HPC Wireless Services
22 Shelter Rock Lane
Danbury, CT, 06810
P.: 203.797.1112

HPC
WIRELESS SERVICES

March 14, 2014

VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Melanie Bachman, Acting Executive Director

Re: T-Mobile Northeast LLC – exempt modification
75 Roberts Road, Groton, Connecticut

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of T-Mobile Northeast LLC ("T-Mobile"). T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement LTE technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the Mayor of the Town of Groton.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at 75 Roberts Road in the Town of Groton (coordinates 41.360281, -72.048425). Attached are a compound plan and elevation depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration, subject to tower reinforcements detailed in the attached drawings. Also included is a power density report reflecting the modification to T-Mobile's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. T-Mobile will replace its six (6) existing panel antennas and six TMAs with six (6) new antennas at a center line of approximately 126'. A hybrid cable will be run from

the equipment to the antennas along the existing coaxial cable run. The proposed modifications will not extend the height of the approximately 145' structure.

2. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

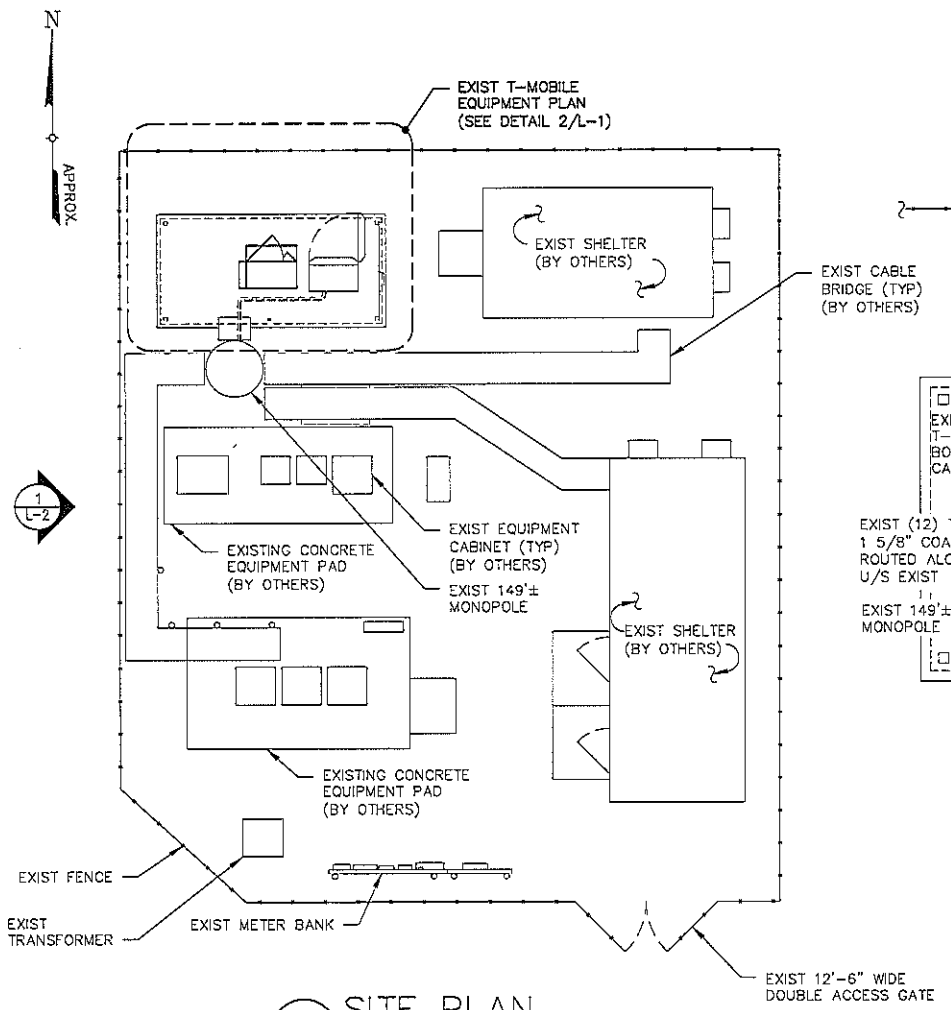
3. The changes to the facility will not increase the calculated power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated on the attached report prepared by EBI Consulting, T-Mobile's operations at the site will result in a power density of approximately 0.810%; the combined site operations will result in a total power density of approximately 38.500%.

Please feel free to contact me by phone at (617) 281-0084 or by e-mail at agiannaras@hpcwireless.com with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

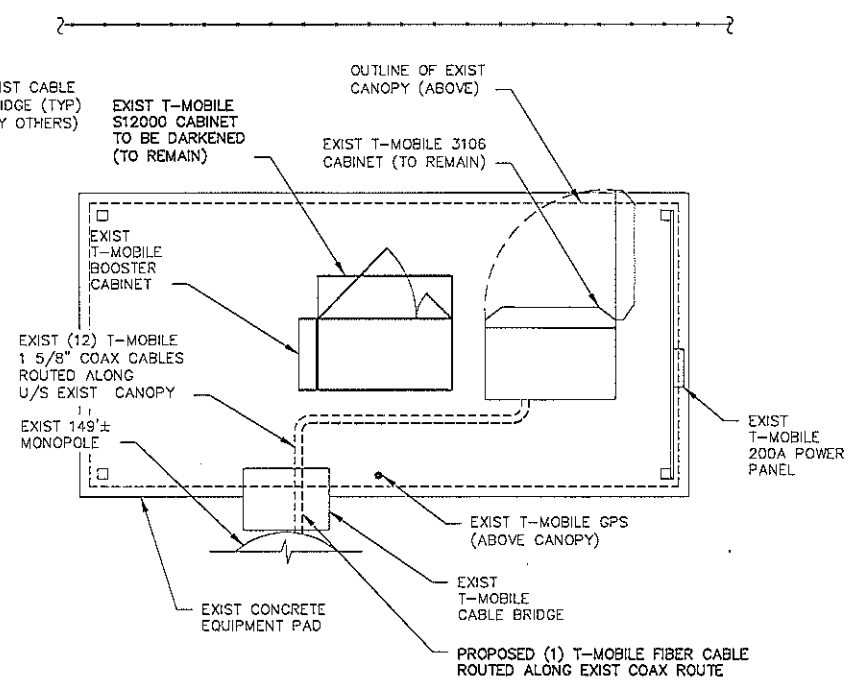
Alex Giannaras

cc: Honorable Rita M. Schmidt, Mayor, Town of Groton
Mark R. Oefinger, Town Manager, Town of Groton
Philip A. Strickland & Daniel J. Perrotta (underlying property owner)



1 L-1 SITE PLAN

SCALE: 3/32" = 1'-0"



2 L-1 EQUIPMENT PLAN

SCALE: 1/4" = 1'-0"

STRUCTURAL NOTE:
EXIST MOUNTS AND MONOPOLE TO BE VERIFIED FOR STRUCTURAL SUITABILITY OF PROPOSED INSTALLATION BY A STATE LICENSED P.E.

CONFIGURATION
2C

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1270 Route 300
Newburgh, NY 12550
Phone: (845) 567-0666
Fax: (845) 567-8703

T-Mobile

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS
T-MOBILE
LANDLORD
RF
CONSTRUCTION

PROJECT NUMBER	DESIGNED BY
0644.CT11428A	TN

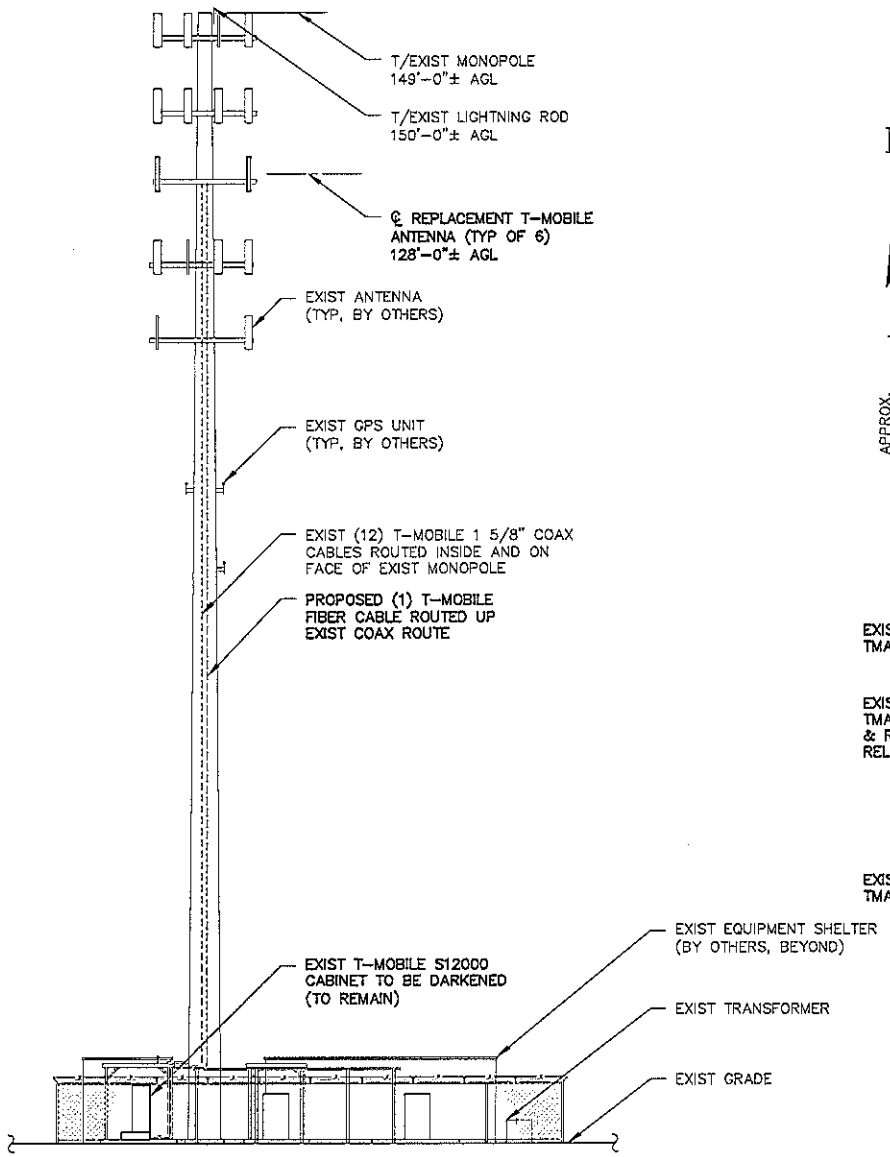
REV	DATE	REVISION	DRAWN BY
0	12/17/13	FOR COMMENT	MJR

ISSUED BY | DATE

SITE INFORMATION
CT11428A
GROTON/I-95/
BUDDINGTON RD
75 ROBERTS ROAD
GROTON, CT 06340

SHEET TITLE
SITE PLAN

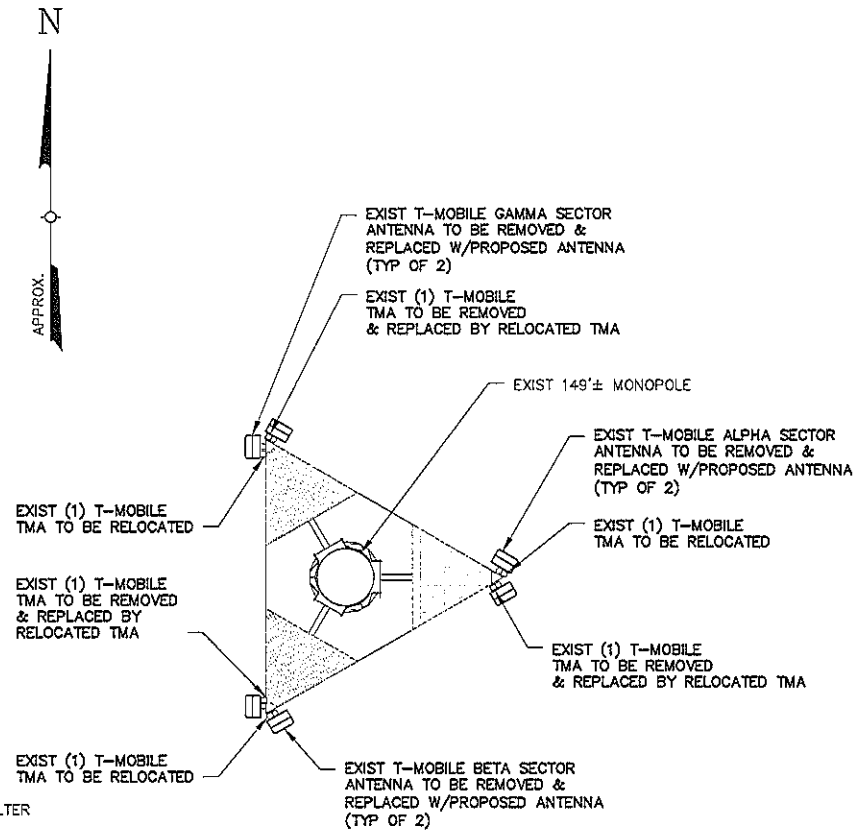
SHEET NUMBER
L-1



NOTE: SOME EXISTING SITE FEATURES BY OTHERS NOT SHOWN FOR CLARITY.

1 / L-2 ELEVATION

SCALE: 1/16" = 1'-0"



2 / L-2 ANTENNA PLAN

SCALE: 3/16" = 1'-0"

STRUCTURAL NOTE:
EXIST MOUNTS AND MONOPOLE TO BE VERIFIED FOR STRUCTURAL SUITABILITY OF PROPOSED INSTALLATION BY A STATE LICENSED P.E.

CONFIGURATION
2C

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-0058
Fax: (845) 567-8703

T-Mobile

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE
LANDLORD
RF
CONSTRUCTION

PROJECT NUMBER	DESIGNED BY
0644.CT11428A	TN

REV	DATE	REVISION	DRAWN BY
0	12/17/13	FOR COMMENT	MJR

ISSUED BY DATE

SITE INFORMATION

CT11428A
GROTON/I-95/
BUDDINGTON RD
75 ROBERTS ROAD
GROTON, CT 06340

SHEET TITLE

ELEVATION &
ANTENNA PLAN

SHEET NUMBER

L-2

Date: **February 25, 2014**

Steve Tuttle
Crown Castle
8 Parkmeadow Drive
Pittsford, NY 14534

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

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate** **Carrier Site Number:**	 CT11428A
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	881533 GROTON TOWER 252704 711991 207070 Rev. 4
Engineering Firm Designation:	**Crown Castle Project Number:**	711991
Site Data:	**75 Roberts Road, Groton, New London County, CT** **Latitude *41° 21' 36.8"*, Longitude *-72° 2' 55.1"*** **144.5 Foot - Monopole Tower**	

Dear Steve Tuttle,

Crown Castle is pleased to submit this **"Structural Modification 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 711991, in accordance with application 207070, revision 4.

The purpose of the analysis is to determine acceptability of the tower stress level including the proposed modifications as outlined in the attached drawings, "Appendix D". Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC4: Modified Structure w/ Existing + Proposed **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment 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* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Drew Stephens /TS

Respectfully submitted by:

STATE OF CONNECTICUT
JAMAL A HUWEL
20893
LICENSED
PROFESSIONAL ENGINEER
DATE
FEB 25 2014
SIGNED

Jamal A. Huwel, P.E.
Manager Engineering

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 144.5 ft Monopole tower designed by Engineered Endeavors, Inc. in January of 2001. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F. The tower has been modified per reinforcement drawings prepared by Walker Engineering, in August of 2007. Reinforcement consists of addition of base plate stiffeners. The tower was later reinforced per reinforcement drawings prepared by Vertical Structures, in November of 2008. Reinforcement consists of weld size increase to the previous base plate stiffener modification.

The modification drawings designed by CCI and attached in Appendix D, have been considered in this analysis

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
125.0	126.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	-
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			

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
145.0	146.0	6	powerwave technologies	7770.00 w/ Mount Pipe	12 3	1-5/8 3/8	1
	145.0	6	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD			
		1	andrew	SBNH-1D6565C w/ Mount Pipe			
		3	ericsson	RRUS 11			
		6	kathrein	782-10250			
		1	kmw communications	AM-X-CD-17-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 601-1]			
		-	-	-	1	1-5/8	3
135.0	137.0	6	andrew	CBC721-DF	12	1-5/8	1
		3	antel	BXA-171063/8CF w/ Mount Pipe			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe			
		6	antel	LPA-80063/4CF w/ Mount Pipe			
	135.0	1	tower mounts	Platform Mount [LP 601-1]			
125.0	126.0	3	ems wireless	RR90-17-02DPL2 w/ Mount Pipe	-	-	2
		3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe			
	125.0	3	rfs celwave	ATMAA1412D-1A20			
		3	rfs celwave	ATMPP1412D-1CWA			
		1	tower mounts	Platform Mount [LP 601-1]	12	1-5/8	1
113.0	113.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	3	1-1/4	1
		1	tower mounts	Platform Mount [LP 601-1]			
111.0	111.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
	109.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			
100.0	102.0	3	kathrein	800 10504 w/ Mount Pipe	6	7/8	1
	100.0	1	tower mounts	Platform Mount [LP 601-1]	1	3/8	
51.0	52.0	1	lucent	KS24019-L112A	1	1/2	1
	51.0	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed; Not Considered in this Analysis
3) Abandoned Equipment; Considered 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	145	12	Allgon	7120.16	-	-
135	135	12	Allgon	7120.16	-	-
125	125	9	Allgon	7120.16	-	-
115	115	12	Allgon	7120.16	-	-
105	105	12	Allgon	7120.16	-	-
95	95	12	Allgon	7120.16	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti	1406209	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	URS	1405796	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI	1405782	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Walker Engineering	2048224	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Vertical Solutions	2353860	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Crown Castle	Appendix D	ON FILE

3.1) Analysis Method

tnxTower (version 6.1.4.1), 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.

tnxTower was used to determine the loads on the modified structure. Additional calculations were performed to determine the stresses in the pole and in the reinforcing elements. These calculations are included in Appendix C.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) The existing base plate grout was not considered in this analysis.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
144.5 - 139.5	Pole	TP22.091x21x0.1875	Pole	11.9%	Pass
139.5 - 134.5	Pole	TP23.181x22.091x0.1875	Pole	23.6%	Pass
134.5 - 129.5	Pole	TP24.272x23.181x0.1875	Pole	37.7%	Pass
129.5 - 124.5	Pole	TP25.362x24.272x0.1875	Pole	51.0%	Pass

124.5 - 121.46	Pole	TP26.88x25.362x0.1875	Pole	59.8%	Pass
121.46 - 116.46	Pole	TP26.722x25.65x0.25	Pole	56.7%	Pass
116.46 - 111.46	Pole	TP27.794x26.722x0.25	Pole	66.4%	Pass
111.46 - 106.46	Pole	TP28.865x27.794x0.25	Pole	76.8%	Pass
106.46 - 101.46	Pole	TP29.937x28.865x0.25	Pole	85.9%	Pass
101.46 - 98.5	Pole	TP30.571x29.937x0.25	Pole	91.3%	Pass
98.5 - 93.5	Pole + Reinf.	TP31.643x30.571x0.4	Reinf. 1 Compression	86.6%	Pass
93.5 - 91.84	Pole + Reinf.	TP33x31.643x0.4	Reinf. 1 Compression	89.3%	Pass
91.84 - 86.17	Pole	TP32.719x31.499x0.375	Pole	77.0%	Pass
86.17 - 81.17	Pole	TP33.794x32.719x0.375	Pole	81.3%	Pass
81.17 - 76.17	Pole	TP34.87x33.794x0.375	Pole	85.1%	Pass
76.17 - 71.17	Pole	TP35.945x34.87x0.375	Pole	88.4%	Pass
71.17 - 66.17	Pole	TP37.021x35.945x0.375	Pole	91.3%	Pass
66.17 - 61.17	Pole	TP38.096x37.021x0.375	Pole	93.8%	Pass
61.17 - 56.17	Pole	TP39.171x38.096x0.375	Pole	96.0%	Pass
56.17 - 51.17	Pole	TP40.247x39.171x0.375	Pole	98.0%	Pass
51.17 - 47.92	Pole	TP42.2x40.247x0.375	Pole	99.1%	Pass
47.92 - 41.09	Pole	TP41.665x40.196x0.4375	Pole	90.4%	Pass
41.09 - 36.09	Pole	TP42.74x41.665x0.4375	Pole	91.5%	Pass
36.09 - 31.09	Pole	TP43.815x42.74x0.4375	Pole	92.5%	Pass
31.09 - 26.09	Pole	TP44.89x43.815x0.4375	Pole	93.3%	Pass
26.09 - 21.09	Pole	TP45.965x44.89x0.4375	Pole	94.0%	Pass
21.09 - 16.09	Pole	TP47.04x45.965x0.4375	Pole	94.6%	Pass
16.09 - 11.09	Pole	TP48.115x47.04x0.4375	Pole	95.1%	Pass
11.09 - 6.09	Pole	TP49.19x48.115x0.4375	Pole	95.5%	Pass
6.09 - 1.09	Pole	TP50.266x49.19x0.4375	Pole	95.8%	Pass
1.09 - 0	Pole	TP50.5x50.266x0.4375	Pole	95.8%	Pass
				Summary	
			Pole	99.1%	Pass
			Reinforcement	89.3%	Pass
			Overall	99.1%	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC4

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	90.9	Pass
1	Base Plate	0	76.5	Pass
1	Base Foundation Soil Interaction	0	47.8	Pass
1	Base Plate Stiffeners	0	80.6	Pass

Structure Rating (max from all components) =	99.1%

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

4.1) Recommendations

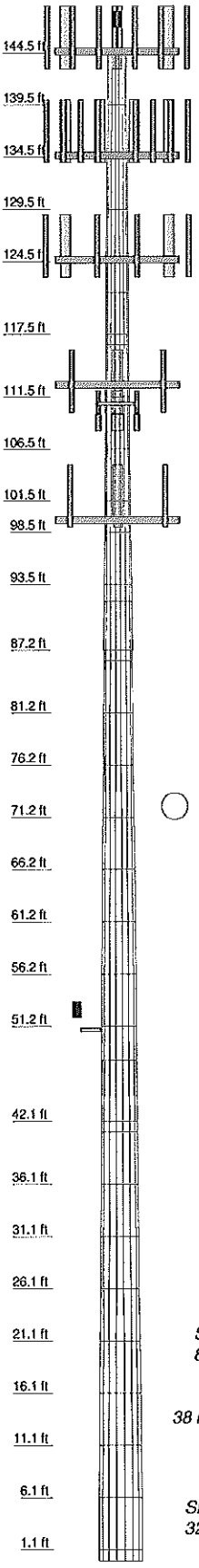
Perform the modifications detailed in "Appendix D" to remedy the deficiencies identified in Crown Castle Work Order No. 684943.

