0000001	0.00080180
23	Yes	5	0.0000001	0.00075583
24	Yes	5	0.0000001	0.00009456
25	Yes	5	0.0000001	0.00070750
26	Yes	5	0.0000001	0.00072126
27	Yes	4	0.0000001	0.00012699
28	Yes	4	0.0000001	0.00078011
29	Yes	4	0.0000001	0.00090153
30	Yes	4	0.0000001	0.00003167
31	Yes	4	0.0000001	0.00083069
32	Yes	4	0.0000001	0.00076347
33	Yes	4	0.0000001	0.00014801
34	Yes	4	0.0000001	0.00093911
35	Yes	4	0.0000001	0.00082477
36	Yes	4	0.0000001	0.00002708
37	Yes	4	0.0000001	0.00080702
38	Yes	4	0.0000001	0.00084319

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	27.025	35	1.9161	0.0059
L2	100 - 47.0833	19.135	35	1.8046	0.0032
L3	52 - 0	4.954	35	0.8965	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.00	DB809MT3-XT	35	26.220	1.9106	0.0059	19566
115.00	(4) DB844G90A-XY w/Mount Pipe	35	25.014	1.9017	0.0055	19566
107.00	KP6-17B	35	21.835	1.8652	0.0044	7525
98.00	ALP 9212-N w/Mount Pipe	35	18.384	1.7803	0.0032	4677
87.00	(2) DB980H90E-M w/Mount Pipe	35	14.450	1.5971	0.0022	3687
73.00	DB809K-YP	35	10.024	1.2966	0.0013	2914
50.00	DB492A	35	4.586	0.8712	0.0007	2318
40.00	EPSILON GPS ANTENNA 35 DB	35	3.044	0.7869	0.0006	2881

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job	BU #806364	Page	11 of 12
	Project		Date	09:11:17 02/12/09
	Client	Crown Castle	Designed by	Eng 1

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	77.717	10	5.5100	0.0245
L2	100 - 47.0833	55.076	10	5.1938	0.0141
L3	52 - 0	14.282	10	2.5850	0.0029

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.00	DB809MT3-XT	10	75.407	5.4923	0.0234	7005
115.00	(4) DB844G90A-XY w/Mount Pipe	10	71.949	5.4639	0.0217	7005
107.00	KP6-17B	10	62.827	5.3573	0.0174	2693
98.00	ALP 9212-N w/Mount Pipe	10	52.919	5.1299	0.0132	1669
87.00	(2) DB980H90E-M w/Mount Pipe	10	41.615	4.6519	0.0092	1305
73.00	DB809K-YP	10	28.884	3.8413	0.0058	1024
50.00	DB492A	10	13.223	2.4820	0.0028	807
40.00	EPSILON GPS ANTENNA 35 DB	10	8.780	2.0307	0.0025	1002

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _u ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
L1	120 - 100 (1)	TP20.263x15.403x0.1875	20.00	0.00	0.0	39.000	12.1206	-3.85	472.70	0.008
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	52.92	0.00	0.0	39.000	28.6407	-12.98	1116.99	0.012
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	52.00	0.00	0.0	39.000	52.6772	-24.24	2054.41	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} /F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} /F _{by}
L1	120 - 100 (1)	TP20.263x15.403x0.1875	76.70	15.494	39.000	0.397	0.00	0.000	39.000	0.000
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	885.09	47.968	39.000	1.230	0.00	0.000	39.000	0.000
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	2127.72	45.478	39.000	1.166	0.00	0.000	39.000	0.000

RISATower Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866	Job BU #806364	Page 12 of 12
	Project	Date 09:11:17 02/12/09
	Client Crown Castle	Designed by Eng 1

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_c ksi	Allow. F_c ksi	Ratio $\frac{f_c}{F_c}$	Actual T kip-ft	Actual f_t ksi	Allow. F_t ksi	Ratio $\frac{f_t}{F_t}$
L1	120 - 100 (1)	TP20.263x15.403x0.1875	6.29	0.519	26.000	0.041	0.53	0.050	26.000	0.002
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	21.29	0.743	26.000	0.058	0.46	0.012	26.000	0.000
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	26.33	0.500	26.000	0.039	0.73	0.007	26.000	0.000

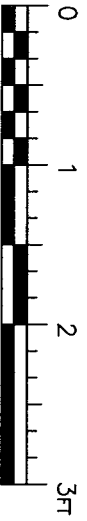
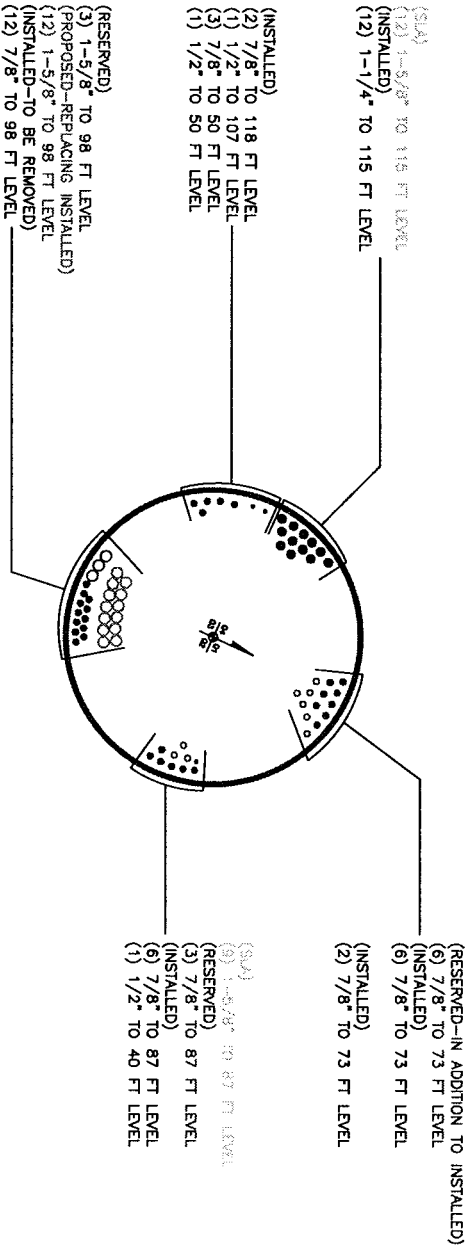
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P	Ratio f_{hw} F_{hw}	Ratio f_{hv} F_{hv}	Ratio f_c F_c	Ratio f_t F_t	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 100 (1)	0.008	0.397	0.000	0.041	0.002	0.406	1.333	H1-3+VT ✓
L2	100 - 47.0833 (2)	0.012	1.230	0.000	0.058	0.000	1.242	1.333	H1-3+VT ✓
L3	47.0833 - 0 (3)	0.012	1.166	0.000	0.039	0.000	1.178	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-3.85	630.11	30.5	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.281	2	-12.98	1488.95	93.2	Pass
L3	47.0833 - 0	Pole	TP44x31.3725x0.375	3	-24.24	2738.53	88.4	Pass
Summary								
Pole (L2)							93.2	Pass
RATING =							93.2	Pass

APPENDIX B
BASE LEVEL DRAWING



: SCALE :

APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Block Foundation

Checks capacity of monolithic block foundation for a monopole tower

BU #: 806364
 Site Name: HRT 106 (B) 943202
 App No.: 62805



Design Reactions		
Shear, S:	26.00	kips
Moment, M:	2128.00	ft*kips
Height, H:	120.00	ft
Weight, Wt:	24.00	kips
Base Diameter, BD:	44.0	in

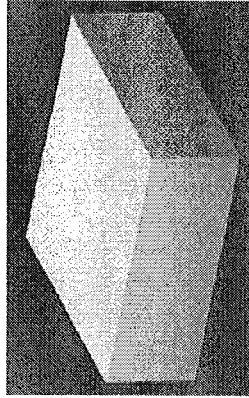
Foundation Dimensions		
Depth, D:	6.0	ft
Block Width, W:	27.0	ft
Neglected Depth, N:	2.0	ft
Ext. Above Grade, E:	0.0	ft
Anchor Steel Length, Lst:	97.0	in
Clear Cover, cc:	4.0	in

Soil Properties		
Soil Unit Weight, Y:	0.125	kcf
Allowable Bearing, Bc:	4,000	kcf
Int. Angle of Friction, Φ:	34.00	deg
Cohesion, Co:	0.000	kcf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ:	0.2	
Seismic Zone, z:	1	

Material Properties		
Rebar Yield Strength, Fy:	60000	psi
Concrete Strength, Fc:	4000	psi
Concrete Density, δc:	0.150	kcf

Rebar Properties		
Pad Rebar Size, sp:	11	
Rebar Quantity, mp:	26	14

Design Checks			
	Capacity/Availability	Demands/Limits	Check
Shear (ksf)	68.01	26.00	OK
Overturning (ft*kips)	6120.90	2284.00	OK
Bearing (ksf)	4.00	1.63	OK
Shear - 1-Way (kips)	68.01	26.00	OK
Pad Rebar Area (in ²)	40.60	21.00	OK
Bar Spacing (in)	11.17	12 > Bs > 4.5	OK
Development Length (in)	158.00	52.17	OK



Modification Checks				
	Capacity/Availability	Demands/Limits	Check	
Minimum Extra Thickness (in)	0.00	0.00	Not Used	
Pad Rebar Area-short (in ²)	8.84	0.00	Not Used	38.2%
Pad Rebar Area-long (in ²)	2.21	0.00	Not Used	37.3%
Pad Rebar Spacing-short (in ²)	15.84	12 > Bs > 4.5	Not Used	40.7%
Pad Rebar Spacing-long (in ²)	78.06	12 > Bs > 4.5	Not Used	38.2%
End Cap Width (in)	0.00	0.00	Not Used	
End Cap Rebar Area (in ²)	4.81	0.00	Not Used	
EC Rebar Spacing (in)	-2.02	12 > Bs > 4.5	Not Used	
Tie Spacing (in)	16.13	316 > s > 4.5	Not Used	
Dowel Area (in ²)	8.84	0.00	Not Used	
Dowel Embedment (in)	6.00	6.00	Not Used	
Shear Strength of Cone (kips)	11.40	23.86	Not Used	
Dowel Edge Distance (in)	12.00	5.19	Not Used	
Dowel Spacing (in)	33.33	12.00	Not Used	
Dowel Edge Distance (vert) (in)	36.00	5.19	Not Used	
Dowel Devel. Length (in)	-4.00	13.32	Not Used	

Modifications						
	Pad Thickness, Te:	0	in	End Cap Width, Wec:	0	in
Revised Pad Thickness, Tx:	6	ft.	27	Revised Width, Wx:	7	ft.
Pad Rebar Size, Se:	6		7	EC Rebar Size, Sec:	7	per side, top & bottom
Rebar Quantity (long), me:	20	0	8	EC Rebar Quantity, mec:	8	0
Rebar Quantity (short), msc:	5	0	4	EC Tie Size, Sect:	4	per side
Dowel Size, Sed:	7		20	Tie Quantity, mect:	20	0
Dowel Quantity, med:	20	0	6	EC Dowel Size, Sect:	6	per side
			20	Dowel Quantity, mecd:	20	0
			2	Rows of Dowels, Nd:	2	
			6	Dowel Depth, dcd:	6	in
			12	Edge Distance, eecd:	12	in

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

Site Data

BU#: 806364
 Site Name: HRT 106(B) 943202
 App #: 62805

Reactions

Moment:	2128	ft-kips
Axial:	24	kips
Shear:	26	kips

Connection Type: *Butt*

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Grade(Fy):	75	ksi
Circle:	52.05	in

Anchor Rod Results

Maximum Rod Tension: 161.5 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 82.9% **Pass**

Plate Data

Diam:	58.05	in
Thick:	2.75	in
Grade:	60	ksi
Eff. Width:	11.79	in

Base Plate Results

Flexural Check
 Base Plate Stress: 32.3 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 53.9% **Pass**

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.375	in
Width:	6	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: n/a
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

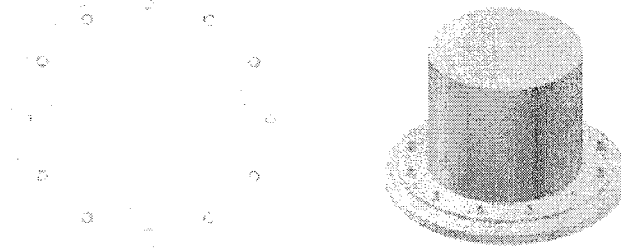
Pole Punching Shear Check: n/a

Pole Data

Diam:	44	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi

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



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

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

September 2, 2008

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-038-080522** – Celco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Old Blue Hills Road, Durham, Connecticut.

