

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

May 3, 2010

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

RE: **EM-VER-033-100324-** Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 201 Main Street, Cromwell, Connecticut.

Dear Attorney Baldwin:

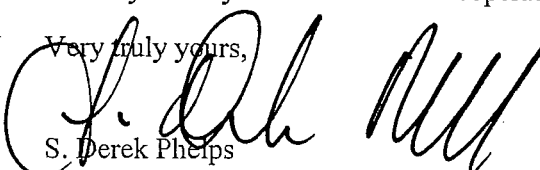
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated March 24, 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
Executive Director

SDP/MP/laf

c: The Honorable John M. Flanders, First Selectman, Town of Cromwell
Frederic Curtin, Zoning Enforcement Officer, Town of Cromwell
American Tower Corporation

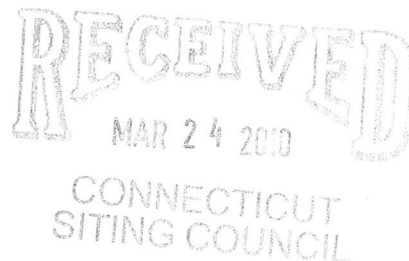
280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

ORIGINAL

March 24, 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
201 Main Street, Cromwell, Connecticut**

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 105-foot level on the existing 125-foot tower at the above-referenced address. The tower is owned by Crown Castle and is shared by multiple wireless carriers. The Council approved Cellco’s use of the existing facility in 2001 through its approval of TS-VER-033-010326. Cellco now intends to modify its installation by replacing six (6) of its cellular antennas with four (4) model DB846F65ZAXY cellular antennas; and two (2) model DB844G65ZAXY cellular antennas, all at the same 105-foot level on the tower. Attached behind Tab 1 are the specifications for the new antennas.



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www.rc.com

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 John M. Flanders, First Selectman for the Town of Cromwell. A copy of this letter is being sent to S & S Properties, Inc., 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 height of the existing tower. Cellco’s antennas will be located at the 105-foot level on the existing 125-foot tower.

ROBINSON & COLE_{LLP}

S. Derek Phelps
March 24, 2010
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2. The proposed modifications will not involve any modifications to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

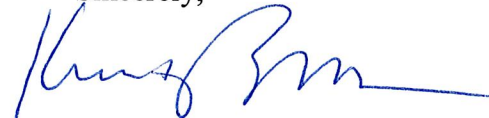
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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:

John M. Flanders, Cromwell First Selectman
S & S Properties, Inc.
Sandy M. Carter



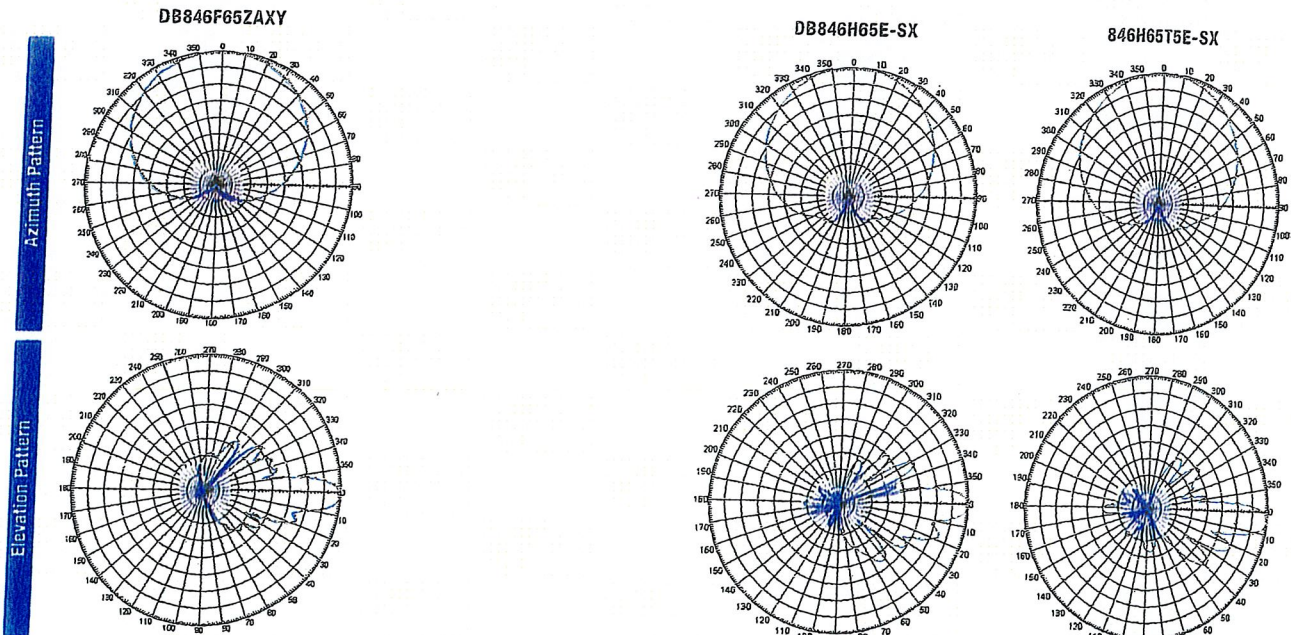
Vertically Polarized Directed Dipole® Panel Antennas

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 (ft²/m²)	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.



Scale: 10° radials, 5 dB per division

Product Specifications



DB844G65ZAXY

Directed Dipole™ Antenna, 806–960 MHz, 65° horizontal beamwidth, fixed electrical tilt



- Excellent azimuth roll-off, reducing sector-to-sector interference and soft hand-offs
- Air dielectric feed system with no screws, rivets, solder, or welding in dipole feed point
- Low profile for ease of zoning approval
- Excellent upper sidelobe suppression

CHARACTERISTICS

General Specifications

Antenna Type	Directed Dipole™
Brand	Directed Dipole™
Operating Frequency Band	806 – 960 MHz

Electrical Specifications

Frequency Band, MHz	806–896	870–960
Beamwidth, Horizontal, degrees	65	65
Gain, dBd	13.5	13.8
Gain, dBi	15.6	15.9
Beamwidth, Vertical, degrees	15.0	15.0
Beam Tilt, degrees	0	0
Upper Sidelobe Suppression (USLS), typical, dB	15	15
Null Fill, dB	20	20
Front-to-Back Ratio at 180°, dB	40	40
VSWR Return Loss, db	1.33:1 17.0	1.33:1 17.0
Intermodulation Products, 3rd Order, 2 x 20 W, dBc	-150	-150
Input Power, maximum, watts	500	500
Polarization	Vertical	Vertical
Impedance, ohms	50	50
Lightning Protection	dc Ground	dc Ground

Product Specifications

DB844G65ZAXY



Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Back
Connector Quantity	1
Wind Loading, maximum	235.8 N @ 100 mph 53.0 lbf @ 100 mph
Wind Speed, maximum	241.4 km/h 150.0 mph

Dimensions

Depth	203.2 mm 8.0 in
Length	1219.2 mm 48.0 in
Width	254.0 mm 10.0 in
Net Weight	5.4 kg 12.0 lb

Regulatory Compliance/Certifications

Agency

RoHS 2002/95/EC
China RoHS SJ/T 11364-2006

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)



INCLUDED PRODUCTS

DB5083

Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

DB380

Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

DB382NS

Side Offset Bracket for 4.5 in (114.3 mm) OD round members

www.commscope.com/andrew

Join the Evolution The graphic for "Join the Evolution" consists of four blue circles of increasing size from left to right.

