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

August 24, 2010

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

Re: **Cellco Partnership d/b/a Verizon Wireless**
EM-VER-164-100114 – 599 Matianuck Avenue, Windsor, Connecticut

Dear Mr. Perrone:

On March 4, 2010, the Siting Council acknowledged receipt of Cellco's notice of intent to modify the above-referenced telecommunications facility. This modification involved the removal of three (3) existing cellular antennas, the installation of three (3) LTE antennas and the installation of six (6) coax cables on the outside of the tower. Recently, Cellco determined that only three (3) additional coax cables were needed at this facility location. Attached to this letter is an updated Structural Analysis confirming that the existing tower can support the installation of the three (3) coax cables attached to the outside of the tower.

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

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Sandy M. Carter
Brian Ragozzine
Mark Gauger

10584058-v1

Date: **August 20, 2010**

CROWN CASTLE

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

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

Subject: **Structural Analysis Report**

Carrier Designation:

***Verizon Wireless* Co-Locate**	
Carrier Site Number:	N/A
Carrier Site Name:	windsor south

Crown Castle Designation:

Crown Castle BU Number:	806371
Crown Castle Site Name:	HRT 096 943227
Crown Castle JDE Job Number:	128571
Crown Castle Work Order Number:	353499

Engineering Firm Designation:

Crown Castle Project Number: 353499

Site Data:

HRT 96599 MATIANUCK AVE, WINDSOR, Hartford County, CT
Latitude *41° 49' 16.04"*, Longitude *-72° 40' 36.29"*
100 Foot - Monopole Tower

Dear Eva Morales,

Crown Castle is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 353499, in accordance with application 92364, revision 1.

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

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 80 mph fastest mile.

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

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

Structural analysis prepared by: Jeffrey Fesko, E.I.T.

Respectfully submitted by:

Aaron C. Poot, P.E.
Engineering Supervisor

STATE OF CONNECTICUT
AARON C. POOT
No. 25050
LICENSED
PROFESSIONAL ENGINEER

RISA Tower Report - version 5.4.2.0

8/20/10

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 100 ft Monopole tower designed by VALMONT in January of 1991. The tower was originally designed for a wind speed of 90 mph per EIA-222-D.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98	101	2	antel	BXA-70063/6CFx2 w/ Mount Pipe	3	1-5/8	-
		1	antel	BXA-70063/6CFx4 w/ Mount Pipe			

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
98	104	1	gps	GPS_A	1 15	1/2 1-5/8	1
	101	6	decibel	950G65VTZE-M w/ Mount Pipe			
		6	decibel	DB844G65ZAXY w/ Mount Pipe			
		3	decibel	DB844G65ZAXY w/ Mount Pipe	-	-	3
	98	1	tower mounts	Platform Mount [LP 713-1]			1
85	85	3	andrew	VHLP2-23	3 6	1/2 5/16	2
		3	argus technologies	LLPX310R w/ Mount Pipe			
		3	samsung telecommunications	FDD_R6_RRH			
		1	tower mounts	Platform Mount [LP 713-1]			

Notes:
1) Existing equipment
2) Reserved equipment
3) Existing Equipment to be Removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
97	97	4	antel	PD10017	-	-
91	91	12	antel	PD1132	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	EDP/TRIGGS Consultants, Inc.	262194	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EDP/TRIGGS Consultants, Inc.	262191	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont Industries, Inc.	2562465	CCISITES

3.1) Analysis Method

RISATower (version 5.4.2.0), 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 the analysis.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	100 - 50.83	Pole	TP26.57x14.76x0.2813	1	-7.34	1190.54	54.1	Pass
L2	50.83 - 0	Pole	TP38.2x25.0059x0.3438	2	-15.92	2178.36	59.5	Pass
							Summary	
						Pole (L2)	59.5	Pass
						Rating =	59.5	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	43.2	Pass
1	Base Plate	0	32.9	Pass
1	Base Foundation	0	56.8	Pass

Structure Rating (max from all components) =	59.5%

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

4.1) Recommendations

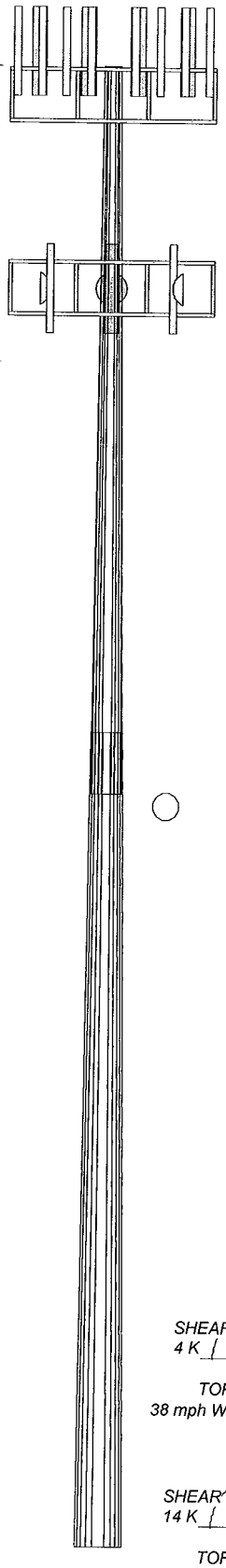
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

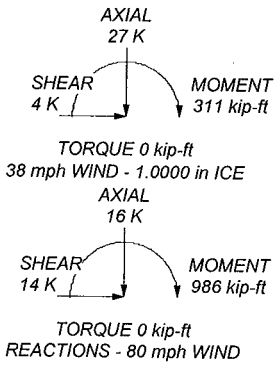
APPENDIX A

RISA TOWER OUTPUT

Section	1	2
Length (ft)	49.17	55.00
Number of Sides	12	12
Thickness (in)	0.2813	0.3438
Socket Length (ft)	4.17	
Top Dia (in)	14.7600	25.0059
Bot Dia (in)	26.5700	38.2000
Grade	S-22	
Weight (K)	3.1	6.5

9.6





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 950G65VTZE-M w/ Mount Pipe	98	LLPX310R w/ Mount Pipe	85
(2) DB844G65ZAXY w/ Mount Pipe	98	FDD_R6_RRH	85
BXA-70063/6CFx2 w/ Mount Pipe	98	LLPX310R w/ Mount Pipe	85
(2) 950G65VTZE-M w/ Mount Pipe	98	FDD_R6_RRH	85
(2) DB844G65ZAXY w/ Mount Pipe	98	LLPX310R w/ Mount Pipe	85
BXA-70063/6CFx4 w/ Mount Pipe	98	FDD_R6_RRH	85
(2) 950G65VTZE-M w/ Mount Pipe	98	Platform Mount [LP 713-1]	85
(2) DB844G65ZAXY w/ Mount Pipe	98	VHLP2-23	85
GPS_A	98	VHLP2-23	85
BXA-70063/6CFx2 w/ Mount Pipe	98	VHLP2-23	85
Platform Mount [LP 713-1]	98		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
S-22	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 59.5%

CROWN CASTLE
Shaping the Wireless World

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: 724-416-2000
FAX:

Job: ***BU#806371***			
Project:			
Client: Crown Castle	Drawn by: JFesko		App'd:
Code: TIA/EIA-222-F	Date: 08/19/10		Scale: NTS
Path: R:\SA Models - Letters\Work Area\JFesko\806371\806371.eri			Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	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	100.00-50.83	49.17	4.17	12	14.7600	26.5700	0.2813	1.1250	S-22 (65 ksi)
L2	50.83-0.00	55.00		12	25.0059	38.2000	0.3438	1.3750	S-22 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	15.2807	13.1123	350.8549	5.1834	7.6457	45.8893	710.9272	6.4535	3.2019	11.385
	27.5073	23.8077	2100.1202	9.4114	13.7633	152.5889	4255.4130	11.7174	6.3670	22.638
L2	26.9237	27.2979	2119.2314	8.8291	12.9531	163.6085	4294.1375	13.4352	5.7803	16.816
	39.5476	41.9021	7664.7378	13.5525	19.7876	387.3506	15530.8368	20.6230	9.3163	27.102