Dear Attorney Baldwin:

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

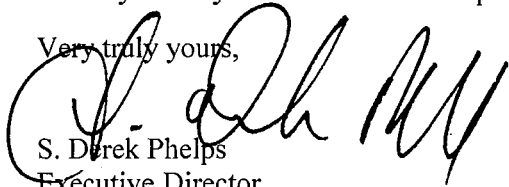
- The applicant shall take steps to reduce the post-construction tower rating to not more than 100 percent; and
- A signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the post-construction tower rating of not more than 100 percent has been achieved.

The proposed modifications are to be implemented as specified here and in your notice dated May 22, 2008, including the placement of all necessary equipment and shelters within the tower compound. 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

A handwritten signature in black ink, appearing to read "S. Derek Phelps". The signature is written in a cursive, flowing style.

S. Derek Phelps
Executive Director

SDP/MP

c: Honorable Laura L. Francis, First Selectman, Town of Durham
Geoffrey Colegrove, Town Planner, Town of Durham
Crown Castle International

EM-VER-038-080522

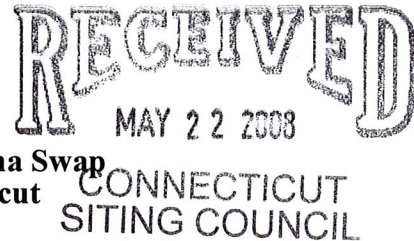
280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

ORIGINAL

May 22, 2008

Via Hand Delivery

S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051



Re: **Notice of Exempt Modification – Antenna Swap
Old Blue Hills Road, Durham, Connecticut**

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains a wireless telecommunications facility at the above referenced location. The Council originally approved Cellco’s use of this facility in Docket No. 161. On May 11, 2005, the Council approved Cellco’s request to replace three (3) of its cellular antennas with six (6) PCS antennas. Cellco now intends to modify its installation further by replacing the six (6) remaining ALP9212 cellular antennas with six (6) LPA-80080/6CF cellular antennas at the top 98-foot level on the 120-foot tower. The tower is owned by Crown Castle International. Attached behind Tab 1 are the specifications for the proposed replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Laura L. Francis, First Selectman of the Town of Durham. Pursuant to a Council directive, a copy of this letter is being sent to Francis and Marie Behrens, the owners of the property on which the facility is located.

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

1. The proposed modifications will not result in any increase in the overall height of the existing structure. Cellco’s replacement antennas will be located at the 98-foot level of the 120-foot tower.



Law Offices

BOSTON

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

SARASOTA

www.rc.com

HART1-1469527-1

ROBINSON & COLE^{LLP}

S. Derek Phelps
May 22, 2008
Page 2

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

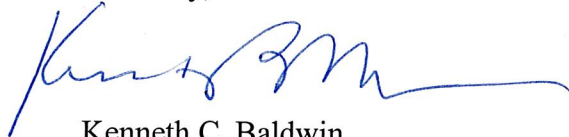
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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

Also attached is a Structural Analysis Report confirming that the tower can support the proposed modifications. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Laura L. Francis, Durham First Selectman
Francis and Marie Behrens
Sandy M. Carter



Vertically Polarized, Log Periodic 80° / 14 dBd

LPA-80080/6CF

When ordering replace "___" with connector type.

Mechanical specifications

Length	1800 mm	70.9 in
Width	140 mm	5.5 in
Depth	335 mm	13.2 in
Depth with z-bracket	375 mm	14.8 in
4) Weight	9.5 kg	21.0 lbs
Wind Area		
Fore/Aft	0.25 m ²	2.7 ft ²
Side	0.60 m ²	6.5 ft ²
Rated Wind Velocity (Safety factor 2.0)		
	>295 km/hr	>183 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	415 N	93.3 lbs
Side	870 N	195.6 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in). If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in)

Mounting Bracket & Downtilt Bracket Kit
#21699999

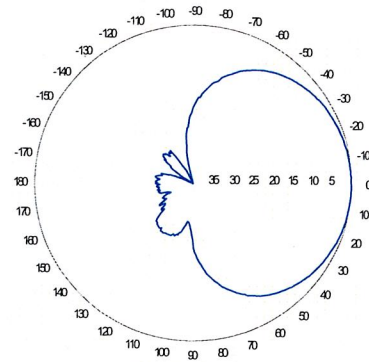
Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
3) Connector(s)	NE or E-DIN 1 port / center
1) VSWR	≤ 1.4:1
Polarization	Vertical
1) Gain	14 dBd
2) Power Rating	500 W
1) Half Power Angle	
H-Plane	80°
E-Plane	10°
1) Electrical Downtilt	0°
1) Null Fill	10%
Lightning Protection	Direct Ground

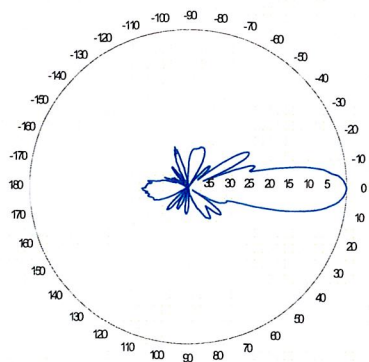
- 1) Typical values.
- 2) Power rating limited by connector only.
- 3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
- 4) The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation pattern¹⁾



Horizontal

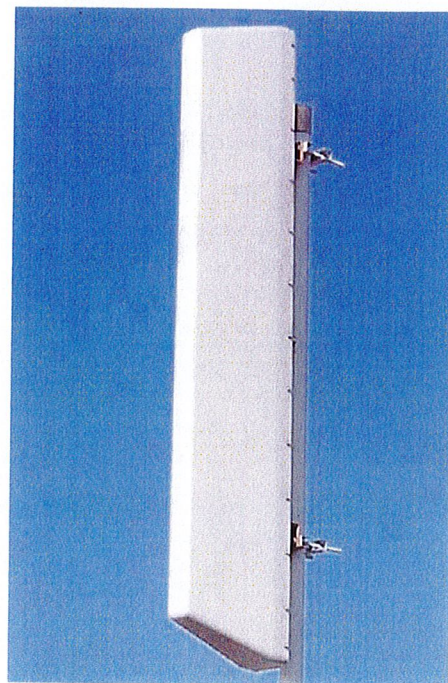


Vertical

Featuring upper side lobe suppression.

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connector only.

CF Denotes a Center-Fed Connector.

806-960 MHz



Revision Date: 7/5/07



May 7, 2008

LaShay Holmes
Crown Castle USA
9105 Monroe Road, Suite 150
Charlotte, NC 28270
(704) 814-8311

Vertical Structures, Inc.
309 Spangler Drive, Suite F
Richmond, KY 40475
(859) 624-8360
case@verticalstructures.com

Subject: Structural Analysis Report

Carrier Designation Verizon Wireless Change-Out
Carrier Site Number: HRT 106
Carrier Site Name: Durham, CT

Crown Castle Designation Crown Castle BU Number: 806364
Crown Castle Site Name: HRT 106(B)
Crown Castle JDE Job Number: 101930

Engineering Firm Designation Vertical Structures Project Number: 2008-004-033

Site Data 101 R Old Blue Hill Road, Durham, CT, Middlesex County
Latitude 41°-27'-33.67", Longitude -72°-39'-45.83"
120' Valmont Monopole Tower

Dear Ms. Holmes,

Vertical Structures is pleased to submit this structural analysis report to determine the structural integrity of the aforementioned 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 276032, and Application Number 59383, Revision 1. The purpose of the analysis is to determine the suitability of the tower for the following load case:

Load Case 1 (LC1): Proposed Equipment (Table 1) + Existing/Reserved Equipment (Table 2)

Based on our analysis we have determined the tower superstructure and foundation are sufficient for LC1. This analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon an 85 MPH basic "fastest mile" wind speed, equivalent to a 105 MPH basic "3-second gust" wind speed per IBC Table 1609.3.1.

Vertical Structures appreciates the opportunity of providing our continuing professional services to you and Crown Castle USA. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted,

Craig Aselyne, P.E.
Project Engineer



TABLE OF CONTENTS

1.) INTRODUCTION

2.) ANALYSIS CRITERIA

Table 1 – Proposed Antenna and Cable Information

Table 2 – Existing and Reserved Antenna and Cable Information

Table 3 – Design Antenna and Cable Information

3.) ANALYSIS PROCEDURE

Table 4 – Documents Provided

3.1) Analysis Methods

3.2) Assumptions

4.) ANALYSIS RESULTS

Table 5 – Tower Component Stresses vs. Capacity (LC1)

5.) APPENDIX A

RISA Tower Output

6.) APPENDIX B

Feedline Routing Drawing

7.) APPENDIX C

Additional Calculations

1.) INTRODUCTION

The original 100' tall monopole tower was designed and manufactured by Valmont in 1994 for Bell Atlantic Mobile. The tower has since been extended 20' up to 120'. The structure consists of three (3) 12-sided tapered polygonal sections joined via a slip joint connection and a bolted flange connection. The tower is founded on a 27' square by 6' thick mat bearing 6' below grade.

2.) ANALYSIS CRITERIA

The HRT 106(B) monopole tower was analyzed in accordance with the current EIA-222-F publication, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures." The proposed, existing and reserved antennas, cables and mounts considered in this analysis are listed in Tables 1 and 2. Applied forces in this study were derived from an 85 MPH basic "fastest mile" wind speed with no ice and a reduced 74 MPH basic "fastest mile" wind speed with a 1/2" of radial ice accumulation. The tower was originally designed for a 90 MPH basic "fastest mile" wind speed with no ice and a reduced 78 MPH basic "fastest mile" wind speed with a 1/2" of radial ice accumulation. The original design loads are listed in Table 3. All cables are assumed to be routed in accordance with the drawing in Appendix B.

