Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

December 17, 2014

RECEIVED
DEC 19 2014
CONNECTICUT
SITING COUNCIL

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-064-140808 – 439 Homestead Avenue, Hartford, Connecticut**
EM-VER-094-131211 – 36 Prospect Street, Newington, Connecticut
EM-VER-094-140123 – 136 Costello Road, Newington, Connecticut
EM-VER-089-131120A – Lester Street, New Britain, Connecticut
EM-VER-101-131004 – 117 Washington Street, North Haven, Connecticut
EM-VER-117-131004 – 80 Lonetown Road, Redding, Connecticut
EM-VER-129-140808 – 400 Main Street, Somers, Connecticut

Completion of Construction Activity

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

If you have any questions or need any additional information regarding these facilities please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

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

December 11, 2013

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

RE: **EM-VER-089-131120A** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 163 Lester Street, New Britain, Connecticut.

Dear Attorney Baldwin:

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

- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration.

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated November 19, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

c: The Honorable Erin Stewart, Mayor, City of New Britain
Norman Wnuk, Director of License Permit & Inspection/ Chief Bldg. Official, City of New Britain
Crown Castle

ROBINSON & COLE LLP

EM-VER-089-131120A

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
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Also admitted in Massachusetts

November 19, 2013

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
163 Lester Street, New Britain, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 145-foot level of the existing 188-foot tower at 163 Lester Street in New Britain. The tower and underlying property are owned by Crown Castle. The Council approved Cellco's use of this tower in 2001. Cellco now intends to replace one (1) of its existing antennas with one (1) model 8000735V01 antenna at the same height on the tower. Included in Attachment 1 is the specification sheet for Cellco's proposed replacement antenna.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Erin Stewart, Mayor of the City of New Britain.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antenna will be located at the 145-foot level on the 188-foot tower.

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative RF emissions calculation for the modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Erin Stewart, New Britain Mayor
Sandy M. Carter

ATTACHMENT 1

KATHREIN
SCALA DIVISION

800 10735V01

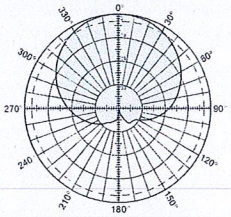
65° Single Band Panel Antenna, 6'

	Antenna
Single Band (MHz)	**698–894**
Dual Polarization	**X**
HPBW	**65°**
Adj. Electrical Downtilt Manual or optional remote control	**0°–10°**

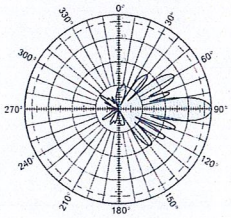
General specifications:

Frequency range	698–894 MHz
VSWR	<1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Maximum input power	500 watts per input (at 50°C)
Connector	2 x 7-16 DIN female (long neck) (bottom mounted)
Isolation	>30 dB
Electrical downtilt	0–10 degrees (continuously adjustable)
See reverse for order information.	

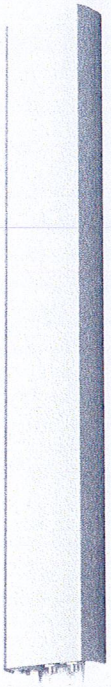
698–894 MHz



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–10° electrical downtilt



Specifications:

	698–806 MHz	824–894 MHz
Gain	15.5 dBi	16 dBi
Front-to-back ratio	>30 dB (co-polar) 35 dB (average)	>30 dB (co-polar) 35 dB (average)
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)
+45° and -45° polarization vertical beamwidth	11.3° (half-power)	10° (half-power)
Min. sidelobe suppression for first sidelobe above main beam	0° 5° 10° T	0° 5° 10° T
average	16 17 17 dB	18 17 16 dB
	16 19 20 dB	20 20 20 dB
Cross polar ratio Main direction 0° Sector ±60°	25 dB (typical) >11 dB, Average: 15 dB	25 dB (typical) >11 dB, Average: 15 dB

IRT specifications:

Logical interface ex factory[1]	3GPP/AISG 2.0
Protocols	AISG 1.1 and 3GPP/AISG 2.0 compliant
Hardware interface[2]	2 x 8 pin connector acc. IEC 60130-9; according to AISG: – IRT in (male): Control / Daisy chain in – IRT in (female): Daisy chain out
Power supply	10–30 V
Power consumption	<1 watt (standby) <8.5 watts (motor activated)
Adjustment time (full range)	40 sec.
Adjustment cycles	>50,000
Certification	FCC 15.107 Class B Computing Devices

[1] The protocol of the logical interface can be switched from 3GPP/AISG 2.0 to AISG 1.1 and vice versa with a vendor specific command. Start-up operation of the RCU 86010149 is possible in an RET system supporting AISG 1.1 or supporting 3GPP/AISG 2.0 after performing a layer 2 reset before address assignment. The protocol can also be changed as follows: AISG 1.1 to 3GPP: Enter "3GPP" into the additional data filed "Installer's ID" and perform a layer 7 reset or a power reset. 3GPP to AISG 1.1: Enter "AISG 1" into the additional datafield "Installer's ID" and perform a layer 2 reset or a power reset. After switching the protocol any other information can be entered into the "Installer's ID" field.

[2] The tightning torque for fixing the connector must be 0.5 – 1.0 Nm ('hand-tightened'). The connector should be tightened by hand only!

RoHS Lead-Free

11387-D Oct 19, 2012
936.4273/a

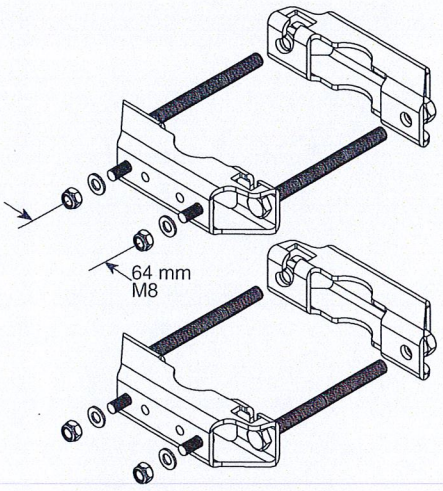
AISG Antenna Interface Standards Group

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

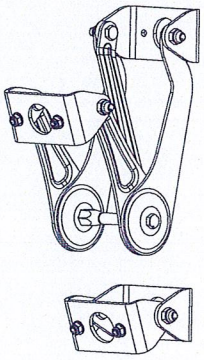
KATHREIN
SCALA DIVISION

800 10735V01

65° Single Band Panel Antenna, 6'



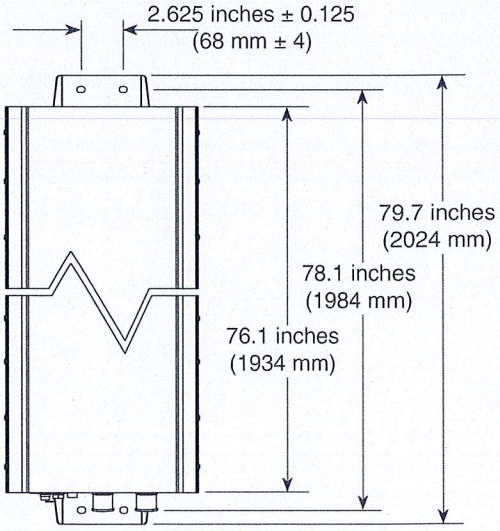
Mounting Brackets
for use with 2-point mount antennas
Mast dia. 2–4.5 inches (50–115 mm)
Weight: 4.4 lb (2 kg)



Mechanical Tilt Brackets
for use with 2-point mount antennas
Weight: 9.5 lb (4.3 kg)
(Model 850 10008)

Mechanical specifications:

Weight	30.9 lb (14 kg)	35.3 lb (16 kg) clamps included
Dimensions H x W x D	76.1 x 11.9 x 3.9 inches (1934 x 303 x 99 mm)	
Wind load Front/Side/Rear	at 93 mph (150kph) 203 lbf / 70 lbf / 232 lbf (900 N / 310 N / 1030 N)	
Mounting category	H (Heavy)	
Wind survival rating*	150 mph (240 kph)	
Shipping dimensions	81.1 x 12.4 x 4.5 inches (2060 x 315 x 115 mm)	
Shipping weight	39.7 lb (18 kg)	
Mounting bracket	2-point hot-dip galvanized with stainless steel hardware for 2 to 4.5 inch (50 to 115 mm) OD masts.	

