STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

September 14, 2009

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

RE: **EM-VER-107-090813** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Grassy Hill Road, Orange, 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 August 13, 2009, 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
Executive Director

SDP/MP/laf

c: The Honorable James M. Zeoli, First Selectman, Town of Orange
Paul Dinice, Zoning Enforcement Officer, Town of Orange
Crown Castle USA, Inc.

G:\EM\BAM-VERIZON\ORANGE\dc090209GrassyHillRd.DOC

CSC
CONNECTICUT SITING COUNCIL

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

August 17, 2009

The Honorable James M. Zeoli
First Selectman
Town of Orange
Town Hall
617 Orange Center Road
Orange, CT 06477-2423

RE: **EM-VER-107-090813** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Grassy Hill Road, Orange, Connecticut.

Dear Mr. Zeoli:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by August 31, 2009.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/laf

Enclosure: Notice of Intent

c: Paul Dinice, Zoning Enforcement Officer, Town of Orange

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

EM-VER-107-090813

August 13, 2009

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**
Grassy Hill Road, Orange, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the 118-foot level on the existing 140-foot tower at the above-referenced address. The tower is owned by Crown Castle USA, Inc. ("Crown"). The Council approved Cellco's shared use of the existing facility in Docket No. 262. Cellco now intends to modify its installation by replacing all of its existing antennas with six (6) DB846F65ZAXY and six (6) DB948F65E-M antennas at the same 118-foot level on the tower. Attached behind Tab 1 are the specification sheets 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 James M. Zeoli, First Selectman of the Town of Orange. The Town of Orange 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 structures. Cellco's antennas will be located at the 118-foot level on the existing 140-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 cumulative power density table for Cellco's modified facility is included behind Tab 2.

Also included is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed antenna 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:
James M. Zeoli, Orange First Selectman
Sandy M. Carter

ANDREW®

Vertically Polarized Directed Dipole® Panel Antennas

806 - 960 MHz

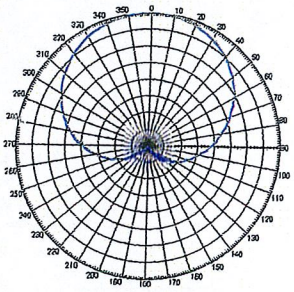
65° HORIZONTAL BEAMWIDTH

HORIZONTAL BEAMWIDTH	65°		65°	65°
FREQUENCY RANGE	806-960 MHz		806-896 MHz	806-896 MHz
	14.5 & 14.8 dBd / 0° Tilt		14.5 dBd / 0° Tilt	14.3 dBd / 5° Tilt
MODEL	DB846F65ZAXY		DB846H65E-SX	846H65T5E-SX
TYPE	Directed Dipole®, No Screen		Directed Dipole®	Directed Dipole®
ELECTRICAL SPECIFICATIONS				
Frequency Range (MHz)	806-896	870-960	806-896	806-896
Gain (dBd/dBi)	14.5 / 16.6	14.8 / 16.9	14.5 / 16.6	14.3 / 16.4
Horizontal Beamwidth (Deg.)	65	60	65	65
Elevation Beamwidth (Deg.)	11	10.5	11	10.5
USLS (dB)	>15	>15	N/A	N/A
Null Fill (dB) – Below Peak	N/A	N/A	N/A	N/A
Beam Tilt (Deg.)	0	0	0	5
VSWR	<1.33:1	<1.33:1	<1.5:1	<1.5:1
Front-To-Back Ratio (dB)	40	40	30	40
Isolation (dB)	N/A	N/A	N/A	N/A
Max. Input Power (Watts)	500	500	500	500
Polarization	Vertical	Vertical	Vertical	Vertical
Connector Location	Back	Back	Back	Back
Connector Type	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female
Optional Connectors	N/A	N/A	N/A	N/A
MECHANICAL SPECIFICATIONS				
Length (inch/mm)	72 / 1,829	72 / 1,829	72 / 1,829	72 / 1,829
Width (inch/mm)	10 / 254	10 / 254	20.5 / 521	20.5 / 521
Depth (inch/mm)	8.5 / 216	8.5 / 216	9 / 229	9 / 229
Net Weight (lbs/kg)	21 / 9.5	21 / 9.5	24 / 10.9	24 / 10.9
Max. Flat Plate Area (ft^2/m^2)	1.61 / 0.15	1.61 / 0.15	4.95 / 0.46	4.95 / 0.46
Max. Wind Load at 100 mph (lbf/N)	87 / 386	87 / 386	273 / 1,214	273 / 1,214
Max. Wind Speed (mph/kmh)	125 / 201	125 / 201	125 / 201	125 / 201
Radome Material	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant
Reflector Material	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum
Radiator Material	Aluminum	Aluminum	Brass	Brass
Hardware Material	Galvanized Steel	Galvanized Steel	Galvanized Steel	Galvanized Steel
Color	Light Gray	Light Gray	Light Gray	Light Gray
Std. Mounting Hardware	DB380	DB380	DB380	DB380
Optional Downtilt Kit	DB5083	DB5083	DB5083	DB5083
Optional Special Mounting	DB5084-AZ	DB5084-AZ	DB5084-AZ	DB5084-AZ

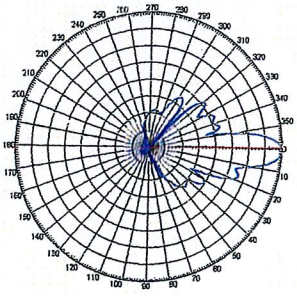
Specifications are subject to change. Please see our website for the latest information.