Table 1 – Proposed Antenna and Cable Information

Mount Center Line Elevation (feet)	Number Of Antenna	Antenna Manufacturer	Antenna Model	Mount Manufacturer	Mount Model	Number Of Feed Lines	Feed Line Size (inches)
98	6	Antel	LPA-80080/6CF			15	1 5/8

Table 2 – Existing and Reserved Antenna and Cable Information

Mount Center Line Elevation (feet)	Number Of Antenna	Antenna Manufacturer	Antenna Model	Mount Manufacturer	Mount Model	Number Of Feed Lines	Feed Line Size (inches)
118	1	Decibel	DB809MT3-XT		(2) 6' Sidearms	2	7/8
	1	Decibel	DB201-A				
115	12	Decibel	DB844H90		(1) 13' L.P. Platform	12	1 1/4
107	1	Andrew	KP6-17B		(1) Pipe Mount	1	1/2
98	3 + 6*	Swedcom	ALP 9212-N	Valmont	(1) 13'-5" Platform w/ Rails	15*	7/8
	6	Decibel	DB950F85T2E-M				
87	6 + 3**	Decibel	DB980H90E-M	Valmont	(1) 13'-5" Platform w/ Rails	6 + 3**	1 1/4
73	3 + 3**	Allgon	7250.02	Valmont	(1) 13'-5" L.P. Platform	8 + 6**	7/8
	2	Decibel	DB809K-YP				
50	1	Celwave	PD1142-1		(2) 6' Sidearms	3	7/8
	1	Celwave	PD1121-6				
	1	Decibel	ASP-655				
	1	Decibel	DB492A			1	1/2

*Indicates equipment to be removed.

**Indicates reserved equipment.

Table 3 – Design Antenna and Cable Information

Mount Center Line Elevation (feet)	Number Of Antenna	Antenna Manufacturer	Antenna Model	Mount Manufacturer	Mount Model	Number Of Feed Lines	Feed Line Size (inches)
97	12	Sinclair	SRL410C4R105	Valmont	Cellular Platform		
87	9	Sinclair	SRL410C4R105	Valmont	Cellular Platform		
75	1	Telewave	450F6				
	1	Decibel	ASP-710				
50	1	Decibel	ASP-710				
	1	Decibel	ASP-701				

3.) ANALYSIS PROCEDURE

Table 4 – Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Change-Out Revision #1	59383	CCI iSite
Tower Drawing	Valmont Drawing No. DC1723Z	262153	CCI iSite
Foundation Drawing	SAC Engineering Project No. 1994-8A	297341	CCI iSite
Geotechnical Information	Dr. Clarence Welti Report Dated 3/18/93	262150	CCI iSite
Extension Information	Vertical Structures Site Visit	N/A	Field Notes

3.1) Analysis Methods

RISA Tower (Version 5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various dead, live, wind, and ice load cases. All loads were computed in accordance with the ANSI/TIA/EIA-222-F or the local building code requirements. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and Vertical Structures should be allowed to review any new information to determine its effect on the structural integrity of the tower.

4.) ANALYSIS RESULTS

Table 5 – Tower Component Stresses vs. Capacity (LC1)

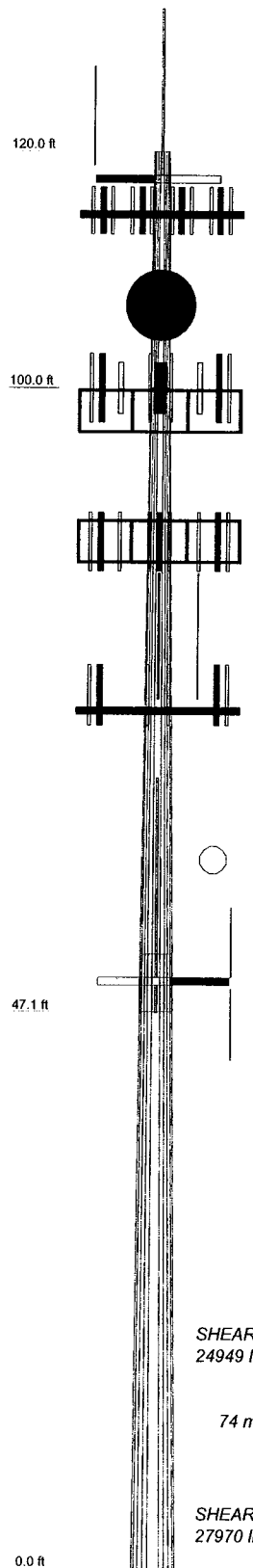
Section Capacity Table										
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass	Fail	
L1	120 - 100	Pole	TP20.263x15.677x0.1875	1	-4354.94	630113.07	34.6	Pass		
L2	100 - 47.0833	Pole	TP33.13x20.263x0.281	2	-13150.20	1488947.61	101.7	Fail	X (1)	
L3	47.0833 - 0	Pole	TP44x31.3725x0.375	3	-24528.70	2738528.42	95.4	Pass		
							Summary			
							Pole (L2)	101.7	Fail	X (1)
							RATING =	101.7	Fail	X (1)

Notes	Component	Elevation (feet)	% Capacity	Pass/Fail
Additional Component Analysis Summary:				
2	Flange Bolts (Tension)	100	21.2	Pass
2	Flange Plate (Bending)	100	22.1	Pass
2	Anchor Bolts (Tension)	0	99.8	Pass
2	Base Plate (Bending)	0	54.5	Pass
	Foundation (Compared to Design Loads)	0	95.1	Pass
Structure Rating =			101.7	Pass

- 1) Indicates overstress of less than 5% and is considered acceptable based on the analysis procedure used.
- 2) Indicates calculations supporting % capacity are included in Appendix C.

APPENDIX A

Section	1	2	3
Length (ft)	20.00	52.92	52.00
Number of Sides	12	12	12
Thickness (in)	0.1875	0.2810	0.3750
Lap Splice (ft)			4.92
Top Dia (in)	15.6770	20.2630	31.3725
Bot Dia (in)	20.2630	33.1300	44.0000
Grade		A572-65	
Weight (lb)	730.7	4303.8	7972.0



DESIGNED APPURTENANCE LOADING

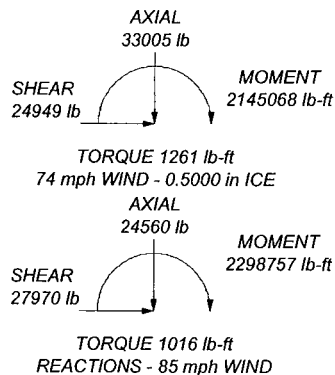
TYPE	ELEVATION	TYPE	ELEVATION
6' Sidearm (4" single tube) (VSI)	118	(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98
6' Sidearm (4" single tube) (VSI)	118	(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98
DB809MT3-XT	118	(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98
DB201-A	118	Valmont 13'-5" Platform w/ Rails (VSI)	87
13 L.P. Platform (VSI)	115	(3) DB980H90E-M w/Mount Pipe	87
(4) DB844H90 w/Mount Pipe	115	(3) DB980H90E-M w/Mount Pipe	87
(4) DB844H90 w/Mount Pipe	115	(3) DB980H90E-M w/Mount Pipe	87
(4) DB844H90 w/Mount Pipe	115	(2) 7250.02 w/Mount Pipe	73
6x4" Pipe Mount	107	(2) 7250.02 w/Mount Pipe	73
KP6-17B	107	DB809K-YP	73
Valmont 13'-5" Platform w/ Rails (VSI) (Verizon Wireless)	98	DB809K-YP	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 7250.02 w/Mount Pipe	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	Valmont 13'-5" L.P. Platform (VSI)	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 6' x 2" Antenna Mount Pipe (VSI)	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 6' x 2" Antenna Mount Pipe (VSI)	73
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	(2) 6' x 2" Antenna Mount Pipe (VSI)	73
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	6' Sidearm (4" single tube) (VSI)	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	6' Sidearm (4" single tube) (VSI)	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	PD1142-1	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	DB492A	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	ASP-655	50
(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98	PD1121-6	50

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex 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: 101.7%



Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job: HRT106(B), CT BU#806364
	Project: Vertical Structures Job No. 2008-004-033
	Client: Crown Castle
	Code: TIA/EIA-222-F
	Path:
Drawn by: AseI	App'd:
Date: 05/07/08	Scale: NTS
Dwg No. E-1	

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 1 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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 Middlesex County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 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	√ 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	120.00-100.00	20.00	0.00	12	15.6770	20.2630	0.1875	0.7500	A572-65 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2810	1.1240	A572-65 (65 ksi)
L3	47.08-0.00	52.00		12	31.3725	44.0000	0.3750	1.5000	A572-65 (65 ksi)

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 2 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by AseI

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	16.2300	9.3518	286.3883	5.5452	8.1207	35.2665	580.3004	4.6027	3.6989	19.728
	20.9778	12.1206	623.5083	7.1870	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283
L2	20.9778	18.0801	921.4356	7.1536	10.4962	87.7873	1867.0784	8.8985	4.6774	16.646
	34.2987	29.7224	4093.6867	11.7599	17.1613	238.5412	8294.9191	14.6285	8.1258	28.917
L3	33.7153	37.4295	4590.4196	11.0971	16.2509	282.4709	9301.4345	18.4216	7.4028	19.741
	45.5522	52.6772	12796.1526	15.6177	22.7920	561.4318	25928.4743	25.9261	10.7870	28.765

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 120.00-100.00				1	1	1		
L2 100.00-47.08				1	1	1		
L3 47.08-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	50.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	50.00 - 8.00	3	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
**								
LDF6-50A (1-1/4 FOAM)	B	No	Inside Pole	87.00 - 8.00	9	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
**								
LDF6-50A (1-1/4 FOAM)	A	No	Inside Pole	115.00 - 8.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
**								
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	73.00 - 8.00	14	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
**								
HJ7-50A (1-5/8 AIR) (Verizon Wireless)	C	No	Inside Pole	100.00 - 8.00	9	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
FLC 158-50J (1 5/8 FOAM) (Verizon Wireless)	C	No	Inside Pole	100.00 - 8.00	6	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
**								
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	107.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	118.00 - 8.00	2	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33

Feed Line/Linear Appurtenances Section Areas

RISA Tower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 3 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	118.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	12.93
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	419.10
		B	0.000	0.000	0.000	0.000	237.11
		C	0.000	0.000	0.000	0.000	953.32
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	309.54
		B	0.000	0.000	0.000	0.000	232.15
		C	0.000	0.000	0.000	0.000	838.34

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	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	118.80
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	12.93
L2	100.00-47.08	A	0.500	0.000	0.000	0.000	0.000	419.10
		B		0.000	0.000	0.000	0.000	237.11
		C		0.000	0.000	0.000	0.000	953.32
L3	47.08-0.00	A	0.500	0.000	0.000	0.000	0.000	309.54
		B		0.000	0.000	0.000	0.000	232.15
		C		0.000	0.000	0.000	0.000	838.34