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See www.commscope.com/andrew for the most current information.

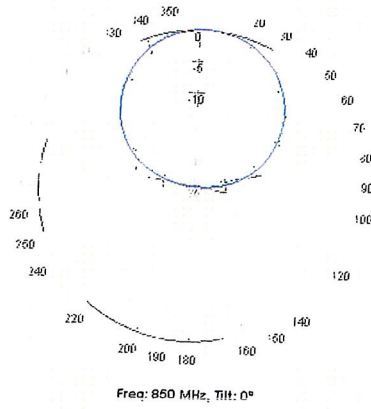
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12/18/2009

Product Specifications

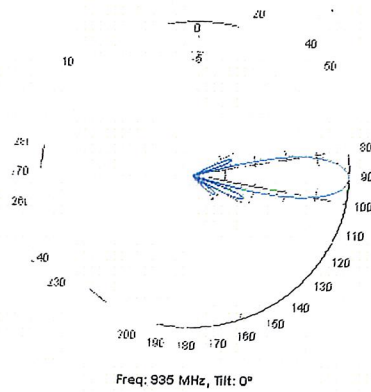
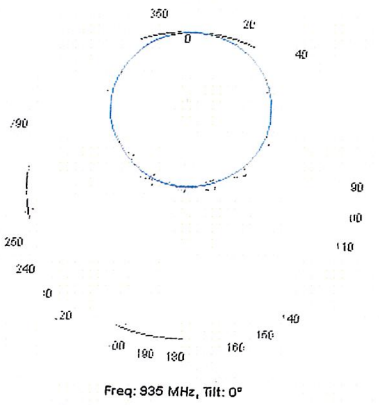
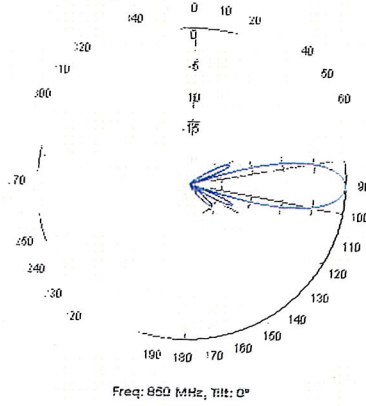
DB844G65ZAXY



Horizontal Pattern



Vertical Pattern



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Join the Evolution

Site Name: Cromwell SE Tower Height: Verizon @ 105Ft.		General	Power	Density						
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total		
*Sprint			125	0.0309	1962.5	1.0000	3.09%			
*Pocket	3	631	85	0.0942	2130	1.0000	9.42%			
*Nextel	12	100	95	0.0478	851	0.5673	8.43%			
*Cingular GSM	3	655	115	0.0534	1900	1.0000	5.34%			
*Cingular UMTS	1	500	115	0.0136	880	0.5867	2.32%			
Verizon	3	312	105	0.0305	970	1.0000	3.05%			
Verizon	9	405	105	0.1189	869	0.5793	20.52%			52.17%
* Source: Siting Council										

Date: February 17, 2010

Vanessa Davis
Crown Castle USA Inc.
12725 Morris Road Extension, Suite 400
Alpharetta, GA 30004



Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Co-Locate

Crown Castle Designation:
Crown Castle BU Number: 876364
Crown Castle Site Name: CROMWELL / FIRST LINE EMERGENC
Crown Castle JDE Job Number: 130243
Crown Castle Work Order Number: 317995

Engineering Firm Designation: Crown Castle USA Project Number: 317995

Site Data: 201 Main St., CROMWELL, Middlesex County, CT
Latitude 41° 35' 0.11", Longitude -72° 38' 59.14"
124.771 Foot - Monopole Tower

Dear Vanessa Davis,

Crown Castle USA 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 317995, in accordance with application 94306, revision 0.

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:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**

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

The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a wind speed of 85 mph fastest mile.

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

We at Crown Castle USA 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: Levi Marcus, E.I.T. / MFB

Respectfully submitted by:

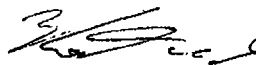


Kenton C. Weber, P.E.
Engineering Supervisor

2/17/10

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1) INTRODUCTION

This tower is a 125 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in February of 2002. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F. Modifications were designed by Semaan Engineering in December of 2004 and by Vertical Structures in October of 2007.

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, 37.6 mph with 0.75 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
105	105	4	andrew	DB846F65ZAXY w/ Mount Pipe	-	-	-
		2	decibel	DB844G65ZAXY 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
125	125	6	decibel	DB980H90A-M w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Platform Mount [LP 712-1]	-	-	-
		3	powerwave tech	7770.00 w/ Mount Pipe	-	-	2
115	115	6	powerwave tech	LGP21401	-	-	2
		1	tower mounts	Pipe Mount [PM 501-3]	6	1-1/4	1
		2	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD	-	-	1
105	105	6	decibel	DB844H90 w/ Mount Pipe	-	-	3
		6	decibel	DB948F85T2E-M w/ Mount Pipe	12	1-5/8	1
		1	tower mounts	Platform Mount [LP 712-1]	-	-	-
95	95	12	decibel	DB844H65E-XY w/ Mount Pipe	12	1-5/8	1
		1	tower mounts	Platform Mount [LP 304-1]	-	-	-
85	85	3	kathrein	742 213 w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 501-3]	-	-	-

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment
- 3) Equipment to be Removed; Coax to be Reused

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)
125	125	6	decibel	DB980H65	-	-
		3	decibel	DB980H90	-	-
115	115	6	allgon	7250	-	-
105	105	12	decibel	DB844	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E.	1532312	CCISITES
4-POST-MODIFICATION INSPECTION	Vertical Structures	1956332	CCISITES
4-POST-MODIFICATION INSPECTION	Vertical Structures	2182292	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI	1613909	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI	2068958	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Semaan	2055765	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Vertical Structures	2296089	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 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	124.771 - 84.9115	Pole	TP27.0855x18.5x0.1875	1	-6.80	806.30	56.1	Pass	
L2	84.9115 - 40.3411	Pole	TP36.1854x25.8736x0.25	2	-12.78	1438.29	89.3	Pass	
L3	40.3411 - 0	Pole	TP44.25x34.6164x0.3125	3	-21.54	2265.62	85.8	Pass	
							Summary		
							Pole (L2)	89.3	Pass
							RATING =	89.3	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	66.3	Pass
1	Base Plate	0	65.2	Pass
1	Base Foundation	0	86.2	Pass
Structure Rating (max from all components) =				89.3%

Notes:

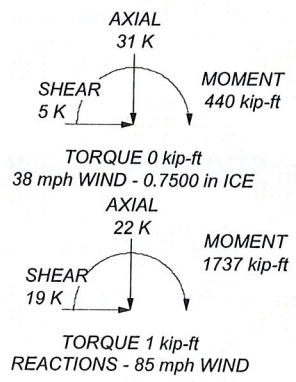
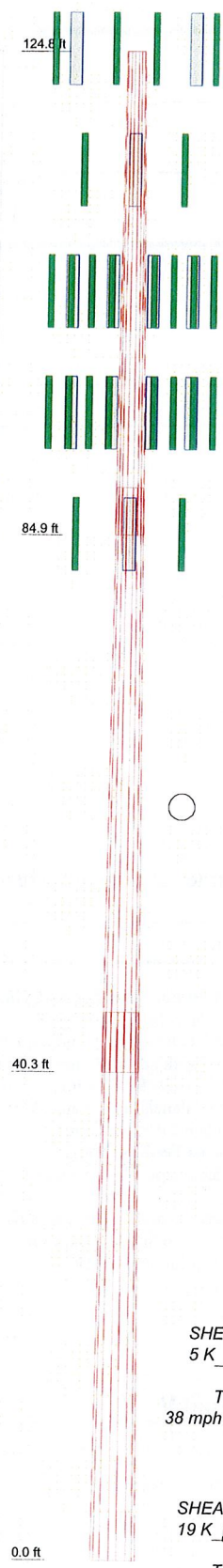
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

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)	39.86	48.46	45.36
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.3125
Lap Splice (ft)		3.89	5.02
Top Dia (in)	18.5000	25.8736	34.6164
Bot Dia (in)	27.0855	36.1854	44.2500
Grade		A572-65	
Weight (K)	1.8	4.0	6.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90A-M w/ Mount Pipe	125	(2) DB844G65ZAXY w/ Mount Pipe	105
(2) DB980H90A-M w/ Mount Pipe	125	(2) DB948F85T2E-M w/ Mount Pipe	105
(2) DB980H90A-M w/ Mount Pipe	125	(2) DB846F65ZAXY w/ Mount Pipe	105
Platform Mount [LP 712-1]	125	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	105
7770.00 w/ Mount Pipe	115		
(2) LGP21401	115	Platform Mount [LP 712-1]	105
7770.00 w/ Mount Pipe	115	(4) DB844H65E-XY w/ Mount Pipe	95
(2) LGP21401	115	(4) DB844H65E-XY w/ Mount Pipe	95
7770.00 w/ Mount Pipe	115	(4) DB844H65E-XY w/ Mount Pipe	95
(2) LGP21401	115	Platform Mount [LP 304-1]	95
Pipe Mount [PM 501-3]	115	742 213 w/ Mount Pipe	85
(2) DB948F85T2E-M w/ Mount Pipe	105	742 213 w/ Mount Pipe	85
(2) DB846F65ZAXY w/ Mount Pipe	105	742 213 w/ Mount Pipe	85
(2) DB948F85T2E-M w/ Mount Pipe	105	Pipe Mount [PM 501-3]	85

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 89.3%

<p>CROWN CASTLE Shaping the Wireless World</p>	Crown Castle USA, Inc. 2000 Corporate Drive Canonsburg, PA Phone: (724) 416-2866 FAX: (724) 416-4866		Job: BU#876364
	Project:	Client: Crown Castle USA	Drawn by: Matt Branagan
	Code: TIA/EIA-222-F	Date: 02/17/10	App'd:
	Path:	Scale: NTS	Dwg No. E-1
	<small>R:\USA Models - Letters\Work Area\1 Marcus\876364\876364 LC7\876364 LC7.dwg</small>		

RISATower Crown Castle USA 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-2254	Job BU#876364	Page 1 of 12
	Project	Date 17:21:36 02/16/10
	Client Crown Castle USA	Designed by LMarcus

Tower Input Data

There is a pole section.

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

The following design criteria apply:

Tower is located in Middlesex County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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

Options

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

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	124.77-84.91	39.86	3.89	18	18.5000	27.0855	0.1875	0.7500	A572-65 (65 ksi)
L2	84.91-40.34	48.46	5.02	18	25.8736	36.1854	0.2500	1.0000	A572-65 (65 ksi)
L3	40.34-0.00	45.36		18	34.6164	44.2500	0.3125	1.2500	A572-65 (65 ksi)

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Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	18.7854	10.8982	461.7305	6.5009	9.3980	49.1307	924.0685	5.4501	2.9260	15.605
	27.5033	16.0077	1463.2065	9.5488	13.7594	106.3421	2928.3383	8.0054	4.4370	23.664
L2	27.1123	20.3323	1686.5721	9.0964	13.1438	128.3170	3375.3635	10.1681	4.1138	16.455
	36.7436	28.5147	4652.1299	12.7571	18.3822	253.0782	9310.3812	14.2601	5.9286	23.715
L3	36.2336	34.0252	5058.5228	12.1779	17.5851	287.6593	10123.7017	17.0158	5.5425	17.736
	44.9326	43.5805	10629.1961	15.5978	22.4790	472.8500	21272.3785	21.7944	7.2380	23.162

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 124.77-84.91				1	1	1		
L2 84.91-40.34				1	1	1		
L3 40.34-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C _{AA}	Weight
				ft		ft ² /ft	plf
LDF7-50A(1-5/8")	B	No	Inside Pole	124.77 - 0.00	6	No Ice	0.82
						1/2" Ice	0.82
						1" Ice	0.82
						2" Ice	0.82
						4" Ice	0.82
						No Ice	0.82
LDF6-50A(1-1/4")	A	No	Inside Pole	115.00 - 0.00	12	No Ice	0.66
						1/2" Ice	0.66
						1" Ice	0.66
						2" Ice	0.66
						4" Ice	0.66
						No Ice	0.66
LDF7-50A(1-5/8")	B	No	Inside Pole	105.00 - 0.00	12	No Ice	0.82
						1/2" Ice	0.82
						1" Ice	0.82
						2" Ice	0.82
						4" Ice	0.82
						No Ice	0.82
LDF7-50A(1-5/8")	B	No	Inside Pole	95.00 - 0.00	12	No Ice	0.82
						1/2" Ice	0.82
						1" Ice	0.82
						2" Ice	0.82
						4" Ice	0.82
						No Ice	0.82
AVA7-50(1-5/8")	C	No	Inside Pole	85.00 - 0.00	6	No Ice	0.72
						1/2" Ice	0.72
						1" Ice	0.72
						2" Ice	0.72
						4" Ice	0.72
						No Ice	0.72

Feed Line/Linear Appurtenances Section Areas

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Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	124.77-84.91	A	0.000	0.000	0.000	0.000	0.24
		B	0.000	0.000	0.000	0.000	0.49
		C	0.000	0.000	0.000	0.000	0.00
L2	84.91-40.34	A	0.000	0.000	0.000	0.000	0.35
		B	0.000	0.000	0.000	0.000	1.10
		C	0.000	0.000	0.000	0.000	0.19
L3	40.34-0.00	A	0.000	0.000	0.000	0.000	0.32
		B	0.000	0.000	0.000	0.000	0.99
		C	0.000	0.000	0.000	0.000	0.17