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 100.00-50.83				1	1	1		
L2 50.83-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Safety Line 3/8	C	No	CaAa (Out Of Face)	100.00 - 0.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
**								
HJ7-50A(1-5/8")	C	No	Inside Pole	98.00 - 5.00	15	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
LDF4-50A(1/2")	C	No	Inside Pole	98.00 - 5.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
HJ7-50A(1-5/8")	C	No	CaAa (Out Of Face)	98.00 - 5.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
						1" Ice	0.40	4.68
						2" Ice	0.60	10.76
						4" Ice	1.00	30.26
HJ7-50A(1-5/8")	C	No	CaAa (Out Of Face)	98.00 - 5.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
						1" Ice	0.00	4.68
						2" Ice	0.00	10.76
						4" Ice	0.00	30.26
***								
7983A(1/2")	C	No	CaAa (Out Of Face)	85.00 - 5.00	3	No Ice	0.00	0.08
						1/2" Ice	0.00	0.74
						1" Ice	0.00	2.01
						2" Ice	0.00	6.39
						4" Ice	0.00	22.47
9207(5/16")	C	No	CaAa (Out Of Face)	85.00 - 5.00	6	No Ice	0.00	0.60
						1/2" Ice	0.00	1.11
						1" Ice	0.00	2.22
						2" Ice	0.00	6.29
						4" Ice	0.00	21.76

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
2" Rigid Conduit	C	No	CaAa (Out Of Face)	85.00 - 5.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	4.33
						1" Ice	0.00	6.47
						2" Ice	0.00	12.57
						4" Ice	0.00	32.12
2" Rigid Conduit	C	No	CaAa (Out Of Face)	85.00 - 5.00	1	No Ice	0.20	2.80
						1/2" Ice	0.30	4.33
						1" Ice	0.40	6.47
						2" Ice	0.60	12.57
						4" Ice	1.00	32.12

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	100.00-50.83	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	18.018	1.22
L2	50.83-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	20.147	1.31

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	100.00-50.83	A	1.101	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	46.759	2.84
L2	50.83-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	51.526	3.23

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	100.00-50.83	-0.4078	0.2355	-0.7683	0.4436
L2	50.83-0.00	-0.4409	0.2545	-0.8970	0.5179

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 950G65VTZE-M w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	4.23	4.20	0.03
						1/2" Ice	4.70	5.07	0.07
						1" Ice	5.15	5.81	0.12
						2" Ice	6.09	7.35	0.23
						4" Ice	8.30	10.63	0.58
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	4.90	4.92	0.03
						1/2" Ice	5.35	5.60	0.08
						1" Ice	5.80	6.28	0.13
						2" Ice	6.73	7.71	0.26
						4" Ice	8.73	10.83	0.62
BXA-70063/6CFx2 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	7.97	5.40	0.04
						1/2" Ice	8.61	6.55	0.10
						1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
(2) 950G65VTZE-M w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	4.23	4.20	0.03
						1/2" Ice	4.70	5.07	0.07
						1" Ice	5.15	5.81	0.12
						2" Ice	6.09	7.35	0.23
						4" Ice	8.30	10.63	0.58
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	4.90	4.92	0.03
						1/2" Ice	5.35	5.60	0.08
						1" Ice	5.80	6.28	0.13
						2" Ice	6.73	7.71	0.26
						4" Ice	8.73	10.83	0.62
BXA-70063/6CFx4 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	7.97	5.40	0.04
						1/2" Ice	8.61	6.55	0.10
						1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
(2) 950G65VTZE-M w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	4.23	4.20	0.03
						1/2" Ice	4.70	5.07	0.07
						1" Ice	5.15	5.81	0.12
						2" Ice	6.09	7.35	0.23
						4" Ice	8.30	10.63	0.58
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	4.90	4.92	0.03
						1/2" Ice	5.35	5.60	0.08
						1" Ice	5.80	6.28	0.13
						2" Ice	6.73	7.71	0.26
						4" Ice	8.73	10.83	0.62
GPS_A	C	From Leg	4.00 0.00 6.00	0.0000	98.00	No Ice	0.30	0.30	0.00
						1/2" Ice	0.37	0.37	0.00
						1" Ice	0.46	0.46	0.01
						2" Ice	0.65	0.65	0.02
						4" Ice	1.15	1.15	0.08
BXA-70063/6CFx2 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	98.00	No Ice	7.97	5.40	0.04
						1/2" Ice	8.61	6.55	0.10
						1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
Platform Mount [LP 713-1]	C	None		0.0000	98.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
						2" Ice	64.91	64.91	3.19
						4" Ice	98.55	98.55	4.86
**									
LLPX310R w/ Mount Pipe	A	From Leg	4.00	0.0000	85.00	No Ice	5.07	2.98	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: Horz ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00								
			0.00					1/2" Ice	5.48	3.53	0.08
								1" Ice	5.91	4.09	0.13
								2" Ice	6.79	5.31	0.23
FDD_R6_RRH	A	From Leg	4.00			0.0000	85.00	4" Ice	8.70	8.13	0.54
			0.00					No Ice	1.79	0.78	0.03
			0.00					1/2" Ice	1.97	0.92	0.04
								1" Ice	2.16	1.07	0.06
								2" Ice	2.57	1.39	0.09
LLPX310R w/ Mount Pipe	B	From Leg	4.00			0.0000	85.00	4" Ice	3.49	2.14	0.20
			0.00					No Ice	5.07	2.98	0.05
			0.00					1/2" Ice	5.48	3.53	0.08
								1" Ice	5.91	4.09	0.13
								2" Ice	6.79	5.31	0.23
FDD_R6_RRH	B	From Leg	4.00			0.0000	85.00	4" Ice	8.70	8.13	0.54
			0.00					No Ice	1.79	0.78	0.03
			0.00					1/2" Ice	1.97	0.92	0.04
								1" Ice	2.16	1.07	0.06
								2" Ice	2.57	1.39	0.09
LLPX310R w/ Mount Pipe	C	From Leg	4.00			0.0000	85.00	4" Ice	3.49	2.14	0.20
			0.00					No Ice	5.07	2.98	0.05
			0.00					1/2" Ice	5.48	3.53	0.08
								1" Ice	5.91	4.09	0.13
								2" Ice	6.79	5.31	0.23
FDD_R6_RRH	C	From Leg	4.00			0.0000	85.00	4" Ice	8.70	8.13	0.54
			0.00					No Ice	1.79	0.78	0.03
			0.00					1/2" Ice	1.97	0.92	0.04
								1" Ice	2.16	1.07	0.06
								2" Ice	2.57	1.39	0.09
Platform Mount [LP 713-1]	C	None				0.0000	85.00	4" Ice	3.49	2.14	0.20
								No Ice	31.27	31.27	1.51
								1/2" Ice	39.68	39.68	1.93
								1" Ice	48.09	48.09	2.35
								2" Ice	64.91	64.91	3.19
**								4" Ice	98.55	98.55	4.86

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-23	A	Paraboloid w/o Radome	From Leg	4.00		0.0000		85.00	2.17	No Ice	3.72	0.03
				0.00						1/2" Ice	4.00	0.03
				0.00						1" Ice	4.31	0.04
										2" Ice	4.94	0.07
										4" Ice	6.34	0.19
VHLP2-23	B	Paraboloid w/o Radome	From Leg	4.00		0.0000		85.00	2.17	No Ice	3.72	0.03
				0.00						1/2" Ice	4.00	0.03
				0.00						1" Ice	4.31	0.04

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
VHLP2-23	C	Paraboloid w/o Radome	From Leg	4.00 0.00 0.00	0.0000		85.00	2.17	2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.94 6.34 3.72 4.00 4.31 4.94 6.34	0.07 0.19 0.03 0.03 0.04 0.07 0.19
**											

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

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	100 - 50.83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.61	1.68	-0.97
			Max. Mx	11	-7.34	324.23	3.00
			Max. My	2	-7.34	0.36	326.09
			Max. Vy	11	-9.67	324.23	3.00
			Max. Vx	2	-9.75	0.36	326.09
			Max. Torque	13			0.19
L2	50.83 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.30	4.75	-2.74
			Max. Mx	11	-15.92	979.38	8.39
			Max. My	2	-15.92	1.08	984.51
			Max. Vy	11	-14.27	979.38	8.39
			Max. Vx	2	-14.35	1.08	984.51
			Max. Torque	13			0.39

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	23	27.30	3.69	-2.13
	Max. H_x	11	15.93	14.26	0.10
	Max. H_z	2	15.93	0.00	14.34
	Max. M_x	2	984.51	0.00	14.34
	Max. M_z	5	977.22	-14.26	0.10
	Max. Torsion	13	0.39	7.22	12.30
	Min. Vert	1	15.93	0.00	0.00
	Min. H_x	5	15.93	-14.26	0.10
	Min. H_z	8	15.93	0.00	-14.30
	Min. M_x	8	-981.97	0.00	-14.30
	Min. M_z	11	-979.38	14.26	0.10
	Min. Torsion	7	-0.39	-7.04	-12.40