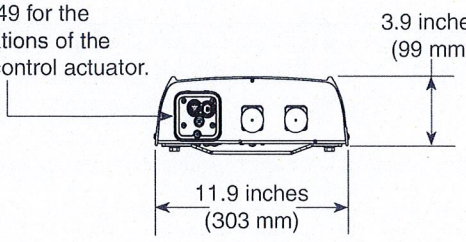


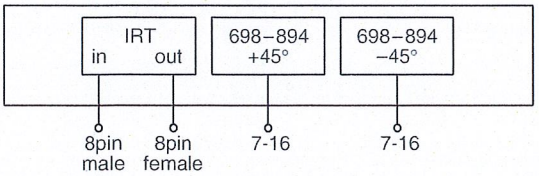
KATHREIN 860 10149

FC Tested To Comply With FCC Standards

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Refer to part number 860 10149 for the specifications of the remote control actuator.





Order Information:

Model	Description
800 10735V01	Antenna with mounting bracket 0°–10° electrical downtilt
800 10735V01K	Antenna with mounting bracket and mechanical tilt bracket 0°–10° electrical downtilt

*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

All specifications are subject to change without notice. The latest specifications are available at www.kathrein-scala.com.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

ATTACHMENT 2

	General	Power	Density					
Site Name: New Britain 3								
Tower Height: Verizon @ 145ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	1077	190	0.0215	1900	1.0000	2.15%	
*AT&T UMTS	2	565	190	0.0113	880	0.5867	1.92%	
*AT&T GSM	1	283	190	0.0028	880	0.5867	0.48%	
*AT&T GSM	4	646	190	0.0257	1900	1.0000	2.57%	
*AT&T LTE	1	1313	189	0.0132	734	0.4893	2.70%	
*T-Mobile GSM/UMTS	2	12	163	0.0003	1950	1.0000	0.03%	
*T-Mobile UMTS	2	12	163	0.0003	2100	1.0000	0.03%	
*T-Mobile LTE	2	24	163	0.0006	2100	1.0000	0.06%	
Verizon PCS	**11**	**261**	**145**	**0.0491**	**1970**	**1.0000**	**4.91%**	
Verizon Cellular	**9**	**389**	**145**	**0.0599**	**869**	**0.5793**	**10.34%**	
Verizon AWS	**1**	**1750**	**145**	**0.0299**	**2145**	**1.0000**	**2.99%**	
Verizon 700	**1**	**578**	**145**	**0.0099**	**698**	**0.4653**	**2.12%**	
								30.31%
* Source: Siting Council								

ATTACHMENT 3

Date: **October 23, 2013**

SSOE™

Veronica Harris
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430
(201) 236-9094

SSOE Group
320 Seven Springs Way, Suite 350
Brentwood, TN 37027
(615) 661-7585
Akulkarni@ssoe.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	
	Carrier Site Name:	New Britain 3, CT
Crown Castle Designation:	**Crown Castle BU Number:**	803175
	Crown Castle Site Name:	CT New Britain 3 CAC 803175
	Crown Castle JDE Job Number:	246472
	Crown Castle Work Order Number:	661799
	Crown Castle Application Number:	200695 Rev. 4
Engineering Firm Designation:	**SSOE Group Project Number:**	013-00321-00
Site Data:	**Lester road, New Britain, CT 06050, Hartford County** **Latitude *41° 41' 11.8"*, Longitude *-72° 45' 27.8"*** **188 Foot – Summit Monopole Tower**	

Dear Veronica Harris,

SSOE Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 587067, in accordance with application 200695, revision 4.

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

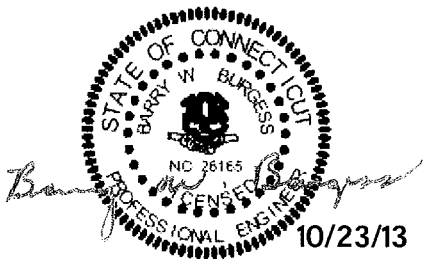
LC7: Existing + Proposed + Reserved **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

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 80 mph fastest mile.