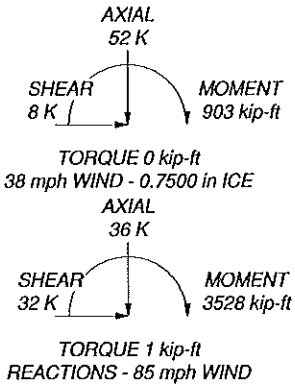
APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Length (ft)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.96	5.00	5.00	6.08	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.08	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.08
Number of Sides	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.1875	0.1875	0.1875	0.1875	0.1875	0.2500	0.2500	0.2500	0.2500	0.4000	0.4000	0.4000	0.3750	0.3750	0.3750	0.3750	0.3750	0.3750	0.3750	0.3750	0.3750	0.4375	0.4375	0.4375	0.4375	0.4375	0.4375	0.4375	0.4375	0.4375	0.4375
Socket Length (ft)																															
Top Dia (in)	21.0000	22.0905	23.1810	24.2715	25.3620	26.7225	27.7935	28.8652	29.9370	30.5712	31.6432	33.0000	33.7941	32.7186	33.7941	34.8695	35.9450	37.0205	38.0960	39.1715	40.2469	41.6040	42.7397	43.8149	44.8900	45.9651	47.0402	48.1154	49.1905	50.2656	50.5080
Bot Dia (in)	22.0905	23.1810	24.2715	25.3620	26.8800	27.7935	28.8652	29.9370	31.6432	31.6432	33.0000	33.7941	32.7186	33.7941	34.8695	35.9450	37.0205	38.0960	39.1715	40.2469	42.2000	42.7397	43.8149	44.8900	45.9651	47.0402	48.1154	49.1905	50.2656	50.5080	50.5080
Grade	A572-65																														
Weight (K)	0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.6	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	1.5	1.3	1.0	1.0	1.1	1.1	1.1	1.1	1.2	0.3	1.0

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	5.00	18	0.1875		21.0000	22.0905	A572-65	0.2
2	5.00	18	0.1875		22.0905	23.1810		0.2
3	5.00	18	0.1875		23.1810	24.2715		0.2
4	5.00	18	0.1875		24.2715	25.3620		0.2
5	5.00	18	0.1875	3.92	25.3620	26.8800		0.4
6	5.00	18	0.2500		26.7225	27.7935		0.4
7	5.00	18	0.2500		27.7935	28.8652		0.4
8	5.00	18	0.2500		28.8652	29.9370		0.4
9	2.96	18	0.2500		29.9370	31.6432		0.2
10	5.00	18	0.4000		30.5712	31.6432		0.6
11	5.00	18	0.4000	4.67	31.6432	33.0000		0.8
12	6.08	18	0.3750		33.0000	33.7941		0.7
13	5.00	18	0.3750		32.7186	33.7941		0.7
14	5.00	18	0.3750		33.7941	34.8695		0.7
15	5.00	18	0.3750		34.8695	35.9450		0.7
16	5.00	18	0.3750		35.9450	37.0205		0.7
17	5.00	18	0.3750		37.0205	38.0960		0.8
18	5.00	18	0.3750		38.0960	39.1715		0.8
19	5.00	18	0.3750		39.1715	40.2469		0.8
20	5.00	18	0.3750	5.83	40.2469	42.2000		1.5
21	6.08	18	0.4375		41.6040	42.7397		1.3
22	5.00	18	0.4375		42.7397	43.8149		1.0
23	5.00	18	0.4375		43.8149	44.8900		1.0
24	5.00	18	0.4375		44.8900	45.9651		1.1
25	5.00	18	0.4375		45.9651	47.0402		1.1
26	5.00	18	0.4375		47.0402	48.1154		1.1
27	5.00	18	0.4375		48.1154	49.1905		1.1
28	5.00	18	0.4375		49.1905	50.2656		1.2
29	1.08	18	0.4375		50.2656	50.5080		0.3





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 5/8" x 5'	147	(2) CBC721-DF	135
Flash Beacon Lighting	147	(2) CBC721-DF	135
(2) 7770.00 w/ Mount Pipe	145	Platform Mount [LP 601-1]	135
(2) 7770.00 w/ Mount Pipe	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	125
(2) 7770.00 w/ Mount Pipe	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	125
P65-17-XLH-RR w/ Mount Pipe	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	125
AM-X-CD-17-65-00T-RET w/ Mount Pipe	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	125
SBNH-1D6565C w/ Mount Pipe	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	125
RRUS 11	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	125
RRUS 11	145	KRY 112 144/1	125
RRUS 11	145	KRY 112 144/1	125
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	145	KRY 112 144/1	125
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	145	Platform Mount [LP 601-1]	125
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	145	APXVSPP18-C-A20 w/ Mount Pipe	113
(2) 782-10250	145	APXVSPP18-C-A20 w/ Mount Pipe	113
(2) 782-10250	145	APXVSPP18-C-A20 w/ Mount Pipe	113
(2) 782-10250	145	(3) 6' x 2" Mount Pipe	113
(2) LGP13519	145	(3) 6' x 2" Mount Pipe	113
(2) LGP13519	145	(3) 6' x 2" Mount Pipe	113
(2) LGP13519	145	Platform Mount [LP 601-1]	113
DC6-48-60-18-8F	145	800MHz 2X50W RRH W/FILTER	111
6'x2" Antenna Mount Pipe	145	800MHz 2X50W RRH W/FILTER	111
8'x2" Antenna Mount Pipe	145	800MHz 2X50W RRH W/FILTER	111
8'x2" Antenna Mount Pipe	145	PCS 1900MHz 4x45W-65MHz	111
Platform Mount [LP 601-1]	145	PCS 1900MHz 4x45W-65MHz	111
BXA-171063/8CF w/ Mount Pipe	135	PCS 1900MHz 4x45W-65MHz	111
BXA-171063/8CF w/ Mount Pipe	135	Side Arm Mount [SO 102-3]	111
BXA-171063/8CF w/ Mount Pipe	135	800 10504 w/ Mount Pipe	100
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	135	800 10504 w/ Mount Pipe	100
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	135	800 10504 w/ Mount Pipe	100
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	135	7'x2" Antenna Mount Pipe	100
(2) LPA-80063/4CF w/ Mount Pipe	135	7'x2" Antenna Mount Pipe	100
(2) LPA-80063/4CF w/ Mount Pipe	135	7'x2" Antenna Mount Pipe	100
(2) LPA-80063/4CF w/ Mount Pipe	135	Platform Mount [LP 601-1]	100
(2) CBC721-DF	135	KS24019-L112A	51
		Side Arm Mount [SO 701-1]	51

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London 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: 99.1%

CROWN CASTLE
We Are Solutions
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX:

Job: *BU# 881533*			
Project:			
Client: Crown Castle	Drawn by: dstephens		App'd:
Code: TIA/EIA-222-F	Date: 02/25/14		Scale: N
Path: R:\Reinforcement Mods\2014-02 February\881533 Work\sq\881533_CCIFP.eri			Dwg No.

Tower Input Data

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

4) Tower is located in New London County, Connecticut.
5) Basic wind speed of 85 mph.
6) Nominal ice thickness of 0.7500 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56.00 pcf.
9) A wind speed of 38 mph is used in combination with ice.
10) Temperature drop of 50 °F.
11) Deflections calculated using a wind speed of 50 mph.
12) TOWER RATING: 99.1%.
13) A non-linear (P-delta) analysis was used.
14) Pressures are calculated at each section.
15) Stress ratio used in pole design is 1.333.
16) Local bending stresses due to climbing loads, feed line 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	Use TIA-222-G Tension Splice	
	Capacity Exemption	

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	144.50-139.50	5.00	0.00	18	21.0000	22.0905	0.1875	0.7500	A572-65 (65 ksi)
L2	139.50-134.50	5.00	0.00	18	22.0905	23.1810	0.1875	0.7500	A572-65 (65 ksi)
L3	134.50-129.50	5.00	0.00	18	23.1810	24.2715	0.1875	0.7500	A572-65 (65 ksi)
L4	129.50-124.50	5.00	0.00	18	24.2715	25.3620	0.1875	0.7500	A572-65 (65 ksi)
L5	124.50-117.54	6.96	3.92	18	25.3620	26.8800	0.1875	0.7500	A572-65 (65 ksi)
L6	117.54-116.46	5.00	0.00	18	25.6500	26.7218	0.2500	1.0000	A572-65 (65 ksi)
L7	116.46-111.46	5.00	0.00	18	26.7218	27.7935	0.2500	1.0000	A572-65 (65 ksi)
L8	111.46-106.46	5.00	0.00	18	27.7935	28.8652	0.2500	1.0000	A572-65 (65 ksi)

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
L9	106.46-101.46	5.00	0.00	18	28.8652	29.9370	0.2500	1.0000	A572-65 (65 ksi)
L10	101.46-98.50	2.96	0.00	18	29.9370	30.5714	0.2500	1.0000	A572-65 (65 ksi)
L11	98.50-93.50	5.00	0.00	18	30.5714	31.6432	0.4000	1.6000	A572-65 (65 ksi)
L12	93.50-87.17	6.33	4.67	18	31.6432	33.0000	0.4000	1.6000	A572-65 (65 ksi)
L13	87.17-86.17	5.67	0.00	18	31.4990	32.7186	0.3750	1.5000	A572-65 (65 ksi)
L14	86.17-81.17	5.00	0.00	18	32.7186	33.7941	0.3750	1.5000	A572-65 (65 ksi)
L15	81.17-76.17	5.00	0.00	18	33.7941	34.8695	0.3750	1.5000	A572-65 (65 ksi)
L16	76.17-71.17	5.00	0.00	18	34.8695	35.9450	0.3750	1.5000	A572-65 (65 ksi)
L17	71.17-66.17	5.00	0.00	18	35.9450	37.0205	0.3750	1.5000	A572-65 (65 ksi)
L18	66.17-61.17	5.00	0.00	18	37.0205	38.0960	0.3750	1.5000	A572-65 (65 ksi)
L19	61.17-56.17	5.00	0.00	18	38.0960	39.1715	0.3750	1.5000	A572-65 (65 ksi)
L20	56.17-51.17	5.00	0.00	18	39.1715	40.2469	0.3750	1.5000	A572-65 (65 ksi)
L21	51.17-42.09	9.08	5.83	18	40.2469	42.2000	0.3750	1.5000	A572-65 (65 ksi)
L22	42.09-41.09	6.83	0.00	18	40.1960	41.6646	0.4375	1.7500	A572-65 (65 ksi)
L23	41.09-36.09	5.00	0.00	18	41.6646	42.7397	0.4375	1.7500	A572-65 (65 ksi)
L24	36.09-31.09	5.00	0.00	18	42.7397	43.8149	0.4375	1.7500	A572-65 (65 ksi)
L25	31.09-26.09	5.00	0.00	18	43.8149	44.8900	0.4375	1.7500	A572-65 (65 ksi)
L26	26.09-21.09	5.00	0.00	18	44.8900	45.9651	0.4375	1.7500	A572-65 (65 ksi)
L27	21.09-16.09	5.00	0.00	18	45.9651	47.0402	0.4375	1.7500	A572-65 (65 ksi)
L28	16.09-11.09	5.00	0.00	18	47.0402	48.1154	0.4375	1.7500	A572-65 (65 ksi)
L29	11.09-6.09	5.00	0.00	18	48.1154	49.1905	0.4375	1.7500	A572-65 (65 ksi)
L30	6.09-1.09	5.00	0.00	18	49.1905	50.2656	0.4375	1.7500	A572-65 (65 ksi)
L31	1.09-0.00	1.09		18	50.2656	50.5000	0.4375	1.7500	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	21.3240	12.3860	677.8263	7.3884	10.6680	63.5383	1356.5444	6.1942	3.3660	17.952
	22.4313	13.0350	790.0539	7.7756	11.2220	70.4024	1581.1474	6.5188	3.5579	18.976
L2	22.4313	13.0350	790.0539	7.7756	11.2220	70.4024	1581.1474	6.5188	3.5579	18.976
	23.5386	13.6840	914.0320	8.1627	11.7760	77.6185	1829.2667	6.8433	3.7499	19.999
L3	23.5386	13.6840	914.0320	8.1627	11.7760	77.6185	1829.2667	6.8433	3.7499	19.999
	24.6459	14.3330	1050.3456	8.5498	12.3299	85.1867	2102.0733	7.1679	3.9418	21.023
L4	24.6459	14.3330	1050.3456	8.5498	12.3299	85.1867	2102.0733	7.1679	3.9418	21.023
	25.7533	14.9820	1199.5798	8.9370	12.8839	93.1068	2400.7379	7.4924	4.1337	22.046
L5	25.7533	14.9820	1199.5798	8.9370	12.8839	93.1068	2400.7379	7.4924	4.1337	22.046
	27.2947	15.8854	1429.9255	9.4758	13.6550	104.7178	2861.7325	7.9442	4.4009	23.471
L6	26.8989	20.1549	1642.8118	9.0170	13.0302	126.0770	3287.7853	10.0794	4.0744	16.298
	27.1340	21.0054	1859.6609	9.3975	13.5747	136.9950	3721.7689	10.5047	4.2630	17.052
L7	27.1340	21.0054	1859.6609	9.3975	13.5747	136.9950	3721.7689	10.5047	4.2630	17.052
	28.2223	21.8558	2094.7992	9.7779	14.1191	148.3663	4192.3548	10.9300	4.4517	17.807

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
L8	28.2223	21.8558	2094.7992	9.7779	14.1191	148.3663	4192.3548	10.9300	4.4517	17.807
	29.3105	22.7062	2348.9671	10.1584	14.6635	160.1909	4701.0250	11.3553	4.6403	18.561
L9	29.3105	22.7062	2348.9671	10.1584	14.6635	160.1909	4701.0250	11.3553	4.6403	18.561
	30.3988	23.5566	2622.9050	10.5389	15.2080	172.4689	5249.2613	11.7805	4.8289	19.316
L10	30.3988	23.5566	2622.9050	10.5389	15.2080	172.4689	5249.2613	11.7805	4.8289	19.316
	31.0431	24.0601	2794.6940	10.7641	15.5303	179.9511	5593.0653	12.0323	4.9406	19.762
L11	31.0431	38.3057	4405.4765	10.7109	15.5303	283.6698	8816.7499	19.1565	4.6766	11.691
	32.1313	39.6663	4891.8173	11.0913	16.0747	304.3171	9790.0713	19.8369	4.8652	12.163
L12	32.1313	39.6663	4891.8173	11.0913	16.0747	304.3171	9790.0713	19.8369	4.8652	12.163
	33.5091	41.3890	5557.2146	11.5730	16.7640	331.4969	11121.7414	20.6984	5.1040	12.76
L13	33.0049	37.0453	4533.7948	11.0490	16.0015	283.3358	9073.5552	18.5262	4.8838	13.024
	33.2233	38.4970	5087.9210	11.4820	16.6210	306.1132	10182.5369	19.2521	5.0985	13.596
L14	33.2233	38.4970	5087.9210	11.4820	16.6210	306.1132	10182.5369	19.2521	5.0985	13.596
	34.3154	39.7770	5612.5299	11.8638	17.1674	326.9298	11232.4450	19.8923	5.2878	14.101
L15	34.3154	39.7770	5612.5299	11.8638	17.1674	326.9298	11232.4450	19.8923	5.2878	14.101
	35.4075	41.0571	6172.0146	12.2456	17.7137	348.4311	12352.1505	20.5325	5.4770	14.605
L16	35.4075	41.0571	6172.0146	12.2456	17.7137	348.4311	12352.1505	20.5325	5.4770	14.605
	36.4995	42.3372	6767.4974	12.6274	18.2601	370.6172	13543.8996	21.1726	5.6663	15.11
L17	36.4995	42.3372	6767.4974	12.6274	18.2601	370.6172	13543.8996	21.1726	5.6663	15.11
	37.5916	43.6173	7400.1006	13.0092	18.8064	393.4881	14809.9385	21.8128	5.8556	15.615
L18	37.5916	43.6173	7400.1006	13.0092	18.8064	393.4881	14809.9385	21.8128	5.8556	15.615
	38.6837	44.8974	8070.9468	13.3909	19.3528	417.0438	16152.5135	22.4530	6.0449	16.12
L19	38.6837	44.8974	8070.9468	13.3909	19.3528	417.0438	16152.5135	22.4530	6.0449	16.12
	39.7757	46.1775	8781.1581	13.7727	19.8991	441.2842	17573.8706	23.0931	6.2342	16.624
L20	39.7757	46.1775	8781.1581	13.7727	19.8991	441.2842	17573.8706	23.0931	6.2342	16.624
	40.8678	47.4576	9531.8569	14.1545	20.4454	466.2094	19076.2561	23.7333	6.4235	17.129
L21	40.8678	47.4576	9531.8569	14.1545	20.4454	466.2094	19076.2561	23.7333	6.4235	17.129
	42.8510	49.7822	11002.3002	14.8479	21.4376	513.2244	22019.0774	24.8958	6.7672	18.046
L22	42.0890	55.2096	11025.8527	14.1143	20.4196	539.9651	22066.2135	27.6101	6.3045	14.41
	42.3074	57.2490	12293.3791	14.6356	21.1656	580.8182	24602.9342	28.6299	6.5630	15.001
L23	42.3074	57.2490	12293.3791	14.6356	21.1656	580.8182	24602.9342	28.6299	6.5630	15.001
	43.3991	58.7419	13280.4430	15.0173	21.7118	611.6697	26578.3608	29.3766	6.7522	15.434
L24	43.3991	58.7419	13280.4430	15.0173	21.7118	611.6697	26578.3608	29.3766	6.7522	15.434
	44.4908	60.2349	14318.9771	15.3990	22.2580	643.3196	28656.7955	30.1232	6.9414	15.866
L25	44.4908	60.2349	14318.9771	15.3990	22.2580	643.3196	28656.7955	30.1232	6.9414	15.866
	45.5825	61.7278	15410.2895	15.7806	22.8041	675.7679	30840.8563	30.8698	7.1306	16.299
L26	45.5825	61.7278	15410.2895	15.7806	22.8041	675.7679	30840.8563	30.8698	7.1306	16.299
	46.6742	63.2208	16555.6884	16.1623	23.3503	709.0145	33133.1611	31.6164	7.3199	16.731
L27	46.6742	63.2208	16555.6884	16.1623	23.3503	709.0145	33133.1611	31.6164	7.3199	16.731
	47.7659	64.7137	17756.4818	16.5440	23.8964	743.0596	35536.3280	32.3630	7.5091	17.164

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
L28	47.7659	64.7137	17756.4818	16.5440	23.8964	743.0596	35536.3280	32.3630	7.5091	17.164
	48.8576	66.2067	19013.9779	16.9256	24.4426	777.9030	38052.9750	33.1096	7.6983	17.596
L29	48.8576	66.2067	19013.9779	16.9256	24.4426	777.9030	38052.9750	33.1096	7.6983	17.596
	49.9493	67.6996	20329.4849	17.3073	24.9888	813.5448	40685.7199	33.8562	7.8875	18.029
L30	49.9493	67.6996	20329.4849	17.3073	24.9888	813.5448	40685.7199	33.8562	7.8875	18.029
	51.0411	69.1926	21704.3109	17.6890	25.5349	849.9849	43437.1809	34.6029	8.0767	18.461
L31	51.0411	69.1926	21704.3109	17.6890	25.5349	849.9849	43437.1809	34.6029	8.0767	18.461
	51.2790	69.5180	22012.0267	17.7722	25.6540	858.0349	44053.0173	34.7656	8.1180	18.555