DB846F65ZAXY

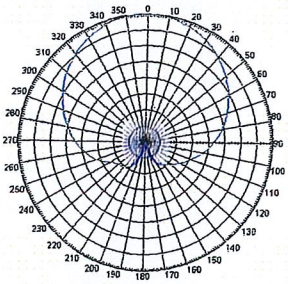
Azimuth Pattern

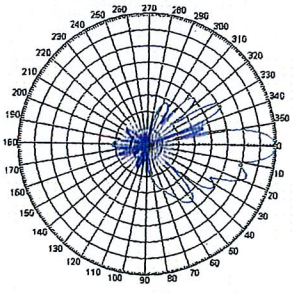


Elevation Pattern



DB846H65E-SX





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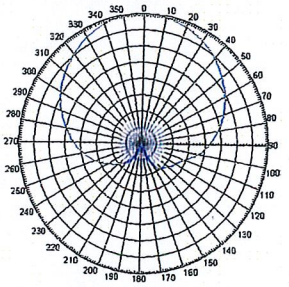
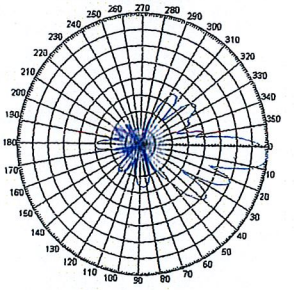




Scale: 10° radials, 5 dB per division

ANDREW®

Vertically Polarized Directed Dipole® Panel Antennas

1710 - 2170 MHz

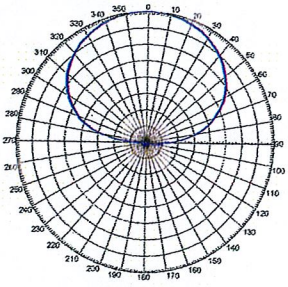
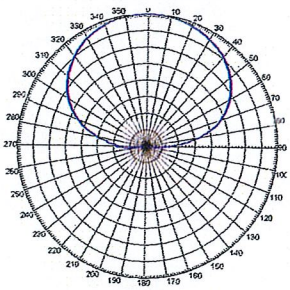
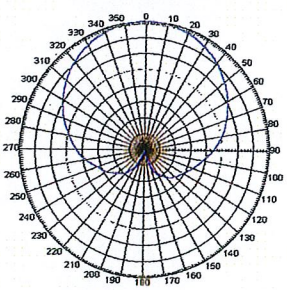
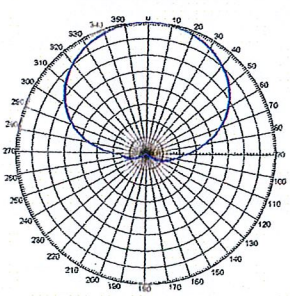
65° HORIZONTAL BEAMWIDTH

HORIZONTAL BEAMWIDTH	65°	65°	65°	65°
FREQUENCY RANGE	1850-1990 MHz	1850-1990 MHz	1850-1990 MHz	1850-1990 MHz
	17.2 dBi / 0° Tilt	17.6 dBi / 0° Tilt	17.2 dBi / 2° Tilt	17.5 dBi / 4° Tilt
MODEL	DB948F65E-M	DB948G65E-M	948F65T2ZE-M	948G65T4E-M
TYPE	Directed Dipole®	Directed Dipole®	Directed Dipole®, No Screen	Directed Dipole®
ELECTRICAL SPECIFICATIONS				
Frequency Range (MHz)	1850-1990	1850-1990	1850-1990	1850-1990
Gain (dBd/dBi)	15.1 / 17.2	15.5 / 17.6	15.1 / 17.2	15.4 / 17.5
Horizontal Beamwidth (Deg.)	65	65	65	65
Elevation Beamwidth (Deg.)	8	7	8	7
USLS (dB)	>15	N/A	>16	N/A
Null Fill (dB) – Below Peak	10	N/A	15	N/A
Beam Tilt (Deg.)	0	0	2	4
VSWR	<1.33:1	<1.33:1	<1.33:1	<1.33:1
Front-To-Back Ratio (dB)	40	40	40	40
Isolation (dB)	N/A	N/A	N/A	N/A
Max. Input Power (Watts)	250	250	250	250
Polarization	Vertical	Vertical	Vertical	Vertical
Connector Location	Bottom	Bottom	Bottom	Bottom
Connector Type	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female
MECHANICAL SPECIFICATIONS				
Length (inch/mm)	48 / 1,219	48 / 1,219	48 / 1,219	48 / 1,219
Width (inch/mm)	10.5 / 267	10.5 / 267	6.5 / 165	10.5 / 267
Depth (inch/mm)	7 / 178	7 / 178	4 / 102	7 / 178
Net Weight (lbs/kg)	11 / 5	14 / 6.3	9.5 / 4.3	14 / 6.3
Max. Flat Plate Area (ft^2/m^2)	2.26 / 0.21	2.26 / 0.21	1.18 / 0.11	2.26 / 0.21
Max. Wind Load at 100 mph (lbf/N)	127 / 565	127 / 565	67 / 299	127 / 565
Max. Wind Speed (mph/kmh)	125 / 201	125 / 201	125 / 201	125 / 201
Radome Material	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant
Reflector Material	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum
Radiator Material	Low Loss Circuit Board	Low Loss Circuit Board	Low Loss Circuit Board	Low Loss Circuit Board
Hardware Material	Galvanized Steel	Galvanized Steel	Galvanized Steel	Galvanized Steel
Color	Light Gray	Light Gray	Light Gray	Light Gray
Std. Mounting Hardware	DB390	DB390	DB390	DB390
Optional Downtilt Kit	DB5098	DB5098	DB5098	DB5098
Optional Special Mounting	DB5094-AZ	DB5094-AZ	DB5094-AZ	DB5094-AZ

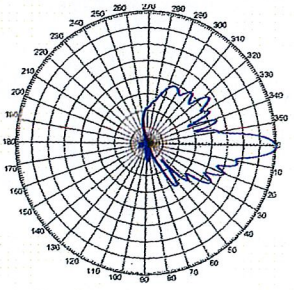
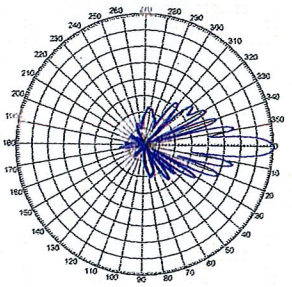
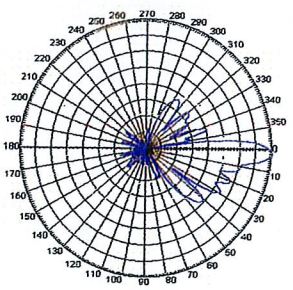
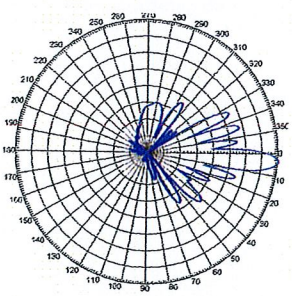
Specifications are subject to change. Please see our website for the latest information.
*TELETILT® compatible.