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	15.93	0.00	0.00	0.61	1.05	0.00
Dead+Wind 0 deg - No Ice	15.93	-0.00	-14.34	-984.51	1.08	-0.33
Dead+Wind 30 deg - No Ice	15.93	7.22	-12.30	-842.11	-495.88	-0.19
Dead+Wind 60 deg - No Ice	15.93	12.38	-7.15	-490.05	-848.79	-0.00
Dead+Wind 90 deg - No Ice	15.93	14.26	-0.10	-8.39	-977.22	0.19
Dead+Wind 120 deg - No Ice	15.93	12.42	7.17	493.19	-852.08	0.33
Dead+Wind 150 deg - No Ice	15.93	7.04	12.40	852.36	-480.27	0.39
Dead+Wind 180 deg - No Ice	15.93	-0.00	14.30	981.97	1.08	0.33
Dead+Wind 210 deg - No Ice	15.93	-7.04	12.40	852.36	482.42	0.19
Dead+Wind 240 deg - No Ice	15.93	-12.42	7.17	493.19	854.23	-0.00
Dead+Wind 270 deg - No Ice	15.93	-14.26	-0.10	-8.39	979.38	-0.19
Dead+Wind 300 deg - No Ice	15.93	-12.38	-7.15	-490.05	850.95	-0.33
Dead+Wind 330 deg - No Ice	15.93	-7.22	-12.30	-842.10	498.03	-0.39
Dead+Ice+Temp	27.30	-0.00	0.00	2.74	4.75	0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 0 deg+Ice+Temp	27.30	-0.00	-4.26	-302.76	4.77	-0.18
Dead+Wind 30 deg+Ice+Temp	27.30	2.14	-3.66	-259.05	-149.15	-0.10
Dead+Wind 60 deg+Ice+Temp	27.30	3.68	-2.13	-149.50	-258.93	-0.00
Dead+Wind 90 deg+Ice+Temp	27.30	4.24	-0.03	0.35	-298.92	0.10
Dead+Wind 120 deg+Ice+Temp	27.30	3.69	2.13	155.51	-259.81	0.18
Dead+Wind 150 deg+Ice+Temp	27.30	2.10	3.69	266.96	-144.99	0.21
Dead+Wind 180 deg+Ice+Temp	27.30	-0.00	4.25	307.26	4.77	0.18
Dead+Wind 210 deg+Ice+Temp	27.30	-2.10	3.69	266.96	154.54	0.10
Dead+Wind 240 deg+Ice+Temp	27.30	-3.69	2.13	155.51	269.35	-0.00
Dead+Wind 270 deg+Ice+Temp	27.30	-4.24	-0.03	0.35	308.46	-0.10
Dead+Wind 300 deg+Ice+Temp	27.30	-3.68	-2.13	-149.50	268.48	-0.18
Dead+Wind 330 deg+Ice+Temp	27.30	-2.14	-3.66	-259.05	158.70	-0.21
Dead+Wind 0 deg - Service	15.93	0.00	-5.60	-384.40	1.08	-0.13
Dead+Wind 30 deg - Service	15.93	2.82	-4.80	-328.74	-193.15	-0.07
Dead+Wind 60 deg - Service	15.93	4.84	-2.79	-191.15	-331.08	-0.00
Dead+Wind 90 deg - Service	15.93	5.57	-0.04	-2.90	-381.27	0.07
Dead+Wind 120 deg - Service	15.93	4.85	2.80	193.13	-332.36	0.13
Dead+Wind 150 deg - Service	15.93	2.75	4.84	333.50	-187.04	0.15
Dead+Wind 180 deg - Service	15.93	0.00	5.58	384.16	1.08	0.13
Dead+Wind 210 deg - Service	15.93	-2.75	4.84	333.50	189.20	0.07
Dead+Wind 240 deg - Service	15.93	-4.85	2.80	193.13	334.51	-0.00
Dead+Wind 270 deg - Service	15.93	-5.57	-0.04	-2.90	383.42	-0.07
Dead+Wind 300 deg - Service	15.93	-4.84	-2.79	-191.15	333.23	-0.13
Dead+Wind 330 deg - Service	15.93	-2.82	-4.80	-328.74	195.30	-0.15

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-15.93	0.00	0.00	15.93	0.00	0.000%
2	0.00	-15.93	-14.34	0.00	15.93	14.34	0.000%
3	7.22	-15.93	-12.30	-7.22	15.93	12.30	0.000%
4	12.38	-15.93	-7.15	-12.38	15.93	7.15	0.000%
5	14.26	-15.93	-0.10	-14.26	15.93	0.10	0.000%
6	12.42	-15.93	7.17	-12.42	15.93	-7.17	0.000%
7	7.04	-15.93	12.40	-7.04	15.93	-12.40	0.000%
8	0.00	-15.93	14.30	0.00	15.93	-14.30	0.000%
9	-7.04	-15.93	12.40	7.04	15.93	-12.40	0.000%
10	-12.42	-15.93	7.17	12.42	15.93	-7.17	0.000%
11	-14.26	-15.93	-0.10	14.26	15.93	0.10	0.000%
12	-12.38	-15.93	-7.15	12.38	15.93	7.15	0.000%
13	-7.22	-15.93	-12.30	7.22	15.93	12.30	0.000%
14	0.00	-27.30	0.00	0.00	27.30	-0.00	0.000%
15	0.00	-27.30	-4.26	0.00	27.30	4.26	0.000%
16	2.14	-27.30	-3.66	-2.14	27.30	3.66	0.000%
17	3.68	-27.30	-2.13	-3.68	27.30	2.13	0.000%
18	4.24	-27.30	-0.03	-4.24	27.30	0.03	0.000%
19	3.69	-27.30	2.13	-3.69	27.30	-2.13	0.000%
20	2.10	-27.30	3.69	-2.10	27.30	-3.69	0.000%
21	0.00	-27.30	4.25	0.00	27.30	-4.25	0.000%
22	-2.10	-27.30	3.69	2.10	27.30	-3.69	0.000%
23	-3.69	-27.30	2.13	3.69	27.30	-2.13	0.000%
24	-4.24	-27.30	-0.03	4.24	27.30	0.03	0.000%
25	-3.68	-27.30	-2.13	3.68	27.30	2.13	0.000%
26	-2.14	-27.30	-3.66	2.14	27.30	3.66	0.000%
27	0.00	-15.93	-5.60	0.00	15.93	5.60	0.000%
28	2.82	-15.93	-4.80	-2.82	15.93	4.80	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
29	4.84	-15.93	-2.79	-4.84	15.93	2.79	0.000%
30	5.57	-15.93	-0.04	-5.57	15.93	0.04	0.000%
31	4.85	-15.93	2.80	-4.85	15.93	-2.80	0.000%
32	2.75	-15.93	4.84	-2.75	15.93	-4.84	0.000%
33	0.00	-15.93	5.58	0.00	15.93	-5.58	0.000%
34	-2.75	-15.93	4.84	2.75	15.93	-4.84	0.000%
35	-4.85	-15.93	2.80	4.85	15.93	-2.80	0.000%
36	-5.57	-15.93	-0.04	5.57	15.93	0.04	0.000%
37	-4.84	-15.93	-2.79	4.84	15.93	2.79	0.000%
38	-2.82	-15.93	-4.80	2.82	15.93	4.80	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	0.00003609
3	Yes	5	0.00000001	0.00002985
4	Yes	5	0.00000001	0.00003000
5	Yes	4	0.00000001	0.00001690
6	Yes	5	0.00000001	0.00003079
7	Yes	5	0.00000001	0.00002904
8	Yes	4	0.00000001	0.00003606
9	Yes	5	0.00000001	0.00002998
10	Yes	5	0.00000001	0.00003044
11	Yes	4	0.00000001	0.00001697
12	Yes	5	0.00000001	0.00002967
13	Yes	5	0.00000001	0.00003076
14	Yes	4	0.00000001	0.00000750
15	Yes	4	0.00000001	0.00040525
16	Yes	4	0.00000001	0.00047770
17	Yes	4	0.00000001	0.00047882
18	Yes	4	0.00000001	0.00039944
19	Yes	4	0.00000001	0.00049209
20	Yes	4	0.00000001	0.00048332
21	Yes	4	0.00000001	0.00041175
22	Yes	4	0.00000001	0.00050231
23	Yes	4	0.00000001	0.00050683
24	Yes	4	0.00000001	0.00041301
25	Yes	4	0.00000001	0.00049354
26	Yes	4	0.00000001	0.00049680
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00009379
29	Yes	4	0.00000001	0.00009531
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00010063
32	Yes	4	0.00000001	0.00009016
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00009726
35	Yes	4	0.00000001	0.00009838
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00009332
38	Yes	4	0.00000001	0.00010084