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	120.00-100.00	0.0000	0.0000	0.0000	0.0000
L2	100.00-47.08	0.0000	0.0000	0.0000	0.0000
L3	47.08-0.00	0.0000	0.0000	0.0000	0.0000

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	
6' Sidearm (4" single tube) (VSI)	A	From Centroid-Leg	4.33	0.0000	50.00	No Ice	0.90	3.60	125.00
			0.00			1/2" Ice	1.25	4.50	175.00
6' Sidearm (4" single tube) (VSI)	B	From Centroid-Leg	4.33	0.0000	50.00	No Ice	0.90	3.60	125.00
			0.00			1/2" Ice	1.25	4.50	175.00

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job		HRT106(B), CT BU#806364		Page		4 of 8	
	Project		Vertical Structures Job No. 2008-004-033		Date		13:47:07 05/07/08	
	Client		Crown Castle		Designed by		Asel	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	lb	
PD1142-1	A	From Centroid-Leg	7.33 0.00 7.00		0.0000	50.00	No Ice 1/2" Ice	1.32 3.21	1.32 3.21	10.00 23.85
DB492A	A	From Centroid-Leg	7.33 0.00 0.00		-40.0000	50.00	No Ice 1/2" Ice	1.10 1.98	1.10 1.98	6.00 7.80
ASP-655	B	From Centroid-Leg	7.33 0.00 -4.00		0.0000	50.00	No Ice 1/2" Ice	0.56 1.02	0.56 1.02	1.00 5.94
PD1121-6	B	From Centroid-Leg	7.33 0.00 3.00		0.0000	50.00	No Ice 1/2" Ice	0.23 0.41	0.23 0.41	3.00 3.90
**										
Valmont 13'-5" L.P. Platform (VSI)	C	None			0.0000	73.00	No Ice 1/2" Ice	31.00 37.70	31.00 37.70	1260.00 2110.00
(2) 6' x 2" Antenna Mount Pipe (VSI)	A	From Centroid-Face	3.90 0.00 0.00		0.0000	73.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	23.00 33.83
(2) 6' x 2" Antenna Mount Pipe (VSI)	B	From Centroid-Face	3.90 0.00 0.00		0.0000	73.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	23.00 33.83
(2) 6' x 2" Antenna Mount Pipe (VSI)	C	From Centroid-Face	3.90 0.00 0.00		0.0000	73.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	23.00 33.83
(2) 7250.02 w/Mount Pipe	A	From Centroid-Face	3.90 0.00 1.00		-10.0000	73.00	No Ice 1/2" Ice	4.45 5.03	3.54 4.72	40.95 76.25
(2) 7250.02 w/Mount Pipe	B	From Centroid-Face	3.90 0.00 1.00		-10.0000	73.00	No Ice 1/2" Ice	4.45 5.03	3.54 4.72	40.95 76.25
(2) 7250.02 w/Mount Pipe	C	From Centroid-Face	3.90 0.00 1.00		-10.0000	73.00	No Ice 1/2" Ice	4.45 5.03	3.54 4.72	40.95 76.25
DB809K-YP	B	From Centroid-Face	3.90 0.00 6.00		0.0000	73.00	No Ice 1/2" Ice	2.67 3.76	2.67 3.76	30.50 50.36
DB809K-YP	C	From Centroid-Face	3.90 0.00 6.00		0.0000	73.00	No Ice 1/2" Ice	2.67 3.76	2.67 3.76	30.50 50.36
**										
Valmont 13'-5" Platform w/ Rails (VSI)	C	None			0.0000	87.00	No Ice 1/2" Ice	44.50 55.50	44.50 55.50	1650.00 2710.00
(3) DB980H90E-M w/Mount Pipe	A	From Centroid-Face	3.90 0.00 0.00		-30.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
(3) DB980H90E-M w/Mount Pipe	B	From Centroid-Face	3.90 0.00 0.00		-30.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
(3) DB980H90E-M w/Mount Pipe	C	From Centroid-Face	3.90 0.00 0.00		-30.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
**										
Valmont 13'-5" Platform w/ Rails (VSI) (Verizon Wireless)	C	None			0.0000	98.00	No Ice 1/2" Ice	44.50 55.50	44.50 55.50	1650.00 2710.00
(2) LPA-80080/6CF w/Mount Pipe	A	From Centroid-	3.90 0.00		-30.0000	98.00	No Ice 1/2" Ice	4.35 4.79	10.51 11.56	42.90 104.60

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 5 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asei

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	lb
(Verizon Wireless)		Face	2.00						
(2) LPA-80080/6CF w/ Mount Pipe	B	From	3.90		-30.0000	98.00	No Ice 4.35	10.51	42.90
		Centroid-	0.00				1/2" Ice 4.79	11.56	104.60
(Verizon Wireless)		Face	2.00						
(2) LPA-80080/6CF w/ Mount Pipe	C	From	3.90		-30.0000	98.00	No Ice 4.35	10.51	42.90
		Centroid-	0.00				1/2" Ice 4.79	11.56	104.60
(Verizon Wireless)		Face	2.00						
ALP 9212-N w/Mount Pipe	A	From	3.90		-30.0000	98.00	No Ice 6.42	7.45	42.71
(Verizon Wireless)		Centroid-	0.00				1/2" Ice 7.11	8.59	103.63
		Face	2.00						
ALP 9212-N w/Mount Pipe	B	From	3.90		-30.0000	98.00	No Ice 6.42	7.45	42.71
(Verizon Wireless)		Centroid-	0.00				1/2" Ice 7.11	8.59	103.63
		Face	2.00						
ALP 9212-N w/Mount Pipe	C	From	3.90		-30.0000	98.00	No Ice 6.42	7.45	42.71
(Verizon Wireless)		Centroid-	0.00				1/2" Ice 7.11	8.59	103.63
		Face	2.00						
(2) DB950F85T2E-M w/Mount Pipe	A	From	3.90		-30.0000	98.00	No Ice 3.01	5.85	36.05
(Verizon Wireless)		Centroid-	0.00				1/2" Ice 3.58	6.96	75.04
		Face	2.00						
(2) DB950F85T2E-M w/Mount Pipe	B	From	3.90		-30.0000	98.00	No Ice 3.01	5.85	36.05
(Verizon Wireless)		Centroid-	0.00				1/2" Ice 3.58	6.96	75.04
		Face	2.00						
(2) DB950F85T2E-M w/Mount Pipe	C	From	3.90		-30.0000	98.00	No Ice 3.01	5.85	36.05
(Verizon Wireless)		Centroid-	0.00				1/2" Ice 3.58	6.96	75.04
		Face	2.00						
**									
13 L.P. Platform (VSI)	C	None			0.0000	115.00	No Ice 31.00	31.00	1260.00
							1/2" Ice 37.70	37.70	2110.00
(4) DB844H90 w/Mount Pipe	A	From	3.90		-30.0000	115.00	No Ice 3.58	5.63	35.55
		Centroid-	0.00				1/2" Ice 4.20	6.73	77.48
		Face	0.00						
(4) DB844H90 w/Mount Pipe	B	From	3.90		-30.0000	115.00	No Ice 3.58	5.63	35.55
		Centroid-	0.00				1/2" Ice 4.20	6.73	77.48
		Face	0.00						
(4) DB844H90 w/Mount Pipe	C	From	3.90		-30.0000	115.00	No Ice 3.58	5.63	35.55
		Centroid-	0.00				1/2" Ice 4.20	6.73	77.48
		Face	0.00						
**									
6' Sidearm (4" single tube) (VSI)	A	From	3.67		0.0000	118.00	No Ice 0.90	3.60	125.00
		Centroid-	0.00				1/2" Ice 1.25	4.50	175.00
		Leg	0.00						
6' Sidearm (4" single tube) (VSI)	C	From	3.67		0.0000	118.00	No Ice 0.90	3.60	125.00
		Centroid-	0.00				1/2" Ice 1.25	4.50	175.00
		Leg	0.00						
DB809MT3-XT	A	From	6.67		0.0000	118.00	No Ice 2.84	2.84	25.00
		Centroid-	0.00				1/2" Ice 4.29	4.29	46.91
		Leg	7.00						
DB201-A	C	From	6.67		0.0000	118.00	No Ice 1.05	1.05	25.00
		Centroid-	0.00				1/2" Ice 1.91	1.91	34.13
		Leg	5.00						
6'x4" Pipe Mount	C	From	1.25		0.0000	107.00	No Ice 2.25	2.25	65.00
		Centroid-	0.00				1/2" Ice 2.62	2.62	84.10
		Face	0.00						

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 6 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz Lateral	Vert							
				ft	°	°	ft	ft	ft ²	lb		
KP6-17B	C	Grid	From Centroid -Face	1.75 0.00 0.00	0.0000			107.00	6.00	No Ice 1/2" Ice	22.62 29.05	198.00 347.13

Load Combinations

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

RISA Tower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 7 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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	120 - 100	Pole	Max Tension	8	0.32	-5.38	0.03
			Max. Compression	14	-4995.74	762.56	-193.41
			Max. Mx	11	-2514.82	85910.72	452.87
			Max. My	15	-4354.94	1569.89	87312.06
			Max. Vy	11	-6231.72	85910.72	452.87
			Max. Vx	15	-6937.07	1569.89	87312.06
			Max. Torque	23			-1405.37
L2	100 - 47.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21379.11	592.10	-291.57
			Max. Mx	11	-13180.75	952213.98	572.05
			Max. My	8	-13150.21	-3165.00	-967512.58
			Max. Vy	5	22744.03	-951314.44	-6602.43
			Max. Vx	8	23039.99	-3165.00	-967512.58
			Max. Torque	16			1328.59
L3	47.0833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33005.36	-127.08	283.33
			Max. Mx	5	-24529.36	-	-9654.41
						2270582.90	
			Max. My	8	-24528.70	-4358.51	-
			Max. Vy	5	27757.08	-	2298753.16
			Max. Vx	8	27996.99	-4358.51	-9654.41
			2270582.90				
					2298753.16		
			Max. Torque	25			-1262.73

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	120 - 100 (1)	TP20.263x15.677x0.1875	20.00	0.00	0.0	39.000	12.1206	-4354.94	472703.00	0.009
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	52.92	0.00	0.0	39.000	28.6407	-13150.20	1116990.00	0.012
L3	47.0833 - 0 (3)	H1-3 (1.36 CR) - 2 TP44x31.3725x0.375	52.00	0.00	0.0	39.000	52.6772	-24528.70	2054410.00	0.012

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	120 - 100 (1)	TP20.263x15.677x0.1875	87325.8	-17.641	39.000	0.452	0.00	0.000	39.000	0.000
L2	100 - 47.0833	TP33.13x20.263x0.281	967516.	-52.435	39.000	1.344	0.00	0.000	39.000	0.000

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job	HRT106(B), CT BU#806364	Page	8 of 8
	Project	Vertical Structures Job No. 2008-004-033	Date	13:47:07 05/07/08
	Client	Crown Castle	Designed by	Asel

