ROBINSON & COLE

EM-VER-054-100324

ORIGINAL

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
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kbaldwin@rc.com
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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**
Three Mile Road, Glastonbury, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the top of the existing 145-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 Docket No. 174. Cellco now intends to modify its installation by replacing two (2) of its cellular antennas with two (2) DB846F65ZAXY cellular antennas at the same level on the tower. Attached behind Tab 1 are the specifications for the new 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 Richard J. Johnson, Town Manager for the Town of Glastonbury. A copy of this letter is being sent to Josephine I. Flanagan, 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 continue to be located at the top of the existing 145-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 boundary.

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:
Richard J. Johnson, Glastonbury Town Manager
Josephine I. Flanagan, Trustee
Sandy M. Carter

ANDREW®

Vertically Polarized Directed Dipole® Panel Antennas

806 - 960 MHz

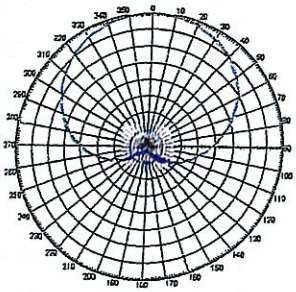
65° HORIZONTAL BEAMWIDTH

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	/2 / 1,829	/2 / 1,829	/2 / 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

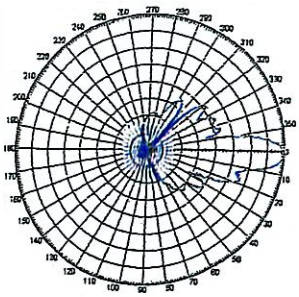
Specifications are subject to change. Please see our website for the latest information.

DB846F65ZAXY

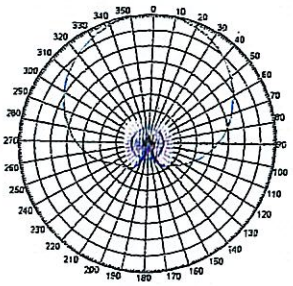
Azimuth Pattern

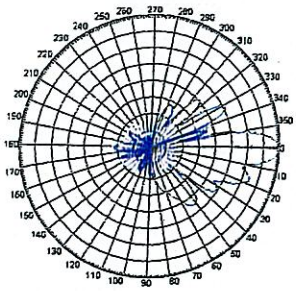


Elevation Pattern

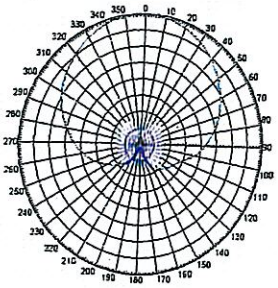


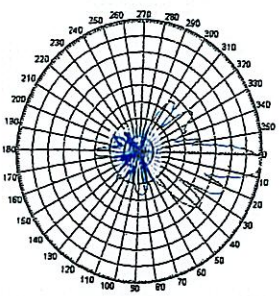
DB846H65E-SX





846H65T5E-SX





Scale: 10° radials, 5 dB per division

	General	Power	Density					
Site Name: East Glastonbury								
Tower Height: Verizon @ 148Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Nextel	9	100	126	0.0204	851	0.5673	3.59%	
*V'Stream	1	595	116	0.0159	1930	1.0000	1.59%	
*Cingular UMTS	1	500	140	0.0092	880	0.5867	1.56%	
*Cingular GSM	2	296	140	0.0109	880	0.5867	1.85%	
*Cingular GSM	1	427	140	0.0078	1930	1.0000	0.78%	
Sprint				0.0042	1900	1.0000	0.42%	
*XM Sat Radio	2	4552	99	0.3340	2337	1.0000	33.40%	
Verizon	**3**	**281**	**148**	**0.0138**	**1970**	**1.0000**	**1.38%**	
Verizon	**9**	**379**	**148**	**0.0560**	**869**	**0.5793**	**9.67%**	
								54.25%
* Source: Siting Council								

Date: **February 18, 2010**

Michael McFadden
Crown Castle
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:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	806368
	Crown Castle Site Name:	HRT 049B 943215
	Crown Castle JDE Job Number:	130376
	Crown Castle Work Order Number:	317854
Engineering Firm Designation:	**Crown Castle USA Inc. Project Number:**	317854
Site Data:	**THREE MILE ROAD, GLASTONBURY, Hartford County, CT** **Latitude *41° 41' 36.93"*, Longitude *-72° 32' 50.11"*** **145 Foot - Monopole Tower**	

Dear Michael McFadden,

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 130376, in accordance with application 94302, revision 3.

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

LC1: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a wind speed of 80 mph fastest mile.

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

We at *Crown Castle 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: Brad Truman / JYK

Respectfully submitted by:

Kenton C. Weber, P.E.
Engineering Supervisor

STATE OF CONNECTICUT
KENTON C. WEBER
No. 27263
LICENSED
PROFESSIONAL ENGINEER

2/18/10

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 145 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in March of 1997. 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 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145	148	2	andrew	DB846F65ZAXY w/ Mount Pipe	-	-	1,2

Notes:
1) Proposed Equipment
2) Using existing feed lines

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
145	150	1	unknown	GPS	1	1/2	1
	148	2	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD	6	1-5/8	1
		2	andrew	850/1900 DUAL BAND TMA			
		4	antel	LPD-6513 w/ Mount Pipe	-	-	3
		2	antel	LPD-6513 w/ Mount Pipe	6	1-5/8	1
		6	decibel	948F65T2ZE-M w/ Mount Pipe	-	-	2
		12	mla	MLA_ANTENNA w/ Mount Pipe	-	-	1
	145	1	tower mounts	Platform Mount (LP 101-1)			
136	140	6	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD	12	1-1/4	1
		6	css	DUO1417-8686 w/ Mount Pipe			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
	136	1	tower mounts	Platform Mount (LP 101-1)			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
	130	2	unknown	GPS	2	1/2	1
126	128	12	swedcom	ALP 9212-N w/ Mount Pipe	12	1-1/4	1
	126	1	tower mounts	Platform Mount [LP 601-1]	-	-	1
116	117	3	rfs celwave	APN199015 w/ Mount Pipe	6	1-5/8	1
	116	1	tower mounts	Platform Mount [LP 601-1]			
	97	1	ems wireless	RR65-18-02DP w/ Mount Pipe			
95	96	1	repeater technologies	DA1900-39	3	1-1/4	1
	95	2	tower mounts	Side Arm Mount [SO 701-1]			
87	87	3	allgon	7250.02 w/ Mount Pipe	6	1-1/4	4
		1	tower mounts	Side Arm Mount [SO 102-3]			

Notes:
1) Existing equipment
2) MLA equipment does not control and was not considered in this analysis
3) Equipment to be removed and replaced by proposed
4) Abandoned equipment was included in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
145	147.5	15	Unknown	ALP 9212	-	-
135	137.5	15	Unknown	ALP 11011	-	-
125	127.5	15	Unknown	ALP 9212	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc., Inc.	262197	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	974245	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	262188	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.