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	100 - 50.83	16.456	35	1.4648	0.0013
L2	55 - 0	4.903	35	0.8484	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
98.00	(2) 950G65VTZE-M w/ Mount Pipe	35	15.868	1.4382	0.0013	21500
85.00	VHLP2-23	35	12.102	1.2645	0.0010	7166

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	100 - 50.83	41.977	10	3.7376	0.0034
L2	55 - 0	12.515	10	2.1658	0.0013

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
98.00	(2) 950G65VTZE-M w/ Mount Pipe	10	40.475	3.6697	0.0033	8477
85.00	VHLP2-23	10	30.875	3.2270	0.0026	2824

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	100 - 50.83 (1)	TP26.57x14.76x0.2813	49.17	0.00	0.0	39.000	22.9007	-7.34	893.13	0.008
L2	50.83 - 0 (2)	TP38.2x25.0059x0.3438	55.00	0.00	0.0	39.000	41.9021	-15.92	1634.18	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	100 - 50.83 (1)	TP26.57x14.76x0.2813	326.72	27.782	39.000	0.712	0.00	0.000	39.000	0.000
L2	50.83 - 0 (2)	TP38.2x25.0059x0.3438	986.38	30.558	39.000	0.784	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	100 - 50.83 (1)	TP26.57x14.76x0.2813	9.75	0.426	26.000	0.033	0.00	0.000	26.000	0.000
L2	50.83 - 0 (2)	TP38.2x25.0059x0.3438	14.35	0.343	26.000	0.027	0.00	0.000	26.000	0.000

Pole Interaction Design Data

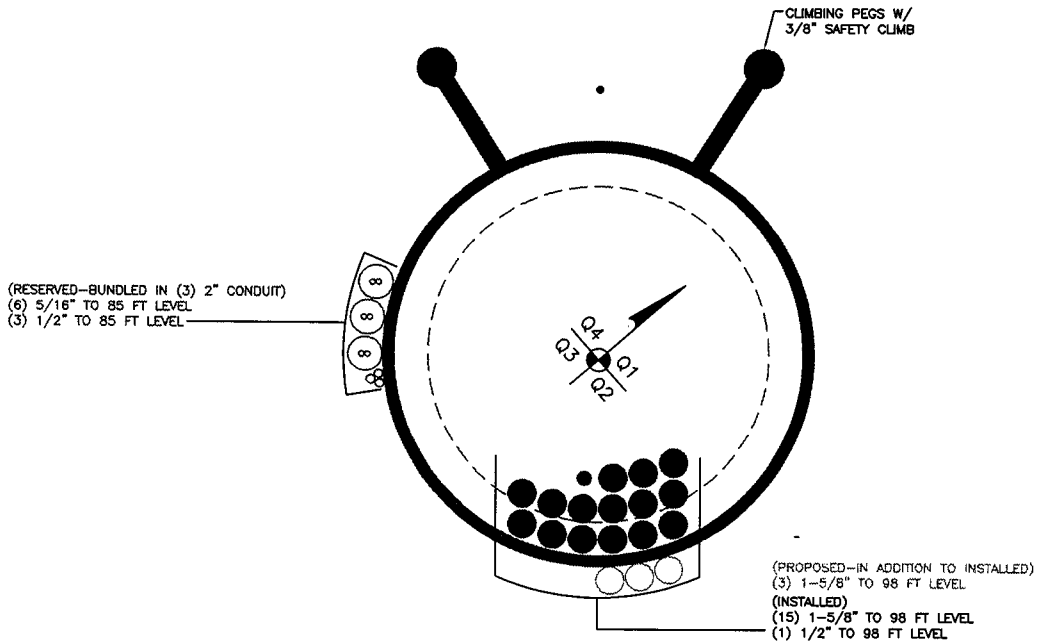
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	100 - 50.83 (1)	0.008	0.712	0.000	0.033	0.000	0.721 ✓	1.333	H1-3+VT ✓
L2	50.83 - 0 (2)	0.010	0.784	0.000	0.027	0.000	0.793 ✓	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	100 - 50.83	Pole	TP26.57x14.76x0.2813	1	-7.34	1190.54	54.1	Pass
L2	50.83 - 0	Pole	TP38.2x25.0059x0.3438	2	-15.92	2178.36	59.5	Pass
							Summary	
						Pole (L2)	59.5	Pass
						RATING =	**59.5**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



: SCALE :

BUSINESS UNIT: 806371 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

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

Site Data

BU#: *806371*
Site Name: *HRT 096 943227*
App #: *92364, rev.1*

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

Pier Properties

Concrete:

Pier Diameter = 6.0 ft
Concrete Area = 4071.5 in^2

Reinforcement:

Clear Cover to **Tie**= 3.00 in
Horiz. **Tie** Bar Size= 4
Vert. Cage Diameter = 5.33 ft
Vert. Cage Diameter = 64.00 in
Vertical Bar Size = 8
Bar Diameter = 1.00 in
Bar Area = 0.79 in^2
Number of Bars = 24
As Total= 18.96 in^2
A s/ Aconc, Rho: 0.0047 0.47%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tesnion Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033
IBC 1810.1.2: None SDC A or B
Governing: 0.0033 **0.33%**

ACI 10.8 and 10.9
Min As for Columns, Comp. Controlled, Shafts:
Min As: 0.0050 **0.50%**

Minimum Rho Check:
Actual Req'd Min. Rho: 0.33% Flexural
Provided Rho: 0.47% **OK**

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	1104.291	ft-kips (* **Note**)
Max. Service Shaft P:	16	kips
Max Axial Force Type:	Tension	

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

Load Factor	Shaft Factored Loads		
1.30	Mu:	1435.578	ft-kips
1.30	Pu:	20.8	kips

Material Properties

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

ACI 318 Code

Select Analysis ACI Code= 2002

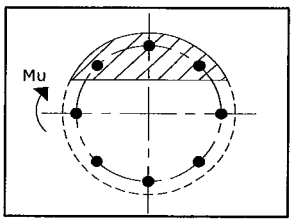
Seismic Properties

Seismic Design Category = B
Seismic Risk = **Low**

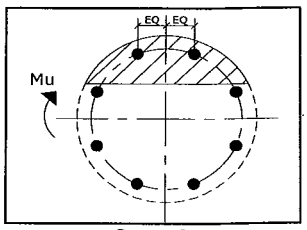
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis: **10.13** in
Extreme Steel Strain, ϵt: **0.0171**
$\epsilon t > 0.0050$, Tension Controlled
Reduction Factor, φ: **0.900**

<-- Comment Box

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	5965.23	kips
at Mu=(ϕ=0.65)Mn=	3120.10	ft-kips
Max Tu, (φ=0.9) Tn =	1023.84	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Output Note: Negative Pu=Tension
For Axial Compression, φ Pn = Pu: -20.80 kips
Drilled Shaft Moment Capacity, φMn: **2529.55** ft-kips
Drilled Shaft Superimposed Mu: **1435.58** ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR: 56.75%

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

Site Data

BU#: *806371*
Site Name: *HRT 096 943227*
App #: *92364, rev.1*

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	46.05	in

Plate Data		
Diam:	52.05	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	10.24	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0	in
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	38.2	in
Thick:	0.34375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	986	ft-kips
Axial:	16	kips
Shear:	14	kips

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

Anchor Rod Results

		Rigid
Maximum Rod Tension:	84.3 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	43.2% **Pass**	

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	19.7 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	32.9% **Pass**	Y.L. Length: 25.72

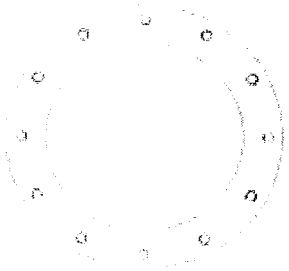
n/a

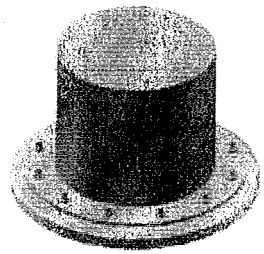
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

Monopole Drilled Pier

Checks capacity of a single drilled shaft foundation for a monopole

BU#: 806371
Site Name: *HRT 096 943227*
App Number: *92364, rev.1*

CROWN CASTLE

ACI 318 Version:	2002

Design Reactions		
Shear, **S**:	14.00	kips
Moment, **Mt**:	986.00	ft-kips
Tower Weight, **Wt**:	16.00	kips
Tower Height, **H**:	100	ft
Base Diameter, **BD**:	38.2	in