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 $\frac{f_{by}}{F_{by}}$
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	2298758 .33	-49.133	39.000	1.260	0.00	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	120 - 100 (1)	TP20.263x15.677x0.1875	0.009	0.452	0.000	0.462 ✓	1.333	H1-3 ✓
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	0.012	1.344	0.000	1.356 ✗	1.333	H1-3 ✗
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	0.012	1.260	0.000	1.272 ✓	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF* P_{allow} lb	% Capacity	Pass Fail	
L1	120 - 100	Pole	TP20.263x15.677x0.1875	1	-4354.94	630113.07	34.6	Pass	
L2	100 - 47.0833	Pole	TP33.13x20.263x0.281	2	-13150.20	1488947.61	101.7	Fail ✗	
L3	47.0833 - 0	Pole	TP44x31.3725x0.375	3	-24528.70	2738528.42	95.4	Pass	
							Summary		
							Pole (L2)	101.7	Fail ✗
							RATING =	101.7	Fail ✗

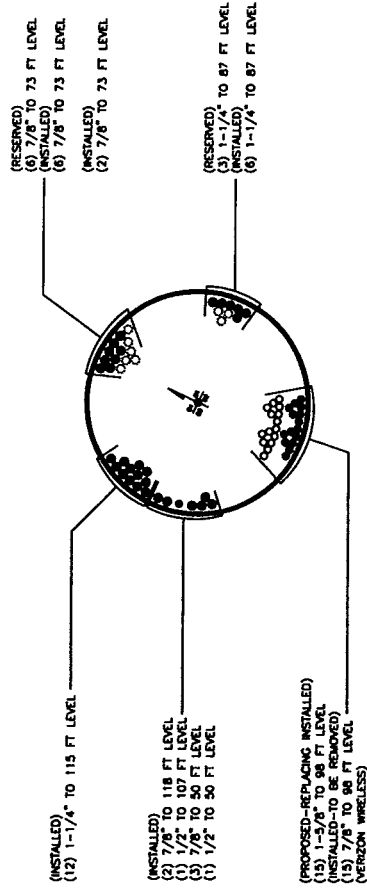
APPENDIX B

MAINTENANCE MANUAL FOR THE JACOBS [1125] SERIES

(*)



CROWN REGION ADDRESS
USA



: SCALE :

DRAWN BY: WAD
CHECKED BY: BRM
DRAWING DATE: 140208

SITE NUMBER:

SITE NAME:

HRT (0000)

BUSINESS UNIT NUMBER

800384

SITE ADDRESS

101 R OLD BLUE HILL ROAD

MIDDLESEX COUNTY

USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

LEGEND: FEEDLINES

- SOLID BLUE CIRCLE DENOTES EXISTING FEEDLINE
- OPEN RED CIRCLE DENOTES PROPOSED FEEDLINE
- OPEN BLUE CIRCLE DENOTES RESERVED FEEDLINE
- x BLUE "x" DENOTES LOCATION NOT GIVEN

NOTE: ASSUME FEEDLINE ATTACHMENT HEIGHT TO TOWER STEEL AT 8-FEET ABOVE FINISHED GRADE UNLESS OTHERWISE SPECIFIED

BUSINESS UNIT: 800384 TOWER ID: C.BASELEVEL

BASE LEVEL DRAWING	SCALE: 1" = 1'-0"	1
--------------------	-------------------	---

APPENDIX C



FLANGE BOLT CALCULATIONS @ 100'

Customer: Crown Castle
Site Name: HRT 106(B), CT BU#806364
Job Number: 2008-004-033
Tower Model: 120' Valmont Monoploe Tower
Date: 5/7/2008

<i>Input Information:</i>	<i>Existing Bolts</i>	
# Bolts, n	8	
Bolt Diameter, d	1.5	in
Bolt Circle Diameter, D	23.5	in
Bolt Ultimate Tensile Stress, F_u	120	ksi
Applied Vertical Load P	2.515	kips
Applied Shear S	6.937	kips
Applied Moment M	1047.744	kip-in
Bolt Type	A325	

Bolt Cross-Sectional Area, A	1.767	in ² (each)
Bolt Group Moment of Inertia, I	975.9063054	in ⁴
Maximum Tensile Stress (outer bolt), σ_y	12.44	ksi
Maximum Shear Stress (any bolt), τ_{xy}	0.491	ksi
Maximum Allowable Stress (per bolt), Ft	58.65	ksi
% Capacity	21.2%	

The Bolt Group is Adequate for Loading

Maximum Allowable Stress (per bolt), Ft

$$(44^2 - 4.39 * fv^2)^{1/2}$$

This equation is for A325 bolts (threads included in shear plane) Manual of Steel Construction ASD, 9th Edition, pg. 5-74, Table J3.3



FLANGE PLATE CALCULATIONS @ 100' (BUTT WELDED)

Customer:	Crown Castle
Site Name:	HRT 106(B), CT BU#806364
Job Number:	2008-004-033
Tower Model:	120' Valmont Monopole Tower
Date:	5/7/2008

FOR BUTT WELDED FLANGE PLATES LESS THAN 2" THICK WITH EQUALLY DISTRIBUTED BOLTS WITHOUT GUSSET PLATE STIFFENERS

Maximum Tensile Bolt Load	21.98	kip
Number of Sides of Pole	12	
Diameter of Pole at Flange	20.26	in
Thickness of Pole at Flange	0.1875	in
Area of Pole at Base	12.101423	in ²
Interior Circumference of Pole at Base	63.938036	in
Flange Bolt Circle	23.5	in
Flange Bolt Diameter	1.5	in
Flange Plate Section Length	1.62	in
Flange Bolt Quantity	8	
Flange Plate Section Width	8.5922559	in
Moment on Flange Plate Section	35.604442	kip-in
Flange Plate Thickness	1.5	in
Flange Plate Bending Stress	11.050087	ksi
Flange Plate Yield Strength	50	ksi
Allowable Bending Stress (with 4/3 Increase)	50	ksi
% Capacity	22.1%	

Flange Plate is Adequate for Loading



ANCHOR BOLT CALCULATIONS

Customer: Crown Castle
Site Name: HRT 106(B), CT BU#806364
Job Number: 2008-004-033
Tower Model: 120' Valmont Monopole Tower
Date: 5/7/2008

<i>Input Information:</i>	<i>Existing Bolts</i>	
# Bolts, n	12	
Bolt Diameter, d	2.25	in
Bolt Circle Diameter, D	52.05	in
Bolt Ultimate Tensile Stress, F_u	100	ksi
Applied Vertical Load P	24.56	kips
Applied Shear S	27.97	kips
Applied Moment M	27585.08	kip-in
Steel Grade	A615 Gr 75	

Bolt Cross-Sectional Area, A	3.976	in ² (each)
Bolt Group Moment of Inertia, I	16158.00151	in ⁴
Maximum Tensile Stress (outer bolt), σ_y	43.92	ksi
Maximum Shear Stress (any bolt), τ_{xy}	0.586	ksi
Maximum Allowable Stress (per bolt), F_t	44.00	ksi
% Capacity	99.8%	

The Bolt Group is Adequate for Loading

Maximum Allowable Stress (per bolt), **F_t**

$$0.43F_u - 1.8f_v \leq 0.33F_u$$

This equation is for threaded parts, A449 bolts over 1 1/2" dia. (threads included in shear plane) Manual of Steel Construction ASD, 9th Edition, pg. 5-74, Table J3.3



BASE PLATE CALCULATIONS (BUTT WELDED)

Customer: Crown Castle
Site Name: HRT 106(B), CT BU#806364
Job Number: 2008-004-033
Tower Model: 120' Valmont Monoploe Tower
Date: 5/7/2008

FOR BUTT WELDED BASE PLATES WITH EQUALLY DISTRUBUTED ANCHOR BOLTS WITHOUT GUSSET PLATE STIFFENERS

Maximum Tensile Bolt Load	174.61	kip
Number of Sides of Pole	12	
Diameter of Pole at Base	44	in
Thickness of Pole at Base	0.375	in
Area of Pole at Base	52.60	in ²
Circumference of Pole at Base	141.48	in
Anchor Bolt Circle	52.05	in
Anchor Bolt Diameter	2.25	in
Base Plate Section Length	2.9	in
Anchor Bolt Quantity	12	
Base Plate Section Width	12.28	in
Moment on Base Plate Section	506.37	kip-in
Base Plate Thickness	2.75	in
Base Plate Bending Stress	32.72	ksi
Base Plate Yield Strength	60	ksi
Allowable Bending Stress (with 4/3 Increase)	60	ksi
% Capacity	54.5%	

Base Plate is Adequate for Loading



May 7 2008

LaShay Holmes
Crown Castle USA
9105 Monroe Road, Suite 150
Charlotte, NC 28270
(704) 814-8311

Vertical Structures, Inc
309 Spangler Drive, Suite F
Richmond, KY 40475
(859) 624-8360
caseltyne@verticalstructures.com

Subject: Structural Analysis Report

Carrier Designation Verizon Wireless Change-Out
Carrier Site Number: HRT 106
Carrier Site Name: Durham, CT

Crown Castle Designation Crown Castle BU Number: 806364
Crown Castle Site Name: HRT 106(B)
Crown Castle JDE Job Number: 101930

Engineering Firm Designation Vertical Structures Project Number: 2008-004-033

Site Data 101 R Old Blue Hill Road, Durham, CT, Middlesex County
Latitude 41°-27'-33.67", Longitude -72°-39'-45.83"
120' Valmont Monopole Tower

Dear Ms. Holmes,

Vertical Structures is pleased to submit this structural analysis report to determine the structural integrity of the aforementioned 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 276032, and Application Number 59383, Revision 1. The purpose of the analysis is to determine the suitability of the tower for the following load case:

Load Case 1 (LC1): Proposed Equipment (Table 1) + Existing/Reserved Equipment (Table 2)

Based on our analysis we have determined the tower superstructure and foundation are sufficient for LC1. This analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon an 85 MPH basic "fastest mile" wind speed, equivalent to a 105 MPH basic "3-second gust" wind speed per IBC Table 1609.3.1.

Vertical Structures appreciates the opportunity of providing our continuing professional services to you and Crown Castle USA. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted,

Craig Aseltyne, P.E.
Project Engineer





May 7, 2008

LaShay Holmes
Crown Castle USA
9105 Monroe Road, Suite 150
Charlotte, NC 28270
(704) 814-8311

Vertical Structures, Inc.
309 Spangler Drive, Suite E
Richmond, KY 40475
(859) 624-8360
caseltyne@verticalstructures.com

Subject: Structural Analysis Report

Carrier Designation Verizon Wireless Change-Out
Carrier Site Number: HRT 106
Carrier Site Name: Durham, CT

Crown Castle Designation Crown Castle BU Number: 806364
Crown Castle Site Name: HRT 106(B)
Crown Castle JDE Job Number: 101930

Engineering Firm Designation Vertical Structures Project Number: 2008-004-033

Site Data 101 R Old Blue Hill Road, Durham, CT, Middlesex County
Latitude 41°-27'-33.67", Longitude -72°-39'-45.83"
120' Valmont Monopole Tower

Dear Ms. Holmes,

Vertical Structures is pleased to submit this structural analysis report to determine the structural integrity of the aforementioned 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 276032, and Application Number 59383, Revision 1. The purpose of the analysis is to determine the suitability of the tower for the following load case:

Load Case 1 (LC1): Proposed Equipment (Table 1) + Existing/Reserved Equipment (Table 2)

Based on our analysis we have determined the tower superstructure and foundation are sufficient for LC1. This analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon an 85 MPH basic "fastest mile" wind speed, equivalent to a 105 MPH basic "3-second gust" wind speed per IBC Table 1609.3.1.