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	145 - 92.5	Pole	TP35.64x20.5x0.3438	1	-12.37	1948.37	50.5	Pass
L2	92.5 - 44.71	Pole	TP48.61x33.5105x0.4375	2	-24.26	3390.15	56.0	Pass
L3	44.71 - 0	Pole	TP60.5x45.8529x0.4688	3	-42.22	4564.23	60.4	Pass
							Summary	
						Pole (L3)	60.4	Pass
						Rating =	60.4	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	57.3	Pass
1	Base Plate	0	43.0	Pass
1	Base Foundation	0	76.9	Pass

Structure Rating (max from all components) =	76.9%

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

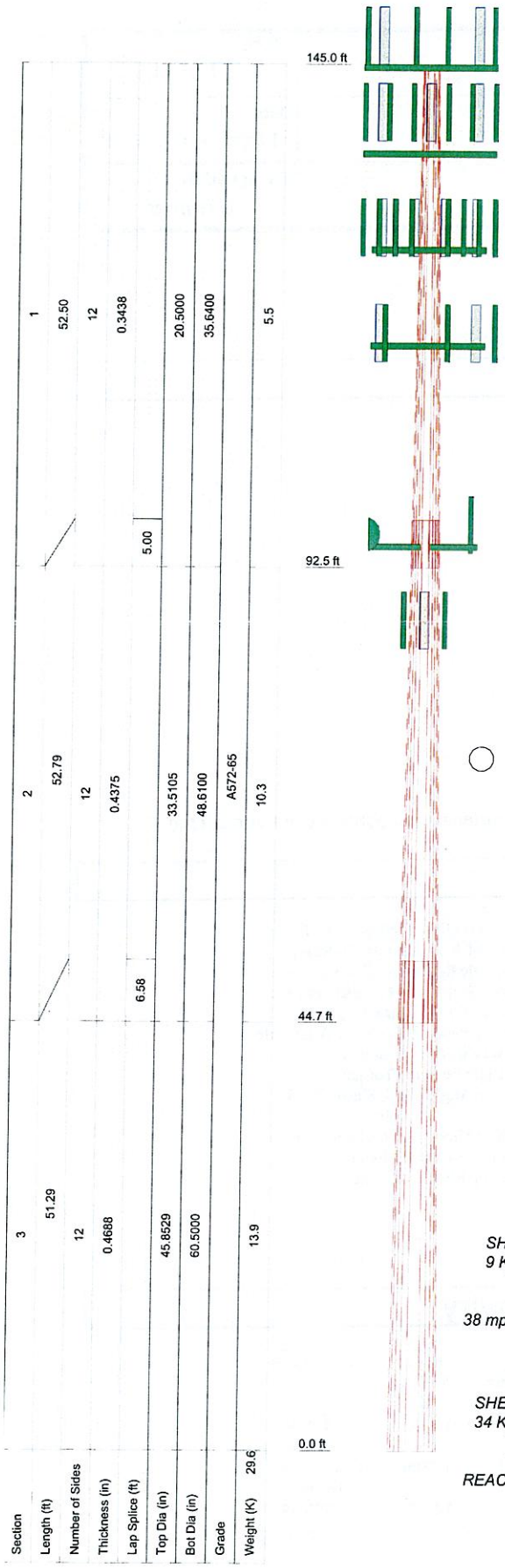
4.1) Recommendations

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

There is a level of abandoned equipment at 87 feet. There are three panels and six 1-1/4" feed lines currently installed. The tower passes as-is, without removing the abandoned equipment. However, additional capacity will be realized when the abandoned equipment is removed.

APPENDIX A

RISA TOWER OUTPUT



Section	1	2	3
Length (ft)	52.50	52.79	51.29
Number of Sides	12	12	12
Thickness (in)	0.3438	0.4375	0.4688
Lap Splice (ft)	5.00	6.56	
Top Dia (in)	20.5000	33.5105	45.8529
Bot Dia (in)	35.6400	48.6100	60.5000
Grade		A572-65	
Weight (K)	5.5	10.3	13.9

Total Weight: 29.6 K

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
850/1900 DUAL BAND TMA	145	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	136
(2) LPD-6513 w/ Mount Pipe	145	(2) DUO1417-8686 w/ Mount Pipe	136
(2) 948F65T2ZE-M w/ Mount Pipe	145	7770.00 w/ Mount Pipe	136
GPS	145	(2) LGP13519	136
DUAL BAND 800/1900 FULL BAND MASTHEAD	145	Platform Mount (LP 101-1)	136
(2) LPD-6513 w/ Mount Pipe	145	(4) ALP 9212-N w/ Mount Pipe	126
(2) 948F65T2ZE-M w/ Mount Pipe	145	GPS	126
850/1900 DUAL BAND TMA	145	GPS	126
DUAL BAND 800/1900 FULL BAND MASTHEAD	145	(4) ALP 9212-N w/ Mount Pipe	126
(2) 948F65T2ZE-M w/ Mount Pipe	145	(4) ALP 9212-N w/ Mount Pipe	126
(2) DB846F65ZAXY w/ Mount Pipe	145	Platform Mount [LP 601-1]	126
Platform Mount (LP 101-1)	145	APN199015 w/ Mount Pipe	116
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	136	APN199015 w/ Mount Pipe	116
(2) DUO1417-8686 w/ Mount Pipe	136	APN199015 w/ Mount Pipe	116
7770.00 w/ Mount Pipe	136	Platform Mount [LP 601-1]	116
(2) LGP13519	136	RR65-18-02DP w/ Mount Pipe	95
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	136	Side Arm Mount [SO 701-1]	95
(2) DUO1417-8686 w/ Mount Pipe	136	Side Arm Mount [SO 701-1]	95
7770.00 w/ Mount Pipe	136	DA1900-39	95
(2) LGP13519	136	7250.02 w/ Mount Pipe	87
		7250.02 w/ Mount Pipe	87
		Side Arm Mount [SO 102-3]	87
		7250.02 w/ Mount Pipe	87