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 144.50-139.50				1	1	1		
L2 139.50-134.50				1	1	1		
L3 134.50-129.50				1	1	1		
L4 129.50-124.50				1	1	1		
L5 124.50-117.54				1	1	1		
L6 117.54-116.46				1	1	1		
L7 116.46-111.46				1	1	1		
L8 111.46-106.46				1	1	1		
L9 106.46-101.46				1	1	1		
L10 101.46-98.50				1	1	1		
L11 98.50-93.50				1	1	0.968352		
L12 93.50-87.17				1	1	0.964486		
L13 87.17-86.17				1	1	1		
L14 86.17-81.17				1	1	1		
L15 81.17-76.17				1	1	1		
L16 76.17-71.17				1	1	1		
L17 71.17-66.17				1	1	1		
L18 66.17-61.17				1	1	1		
L19 61.17-56.17				1	1	1		
L20 56.17-51.17				1	1	1		
L21 51.17-42.09				1	1	1		
L22 42.09-41.09				1	1	1		
L23 41.09-36.09				1	1	1		
L24 36.09-				1	1	1		

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
31.09								
L25 31.09-26.09				1	1	1		
L26 26.09-21.09				1	1	1		
L27 21.09-16.09				1	1	1		
L28 16.09-11.09				1	1	1		
L29 11.09-6.09				1	1	1		
L30 6.09-1.09				1	1	1		
L31 1.09-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	C	No	Inside Pole	144.50 - 0.00	1	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
						4" Ice	0.00	0.82
CR 50 1873(1-5/8")	C	No	Inside Pole	144.50 - 0.00	12	No Ice	0.00	0.83
						1/2" Ice	0.00	0.83
						1" Ice	0.00	0.83
						2" Ice	0.00	0.83
						4" Ice	0.00	0.83
FB-L98B-002-75000(3/8")	C	No	Inside Pole	144.50 - 0.00	3	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
2" Rigid Conduit	C	No	Inside Pole	144.50 - 0.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
						2" Ice	0.00	2.80
						4" Ice	0.00	2.80
***								
LDF7-50A(1-5/8")	A	No	Inside Pole	135.00 - 0.00	12	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
						4" Ice	0.00	0.82
***								
LDF7-50A(1-5/8")	B	No	CaAa (Out Of Face)	125.00 - 10.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.54
						4" Ice	1.00	30.04
LDF7-50A(1-5/8")	B	No	Inside Pole	125.00 - 10.00	10	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
						4" Ice	0.00	0.82
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	Inside Pole	125.00 - 10.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
						2" Ice	0.00	1.07
						4" Ice	0.00	1.07
***								
HB114-1-08U4-M5J(1	C	No	Inside Pole	113.00 - 0.00	3	No Ice	0.00	1.08

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1/4")						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08
						2" Ice	0.00	1.08
						4" Ice	0.00	1.08
***								
FXL 780 PE(7/8)	B	No	CaAa (Out Of Face)	100.00 - 10.00	6	No Ice	0.00	0.25
						1/2" Ice	0.00	1.22
						1" Ice	0.00	2.80
						2" Ice	0.00	7.80
						4" Ice	0.00	25.12
840 10414(3/8)	B	No	CaAa (Out Of Face)	100.00 - 10.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.54
						1" Ice	0.00	1.68
						2" Ice	0.00	5.81
						4" Ice	0.00	21.38
***								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	51.00 - 0.00	1	No Ice	0.06	0.15
						1/2" Ice	0.16	0.84
						1" Ice	0.26	2.14
						2" Ice	0.46	6.58
						4" Ice	0.86	22.78
***								
Grounding Line (3/8)	C	No	CaAa (Out Of Face)	51.00 - 0.00	1	No Ice	0.00	0.22
						1/2" Ice	0.00	0.75
						1" Ice	0.00	1.28
						2" Ice	0.00	2.34
						4" Ice	0.00	4.46
***								
Climbing Ladder (Flat)	B	No	CaAa (Out Of Face)	144.50 - 140.00	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)	135.00 - 130.00	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)	125.00 - 120.00	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)	113.00 - 108.00	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)	100.00 - 95.00	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
***								
CCI-65FP-045100	A	No	CaAa (Out Of Face)	100.00 - 90.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00
CCI-65FP-045100	B	No	CaAa (Out Of Face)	100.00 - 90.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00

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	144.50-139.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	2.630	0.02
		C	0.000	0.000	0.000	0.000	0.07
L2	139.50-134.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.292	0.00
		C	0.000	0.000	0.000	0.000	0.07
L3	134.50-129.50	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	2.630	0.02
		C	0.000	0.000	0.000	0.000	0.07
L4	129.50-124.50	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	0.490	0.01
		C	0.000	0.000	0.000	0.000	0.07
L5	124.50-117.54	A	0.000	0.000	0.000	0.000	0.07
		B	0.000	0.000	0.000	5.386	0.10
		C	0.000	0.000	0.000	0.000	0.10
L6	117.54-116.46	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.428	0.01
		C	0.000	0.000	0.000	0.000	0.01
L7	116.46-111.46	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	2.880	0.06
		C	0.000	0.000	0.000	0.000	0.07
L8	111.46-106.46	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	4.002	0.07
		C	0.000	0.000	0.000	0.000	0.08
L9	106.46-101.46	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.05
		C	0.000	0.000	0.000	0.000	0.08
L10	101.46-98.50	A	0.000	0.000	0.000	0.250	0.03
		B	0.000	0.000	0.000	2.299	0.04
		C	0.000	0.000	0.000	0.000	0.05
L11	98.50-93.50	A	0.000	0.000	0.000	0.833	0.05
		B	0.000	0.000	0.000	4.859	0.08
		C	0.000	0.000	0.000	0.000	0.08
L12	93.50-87.17	A	0.000	0.000	0.000	0.583	0.06
		B	0.000	0.000	0.000	3.090	0.08
		C	0.000	0.000	0.000	0.000	0.11
L13	87.17-86.17	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.396	0.01
		C	0.000	0.000	0.000	0.000	0.02
L14	86.17-81.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L15	81.17-76.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L16	76.17-71.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L17	71.17-66.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L18	66.17-61.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L19	61.17-56.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L20	56.17-51.17	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.000	0.08
L21	51.17-42.09	A	0.000	0.000	0.000	0.000	0.09
		B	0.000	0.000	0.000	3.596	0.11
		C	0.000	0.000	0.000	0.561	0.16
L22	42.09-41.09	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.396	0.01
		C	0.000	0.000	0.000	0.063	0.02
L23	41.09-36.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06

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
		C	0.000	0.000	0.000	0.315	0.09
L24	36.09-31.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.315	0.09
L25	31.09-26.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.315	0.09
L26	26.09-21.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.315	0.09
L27	21.09-16.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.315	0.09
L28	16.09-11.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	1.980	0.06
		C	0.000	0.000	0.000	0.315	0.09
L29	11.09-6.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	0.432	0.01
		C	0.000	0.000	0.000	0.315	0.09
L30	6.09-1.09	A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.315	0.09
L31	1.09-0.00	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.069	0.02

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	144.50-139.50	A	0.894	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	6.215	0.04
		C		0.000	0.000	0.000	0.000	0.07
L2	139.50-134.50	A	0.890	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.689	0.00
		C		0.000	0.000	0.000	0.000	0.07
L3	134.50-129.50	A	0.886	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	6.183	0.04
		C		0.000	0.000	0.000	0.000	0.07
L4	129.50-124.50	A	0.882	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	1.060	0.01
		C		0.000	0.000	0.000	0.000	0.07
L5	124.50-117.54	A	0.877	0.000	0.000	0.000	0.000	0.07
		B		0.000	0.000	0.000	11.343	0.16
		C		0.000	0.000	0.000	0.000	0.10
L6	117.54-116.46	A	0.873	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.806	0.02
		C		0.000	0.000	0.000	0.000	0.01
L7	116.46-111.46	A	0.870	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	5.815	0.10
		C		0.000	0.000	0.000	0.000	0.07
L8	111.46-106.46	A	0.866	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	8.403	0.12
		C		0.000	0.000	0.000	0.000	0.08
L9	106.46-101.46	A	0.861	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.701	0.09
		C		0.000	0.000	0.000	0.000	0.08
L10	101.46-98.50	A	0.857	0.000	0.000	0.000	0.464	0.03
		B		0.000	0.000	0.000	4.673	0.09
		C		0.000	0.000	0.000	0.000	0.05
L11	98.50-93.50	A	0.853	0.000	0.000	0.000	1.544	0.05
		B		0.000	0.000	0.000	9.934	0.19
		C		0.000	0.000	0.000	0.000	0.08
L12	93.50-87.17	A	0.846	0.000	0.000	0.000	1.077	0.06
		B		0.000	0.000	0.000	5.727	0.20

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
		C		0.000	0.000	0.000	0.000	0.11
L13	87.17-86.17	A	0.842	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.735	0.03
		C		0.000	0.000	0.000	0.000	0.02
L14	86.17-81.17	A	0.839	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.657	0.16
		C		0.000	0.000	0.000	0.000	0.08
L15	81.17-76.17	A	0.832	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.645	0.16
		C		0.000	0.000	0.000	0.000	0.08
L16	76.17-71.17	A	0.826	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.632	0.16
		C		0.000	0.000	0.000	0.000	0.08
L17	71.17-66.17	A	0.819	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.618	0.16
		C		0.000	0.000	0.000	0.000	0.08
L18	66.17-61.17	A	0.812	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.603	0.16
		C		0.000	0.000	0.000	0.000	0.08
L19	61.17-56.17	A	0.804	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.587	0.15
		C		0.000	0.000	0.000	0.000	0.08
L20	56.17-51.17	A	0.795	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.570	0.15
		C		0.000	0.000	0.000	0.000	0.08
L21	51.17-42.09	A	0.782	0.000	0.000	0.000	0.000	0.09
		B		0.000	0.000	0.000	6.435	0.27
		C		0.000	0.000	0.000	1.954	0.18
L22	42.09-41.09	A	0.771	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.709	0.03
		C		0.000	0.000	0.000	0.219	0.02
L23	41.09-36.09	A	0.764	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.508	0.15
		C		0.000	0.000	0.000	1.079	0.10
L24	36.09-31.09	A	0.752	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.483	0.15
		C		0.000	0.000	0.000	1.067	0.10
L25	31.09-26.09	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.480	0.15
		C		0.000	0.000	0.000	1.065	0.10
L26	26.09-21.09	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.480	0.15
		C		0.000	0.000	0.000	1.065	0.10
L27	21.09-16.09	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.480	0.15
		C		0.000	0.000	0.000	1.065	0.10
L28	16.09-11.09	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	3.480	0.15
		C		0.000	0.000	0.000	1.065	0.10
L29	11.09-6.09	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	0.759	0.03
		C		0.000	0.000	0.000	1.065	0.10
L30	6.09-1.09	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.065	0.10
L31	1.09-0.00	A	0.750	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.232	0.02

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	144.50-139.50	0.5271	0.3043	0.9072	0.5238

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L2	139.50-134.50	0.0752	0.0434	0.1588	0.0917
L3	134.50-129.50	0.5384	0.3109	0.9427	0.5443
L4	129.50-124.50	0.1240	0.0716	0.2392	0.1381
L5	124.50-117.54	0.7379	0.4260	1.1594	0.6694
L6	117.54-116.46	0.4365	0.2520	0.6915	0.3992
L7	116.46-111.46	0.5994	0.3461	0.9634	0.5562
L8	111.46-106.46	0.7742	0.4470	1.2274	0.7086
L9	106.46-101.46	0.4428	0.2557	0.7067	0.4080
L10	101.46-98.50	0.7539	0.3403	1.1785	0.5449
L11	98.50-93.50	0.8752	0.3316	1.3269	0.5274
L12	93.50-87.17	0.5208	0.1880	0.8083	0.2925
L13	87.17-86.17	0.4490	0.2592	0.7217	0.4167
L14	86.17-81.17	0.4501	0.2599	0.7229	0.4174
L15	81.17-76.17	0.4519	0.2609	0.7266	0.4195
L16	76.17-71.17	0.4535	0.2619	0.7298	0.4214
L17	71.17-66.17	0.4551	0.2628	0.7327	0.4230
L18	66.17-61.17	0.4566	0.2636	0.7351	0.4244
L19	61.17-56.17	0.4581	0.2645	0.7371	0.4255
L20	56.17-51.17	0.4594	0.2653	0.7386	0.4264
L21	51.17-42.09	0.3830	0.3030	0.4904	0.5303
L22	42.09-41.09	0.3820	0.3040	0.4869	0.5331
L23	41.09-36.09	0.3826	0.3045	0.4866	0.5305
L24	36.09-31.09	0.3837	0.3054	0.4878	0.5303
L25	31.09-26.09	0.3848	0.3062	0.4903	0.5327
L26	26.09-21.09	0.3858	0.3070	0.4928	0.5355
L27	21.09-16.09	0.3868	0.3078	0.4953	0.5382
L28	16.09-11.09	0.3877	0.3085	0.4977	0.5407
L29	11.09-6.09	0.0283	0.1075	-0.0725	0.2432
L30	6.09-1.09	-0.0806	0.0465	-0.2558	0.1477
L31	1.09-0.00	-0.0806	0.0466	-0.2561	0.1478

Discrete Tower Loads

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
Lighting Rod 5/8" x 5'	C	None		0.00	147.00	No Ice	0.31	0.31	0.03
						1/2" Ice	0.83	0.83	0.03
						1" Ice	1.32	1.32	0.04
						2" Ice	1.96	1.96	0.07
						4" Ice	3.34	3.34	0.16
Flash Beacon Lighting	C	None		0.00	147.00	No Ice	2.70	2.70	0.05
						1/2" Ice	3.10	3.10	0.07
						1" Ice	3.50	3.50	0.09
						2" Ice	4.30	4.30	0.13
						4" Ice	5.90	5.90	0.21
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.00	145.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						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) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.00	145.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66

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) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	145.00	No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			1.00				1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	145.00	No Ice	11.70	8.94	0.09
			0.00				1/2" Ice	12.42	10.45	0.18
			0.00				1" Ice	13.15	11.99	0.27
							2" Ice	14.64	14.31	0.50
							4" Ice	17.91	19.14	1.13
AM-X-CD-17-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	145.00	No Ice	11.55	8.94	0.09
			0.00				1/2" Ice	12.27	10.45	0.18
			0.00				1" Ice	13.00	11.99	0.27
							2" Ice	14.45	14.31	0.50
							4" Ice	17.71	19.14	1.12
SBNH-1D6565C w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	145.00	No Ice	11.68	9.84	0.09
			0.00				1/2" Ice	12.40	11.37	0.18
			0.00				1" Ice	13.14	12.91	0.28
							2" Ice	14.60	15.27	0.52
							4" Ice	17.87	20.14	1.16
RRUS 11	A	From Leg	4.00	0.00	0.00	145.00	No Ice	3.25	1.37	0.05
			0.00				1/2" Ice	3.49	1.55	0.07
			0.00				1" Ice	3.74	1.74	0.09
							2" Ice	4.27	2.14	0.15
							4" Ice	5.43	3.04	0.31
RRUS 11	B	From Leg	4.00	0.00	0.00	145.00	No Ice	3.25	1.37	0.05
			0.00				1/2" Ice	3.49	1.55	0.07
			0.00				1" Ice	3.74	1.74	0.09
							2" Ice	4.27	2.14	0.15
							4" Ice	5.43	3.04	0.31
RRUS 11	C	From Leg	4.00	0.00	0.00	145.00	No Ice	3.25	1.37	0.05
			0.00				1/2" Ice	3.49	1.55	0.07
			0.00				1" Ice	3.74	1.74	0.09
							2" Ice	4.27	2.14	0.15
							4" Ice	5.43	3.04	0.31
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Leg	4.00	0.00	0.00	145.00	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
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	B	From Leg	4.00	0.00	0.00	145.00	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
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	C	From Leg	4.00	0.00	0.00	145.00	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
(2) 782-10250	A	From Leg	4.00	0.00	0.00	145.00	No Ice	0.52	0.27	0.01
			0.00				1/2" Ice	0.63	0.36	0.01
			0.00				1" Ice	0.75	0.46	0.02
							2" Ice	1.01	0.69	0.03
								1.63	1.24	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
						4" Ice			
(2) 782-10250	B	From Leg	4.00 0.00 0.00	0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.52 0.63 0.75 1.01 1.63	0.27 0.36 0.46 0.69 1.24	0.01 0.01 0.02 0.03 0.09
(2) 782-10250	C	From Leg	4.00 0.00 0.00	0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.52 0.63 0.75 1.01 1.63	0.27 0.36 0.46 0.69 1.24	0.01 0.01 0.02 0.03 0.09
(2) LGP13519	A	From Leg	4.00 0.00 0.00	0.00	145.00	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) LGP13519	B	From Leg	4.00 0.00 0.00	0.00	145.00	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) LGP13519	C	From Leg	4.00 0.00 0.00	0.00	145.00	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
DC6-48-60-18-8F	B	From Leg	4.00 0.00 0.00	0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.27 1.46 1.66 2.09 3.10	1.27 1.46 1.66 2.09 3.10	0.02 0.04 0.05 0.10 0.21
8'x2" Antenna Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.04 0.06 0.12 0.30
8'x2" Antenna Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.04 0.06 0.12 0.30
8'x2" Antenna Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.04 0.06 0.12 0.30
Platform Mount [LP 601-1]	C	None		0.00	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.47 33.59 38.71 48.95 69.43	28.47 33.59 38.71 48.95 69.43	1.12 1.51 1.91 2.69 4.26
***									
BXA-171063/8CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice	3.14 3.52 3.92	3.51 4.13 4.76	0.03 0.06 0.10

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
						1" Ice	4.80	6.06	0.20
						2" Ice	6.71	9.09	0.49
						4" Ice			
BXA-171063/8CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.52 3.92 4.80 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-171063/8CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.52 3.92 4.80 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
(2) LPA-80063/4CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.25 7.72 8.20 9.19 11.32	7.26 7.96 8.67 10.16 13.39	0.04 0.10 0.18 0.34 0.80
(2) LPA-80063/4CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.25 7.72 8.20 9.19 11.32	7.26 7.96 8.67 10.16 13.39	0.04 0.10 0.18 0.34 0.80
(2) LPA-80063/4CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.25 7.72 8.20 9.19 11.32	7.26 7.96 8.67 10.16 13.39	0.04 0.10 0.18 0.34 0.80
(2) CBC721-DF	A	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.45 0.54 0.64 0.87 1.44	0.12 0.18 0.26 0.43 0.88	0.00 0.01 0.01 0.02 0.07
(2) CBC721-DF	B	From Leg	4.00 0.00 2.00	0.00	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.45 0.54 0.64 0.87 1.44	0.12 0.18 0.26 0.43 0.88	0.00 0.01 0.01 0.02 0.07
(2) CBC721-DF	C	From Leg	4.00 0.00	0.00	135.00	No Ice 1/2"	0.45 0.54	0.12 0.18	0.00 0.01

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
			2.00			Ice	0.64	0.26	0.01
						1" Ice	0.87	0.43	0.02
						2" Ice	1.44	0.88	0.07
						4" Ice			
Platform Mount [LP 601-1]	C	None		0.00	135.00	No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice	48.95	48.95	2.69
						2" Ice	69.43	69.43	4.26
						4" Ice			
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
						4" Ice			
KRY 112 144/1	A	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	0.41	0.20	0.01
						1/2"	0.50	0.27	0.01
						Ice	0.59	0.35	0.02
						1" Ice	0.81	0.53	0.03
						2" Ice	1.36	1.00	0.08
						4" Ice			
KRY 112 144/1	B	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	0.41	0.20	0.01
						1/2"	0.50	0.27	0.01
						Ice	0.59	0.35	0.02
						1" Ice	0.81	0.53	0.03
						2" Ice	1.36	1.00	0.08
						4" Ice			
KRY 112 144/1	C	From Leg	4.00 0.00 1.00	0.00	125.00	No Ice	0.41	0.20	0.01
						1/2"	0.50	0.27	0.01
						Ice	0.59	0.35	0.02
						1" Ice	0.81	0.53	0.03
						2" Ice	1.36	1.00	0.08
						4" Ice			

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
Platform Mount [LP 601-1]	C	None		0.00	125.00	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
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
(3) 6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
(3) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
(3) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
Platform Mount [LP 601-1]	C	None		0.00	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.47 33.59 38.71 48.95 69.43	28.47 33.59 38.71 48.95 69.43	1.12 1.51 1.91 2.69 4.26
***									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00 0.00 -2.00	0.00	111.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.40 2.61 2.83 3.30 4.34	2.25 2.46 2.68 3.13 4.15	0.06 0.09 0.11 0.17 0.34
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00 0.00 -2.00	0.00	111.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.40 2.61 2.83 3.30 4.34	2.25 2.46 2.68 3.13 4.15	0.06 0.09 0.11 0.17 0.34
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00 0.00 -2.00	0.00	111.00	No Ice 1/2" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11