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	124.77-84.91	A	0.861	0.000	0.000	0.000	0.000	0.24
		B		0.000	0.000	0.000	0.000	0.49
		C		0.000	0.000	0.000	0.000	0.00
L2	84.91-40.34	A	0.809	0.000	0.000	0.000	0.000	0.35
		B		0.000	0.000	0.000	0.000	1.10
		C		0.000	0.000	0.000	0.000	0.19
L3	40.34-0.00	A	0.750	0.000	0.000	0.000	0.000	0.32
		B		0.000	0.000	0.000	0.000	0.99
		C		0.000	0.000	0.000	0.000	0.17

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	124.77-84.91	0.0000	0.0000	0.0000	0.0000
L2	84.91-40.34	0.0000	0.0000	0.0000	0.0000
L3	40.34-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C_{AA} Front ft ²	C_{AA} Side ft ²	Weight K	
(2) DB980H90A-M w/ Mount Pipe	A	From Leg	4.00	0.0000	125.00	No Ice	4.04	3.62	0.03
						1/2" Ice	4.50	4.48	0.06
						1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
(2) DB980H90A-M w/ Mount	B	From Leg	4.00	0.0000	125.00	4" Ice	8.05	10.00	0.55
						No Ice	4.04	3.62	0.03

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Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral	Vert					
Pipe			ft	ft	ft					
			0.00				1/2" Ice	4.50	4.48	0.06
			0.00				1" Ice	4.95	5.22	0.11
							2" Ice	5.87	6.74	0.22
							4" Ice	8.05	10.00	0.55
(2) DB980H90A-M w/ Mount Pipe	C	From Leg	4.00	0.0000	125.00		No Ice	4.04	3.62	0.03
			0.00				1/2" Ice	4.50	4.48	0.06
			0.00				1" Ice	4.95	5.22	0.11
							2" Ice	5.87	6.74	0.22
							4" Ice	8.05	10.00	0.55
Platform Mount [LP 712-1]	C	None		0.0000	125.00		No Ice	24.53	24.53	1.34
							1/2" Ice	29.94	29.94	1.65
							1" Ice	35.35	35.35	1.96
							2" Ice	46.17	46.17	2.58
							4" Ice	67.81	67.81	3.82

7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	115.00		No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			0.00				1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
(2) LGP21401	A	From Leg	4.00	0.0000	115.00		No Ice	1.29	0.23	0.01
			0.00				1/2" Ice	1.45	0.31	0.02
			0.00				1" Ice	1.61	0.40	0.03
							2" Ice	1.97	0.61	0.05
							4" Ice	2.79	1.12	0.14
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	115.00		No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			0.00				1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
(2) LGP21401	B	From Leg	4.00	0.0000	115.00		No Ice	1.29	0.23	0.01
			0.00				1/2" Ice	1.45	0.31	0.02
			0.00				1" Ice	1.61	0.40	0.03
							2" Ice	1.97	0.61	0.05
							4" Ice	2.79	1.12	0.14
7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	115.00		No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			0.00				1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
(2) LGP21401	C	From Leg	4.00	0.0000	115.00		No Ice	1.29	0.23	0.01
			0.00				1/2" Ice	1.45	0.31	0.02
			0.00				1" Ice	1.61	0.40	0.03
							2" Ice	1.97	0.61	0.05
							4" Ice	2.79	1.12	0.14
Pipe Mount [PM 501-3]	C	None		0.0000	115.00		No Ice	5.78	5.78	0.16
							1/2" Ice	7.37	7.37	0.18
							1" Ice	8.96	8.96	0.20
							2" Ice	12.14	12.14	0.24
							4" Ice	18.50	18.50	0.32

(2) DB948F85T2E-M w/ Mount Pipe	A	From Leg	4.00	0.0000	105.00		No Ice	2.13	4.45	0.03
			0.00				1/2" Ice	2.49	5.12	0.06
			0.00				1" Ice	2.86	5.80	0.10
							2" Ice	3.62	7.22	0.19
							4" Ice	5.36	10.31	0.49
(2) DB846F65ZAXY w/	A	From Leg	4.00	0.0000	105.00		No Ice	7.27	7.82	0.05

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
Mount Pipe			0.00						
			0.00			1/2" Ice	7.88	9.01	0.11
						1" Ice	8.48	9.91	0.19
						2" Ice	9.72	11.81	0.37
						4" Ice	12.33	15.98	0.87
(2) DB948F85T2E-M w/ Mount Pipe	B	From Leg	4.00	0.0000	105.00	No Ice	2.13	4.45	0.03
			0.00			1/2" Ice	2.49	5.12	0.06
			0.00			1" Ice	2.86	5.80	0.10
						2" Ice	3.62	7.22	0.19
						4" Ice	5.36	10.31	0.49
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00	0.0000	105.00	No Ice	4.90	4.92	0.03
			0.00			1/2" Ice	5.35	5.60	0.08
			0.00			1" Ice	5.80	6.28	0.13
						2" Ice	6.73	7.71	0.26
						4" Ice	8.73	10.83	0.62
(2) DB948F85T2E-M w/ Mount Pipe	C	From Leg	4.00	0.0000	105.00	No Ice	2.13	4.45	0.03
			0.00			1/2" Ice	2.49	5.12	0.06
			0.00			1" Ice	2.86	5.80	0.10
						2" Ice	3.62	7.22	0.19
						4" Ice	5.36	10.31	0.49
(2) DB846F65ZAXY w/ Mount Pipe	C	From Leg	4.00	0.0000	105.00	No Ice	7.27	7.82	0.05
			0.00			1/2" Ice	7.88	9.01	0.11
			0.00			1" Ice	8.48	9.91	0.19
						2" Ice	9.72	11.81	0.37
						4" Ice	12.33	15.98	0.87
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	C	From Leg	4.00	0.0000	105.00	No Ice	1.55	0.81	0.03
			0.00			1/2" Ice	1.72	0.94	0.04
			0.00			1" Ice	1.90	1.09	0.05
						2" Ice	2.28	1.40	0.09
						4" Ice	3.14	2.12	0.19
Platform Mount [LP 712-1]	C	None		0.0000	105.00	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82

(4) DB844H65E-XY w/ Mount Pipe	A	From Leg	4.00	0.0000	95.00	No Ice	6.89	5.15	0.04
			0.00			1/2" Ice	10.55	5.83	0.10
			0.00			1" Ice	11.07	6.52	0.18
						2" Ice	12.15	7.96	0.35
						4" Ice	14.44	11.09	0.81
(4) DB844H65E-XY w/ Mount Pipe	B	From Leg	4.00	0.0000	95.00	No Ice	6.89	5.15	0.04
			0.00			1/2" Ice	10.55	5.83	0.10
			0.00			1" Ice	11.07	6.52	0.18
						2" Ice	12.15	7.96	0.35
						4" Ice	14.44	11.09	0.81
(4) DB844H65E-XY w/ Mount Pipe	C	From Leg	4.00	0.0000	95.00	No Ice	6.89	5.15	0.04
			0.00			1/2" Ice	10.55	5.83	0.10
			0.00			1" Ice	11.07	6.52	0.18
						2" Ice	12.15	7.96	0.35
						4" Ice	14.44	11.09	0.81
Platform Mount [LP 304-1]	C	None		0.0000	95.00	No Ice	17.46	17.46	1.35
						1/2" Ice	22.44	22.44	1.62
						1" Ice	27.42	27.42	1.90
						2" Ice	37.38	37.38	2.45
						4" Ice	57.30	57.30	3.55