DB948F65E-M | **DB948G65E-M** | **948F65T2ZE-M** | **948G65T4E-M**

Azimuth Pattern

Elevation Pattern

Scale: 10° radials, 5 dB per division

ANDREW CORPORATION PHONE 1-800-676-5342 • (214) 631-0310 FAX 1-800-229-4706 • (214) 631-4706 WWW.ANDREW.COM

	General	Power	Density					
Site Name: Orange 3								
Tower Height: Verizon @ 118Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint CDMA	11	266.07	130	0.0623	1962.5	1.0000	6.23%	
*Pocket	3	631	100	0.0681	2130	1.0000	6.81%	
*Sprint WiMAX	3	562	130	0.0359	2657	1.0000	3.59%	
*Cingular GSM	2	427	140	0.0157	1900	1.0000	1.57%	
*Cingular UMTS	1	500	140	0.0092	880	0.5867	1.56%	
*T-Mobile UMTS	2	633	110	0.0376	2.1 GHz	1.0000	3.76%	
*T-Mobile GSM	8	123	110	0.0292	1945	1.0000	2.92%	
Verizon	**7**	**289**	**118**	**0.0522**	**1970**	**1.0000**	**5.22%**	
Verizon	**9**	**380**	**118**	**0.0883**	**869**	**0.5793**	**15.24%**	
								46.91%
* Source: Siting Council								

Date: **July 14, 2009**

Molly Carder
Crown Castle USA Inc.
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Crown Castle USA, Inc.
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:	Orange 3
Crown Castle Designation:	**Crown Castle BU Number:**	881541
	Crown Castle Site Name:	Rogers Property
	Crown Castle JDE Job Number:	122165
	Crown Castle Work Order Number:	283152
Engineering Firm Designation:	**Crown Castle USA, Inc. Project Number:**	283152
Site Data:	**Grassy Hill Road, Orange, New Haven County, CT**	
	Latitude *41° 17' 7.75"*, Longitude *-73° 2' 33.27"*	
	139.5 Foot - Monopole Tower	

Dear Molly Carder,

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 283152, in accordance with application 84897, 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 85 mph fastest mile.

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

We at *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: Jeannette Messmer, E.I.T.

Respectfully submitted by:

Aaron C. Poot, P.E.
Engineering Supervisor

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

7/14/09

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 139.5 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in March of 2004. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
118	118	6	decibel	DB846F65ZAXY w/Mount Pipe	-	-	-
		6	decibel	DB948F65E-M 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
136	136	3	powerwave technologies	7770.00 w/Mount Pipe	-	-	2
		6	powerwave technologies	LGP21401			
130	130	1	tower mounts	Flushed Mount	6	1-5/8	1
		9	mla	MLA_ANTENNA w/Mount Pipe	9	1-5/8	4
		6	css	CSS-XS4-65-R w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	T-Arm Mount [TA 602-3]			
118	118	12	decibel	DB844H90 w/ Mount Pipe	-	-	3
		1	tower mounts	T-Arm Mount [TA 602-3]	12	1-5/8	1
108	109	3	rfs celwave	APXV18-206516S-C-A20 w/ Mount Pipe	12	1-5/8	2
		3	rfs celwave	ATMAA1412D-1A20			
		3	ems wireless	RR90-17-02DP w/Mount Pipe			
		6	ericsson	KRY 112 71			1
	108	1	tower mounts	T-Arm Mount [TA 602-3]			
100	100	3	kathrein	742 213 w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Flushed Mount			
75	77	1	lucent	KS24019-L112A	1	1/2	1
	75	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment

3) Existing antennas will be replaced by the proposed loading and was not considered in the analysis.
4) MLA Equipment 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)
140	140	12	dapa	48000	12	-
130	130	12	dapa	48000	12	-
120	120	12	dapa	48000	12	-
110	110	12	dapa	48000	12	-
100	100	12	dapa	48000	12	-
75	75	1	-	GPS	1	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI	2208511	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI	2207700	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.

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	139.5 - 93.04	Pole	TP26.99x15.5x0.25	1	-6.745	1063.078	59.7	Pass
L2	93.04 - 46.38	Pole	TP37.91x25.521x0.375	2	-15.005	2242.999	63.9	Pass
L3	46.38 - 0	Pole	TP48.5x35.874x0.375	3	-27.220	2940.918	70.3	Pass
							Summary	
						Pole (L3)	70.3	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
						RATING =	70.3	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	54.3	Pass
1	Base Plate	0	73.9	Pass
1	Base Foundation (Compared w/ Design Loads)	0	79.8	Pass

Structure Rating (max from all components) =	79.8%

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

4.1) Recommendations

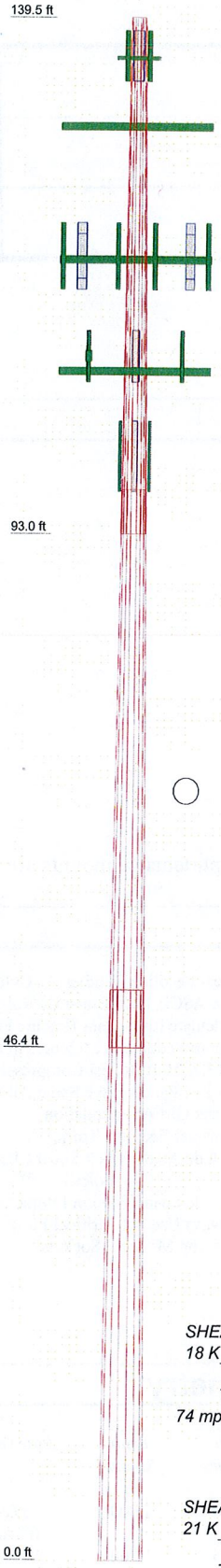
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

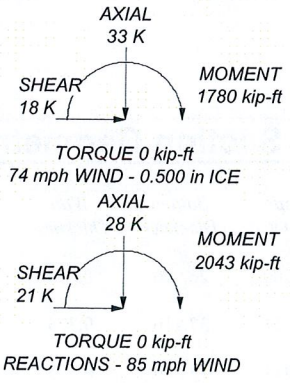
APPENDIX A

RISA TOWER OUTPUT

Section	1	2	3
Length (ft)	46.460	50.580	51.630
Number of Sides	18	18	18
Thickness (in)	0.250	0.375	0.375
Lap Splice (ft)	3.920	5.250	
Top Dia (in)	15.500	25.521	35.874
Bot Dia (in)	26.990	37.910	48.500
Grade		A572-65	
Weight (K)	2.8	6.7	9.2