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
						1" Ice	3.30	3.13	0.17
						2" Ice	4.34	4.15	0.34
						4" Ice			
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 0.00 0.00	0.00	111.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 0.00 0.00	0.00	111.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 0.00 0.00	0.00	111.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
Side Arm Mount [SO 102-3]	C	None		0.00	111.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.00 3.48 3.96 4.92 6.84	3.00 3.48 3.96 4.92 6.84	0.08 0.11 0.14 0.20 0.32
***									
800 10504 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
7'x2" Antenna Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.66 2.39 2.83 3.71 5.58	1.66 2.39 2.83 3.71 5.58	0.03 0.04 0.06 0.10 0.27
7'x2" Antenna Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.66 2.39 2.83 3.71 5.58	1.66 2.39 2.83 3.71 5.58	0.03 0.04 0.06 0.10 0.27
7'x2" Antenna Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.66 2.39 2.83 3.71 5.58	1.66 2.39 2.83 3.71 5.58	0.03 0.04 0.06 0.10 0.27
Platform Mount [LP 601-1]	C	None		0.00	100.00	No Ice	28.47	28.47	1.12

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
							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
**										
KS24019-L112A	C	From Leg	3.00	0.00	0.00	51.00	No Ice	0.10	0.10	0.01
			0.00				1/2" Ice	0.18	0.18	0.01
			1.00				1" Ice	0.26	0.26	0.01
							2" Ice	0.42	0.42	0.01
							4" Ice	0.74	0.74	0.02
Side Arm Mount [SO 701-1]	C	From Leg	1.50	0.00	0.00	51.00	No Ice	0.85	1.67	0.07
			0.00				1/2" Ice	1.14	2.34	0.08
			0.00				1" Ice	1.43	3.01	0.09
							2" Ice	2.01	4.35	0.12
							4" Ice	3.17	7.03	0.18

Load Combinations

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

Comb. No.	Description
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	144.5 - 139.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-4.98	-0.20	-0.16
			Max. Mx	5	-1.91	-35.31	-0.12
			Max. My	8	-1.90	-0.18	-35.41
			Max. Vy	5	6.34	-35.31	-0.12
			Max. Vx	8	6.36	-0.18	-35.41
			Max. Torque	10			0.28
L2	139.5 - 134.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-8.99	-0.21	-0.17
			Max. Mx	5	-3.19	-77.39	-0.20
			Max. My	8	-3.19	-0.27	-77.62
			Max. Vy	5	11.72	-77.39	-0.20
			Max. Vx	8	11.74	-0.27	-77.62
			Max. Torque	10			0.28
L3	134.5 - 129.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-9.53	-0.25	-0.19
			Max. Mx	5	-3.55	-137.12	-0.30
			Max. My	8	-3.55	-0.37	-137.47
			Max. Vy	5	12.17	-137.12	-0.30
			Max. Vx	8	12.20	-0.37	-137.47
			Max. Torque	10			0.30
L4	129.5 - 124.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.22	-0.27	-0.20
			Max. Mx	5	-5.39	-202.22	-0.39
			Max. My	8	-5.38	-0.45	-202.70
			Max. Vy	5	15.77	-202.22	-0.39
			Max. Vx	8	15.80	-0.45	-202.70
			Max. Torque	10			0.30
L5	124.5 - 117.54	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.60	-0.31	-0.23
			Max. Mx	5	-5.67	-250.63	-0.45
			Max. My	8	-5.66	-0.52	-251.19
			Max. Vy	5	16.08	-250.63	-0.45
			Max. Vx	8	16.11	-0.52	-251.19
			Max. Torque	10			0.32
L6	117.54 - 116.46	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.65	-0.38	-0.26
			Max. Mx	5	-6.40	-332.45	-0.54
			Max. My	8	-6.40	-0.62	-333.13
			Max. Vy	5	16.62	-332.45	-0.54
			Max. Vx	8	16.65	-0.62	-333.13
			Max. Torque	10			0.35
L7	116.46 - 111.46	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.21	-0.44	-0.30
			Max. Mx	5	-8.22	-421.38	-0.64
			Max. My	8	-8.22	-0.72	-422.19
			Max. Vy	5	20.11	-421.38	-0.64
			Max. Vx	8	20.14	-0.72	-422.19
			Max. Torque	10			0.37
L8	111.46 - 106.46	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.75	-0.52	-0.35

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	5	-9.22	-526.41	-0.74
			Max. My	8	-9.22	-0.83	-527.34
			Max. Vy	5	21.46	-526.41	-0.74
			Max. Vx	8	21.49	-0.83	-527.34
			Max. Torque	10			0.41
L9	106.46 - 101.46	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-20.53	-0.57	-0.38
			Max. Mx	5	-9.89	-634.78	-0.83
			Max. My	8	-9.88	-0.93	-635.84
			Max. Vy	5	21.89	-634.78	-0.83
			Max. Vx	8	21.92	-0.93	-635.84
			Max. Torque	10			0.42
L10	101.46 - 98.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.27	-0.64	-0.42
			Max. Mx	5	-11.45	-703.89	-0.89
			Max. My	8	-11.45	-0.99	-705.03
			Max. Vy	5	24.19	-703.89	-0.89
			Max. Vx	8	24.22	-0.99	-705.03
			Max. Torque	10			0.44
L11	98.5 - 93.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.41	-0.81	-0.52
			Max. Mx	5	-12.37	-826.37	-1.00
			Max. My	8	-12.36	-1.11	-827.63
			Max. Vy	5	24.81	-826.37	-1.00
			Max. Vx	8	24.83	-1.11	-827.63
			Max. Torque	10			0.47
L12	93.5 - 87.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.78	-0.85	-0.54
			Max. Mx	5	-12.66	-867.69	-1.03
			Max. My	8	-12.66	-1.15	-868.98
			Max. Vy	5	24.97	-867.69	-1.03
			Max. Vx	8	25.00	-1.15	-868.98
			Max. Torque	10			0.48
L13	87.17 - 86.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.83	-1.00	-0.63
			Max. Mx	5	-14.28	-1011.09	-1.14
			Max. My	8	-14.27	-1.26	-1012.53
			Max. Vy	5	25.60	-1011.09	-1.14
			Max. Vx	8	25.63	-1.26	-1012.53
			Max. Torque	10			0.50
L14	86.17 - 81.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.96	-1.14	-0.71
			Max. Mx	5	-15.23	-1140.16	-1.24
			Max. My	8	-15.23	-1.37	-1141.73
			Max. Vy	5	26.04	-1140.16	-1.24
			Max. Vx	8	26.06	-1.37	-1141.73
			Max. Torque	10			0.51
L15	81.17 - 76.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.12	-1.28	-0.79
			Max. Mx	5	-16.21	-1271.40	-1.34
			Max. My	8	-16.21	-1.47	-1273.10
			Max. Vy	5	26.47	-1271.40	-1.34
			Max. Vx	8	26.50	-1.47	-1273.10
			Max. Torque	10			0.53
L16	76.17 - 71.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.31	-1.42	-0.87
			Max. Mx	5	-17.22	-1404.79	-1.44
			Max. My	8	-17.22	-1.58	-1406.62
			Max. Vy	5	26.90	-1404.79	-1.44
			Max. Vx	8	26.93	-1.58	-1406.62
			Max. Torque	10			0.55
L17	71.17 - 66.17	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-31.52	-1.56	-0.95
			Max. Mx	5	-18.26	-1540.30	-1.54
			Max. My	8	-18.26	-1.69	-1542.26
			Max. Vy	5	27.32	-1540.30	-1.54
			Max. Vx	8	27.35	-1.69	-1542.26
			Max. Torque	10			0.57
L18	66.17 - 61.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.76	-1.71	-1.04
			Max. Mx	5	-19.33	-1677.90	-1.63
			Max. My	8	-19.32	-1.79	-1679.98
			Max. Vy	5	27.73	-1677.90	-1.63
			Max. Vx	8	27.76	-1.79	-1679.98
			Max. Torque	10			0.58
L19	61.17 - 56.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.01	-1.86	-1.13
			Max. Mx	5	-20.42	-1817.54	-1.73
			Max. My	8	-20.41	-1.90	-1819.74
			Max. Vy	5	28.14	-1817.54	-1.73
			Max. Vx	8	28.16	-1.90	-1819.74
			Max. Torque	10			0.60
L20	56.17 - 51.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.30	-2.02	-1.21
			Max. Mx	5	-21.53	-1959.17	-1.83
			Max. My	8	-21.53	-2.00	-1961.50
			Max. Vy	5	28.53	-1959.17	-1.83
			Max. Vx	8	28.56	-2.00	-1961.50
			Max. Torque	9			0.62
L21	51.17 - 42.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-36.25	-1.83	-1.44
			Max. Mx	5	-22.34	-2052.22	-2.04
			Max. My	8	-22.34	-1.92	-2054.99
			Max. Vy	5	28.83	-2052.22	-2.04
			Max. Vx	8	28.87	-1.92	-2054.99
			Max. Torque	10			0.63
L22	42.09 - 41.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-39.44	-2.02	-1.57
			Max. Mx	5	-24.98	-2251.30	-2.27
			Max. My	8	-24.97	-2.15	-2254.35
			Max. Vy	5	29.47	-2251.30	-2.27
			Max. Vx	8	29.51	-2.15	-2254.35
			Max. Torque	10			0.65
L23	41.09 - 36.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-40.93	-2.16	-1.67
			Max. Mx	5	-26.28	-2399.52	-2.43
			Max. My	8	-26.28	-2.32	-2402.78
			Max. Vy	5	29.84	-2399.52	-2.43
			Max. Vx	8	29.88	-2.32	-2402.78
			Max. Torque	10			0.67
L24	36.09 - 31.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.44	-2.29	-1.78
			Max. Mx	5	-27.61	-2549.57	-2.59
			Max. My	8	-27.61	-2.48	-2553.02
			Max. Vy	5	30.19	-2549.57	-2.59
			Max. Vx	8	30.24	-2.48	-2553.02
			Max. Torque	10			0.68
L25	31.09 - 26.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-43.98	-2.43	-1.88
			Max. Mx	5	-28.97	-2701.38	-2.75
			Max. My	8	-28.97	-2.65	-2705.03
			Max. Vy	5	30.55	-2701.38	-2.75
			Max. Vx	8	30.59	-2.65	-2705.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	10			0.70
L26	26.09 - 21.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.55	-2.58	-1.99
			Max. Mx	5	-30.35	-2854.95	-2.91
			Max. My	8	-30.35	-2.82	-2858.80
			Max. Vy	5	30.90	-2854.95	-2.91
			Max. Vx	8	30.94	-2.82	-2858.80
			Max. Torque	10			0.72
L27	21.09 - 16.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.15	-2.72	-2.10
			Max. Mx	5	-31.76	-3010.29	-3.08
			Max. My	8	-31.76	-2.99	-3014.34
			Max. Vy	5	31.25	-3010.29	-3.08
			Max. Vx	8	31.29	-2.99	-3014.34
			Max. Torque	10			0.74
L28	16.09 - 11.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-48.78	-2.87	-2.21
			Max. Mx	5	-33.20	-3167.39	-3.24
			Max. My	8	-33.20	-3.15	-3171.64
			Max. Vy	5	31.61	-3167.39	-3.24
			Max. Vx	8	31.65	-3.15	-3171.64
			Max. Torque	10			0.75
L29	11.09 - 6.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-50.32	-2.89	-2.24
			Max. Mx	5	-34.62	-3326.13	-3.39
			Max. My	8	-34.62	-3.30	-3330.58
			Max. Vy	5	31.91	-3326.13	-3.39
			Max. Vx	8	31.95	-3.30	-3330.58
			Max. Torque	10			0.76
L30	6.09 - 1.09	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-51.87	-2.87	-2.25
			Max. Mx	5	-36.05	-3486.34	-3.53
			Max. My	8	-36.05	-3.44	-3491.01
			Max. Vy	5	32.21	-3486.34	-3.53
			Max. Vx	8	32.25	-3.44	-3491.01
			Max. Torque	10			0.76
L31	1.09 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-52.21	-2.86	-2.26
			Max. Mx	5	-36.36	-3521.47	-3.56
			Max. My	8	-36.36	-3.47	-3526.17
			Max. Vy	5	32.27	-3521.47	-3.56
			Max. Vx	8	32.31	-3.47	-3526.17
			Max. Torque	10			0.76

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	52.21	-0.01	-7.94
	Max. H_x	11	36.37	32.25	0.03
	Max. H_z	2	36.37	0.03	32.30
	Max. M_x	2	3525.14	0.03	32.30
	Max. M_z	5	3521.47	-32.25	-0.03
	Max. Torsion	10	0.76	27.92	-16.12
	Min. Vert	1	36.37	0.00	0.00
	Min. H_x	5	36.37	-32.25	-0.03
	Min. H_z	8	36.37	-0.03	-32.30
	Min. M_x	8	-3526.17	-0.03	-32.30
	Min. M_z	11	-3520.62	32.25	0.03
	Min. Torsion	4	-0.76	-27.92	16.12

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	36.37	0.00	0.00	0.50	-0.41	0.00
Dead+Wind 0 deg - No Ice	36.37	-0.03	-32.30	-3525.14	2.62	0.39
Dead+Wind 30 deg - No Ice	36.37	16.10	-27.95	-3051.29	-1758.31	0.66
Dead+Wind 60 deg - No Ice	36.37	27.92	-16.12	-1759.69	-3048.22	0.76
Dead+Wind 90 deg - No Ice	36.37	32.25	0.03	3.56	-3521.47	0.65
Dead+Wind 120 deg - No Ice	36.37	27.95	16.17	1765.99	-3051.25	0.37
Dead+Wind 150 deg - No Ice	36.37	16.15	27.98	3055.35	-1763.57	-0.01
Dead+Wind 180 deg - No Ice	36.37	0.03	32.30	3526.17	-3.47	-0.39
Dead+Wind 210 deg - No Ice	36.37	-16.10	27.95	3052.32	1757.46	-0.66
Dead+Wind 240 deg - No Ice	36.37	-27.92	16.12	1760.72	3047.38	-0.76
Dead+Wind 270 deg - No Ice	36.37	-32.25	-0.03	-2.53	3520.62	-0.65
Dead+Wind 300 deg - No Ice	36.37	-27.95	-16.17	-1764.96	3050.40	-0.37
Dead+Wind 330 deg - No Ice	36.37	-16.15	-27.98	-3054.31	1762.72	0.01
Dead+Ice+Temp	52.21	0.00	0.00	2.26	-2.86	0.00
Dead+Wind 0 deg+Ice+Temp	52.21	-0.01	-7.94	-896.45	-2.28	0.16
Dead+Wind 30 deg+Ice+Temp	52.21	3.96	-6.87	-775.68	-451.25	0.25
Dead+Wind 60 deg+Ice+Temp	52.21	6.86	-3.96	-446.43	-780.11	0.27
Dead+Wind 90 deg+Ice+Temp	52.21	7.93	0.01	3.07	-900.74	0.22
Dead+Wind 120 deg+Ice+Temp	52.21	6.87	3.98	452.37	-780.82	0.11
Dead+Wind 150 deg+Ice+Temp	52.21	3.97	6.88	781.10	-452.49	-0.03
Dead+Wind 180 deg+Ice+Temp	52.21	0.01	7.94	901.16	-3.71	-0.16
Dead+Wind 210 deg+Ice+Temp	52.21	-3.96	6.87	780.38	445.26	-0.25
Dead+Wind 240 deg+Ice+Temp	52.21	-6.86	3.96	451.13	774.12	-0.27
Dead+Wind 270 deg+Ice+Temp	52.21	-7.93	-0.01	1.64	894.76	-0.22
Dead+Wind 300 deg+Ice+Temp	52.21	-6.87	-3.98	-447.67	774.84	-0.11
Dead+Wind 330 deg+Ice+Temp	52.21	-3.97	-6.88	-776.39	446.50	0.03
Dead+Wind 0 deg - Service	36.37	-0.01	-11.17	-1221.65	0.63	0.14
Dead+Wind 30 deg - Service	36.37	5.57	-9.67	-1057.39	-609.80	0.23
Dead+Wind 60 deg - Service	36.37	9.66	-5.58	-609.65	-1056.94	0.27
Dead+Wind 90 deg - Service	36.37	11.16	0.01	1.58	-1220.99	0.23
Dead+Wind 120 deg - Service	36.37	9.67	5.60	612.52	-1058.00	0.13
Dead+Wind 150 deg - Service	36.37	5.59	9.68	1059.48	-611.63	-0.00
Dead+Wind 180 deg - Service	36.37	0.01	11.17	1222.69	-1.48	-0.14
Dead+Wind 210 deg - Service	36.37	-5.57	9.67	1058.43	608.94	-0.23
Dead+Wind 240 deg - Service	36.37	-9.66	5.58	610.69	1056.09	-0.27
Dead+Wind 270 deg - Service	36.37	-11.16	-0.01	-0.54	1220.14	-0.23
Dead+Wind 300 deg - Service	36.37	-9.67	-5.60	-611.48	1057.14	-0.13
Dead+Wind 330 deg - Service	36.37	-5.59	-9.68	-1058.44	610.77	0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-36.37	0.00	0.00	36.37	0.00	0.000%
2	-0.03	-36.37	-32.30	0.03	36.37	32.30	0.000%
3	16.10	-36.37	-27.95	-16.10	36.37	27.95	0.000%
4	27.92	-36.37	-16.12	-27.92	36.37	16.12	0.000%
5	32.25	-36.37	0.03	-32.25	36.37	-0.03	0.000%
6	27.95	-36.37	16.17	-27.95	36.37	-16.17	0.000%
7	16.15	-36.37	27.98	-16.15	36.37	-27.98	0.000%
8	0.03	-36.37	32.30	-0.03	36.37	-32.30	0.000%
9	-16.10	-36.37	27.95	16.10	36.37	-27.95	0.000%
10	-27.92	-36.37	16.12	27.92	36.37	-16.12	0.000%
11	-32.25	-36.37	-0.03	32.25	36.37	0.03	0.000%
12	-27.95	-36.37	-16.17	27.95	36.37	16.17	0.000%
13	-16.15	-36.37	-27.98	16.15	36.37	27.98	0.000%
14	0.00	-52.21	0.00	-0.00	52.21	-0.00	0.000%
15	-0.01	-52.21	-7.94	0.01	52.21	7.94	0.000%
16	3.96	-52.21	-6.87	-3.96	52.21	6.87	0.000%
17	6.86	-52.21	-3.96	-6.86	52.21	3.96	0.000%
18	7.93	-52.21	0.01	-7.93	52.21	-0.01	0.000%
19	6.87	-52.21	3.98	-6.87	52.21	-3.98	0.000%
20	3.97	-52.21	6.88	-3.97	52.21	-6.88	0.000%
21	0.01	-52.21	7.94	-0.01	52.21	-7.94	0.000%
22	-3.96	-52.21	6.87	3.96	52.21	-6.87	0.000%
23	-6.86	-52.21	3.96	6.86	52.21	-3.96	0.000%
24	-7.93	-52.21	-0.01	7.93	52.21	0.01	0.000%
25	-6.87	-52.21	-3.98	6.87	52.21	3.98	0.000%
26	-3.97	-52.21	-6.88	3.97	52.21	6.88	0.000%
27	-0.01	-36.37	-11.17	0.01	36.37	11.17	0.000%
28	5.57	-36.37	-9.67	-5.57	36.37	9.67	0.000%
29	9.66	-36.37	-5.58	-9.66	36.37	5.58	0.000%
30	11.16	-36.37	0.01	-11.16	36.37	-0.01	0.000%
31	9.67	-36.37	5.60	-9.67	36.37	-5.60	0.000%
32	5.59	-36.37	9.68	-5.59	36.37	-9.68	0.000%
33	0.01	-36.37	11.17	-0.01	36.37	-11.17	0.000%
34	-5.57	-36.37	9.67	5.57	36.37	-9.67	0.000%
35	-9.66	-36.37	5.58	9.66	36.37	-5.58	0.000%
36	-11.16	-36.37	-0.01	11.16	36.37	0.01	0.000%
37	-9.67	-36.37	-5.60	9.67	36.37	5.60	0.000%
38	-5.59	-36.37	-9.68	5.59	36.37	9.68	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	0.00057598
3	Yes	6	0.00000001	0.00007270
4	Yes	6	0.00000001	0.00007128
5	Yes	4	0.00000001	0.00096422
6	Yes	6	0.00000001	0.00007247
7	Yes	6	0.00000001	0.00007222
8	Yes	4	0.00000001	0.00078042
9	Yes	6	0.00000001	0.00007134
10	Yes	6	0.00000001	0.00007276
11	Yes	4	0.00000001	0.00073742
12	Yes	6	0.00000001	0.00007179
13	Yes	6	0.00000001	0.00007204
14	Yes	4	0.00000001	0.00003078
15	Yes	5	0.00000001	0.00063075
16	Yes	5	0.00000001	0.00084104
17	Yes	5	0.00000001	0.00083436
18	Yes	5	0.00000001	0.00063411
19	Yes	5	0.00000001	0.00084521
20	Yes	5	0.00000001	0.00084548
21	Yes	5	0.00000001	0.00063413
22	Yes	5	0.00000001	0.00083258