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 60.4%

CROWN CASTLE
Shaping the Wireless World

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

Job: BU# 806368			
Project:			
Client: Crown Castle USA, Inc.	Drawn by: BTruman	App'd:	
Code: TIA/EIA-222-F	Date: 02/17/10	Scale: NTS	
Path: R:\SA Models - Letters\Work Area\BTruman\806368\806368.eri		Dwg No. E-1	

Tower Input Data

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

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

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	145.00-92.50	52.50	5.00	12	20.5000	35.6400	0.3438	1.3752	A572-65 (65 ksi)
L2	92.50-44.71	52.79	6.58	12	33.5105	48.6100	0.4375	1.7500	A572-65 (65 ksi)
L3	44.71-0.00	51.29		12	45.8529	60.5000	0.4688	1.8752	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	21.2232	22.3136	1157.1074	7.2159	10.6190	108.9658	2344.6133	10.9821	4.5726	13.3
	36.8972	39.0742	6213.4320	12.6360	18.4615	336.5612	12590.0978	19.2311	8.6301	25.102
L2	36.1732	46.5916	6504.8975	11.8401	17.3584	374.7398	13180.6858	22.9310	7.8083	17.848
	50.3248	67.8630	20100.9894	17.2458	25.1800	798.2925	40730.0543	33.4001	11.8550	27.097
L3	49.4158	68.5090	18011.1451	16.2475	23.7518	758.3060	36495.4630	33.7180	11.0322	23.533
	62.6342	90.6193	41683.1469	21.4912	31.3390	1330.0727	84461.3566	44.6000	14.9576	31.906

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 145.00-92.50				1	1	1		
L2 92.50-44.71				1	1	1		
L3 44.71-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
HJ7-50A(1-5/8")	C	No	Inside Pole	145.00 - 0.00	0.0000	0	12	No Ice	0.00	1.04
								1/2" Ice	0.00	1.04
								1" Ice	0.00	1.04
								2" Ice	0.00	1.04
								4" Ice	0.00	1.04
LDF4-50A(1/2")	C	No	Inside Pole	145.00 - 0.00	0.0000	0	1	No Ice	0.00	0.15
								1/2" Ice	0.00	0.15
								1" Ice	0.00	0.15
								2" Ice	0.00	0.15
								4" Ice	0.00	0.15
**										
LDF6-50A(1-1/4")	C	No	Inside Pole	136.00 - 0.00	0.0000	0	12	No Ice	0.00	0.66
								1/2" Ice	0.00	0.66
								1" Ice	0.00	0.66
								2" Ice	0.00	0.66
								4" Ice	0.00	0.66
**										
LDF6-50A(1-1/4")	C	No	Inside Pole	126.00 - 0.00	0.0000	0	12	No Ice	0.00	0.66
								1/2" Ice	0.00	0.66
								1" Ice	0.00	0.66
								2" Ice	0.00	0.66
								4" Ice	0.00	0.66
LDF4-50A(1/2")	C	No	Inside Pole	126.00 - 0.00	0.0000	0	2	No Ice	0.00	0.15
								1/2" Ice	0.00	0.15
								1" Ice	0.00	0.15
								2" Ice	0.00	0.15
								4" Ice	0.00	0.15
**										
LDF7-50A(1-5/8")	C	No	Inside Pole	116.00 - 0.00	0.0000	0	6	No Ice	0.00	0.82
								1/2" Ice	0.00	0.82
								1" Ice	0.00	0.82
								2" Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
**								4" Ice	0.00	0.82
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	95.00 - 0.00	0.0000	0	1	No Ice	0.16	0.66
								1/2" Ice	0.25	1.91
								1" Ice	0.35	3.78
								2" Ice	0.55	9.33
								4" Ice	0.95	27.78
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	95.00 - 0.00	0.0000	0	2	No Ice	0.00	0.66
								1/2" Ice	0.00	1.91
								1" Ice	0.00	3.78
								2" Ice	0.00	9.33
								4" Ice	0.00	27.78
**										
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	87.00 - 0.00	0.0000	0	2	No Ice	0.16	0.66
								1/2" Ice	0.25	1.91
								1" Ice	0.35	3.78
								2" Ice	0.55	9.33
								4" Ice	0.95	27.78
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	87.00 - 0.00	0.0000	0	4	No Ice	0.00	0.66
								1/2" Ice	0.00	1.91
								1" Ice	0.00	3.78
								2" Ice	0.00	9.33
								4" Ice	0.00	27.78
**										
Climbing Ladder (Flat)	B	No	CaAa (Out Of Face)	119.00 - 111.00	36.0000	0	1	No Ice	0.58	4.81
								1/2" Ice	1.03	7.12
								1" Ice	1.48	10.35
								2" Ice	2.37	19.55
								4" Ice	4.15	48.96
Climbing Ladder (Flat)	B	No	CaAa (Out Of Face)	129.00 - 121.00	36.0000	0	1	No Ice	0.58	4.81
								1/2" Ice	1.03	7.12
								1" Ice	1.48	10.35
								2" Ice	2.37	19.55
								4" Ice	4.15	48.96

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	145.00-92.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	9.350	0.08
		C	0.000	0.000	0.000	0.388	1.40
L2	92.50-44.71	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	20.518	1.87
L3	44.71-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	20.791	1.77

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K

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	145.00-92.50	A	1.164	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	25.953	0.19
		C		0.000	0.000	0.000	0.969	1.43
L2	92.50-44.71	A	1.090	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	51.327	3.47
L3	44.71-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	50.042	3.23

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	145.00-92.50	0.2004	0.1286	0.4637	0.2944
L2	92.50-44.71	-0.5025	0.2901	-1.0350	0.5976
L3	44.71-0.00	-0.5476	0.3162	-1.1284	0.6515

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
850/1900 DUAL BAND TMA	A	From Leg	4.00	0.0000	145.00	No Ice	2.15	0.48	0.03
			0.00			1/2" Ice	2.35	0.60	0.04
			3.00			1" Ice	2.55	0.74	0.06
						2" Ice	2.99	1.04	0.09
						4" Ice	3.97	1.73	0.20
(2) LPD-6513 w/ Mount Pipe	A	From Leg	4.00	0.0000	145.00	No Ice	6.65	6.32	0.05
			0.00			1/2" Ice	7.11	7.00	0.10
			3.00			1" Ice	7.59	7.70	0.17
						2" Ice	8.56	9.15	0.32
						4" Ice	10.65	12.33	0.74
(2) 948F65T2ZE-M w/ Mount Pipe	A	From Leg	4.00	0.0000	145.00	No Ice	3.30	3.28	0.03
			0.00			1/2" Ice	3.69	3.88	0.06
			3.00			1" Ice	4.12	4.50	0.10
						2" Ice	5.01	5.79	0.19
						4" Ice	6.92	8.76	0.49
GPS	A	From Leg	4.00	0.0000	145.00	No Ice	0.17	0.17	0.00
			0.00			1/2" Ice	0.24	0.24	0.00
			5.00			1" Ice	0.31	0.31	0.00
						2" Ice	0.48	0.48	0.01
						4" Ice	0.92	0.92	0.05
DUAL BAND 800/1900 FULL BAND MASTHEAD	B	From Leg	4.00	0.0000	145.00	No Ice	1.55	0.81	0.03
			0.00			1/2" Ice	1.72	0.94	0.04
			3.00			1" Ice	1.90	1.09	0.05
						2" Ice	2.28	1.40	0.09