18.7





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
7770.00 w/Mount Pipe	136	RR90-17-02DP w/Mount Pipe	108
7770.00 w/Mount Pipe	136	(2) KRY 112 71	108
7770.00 w/Mount Pipe	136	APXV18-206516S-C-A20 w/ Mount Pipe	108
(2) LGP21401	136	ATMAA1412D-1A20	108
(2) LGP21401	136	APXV18-206516S-C-A20 w/ Mount Pipe	108
(2) LGP21401	136	ATMAA1412D-1A20	108
Flushed Mount	136	APXV18-206516S-C-A20 w/ Mount Pipe	108
(3) 72" x 12" Panel w/Mount Pipe	130	ATMAA1412D-1A20	108
(3) 72" x 12" Panel w/Mount Pipe	130	(2) 2'6"x4" Pipe Mount	108
(3) 72" x 12" Panel w/Mount Pipe	130	(2) 2'6"x4" Pipe Mount	108
T-Arm Mount [TA 602-3]	130	(2) 2'6"x4" Pipe Mount	108
(2) DB846F65ZAXY w/Mount Pipe	118	T-Arm Mount [TA 602-3]	108
(2) DB948F65E-M w/Mount Pipe	118	742 213 w/ Mount Pipe	100
(2) DB846F65ZAXY w/Mount Pipe	118	742 213 w/ Mount Pipe	100
(2) DB948F65E-M w/Mount Pipe	118	742 213 w/ Mount Pipe	100
(2) DB846F65ZAXY w/Mount Pipe	118	Flushed Mount	100
(2) DB948F65E-M w/Mount Pipe	118	KS24019-L112A	75
T-Arm Mount [TA 602-3]	118	Side Arm Mount [SO 701-1]	75
RR90-17-02DP w/Mount Pipe	108		
(2) KRY 112 71	108		
RR90-17-02DP w/Mount Pipe	108		
(2) KRY 112 71	108		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 70.3%

CROWN CASTLE
Shaping the Wireless World

Crown Castle USA, Inc.
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX: (724) 416-2254

Job: BU # 881541			
Project:			
Client: Crown Castle USA	Drawn by: jmessmer	App'd:	
Code: TIA/EIA-222-F	Date: 07/14/09	Scale: NTS	
Path: R:\SA Models - Letters\Work Area\jmessmer\881541\881541.eri		Dwg No. E-1	

RISATower	Job	Page
	BU # 881541	1 of 12
Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-2254	Project	Date 09:40:26 07/14/09
	Client Crown Castle USA	Designed by jmessmer

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.500 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	139.500-93.040	46.460	3.920	18	15.500	26.990	0.250	1.000	A572-65 (65 ksi)
L2	93.040-46.380	50.580	5.250	18	25.521	37.910	0.375	1.500	A572-65 (65 ksi)
L3	46.380-0.000	51.630		18	35.874	48.500	0.375	1.500	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	15.739	12.101	355.544	5.414	7.874	45.154	711.557	6.052	2.288	9.152
	27.406	21.218	1916.764	9.493	13.711	139.798	3836.050	10.611	4.310	17.241
L2	26.889	29.929	2390.886	8.927	12.964	184.419	4784.918	14.968	3.832	10.218
	38.495	44.676	7952.156	13.325	19.258	412.921	15914.776	22.342	6.012	16.032
L3	37.731	42.253	6727.054	12.602	18.224	369.131	13462.960	21.130	5.654	15.077
	49.248	57.281	16760.535	17.084	24.638	680.272	33543.123	28.646	7.876	21.003

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 139.500-93.040				1	1	1.05		
L2 93.040-46.380				1	1	1.05		
L3 46.380-0.000				1	1	1.05		

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 klf
LDF7-50A(1-5/8")	B	No	Inside Pole	136.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
LDF7-50A(1-5/8")	C	No	Inside Pole	130.000 - 0.000	9	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
LDF7-50A(1-5/8")	A	No	Inside Pole	118.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
LDF7-50A(1-5/8")	B	No	Inside Pole	108.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
CR 50 1873(1-5/8")	B	No	Inside Pole	100.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
LDF4-50A(1/2")	B	No	Inside Pole	75.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
**								
Safety Line 3/8	C	No	CaAa (Out Of Face)	139.500 - 0.000	1	No Ice	0.037	0.000
						1/2" Ice	0.137	0.001

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	139.500-93.040	A	0.000	0.000	0.000	0.000	0.246
		B	0.000	0.000	0.000	0.000	0.393
		C	0.000	0.000	0.000	1.742	0.283
L2	93.040-46.380	A	0.000	0.000	0.000	0.000	0.459
		B	0.000	0.000	0.000	0.000	0.925

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C	0.000	0.000	0.000	1.750	0.355
L3	46.380-0.000	A	0.000	0.000	0.000	0.000	0.456
		B	0.000	0.000	0.000	0.000	0.922
		C	0.000	0.000	0.000	1.739	0.352

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	139.500-93.040	A	0.500	0.000	0.000	0.000	0.000	0.246
		B		0.000	0.000	0.000	0.000	0.393
		C		0.000	0.000	0.000	6.388	0.308
L2	93.040-46.380	A	0.500	0.000	0.000	0.000	0.000	0.459
		B		0.000	0.000	0.000	0.000	0.925
		C		0.000	0.000	0.000	6.416	0.379
L3	46.380-0.000	A	0.500	0.000	0.000	0.000	0.000	0.456
		B		0.000	0.000	0.000	0.000	0.922
		C		0.000	0.000	0.000	6.377	0.377

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	139.500-93.040	-0.048	0.028	-0.159	0.092
L2	93.040-46.380	-0.048	0.028	-0.165	0.095
L3	46.380-0.000	-0.048	0.028	-0.168	0.097

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
7770.00 w/Mount Pipe	A	From Leg	0.500 0.000 0.000	0.000	136.000	No Ice 1/2" Ice	5.921 6.363	4.035 4.668	0.052 0.096
7770.00 w/Mount Pipe	B	From Leg	0.500 0.000 0.000	0.000	136.000	No Ice 1/2" Ice	5.921 6.363	4.035 4.668	0.052 0.096
7770.00 w/Mount Pipe	C	From Leg	0.500 0.000 0.000	0.000	136.000	No Ice 1/2" Ice	5.921 6.363	4.035 4.668	0.052 0.096
(2) LGP21401	A	From Leg	0.500 0.000	0.000	136.000	No Ice 1/2" Ice	1.288 1.445	0.233 0.313	0.014 0.021