Vertical Structures appreciates the opportunity of providing our continuing professional services to you and Crown Castle USA. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted,

Craig Aseltyne, P.E.
Project Engineer

TABLE OF CONTENTS

1.) INTRODUCTION

2.) ANALYSIS CRITERIA

Table 1 – Proposed Antenna and Cable Information

Table 2 – Existing and Reserved Antenna and Cable Information

Table 3 – Design Antenna and Cable Information

3.) ANALYSIS PROCEDURE

Table 4 – Documents Provided

3.1) Analysis Methods

3.2) Assumptions

4.) ANALYSIS RESULTS

Table 5 – Tower Component Stresses vs. Capacity (LC1)

5.) APPENDIX A

RISA Tower Output

6.) APPENDIX B

Feedline Routing Drawing

7.) APPENDIX C

Additional Calculations

1.) INTRODUCTION

The original 100' tall monopole tower was designed and manufactured by Valmont in 1994 for Bell Atlantic Mobile. The tower has since been extended 20' up to 120'. The structure consists of three (3) 12-sided tapered polygonal sections joined via a slip joint connection and a bolted flange connection. The tower is founded on a 27' square by 6' thick mat bearing 6' below grade.

2.) ANALYSIS CRITERIA

The HRT 106(B) monopole tower was analyzed in accordance with the current EIA-222-F publication, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures." The proposed, existing and reserved antennas, cables and mounts considered in this analysis are listed in Tables 1 and 2. Applied forces in this study were derived from an 85 MPH basic "fastest mile" wind speed with no ice and a reduced 74 MPH basic "fastest mile" wind speed with a 1/2" of radial ice accumulation. The tower was originally designed for a 90 MPH basic "fastest mile" wind speed with no ice and a reduced 78 MPH basic "fastest mile" wind speed with a 1/2" of radial ice accumulation. The original design loads are listed in Table 3. All cables are assumed to be routed in accordance with the drawing in Appendix B.

Table 1 – Proposed Antenna and Cable Information

Mount Center Line Elevation (feet)	Number Of Antenna	Antenna Manufacturer	Antenna Model	Mount Manufacturer	Mount Model	Number Of Feed Lines	Feed Line Size (inches)
98	6	Antel	LPA-80080/6CF			15	1 5/8

Table 2 – Existing and Reserved Antenna and Cable Information

Mount Center Line Elevation (feet)	Number Of Antenna	Antenna Manufacturer	Antenna Model	Mount Manufacturer	Mount Model	Number Of Feed Lines	Feed Line Size (inches)
118	1	Decibel	DB809MT3-XT		(2) 6' Sidearms	2	7/8
	1	Decibel	DB201-A				
115	12	Decibel	DB844H90		(1) 13' L.P. Platform	12	1 1/4
107	1	Andrew	KP6-17B		(1) Pipe Mount	1	1/2
98	3 + 6*	Swedcom	ALP 9212-N	Valmont	(1) 13'-5" Platform w/ Rails	15*	7/8
	6	Decibel	DB950F85T2E-M				
87	6 + 3**	Decibel	DB980H90E-M	Valmont	(1) 13'-5" Platform w/ Rails	6 + 3**	1 1/4
73	3 + 3**	Allgon	7250.02	Valmont	(1) 13'-5" L.P. Platform	8 + 6**	7/8
	2	Decibel	DB809K-YP				
50	1	Celwave	PD1142-1		(2) 6' Sidearms	3	7/8
	1	Celwave	PD1121-6				
	1	Decibel	ASP-655				
	1	Decibel	DB492A				

*Indicates equipment to be removed.

**Indicates reserved equipment.

Table 3 – Design Antenna and Cable Information

Mount Center Line Elevation (feet)	Number Of Antenna	Antenna Manufacturer	Antenna Model	Mount Manufacturer	Mount Model	Number Of Feed Lines	Feed Line Size (inches)
97	12	Sinclair	SRL410C4R105	Valmont	Cellular Platform		
87	9	Sinclair	SRL410C4R105	Valmont	Cellular Platform		
75	1	Telewave	450F6				
	1	Decibel	ASP-710				
50	1	Decibel	ASP-710				
	1	Decibel	ASP-701				

3.) ANALYSIS PROCEDURE

Table 4 – Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Change-Out Revision #1	59383	CCI iSite
Tower Drawing	Valmont Drawing No. DC1723Z	262153	CCI iSite
Foundation Drawing	SAC Engineering Project No. 1994-8A	297341	CCI iSite
Geotechnical Information	Dr. Clarence Welti Report Dated 3/18/93	262150	CCI iSite
Extension Information	Vertical Structures Site Visit	N/A	Field Notes

3.1) Analysis Methods

RISA Tower (Version 5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various dead, live, wind, and ice load cases. All loads were computed in accordance with the ANSI/TIA/EIA-222-F or the local building code requirements. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and Vertical Structures should be allowed to review any new information to determine its effect on the structural integrity of the tower.

4.) ANALYSIS RESULTS

Table 5 – Tower Component Stresses vs. Capacity (LC1)

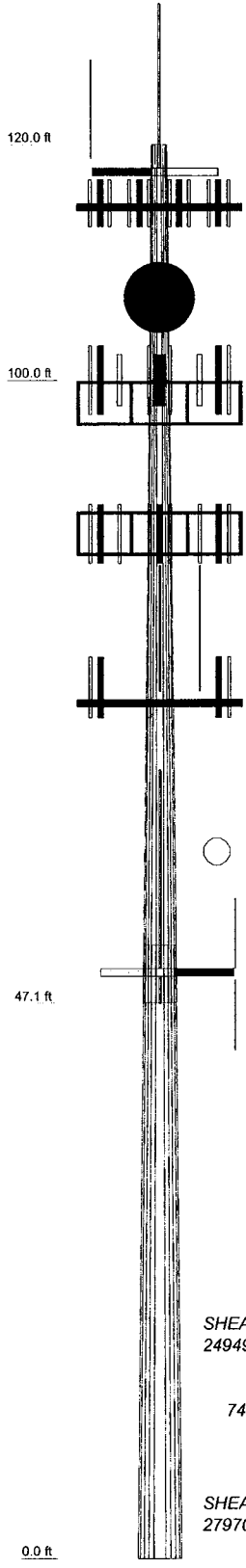
Section Capacity Table										
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass	Fail	
L1	120 - 100	Pole	TP20.263x15.677x0.1875	1	-4354.94	630113.07	34.6	Pass		
L2	100 - 47.0833	Pole	TP33.13x20.263x0.281	2	-13150.20	1488947.61	101.7	Fail	X(1)	
L3	47.0833 - 0	Pole	TP44x31.3725x0.375	3	-24528.70	2738528.42	95.4	Pass		
							Summary			
							Pole (L2)	101.7	Fail	X(1)
							RATING =	101.7	Fail	X(1)

Notes	Component	Elevation (feet)	% Capacity	Pass/Fail
Additional Component Analysis Summary:				
2	Flange Bolts (Tension)	100	21.2	Pass
2	Flange Plate (Bending)	100	22.1	Pass
2	Anchor Bolts (Tension)	0	99.8	Pass
2	Base Plate (Bending)	0	54.5	Pass
	Foundation (Compared to Design Loads)	0	95.1	Pass
Structure Rating =			101.7	Pass

- 1) Indicates overstress of less than 5% and is considered acceptable based on the analysis procedure used.
- 2) Indicates calculations supporting % capacity are included in Appendix C.

APPENDIX A

Section	1	2	3
Length (ft)	20.00	52.92	52.00
Number of Sides	12	12	12
Thickness (in)	0.1875	0.2810	0.3750
Lap Splice (ft)			4.92
Top Dia (in)	15.6770	20.2630	31.3725
Bot Dia (in)	20.2630	33.1300	44.0000
Grade		A572-65	
Weight (lb)	730.7	4303.8	7972.0



DESIGNED APPURTENANCE LOADING

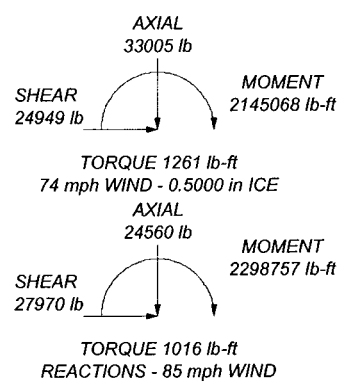
TYPE	ELEVATION	TYPE	ELEVATION
6' Sidearm (4" single tube) (VSI)	118	(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98
6' Sidearm (4" single tube) (VSI)	118	(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98
DB809MT3-XT	118	(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98
DB201-A	118	Valmont 13'-5" Platform w/ Rails (VSI)	87
13 L.P. Platform (VSI)	115	(3) DB980H90E-M w/Mount Pipe	87
(4) DB844H90 w/Mount Pipe	115	(3) DB980H90E-M w/Mount Pipe	87
(4) DB844H90 w/Mount Pipe	115	(3) DB980H90E-M w/Mount Pipe	87
(4) DB844H90 w/Mount Pipe	115	(2) 7250.02 w/Mount Pipe	73
6"x4" Pipe Mount	107	(2) 7250.02 w/Mount Pipe	73
KP6-17B	107	DB809K-YP	73
Valmont 13'-5" Platform w/ Rails (VSI) (Verizon Wireless)	98	DB809K-YP	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 7250.02 w/Mount Pipe	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	Valmont 13'-5" L.P. Platform (VSI)	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 6' x 2" Antenna Mount Pipe (VSI)	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 6' x 2" Antenna Mount Pipe (VSI)	73
(2) LPA-80080/6CF w/ Mount Pipe (Verizon Wireless)	98	(2) 6' x 2" Antenna Mount Pipe (VSI)	73
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	6' Sidearm (4" single tube) (VSI)	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	6' Sidearm (4" single tube) (VSI)	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	PD1142-1	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	DB492A	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	ASP-655	50
ALP 9212-N w/Mount Pipe (Verizon Wireless)	98	PD1121-6	50
(2) DB950F85T2E-M w/Mount Pipe (Verizon Wireless)	98		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex 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: 101.7%



Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job: HRT106(B), CT BU#806364
	Project: Vertical Structures Job No. 2008-004-033
	Client: Crown Castle Drawn by: Asel App'd:
	Code: TIA/EIA-222-F Date: 05/07/08 Scale: NTS
	Path: _____ Dwg No. E-1

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 1 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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 Middlesex County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 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	√ Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	√ SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	√ Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-100.00	20.00	0.00	12	15.6770	20.2630	0.1875	0.7500	A572-65 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2810	1.1240	A572-65 (65 ksi)
L3	47.08-0.00	52.00		12	31.3725	44.0000	0.3750	1.5000	A572-65 (65 ksi)