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
(2) LPD-6513 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	145.00	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 6.65 7.11 7.59 8.56 10.65	2.12 6.32 7.00 7.70 9.15 12.33	0.19 0.05 0.10 0.17 0.32 0.74
(2) 948F65T2ZE-M w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	3.28 3.88 4.50 5.79 8.76	0.03 0.06 0.10 0.19 0.49
850/1900 DUAL BAND TMA	B	From Leg	4.00 0.00 3.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.15 2.35 2.55 2.99 3.97	0.48 0.60 0.74 1.04 1.73	0.03 0.04 0.06 0.09 0.20
DUAL BAND 800/1900 FULL BAND MASTHEAD	C	From Leg	4.00 0.00 3.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14	0.81 0.94 1.09 1.40 2.12	0.03 0.04 0.05 0.09 0.19
(2) 948F65T2ZE-M w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	3.28 3.88 4.50 5.79 8.76	0.03 0.06 0.10 0.19 0.49
(2) DB846F65ZAXY w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.27 7.88 8.48 9.72 12.33	7.82 9.01 9.91 11.81 15.98	0.05 0.11 0.19 0.37 0.87
Platform Mount (LP 101-1)	C	None		0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	36.21 42.82 49.43 62.65 89.09	36.21 42.82 49.43 62.65 89.09	1.50 2.30 3.10 4.70 7.89
**									
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14	0.81 0.94 1.09 1.40 2.12	0.03 0.04 0.05 0.09 0.19
(2) DUO1417-8686 w/ Mount Pipe	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.77 7.24 7.72 8.70 10.81	5.39 6.07 6.76 8.20 11.35	0.04 0.09 0.15 0.30 0.71
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP13519	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.34 0.42 0.51 0.73 1.25	0.21 0.28 0.36 0.55 1.03	0.01 0.01 0.01 0.02 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14	0.81 0.94 1.09 1.40 2.12	0.03 0.04 0.05 0.09 0.19
(2) DUO1417-8686 w/ Mount Pipe	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.77 7.24 7.72 8.70 10.81	5.39 6.07 6.76 8.20 11.35	0.04 0.09 0.15 0.30 0.71
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP13519	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.34 0.42 0.51 0.73 1.25	0.21 0.28 0.36 0.55 1.03	0.01 0.01 0.01 0.02 0.07
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14	0.81 0.94 1.09 1.40 2.12	0.03 0.04 0.05 0.09 0.19
(2) DUO1417-8686 w/ Mount Pipe	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.77 7.24 7.72 8.70 10.81	5.39 6.07 6.76 8.20 11.35	0.04 0.09 0.15 0.30 0.71
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP13519	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.34 0.42 0.51 0.73 1.25	0.21 0.28 0.36 0.55 1.03	0.01 0.01 0.01 0.02 0.07
Platform Mount (LP 101-1)	C	None		0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	36.21 42.82 49.43 62.65 89.09	36.21 42.82 49.43 62.65 89.09	1.50 2.30 3.10 4.70 7.89
**									
(4) ALP 9212-N w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.02 6.51 6.99 7.99 10.13	7.05 7.83 8.59 10.15 13.50	0.04 0.09 0.16 0.32 0.75
GPS	A	From Leg	4.00 0.00 4.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.17 0.24 0.31 0.48 0.92	0.17 0.24 0.31 0.48 0.92	0.00 0.00 0.00 0.01 0.05
GPS	B	From Leg	4.00	0.0000	126.00	No Ice	0.17	0.17	0.00

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
			0.00 4.00			1/2" Ice	0.24	0.24	0.00
						1" Ice	0.31	0.31	0.00
						2" Ice	0.48	0.48	0.01
						4" Ice	0.92	0.92	0.05
(4) ALP 9212-N w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice	6.02	7.05	0.04
						1/2" Ice	6.51	7.83	0.09
						1" Ice	6.99	8.59	0.16
						2" Ice	7.99	10.15	0.32
						4" Ice	10.13	13.50	0.75
(4) ALP 9212-N w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice	6.02	7.05	0.04
						1/2" Ice	6.51	7.83	0.09
						1" Ice	6.99	8.59	0.16
						2" Ice	7.99	10.15	0.32
						4" Ice	10.13	13.50	0.75
Platform Mount [LP 601-1]	C	None		0.0000	126.00	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
**									
APN199015 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	116.00	No Ice	3.50	3.47	0.03
						1/2" Ice	3.96	4.33	0.07
						1" Ice	4.40	5.07	0.11
						2" Ice	5.31	6.59	0.21
						4" Ice	7.35	9.84	0.53
APN199015 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	116.00	No Ice	3.50	3.47	0.03
						1/2" Ice	3.96	4.33	0.07
						1" Ice	4.40	5.07	0.11
						2" Ice	5.31	6.59	0.21
						4" Ice	7.35	9.84	0.53
APN199015 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	116.00	No Ice	3.50	3.47	0.03
						1/2" Ice	3.96	4.33	0.07
						1" Ice	4.40	5.07	0.11
						2" Ice	5.31	6.59	0.21
						4" Ice	7.35	9.84	0.53
Platform Mount [LP 601-1]	C	None		0.0000	116.00	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
**									
RR65-18-02DP w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	95.00	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.11
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
Side Arm Mount [SO 701-1]	B	From Leg	2.00 0.00 0.00	0.0000	95.00	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
Side Arm Mount [SO 701-1]	C	From Leg	2.00 0.00 0.00	0.0000	95.00	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
**									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
7250.02 w/ Mount Pipe	A	From Leg	1.00	0.0000	87.00	No Ice	4.24	3.32	0.04
			0.00			1/2" Ice	4.71	4.30	0.07
			0.00			1" Ice	5.17	5.05	0.11
						2" Ice	6.11	6.60	0.22
						4" Ice	8.32	9.89	0.56
7250.02 w/ Mount Pipe	B	From Leg	1.00	0.0000	87.00	No Ice	4.24	3.32	0.04
			0.00			1/2" Ice	4.71	4.30	0.07
			0.00			1" Ice	5.17	5.05	0.11
						2" Ice	6.11	6.60	0.22
						4" Ice	8.32	9.89	0.56
7250.02 w/ Mount Pipe	C	From Leg	1.00	0.0000	87.00	No Ice	4.24	3.32	0.04
			0.00			1/2" Ice	4.71	4.30	0.07
			0.00			1" Ice	5.17	5.05	0.11
						2" Ice	6.11	6.60	0.22
						4" Ice	8.32	9.89	0.56
Side Arm Mount [SO 102-3]	C	None		0.0000	87.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14
						2" Ice	4.92	4.92	0.20
						4" Ice	6.84	6.84	0.32