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000						
(2) LGP21401	B	From Leg	0.500 0.000 0.000	0.000	136.000	No Ice 1/2" Ice	1.288 1.445	0.233 0.313	0.014 0.021
(2) LGP21401	C	From Leg	0.500 0.000 0.000	0.000	136.000	No Ice 1/2" Ice	1.288 1.445	0.233 0.313	0.014 0.021
Flushed Mount	C	None		0.000	136.000	No Ice 1/2" Ice	3.470 4.450	1.670 2.100	0.052 0.059
****									
(3) 72" x 12" Panel w/Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice	8.637 9.290	6.946 8.127	0.066 0.131
(3) 72" x 12" Panel w/Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice	8.637 9.290	6.946 8.127	0.066 0.131
(3) 72" x 12" Panel w/Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice	8.637 9.290	6.946 8.127	0.066 0.131
T-Arm Mount [TA 602-3]	A	None		0.000	130.000	No Ice 1/2" Ice	11.590 15.440	11.590 15.440	0.774 0.990
**** ****									
(2) DB846F65ZAXY w/Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	118.000	No Ice 1/2" Ice	7.271 7.877	7.821 9.010	0.047 0.111
(2) DB948F65E-M w/Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	118.000	No Ice 1/2" Ice	5.654 6.348	4.918 6.008	0.040 0.087
(2) DB846F65ZAXY w/Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	118.000	No Ice 1/2" Ice	7.271 7.877	7.821 9.010	0.047 0.111
(2) DB948F65E-M w/Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	118.000	No Ice 1/2" Ice	5.654 6.348	4.918 6.008	0.040 0.087
(2) DB846F65ZAXY w/Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	118.000	No Ice 1/2" Ice	7.271 7.877	7.821 9.010	0.047 0.111
(2) DB948F65E-M w/Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	118.000	No Ice 1/2" Ice	5.654 6.348	4.918 6.008	0.040 0.087
T-Arm Mount [TA 602-3]	A	None		0.000	118.000	No Ice 1/2" Ice	11.590 15.440	11.590 15.440	0.774 0.990
** **									
RR90-17-02DP w/Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	4.910 5.572	3.636 4.703	0.044 0.082
(2) KRY 112 71	A	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	0.681 0.802	0.450 0.559	0.000 0.005
RR90-17-02DP w/Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	4.910 5.572	3.636 4.703	0.044 0.082
(2) KRY 112 71	B	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	0.681 0.802	0.450 0.559	0.000 0.005

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
RR90-17-02DP w/Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	4.910 5.572	3.636 4.703	0.044 0.082
(2) KRY 112 71	C	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	0.681 0.802	0.450 0.559	0.000 0.005
APXV18-206516S-C-A20 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	3.859 4.274	3.296 4.004	0.039 0.071
ATMAA1412D-1A20	A	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	1.517 1.683	0.467 0.575	0.013 0.022
APXV18-206516S-C-A20 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	3.859 4.274	3.296 4.004	0.039 0.071
ATMAA1412D-1A20	B	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	1.517 1.683	0.467 0.575	0.013 0.022
APXV18-206516S-C-A20 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	3.859 4.274	3.296 4.004	0.039 0.071
ATMAA1412D-1A20	C	From Leg	4.000 0.000 1.000	0.000	108.000	No Ice 1/2" Ice	1.517 1.683	0.467 0.575	0.013 0.022
(2) 2'6"x4" Pipe Mount	A	From Leg	4.000 0.000 0.000	0.000	108.000	No Ice 1/2" Ice	0.750 0.947	0.750 0.947	0.027 0.035
(2) 2'6"x4" Pipe Mount	B	From Leg	4.000 0.000 0.000	0.000	108.000	No Ice 1/2" Ice	0.750 0.947	0.750 0.947	0.027 0.035
(2) 2'6"x4" Pipe Mount	C	From Leg	4.000 0.000 0.000	0.000	108.000	No Ice 1/2" Ice	0.750 0.947	0.750 0.947	0.027 0.035
T-Arm Mount [TA 602-3]	C	None		0.000	108.000	No Ice 1/2" Ice	11.590 15.440	11.590 15.440	0.774 0.990
****									
****									
KS24019-L112A	A	From Leg	3.000 0.000 2.000	0.000	75.000	No Ice 1/2" Ice	0.100 0.180	0.100 0.180	0.005 0.006
Side Arm Mount [SO 701-1]	A	From Leg	1.500 0.000 0.000	0.000	75.000	No Ice 1/2" Ice	0.850 1.140	1.670 2.340	0.065 0.079
****									
****									
742 213 w/ Mount Pipe	A	From Leg	0.500 0.000 0.000	0.000	100.000	No Ice 1/2" Ice	5.373 5.950	4.620 6.000	0.049 0.091
742 213 w/ Mount Pipe	B	From Leg	0.500 0.000 0.000	0.000	100.000	No Ice 1/2" Ice	5.373 5.950	4.620 6.000	0.049 0.091
742 213 w/ Mount Pipe	C	From Leg	0.500 0.000 0.000	0.000	100.000	No Ice 1/2" Ice	5.373 5.950	4.620 6.000	0.049 0.091
Flushed Mount	C	None		0.000	100.000	No Ice 1/2" Ice	3.470 4.450	1.670 2.100	0.052 0.059

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	139.5 - 93.04	Pole	Max Tension	36	0.000	-0.000	-0.000
			Max. Compression	14	-10.812	0.024	-0.014
			Max. Mx	11	-6.745	331.962	0.001
			Max. My	8	-6.746	0.007	-331.951
			Max. Vy	11	-14.348	331.962	0.001
			Max. Vx	2	-14.348	0.007	331.945

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	20			-0.029
L2	93.04 - 46.38	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-19.636	0.063	0.212
			Max. Mx	11	-15.005	1053.485	0.196
			Max. My	2	-15.007	0.019	1052.880
			Max. Vy	11	-17.504	1053.485	0.196
			Max. Vx	2	-17.472	0.019	1052.880
			Max. Torque	24			-0.195
L3	46.38 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-32.958	0.121	0.178
			Max. Mx	11	-27.514	2042.888	0.188
			Max. My	2	-27.514	0.036	2040.565
			Max. Vy	11	-20.829	2042.888	0.188
			Max. Vx	2	-20.796	0.036	2040.565
			Max. Torque	11			-0.189