742 213 w/ Mount Pipe	A	From Leg	4.00	0.0000	85.00	No Ice	5.37	4.62	0.05

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			Horz Lateral ft	Vert ft					
				0.00					
				0.00		1/2" Ice	5.95	6.00	0.09
						1" Ice	6.50	6.98	0.14
						2" Ice	7.61	8.85	0.28
						4" Ice	9.93	12.79	0.68
742 213 w/ Mount Pipe	B	From Leg	4.00	0.0000	85.00	No Ice	5.37	4.62	0.05
			0.00			1/2" Ice	5.95	6.00	0.09
			0.00			1" Ice	6.50	6.98	0.14
						2" Ice	7.61	8.85	0.28
						4" Ice	9.93	12.79	0.68
742 213 w/ Mount Pipe	C	From Leg	4.00	0.0000	85.00	No Ice	5.37	4.62	0.05
			0.00			1/2" Ice	5.95	6.00	0.09
			0.00			1" Ice	6.50	6.98	0.14
						2" Ice	7.61	8.85	0.28
						4" Ice	9.93	12.79	0.68
Pipe Mount [PM 501-3]	C	None		0.0000	85.00	No Ice	5.78	5.78	0.16
						1/2" Ice	7.37	7.37	0.18
						1" Ice	8.96	8.96	0.20
						2" Ice	12.14	12.14	0.24
						4" Ice	18.50	18.50	0.32

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

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Comb. No.	Description
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	Force	Major Axis Moment	Minor Axis Moment
				Comb.	K	kip-ft	kip-ft
L1	124.771 - 84.9115	Pole	Max Tension	14	0.00	-0.00	-0.00
			Max. Compression	14	-13.38	0.87	0.01
			Max. Mx	11	-6.80	238.55	-0.20
			Max. My	8	-6.81	0.50	-237.23
			Max. Vy	11	-13.39	238.55	-0.20
			Max. Vx	8	13.33	0.50	-237.23
			Max. Torque	3			1.40
L2	84.9115 - 40.3411	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-20.61	0.87	0.01
			Max. Mx	11	-12.78	912.32	-0.54
			Max. My	8	-12.79	0.92	-908.50
			Max. Vy	11	-16.89	912.32	-0.54
			Max. Vx	8	16.83	0.92	-908.50
			Max. Torque	3			1.40
L3	40.3411 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.61	0.87	0.01
			Max. Mx	11	-21.54	1737.34	-0.90
			Max. My	8	-21.54	1.29	-1730.96
			Max. Vy	11	-19.48	1737.34	-0.90
			Max. Vx	8	19.42	1.29	-1730.96
			Max. Torque	3			1.40

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	30.61	4.68	0.00
	Max. H _x	11	21.56	19.46	-0.01
	Max. H _z	2	21.56	-0.01	19.40
	Max. M _x	2	1730.85	-0.01	19.40
	Max. M _z	5	1736.44	-19.46	0.01
	Max. Torsion	3	1.39	-9.74	16.81
	Min. Vert	1	21.56	0.00	0.00
	Min. H _x	5	21.56	-19.46	0.01
	Min. H _z	8	21.56	0.01	-19.40

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Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M _x	8	-1730.96	0.01	-19.40
	Min. M _z	11	-1737.34	19.46	-0.01
	Min. Torsion	9	-1.39	9.74	-16.81

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	21.56	0.00	0.00	0.05	0.43	0.00
Dead+Wind 0 deg - No Ice	21.56	0.01	-19.40	-1730.85	-0.40	-1.35
Dead+Wind 30 deg - No Ice	21.56	9.74	-16.81	-1499.37	-868.74	-1.39
Dead+Wind 60 deg - No Ice	21.56	16.85	-9.71	-866.12	-1504.17	-1.06
Dead+Wind 90 deg - No Ice	21.56	19.46	-0.01	-0.79	-1736.44	-0.45
Dead+Wind 120 deg - No Ice	21.56	16.85	9.69	864.77	-1503.33	0.29
Dead+Wind 150 deg - No Ice	21.56	9.72	16.80	1498.63	-867.28	0.95
Dead+Wind 180 deg - No Ice	21.56	-0.01	19.40	1730.96	1.29	1.35
Dead+Wind 210 deg - No Ice	21.56	-9.74	16.81	1499.48	869.63	1.39
Dead+Wind 240 deg - No Ice	21.56	-16.85	9.71	866.23	1505.07	1.06
Dead+Wind 270 deg - No Ice	21.56	-19.46	0.01	0.90	1737.34	0.45
Dead+Wind 300 deg - No Ice	21.56	-16.85	-9.69	-864.66	1504.23	-0.29
Dead+Wind 330 deg - No Ice	21.56	-9.72	-16.80	-1498.53	868.17	-0.95
Dead+Ice+Temp	30.61	-0.00	0.00	-0.01	0.87	0.00
Dead+Wind 0 deg+Ice+Temp	30.61	-0.00	-4.67	-437.76	1.03	-0.33
Dead+Wind 30 deg+Ice+Temp	30.61	2.34	-4.04	-379.06	-218.68	-0.34
Dead+Wind 60 deg+Ice+Temp	30.61	4.05	-2.33	-218.80	-379.54	-0.26
Dead+Wind 90 deg+Ice+Temp	30.61	4.68	0.00	0.09	-438.45	-0.11
Dead+Wind 120 deg+Ice+Temp	30.61	4.06	2.33	218.95	-379.64	0.07
Dead+Wind 150 deg+Ice+Temp	30.61	2.34	4.04	379.14	-218.85	0.23
Dead+Wind 180 deg+Ice+Temp	30.61	0.00	4.67	437.74	0.82	0.33
Dead+Wind 210 deg+Ice+Temp	30.61	-2.34	4.04	379.04	220.53	0.34
Dead+Wind 240 deg+Ice+Temp	30.61	-4.05	2.33	218.78	381.39	0.26
Dead+Wind 270 deg+Ice+Temp	30.61	-4.68	-0.00	-0.11	440.31	0.11
Dead+Wind 300 deg+Ice+Temp	30.61	-4.06	-2.33	-218.98	381.49	-0.07
Dead+Wind 330 deg+Ice+Temp	30.61	-2.34	-4.04	-379.17	220.70	-0.23
Dead+Wind 0 deg - Service	21.56	0.00	-6.71	-599.57	0.16	-0.47
Dead+Wind 30 deg - Service	21.56	3.37	-5.82	-519.38	-300.65	-0.49
Dead+Wind 60 deg - Service	21.56	5.83	-3.36	-300.01	-520.78	-0.37
Dead+Wind 90 deg - Service	21.56	6.73	-0.00	-0.24	-601.25	-0.16
Dead+Wind 120 deg - Service	21.56	5.83	3.35	299.61	-520.49	0.10
Dead+Wind 150 deg - Service	21.56	3.36	5.81	519.19	-300.14	0.33
Dead+Wind 180 deg - Service	21.56	-0.00	6.71	599.67	0.75	0.47
Dead+Wind 210 deg - Service	21.56	-3.37	5.82	519.49	301.56	0.49
Dead+Wind 240 deg - Service	21.56	-5.83	3.36	300.12	521.69	0.37
Dead+Wind 270 deg - Service	21.56	-6.73	0.00	0.35	602.16	0.16
Dead+Wind 300 deg - Service	21.56	-5.83	-3.35	-299.50	521.40	-0.10
Dead+Wind 330 deg - Service	21.56	-3.36	-5.81	-519.09	301.05	-0.33