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
DA1900-39	C	Paraboloid w/o Radome	From Leg	4.00	0.0000		95.00	3.54	No Ice	9.86	0.05
				0.00					1/2" Ice	10.32	0.10
				1.00					1" Ice	10.77	0.15
									2" Ice	11.68	0.26
									4" Ice	13.50	0.47

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

Comb. No.	Description
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	145 - 92.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.79	-0.23	-0.32
			Max. Mx	5	-12.37	-664.44	-3.30
			Max. My	8	-12.37	-3.45	-666.44
			Max. Vy	5	19.62	-664.44	-3.30
			Max. Vx	2	-19.66	2.91	666.25
			Max. Torque	11			1.09
L2	92.5 - 44.71	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.06	2.38	-2.88
			Max. Mx	5	-24.26	-1761.43	5.59
			Max. My	2	-24.26	-14.65	1760.26
			Max. Vy	5	26.99	-1761.43	5.59
			Max. Vx	2	-26.92	-14.65	1760.26
			Max. Torque	11			1.90
L3	44.71 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-65.03	6.13	-5.05
			Max. Mx	5	-42.22	-3317.24	16.31
			Max. My	2	-42.22	-34.75	3313.14
			Max. Vy	5	33.77	-3317.24	16.31
			Max. Vx	2	-33.71	-34.75	3313.14
			Max. Torque	12			2.20

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	23	65.03	8.05	-4.65
	Max. H_x	11	42.24	33.58	0.07
	Max. H_z	2	42.24	-0.40	33.69
	Max. M_x	2	3313.14	-0.40	33.69
	Max. M_z	5	3317.24	-33.75	0.21
	Max. Torsion	12	2.20	29.08	16.79
	Min. Vert	1	42.24	0.00	0.00
	Min. H_x	5	42.24	-33.75	0.21
	Min. H_z	8	42.24	-0.02	-33.54
	Min. M_x	8	-3300.58	-0.02	-33.54
	Min. M_z	11	-3302.07	33.58	0.07
	Min. Torsion	6	-1.77	-29.42	-16.50

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	42.24	0.00	0.00	1.09	0.82	0.00
Dead+Wind 0 deg - No Ice	42.24	0.40	-33.69	-3313.14	-34.75	-0.79
Dead+Wind 30 deg - No Ice	42.24	17.06	-29.08	-2858.04	-1673.30	0.45
Dead+Wind 60 deg - No Ice	42.24	29.26	-16.87	-1655.26	-2873.77	0.99
Dead+Wind 90 deg - No Ice	42.24	33.75	-0.21	-16.31	-3317.24	1.25
Dead+Wind 120 deg - No Ice	42.24	29.42	16.50	1627.43	-2892.85	1.77
Dead+Wind 150 deg - No Ice	42.24	16.76	29.00	2855.78	-1650.10	1.61
Dead+Wind 180 deg - No Ice	42.24	0.02	33.54	3300.58	-4.78	1.22
Dead+Wind 210 deg - No Ice	42.24	-16.73	29.07	2859.38	1642.88	0.39
Dead+Wind 240 deg - No Ice	42.24	-29.10	16.78	1648.54	2859.90	-0.98
Dead+Wind 270 deg - No Ice	42.24	-33.58	-0.07	-8.78	3302.07	-2.09
Dead+Wind 300 deg - No Ice	42.24	-29.08	-16.79	-1653.46	2861.09	-2.20
Dead+Wind 330 deg - No Ice	42.24	-16.77	-29.00	-2853.13	1652.48	-1.61
Dead+Ice+Temp	65.03	0.00	0.00	5.05	6.13	0.00
Dead+Wind 0 deg+Ice+Temp	65.03	0.10	-9.34	-949.16	-2.27	-0.31
Dead+Wind 30 deg+Ice+Temp	65.03	4.71	-8.06	-818.43	-474.18	0.12
Dead+Wind 60 deg+Ice+Temp	65.03	8.09	-4.67	-471.56	-819.94	0.36
Dead+Wind 90 deg+Ice+Temp	65.03	9.34	-0.05	1.17	-947.60	0.51
Dead+Wind 120 deg+Ice+Temp	65.03	8.13	4.58	475.03	-824.91	0.67
Dead+Wind 150 deg+Ice+Temp	65.03	4.64	8.04	828.05	-468.85	0.60
Dead+Wind 180 deg+Ice+Temp	65.03	0.01	9.30	955.98	4.66	0.42
Dead+Wind 210 deg+Ice+Temp	65.03	-4.63	8.06	828.69	478.83	0.09
Dead+Wind 240 deg+Ice+Temp	65.03	-8.05	4.65	479.83	828.69	-0.36
Dead+Wind 270 deg+Ice+Temp	65.03	-9.30	-0.02	2.55	956.02	-0.72
Dead+Wind 300 deg+Ice+Temp	65.03	-8.05	-4.65	-471.54	829.23	-0.78
Dead+Wind 330 deg+Ice+Temp	65.03	-4.64	-8.04	-817.46	481.63	-0.60
Dead+Wind 0 deg - Service	42.24	0.16	-13.16	-1294.07	-13.07	-0.30
Dead+Wind 30 deg - Service	42.24	6.66	-11.36	-1116.22	-653.41	0.18
Dead+Wind 60 deg - Service	42.24	11.43	-6.59	-646.18	-1122.54	0.39
Dead+Wind 90 deg - Service	42.24	13.18	-0.08	-5.69	-1295.85	0.49
Dead+Wind 120 deg - Service	42.24	11.49	6.45	636.68	-1130.00	0.69
Dead+Wind 150 deg - Service	42.24	6.55	11.33	1116.70	-644.34	0.63
Dead+Wind 180 deg - Service	42.24	0.01	13.10	1290.52	-1.37	0.48
Dead+Wind 210 deg - Service	42.24	-6.54	11.36	1118.10	642.52	0.15
Dead+Wind 240 deg - Service	42.24	-11.37	6.55	644.92	1118.13	-0.39
Dead+Wind 270 deg - Service	42.24	-13.12	-0.03	-2.75	1290.92	-0.82