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	32.958	0.000	0.000
	Max. H_x	11	27.530	20.808	0.000
	Max. H_z	2	27.530	0.000	20.776
	Max. M_x	2	2040.565	0.000	20.776
	Max. M_z	5	2042.815	-20.808	0.000
	Max. Torsion	17	0.188	-15.364	8.853
	Min. Vert	11	27.530	20.808	0.000
	Min. H_x	5	27.530	-20.808	0.000
	Min. H_z	8	27.530	0.000	-20.776
	Min. M_x	8	-2040.188	0.000	-20.776
	Min. M_z	11	-2042.888	20.808	0.000
	Min. Torsion	23	-0.189	15.364	-8.853

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	27.530	0.000	0.000	-0.182	0.036	0.000
Dead+Wind 0 deg - No Ice	27.530	-0.000	-20.776	-2040.565	0.036	-0.036
Dead+Wind 30 deg - No Ice	27.530	10.404	-17.993	-1767.239	-1021.410	-0.122
Dead+Wind 60 deg - No Ice	27.530	18.021	-10.388	-1020.395	-1769.159	-0.175
Dead+Wind 90 deg - No Ice	27.530	20.808	-0.000	-0.188	-2042.815	-0.181
Dead+Wind 120 deg - No Ice	27.530	18.021	10.388	1020.018	-1769.159	-0.139
Dead+Wind 150 deg - No Ice	27.530	10.404	17.993	1766.862	-1021.410	-0.059
Dead+Wind 180 deg - No Ice	27.530	-0.000	20.776	2040.188	0.036	0.036
Dead+Wind 210 deg - No Ice	27.530	-10.404	17.993	1766.862	1021.482	0.122
Dead+Wind 240 deg - No Ice	27.530	-18.021	10.388	1020.018	1769.231	0.175
Dead+Wind 270 deg - No Ice	27.530	-20.808	-0.000	-0.188	2042.888	0.181
Dead+Wind 300 deg - No Ice	27.530	-18.021	-10.388	-1020.395	1769.231	0.139
Dead+Wind 330 deg - No Ice	27.530	-10.404	-17.993	-1767.239	1021.482	0.059
Dead+Ice+Temp	32.958	0.000	0.000	-0.178	0.121	0.000

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+Wind 0 deg+Ice+Temp	32.958	-0.000	-17.705	-1777.328	0.125	-0.101
Dead+Wind 30 deg+Ice+Temp	32.958	8.870	-15.333	-1539.245	-889.818	-0.167
Dead+Wind 60 deg+Ice+Temp	32.958	15.364	-8.853	-888.762	-1541.300	-0.188
Dead+Wind 90 deg+Ice+Temp	32.958	17.741	-0.000	-0.187	-1779.748	-0.159
Dead+Wind 120 deg+Ice+Temp	32.958	15.364	8.853	888.388	-1541.300	-0.087
Dead+Wind 150 deg+Ice+Temp	32.958	8.870	15.333	1538.870	-889.818	0.008
Dead+Wind 180 deg+Ice+Temp	32.958	-0.000	17.705	1776.953	0.125	0.101
Dead+Wind 210 deg+Ice+Temp	32.958	-8.870	15.333	1538.870	890.069	0.168
Dead+Wind 240 deg+Ice+Temp	32.958	-15.364	8.853	888.388	1541.551	0.189
Dead+Wind 270 deg+Ice+Temp	32.958	-17.741	-0.000	-0.187	1779.999	0.159
Dead+Wind 300 deg+Ice+Temp	32.958	-15.364	-8.853	-888.762	1541.551	0.087
Dead+Wind 330 deg+Ice+Temp	32.958	-8.870	-15.333	-1539.245	890.069	-0.008
Dead+Wind 0 deg - Service	27.530	0.000	-7.188	-706.805	0.037	-0.013
Dead+Wind 30 deg - Service	27.530	3.600	-6.226	-612.180	-353.725	-0.042
Dead+Wind 60 deg - Service	27.530	6.235	-3.594	-353.522	-612.697	-0.061
Dead+Wind 90 deg - Service	27.530	7.200	0.000	-0.189	-707.437	-0.063
Dead+Wind 120 deg - Service	27.530	6.235	3.594	353.144	-612.697	-0.048
Dead+Wind 150 deg - Service	27.530	3.600	6.226	611.802	-353.725	-0.021
Dead+Wind 180 deg - Service	27.530	0.000	7.188	706.427	0.037	0.013
Dead+Wind 210 deg - Service	27.530	-3.600	6.226	611.802	353.798	0.042
Dead+Wind 240 deg - Service	27.530	-6.235	3.594	353.144	612.770	0.061
Dead+Wind 270 deg - Service	27.530	-7.200	0.000	-0.189	707.510	0.063
Dead+Wind 300 deg - Service	27.530	-6.235	-3.594	-353.522	612.770	0.048
Dead+Wind 330 deg - Service	27.530	-3.600	-6.226	-612.180	353.798	0.021