Foundation Dimensions		
Caisson Diameter, **CD**:	6.0	ft
Ext. Above Grade, **E**:	0.5	ft
Depth Below Grade, **L**:	50.0	ft
Neglected Depth, **N**:	5.0	ft
Rebar Size, **Sp**:	8	
Rebar Quantity, **mp**:	24	
Tie Size, **tp**:	4	

Material Properties		
Rebar Tensile, **Fy**:	60	ksi
Concrete Strength, **F'c**:	3000	psi
Concrete Density, **δx**:	150	pcf
Clear Cover, **cc**:	3	in

Soil Properties		
Soil Unit Weight, γ:	57	pcf
Allowable Bearing, **Bc**:	2.000	ksf
Seismic Design Cat, **z**:	B	

Caisson Analysis		
Depth to Zero Shear	10.6	ft
Max Factored Moment	1435.58	ft-kips
Overturning FOS	8.69	

Depth		Shear		Moment	
5.05	ft	14	kips	1058.8	ft-kips
10.1	ft	1.3	kips	1100.4	ft-kips
15.15	ft	-12.6	kips	1071.7	ft-kips

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Minimum Req'd Dia. 1 (ft):	6.00	3.19	**OK**
Minimum Req'd Dia. 2 (ft):	6.00	4.68	**OK**
Bearing (ksf):	2.00	0.57	**OK**
Rebar Area (in^2):	18.96	13.57	**OK**
Pier moment capacity (k-ft):	2529.55	1435.58	**OK**
Rebar spacing (in):	7.64	2 < Bs <18	**OK**
Development Length (in)	470.13	12.00	**OK**
Soil moment capacity(FOS):	8.69	2.00	**OK**

Bearing: 28.3%

Steel: 56.8%

Soil: 23.0%

CAISSON Version 10.40 1:28:04 PM Thursday, August 19, 2010
Crown Castle USA

Project Title: BU#806371
Project Notes:

Calculation Method: Full 8CD

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

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
6.00	0.50	3.00	60.00

Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	5.00	0.00	110.0			
2	Clay	5.00	5.00	110.0	500.0		
3	Clay	35.00	10.00	56.6	500.0		

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
986.0	16.0	14.00	8.69

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

Calculated Pier Properties

Length (ft)	Weight (kips)	End Bearing Pressure (psf)
50.500	214.178	565.9

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.50	5.00	110.0			0.00	3.00
Clay	5.50	5.00	110.0	500.0		120.00	8.00
Clay	10.50	20.04	56.6	500.0		480.88	20.52
Clay	30.54	19.96	56.6	500.0		-479.12	40.52

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)
0.00	121.8	8586.2	14.0	988.1
5.05	121.8	9201.1	14.0	1058.8
10.10	11.4	9562.1	1.3	1100.4
15.15	-109.8	9313.4	-12.6	1071.7
20.20	-231.0	8452.7	-26.6	972.7
25.25	-352.2	6980.0	-40.5	803.2
30.30	-473.4	4895.1	-54.5	563.3
35.35	-363.6	2754.3	-41.8	316.9
40.40	-242.4	1224.1	-27.9	140.9
45.45	-121.2	306.0	-13.9	35.2
50.50	-0.0	0.0	-0.0	0.0

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

March 4, 2010

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

RE: **EM-VER-164-100114** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 599 Matianuck Avenue, Windsor, 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.

The proposed modifications are to be implemented as specified here and in your notice dated January 14, 2010, 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,

S. Derek Phelps

S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable Donald Trinks, Mayor, Town of Windsor
Peter Souza, Town Manager, Town of Windsor
Eric Barz, Town Planner, Town of Windsor
Crown Castle USA Inc.

G:\EM\BAM-VERIZON\Windsor\dc03042010Matianuck.DOC

ROBINSON & COLE LLP

EM-VER-164-100114

ORIGINAL

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

January 14, 2010

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**
599 Matianuck Avenue, Windsor, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the 101-foot level on the existing 100-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Connecticut Siting Council ("Council") approved Cellco's use of the existing tower in 1990 in Docket No. 137. Cellco now intends to modify its installation by replacing three of its cellular antennas with two (2) BXA-70063/6CF_2 LTE (700 MHz) antennas and one (1) model BXA 70063/6CF_4 LTE (700 MHz) antenna all at the same 101-foot level on the tower. 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 Peter Souza, Town Manager for the Town of Windsor. Please note that the Town of Windsor is the owner of the property on which the tower is located.

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

1. The proposed modifications will not result in any increase in the overall height of the existing tower. Cellco's antennas will be located at the same 101-foot level on the existing 100-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A Calculated Radio Frequency Emissions report, for the existing antennas and Cellco's modified facility, is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed antennas modification. (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:
Peter Souza, Windsor Town Manager
Sandy M. Carter

Slant ±45° Dual Polarized FET Panel 63° / 13.0 dBd
696-900 MHz

Mechanical specifications

Length	1205	mm	47.4	in
Width	285	mm	11.2	in
Depth	126	mm	5.0	in
Depth with z-bracket	166	mm	6.5	in
Weight [4]	4.5	kg	9.9	lbs
Wind Area Fore/Aft	0.36	m^2	3.9	ft^2
Wind Area Side	0.15	m^2	1.7	ft^2
Max Wind Survivability	>201	km/hr	>125	mph
Wind Load @ 100 mph (161 km/hr)				
Fore/Aft	522	N	117	lbf
Side	244	N	55	lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiber-glass radome. RoHS compliant.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter Ø50-160 mm; Ø2.0-6.3 in.

Mounting Bracket Kit	36210002
Downtilt Bracket Kit	36114003

Electrical specifications

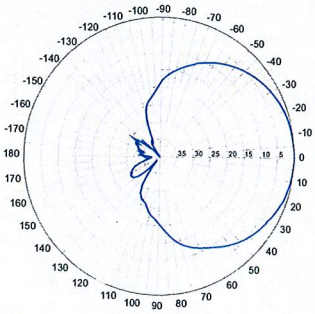
Frequency Range	696-900 MHz
Impedance	50Ω
Connector [3]	NE or E-DIN Female 2 ports / Center
VSWR [1]	≤ 1.35:1
Polarization	Slant ±45°
Isolation Between Ports [1]	< -30 dB
Gain [1]	13.0 dBd 15.0 dBi
Power Rating [2]	500 W
Half Power Angle [1]	
Horizontal Beamwidth	63°
Vertical Beamwidth	15°
Electrical downtilt [5]	2°
Null fill [1]	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

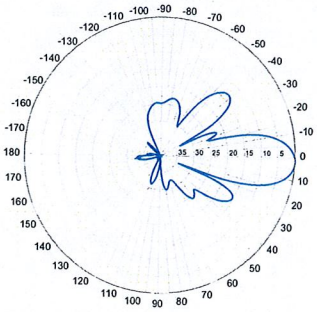
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector. E-DIN indicates an elongated DIN connector.
4) Antenna weight does not include brackets.
5) Add'l downtilts may be available. Check website for details.

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

Radiation-pattern[1]
750 MHz

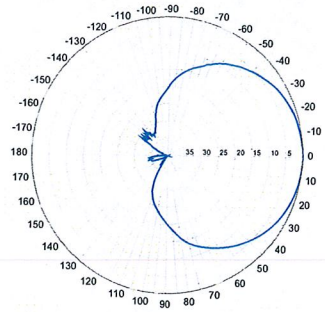


Horizontal

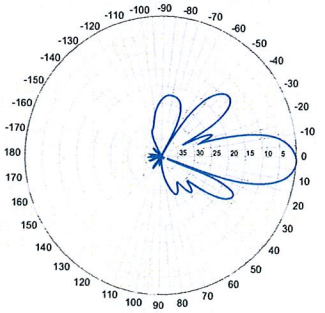


Vertical

850 MHz



Horizontal

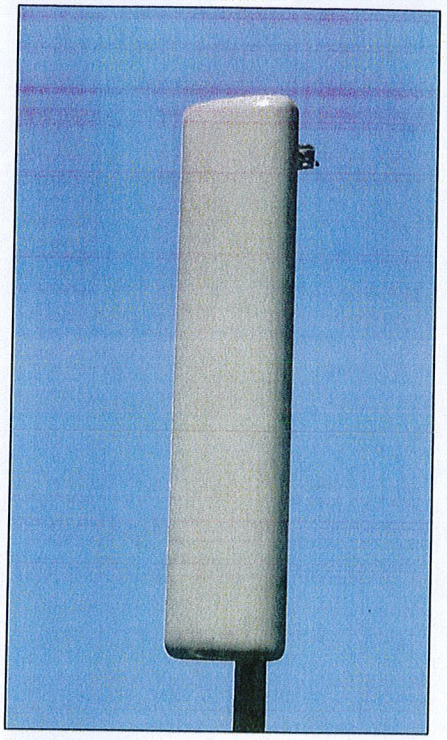


Vertical

696-900 MHz

BXA-70063/4CF __ 2°

When ordering replace "__" with connector type.