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 300 deg - Service	42.24	-11.36	-6.56	-645.48	1118.60	-0.86
Dead+Wind 330 deg - Service	42.24	-6.55	-11.33	-1114.30	646.28	-0.63

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	0.00	-42.24	0.00	0.00	42.24	0.00	0.000%
2	0.40	-42.24	-33.69	-0.40	42.24	33.69	0.000%
3	17.06	-42.24	-29.08	-17.06	42.24	29.08	0.000%
4	29.26	-42.24	-16.87	-29.26	42.24	16.87	0.000%
5	33.75	-42.24	-0.21	-33.75	42.24	0.21	0.000%
6	29.42	-42.24	16.50	-29.42	42.24	-16.50	0.000%
7	16.76	-42.24	29.00	-16.76	42.24	-29.00	0.000%
8	0.02	-42.24	33.54	-0.02	42.24	-33.54	0.000%
9	-16.73	-42.24	29.07	16.73	42.24	-29.07	0.000%
10	-29.10	-42.24	16.78	29.10	42.24	-16.78	0.000%
11	-33.58	-42.24	-0.07	33.58	42.24	0.07	0.000%
12	-29.08	-42.24	-16.79	29.08	42.24	16.79	0.000%
13	-16.77	-42.24	-29.00	16.77	42.24	29.00	0.000%
14	0.00	-65.03	0.00	0.00	65.03	0.00	0.000%
15	0.10	-65.03	-9.34	-0.10	65.03	9.34	0.000%
16	4.71	-65.03	-8.06	-4.71	65.03	8.06	0.000%
17	8.09	-65.03	-4.67	-8.09	65.03	4.67	0.000%
18	9.34	-65.03	-0.05	-9.34	65.03	0.05	0.000%
19	8.13	-65.03	4.58	-8.13	65.03	-4.58	0.000%
20	4.64	-65.03	8.04	-4.64	65.03	-8.04	0.000%
21	0.01	-65.03	9.30	-0.01	65.03	-9.30	0.000%
22	-4.63	-65.03	8.06	4.63	65.03	-8.06	0.000%
23	-8.05	-65.03	4.65	8.05	65.03	-4.65	0.000%
24	-9.30	-65.03	-0.02	9.30	65.03	0.02	0.000%
25	-8.05	-65.03	-4.65	8.05	65.03	4.65	0.000%
26	-4.64	-65.03	-8.04	4.64	65.03	8.04	0.000%
27	0.16	-42.24	-13.16	-0.16	42.24	13.16	0.000%
28	6.66	-42.24	-11.36	-6.66	42.24	11.36	0.000%
29	11.43	-42.24	-6.59	-11.43	42.24	6.59	0.000%
30	13.18	-42.24	-0.08	-13.18	42.24	0.08	0.000%
31	11.49	-42.24	6.45	-11.49	42.24	-6.45	0.000%
32	6.55	-42.24	11.33	-6.55	42.24	-11.33	0.000%
33	0.01	-42.24	13.10	-0.01	42.24	-13.10	0.000%
34	-6.54	-42.24	11.36	6.54	42.24	-11.36	0.000%
35	-11.37	-42.24	6.55	11.37	42.24	-6.55	0.000%
36	-13.12	-42.24	-0.03	13.12	42.24	0.03	0.000%
37	-11.36	-42.24	-6.56	11.36	42.24	6.56	0.000%
38	-6.55	-42.24	-11.33	6.55	42.24	11.33	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	0.00001996

3	Yes	5	0.00000001	0.00002664
4	Yes	5	0.00000001	0.00002560
5	Yes	4	0.00000001	0.00004673
6	Yes	5	0.00000001	0.00002713
7	Yes	5	0.00000001	0.00002548
8	Yes	4	0.00000001	0.00004228
9	Yes	5	0.00000001	0.00002610
10	Yes	5	0.00000001	0.00002660
11	Yes	4	0.00000001	0.00008191
12	Yes	5	0.00000001	0.00002519
13	Yes	5	0.00000001	0.00002703
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00065336
16	Yes	4	0.00000001	0.00071667
17	Yes	4	0.00000001	0.00071482
18	Yes	4	0.00000001	0.00065353
19	Yes	4	0.00000001	0.00072574
20	Yes	4	0.00000001	0.00072244
21	Yes	4	0.00000001	0.00065891
22	Yes	4	0.00000001	0.00072474
23	Yes	4	0.00000001	0.00072572
24	Yes	4	0.00000001	0.00065721
25	Yes	4	0.00000001	0.00072089
26	Yes	4	0.00000001	0.00072209
27	Yes	4	0.00000001	0.00001066
28	Yes	4	0.00000001	0.00010213
29	Yes	4	0.00000001	0.00009479
30	Yes	4	0.00000001	0.00001441
31	Yes	4	0.00000001	0.00010732
32	Yes	4	0.00000001	0.00009389
33	Yes	4	0.00000001	0.00001343
34	Yes	4	0.00000001	0.00009927
35	Yes	4	0.00000001	0.00010324
36	Yes	4	0.00000001	0.00002083
37	Yes	4	0.00000001	0.00009194
38	Yes	4	0.00000001	0.00010575

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	145 - 92.5	21.983	31	1.3879	0.0025
L2	97.5 - 44.71	9.692	31	0.9762	0.0011
L3	51.29 - 0	2.598	31	0.4704	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
145.00	850/1900 DUAL BAND TMA	31	21.983	1.3879	0.0030	41429
136.00	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	31	19.466	1.3213	0.0027	23016
126.00	(4) ALP 9212-N w/ Mount Pipe	31	16.720	1.2441	0.0024	10902
116.00	APN199015 w/ Mount Pipe	31	14.083	1.1604	0.0020	7142

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
96.00	DA1900-39	31	9.372	0.9591	0.0015	4402
95.00	RR65-18-02DP w/ Mount Pipe	31	9.163	0.9475	0.0014	4392
87.00	7250.02 w/ Mount Pipe	31	7.583	0.8508	0.0012	4453

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	145 - 92.5	56.190	6	3.5476	0.0064
L2	97.5 - 44.71	24.788	6	2.4966	0.0026
L3	51.29 - 0	6.647	6	1.2035	0.0010