23	Yes	5	0.00000001	0.00083864
24	Yes	5	0.00000001	0.00062935
25	Yes	5	0.00000001	0.00083141
26	Yes	5	0.00000001	0.00083173
27	Yes	4	0.00000001	0.00026886
28	Yes	5	0.00000001	0.00020362
29	Yes	5	0.00000001	0.00019652
30	Yes	4	0.00000001	0.00029644
31	Yes	5	0.00000001	0.00020306
32	Yes	5	0.00000001	0.00020196
33	Yes	4	0.00000001	0.00027633
34	Yes	5	0.00000001	0.00019684
35	Yes	5	0.00000001	0.00020374
36	Yes	4	0.00000001	0.00028677
37	Yes	5	0.00000001	0.00019909
38	Yes	5	0.00000001	0.00020039

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	144.5 - 139.5	38.21	32	2.39	0.00
L2	139.5 - 134.5	35.71	32	2.38	0.00
L3	134.5 - 129.5	33.23	32	2.35	0.00
L4	129.5 - 124.5	30.79	32	2.30	0.00
L5	124.5 - 117.54	28.43	32	2.22	0.00
L6	121.46 - 116.46	27.03	32	2.17	0.00
L7	116.46 - 111.46	24.79	32	2.11	0.00
L8	111.46 - 106.46	22.62	32	2.02	0.00
L9	106.46 - 101.46	20.56	32	1.91	0.00
L10	101.46 - 98.5	18.62	32	1.80	0.00
L11	98.5 - 93.5	17.53	32	1.72	0.00
L12	93.5 - 87.17	15.77	32	1.64	0.00
L13	91.84 - 86.17	15.20	32	1.61	0.00
L14	86.17 - 81.17	13.32	32	1.55	0.00
L15	81.17 - 76.17	11.74	32	1.45	0.00
L16	76.17 - 71.17	10.27	32	1.35	0.00
L17	71.17 - 66.17	8.91	32	1.25	0.00
L18	66.17 - 61.17	7.66	32	1.15	0.00
L19	61.17 - 56.17	6.51	32	1.04	0.00
L20	56.17 - 51.17	5.47	32	0.94	0.00
L21	51.17 - 42.09	4.54	32	0.84	0.00
L22	47.92 - 41.09	3.99	32	0.77	0.00
L23	41.09 - 36.09	2.94	32	0.70	0.00
L24	36.09 - 31.09	2.25	32	0.61	0.00
L25	31.09 - 26.09	1.66	32	0.52	0.00
L26	26.09 - 21.09	1.16	32	0.43	0.00
L27	21.09 - 16.09	0.76	32	0.35	0.00
L28	16.09 - 11.09	0.44	32	0.26	0.00
L29	11.09 - 6.09	0.21	32	0.18	0.00
L30	6.09 - 1.09	0.06	32	0.10	0.00
L31	1.09 - 0	0.00	32	0.02	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	Lighting Rod 5/8" x 5'	32	38.21	2.39	0.00	13058
145.00	(2) 7770.00 w/ Mount Pipe	32	38.21	2.39	0.00	13058
135.00	BXA-171063/8CF w/ Mount Pipe	32	33.47	2.35	0.00	7226
125.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	32	28.66	2.23	0.00	3662

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
113.00	APXVSPP18-C-A20 w/ Mount Pipe	32	23.28	2.05	0.00	3054
111.00	800MHz 2X50W RRH W/FILTER	32	22.43	2.01	0.00	2836
100.00	800 10504 w/ Mount Pipe	32	18.08	1.76	0.00	2628
51.00	KS24019-L112A	32	4.51	0.83	0.00	3024

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	144.5 - 139.5	109.84	8	6.89	0.01
L2	139.5 - 134.5	102.67	8	6.85	0.01
L3	134.5 - 129.5	95.56	8	6.76	0.00
L4	129.5 - 124.5	88.57	8	6.61	0.00
L5	124.5 - 117.54	81.77	8	6.40	0.00
L6	121.46 - 116.46	77.76	8	6.24	0.00
L7	116.46 - 111.46	71.32	8	6.08	0.00
L8	111.46 - 106.46	65.10	8	5.81	0.00
L9	106.46 - 101.46	59.18	8	5.51	0.00
L10	101.46 - 98.5	53.60	8	5.17	0.00
L11	98.5 - 93.5	50.46	8	4.97	0.00
L12	93.5 - 87.17	45.39	7	4.73	0.00
L13	91.84 - 86.17	43.76	7	4.65	0.00
L14	86.17 - 81.17	38.34	7	4.47	0.00
L15	81.17 - 76.17	33.82	7	4.19	0.00
L16	76.17 - 71.17	29.59	7	3.89	0.00
L17	71.17 - 66.17	25.67	7	3.60	0.00
L18	66.17 - 61.17	22.06	7	3.30	0.00
L19	61.17 - 56.17	18.76	7	3.01	0.00
L20	56.17 - 51.17	15.77	7	2.71	0.00
L21	51.17 - 42.09	13.09	7	2.42	0.00
L22	47.92 - 41.09	11.51	7	2.23	0.00
L23	41.09 - 36.09	8.46	7	2.01	0.00
L24	36.09 - 31.09	6.49	7	1.75	0.00
L25	31.09 - 26.09	4.79	7	1.50	0.00
L26	26.09 - 21.09	3.35	7	1.25	0.00
L27	21.09 - 16.09	2.18	7	1.00	0.00
L28	16.09 - 11.09	1.26	7	0.76	0.00
L29	11.09 - 6.09	0.59	7	0.52	0.00
L30	6.09 - 1.09	0.18	7	0.28	0.00
L31	1.09 - 0	0.01	7	0.05	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	Lighting Rod 5/8" x 5'	8	109.84	6.89	0.01	4690
145.00	(2) 7770.00 w/ Mount Pipe	8	109.84	6.89	0.01	4690
135.00	BXA-171063/8CF w/ Mount Pipe	8	96.26	6.78	0.00	2587
125.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	8	82.44	6.42	0.00	1305
113.00	APXVSPP18-C-A20 w/ Mount Pipe	8	66.99	5.90	0.00	1083
111.00	800MHz 2X50W RRH W/FILTER	8	64.54	5.78	0.00	1005
100.00	800 10504 w/ Mount Pipe	8	52.04	5.07	0.00	927
51.00	KS24019-L112A	7	13.01	2.41	0.00	1054

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	144.5 - 139.5 (1)	TP22.0905x21x0.1875	5.00	0.00	0.0	39.00	13.0350	-1.90	508.37	0.004
L2	139.5 - 134.5 (2)	TP23.181x22.0905x0.1875	5.00	0.00	0.0	39.00	13.6840	-3.19	533.68	0.006
L3	134.5 - 129.5 (3)	TP24.2715x23.181x0.1875	5.00	0.00	0.0	39.00	14.3330	-3.54	558.99	0.006
L4	129.5 - 124.5 (4)	TP25.362x24.2715x0.1875	5.00	0.00	0.0	39.00	14.9820	-5.38	584.30	0.009
L5	124.5 - 117.54 (5)	TP26.88x25.362x0.1875	6.96	0.00	0.0	39.00	15.3766	-5.66	599.69	0.009
L6	117.54 - 116.46 (6)	TP26.7218x25.65x0.25	5.00	0.00	0.0	39.00	21.0054	-6.39	819.21	0.008
L7	116.46 - 111.46 (7)	TP27.7935x26.7218x0.25	5.00	0.00	0.0	39.00	21.8558	-8.22	852.38	0.010
L8	111.46 - 106.46 (8)	TP28.8652x27.7935x0.25	5.00	0.00	0.0	39.00	22.7062	-9.22	885.54	0.010
L9	106.46 - 101.46 (9)	TP29.937x28.8652x0.25	5.00	0.00	0.0	39.00	23.5566	-9.88	918.71	0.011
L10	101.46 - 98.5 (10)	TP30.5714x29.937x0.25	2.96	0.00	0.0	39.00	24.0601	-11.45	938.34	0.012
L11	98.5 - 93.5 (11)	TP31.6432x30.5714x0.4	5.00	0.00	0.0	39.00	39.6663	-12.36	1546.99	0.008
L12	93.5 - 87.17 (12)	TP33x31.6432x0.4	6.33	0.00	0.0	39.00	40.1181	-12.66	1564.61	0.008
L13	87.17 - 86.17 (13)	TP32.7186x31.499x0.375	5.67	0.00	0.0	39.00	38.4970	-14.27	1501.38	0.010
L14	86.17 - 81.17 (14)	TP33.7941x32.7186x0.375	5.00	0.00	0.0	39.00	39.7770	-15.22	1551.30	0.010
L15	81.17 - 76.17 (15)	TP34.8695x33.7941x0.375	5.00	0.00	0.0	39.00	41.0571	-16.21	1601.23	0.010
L16	76.17 - 71.17 (16)	TP35.945x34.8695x0.375	5.00	0.00	0.0	39.00	42.3372	-17.22	1651.15	0.010
L17	71.17 - 66.17 (17)	TP37.0205x35.945x0.375	5.00	0.00	0.0	39.00	43.6173	-18.26	1701.08	0.011
L18	66.17 - 61.17 (18)	TP38.096x37.0205x0.375	5.00	0.00	0.0	39.00	44.8974	-19.32	1751.00	0.011
L19	61.17 - 56.17 (19)	TP39.1715x38.096x0.375	5.00	0.00	0.0	39.00	46.1775	-20.41	1800.92	0.011
L20	56.17 - 51.17 (20)	TP40.2469x39.1715x0.375	5.00	0.00	0.0	39.00	47.4576	-21.53	1850.85	0.012
L21	51.17 - 42.09 (21)	TP42.2x40.2469x0.375	9.08	0.00	0.0	39.00	48.2896	-22.34	1883.30	0.012
L22	42.09 - 41.09 (22)	TP41.6646x40.196x0.4375	6.83	0.00	0.0	39.00	57.2490	-24.97	2232.71	0.011
L23	41.09 - 36.09 (23)	TP42.7397x41.6646x0.4375	5.00	0.00	0.0	39.00	58.7420	-26.28	2290.94	0.011
L24	36.09 - 31.09 (24)	TP43.8149x42.7397x0.4375	5.00	0.00	0.0	39.00	60.2349	-27.61	2349.16	0.012
L25	31.09 - 26.09 (25)	TP44.89x43.8149x0.4375	5.00	0.00	0.0	39.00	61.7278	-28.97	2407.39	0.012
L26	26.09 - 21.09 (26)	TP45.9651x44.89x0.4375	5.00	0.00	0.0	39.00	63.2208	-30.35	2465.61	0.012
L27	21.09 - 16.09 (27)	TP47.0402x45.9651x0.4375	5.00	0.00	0.0	39.00	64.7137	-31.76	2523.84	0.013
L28	16.09 - 11.09 (28)	TP48.1154x47.0402x0.4375	5.00	0.00	0.0	39.00	66.2067	-33.20	2582.06	0.013
L29	11.09 - 6.09 (29)	TP49.1905x48.1154x0.4375	5.00	0.00	0.0	39.00	67.6996	-34.62	2640.29	0.013
L30	6.09 - 1.09 (30)	TP50.2656x49.1905x0.4375	5.00	0.00	0.0	39.00	69.1926	-36.05	2698.51	0.013

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L31	1.09 - 0 (31)	TP50.5x50.2656x0.4375	1.09	0.00	0.0	39.00	69.5180	-36.36	2711.20	0.013

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	144.5 - 139.5 (1)	TP22.0905x21x0.1875	35.49	6.05	39.00	0.155	0.00	0.00	39.00	0.000
L2	139.5 - 134.5 (2)	TP23.181x22.0905x0.1875	77.74	12.02	39.00	0.308	0.00	0.00	39.00	0.000
L3	134.5 - 129.5 (3)	TP24.2715x23.181x0.1875	137.64	19.39	39.00	0.497	0.00	0.00	39.00	0.000
L4	129.5 - 124.5 (4)	TP25.362x24.2715x0.1875	202.90	26.15	39.00	0.671	0.00	0.00	39.00	0.000
L5	124.5 - 117.54 (5)	TP26.88x25.362x0.1875	251.42	30.76	39.00	0.789	0.00	0.00	39.00	0.000
L6	117.54 - 116.46 (6)	TP26.7218x25.65x0.25	333.41	29.20	39.00	0.749	0.00	0.00	39.00	0.000
L7	116.46 - 111.46 (7)	TP27.7935x26.7218x0.25	422.52	34.17	39.00	0.876	0.00	0.00	39.00	0.000
L8	111.46 - 106.46 (8)	TP28.8652x27.7935x0.25	527.72	39.53	39.00	1.014	0.00	0.00	39.00	0.000
L9	106.46 - 101.46 (9)	TP29.937x28.8652x0.25	636.26	44.27	39.00	1.135	0.00	0.00	39.00	0.000
L10	101.46 - 98.5 (10)	TP30.5714x29.937x0.25	705.48	47.04	39.00	1.206	0.00	0.00	39.00	0.000
L11	98.5 - 93.5 (11)	TP31.6432x30.5714x0.4	828.13	32.66	39.00	0.837	0.00	0.00	39.00	0.000
L12	93.5 - 87.17 (12)	TP33x31.6432x0.4	869.50	33.51	39.00	0.859	0.00	0.00	39.00	0.000
L13	87.17 - 86.17 (13)	TP32.7186x31.499x0.375	1013.11	39.72	39.00	1.018	0.00	0.00	39.00	0.000
L14	86.17 - 81.17 (14)	TP33.7941x32.7186x0.375	1142.35	41.93	39.00	1.075	0.00	0.00	39.00	0.000
L15	81.17 - 76.17 (15)	TP34.8695x33.7941x0.375	1273.77	43.87	39.00	1.125	0.00	0.00	39.00	0.000
L16	76.17 - 71.17 (16)	TP35.945x34.8695x0.375	1407.33	45.57	39.00	1.168	0.00	0.00	39.00	0.000
L17	71.17 - 66.17 (17)	TP37.0205x35.945x0.375	1543.03	47.06	39.00	1.207	0.00	0.00	39.00	0.000
L18	66.17 - 61.17 (18)	TP38.096x37.0205x0.375	1680.79	48.36	39.00	1.240	0.00	0.00	39.00	0.000
L19	61.17 - 56.17 (19)	TP39.1715x38.096x0.375	1820.60	49.51	39.00	1.269	0.00	0.00	39.00	0.000
L20	56.17 - 51.17 (20)	TP40.2469x39.1715x0.375	1962.41	50.51	39.00	1.295	0.00	0.00	39.00	0.000
L21	51.17 - 42.09 (21)	TP42.2x40.2469x0.375	2055.83	51.10	39.00	1.310	0.00	0.00	39.00	0.000
L22	42.09 - 41.09 (22)	TP41.6646x40.196x0.4375	2255.31	46.60	39.00	1.195	0.00	0.00	39.00	0.000
L23	41.09 - 36.09 (23)	TP42.7397x41.6646x0.4375	2403.82	47.16	39.00	1.209	0.00	0.00	39.00	0.000
L24	36.09 - 31.09 (24)	TP43.8149x42.7397x0.4375	2554.15	47.64	39.00	1.222	0.00	0.00	39.00	0.000
L25	31.09 - 26.09 (25)	TP44.89x43.8149x0.4375	2706.24	48.06	39.00	1.232	0.00	0.00	39.00	0.000
L26	26.09 - 21.09 (26)	TP45.9651x44.89x0.4375	2860.10	48.41	39.00	1.241	0.00	0.00	39.00	0.000
L27	21.09 - 16.09 (27)	TP47.0402x45.9651x0.4375	3015.72	48.70	39.00	1.249	0.00	0.00	39.00	0.000
L28	16.09 - 11.09 (28)	TP48.1154x47.0402x0.4375	3173.10	48.95	39.00	1.255	0.00	0.00	39.00	0.000
L29	11.09 - 6.09 (29)	TP49.1905x48.1154x0.4375	3332.12	49.15	39.00	1.260	0.00	0.00	39.00	0.000

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 $\frac{f_{by}}{F_{by}}$
L30	6.09 - 1.09 (30)	TP50.2656x49.1905x0.4375	3492.62	49.31	39.00	1.264	0.00	0.00	39.00	0.000
L31	1.09 - 0 (31)	TP50.5x50.2656x0.4375	3527.79	49.34	39.00	1.265	0.00	0.00	39.00	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	144.5 - 139.5 (1)	TP22.0905x21x0.1875	6.37	0.49	26.00	0.038	0.05	0.00	26.00	0.000
L2	139.5 - 134.5 (2)	TP23.181x22.0905x0.1875	11.75	0.86	26.00	0.066	0.05	0.00	26.00	0.000
L3	134.5 - 129.5 (3)	TP24.2715x23.181x0.1875	12.20	0.85	26.00	0.065	0.04	0.00	26.00	0.000
L4	129.5 - 124.5 (4)	TP25.362x24.2715x0.1875	15.80	1.05	26.00	0.081	0.03	0.00	26.00	0.000
L5	124.5 - 117.54 (5)	TP26.88x25.362x0.1875	16.11	1.05	26.00	0.081	0.03	0.00	26.00	0.000
L6	117.54 - 116.46 (6)	TP26.7218x25.65x0.25	16.66	0.79	26.00	0.061	0.01	0.00	26.00	0.000
L7	116.46 - 111.46 (7)	TP27.7935x26.7218x0.25	20.14	0.92	26.00	0.071	0.01	0.00	26.00	0.000
L8	111.46 - 106.46 (8)	TP28.8652x27.7935x0.25	21.50	0.95	26.00	0.073	0.03	0.00	26.00	0.000
L9	106.46 - 101.46 (9)	TP29.937x28.8652x0.25	21.93	0.93	26.00	0.072	0.03	0.00	26.00	0.000
L10	101.46 - 98.5 (10)	TP30.5714x29.937x0.25	24.23	1.01	26.00	0.077	0.05	0.00	26.00	0.000
L11	98.5 - 93.5 (11)	TP31.6432x30.5714x0.4	24.84	0.63	26.00	0.048	0.08	0.00	26.00	0.000
L12	93.5 - 87.17 (12)	TP33x31.6432x0.4	25.01	0.62	26.00	0.048	0.08	0.00	26.00	0.000
L13	87.17 - 86.17 (13)	TP32.7186x31.499x0.375	25.63	0.67	26.00	0.051	0.10	0.00	26.00	0.000
L14	86.17 - 81.17 (14)	TP33.7941x32.7186x0.375	26.07	0.66	26.00	0.050	0.11	0.00	26.00	0.000
L15	81.17 - 76.17 (15)	TP34.8695x33.7941x0.375	26.50	0.65	26.00	0.050	0.12	0.00	26.00	0.000
L16	76.17 - 71.17 (16)	TP35.945x34.8695x0.375	26.93	0.64	26.00	0.049	0.13	0.00	26.00	0.000
L17	71.17 - 66.17 (17)	TP37.0205x35.945x0.375	27.35	0.63	26.00	0.048	0.14	0.00	26.00	0.000
L18	66.17 - 61.17 (18)	TP38.096x37.0205x0.375	27.77	0.62	26.00	0.048	0.15	0.00	26.00	0.000
L19	61.17 - 56.17 (19)	TP39.1715x38.096x0.375	28.17	0.61	26.00	0.047	0.16	0.00	26.00	0.000
L20	56.17 - 51.17 (20)	TP40.2469x39.1715x0.375	28.56	0.60	26.00	0.046	0.17	0.00	26.00	0.000
L21	51.17 - 42.09 (21)	TP42.2x40.2469x0.375	28.88	0.60	26.00	0.046	0.04	0.00	26.00	0.000
L22	42.09 - 41.09 (22)	TP41.6646x40.196x0.4375	29.52	0.52	26.00	0.040	0.03	0.00	26.00	0.000
L23	41.09 - 36.09 (23)	TP42.7397x41.6646x0.4375	29.90	0.51	26.00	0.039	0.02	0.00	26.00	0.000
L24	36.09 - 31.09 (24)	TP43.8149x42.7397x0.4375	30.25	0.50	26.00	0.039	0.01	0.00	26.00	0.000
L25	31.09 - 26.09 (25)	TP44.89x43.8149x0.4375	30.60	0.50	26.00	0.038	0.01	0.00	26.00	0.000
L26	26.09 - 21.09 (26)	TP45.9651x44.89x0.4375	30.96	0.49	26.00	0.038	0.00	0.00	26.00	0.000
L27	21.09 - 16.09 (27)	TP47.0402x45.9651x0.4375	31.31	0.48	26.00	0.037	0.01	0.00	26.00	0.000
L28	16.09 - 11.09	TP48.1154x47.0402x0.4375	31.66	0.48	26.00	0.037	0.01	0.00	26.00	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	(28)	75								
L29	11.09 - 6.09	TP49.1905x48.1154x0.43	31.97	0.47	26.00	0.036	0.01	0.00	26.00	0.000
	(29)	75								
L30	6.09 - 1.09	TP50.2656x49.1905x0.43	32.26	0.47	26.00	0.036	0.01	0.00	26.00	0.000
	(30)	75								
L31	1.09 - 0 (31)	TP50.5x50.2656x0.4375	32.33	0.46	26.00	0.036	0.01	0.00	26.00	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	144.5 - 139.5 (1)	0.004	0.155	0.000	0.038	0.000	0.159 ✓	1.333	H1-3+VT ✓
L2	139.5 - 134.5 (2)	0.006	0.308	0.000	0.066	0.000	0.315 ✓	1.333	H1-3+VT ✓
L3	134.5 - 129.5 (3)	0.006	0.497	0.000	0.065	0.000	0.505 ✓	1.333	H1-3+VT ✓
L4	129.5 - 124.5 (4)	0.009	0.671	0.000	0.081	0.000	0.681 ✓	1.333	H1-3+VT ✓
L5	124.5 - 117.54 (5)	0.009	0.789	0.000	0.081	0.000	0.800 ✓	1.333	H1-3+VT ✓
L6	117.54 - 116.46 (6)	0.008	0.749	0.000	0.061	0.000	0.758 ✓	1.333	H1-3+VT ✓
L7	116.46 - 111.46 (7)	0.010	0.876	0.000	0.071	0.000	0.887 ✓	1.333	H1-3+VT ✓
L8	111.46 - 106.46 (8)	0.010	1.014	0.000	0.073	0.000	1.025 ✓	1.333	H1-3+VT ✓
L9	106.46 - 101.46 (9)	0.011	1.135	0.000	0.072	0.000	1.147 ✓	1.333	H1-3+VT ✓
L10	101.46 - 98.5 (10)	0.012	1.206	0.000	0.077	0.000	1.220 ✓	1.333	H1-3+VT ✓
L11	98.5 - 93.5 (11)	0.008	0.837	0.000	0.048	0.000	0.846 ✓	1.333	H1-3+VT ✓
L12	93.5 - 87.17 (12)	0.008	0.859	0.000	0.048	0.000	0.868 ✓	1.333	H1-3+VT ✓
L13	87.17 - 86.17 (13)	0.010	1.018	0.000	0.051	0.000	1.028 ✓	1.333	H1-3+VT ✓
L14	86.17 - 81.17 (14)	0.010	1.075	0.000	0.050	0.000	1.086 ✓	1.333	H1-3+VT ✓
L15	81.17 - 76.17 (15)	0.010	1.125	0.000	0.050	0.000	1.136 ✓	1.333	H1-3+VT ✓
L16	76.17 - 71.17 (16)	0.010	1.168	0.000	0.049	0.000	1.179 ✓	1.333	H1-3+VT ✓
L17	71.17 - 66.17 (17)	0.011	1.207	0.000	0.048	0.000	1.218 ✓	1.333	H1-3+VT ✓
L18	66.17 - 61.17 (18)	0.011	1.240	0.000	0.048	0.000	1.252 ✓	1.333	H1-3+VT ✓
L19	61.17 - 56.17 (19)	0.011	1.269	0.000	0.047	0.000	1.281 ✓	1.333	H1-3+VT ✓
L20	56.17 - 51.17 (20)	0.012	1.295	0.000	0.046	0.000	1.307 ✓	1.333	H1-3+VT ✓
L21	51.17 - 42.09 (21)	0.012	1.310	0.000	0.046	0.000	1.323 ✓	1.333	H1-3+VT ✓
L22	42.09 - 41.09 (22)	0.011	1.195	0.000	0.040	0.000	1.206 ✓	1.333	H1-3+VT ✓