Featuring our Exclusive 3T Technology™ Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- 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 band-width and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:
This antenna is under a five-year limited warranty for repair or replacement.

Revision Date 1/8/09

815.399.0001 • antel@antelinc.com • www.antelinc.com

Amphenol Antel, Inc. The Antenna Technology Company

Slant +/- 45° Dual Polarized, Panel 63° / 13 dBd

BXA-80063/4CF __ 4°

When ordering replace "__" with connector type.

Mechanical specifications

Length	1205 mm	47.4 in
Width	285 mm	11.2 in
Depth	126 mm	5.0 in
Depth with z-bracket	166 mm	6.5 in
[4] Weight	4.5 kg	9.9 lbs
Wind Area		
Fore/Aft	0.36 m^2	3.9 ft^2
Side	0.15 m^2	1.7 ft^2
Rated Wind Velocity (Safety factor 2.0)	>653 km/hr	>406 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	522 N	117 lbs
Side	244 N	54.5 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 Ø50-160 mm (2.0-6.3 in).

Mounting bracket kit #36210002
Downtilt bracket kit #36114003

Electrical specifications

	Frequency Range	806-900 MHz*
	Impedance	50Ω
[3]	Connector(s)	NE or E-DIN 2 ports / center
[1]	VSWR	≤ 1.4:1
	Polarization	Slant ± 45°
[1]	Isolation Between Ports	< -30 dB
[1]	Gain	13 dBd
[2]	Power Rating	500 W
[1]	Half Power Angle	
	H-Plane	63°
	E-Plane	15°
[1]	Electrical Downtilt	4°
[1]	Null Fill	5%
	Lightning Protection	Direct Ground

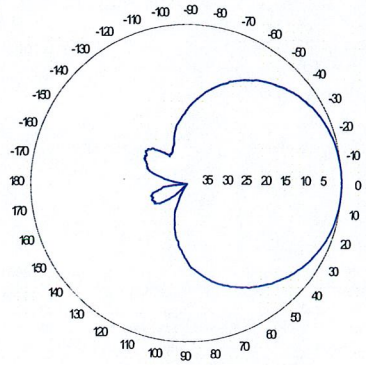
*Also available for 870-960 MHz. Consult your sales director for more information.

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

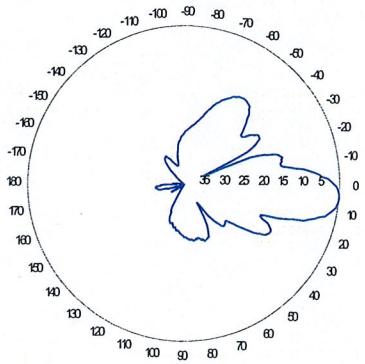
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector.
   E-DIN indicates an elongated DIN connector.
4) The antenna weight listed above does not include the bracket weight.

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

Radiation pattern[1]



Horizontal



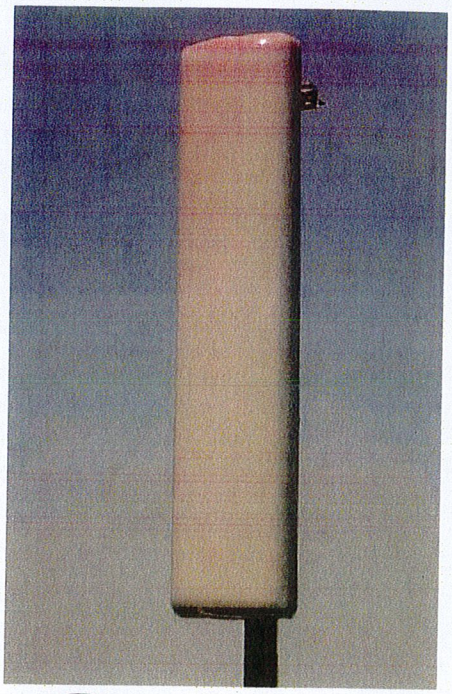
Vertical

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.

CF Denotes a Center-Fed Connector.

806-900 MHz



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

- Watercut brass feedline assembly for consistent performance.
- 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 band-width 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 connectors only.

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc.
The Antenna Technology Company

Revision Date: 7/3/07

Site Name: Windsor South, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW PCS	1970	3	440	1320	101	0.0465	1.0	4.65%
VZW Cellular	869	9	349	3141	101	0.1107	0.579333	19.11%
VZW 700	757	1	893	762	101	0.0269	0.497333	5.40%

Total Percentage of Maximum Permissible Exposure 29.17%

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

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used.

Date: **December 21, 2009**

Steve Tuttle
Crown Castle USA Inc.
349 West Commercial Street, Suite 2630
East Rochester, NY, 14445
(585) 899-3445

GPD ASSOCIATES
GPD Associates
520 S. Main Street, Suite 2531
Akron, OH 44311
(330) 572-2206
ddicesare@gpdgroup.com

Subject: **Structural Analysis Report**

Carrier Designation: ***Verizon* Co-Locate**
Carrier Site Name: Windsor South

Crown Castle Designation:
Crown Castle BU Number: 806371
Crown Castle Site Name: HRT 096 943227
Crown Castle JDE Job Number: 128571
Crown Castle Work Order Number: 309816

Engineering Firm Designation: **GPD Associates Project Number:** 2009282.17

Site Data:
HRT 96 599 Matianuck Ave, Windsor, CT, 06095, Hartford County
Latitude *41°49' 16.04"*, Longitude *72°40' 36.29"*
100 Foot – Valmont Monopole

Dear Steve Tuttle,

GPD Associates 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 356500, in accordance with application 92364, revision 1.

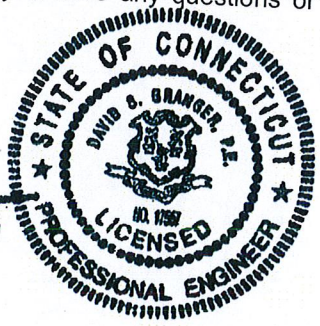
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

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 based upon a wind speed of 80 mph fastest mile.

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

Respectfully submitted by:



David B. Granger, P.E.
Connecticut #: 17557

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 100 ft Monopole tower designed by Valmont Industries, Inc in January of 1991. The tower was originally designed for a wind speed of 90 mph per EIA-222-D.

The existing monopole has 12 sides and is evenly tapered from 38.20" (flat-flat) at the base to 14.76" (flat-flat) at the top. It has two major sections, connected with slip joints. The structure is galvanized and has no tower lighting.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 69.3 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	101	2	Antel	BXA-70063/6CFx2	6	1-5/8"	1
		1	Antel	BXA-70063/6CFx4			

Notes:
1.) See Appendix B for proposed coax layout.

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
98	101	9	Decibel	DB844G65ZAXY	15	1-5/8"	1
		6	Decibel	950G65VTZE-M			
		1	GPS	GPS_A	1	1/2"	
	98	1		Platform Mount [LP 101-1]			
85	85	1		Platform Mount [LP 601-1]			

Notes:
1.) (3) DB844G65ZAXY Antennas and (3) 1-5/8" coax shall be removed.

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
97	97	4		PD10017		
		12		PD1132		
		1		Cellular Platform		
84	84	1		Cellular Platform		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Original Tower Drawings	Valmont Industries, Inc. Order #: 10887-91, dated 1/22/1991	Doc ID#: 2562465	Crown DMZ
Foundation Investigation	EDP/Triggs Consultants, Inc., Job #: 19038, dated 4/26/1991	Doc ID#: 262191	Crown DMZ
Geotechnical Report	EDP/Triggs Consultants, Inc., Job #: 19038, dated 2/22/1991	Doc ID#: 262194	Crown DMZ
Previous Structural Analysis	GPD Associates Project #: 2005078.08, dated 1/31/2005	Doc ID #: 1037004	Crown DMZ

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) Mount sizes, weights, and manufacturers are best estimates based on site photos provided and were determined without the benefit of a site visit by GPD.