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-27.530	0.000	0.000	27.530	0.000	0.000%
2	0.000	-27.530	-20.776	0.000	27.530	20.776	0.001%
3	10.404	-27.530	-17.993	-10.404	27.530	17.993	0.000%
4	18.021	-27.530	-10.388	-18.021	27.530	10.388	0.000%
5	20.809	-27.530	0.000	-20.808	27.530	0.000	0.001%
6	18.021	-27.530	10.388	-18.021	27.530	-10.388	0.000%
7	10.404	-27.530	17.993	-10.404	27.530	-17.993	0.000%
8	0.000	-27.530	20.776	0.000	27.530	-20.776	0.001%
9	-10.404	-27.530	17.993	10.404	27.530	-17.993	0.000%
10	-18.021	-27.530	10.388	18.021	27.530	-10.388	0.000%
11	-20.809	-27.530	0.000	20.808	27.530	0.000	0.001%
12	-18.021	-27.530	-10.388	18.021	27.530	10.388	0.000%
13	-10.404	-27.530	-17.993	10.404	27.530	17.993	0.000%
14	0.000	-32.958	0.000	0.000	32.958	0.000	0.000%
15	0.000	-32.958	-17.705	0.000	32.958	17.705	0.000%
16	8.870	-32.958	-15.333	-8.870	32.958	15.333	0.000%
17	15.364	-32.958	-8.853	-15.364	32.958	8.853	0.000%
18	17.741	-32.958	0.000	-17.741	32.958	0.000	0.000%
19	15.364	-32.958	8.853	-15.364	32.958	-8.853	0.000%
20	8.870	-32.958	15.333	-8.870	32.958	-15.333	0.000%
21	0.000	-32.958	17.705	0.000	32.958	-17.705	0.000%
22	-8.870	-32.958	15.333	8.870	32.958	-15.333	0.000%
23	-15.364	-32.958	8.853	15.364	32.958	-8.853	0.000%
24	-17.741	-32.958	0.000	17.741	32.958	0.000	0.000%
25	-15.364	-32.958	-8.853	15.364	32.958	8.853	0.000%
26	-8.870	-32.958	-15.333	8.870	32.958	15.333	0.000%
27	0.000	-27.530	-7.189	-0.000	27.530	7.188	0.002%
28	3.600	-27.530	-6.226	-3.600	27.530	6.226	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
29	6.236	-27.530	-3.595	-6.235	27.530	3.594	0.000%
30	7.200	-27.530	0.000	-7.200	27.530	-0.000	0.002%
31	6.236	-27.530	3.595	-6.235	27.530	-3.594	0.000%
32	3.600	-27.530	6.226	-3.600	27.530	-6.226	0.000%
33	0.000	-27.530	7.189	-0.000	27.530	-7.188	0.002%
34	-3.600	-27.530	6.226	3.600	27.530	-6.226	0.000%
35	-6.236	-27.530	3.595	6.235	27.530	-3.594	0.000%
36	-7.200	-27.530	0.000	7.200	27.530	-0.000	0.002%
37	-6.236	-27.530	-3.595	6.235	27.530	3.594	0.000%
38	-3.600	-27.530	-6.226	3.600	27.530	6.226	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	6	0.00000001	0.00004007
3	Yes	8	0.00000001	0.00004482
4	Yes	8	0.00000001	0.00004507
5	Yes	6	0.00000001	0.00004057
6	Yes	8	0.00000001	0.00004476
7	Yes	8	0.00000001	0.00004496
8	Yes	6	0.00000001	0.00004006
9	Yes	8	0.00000001	0.00004501
10	Yes	8	0.00000001	0.00004474
11	Yes	6	0.00000001	0.00004057
12	Yes	8	0.00000001	0.00004505
13	Yes	8	0.00000001	0.00004487
14	Yes	4	0.00000001	0.00000001
15	Yes	7	0.00000001	0.00006536
16	Yes	8	0.00000001	0.00005956
17	Yes	8	0.00000001	0.00005986
18	Yes	7	0.00000001	0.00006538
19	Yes	8	0.00000001	0.00005956
20	Yes	8	0.00000001	0.00005968
21	Yes	7	0.00000001	0.00006534
22	Yes	8	0.00000001	0.00005982
23	Yes	8	0.00000001	0.00005950
24	Yes	7	0.00000001	0.00006539
25	Yes	8	0.00000001	0.00005980
26	Yes	8	0.00000001	0.00005970
27	Yes	5	0.00000001	0.00008435
28	Yes	6	0.00000001	0.00004354
29	Yes	6	0.00000001	0.00004450
30	Yes	5	0.00000001	0.00008450
31	Yes	6	0.00000001	0.00004339
32	Yes	6	0.00000001	0.00004406
33	Yes	5	0.00000001	0.00008429
34	Yes	6	0.00000001	0.00004424
35	Yes	6	0.00000001	0.00004331
36	Yes	5	0.00000001	0.00008451
37	Yes	6	0.00000001	0.00004442
38	Yes	6	0.00000001	0.00004372

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	139.5 - 93.04	27.359	36	1.705	0.000
L2	96.96 - 46.38	13.185	36	1.320	0.000
L3	51.63 - 0	3.643	36	0.666	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136.000	7770.00 w/Mount Pipe	36	26.112	1.681	0.000	31273
130.000	(3) 72" x 12" Panel w/Mount Pipe	36	23.984	1.640	0.000	16459
118.000	(2) DB846F65ZAXY w/Mount Pipe	36	19.824	1.547	0.000	7272
108.000	RR90-17-02DP w/Mount Pipe	36	16.534	1.452	0.000	4963
100.000	742 213 w/ Mount Pipe	36	14.072	1.360	0.000	3962
75.000	KS24019-L112A	36	7.686	0.978	0.000	3518

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	139.5 - 93.04	78.885	11	4.919	0.001
L2	96.96 - 46.38	38.040	11	3.808	0.001
L3	51.63 - 0	10.516	11	1.923	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136.000	7770.00 w/Mount Pipe	11	75.293	4.845	0.001	10982
130.000	(3) 72" x 12" Panel w/Mount Pipe	11	69.162	4.716	0.001	5779
118.000	(2) DB846F65ZAXY w/Mount Pipe	11	57.175	4.438	0.001	2551
108.000	RR90-17-02DP w/Mount Pipe	11	47.692	4.168	0.001	1739
100.000	742 213 w/ Mount Pipe	11	40.596	3.915	0.001	1387
75.000	KS24019-L112A	11	22.182	2.898	0.000	1226

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	139.5 - 93.04 (1)	TP26.99x15.5x0.25	46.460	0.000	0.0	39.000	20.449	-6.745	797.508	0.008
L2	93.04 - 46.38 (2)	TP37.91x25.521x0.375	50.580	0.000	0.0	39.000	43.145	-15.005	1682.670	0.009
L3	46.38 - 0 (3)	TP48.5x35.874x0.375	51.630	0.000	0.0	39.000	56.570	-27.220	2206.240	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 $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	139.5 - 93.04 (1)	TP26.99x15.5x0.25	331.967	30.690	39.000	0.787	0.000	0.000	39.000	0.000
L2	93.04 - 46.38 (2)	TP37.91x25.521x0.375	1053.483	32.838	39.000	0.842	0.000	0.000	39.000	0.000
L3	46.38 - 0 (3)	TP48.5x35.874x0.375	1992.292	36.036	39.000	0.924	0.000	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	139.5 - 93.04 (1)	TP26.99x15.5x0.25	14.348	0.702	26.000	0.054	0.000	0.000	26.000	0.000
L2	93.04 - 46.38 (2)	TP37.91x25.521x0.375	17.504	0.406	26.000	0.031	0.191	0.003	26.000	0.000
L3	46.38 - 0 (3)	TP48.5x35.874x0.375	20.829	0.368	26.000	0.028	0.182	0.002	26.000	0.000