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
L23	41.09 - 36.09 (23)	0.011	1.209	0.000	0.039	0.000	1.221 ✓	1.333	H1-3+VT ✓
L24	36.09 - 31.09 (24)	0.012	1.222	0.000	0.039	0.000	1.234 ✓	1.333	H1-3+VT ✓
L25	31.09 - 26.09 (25)	0.012	1.232	0.000	0.038	0.000	1.245 ✓	1.333	H1-3+VT ✓
L26	26.09 - 21.09 (26)	0.012	1.241	0.000	0.038	0.000	1.254 ✓	1.333	H1-3+VT ✓
L27	21.09 - 16.09 (27)	0.013	1.249	0.000	0.037	0.000	1.262 ✓	1.333	H1-3+VT ✓
L28	16.09 - 11.09 (28)	0.013	1.255	0.000	0.037	0.000	1.268 ✓	1.333	H1-3+VT ✓
L29	11.09 - 6.09 (29)	0.013	1.260	0.000	0.036	0.000	1.274 ✓	1.333	H1-3+VT ✓
L30	6.09 - 1.09 (30)	0.013	1.264	0.000	0.036	0.000	1.278 ✓	1.333	H1-3+VT ✓
L31	1.09 - 0 (31)	0.013	1.265	0.000	0.036	0.000	1.279 ✓	1.333	H1-3+VT ✓

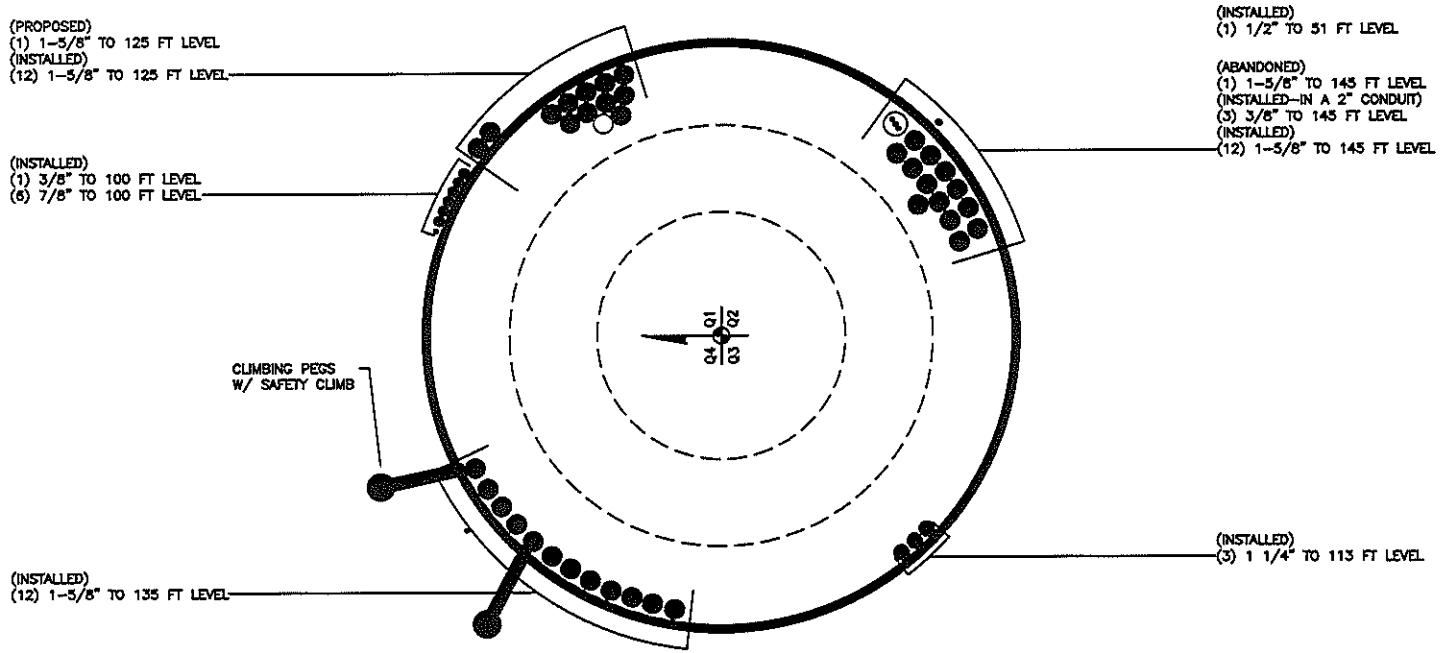
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	144.5 - 139.5	Pole	TP22.0905x21x0.1875	1	-1.90	677.65	11.9	Pass
L2	139.5 - 134.5	Pole	TP23.181x22.0905x0.1875	2	-3.19	711.39	23.7	Pass
L3	134.5 - 129.5	Pole	TP24.2715x23.181x0.1875	3	-3.54	745.13	37.9	Pass
L4	129.5 - 124.5	Pole	TP25.362x24.2715x0.1875	4	-5.38	778.87	51.1	Pass
L5	124.5 - 117.54	Pole	TP26.88x25.362x0.1875	5	-5.66	799.38	60.0	Pass
L6	117.54 - 116.46	Pole	TP26.7218x25.65x0.25	6	-6.39	1092.01	56.8	Pass
L7	116.46 - 111.46	Pole	TP27.7935x26.7218x0.25	7	-8.22	1136.22	66.6	Pass
L8	111.46 - 106.46	Pole	TP28.8652x27.7935x0.25	8	-9.22	1180.43	76.9	Pass
L9	106.46 - 101.46	Pole	TP29.937x28.8652x0.25	9	-9.88	1224.64	86.1	Pass
L10	101.46 - 98.5	Pole	TP30.5714x29.937x0.25	10	-11.45	1250.81	91.5	Pass
L11	98.5 - 93.5	Pole	TP31.6432x30.5714x0.4	11	-12.36	2062.14	63.5	Pass
L12	93.5 - 87.17	Pole	TP33x31.6432x0.4	12	-12.66	2085.63	65.1	Pass
L13	87.17 - 86.17	Pole	TP32.7186x31.499x0.375	13	-14.27	2001.34	77.2	Pass
L14	86.17 - 81.17	Pole	TP33.7941x32.7186x0.375	14	-15.22	2067.88	81.4	Pass
L15	81.17 - 76.17	Pole	TP34.8695x33.7941x0.375	15	-16.21	2134.44	85.2	Pass
L16	76.17 - 71.17	Pole	TP35.945x34.8695x0.375	16	-17.22	2200.98	88.5	Pass
L17	71.17 - 66.17	Pole	TP37.0205x35.945x0.375	17	-18.26	2267.54	91.4	Pass
L18	66.17 - 61.17	Pole	TP38.096x37.0205x0.375	18	-19.32	2334.08	93.9	Pass
L19	61.17 - 56.17	Pole	TP39.1715x38.096x0.375	19	-20.41	2400.63	96.1	Pass
L20	56.17 - 51.17	Pole	TP40.2469x39.1715x0.375	20	-21.53	2467.18	98.1	Pass
L21	51.17 - 42.09	Pole	TP42.2x40.2469x0.375	21	-22.34	2510.44	99.2	Pass
L22	42.09 - 41.09	Pole	TP41.6646x40.196x0.4375	22	-24.97	2976.20	90.5	Pass
L23	41.09 - 36.09	Pole	TP42.7397x41.6646x0.4375	23	-26.28	3053.82	91.6	Pass
L24	36.09 - 31.09	Pole	TP43.8149x42.7397x0.4375	24	-27.61	3131.43	92.6	Pass
L25	31.09 - 26.09	Pole	TP44.89x43.8149x0.4375	25	-28.97	3209.05	93.4	Pass
L26	26.09 - 21.09	Pole	TP45.9651x44.89x0.4375	26	-30.35	3286.66	94.1	Pass
L27	21.09 - 16.09	Pole	TP47.0402x45.9651x0.4375	27	-31.76	3364.28	94.7	Pass
L28	16.09 - 11.09	Pole	TP48.1154x47.0402x0.4375	28	-33.20	3441.89	95.1	Pass
L29	11.09 - 6.09	Pole	TP49.1905x48.1154x0.4375	29	-34.62	3519.51	95.6	Pass
L30	6.09 - 1.09	Pole	TP50.2656x49.1905x0.4375	30	-36.05	3597.11	95.9	Pass
L31	1.09 - 0	Pole	TP50.5x50.2656x0.4375	31	-36.36	3614.03	95.9	Pass
							Summary	
						Pole (L21)	99.2	Pass
						RATING =	**99.2**	**Pass**

NOTE: Above stress ratios for reinforced sections are approximate. More exact calculations are presented in Appendix C.

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 881533 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

CCIpole

per TIA-222- F

Site BU: 881533

Work Order: 711991

Pole Geometry

881533_unreinforced.eri *(last saved 02/25 9:16 am)*

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	144.5	26.96	3.92	18	21	26.88	0.1875	0.75	A572-65
2	121.46	34.29	4.67	18	25.65	33	0.25	1	A572-65
3	91.84	49.75	5.83	18	31.50	42.2	0.375	1.5	A572-65
4	47.92	47.92	0	18	40.20	50.5	0.4375	1.75	A572-65

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	91.5	98.5	plate	CCI-SFP-045100	3																		
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	I_x (in^4)	I_y (in^4)	L_u (in)	Connection Length (in)	Bolt Hole Size (in)	Reinforcement Material
1	4.5	1	4.5	0.5	0.375	7.594	20.000	n/a	1.1875	A572-65

TNX Geometry Input

Increment (ft): 5

	Section Height (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Tapered Pole Grade	Weight Multiplier
1	144.5 - 139.5	5		18	21.000	22.091	0.1875	A572-65	1.000
2	139.5 - 134.5	5		18	22.091	23.181	0.1875	A572-65	1.000
3	134.5 - 129.5	5		18	23.181	24.272	0.1875	A572-65	1.000
4	129.5 - 124.5	5		18	24.272	25.362	0.1875	A572-65	1.000
5	124.5 - 121.46	6.96	3.92	18	25.362	26.880	0.1875	A572-65	1.000
6	121.46 - 116.46	5		18	25.650	26.722	0.25	A572-65	1.000
7	116.46 - 111.46	5		18	26.722	27.794	0.25	A572-65	1.000
8	111.46 - 106.46	5		18	27.794	28.865	0.25	A572-65	1.000
9	106.46 - 101.46	5		18	28.865	29.937	0.25	A572-65	1.000
10	101.46 - 98.5	2.96		18	29.937	30.571	0.25	A572-65	1.000
11	98.5 - 93.5	5		18	30.571	31.643	0.4	A572-65	0.968
12	93.5 - 91.84	6.33	4.67	18	31.643	33.000	0.4	A572-65	0.964
13	91.84 - 86.17	5.67		18	31.499	32.719	0.375	A572-65	1.000
14	86.17 - 81.17	5		18	32.719	33.794	0.375	A572-65	1.000
15	81.17 - 76.17	5		18	33.794	34.870	0.375	A572-65	1.000
16	76.17 - 71.17	5		18	34.870	35.945	0.375	A572-65	1.000
17	71.17 - 66.17	5		18	35.945	37.021	0.375	A572-65	1.000
18	66.17 - 61.17	5		18	37.021	38.096	0.375	A572-65	1.000
19	61.17 - 56.17	5		18	38.096	39.171	0.375	A572-65	1.000
20	56.17 - 51.17	5		18	39.171	40.247	0.375	A572-65	1.000
21	51.17 - 47.92	9.08	5.83	18	40.247	42.200	0.375	A572-65	1.000
22	47.92 - 41.09	6.83		18	40.196	41.665	0.4375	A572-65	1.000
23	41.09 - 36.09	5		18	41.665	42.740	0.4375	A572-65	1.000
24	36.09 - 31.09	5		18	42.740	43.815	0.4375	A572-65	1.000
25	31.09 - 26.09	5		18	43.815	44.890	0.4375	A572-65	1.000
26	26.09 - 21.09	5		18	44.890	45.965	0.4375	A572-65	1.000
27	21.09 - 16.09	5		18	45.965	47.040	0.4375	A572-65	1.000
28	16.09 - 11.09	5		18	47.040	48.115	0.4375	A572-65	1.000
29	11.09 - 6.09	5		18	48.115	49.190	0.4375	A572-65	1.000
30	6.09 - 1.09	5		18	49.190	50.266	0.4375	A572-65	1.000
31	1.09 - 0	1.09		18	50.266	50.500	0.4375	A572-65	1.000

TNX Section Forces

Increment (ft):	5	TNX Output		
	Section Height (ft)	P_u (K)	M_{ux} (kip-ft)	V_u (K)
1	144.5 - 139.5	1.9018	35.489	6.3715
2	139.5 - 134.5	3.1868	77.743	11.751
3	134.5 - 129.5	3.5441	137.64	12.204
4	129.5 - 124.5	5.3828	202.9	15.804
5	124.5 - 121.46	5.6624	251.42	16.114
6	121.46 - 116.46	6.3943	333.41	16.657
7	116.46 - 111.46	8.2154	422.52	20.144
8	111.46 - 106.46	9.2155	527.72	21.499
9	106.46 - 101.46	9.88	636.26	21.928
10	101.46 - 98.5	11.447	705.48	24.226
11	98.5 - 93.5	12.362	828.13	24.841
12	93.5 - 91.84	12.658	869.5	25.008
13	91.84 - 86.17	14.269	1013.1	25.633
14	86.17 - 81.17	15.224	1142.3	26.072
15	81.17 - 76.17	16.207	1273.8	26.505
16	76.17 - 71.17	17.219	1407.3	26.933
17	71.17 - 66.17	18.257	1543	27.353
18	66.17 - 61.17	19.322	1680.8	27.766
19	61.17 - 56.17	20.413	1820.6	28.171
20	56.17 - 51.17	21.53	1962.4	28.565
21	51.17 - 47.92	22.336	2055.8	28.882
22	47.92 - 41.09	24.972	2255.3	29.524
23	41.09 - 36.09	26.276	2403.8	29.895
24	36.09 - 31.09	27.608	2554.1	30.25
25	31.09 - 26.09	28.966	2706.2	30.603
26	26.09 - 21.09	30.351	2860.1	30.956
27	21.09 - 16.09	31.762	3015.7	31.309
28	16.09 - 11.09	33.201	3173.1	31.662
29	11.09 - 6.09	34.617	3332.1	31.968
30	6.09 - 1.09	36.046	3492.6	32.26
31	1.09 - 0	36.359	3527.8	32.325

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
144.5 - 139.5	Pole	TP22.091x21x0.1875	Pole	11.9%	Pass
139.5 - 134.5	Pole	TP23.181x22.091x0.1875	Pole	23.6%	Pass
134.5 - 129.5	Pole	TP24.272x23.181x0.1875	Pole	37.7%	Pass
129.5 - 124.5	Pole	TP25.362x24.272x0.1875	Pole	51.0%	Pass
124.5 - 121.46	Pole	TP26.88x25.362x0.1875	Pole	59.8%	Pass
121.46 - 116.46	Pole	TP26.722x25.65x0.25	Pole	56.7%	Pass
116.46 - 111.46	Pole	TP27.794x26.722x0.25	Pole	66.4%	Pass
111.46 - 106.46	Pole	TP28.865x27.794x0.25	Pole	76.8%	Pass
106.46 - 101.46	Pole	TP29.937x28.865x0.25	Pole	85.9%	Pass
101.46 - 98.5	Pole	TP30.571x29.937x0.25	Pole	91.3%	Pass
98.5 - 93.5	Pole + Reinf.	TP31.643x30.571x0.4	Reinf. 1 Compression	86.6%	Pass
93.5 - 91.84	Pole + Reinf.	TP33x31.643x0.4	Reinf. 1 Compression	89.3%	Pass
91.84 - 86.17	Pole	TP32.719x31.499x0.375	Pole	77.0%	Pass
86.17 - 81.17	Pole	TP33.794x32.719x0.375	Pole	81.3%	Pass
81.17 - 76.17	Pole	TP34.87x33.794x0.375	Pole	85.1%	Pass
76.17 - 71.17	Pole	TP35.945x34.87x0.375	Pole	88.4%	Pass
71.17 - 66.17	Pole	TP37.021x35.945x0.375	Pole	91.3%	Pass
66.17 - 61.17	Pole	TP38.096x37.021x0.375	Pole	93.8%	Pass
61.17 - 56.17	Pole	TP39.171x38.096x0.375	Pole	96.0%	Pass
56.17 - 51.17	Pole	TP40.247x39.171x0.375	Pole	98.0%	Pass
51.17 - 47.92	Pole	TP42.2x40.247x0.375	Pole	99.1%	Pass
47.92 - 41.09	Pole	TP41.665x40.196x0.4375	Pole	90.4%	Pass
41.09 - 36.09	Pole	TP42.74x41.665x0.4375	Pole	91.5%	Pass
36.09 - 31.09	Pole	TP43.815x42.74x0.4375	Pole	92.5%	Pass
31.09 - 26.09	Pole	TP44.89x43.815x0.4375	Pole	93.3%	Pass
26.09 - 21.09	Pole	TP45.965x44.89x0.4375	Pole	94.0%	Pass
21.09 - 16.09	Pole	TP47.04x45.965x0.4375	Pole	94.6%	Pass
16.09 - 11.09	Pole	TP48.115x47.04x0.4375	Pole	95.1%	Pass
11.09 - 6.09	Pole	TP49.19x48.115x0.4375	Pole	95.5%	Pass
6.09 - 1.09	Pole	TP50.266x49.19x0.4375	Pole	95.8%	Pass
1.09 - 0	Pole	TP50.5x50.266x0.4375	Pole	95.8%	Pass
				Summary	
			Pole	99.1%	Pass
			Reinforcement	89.3%	Pass
			Overall	99.1%	Pass