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
145.00	850/1900 DUAL BAND TMA	6	56.190	3.5476	0.0078	16321
136.00	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	6	49.759	3.3697	0.0070	9067
126.00	(4) ALP 9212-N w/ Mount Pipe	6	42.744	3.1663	0.0061	4293
116.00	APN199015 w/ Mount Pipe	6	36.009	2.9505	0.0052	2812
96.00	DA1900-39	6	23.971	2.4557	0.0038	1731
95.00	RR65-18-02DP w/ Mount Pipe	6	23.435	2.4281	0.0037	1727
87.00	7250.02 w/ Mount Pipe	6	19.396	2.1991	0.0032	1749

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	145 - 92.5 (1)	TP35.64x20.5x0.3438	52.50	0.00	0.0	39.000	37.4779	-12.37	1461.64	0.008
L2	92.5 - 44.71 (2)	TP48.61x33.5105x0.4375	52.79	0.00	0.0	39.000	65.2116	-24.26	2543.25	0.010
L3	44.71 - 0 (3)	TP60.5x45.8529x0.4688	51.29	0.00	0.0	37.785	90.6193	-42.22	3424.03	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	145 - 92.5 (1)	TP35.64x20.5x0.3438	668.78	25.930	39.000	0.665	0.00	0.000	39.000	0.000
L2	92.5 - 44.71 (2)	TP48.61x33.5105x0.4375	1764.28	28.732	39.000	0.737	0.00	0.000	39.000	0.000
L3	44.71 - 0 (3)	TP60.5x45.8529x0.4688	3319.20	29.946	37.785	0.793	0.00	0.000	37.785	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	145 - 92.5 (1)	TP35.64x20.5x0.3438	19.70	0.526	26.000	0.041	0.50	0.009	26.000	0.000
L2	92.5 - 44.71 (2)	TP48.61x33.5105x0.4375	26.97	0.414	26.000	0.032	1.44	0.011	26.000	0.000
L3	44.71 - 0 (3)	TP60.5x45.8529x0.4688	33.75	0.372	26.000	0.029	1.77	0.008	26.000	0.000

Pole Interaction Design Data

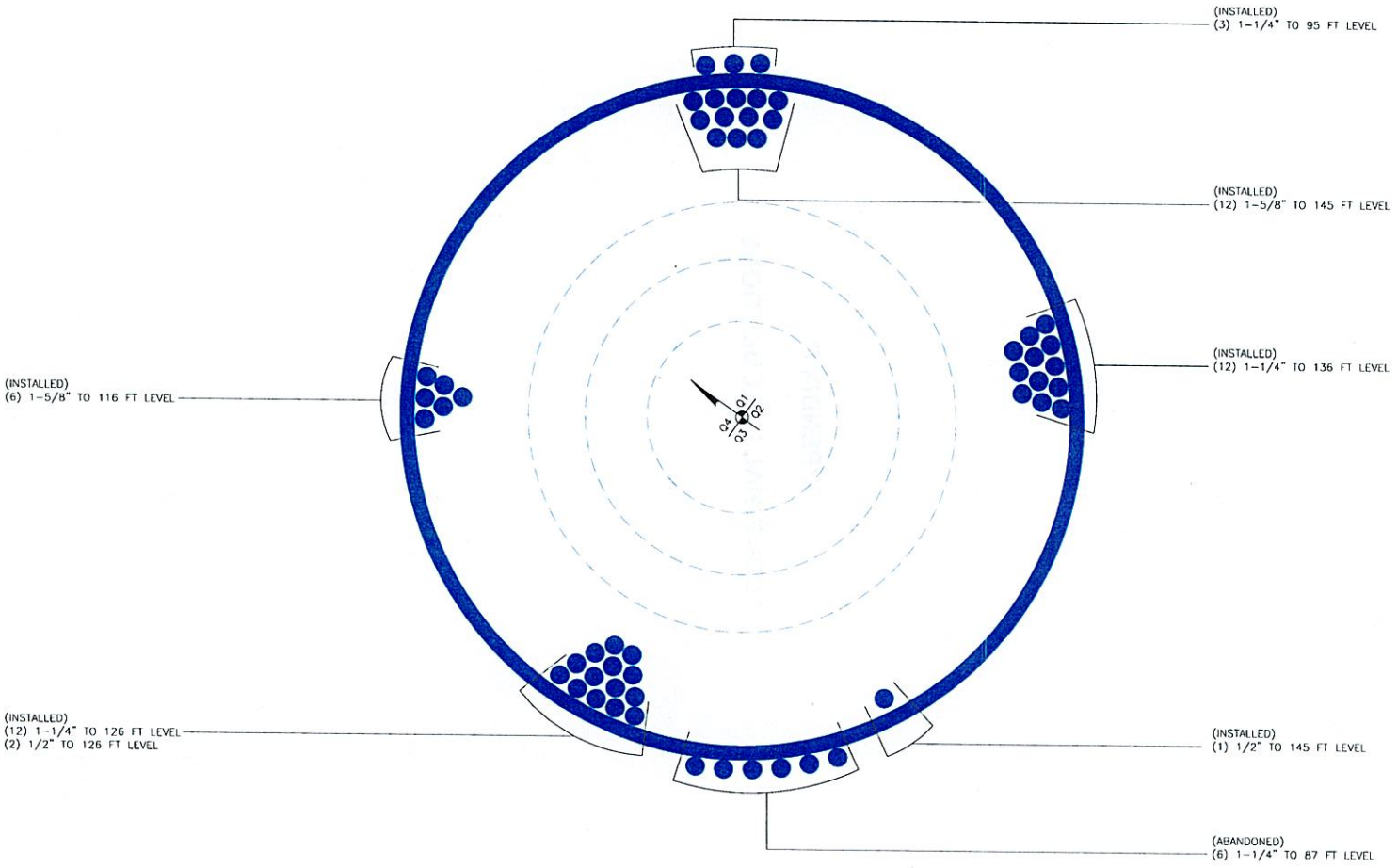
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	145 - 92.5 (1)	0.008	0.665	0.000	0.041	0.000	0.674 ✓	1.333	H1-3+VT ✓
L2	92.5 - 44.71 (2)	0.010	0.737	0.000	0.032	0.000	0.747 ✓	1.333	H1-3+VT ✓
L3	44.71 - 0 (3)	0.012	0.793	0.000	0.029	0.000	0.805 ✓	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	145 - 92.5	Pole	TP35.64x20.5x0.3438	1	-12.37	1948.37	50.5	Pass
L2	92.5 - 44.71	Pole	TP48.61x33.5105x0.4375	2	-24.26	3390.15	56.0	Pass
L3	44.71 - 0	Pole	TP60.5x45.8529x0.4688	3	-42.22	4564.23	60.4	Pass
							Summary	
						Pole (L3)	60.4	Pass
						RATING =	**60.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED)
(3) 1-1/4" TO 95 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 145 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 136 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 116 FT LEVEL
Q1
Q2
Q3
Q4
(INSTALLED)
(12) 1-1/4" TO 126 FT LEVEL
(2) 1/2" TO 126 FT LEVEL
(INSTALLED)
(1) 1/2" TO 145 FT LEVEL
(ABANDONED)
(6) 1-1/4" TO 87 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Monopole Pier and Pad Foundation