Pole Interaction Design Data

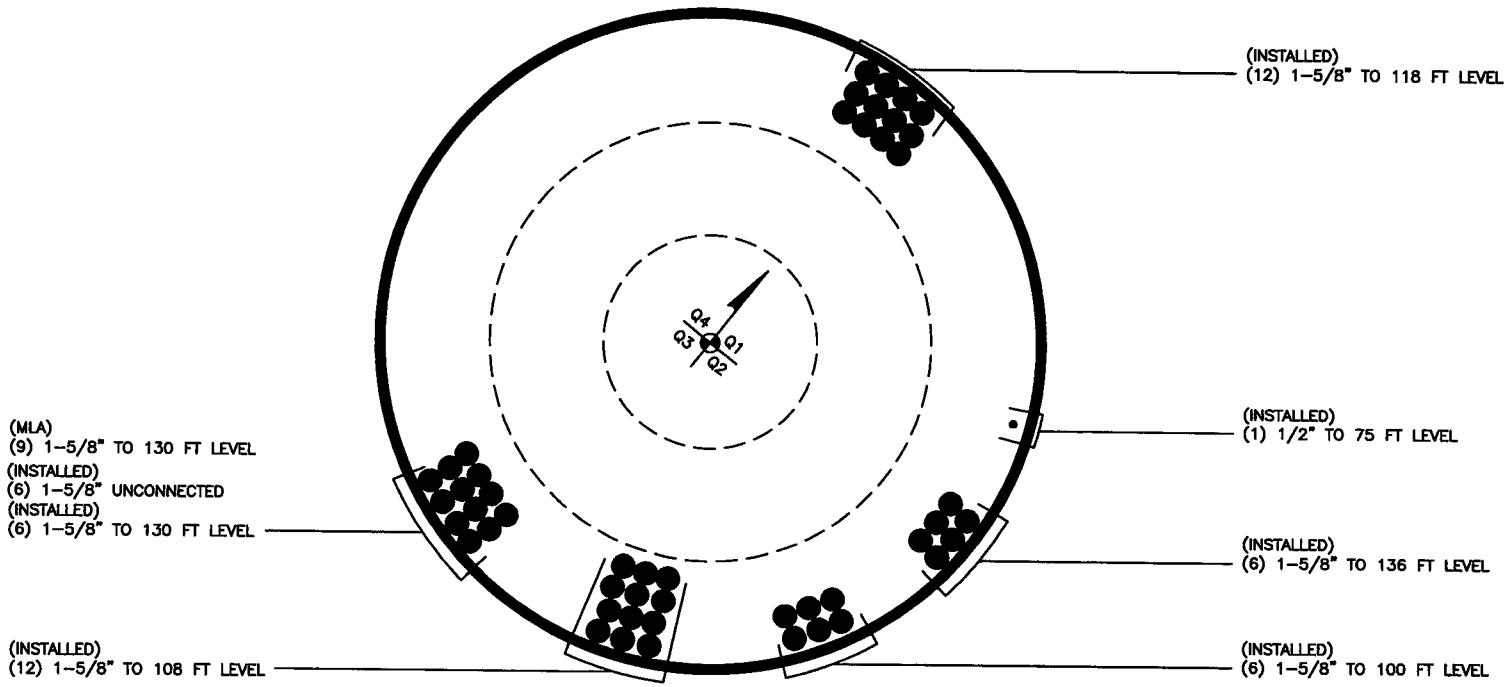
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	139.5 - 93.04 (1)	0.008	0.787	0.000	0.054	0.000	0.796 ✓	1.333	H1-3+VT ✓
L2	93.04 - 46.38 (2)	0.009	0.842	0.000	0.031	0.000	0.851 ✓	1.333	H1-3+VT ✓
L3	46.38 - 0 (3)	0.012	0.924	0.000	0.028	0.000	0.937 ✓	1.333	H1-3+VT ✓

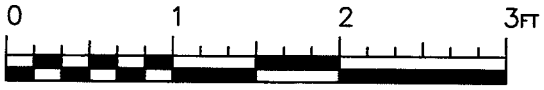
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	139.5 - 93.04	Pole	TP26.99x15.5x0.25	1	-6.745	1063.078	59.7	Pass
L2	93.04 - 46.38	Pole	TP37.91x25.521x0.375	2	-15.005	2242.999	63.9	Pass
L3	46.38 - 0	Pole	TP48.5x35.874x0.375	3	-27.220	2940.918	70.3	Pass
							Summary	
						Pole (L3)	70.3	Pass
						RATING =	**70.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING





: SCALE :

BUSINESS UNIT: 881541 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

FOUNDATION REACTION COMPARISON

BU #881541
WO#283152

REACTIONS	DESIGN REACTIONS	CURRENT REACTIONS	% CAPACITY
MOMENT (kip-ft)	2561.0	2043.0	79.8%
SHEAR (kips)	24.7	21.0	85.0%

Design loads from: CCIsites Doc #2208511
EEI Foundation Drawing

Although the shear capacity is at 85.0%, the moment reaction is the governing criteria for a monopole drilled pier foundation. Therefore, the overall capacity for this foundation is 79.8%.

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

Site Data

BU#: *881541*
Site Name: *Rogers Property*
App #: *84897, Rev. 1*

Connection Type:	*Butt*

Reactions		
Moment:	2043	ft-kips
Axial:	28	kips
Shear:	21	kips

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	57	in

Plate Data		
Diam:	63	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	9.62	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Both	
Groove Depth:	0.4375	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	1	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	48.5	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	105.8 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	54.3% **Pass**	Fty*ASIF

Base Plate Results

	Flexural Check	
Base Plate Stress:	44.3 ksi	Rigid
Allowable Plate Stress:	60.0 ksi	Service ASD
Base Plate Stress Ratio:	73.9% **Pass**	0.75*Fy*ASIF
		Y.L. Length: 29.95

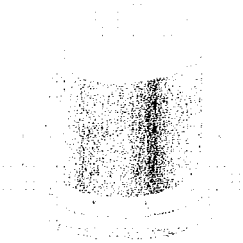
n/a

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