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 2 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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	16.2300	9.3518	286.3883	5.5452	8.1207	35.2665	580.3004	4.6027	3.6989	19.728
	20.9778	12.1206	623.5083	7.1870	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283
L2	20.9778	18.0801	921.4356	7.1536	10.4962	87.7873	1867.0784	8.8985	4.6774	16.646
	34.2987	29.7224	4093.6867	11.7599	17.1613	238.5412	8294.9191	14.6285	8.1258	28.917
L3	33.7153	37.4295	4590.4196	11.0971	16.2509	282.4709	9301.4345	18.4216	7.4028	19.741
	45.5522	52.6772	12796.1526	15.6177	22.7920	561.4318	25928.4743	25.9261	10.7870	28.765

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 120.00-100.00				1	1	1		
L2 100.00-47.08				1	1	1		
L3 47.08-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C _A A _A	Weight
				ft		ft ² /ft	plf
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	50.00 - 8.00	1	No Ice 1/2" Ice	0.00 0.00
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	50.00 - 8.00	3	No Ice 1/2" Ice	0.00 0.00
**							
LDF6-50A (1-1/4 FOAM)	B	No	Inside Pole	87.00 - 8.00	9	No Ice 1/2" Ice	0.00 0.00
**							
LDF6-50A (1-1/4 FOAM)	A	No	Inside Pole	115.00 - 8.00	12	No Ice 1/2" Ice	0.00 0.00
**							
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	73.00 - 8.00	14	No Ice 1/2" Ice	0.00 0.00
**							
HJ7-50A (1-5/8 AIR) (Verizon Wireless)	C	No	Inside Pole	100.00 - 8.00	9	No Ice 1/2" Ice	0.00 0.00
FLC 158-50J (1 5/8 FOAM) (Verizon Wireless)	C	No	Inside Pole	100.00 - 8.00	6	No Ice 1/2" Ice	0.00 0.00
**							
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	107.00 - 8.00	1	No Ice 1/2" Ice	0.00 0.00
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	118.00 - 8.00	2	No Ice 1/2" Ice	0.00 0.00

Feed Line/Linear Appurtenances Section Areas

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 3 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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 lb
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	118.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	12.93
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	419.10
		B	0.000	0.000	0.000	0.000	237.11
		C	0.000	0.000	0.000	0.000	953.32
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	309.54
		B	0.000	0.000	0.000	0.000	232.15
		C	0.000	0.000	0.000	0.000	838.34

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 lb
L1	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	118.80
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	12.93
L2	100.00-47.08	A	0.500	0.000	0.000	0.000	0.000	419.10
		B		0.000	0.000	0.000	0.000	237.11
		C		0.000	0.000	0.000	0.000	953.32
L3	47.08-0.00	A	0.500	0.000	0.000	0.000	0.000	309.54
		B		0.000	0.000	0.000	0.000	232.15
		C		0.000	0.000	0.000	0.000	838.34

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	120.00-100.00	0.0000	0.0000	0.0000	0.0000
L2	100.00-47.08	0.0000	0.0000	0.0000	0.0000
L3	47.08-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	$C_A A_A$ Front ft ²	$C_A A_A$ Side ft ²	Weight lb	
6' Sidearm (4" single tube) (VSI)	A	From Centroid-Leg	4.33	0.0000	50.00	No Ice	0.90	3.60	125.00
			0.00			1/2" Ice	1.25	4.50	175.00
6' Sidearm (4" single tube) (VSI)	B	From Centroid-Leg	4.33	0.0000	50.00	No Ice	0.90	3.60	125.00
			0.00			1/2" Ice	1.25	4.50	175.00

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job		HRT106(B), CT BU#806364		Page		4 of 8	
	Project		Vertical Structures Job No. 2008-004-033		Date		13:47:07 05/07/08	
	Client		Crown Castle		Designed by		Asef	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	lb	
PD1142-1	A	From Centroid-Leg	7.33 0.00 7.00		0.0000	50.00	No Ice 1/2" Ice	1.32 3.21	1.32 3.21	10.00 23.85
DB492A	A	From Centroid-Leg	7.33 0.00 0.00		-40.0000	50.00	No Ice 1/2" Ice	1.10 1.98	1.10 1.98	6.00 7.80
ASP-655	B	From Centroid-Leg	7.33 0.00 -4.00		0.0000	50.00	No Ice 1/2" Ice	0.56 1.02	0.56 1.02	1.00 5.94
PD1121-6	B	From Centroid-Leg	7.33 0.00 3.00		0.0000	50.00	No Ice 1/2" Ice	0.23 0.41	0.23 0.41	3.00 3.90
**										
Valmont 13'-5" L.P. Platform (VSI)	C	None			0.0000	73.00	No Ice 1/2" Ice	31.00 37.70	31.00 37.70	1260.00 2110.00
(2) 6' x 2" Antenna Mount Pipe (VSI)	A	From Centroid-Face	3.90 0.00 0.00		0.0000	73.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	23.00 33.83
(2) 6' x 2" Antenna Mount Pipe (VSI)	B	From Centroid-Face	3.90 0.00 0.00		0.0000	73.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	23.00 33.83
(2) 6' x 2" Antenna Mount Pipe (VSI)	C	From Centroid-Face	3.90 0.00 0.00		0.0000	73.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	23.00 33.83
(2) 7250.02 w/Mount Pipe	A	From Centroid-Face	3.90 0.00 1.00		-10.0000	73.00	No Ice 1/2" Ice	4.45 5.03	3.54 4.72	40.95 76.25
(2) 7250.02 w/Mount Pipe	B	From Centroid-Face	3.90 0.00 1.00		-10.0000	73.00	No Ice 1/2" Ice	4.45 5.03	3.54 4.72	40.95 76.25
(2) 7250.02 w/Mount Pipe	C	From Centroid-Face	3.90 0.00 1.00		-10.0000	73.00	No Ice 1/2" Ice	4.45 5.03	3.54 4.72	40.95 76.25
DB809K-YP	B	From Centroid-Face	3.90 0.00 6.00		0.0000	73.00	No Ice 1/2" Ice	2.67 3.76	2.67 3.76	30.50 50.36
DB809K-YP	C	From Centroid-Face	3.90 0.00 6.00		0.0000	73.00	No Ice 1/2" Ice	2.67 3.76	2.67 3.76	30.50 50.36
**										
Valmont 13'-5" Platform w/ Rails (VSI)	C	None			0.0000	87.00	No Ice 1/2" Ice	44.50 55.50	44.50 55.50	1650.00 2710.00
(3) DB980H90E-M w/Mount Pipe	A	From Centroid-Face	3.90 0.00 0.00		-30.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
(3) DB980H90E-M w/Mount Pipe	B	From Centroid-Face	3.90 0.00 0.00		-30.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
(3) DB980H90E-M w/Mount Pipe	C	From Centroid-Face	3.90 0.00 0.00		-30.0000	87.00	No Ice 1/2" Ice	4.27 4.86	3.86 4.95	34.05 69.84
**										
Valmont 13'-5" Platform w/ Rails (VSI) (Verizon Wireless)	C	None			0.0000	98.00	No Ice 1/2" Ice	44.50 55.50	44.50 55.50	1650.00 2710.00
(2) LPA-80080/6CF w/Mount Pipe	A	From Centroid-	3.90 0.00		-30.0000	98.00	No Ice 1/2" Ice	4.35 4.79	10.51 11.56	42.90 104.60

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 5 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Lateral	Vert					
(Verizon Wireless)		Face	2.00						
(2) LPA-80080/6CF w/ Mount Pipe	B	From	3.90		-30.0000	98.00	No Ice	4.35	42.90
		Centroid-	0.00				1/2" Ice	4.79	104.60
(Verizon Wireless)		Face	2.00						
(2) LPA-80080/6CF w/ Mount Pipe	C	From	3.90		-30.0000	98.00	No Ice	4.35	42.90
		Centroid-	0.00				1/2" Ice	4.79	104.60
(Verizon Wireless)		Face	2.00						
ALP 9212-N w/Mount Pipe	A	From	3.90		-30.0000	98.00	No Ice	6.42	42.71
(Verizon Wireless)		Centroid-	0.00				1/2" Ice	7.11	103.63
		Face	2.00						
ALP 9212-N w/Mount Pipe	B	From	3.90		-30.0000	98.00	No Ice	6.42	42.71
(Verizon Wireless)		Centroid-	0.00				1/2" Ice	7.11	103.63
		Face	2.00						
ALP 9212-N w/Mount Pipe	C	From	3.90		-30.0000	98.00	No Ice	6.42	42.71
(Verizon Wireless)		Centroid-	0.00				1/2" Ice	7.11	103.63
		Face	2.00						
(2) DB950F85T2E-M w/Mount Pipe	A	From	3.90		-30.0000	98.00	No Ice	3.01	36.05
(Verizon Wireless)		Centroid-	0.00				1/2" Ice	3.58	75.04
		Face	2.00						
(2) DB950F85T2E-M w/Mount Pipe	B	From	3.90		-30.0000	98.00	No Ice	3.01	36.05
(Verizon Wireless)		Centroid-	0.00				1/2" Ice	3.58	75.04
		Face	2.00						
(2) DB950F85T2E-M w/Mount Pipe	C	From	3.90		-30.0000	98.00	No Ice	3.01	36.05
(Verizon Wireless)		Centroid-	0.00				1/2" Ice	3.58	75.04
		Face	2.00						
**									
13 L.P. Platform (VSI)	C	None			0.0000	115.00	No Ice	31.00	1260.00
							1/2" Ice	37.70	2110.00
(4) DB844H90 w/Mount Pipe	A	From	3.90		-30.0000	115.00	No Ice	3.58	35.55
		Centroid-	0.00				1/2" Ice	4.20	77.48
		Face	0.00						
(4) DB844H90 w/Mount Pipe	B	From	3.90		-30.0000	115.00	No Ice	3.58	35.55
		Centroid-	0.00				1/2" Ice	4.20	77.48
		Face	0.00						
(4) DB844H90 w/Mount Pipe	C	From	3.90		-30.0000	115.00	No Ice	3.58	35.55
		Centroid-	0.00				1/2" Ice	4.20	77.48
		Face	0.00						
**									
6' Sidearm (4" single tube) (VSI)	A	From	3.67		0.0000	118.00	No Ice	0.90	125.00
		Centroid-	0.00				1/2" Ice	1.25	175.00
		Leg	0.00						
6' Sidearm (4" single tube) (VSI)	C	From	3.67		0.0000	118.00	No Ice	0.90	125.00
		Centroid-	0.00				1/2" Ice	1.25	175.00
		Leg	0.00						
DB809MT3-XT	A	From	6.67		0.0000	118.00	No Ice	2.84	25.00
		Centroid-	0.00				1/2" Ice	4.29	46.91
		Leg	7.00						
DB201-A	C	From	6.67		0.0000	118.00	No Ice	1.05	25.00
		Centroid-	0.00				1/2" Ice	1.91	34.13
		Leg	5.00						
6'x4" Pipe Mount	C	From	1.25		0.0000	107.00	No Ice	2.25	65.00
		Centroid-	0.00				1/2" Ice	2.62	84.10
		Face	0.00						