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-21.56	0.00	0.00	21.56	0.00	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
2	0.01	-21.56	-19.40	-0.01	21.56	19.40	0.000%
3	9.74	-21.56	-16.81	-9.74	21.56	16.81	0.000%
4	16.85	-21.56	-9.71	-16.85	21.56	9.71	0.000%
5	19.46	-21.56	-0.01	-19.46	21.56	0.01	0.000%
6	16.85	-21.56	9.69	-16.85	21.56	-9.69	0.000%
7	9.72	-21.56	16.80	-9.72	21.56	-16.80	0.000%
8	-0.01	-21.56	19.40	0.01	21.56	-19.40	0.000%
9	-9.74	-21.56	16.81	9.74	21.56	-16.81	0.000%
10	-16.85	-21.56	9.71	16.85	21.56	-9.71	0.000%
11	-19.46	-21.56	0.01	19.46	21.56	-0.01	0.000%
12	-16.85	-21.56	-9.69	16.85	21.56	9.69	0.000%
13	-9.72	-21.56	-16.80	9.72	21.56	16.80	0.000%
14	0.00	-30.61	0.00	0.00	30.61	0.00	0.000%
15	-0.00	-30.61	-4.67	0.00	30.61	4.67	0.000%
16	2.34	-30.61	-4.04	-2.34	30.61	4.04	0.000%
17	4.05	-30.61	-2.33	-4.05	30.61	2.33	0.000%
18	4.68	-30.61	0.00	-4.68	30.61	-0.00	0.000%
19	4.06	-30.61	2.33	-4.06	30.61	-2.33	0.000%
20	2.34	-30.61	4.04	-2.34	30.61	-4.04	0.000%
21	0.00	-30.61	4.67	-0.00	30.61	-4.67	0.000%
22	-2.34	-30.61	4.04	2.34	30.61	-4.04	0.000%
23	-4.05	-30.61	2.33	4.05	30.61	-2.33	0.000%
24	-4.68	-30.61	-0.00	4.68	30.61	0.00	0.000%
25	-4.06	-30.61	-2.33	4.06	30.61	2.33	0.000%
26	-2.34	-30.61	-4.04	2.34	30.61	4.04	0.000%
27	0.00	-21.56	-6.71	-0.00	21.56	6.71	0.000%
28	3.37	-21.56	-5.82	-3.37	21.56	5.82	0.000%
29	5.83	-21.56	-3.36	-5.83	21.56	3.36	0.000%
30	6.73	-21.56	-0.00	-6.73	21.56	0.00	0.000%
31	5.83	-21.56	3.35	-5.83	21.56	-3.35	0.000%
32	3.36	-21.56	5.81	-3.36	21.56	-5.81	0.000%
33	-0.00	-21.56	6.71	0.00	21.56	-6.71	0.000%
34	-3.37	-21.56	5.82	3.37	21.56	-5.82	0.000%
35	-5.83	-21.56	3.36	5.83	21.56	-3.36	0.000%
36	-6.73	-21.56	0.00	6.73	21.56	-0.00	0.000%
37	-5.83	-21.56	-3.35	5.83	21.56	3.35	0.000%
38	-3.36	-21.56	-5.81	3.36	21.56	5.81	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	0.00071958
3	Yes	5	0.00000001	0.00027548
4	Yes	5	0.00000001	0.00030208
5	Yes	4	0.00000001	0.00026532
6	Yes	5	0.00000001	0.00029236
7	Yes	5	0.00000001	0.00027917
8	Yes	4	0.00000001	0.00074024
9	Yes	5	0.00000001	0.00030642
10	Yes	5	0.00000001	0.00027914
11	Yes	4	0.00000001	0.00024615
12	Yes	5	0.00000001	0.00028643
13	Yes	5	0.00000001	0.00030029
14	Yes	4	0.00000001	0.00000001

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15	Yes	5	0.0000001	0.00007298
16	Yes	5	0.0000001	0.00009251
17	Yes	5	0.0000001	0.00009462
18	Yes	5	0.0000001	0.00007248
19	Yes	5	0.0000001	0.00009383
20	Yes	5	0.0000001	0.00009275
21	Yes	5	0.0000001	0.00007296
22	Yes	5	0.0000001	0.00009589
23	Yes	5	0.0000001	0.00009369
24	Yes	5	0.0000001	0.00007313
25	Yes	5	0.0000001	0.00009425
26	Yes	5	0.0000001	0.00009540
27	Yes	4	0.0000001	0.00013872
28	Yes	4	0.0000001	0.00052621
29	Yes	4	0.0000001	0.00064001
30	Yes	4	0.0000001	0.00005347
31	Yes	4	0.0000001	0.00059423
32	Yes	4	0.0000001	0.00053866
33	Yes	4	0.0000001	0.00014010
34	Yes	4	0.0000001	0.00066440
35	Yes	4	0.0000001	0.00054157
36	Yes	4	0.0000001	0.00005250
37	Yes	4	0.0000001	0.00056996
38	Yes	4	0.0000001	0.00063424

Maximum Tower Deflections - Service Wind

Section No.	Elevation <i>ft</i>	Horz. Deflection <i>in</i>	Gov. Load Comb.	Tilt <i>°</i>	Twist <i>°</i>
L1	124.771 - 84.9115	27.430	36	1.8347	0.0065
L2	88.7969 - 40.3411	14.311	36	1.5442	0.0038
L3	45.3646 - 0	3.611	36	0.7370	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation <i>ft</i>	Appurtenance	Gov. Load Comb.	Deflection <i>in</i>	Tilt <i>°</i>	Twist <i>°</i>	Radius of Curvature <i>ft</i>
125.00	(2) DB980H90A-M w/ Mount Pipe	36	27.430	1.8347	0.0065	27557
115.00	7770.00 w/ Mount Pipe	36	23.696	1.7889	0.0058	14101
105.00	(2) DB948F85T2E-M w/ Mount Pipe	36	19.960	1.7255	0.0050	6968
95.00	(4) DB844H65E-XY w/ Mount Pipe	36	16.397	1.6286	0.0043	4627
85.00	742 213 w/ Mount Pipe	36	13.093	1.4817	0.0035	3653