Additional Calculations

Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity	
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1
144.5 - 139.5	790	n/a	790	13.03	n/a	13.03	11.9%	
139.5 - 134.5	914	n/a	914	13.68	n/a	13.68	23.6%	
134.5 - 129.5	1050	n/a	1050	14.33	n/a	14.33	37.7%	
129.5 - 124.5	1199	n/a	1199	14.98	n/a	14.98	51.0%	
124.5 - 121.46	1296	n/a	1296	15.38	n/a	15.38	59.8%	
121.46 - 116.46	1859	n/a	1859	21.00	n/a	21.00	56.7%	
116.46 - 111.46	2094	n/a	2094	21.85	n/a	21.85	66.4%	
111.46 - 106.46	2348	n/a	2348	22.71	n/a	22.71	76.8%	
106.46 - 101.46	2622	n/a	2622	23.56	n/a	23.56	85.9%	
101.46 - 98.5	2794	n/a	2794	24.06	n/a	24.06	91.3%	
98.5 - 93.5	3101	1810	4911	24.91	13.50	38.41	62.3%	86.7%
93.5 - 91.84	3207	1850	5057	25.19	13.50	38.69	64.2%	89.3%
91.84 - 86.17	5086	n/a	5086	38.50	n/a	38.50	77.0%	
86.17 - 81.17	5611	n/a	5611	39.78	n/a	39.78	81.3%	
81.17 - 76.17	6170	n/a	6170	41.06	n/a	41.06	85.1%	
76.17 - 71.17	6765	n/a	6765	42.34	n/a	42.34	88.4%	
71.17 - 66.17	7398	n/a	7398	43.62	n/a	43.62	91.3%	
66.17 - 61.17	8068	n/a	8068	44.90	n/a	44.90	93.8%	
61.17 - 56.17	8778	n/a	8778	46.18	n/a	46.18	96.0%	
56.17 - 51.17	9529	n/a	9529	47.46	n/a	47.46	98.0%	
51.17 - 47.92	10039	n/a	10039	48.29	n/a	48.29	99.1%	
47.92 - 41.09	12289	n/a	12289	57.25	n/a	57.25	90.4%	
41.09 - 36.09	13276	n/a	13276	58.74	n/a	58.74	91.5%	
36.09 - 31.09	14314	n/a	14314	60.23	n/a	60.23	92.5%	
31.09 - 26.09	15405	n/a	15405	61.73	n/a	61.73	93.3%	
26.09 - 21.09	16550	n/a	16550	63.22	n/a	63.22	94.0%	
21.09 - 16.09	17750	n/a	17750	64.71	n/a	64.71	94.6%	
16.09 - 11.09	19007	n/a	19007	66.20	n/a	66.20	95.1%	
11.09 - 6.09	20322	n/a	20322	67.70	n/a	67.70	95.5%	
6.09 - 1.09	21697	n/a	21697	69.19	n/a	69.19	95.8%	
1.09 - 0	22004	n/a	22004	69.52	n/a	69.52	95.8%	

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

TIA Rev F

Site Data

BU#: *881533*
Site Name: *GROTON TOWER*
App #: *207070 - Rev. 4*

Pole Manufacturer:	*Other*

Reactions		
Moment:	3528	ft-kips
Axial:	36	kips
Shear:	32	kips

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	59	in

Plate Data		
Diam:	65	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	10.02	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.625	in
Fillet V. Weld:	0.375	in
Width:	6.75	in
Height:	17.75	in
Thick:	0.625	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	50.5	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	177.1 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	90.9% Pass	

Base Plate Results

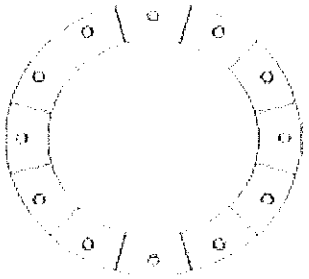
	Flexural Check	Stiffened
Base Plate Stress:	45.9 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	76.5% Pass	Y.L. Length: N/A, Roark

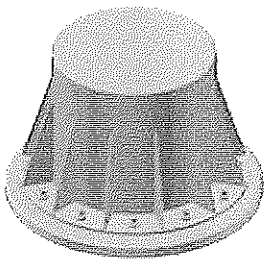
Stiffener Results

Horizontal Weld :	69.5% Pass
Vertical Weld:	45.6% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	26.1% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	75.2% Pass
Plate Comp. (AISC Bracket):	80.6% Pass

Pole Results

Pole Punching Shear Check:	11.6% 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

Monopole Block Foundation

Checks capacity of monolithic block foundation for a monopole tower per TIA/EIA-222-F

BU #: 881533
Site Name: GROTON TOWER
App No.: 207070 - Rev. 4

Design Reactions		
Shear, S:	32.00	kips
Moment, M:	3528.00	ft*kips
Height, H:	144.50	ft
Weight, Wt:	36.00	kips
Base Diameter, BD:	50.5	in

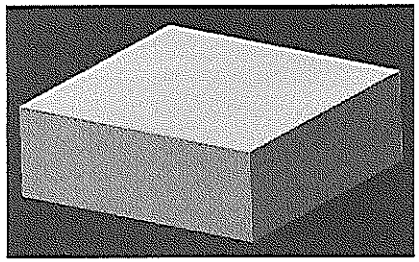
Foundation Dimensions		
Depth, D:	5.0	ft
Block Width, W:	30.0	ft
Neglected Depth, N:	3.3	ft
Ext. Above Grade, E:	0.0	ft
Anchor Steel Length, Lst:	72.0	in
Clear Cover, cc:	4.0	in

Soil Properties		
Soil Unit Weight, γ:	0.120	kcf
Allowable Bearing, Bc:	12.000	ksf
Int. Angle of Friction, Φ:	30.00	deg
Cohesion, Co:	0.000	ksf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ:	0.2	
Seismic Zone, z:	1	

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

Rebar Properties		
Pad Rebar Size, sp:	8	
Rebar Quanity, mp:	44	25

Design Checks	Capacity/ Availability	Demands/ Limits	Check	%
Shear (ksf)	71.10	32.00	OK	45.0%
Overturning (ft*kips):	7719.10	3688.00	OK	47.8%
Bearing (ksf):	12.00	1.61	OK	13.4%
Shear - 1-Way (kips):	2527.29	843.23	OK	33.4%
Pad Rebar Area (in²):	34.56	19.44	OK	N/A
Bar Spacing (in):	7.16	18 > Bs > 2	OK	N/A
Development Length (in):	176.00	37.00	OK	N/A



Modification Checks	Capacity/ Availibility	Demands/ Limits	Check
Minimum Extra Thickness (in):	0.00	0.00	Not Used
Pad Rebar Area-short (in²):	8.84	0.52	Not Used
Pad Rebar Area-long (in2):	2.21	0.52	Not Used
Pad Rebar Spacing-short (in2):	17.74	18 > Bs > 2	Not Used
Pad Rebar Spacing-long (in2):	87.06	18 > Bs > 2	Not Used
End Cap Width (in):	0.00	0.00	Not Used
End Cap Rebar Area (in2):	4.81	0.00	Not Used
EC Rebar Spacing (in):	-2.02	18 > Bs > 2	Not Used
Tie Spacing (in):	18.03	352 > s > 4.5	Not Used
Dowel Area (in2):	8.84	0.00	Not Used
Dowel Embedment (in):	15.00	6.00	Not Used
Shear Strength of Cone (kips):	68.73	23.86	Not Used
Dowel Edge Distance (in):	12.00	14.51	Not Used
Dowel Spacing (in):	37.33	30.00	Not Used
Dowel Edge Distance (vert) (in):	30.00	14.51	Not Used
Dowel Devel. Length (in):	-4.00	13.32	Not Used

Modifications					
Pad Thickness, Te:	0	in	End Cap Width, Wec:	0	in
Revised Pad Thickness, Tx:	5	ft	Revised Width, Wx:	30	ft
Pad Rebar Size, Se:	6		EC Rebar Size, Sec:	7	per side, top & bottom
Rebar Quanity (long), me:	20	2	EC Rebar Quanity, mec:	8	0
Rebar Quanity (short), mex:	5	2	EC Tie Size, Sect:	4	per side
Dowel Size, Sed:	7		Tie Quanity, mect:	20	0
Dowel Quanity, med:	20	0	EC Dowel Size, Secd:	6	per side
			Dowel Quanity, mecd:	20	0
			Rows of Dowels, Nd:	2	
			Dowel Depth, decd:	15	in
			Edge Distance, eecd:	12	in

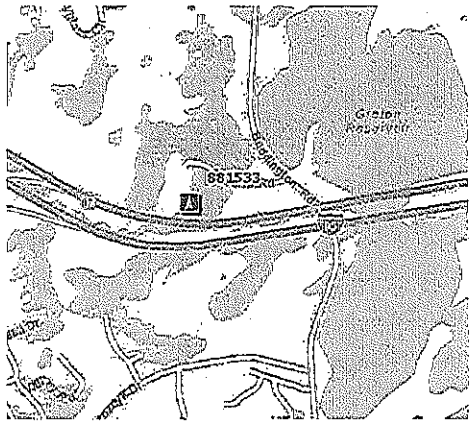
APPENDIX D

REQUIRED MODIFICATION DRAWINGS

MONOPOLE REINFORCEMENT DRAWINGS

SITE NAME: GROTON TOWER
BU NUMBER: 881533

SITE ADDRESS:
75 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA



95 N TO 117 S TO BUDDINGTON RD. RIGHT ON BUDDINGTON TO ROBERTS RD. LEFT ON ROBERTS RD TO TOP OF HILL.

PROJECT CONTACTS:

1. CROWN TOWER STRUCTURAL ANALYST
   STEVE TUTTLE
   (585) 899-3445
   STEVE.TUTTLE@CROWNCASTLE.COM
   8 PARKMEADOW DRIVE
   PITTSFORD, NY 14534
2. CROWN PROJECT MANAGER
   EVA MORALES
   (704) 405-6612
   EVA.MORALES@CROWNCASTLE.COM
   3530 TORINGDON WAY SUITE 300
   CHARLOTTE, NC 28277
3. CROWN CONSTRUCTION MANAGER
   JASON D'AMICO
   (860) 209-0104
   JASON.D'AMICO@CROWNCASTLE.COM
   46 BROADWAY
   ALBANY, NY 12204
4. CROWN DESIGN ENGINEER (EOR)
   JAMAL A. HUWEL, P.E.
   (724) 416-2337
   JAMAL.HUWEL@CROWNCASTLE.COM
   2000 CORPORATE DRIVE
   CANONSBURG, PA 15317

DRAWINGS INCLUDED

SHEET NUMBER	DESCRIPTION
S-1	TITLE PAGE
S-2	MODIFICATION INSPECTION CHECKLIST
S-3	NOTES
S-4	AJAX/DTI BOLT SPECIFICATIONS AND TIGHTENING PROCEDURE
S-5	ELEVATION
S-6	TOWER SECTION

TOWER INFORMATION

TOWER MANUFACTURER / DWG #:	EEI / DWG # GS52968
TOWER HEIGHT / TYPE:	144.5 FT MONOPOLE TOWER
TOWER LOCATION:	LAT 41° 21' 36.8"
DATUM: (NAD 1983)	LONG -72° 2' 55.1"
	ELEV 123 FT AMSL
STRUCTURAL DESIGN DRAWING:	CCI / WO # 711991
STRUCTURAL ANALYSIS REPORT:	AERO / WO # 684943
STRUCTURAL ANALYSIS DATE:	12/09/13
APPLICATION ID:	207070 REV # 4
CCISITES DOCUMENT ID:	4098241

CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS BASED ON THE REQUIREMENTS OF TIA-222-F STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES AND THE 2005 CT STATE BUILDING CODE WITH 2009 AMENDMENT USING A FASTEST WIND SPEED OF 85 MPH WITH NO ICE, 37.6 MPH WITH 0.75 INCH ICE THICKNESS AND 50 MPH UNDER SERVICE LOADS.

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

STATE OF CONNECTICUT
JAMAL A. HUWEL
28893
LICENSED
PROFESSIONAL ENGINEER
DATE FEB 25 2014
SIGNED

SITE NAME: GROTON TOWER
BU NUMBER: 881533
WO NUMBER: 711991
SITE ADDRESS:
75 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA

ENG/QA BY: TS DATE: 02/25/14
DFT BY: MDP/JJW DATE: 02/25/14
DFT/QA BY: PS DATE: 2/25/14
APRV'D BY: DBS DATE: 2/25/14
SCALE: N.T.S.

TITLE PAGE

S-1 REV 0

MODIFICATION INSPECTION NOTES

MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWING
X	EOR APPROVED SHOP DRAWINGS
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION AND NDE REPORTS
NA	EARTHWORK: LIFT AND DENSITY
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT REQUIRED FOR THE MI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT

GENERAL

THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE CROWN ENG-BUL-10173, "APPROVED MI VENDORS".

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PURCHASE ORDER (PO) IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN POINT OF CONTACT (POC).

REFER TO CROWN ENG-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

MI INSPECTOR

THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GC INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN.

GENERAL CONTRACTOR

THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE MI INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND CROWN ENG-SOW-10007.

RECOMMENDATIONS

THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW THE FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

CANCELLATION OR DELAYS IN SCHEDULED MI

IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY, NOR FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

CORRECTION OF FAILING MI'S

IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH CROWN'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

MI VERIFICATION INSPECTIONS

CROWN RESERVES THE RIGHT TO CONDUCT AN MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH CROWN ENG-SOW-10007.

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

REQUIRED PHOTOS

BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN ONLY FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO CROWN ENG-SOW-10007.

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

STATE OF CONNECTICUT * JAMES A. MURRELL * 28893 LICENSED PROFESSIONAL ENGINEER * DATE FEB 25 2014 SIGNED

CROWN CASTLE

SITE NAME: GROTON TOWER
BU NUMBER: 881833
WO NUMBER: 711091
SITE ADDRESS:
75 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA

ENG/QA BY: TS DATE: 02/28/14
DFT BY: MDP/JJW DATE: 02/28/14
DFT/QA BY: PS DATE: 2/25/14
APRV'D BY: DBS DATE: 2/25/14
SCALE: N.T.S.

MODIFICATION INSPECTION CHECKLIST

S-2 REV 0

GENERAL NOTES

1. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED, THAT HE IS PROPERLY LICENSED, AND THAT HE IS PROPERLY REGISTERED TO DO THIS WORK IN THE STATE AND/OR COUNTY IN WHICH IT IS TO BE PERFORMED.
2. THE GENERAL NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE STRUCTURE AND SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS.
3. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVALS FROM ALL AUTHORITIES HAVING JURISDICTION FOR THIS PROJECT AND SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
5. ERECT GUARDS AND BARRIERS PER APPLICABLE LABOR AND CONSTRUCTION SAFETY REGULATIONS.
6. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, POSSIBLE INTERFERENCES, AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO THE CROWN CASTLE ENGINEER OF RECORD (EOR) AND CROWN CASTLE FIELD PERSONNEL IMMEDIATELY. ANY AND ALL FIELD CHANGES SHALL BE APPROVED AND DOCUMENTED BY THE EOR PRIOR TO FIELD IMPLEMENTATION.
7. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR TWO (2) YEARS FROM THE DATE OF COMPLETED CONSTRUCTION.
8. USE ONLY THE LATEST ISSUES OF ANY APPLICABLE CODES, STANDARDS, OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES AND SPECIFICATIONS, UNO.
9. ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH ANSI, ASTM, ACI, TIA, AND AISC STANDARDS AS REFERENCED IN THE APPLICABLE CODE.
10. STRUCTURAL ELEMENTS SHOWN ON THESE DRAWINGS ARE DESIGNED IN ACCORDANCE WITH APPLICABLE BUILDING CODES/STANDARDS. ALL CONSTRUCTION, EXCEPT WHERE NOTED OTHERWISE, SHALL COMPLY WITH THOSE CODES/STANDARDS.
11. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS, AND IN CONFORMANCE WITH THE DRAWINGS. ANY AND ALL SUBSTITUTIONS MUST BE DULY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER OF RECORD PRIOR TO FABRICATION AND INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
12. ALL MANUFACTURER'S HARDWARE ASSEMBLY INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION PROCEDURES MEET THE REQUIREMENTS OF OSHA, THE OWNER, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS.
14. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIAL ACCESS, WITH THE RESIDENT LEASING AGENT.
15. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES OR BURIED SERVICES AFFECTED BY THIS CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR TEMPORARILY RELOCATING ANY LINES OR STRUTS AS NECESSARY TO COMPLETE THE REQUIRED WORK.
16. STRUCTURAL DESIGN IS FOR THE COMPLETE CONDITION ONLY. THE CONTRACTOR MUST BE COGNIZANT THAT THE REMOVAL OF ANY STRUCTURAL COMPONENT OF AN EXISTING TOWER HAS THE POTENTIAL TO CAUSE THE PARTIAL OR COMPLETE COLLAPSE OF THE STRUCTURE. ALL NECESSARY PRECAUTIONS MUST BE TAKEN TO ENSURE STRUCTURAL INTEGRITY, INCLUDING, BUT NOT LIMITED TO, ENGINEERING ASSESSMENT OF CONSTRUCTION STRESSES WITH INSTALLATION MAXIMUM WIND SPEED AND/OR TEMPORARY BRACING AND SHORING.
17. DO NOT SCALE DRAWINGS.
18. THE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF CROWN CASTLE. THEY MAY NOT BE REPRODUCED IN ANY FORM WITHOUT THE EXPRESSED WRITTEN CONSENT/PERMISSION OF CROWN CASTLE.
19. FOR THIS ANALYSIS AND MODIFICATION, THE TOWER HAS BEEN ASSUMED TO BE IN GOOD CONDITION WITHOUT ANY DEFECTS. IF THE CONTRACTOR DISCOVERS ANY INDICATION OF AN EXISTING STRUCTURAL DEFECT, CONTACT THE ENGINEER OF RECORD IMMEDIATELY
20. MODIFICATION WORK SHALL BE COMPLETED IN CALM WIND CONDITIONS / OR APPROPRIATE WIND SPEED FOR THE TYPE OF MODIFICATION WORK TO BE INSTALLED.
21. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE ENGINEER OF RECORD.

STRUCTURAL STEEL NOTES

1. DESIGN, FABRICATION, ERECTION, ALTERATION AND MAINTENANCE SHALL CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE (UNO).
   A. TIA-222: STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
   B. TIA-1019-A: INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
   C. AISC: MANUAL OF STEEL CONSTRUCTION
2. ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS, UNO.
   A. STRUCTURAL STEEL, ASTM A572 GRADE 65 (FY = 65KSI).
   B. ALL BOLTS, ASTM A325 TYPE 1 GALVANIZED HIGH STRENGTH BOLTS.
   C. ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
   D. ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.
3. HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER OF RECORD.
4. ALL FASTENERS SHALL NOT BE REUSED.
5. A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED ASTM A325 BOLTS.
6. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH SUCH THAT THE END OF THE BOLT BE AT LEAST FLUSH WITH THE FACE OF THE NUT. IT IS NOT PERMITTED FOR THE BOLT END TO BE BELOW THE FACE OF THE NUT AFTER TIGHTENING IS COMPLETED.
7. HOT-DIP GALVANIZE ALL ITEMS, UNO.
   GALVANIZE PER ASTM A123, ASTM A153/A153M OR ASTM A653 G90, AS APPLICABLE.
8. FOR A LIST OF CROWN APPROVED COLD GALVANIZING COMPOUNDS, REFER TO CROWN ENG-BUL-10140, "TOWER PROTECTIVE COATINGS BULLETIN".
9. AFTER FINAL INSPECTION, ALL EXPOSED STRUCTURAL STEEL AS THE RESULT OF THIS SCOPE OF WORK INCLUDING WELDS, FIELD DRILLED HOLES, AND SHAFT INTERIORS (WHERE ACCESSIBLE), SHALL BE CLEANED AND COLD GALVANIZING APPLIED BY BRUSH IN ACCORDANCE WITH CROWN ENG-BUL-10140, "TOWER PROTECTIVE COATINGS BULLETIN". PHOTO DOCUMENTATION IS REQUIRED TO BE SUBMITTED TO THE MI INSPECTOR.