BU # : 806368
Site Name: HRT 049B 943215
App. Number: 94302

CROWN

Design Reactions		
Shear, S:	34	kips
Moment, M:	3319	ft-kips
Tower Height, H:	145	ft
Tower Weight, Wt:	42	kips
Base Diameter, BD:	5.04	ft

Foundation Dimensions		
Depth, D:	10.5	ft
Pad Width, W:	23	ft
Neglected Depth, N:	3	ft
Thickness, T:	3.00	ft
Pier Diameter, Pd:	7.50	ft
Ext. Above Grade, E:	1.00	ft
Clear Cover, Cc:	3.0	in

Soil Properties		
Soil Unit Weight, γ:	0.070	kcf
Bearing Capacity, Bc:	20.0	ksf
Angle of Friction, Φ:	35	deg
Cohesion, Co:	0.000	ksf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ:	0.20	

Material Properties		
Rebar Yield Strength, Fy:	60000	psi
Concrete Strength, F'c:	3000	psi
Concrete Unit Weight, δc:	0.088	kcf
Seismic Zone, z:	2	

Rebar Properties		
Pier Rebar Size, Sp:	8	
Pier Rebar Quanity, mp:	52	41
Pad Rebar Size, Spad:	8	
Pad Rebar Quanity, mpad:	46	22
Pier Tie Size, St:	4	3
Tie Quanity, mt:	8	15

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	7.5	7.04	OK
Overturning (ft-kips)	4824.73	3710.00	OK
Sheer Capacity (kips)	61.54	34.00	OK
Bearing (ksf)	20.00	3.26	OK
Pad Shear - 1-way (kips)	982.61	590.57	OK
Pad Shear - 2-way (kips)	2013.24	945.84	OK
Pier Rebar Area (in^2)	41.08	31.81	OK
Pad Rebar Area (in^2)	36.34	17.29	OK
Pier Moment Capacity (k-ft)	5425.33	3608.00	OK
Pier Bar Spacing (in)	4.07	18 > s > 2	OK
Pad Bar Spacing (in)	4.98	18 > s > 2	OK
Pier Development Length (in)	99	33.08	OK
Pad Development Length (in)	33	33.08	Hooks!
Hook Development Length (in)	135.00	15.34	OK
Rebar Hook Length (in)	93.00	16.00	OK

	Modification Checks	Capacity/ Availability	Demand/ Limits	Check
	Sleeve Rebar Area (in2):	15.8	0.00	Not Used
76.9%	Sleeve Moment Capacity (k-ft):	5425.33	3608.00	Not Run
55.3%	Sleeve Rebar Spacing (in):	N/a	18 > s > 2	Not Used
16.3%	Sleeve Tie Spacing (in):	N/A	4.5 > s > 4.5	Not Used
60.1%	Minimum Extra Thickness (in):	0	0	Not Used
47.0%	Pad Rebar Area-short (in2):	0.44	0.00	Not Used
	Pad Rebar Area-long (in2):	0.44	0.00	Not Used
	Pad Rebar Spacing-short (in):	89.5	18 > s > 2	Not Used
66.5%	Pad Rebar Spacing-long (in):	89.5	18 > s > 2	Not Used
	End Cap Width (ft):	0	0	Not Used
	End Cap Rebar Area (in2):	3.16	0	Not Used
	Rebar Spacing (in):	-3.00	18 > s > 2	Not Used
	Tie Spacing (in):	18.79	270 > s > 4.5	Not Used
	Dowel Area (in2):	2.2	0.00	Not Used
	Dowel Embedment (in):	9	6	Not Used
	Cone Shear Strength (kips):	24.68	23.76	Not Used
	Dowel Edge Dist (in):	12.00	4.78	Not Used
	Dowel Spacing (in):	63.00	18.00	Not Used
	Dowel Edge Dist (vert) (in):	18.00	4.78	Not Used
	Dowel Devel. Length (in):	-3.00	15.38	Not Used

Modifications					
Pier Sleeve, ds:	0	in	End Cap Width, Wec:	0	ft
Revised Pier Diameter, dx:	7.5	ft	Revised Width, Wx:	23	ft
PS Rebar Size, Ss:	8		EC Rebar Size, Sec:	8	per side, top & bottom
Rebar Quanity, ms:	20	0	Rebar Quanity, mec:	4	0
Tie Size, Sst:	3		EC Tie Size, Sect:	4	per side
Tie Quanity, mst:	9	25	Tie Quanity, mect:	15	0
Pad Thickness, Te:	0	in	EC Dowel Size, Secd:	6	per side
Revised Pier Thickness, Tx:	3.00	ft	Dowel Quanity, mecd:	5	0
Rebar Size, Se:	3		Rows of Dowels, Nd:	1	
Rebar Quanity (long), me:	4	0	Dowel Depth, decd:	9	in
Rebar Quanity (short), mex:	4	0	Edge Distance, eecd:	12	in
Dowel Size, Sed:	3				
Dowel Quanity, med:	0	0			

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

Site Data

BU#: *806368*
Site Name: *HRT 049B 943215*
App #: *94302*

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	70	in

Plate Data		
Diam:	76.5	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	9.73	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Both	
Groove Depth:	0.5	in **
Groove Angle:	60	degrees
Fillet H. Weld:	0.375	in
Fillet V. Weld:	0.375	in
Width:	6	in
Height:	18	in
Thick:	1	in
Notch:	1	in
Grade:	65	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	60.5	in
Thick:	0.4688	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	3319	ft-kips
Axial:	42	kips
Shear:	34	kips

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

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	111.7 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	57.3% **Pass**	

Base Plate Results

	Flexural Check	Stiffened
Base Plate Stress:	25.8 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	43.0% **Pass**	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	28.7% **Pass**
Vertical Weld:	31.3% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	5.7% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	27.9% **Pass**
Plate Comp. (AISC Bracket):	28.1% **Pass**

Pole Results

Pole Punching Shear Check:	6.9% **Pass**

* 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