Maximum Tower Deflections - Design Wind

Section No.	Elevation <i>ft</i>	Horz. Deflection <i>in</i>	Gov. Load Comb.	Tilt <i>°</i>	Twist <i>°</i>
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Section No.	Elevation <i>ft</i>	Horz. Deflection <i>in</i>	Gov. Load Comb.	Tilt <i>°</i>	Twist <i>°</i>
L1	124.771 - 84.9115	78.961	11	5.2817	0.0186
L2	88.7969 - 40.3411	41.235	11	4.4485	0.0108
L3	45.3646 - 0	10.413	11	2.1252	0.0030

Critical Deflections and Radius of Curvature - Design Wind

Elevation <i>ft</i>	Appurtenance	Gov. Load Comb.	Deflection <i>in</i>	Tilt <i>°</i>	Twist <i>°</i>	Radius of Curvature <i>ft</i>
125.00	(2) DB980H90A-M w/ Mount Pipe	11	78.961	5.2817	0.0186	9742
115.00	7770.00 w/ Mount Pipe	11	68.228	5.1343	0.0165	4984
105.00	(2) DB948F85T2E-M w/ Mount Pipe	11	57.485	4.9441	0.0144	2461
95.00	(4) DB844H65E-XY w/ Mount Pipe	11	47.235	4.6740	0.0122	1632
85.00	742 213 w/ Mount Pipe	11	37.727	4.2843	0.0101	1286

Compression Checks

Pole Design Data

Section No.	Elevation <i>ft</i>	Size	L	\bar{L}_u	Kl/r	F_a	A	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	124.771 - 84.9115 (1)	TP27.0855x18.5x0.1875	39.86	0.00	0.0	39.000	15.5096	-6.80	604.88	0.011
L2	84.9115 - 40.3411 (2)	TP36.1854x25.8736x0.25	48.46	0.00	0.0	39.000	27.6665	-12.78	1078.99	0.012
L3	40.3411 - 0 (3)	TP44.25x34.6164x0.3125	45.36	0.00	0.0	39.000	43.5805	-21.54	1699.64	0.013

Pole Bending Design Data

Section No.	Elevation <i>ft</i>	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	124.771 - 84.9115 (1)	TP27.0855x18.5x0.1875	238.55	28.682	39.000	0.735	0.00	0.000	39.000	0.000
L2	84.9115 - 40.3411 (2)	TP36.1854x25.8736x0.25	912.33	45.962	39.000	1.179	0.00	0.000	39.000	0.000
L3	40.3411 - 0 (3)	TP44.25x34.6164x0.3125	1737.34	44.090	39.000	1.131	0.00	0.000	39.000	0.000

Pole Shear Design Data

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Section No.	Elevation <i>ft</i>	Size	Actual $\frac{V}{K}$	Actual $\frac{f_v}{ksi}$	Allow. $\frac{F_v}{ksi}$	Ratio $\frac{f_v}{F_v}$	Actual $\frac{T}{kip-ft}$	Actual $\frac{f_{vt}}{ksi}$	Allow. $\frac{F_{vt}}{ksi}$	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	124.771 - 84.9115 (1)	TP27.0855x18.5x0.1875	13.39	0.863	26.000	0.066	0.45	0.026	26.000	0.001
L2	84.9115 - 40.3411 (2)	TP36.1854x25.8736x0.25	16.89	0.610	26.000	0.047	0.45	0.011	26.000	0.000
L3	40.3411 - 0 (3)	TP44.25x34.6164x0.3125	19.48	0.447	26.000	0.034	0.45	0.006	26.000	0.000

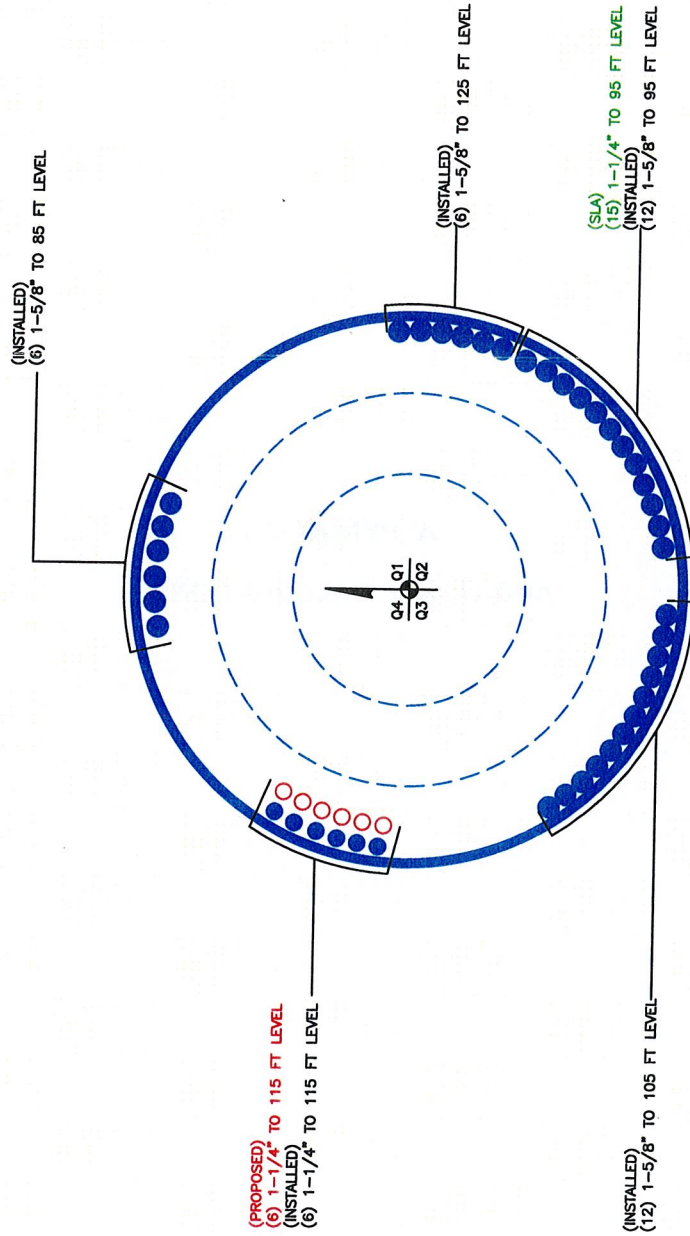
Pole Interaction Design Data

Section No.	Elevation <i>ft</i>	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	124.771 - 84.9115 (1)	0.011	0.735	0.000	0.066	0.001	0.748	1.333	H1-3+VT ✓
L2	84.9115 - 40.3411 (2)	0.012	1.179	0.000	0.047	0.000	1.191	1.333	H1-3+VT ✓
L3	40.3411 - 0 (3)	0.013	1.131	0.000	0.034	0.000	1.143	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation <i>ft</i>	Component Type	Size	Critical Element	P $\frac{K}{K}$	SF*P _{allow} $\frac{K}{K}$	% Capacity	Pass Fail	
L1	124.771 - 84.9115	Pole	TP27.0855x18.5x0.1875	1	-6.80	806.30	56.1	Pass	
L2	84.9115 - 40.3411	Pole	TP36.1854x25.8736x0.25	2	-12.78	1438.29	89.3	Pass	
L3	40.3411 - 0	Pole	TP44.25x34.6164x0.3125	3	-21.54	2265.62	85.8	Pass	
							Summary		
							Pole (L2)	89.3	Pass
							RATING =	89.3	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: 876364
Site Name: CROMWELL / FIRST LINE
App #: 94306
Pole Manufacturer: Other