This analysis may be affected if any assumptions are not valid or have been made in error. GPD Associates 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	100 - 50.83	Pole	TP26.57x14.76x0.2813	1	-6.23	1190.54	43.9	Pass
L2	50.83 - 0	Pole	TP38.2x25.0059x0.3438	2	-14.16	2178.36	48.2	Pass
							Summary	
						Pole (L2)	48.2	Pass
						Rating =	48.2	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods		34.9	Pass
1	Base Plate		26.6	Pass
2	Base Foundation		48.9	Pass

Structure Rating (max from all components) =	48.9%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation capacity determined by comparing analysis reactions to original design reactions.

4.1) Recommendations

The designs of the tower and its foundation are sufficient for the proposed loading and do not require modification.

5) DISCLAIMER OF WARRANTIES

GPD ASSOCIATES has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD ASSOCIATES in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. All tower components have been assumed to only resist dead loads when no other loads are applied. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

GPD ASSOCIATES does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD ASSOCIATES provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the feasibility of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owners responsibility to determine the amount of ice accumulation, if any, that should be considered in the structural analysis.

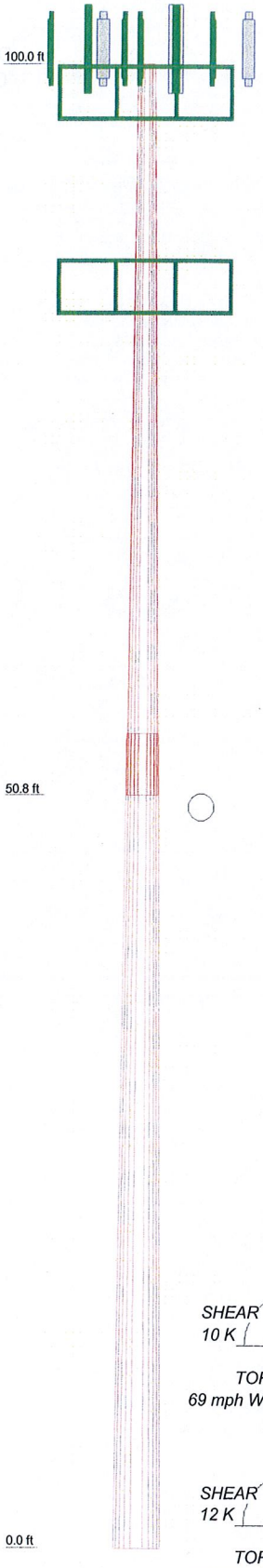
The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD ASSOCIATES, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

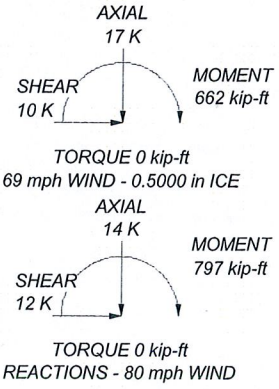
GPD ASSOCIATES makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD ASSOCIATES will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD ASSOCIATES pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

RISA TOWER OUTPUT



Section	Length (ft)	Number of Sides	Thickness (in)	Lap Splice (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	49.17	12	0.2813	4.17	14.7600	26.5700	A572-65	3.1
2	55.00	12	0.3438		25.0059	38.2000		6.5
								9.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Platform Mount (LP 101-1)	98	(2) 950G65VTZE-M	98
(2) DB844G65ZAXY	98	BXA-70063/6CFx2	98
(2) DB844G65ZAXY	98	BXA-70063/6CFx4	98
(2) DB844G65ZAXY	98	BXA-70063/6CFx2	98
(2) 950G65VTZE-M	98	GPS_A	98
(2) 950G65VTZE-M	98	Platform Mount [LP 601-1]	85

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

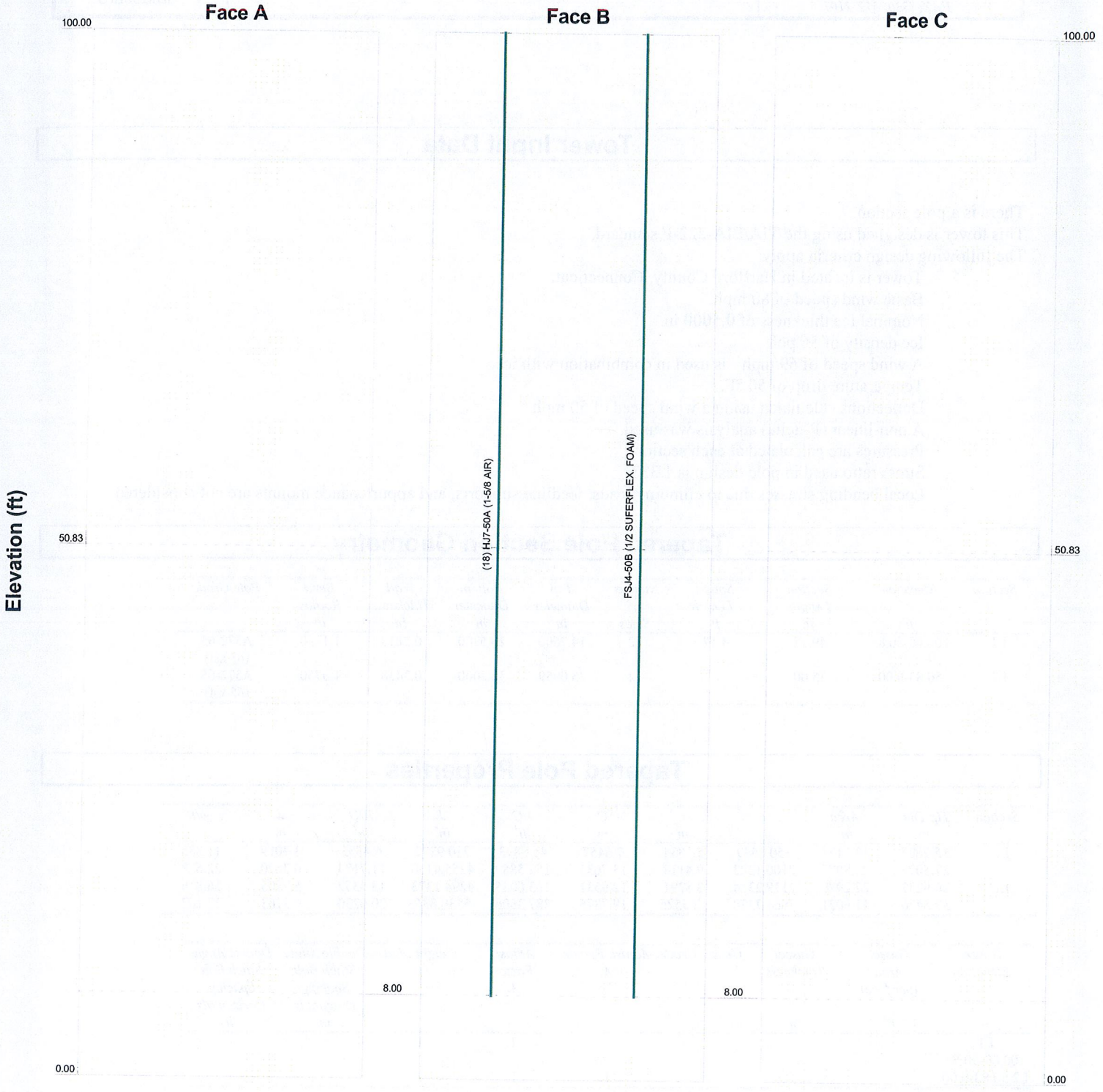
1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 48.2%

GPD GROUP
Consulting Engineers
GPD Associates
520 S. Main Street, Suite 2531
Akron, OH 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job: HRT 096 943227 BU#: 806371			
Project: 2009282.17			
Client: Crown Castle, USA	Drawn by: ddicesare	App'd:	
Code: TIA/EIA-222-F	Date: 12/21/09	Scale: NTS	
Path: N:\2009\2009282\17\RISA\806371.eri		Dwg No. E-1	

0' - 100'

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



GPD GROUP
Consulting Engineers

GPD Associates
520 S. Main Street, Suite 2531
Akron, OH 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job: ***HRT 096 943227 BU#: 806371***			
Project: ***2009282.17***			
Client: Crown Castle, USA	Drawn by: ddicesare	App'd:	
Code: TIA/EIA-222-F	Date: 12/21/09	Scale: NTS	
Path: N:\2009\2009282\17\RISA\806371.eri		Dwg No. E-7	

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 Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 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.