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 6 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:			Azimuth Adjustment	3 dB Beam Width	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight lb
				Horz Lateral Vert ft	°	°						
KP6-17B	C	Grid	From Centroid -Face	1.75 0.00 0.00	0.0000			107.00	6.00	No Ice 1/2" Ice	22.62 29.05	198.00 347.13

Load Combinations

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

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 7 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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	120 - 100	Pole	Max Tension	8	0.32	-5.38	0.03
			Max. Compression	14	-4995.74	762.56	-193.41
			Max. Mx	11	-2514.82	85910.72	452.87
			Max. My	15	-4354.94	1569.89	87312.06
			Max. Vy	11	-6231.72	85910.72	452.87
			Max. Vx	15	-6937.07	1569.89	87312.06
			Max. Torque	23			-1405.37
L2	100 - 47.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21379.11	592.10	-291.57
			Max. Mx	11	-13180.75	952213.98	572.05
			Max. My	8	-13150.21	-3165.00	-967512.58
			Max. Vy	5	22744.03	-951314.44	-6602.43
			Max. Vx	8	23039.99	-3165.00	-967512.58
			Max. Torque	16			1328.59
L3	47.0833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33005.36	-127.08	283.33
			Max. Mx	5	-24529.36	-	-9654.41
						2270582.90	
			Max. My	8	-24528.70	-4358.51	-
						2270582.90	
			Max. Vy	5	27757.08	-	-9654.41
						2270582.90	
			Max. Vx	8	27996.99	-4358.51	-
						2298753.16	
Max. Torque	25			-1262.73			

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	120 - 100 (1)	TP20.263x15.677x0.1875	20.00	0.00	0.0	39.000	12.1206	-4354.94	472703.00	0.009
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	52.92	0.00	0.0	39.000	28.6407	-13150.20	1116990.00	0.012
L3	47.0833 - 0 (3)	H1-3 (1.36 CR) - 2 TP44x31.3725x0.375	52.00	0.00	0.0	39.000	52.6772	-24528.70	2054410.00	0.012

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	120 - 100 (1)	TP20.263x15.677x0.1875	87325.8	-17.641	39.000	0.452	0.00	0.000	39.000	0.000
L2	100 - 47.0833	TP33.13x20.263x0.281	967516.	-52.435	39.000	1.344	0.00	0.000	39.000	0.000

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT106(B), CT BU#806364	Page 8 of 8
	Project Vertical Structures Job No. 2008-004-033	Date 13:47:07 05/07/08
	Client Crown Castle	Designed by Asel

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 $\frac{f_{by}}{F_{by}}$
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	67 2298758 .33	-49.133	39.000	1.260	0.00	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	120 - 100 (1)	TP20.263x15.677x0.1875	0.009	0.452	0.000	0.462 ✓	1.333	H1-3 ✓
L2	100 - 47.0833 (2)	TP33.13x20.263x0.281	0.012	1.344	0.000	1.356 ✗	1.333	H1-3 ✗
L3	47.0833 - 0 (3)	TP44x31.3725x0.375	0.012	1.260	0.000	1.272 ✓	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF* P_{allow} lb	% Capacity	Pass Fail
L1	120 - 100	Pole	TP20.263x15.677x0.1875	1	-4354.94	630113.07	34.6	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.281	2	-13150.20	1488947.61	101.7	Fail ✗
L3	47.0833 - 0	Pole	TP44x31.3725x0.375	3	-24528.70	2738528.42	95.4	Pass
Summary								
Pole (L2)							101.7	Fail ✗
RATING =							101.7	Fail ✗

APPENDIX B

CROWN REGION ADDRESS
USA

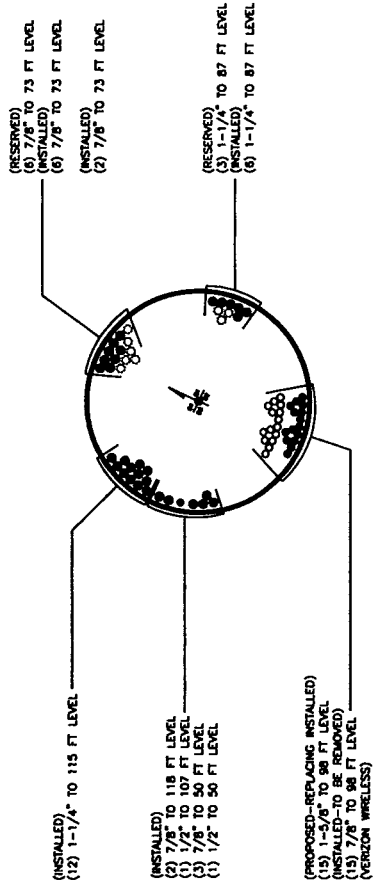
DRAWN BY: WAD
CHECKED BY: BRM
DRAWING DATE: 1402208

SITE NUMBER: _____
 SITE NAME: _____
 HRT 100(R) _____
 BUSINESS UNIT NUMBER: 806384
 SITE ADDRESS: 101 R OLD BLUE HILL ROAD
 WINDHAM CT 06092
 MIDDLEBURY COUNTY
 VTA
 SHEET TITLE: _____
 BASE LEVEL: _____
 SHEET NUMBER: _____

1/4" = 1'-0"

LEGEND: FEEDLINES	
●	SOLID BLUE CIRCLE DENOTES EXISTING FEEDLINE
○	OPEN RED CIRCLE DENOTES PROPOSED FEEDLINE
○	OPEN BLUE CIRCLE DENOTES RESERVED FEEDLINE
x	BLUE 'X' DENOTES LOCATION NOT GIVEN

NOTE: ASSUME FEEDLINE ATTACHMENT HEIGHT TO TOWER STEPS AT 8'-FEET ABOVE FINISHED GRADE UNLESS OTHERWISE SPECIFIED



BUSINESS UNIT: 806384 TOWER ID: C_BASELEVEL



SCALE :

BASE LEVEL DRAWING

1

APPENDIX C



FLANGE BOLT CALCULATIONS @ 100'

Customer: Crown Castle
Site Name: HRT 106(B), CT BU#806364
Job Number: 2008-004-033
Tower Model: 120' Valmont Monopole Tower
Date: 5/7/2008

<i>Input Information:</i>	<i>Existing Bolts</i>	
# Bolts, n	8	
Bolt Diameter, d	1.5	in
Bolt Circle Diameter, D	23.5	in
Bolt Ultimate Tensile Stress, F_u	120	ksi
Applied Vertical Load P	2.515	kips
Applied Shear S	6.937	kips
Applied Moment M	1047.744	kip-in
Bolt Type	A325	

Bolt Cross-Sectional Area, A	1.767	in ² (each)
Bolt Group Moment of Inertia, I	975.9063054	in ⁴
Maximum Tensile Stress (outer bolt), σ_y	12.44	ksi
Maximum Shear Stress (any bolt), τ_{xy}	0.491	ksi
Maximum Allowable Stress (per bolt), Ft	58.65	ksi
% Capacity	21.2%	

The Bolt Group is Adequate for Loading

Maximum Allowable Stress (per bolt), Ft

$$(44^2 - 4.39 * fv^2)^{1/2}$$

This equation is for A325 bolts (threads included in shear plane) Manual of Steel Construction ASD, 9th Edition, pg. 5-74, Table J3.3



FLANGE PLATE CALCULATIONS @ 100' (BUTT WELDED)

Customer:	Crown Castle
Site Name:	HRT 106(B), CT BU#806364
Job Number:	2008-004-033
Tower Model:	120' Valmont Monoploe Tower
Date:	5/7/2008

FOR BUTT WELDED FLANGE PLATES LESS THAN 2" THICK WITH EQUALLY DISTRUBUTED BOLTS WITHOUT GUSSET PLATE STIFFENERS

Maximum Tensile Bolt Load	21.98	kip
Number of Sides of Pole	12	
Diameter of Pole at Flange	20.26	in
Thickness of Pole at Flange	0.1875	in
Area of Pole at Base	12.101423	in ²
Interior Circumference of Pole at Base	63.938036	in
Flange Bolt Circle	23.5	in
Flange Bolt Diameter	1.5	in
Flange Plate Section Length	1.62	in
Flange Bolt Quantity	8	
Flange Plate Section Width	8.5922559	in
Moment on Flange Plate Section	35.604442	kip-in
Flange Plate Thickness	1.5	in
Flange Plate Bending Stress	11.050087	ksi
Flange Plate Yield Strength	50	ksi
Allowable Bending Stress (with 4/3 Increase)	50	ksi
% Capacity	22.1%	

Flange Plate is Adequate for Loading



ANCHOR BOLT CALCULATIONS

Customer: Crown Castle
Site Name: HRT 106(B), CT BU#806364
Job Number: 2008-004-033
Tower Model: 120' Valmont Monopole Tower
Date: 5/7/2008

<i>Input Information:</i>	<i>Existing Bolts</i>	
# Bolts, n	12	
Bolt Diameter, d	2.25	in
Bolt Circle Diameter, D	52.05	in
Bolt Ultimate Tensile Stress, F_u	100	ksi
Applied Vertical Load P	24.56	kips
Applied Shear S	27.97	kips
Applied Moment M	27585.08	kip-in
Steel Grade	A615 Gr 75	

Bolt Cross-Sectional Area, A	3.976	in ² (each)
Bolt Group Moment of Inertia, I	16158.00151	in ⁴
Maximum Tensile Stress (outer bolt), σ_y	43.92	ksi
Maximum Shear Stress (any bolt), τ_{xy}	0.586	ksi
Maximum Allowable Stress (per bolt), F_t	44.00	ksi
% Capacity	99.8%	

The Bolt Group is Adequate for Loading

Maximum Allowable Stress (per bolt), **F_t**

$$0.43F_u - 1.8f_v \leq 0.33F_u$$

This equation is for threaded parts, A449 bolts over 1 1/2" dia. (threads included in shear plane) Manual of Steel Construction ASD, 9th Edition, pg. 5-74, Table J3.3



BASE PLATE CALCULATIONS (BUTT WELDED)

Customer: Crown Castle
Site Name: HRT 106(B), CT BU#806364
Job Number: 2008-004-033
Tower Model: 120' Valmont Monopole Tower
Date: 5/7/2008

FOR BUTT WELDED BASE PLATES WITH EQUALLY DISTRIBUTED ANCHOR BOLTS WITHOUT GUSSET PLATE STIFFENERS

Maximum Tensile Bolt Load	174.61	kip
Number of Sides of Pole	12	
Diameter of Pole at Base	44	in
Thickness of Pole at Base	0.375	in
Area of Pole at Base	52.60	in ²
Circumference of Pole at Base	141.48	in
Anchor Bolt Circle	52.05	in
Anchor Bolt Diameter	2.25	in
Base Plate Section Length	2.9	in
Anchor Bolt Quantity	12	
Base Plate Section Width	12.28	in
Moment on Base Plate Section	506.37	kip-in
Base Plate Thickness	2.75	in
Base Plate Bending Stress	32.72	ksi
Base Plate Yield Strength	60	ksi
Allowable Bending Stress (with 4/3 Increase)	60	ksi
% Capacity	54.5%	

Base Plate is Adequate for Loading