WELDING NOTES

1. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE-STEEL".
2. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.
3. ALL ARC WELDING ON CROWN STRUCTURES SHALL BE DONE IN ACCORDANCE WITH THE CROWN ENG-PLN-10016, "CUTTING AND WELDING SAFETY PLAN" AND AWS D1.1 (LATEST EDITION). THIS SHALL INCLUDE A CERTIFIED WELDING INSPECTOR (CWI) FOR ACCEPTANCE OR REJECTION OF ALL WELDING OPERATIONS, PRE-DURING-POST, USING THE ACCEPTANCE CRITERIA OF AWS D1.1. THE CWI SHALL WORK WITH THE QC ON THE LEVEL OF INTERACTION NEEDED TO CONDUCT THE WELDING INSPECTION. THE CERTIFIED WELDING INSPECTION IS THE RESPONSIBILITY OF THE QC.
4. FOR ALL WELDING, USE E60XX ELECTRODES FOR SMAW PROCESS AND E8XT-XX ELECTRODES FOR FCAW PROCESS, UNO.
5. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING.
6. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0° F. WHEN THE TEMPERATURE IS BETWEEN 0° F AND 32° F, PREHEAT AND MAINTAIN THE STEEL IN THE VICINITY OF THE WELD AREA AT 70° F DURING THE WELDING PROCESS.
7. DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.
8. FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.
9. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

STATE OF CONNECTICUT
JAMAL A. HUMMEL
28893
LICENSED
PROFESSIONAL ENGINEER
DATE FEB 25 2014 SIGNED

CROWN CASTLE

SITE NAME: GROTON TOWER
BU NUMBER: 881633
WO NUMBER: 711691
SITE ADDRESS:
76 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA

ENG/QA BY: TS DATE: 02/25/14
DFT BY: MDP/JJW DATE: 02/26/14
DFT/QA BY: PS DATE: 2/26/14
APRVD BY: DBS DATE: 2/25/14
SCALE: N.T.S.

NOTES

S-3 REV 0

AJAX/DTI BOLT SPECIFICATIONS AND TIGHTENING PROCEDURE

M20 AJAX/DTI BOLT ASSEMBLY COMPONENT SPECIFICATIONS:

BOLT:
AJAX ONESIDE™ BLIND BOLT (M8.8; EQUIVALENT TO A325)
FINISH: HOT DIP GALVANIZED PER ASTM A153.

SPLIT WASHER:
AJAX ONESIDE™ SPLIT WASHER
FINISH: HOT DIP GALVANIZED PER ASTM A153.

SHEAR SLEEVE:
F_u = 120 KSI MIN. (ASTM A519)
29MM O.D. x 20MM I.D.
LENGTH = NOMINAL [GRIP-6MM] = [GRIP-0.25"] (TOL. -0", +1/32")
SLEEVES SHALL BE ROUND, WITH ENDS CUT SQUARE AND DEBURRED.
FINISH: GALVANIZED (COLD GALVANIZED AS PER CROWN ENG-BUL-10149, HOT DIP GALVANIZED PER ASTM A123, MECHANICALLY GALVANIZED AND SPUN) OR CADMIUM PLATED.

SOLID WASHER:
AJAX ONESIDE™ SOLID WASHER
FINISH: HOT DIP GALVANIZED PER ASTM A153.

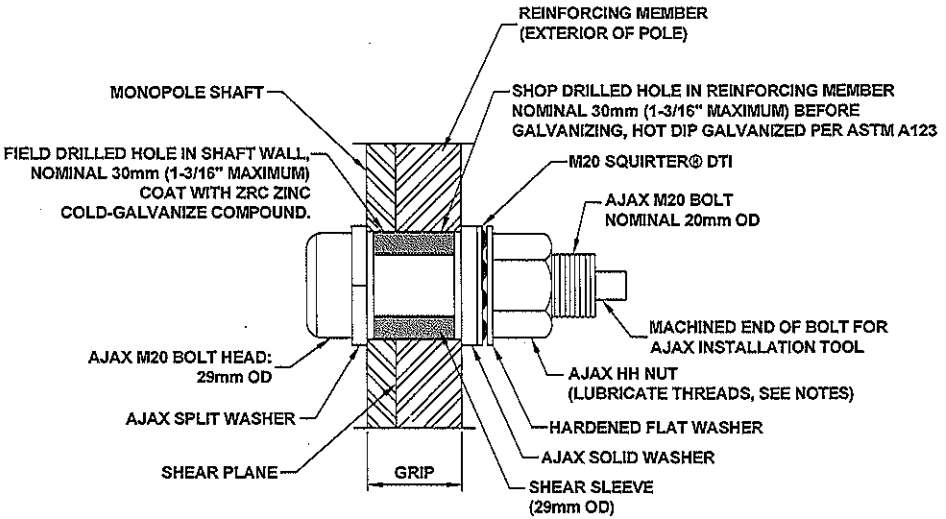
DIRECT TENSION INDICATOR WASHER:
SQUIRTER® DTI, ASTM F959M
FINISH: COLD MECHANICALLY GALVANIZED (TO ASTM B695) AND EPOXY COATED.

MANUFACTURER:
APPLIED BOLTING TECHNOLOGY PRODUCTS, INC.
1413 ROCKINGHAM ROAD, BELLOWS FALLS, VERMONT, USA 05101
PHONE: 1-800-552-1999
WEBSITE: WWW.APPLIEDBOLTING.COM

DISTRIBUTORS OF SQUIRTER® DTI'S:
http://www.appliedbolting.com/applied-bolting-distributors.html

FLAT WASHER:
HARDENED FLAT WASHER, ASTM F436M (MINIMUM HARDNESS RC38)
FINISH: COLD MECHANICALLY GALVANIZED

HEX NUT:
AJAX ONESIDE™ HEAVY HEX NUT
FINISH: HOT DIP GALVANIZED PER ASTM A153.



DETAIL 1: M20 AJAX/DTI BOLT ASSEMBLY

BOLT ASSEMBLY AND INSTALLATION:
BOLT ASSEMBLY SHALL ADHERE TO THE REQUIREMENTS OF DETAIL 1.
NON-PETROLEUM BASED, WATER SOLUBLE, INERT BOLT LUBRICANT SHALL BE USED ON ALL AJAX BOLTS TO ENSURE PROPER TENSIONING OF THE ASSEMBLY. CARE SHOULD BE TAKEN TO ENSURE THE BOLT HEAD AND SPLIT WASHER ARE NOT LUBRICATED AS THIS MAY CAUSE EXCESSIVE BOLT SLIPPAGE UPON APPLYING TORQUE, WHICH MAY LEAD TO DIFFICULTIES IN ENGAGING THE SQUIRTER® DTI WASHER PROPERLY. **NOTE:** ONLY LUBRICATING THE THREADS OF THE NUT MAY ACHIEVE BETTER RESULTS.
THE TYPICAL RULE OF THUMB WHEN USING AN IMPACT WRENCH IS TO ENGAGE FOR NO MORE THAN 10 SECONDS. IF THE BOLT IS NOT SPINNING AND THE SQUIRTER ® DTI "BUMPS" HAVE NOT ENGAGED AFTER 10 SECONDS USING AN IMPACT WRENCH, REMOVE THE NUT AND REAPPLY LUBRICANT. **NOTE:** PROLONGED USE OF THE IMPACT WRENCH TENDS TO HEAT THE BOLT THREAD/NUT, THEREBY, INCREASING FRICTION ON THE THREADS WHICH WOULD REQUIRE ADDITIONAL TORQUE. HOLDING FOR LONGER THAN 10 SECONDS CAN BE COUNTERPRODUCTIVE.

A MINIMUM OF 4 OUT OF 5 SQUIRTER® DTI "BUMPS" SHALL BE ENGAGED IN ANY AJAX/DTI BOLT ASSEMBLY IN THE END CONNECTION OF REINFORCING MEMBERS. INTERMEDIATE BOLTS SHALL ENGAGE A MINIMUM OF 3 OUT OF 5 SQUIRTER® DTI "BUMPS".

DTI WASHERS MUST BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE "BUMPS" FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI "BUMPS" SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

FOLLOW THE DTI MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION, LUBRICATION, TIGHTENING, AND INSPECTION.

INSPECTION:
VISUALLY INSPECT ALL BOLT ASSEMBLIES TO ENSURE THE MINIMUM "BUMP" ENGAGEMENT AS DEFINED IN THE SECTION "BOLT ASSEMBLY AND INSTALLATION" HAS BEEN ACHIEVED. FOR MORE INFORMATION ON INSPECTION, SEE THE MANUFACTURER'S GUIDELINES.
WHERE FEASIBLE, CHECK A SAMPLE OF THE END CONNECTION DTI WASHERS WITH THE APPROPRIATE FEELER GAGE. IF THE FEELER GAGE CANNOT BE INSERTED TO THE BOLT SHANK HALF WAY AROUND THE BOLT, THE INSTALLATION IS OKAY. IF YOU CAN INSERT THE FEELER GAGE TO THE SHANK ALL THE WAY AROUND THE BOLT, THE INSTALLATION IS NOT OKAY. IF YOU FIND MORE THAN ONE SUCH "NOT OKAY" BOLT IN ANY ONE END CONNECTION, CHECK ALL BOLTS IN THAT END CONNECTION. A MINIMUM OF THREE BOLTS SHALL BE CHECKED IN EACH END CONNECTION. PHOTOS SHALL BE TAKEN TO INDICATE THE BOLTS TESTED.

ALL BOLT ASSEMBLIES AND DTI WASHERS SHALL BE VISUALLY INSPECTED. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE PHOTO DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI WASHERS.

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

STATE OF CONNECTICUT · JAMAL A. HUMMIEDA · 28893 · LICENSED PROFESSIONAL ENGINEER · DATE FEB 25 2014 · SIGNED

CROWN CASTLE

SITE NAME: GROTON TOWER
BU NUMBER: 881533
WO NUMBER: 711001
SITE ADDRESS:
76 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA

ENG/QA BY: TS DATE: 02/25/14
DFT BY: MDP/JJW DATE: 02/25/14
DFT/QA BY: PS DATE: 2/25/14
APRVD BY: DBS DATE: 2/25/14
SCALE: N.T.S.

AJAX/DTI BOLT SPECIFICATIONS AND TIGHTENING PROCEDURE

S-4 REV 0

POLE SPECIFICATIONS

POLE SHAPE TYPE:	18-SIDED POLYGON
TAPER:	0.21075 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A572 (50 KSI)
ANCHOR RODS:	2 1/4"Ø #10J ASTM A615 GRADE 75

SHAFT SECTION DATA

SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)	
				@ TOP	@ BOTTOM
1	26.00	0.1875	47	21.000	26.800
2	34.29	0.2500	56	25.520	33.000
3	40.75	0.3750	70	31.360	42.200
4	47.02	0.4375		40.050	50.500

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

POLE MODIFICATION SCHEDULE

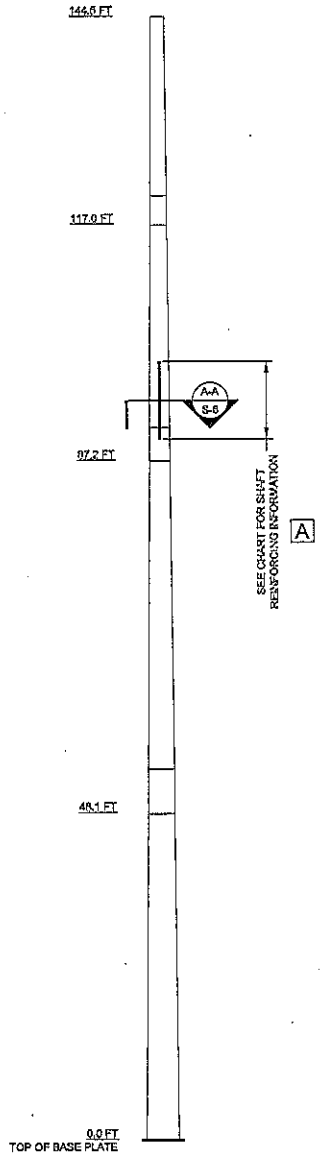
	ELEVATION (FT)	MODIFICATION	REFERENCE SHEET
A	90.0 - 100.0	INSTALL NEW FLAT PLATE REINFORCEMENT	S-6

NEW CCI FLAT PLATE (65 KSI) REINFORCING

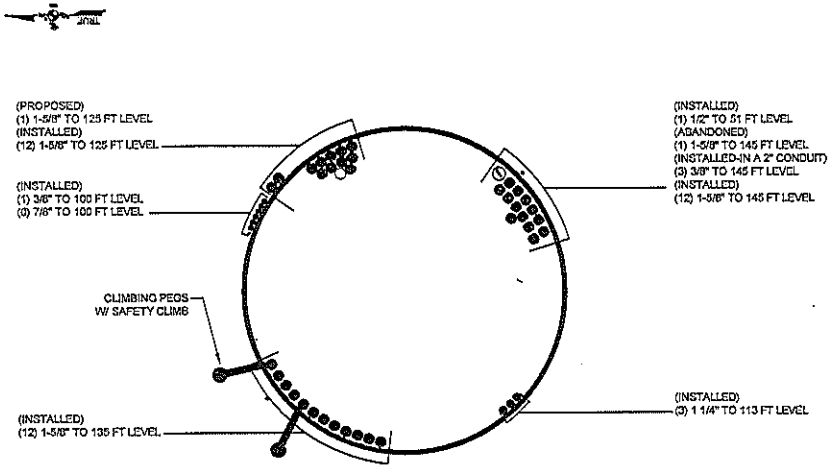
ELEVATION (FT)	FLAT / DEGREES (°)	FLAT PLATE
90'-0" TO 100'-0"	2, 8, 14	CCI-SFP-04510010

NOTES FOR CROWN REINFORCING (65 KSI) MATERIAL:

1. DO NOT WELD WITHOUT APPROVAL FROM THE EOR.
2. ALL SHIMS TO BE MADE OF ASTM A36 STEEL.
3. ALL FLAT PLATE REINFORCEMENT IS TO BE INSTALLED CENTERED ON ITS DESIGNATED FLAT, UNO.
4. SEE *CMRP 65 KSI PARTS CATALOG 2nd EDITION* FOR PART DETAILS.
5. AS AN ALTERNATIVE TO USING DTI WASHERS, AJAX BOLTS MAY BE PRETENSIONED PER THE AISC TURN-OF-NUT METHOD.



POLE ELEVATION



COAX LAYOUT

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

CROWN CASTLE

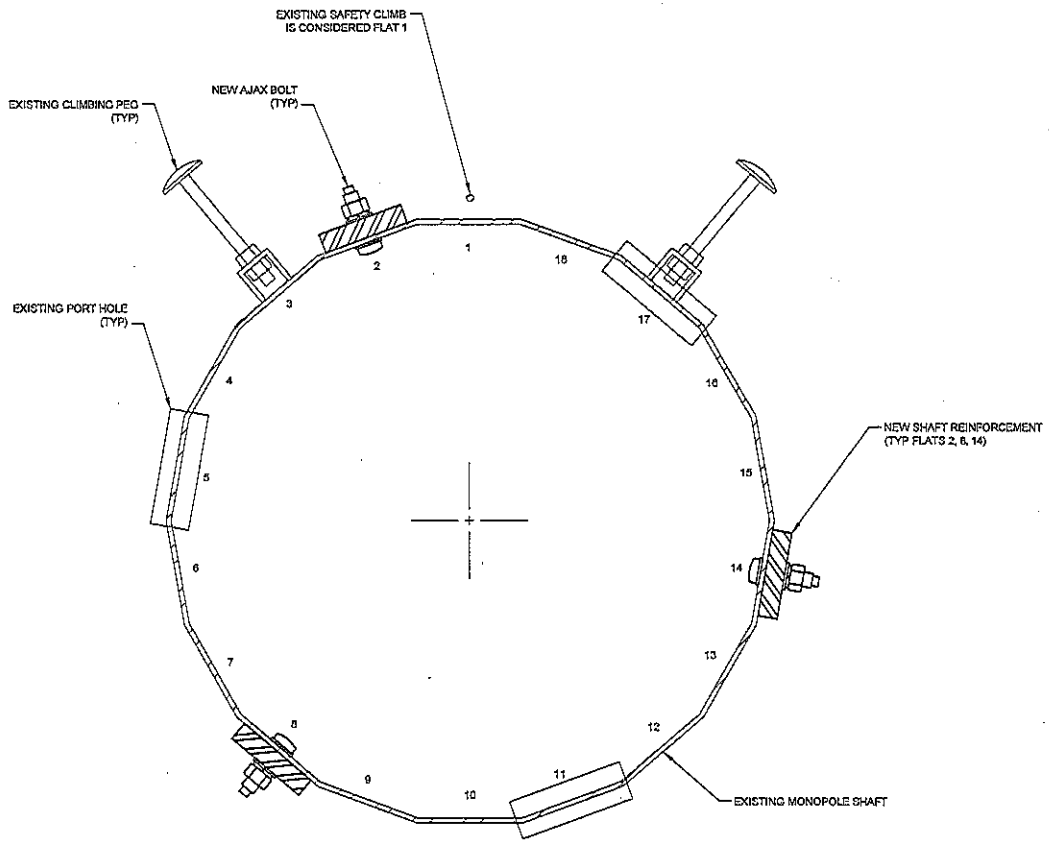
SITE NAME: GROTON TOWER
BU NUMBER: 861533
WO NUMBER: 711091
SITE ADDRESS:
75 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA

ENG/QA BY: TS DATE: 02/25/14
DFT BY: MDP/JJW DATE: 02/25/14
DFT/QA BY: PS DATE: 2/25/14
APRVD BY: PBS DATE: 2/25/14
SCALE: N.T.S.

STATE OF CONNECTICUT
PAUL A. SUNDQUIST
28803
LICENSED PROFESSIONAL ENGINEER
DATE FEB 25 2014
SIGNED

ELEVATION

S-5 REV 0



A-A / S-6 TOWER SECTION

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
DAVID A HUNT
28893
LICENSED
PROFESSIONAL ENGINEER
FEB 25 2014
SIGNED

SITE NAME: GROTON TOWER
BU NUMBER: 861633
WO NUMBER: 711091
SITE ADDRESS:
75 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA

ENG/QA BY: TS DATE: 02/25/14
DFT BY: JJW DATE: 02/25/14
DFT/QA BY: RS DATE: 2 25 14
APRVD BY: DBS DATE: 2 25 14
SCALE: N.T.S.

TOWER SECTION

S-6 REV 0

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11428A

Groton Tower
75 Roberts Road
Groton, CT 06340

March 12, 2014

EBI Project Number: 62141467

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

March 12, 2014

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Re: Emissions Values for Site: **CT11428A - Groton Tower**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 75 Roberts Road, Groton, CT, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of μW/cm2 calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (μW/cm2). The general population exposure limit for the cellular band is 567 μW/cm2, and the general population exposure limit for the PCS and AWS bands is 1000 μW/cm2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 75 Roberts Road, Groton, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is a 6 foot person standing at the base of the tower

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM / UMTS channels (1935.000 MHz to 1945.000 MHz / 1983.000 MHz to 1984.000 MHz) were considered for each sector of the proposed installation.
2) 4 UMTS / LTE channels (2110.000 to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation
3) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
4) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
5) The antenna used in this modeling is the Ericsson AIR21 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.6 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications

6) The antenna mounting height centerline of the proposed antennas is **126 feet** above ground level (AGL)
7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT11428A - Groton Tower
Site Addresss	75 Roberts Road, Groton, CT 06340
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	126	120	None	0	0	48.326044	1.206493	0.12065%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	126	120	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	126	120	None	0	0	24.163022	0.603246	0.06032%
1b	Ericsson	AIR21 B4A/B2P	Passive	AWS - 2100 MHz	UMTS	40	2	80	-3.95	126	114	None	0	0	32.217363	0.891223	0.08912%
														Sector total Power Density Value:		0.270%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	126	120	None	0	0	48.326044	1.206493	0.12065%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	126	120	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	126	120	None	0	0	24.163022	0.603246	0.06032%
1b	Ericsson	AIR21 B4A/B2P	Passive	AWS - 2100 MHz	UMTS	40	2	80	-3.95	126	114	None	0	0	32.217363	0.891223	0.08912%
														Sector total Power Density Value:		0.270%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	126	120	None	0	0	48.326044	1.206493	0.12065%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	126	120	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	126	120	None	0	0	24.163022	0.603246	0.06032%
1b	Ericsson	AIR21 B4A/B2P	Passive	AWS - 2100 MHz	UMTS	40	2	80	-3.95	126	114	None	0	0	32.217363	0.891223	0.08912%
														Sector total Power Density Value:		0.270%	

Site Composite MPE %	
Carrier	MPE %
T-Mobile	0.810%
AT&T	10.610%
Nextel	2.050%
Sprint	1.540%
Verizon Wireless	17.010%
MetroPCS	6.480%
Total Site MPE %	**38.500%**

Summary

All calculations performed for this analysis yielded results that were well within the allowable limits for general public exposure to RF Emissions.

The anticipated Maximum Composite contributions from the T-Mobile facility are **0.810% (0.270% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **38.500%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803