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	100.00-50.83	49.17	4.17	12	14.7600	26.5700	0.2813	1.1250	A572-65 (65 ksi)
L2	50.83-0.00	55.00		12	25.0059	38.2000	0.3438	1.3750	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	15.2807	13.1123	350.8549	5.1834	7.6457	45.8893	710.9272	6.4535	3.2019	11.385
	27.5073	23.8077	2100.1202	9.4114	13.7633	152.5889	4255.4130	11.7174	6.3670	22.638
L2	26.9237	27.2979	2119.2314	8.8291	12.9531	163.6085	4294.1373	13.4352	5.7803	16.816
	39.5476	41.9021	7664.7378	13.5525	19.7876	387.3506	15530.8368	20.6230	9.3163	27.102

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 100.00-50.83				1	1	1		
L2 50.83-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HJ7-50A (1-5/8 AIR)	B	No	Inside Pole	100.00 - 8.00	18	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
FSJ4-50B (1/2 SUFERFLEX. FOAM)	B	No	Inside Pole	100.00 - 8.00	1	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	100.00-50.83	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.93
		C	0.000	0.000	0.000	0.000	0.00
L2	50.83-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.81
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	100.00-50.83	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.93
		C		0.000	0.000	0.000	0.000	0.00
L2	50.83-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.81
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	100.00-50.83	0.0000	0.0000	0.0000	0.0000
L2	50.83-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Platform Mount (LP 101-1)	C	None		0.0000	98.00	No Ice	36.21	36.21	1.50
						1/2" Ice	42.82	42.82	2.30
(2) DB844G65ZAXY	A	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	4.67	3.73	0.02
						1/2" Ice	5.05	4.10	0.05
(2) DB844G65ZAXY	B	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	4.67	3.73	0.02
						1/2" Ice	5.05	4.10	0.05
(2) DB844G65ZAXY	C	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	4.67	3.73	0.02
						1/2" Ice	5.05	4.10	0.05
(2) 950G65VTZE-M	A	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	3.99	2.78	0.01
						1/2" Ice	4.37	3.15	0.03
(2) 950G65VTZE-M	B	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	3.99	2.78	0.01
						1/2" Ice	4.37	3.15	0.03
(2) 950G65VTZE-M	C	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	3.99	2.78	0.01
						1/2" Ice	4.37	3.15	0.03
BXA-70063/6CFx2	A	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	7.74	3.76	0.02
						1/2" Ice	8.28	4.20	0.06
BXA-70063/6CFx4	B	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	7.74	3.76	0.02
						1/2" Ice	8.28	4.20	0.06
BXA-70063/6CFx2	C	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	7.74	3.76	0.02
						1/2" Ice	8.28	4.20	0.06
GPS_A	C	From Centroid-Leg	3.47 2.00 3.00	30.0000	98.00	No Ice	0.30	0.30	0.00
						1/2" Ice	0.37	0.37	0.00
Platform Mount [LP 601-1]	C	None		0.0000	85.00	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51

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

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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 50.83	13.322	36	1.2001	0.0004
L2	55 - 0	3.943	36	0.6824	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	Platform Mount (LP 101-1)	36	12.844	1.1719	0.0004	26347
85.00	Platform Mount [LP 601-1]	36	9.786	0.9930	0.0003	8782

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 50.83	34.075	11	3.0699	0.0011
L2	55 - 0	10.089	11	1.7458	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	Platform Mount (LP 101-1)	11	32.852	3.0065	0.0010	10338
85.00	Platform Mount [LP 601-1]	11	25.031	2.5983	0.0007	3445

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	100 - 50.83 (1)	TP26.57x14.76x0.2813	49.17	0.00	0.0	39.000	22.9007	-6.23	893.13	0.007
L2	50.83 - 0 (2)	TP38.2x25.0059x0.3438	55.00	0.00	0.0	39.000	41.9021	-14.16	1634.18	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	100 - 50.83 (1)	TP26.57x14.76x0.2813	264.83	22.519	39.000	0.577	0.00	0.000	39.000	0.000
L2	50.83 - 0 (2)	TP38.2x25.0059x0.3438	797.06	24.692	39.000	0.633	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	100 - 50.83 (1)	TP26.57x14.76x0.2813	7.72	0.337	26.000	0.026	0.02	0.001	26.000	0.000
L2	50.83 - 0 (2)	TP38.2x25.0059x0.3438	11.78	0.281	26.000	0.022	0.00	0.000	26.000	0.000

Pole Interaction Design Data

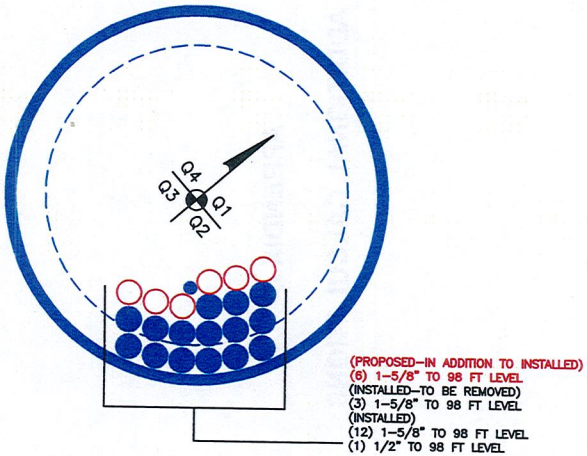
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	100 - 50.83 (1)	0.007	0.577	0.000	0.026	0.000	0.585 ✓	1.333	H1-3+VT ✓
L2	50.83 - 0 (2)	0.009	0.633	0.000	0.022	0.000	0.642 ✓	1.333	H1-3+VT ✓

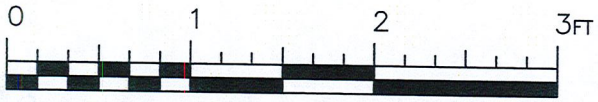
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	100 - 50.83	Pole	TP26.57x14.76x0.2813	1	-6.23	1190.54	43.9	Pass
L2	50.83 - 0	Pole	TP38.2x25.0059x0.3438	2	-14.16	2178.36	48.2	Pass
							Summary	
						Pole (L2)	48.2	Pass
						RATING =	**48.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING





: SCALE :

BUSINESS UNIT: 806371 TOWER ID: C_BASELEVEL

LEGEND: FEEDLINES

- SOLID BLUE CIRCLE DENOTES EXISTING FEEDLINE
- OPEN RED CIRCLE DENOTES PROPOSED 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

SCALE: 1" = 1'-0" | 1

BASE LEVEL DRAWING

PLOT DATE: 12/17/2009 FILE NAME: BASELEVEL.dwg
R:\TEMPLATES\TYPICAL BLOCKS FOR TEMPLATES\TITLE BLOCK STD-VER 0.1.dwg

CROWN REGION ADDRESS

USA

△ 17/12/09 APPLICATION ADDED PER WORK ORDER # 339737 ADK

DRAWN BY: ADK
CHECKED BY:
DRAWING DATE: 17/12/2009

SITE NUMBER:
SITE NAME:

SITE NAME

HRT 096 943227

BUSINESS UNIT NUMBER

806371

SITE ADDRESS

HRT 96
WINDSOR, CT 06095
HARTFORD COUNTY
USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

A1-0

APPENDIX C

ADDITIONAL CALCULATIONS

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

Site Data

BU#: *806371*
Site Name: *HRT 096 943227*
App #: *92364*

Pole Manufacturer:	*Other*

Reactions		
Moment:	797.06	ft-kips
Axial:	14.16	kips
Shear:	11.78	kips

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	46.05	in

Plate Data		
Diam:	52.05	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	10.24	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Both	
Groove Depth:	0.25	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	38.2	in
Thick:	0.34375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Anchor Rod Results

Maximum Rod Tension:	68.1 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	34.9% **Pass**	Fty*ASIF

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	16.0 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	26.6% **Pass**	Y.L. Length: 25.72

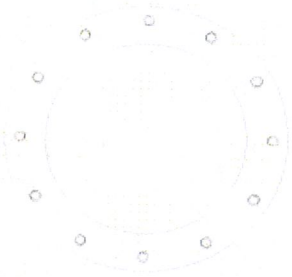
n/a

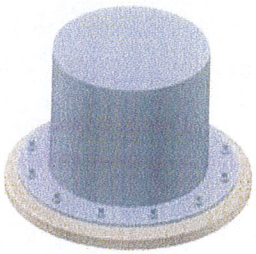
Stiffener Results

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

Pole Results

Pole Punching Shear Check:	n/a





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

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