Reactions		
Moment:	1737	ft-kips
Axial:	22	kips
Shear:	19	kips

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	53	in

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

Anchor Rod Results
 Maximum Rod Tension: 129.3 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 66.3% **Pass**

Stiffened
Service, ASD
Fty*ASIF

Plate Data		
Diam:	59	in
Thick:	1.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.70	in

Base Plate Results
 Base Plate Stress: 39.1 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 65.2% **Pass**

Flexural Check

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

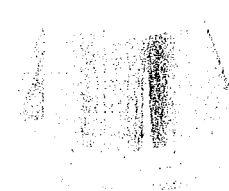
Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.625	in
Fillet V. Weld:	0.375	in
Width:	7	in
Height:	22	in
Thick:	0.75	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Stiffener Results
 Horizontal Weld : 57.8% **Pass**
 Vertical Weld: 30.8% **Pass**
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: 11.1% **Pass**
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: 49.5% **Pass**
 Plate Comp. (AISC Bracket): 50.8% **Pass**

Pole Results
 Pole Punching Shear Check: 9.6% **Pass**

Pole Data		
Diam:	44.25	in
Thick:	0.3125	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	

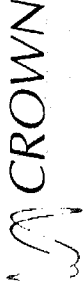


* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

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

Monopole Pier and Pad Foundation

BU #: 876364
 Site Name: CROMWELL / FIRST L
 App. Number: 94306



Design Reactions		
Shear, S:	20	kips
Moment, M:	1737	ft-kips
Tower Height, H:	125	ft
Tower Weight, WT:	22	kips
Base Diameter, BD:	3.683	ft

Foundation Dimensions		
Depth, D:	5	ft
Pad Width, W:	24	ft
Neglected Depth, N:	3.5	ft
Thickness, T:	3.00	ft
Pier Diameter, Pd:	6.00	ft
Ext. Above Grade, E:	1.00	ft
Clear Cover, Cc:	3.0	in

Soil Properties		
Soil Unit Weight, γ :	0.062	kcf
Bearing Capacity, Bc:	4.0	kcf
Angle of Friction, Φ :	30	deg
Cohesion, Co:	0.000	kcf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ :	0.60	

Material Properties		
Rebar Yield Strength, Fy:	60000	psi
Concrete Strength, Fc:	3000	psi
Concrete Unit Weight, γ_c :	0.088	kcf
Seismic Zone, z:	1	

Rebar Properties		
Pier Rebar Size, Sp:	8	
Pier Rebar Quantity, mp:	24	26
Pad Rebar Size, Spad:	8	
Pad Rebar Quantity, mpad:	30	14
Pier Tie Size, St:	4	3
Tie Quantity, mt:	4	5

Design Checks					
Req'd Pier Diam. (ft)	6	Demand/ Limits	5.183	Check	OK
Overturning (ft-kips)	2154.51	Capacity/ Availability	1857.00	OK	OK
Shear Capacity (kips)	80.08		20.00	OK	OK
Bearing (ksf)	4.00		1.47	OK	OK
Pad Shear - 1-way (kips)	1025.34		308.36	OK	OK
Pad Shear - 2-way (kips)	1610.60		568.11	OK	OK
Pier Rebar Area (in^2)	18.96		25.92	Adequate	OK
Pad Rebar Area (in^2)	23.70		10.33	OK	OK
Pier Moment Capacity (k-ft)	2604.47		1797.00	OK	OK
Pier Bar Spacing (ft)	7.64		18 > s > 2	OK	OK
Pad Bar Spacing (ft)	8.69		18 > s > 2	OK	OK
Pier Development Length (ft)	33		45.87	OK	OK
Pad Development Length (ft)	141.00		15.34	OK	OK
Hook Length (ft)	108.00		16.00	OK	OK

Modification Checks					
Sleeve Rebar Area (in^2):	17.6	Capacity/ Availability	90.48	Check	OK
Sleeve Moment Capacity (k-ft):	0.00		1797.00	OK	OK
Sleeve Rebar Spacing (ft):	12.30		18 > s > 2	OK	OK
Sleeve Tie Spacing (ft):	5.14		9 > s > 4.5	OK	OK
Minimum Extra Thickness (ft):	0		0	Not Used	Not Used
Pad Rebar Area-short (in^2):	0.44		0.00	Not Used	Not Used
Pad Rebar Area-long (in^2):	0.44		0.00	Not Used	Not Used
Pad Rebar Spacing-short (ft):	93.5		18 > s > 2	Not Used	Not Used
Pad Rebar Spacing-long (ft):	93.5		18 > s > 2	Not Used	Not Used
End Cap Width (ft):	0		0	Not Used	Not Used
End Cap Rebar Area (in^2):	3.16		0	Not Used	Not Used
Rebar Spacing (ft):	-3.00		18 > s > 2	Not Used	Not Used
Tie Spacing (ft):	19.64		282 > s > 4.5	Not Used	Not Used
Dowel Area (in^2):	2.2		0.00	Not Used	Not Used
Dowel Embedment (ft):	9		6	Not Used	Not Used
Cone Shear Strength (kps):	24.68		23.76	Not Used	Not Used
Dowel Edge Dist (ft):	12.00		4.78	Not Used	Not Used
Dowel Spacing (ft):	66.00		18.00	Not Used	Not Used
Dowel Edge Dist (vert) (ft):	18.00		4.78	Not Used	Not Used
Dowel Devel. Length (ft):	-3.00		15.38	Not Used	Not Used

Modifications					
Pier Sleeve, ds:	48	in	End Cap Width, Wee:	0	ft
Revised Pier Diameter, dx:	14	ft	Revised Width, Wc:	24	ft
PS Rebar Size, Ss:	6		EC Rebar Size, Sec:	8	per side, top & bottom
Rebar Quantity, ms:	40	206	Rebar Quantity, mec:	4	per side
Tie Size, Sst:	3		EC Tie Size, Sect:	4	per side
Tie Quantity, mst:	9	6	Tie Quantity, meet:	15	
Pad Thickness, Te:	0	in	EC Dowel Size, Secd:	6	per side
Revised Pier Thickness, Tc:	3.00	ft	Dowel Quantity, mecd:	5	
Rebar Size, Se:	3		Rows of Dowels, Ndi:	1	
Rebar Quantity (long), ml:	4	0	Dowel Depth, decd:	9	in
Rebar Quantity (short), mecl:	4	0	Edge Distance, eecd:	12	in
Dowel Size, Sed:	3				
Dowel Quantity, mecd:	0				