We at *SSOE Group* 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: Anjali Kulkarni

Respectfully submitted by:



Barry W. Burgess, PE
Section Manager

TABLE OF CONTENTS

1) INTRODUCTION

The existing 188' monopole has eighteen sides and is evenly tapered from 59.610" (flat-flat) at the base to 22.00" (flat-flat) at the top. It has four major sections, connected with slip joints. The structure is galvanized and has no tower lighting.

The tower was originally designed for Crown Castle by Summit Manufacturing of West Hazleton, PA for a 85 mph wind speed with 1/2" radial ice in accordance with ANSI/EIA-TIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting using a fastest mile wind speed of 80 mph with no ice, 38 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	145.0	1	Kathrein	800 10735V01 w/ Mount Pipe			1
		1	Rfs Celwave	DB-T1-6Z-8AB-0Z			

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

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		6	Ericsson	RRUS-11			
		3	Kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
188.0	189.0	3	Powerwave technologies	7770.00 w/ Mount Pipe	1 2	3/8 3/4	
		6	Powerwave technologies	LGP21401	6	1-5/8	
		1	Raycap	DC6-48-60-18-8F			
	188.0	1		Platform Mount [LP 715-1]			
177.0	177.0	1		Platform Mount [LP 601-1]			
		3	Ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	2
160.0	163.0	3	Ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	Rfs Celwave	ATMAA1412D-1A20	12	1-5/8	
	160.0	1		Platform Mount [LP 601-1]			

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	150.0	1	GPS	GPS_A	1 13	1/2 1-5/8	
	145.0	3	Alcatel lucent	RRH 2x40-700 W/SOLAR			
		3	Alcatel lucent	RRH2x40-AWS			
		3	Andrew	LNX-6512DS-T4M w/ Mount Pipe			1
		2	Antel	BXA-171063-12CF-EDIN-2 w/ Mount Pipe			
		1	Antel	BXA-171063-8BF-EDIN-2 w/ Mount Pipe			
		3	Antel	BXA-185090/8CFx2 w/ Mount Pipe			
		3	Antel	BXA-80063/6 w/ Mount Pipe			
		1		Platform Mount [LP 601-1]			

Notes:
1) (1) Existing LNX-6512DS-T4M antenna to be removed, not considered in this analysis
2) Reserved Equipment

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)
188	188	12	Generic	1' x 5' x 3" Panel Antenna	-	-
		1	Generic	14' Platform	-	-
177	177	12	Generic	1' x 5' x 3" Panel Antenna	-	-
		1	Generic	14' Platform	-	-
162	162	12	Generic	1' x 5' x 3" Panel Antenna	-	-
		1	Generic	14' Platform	-	-
147	147	12	Generic	1' x 5' x 3" Panel Antenna	-	-
		1	Generic	14' Platform	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Original Tower Drawings	Summit Project #: 12481, dated 12/11/2000	Doc ID#: 679659	Crown DMZ
Foundation Drawings	Tower Engineering Professionals Project #: 100063, dated 01/07/2010	Doc ID#: 679659	Crown DMZ
Geotechnical Reports	Clough, Harbour & Associates. Project #: 8961.07.46, dated 10/26/2000	Doc ID#: 679661	Crown DMZ

3.1) Analysis Method

tnxTower (version 6.1.3.1), 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.

3.2) Assumptions

1) The tower was constructed in accordance with its original design and maintained per the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) Mount sizes, weights, and manufacturers are best estimates based on photos provided and determined without the benefit of a site visit by SSOE.
4) Mount pipes are removed when the antennas they support are removed.
5) Coax mounting equipment (feed line ladders, T-brackets, etc.) is removed when all coax attached to the equipment is removed from the tower.
6) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
7) All foundation steel reinforcing is assumed to have been designed to meet or exceed the load carrying capacity of the surrounding soils unless otherwise specified in this report.
8) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package, dated 9/25/12 with any adjustments as noted below.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	188 - 137	Pole	TP32.711x22x0.25	1	-10.30	1302.25	56.3	Pass
L2	137 - 90.25	Pole	TP42.03x31.3184x0.3125	2	-18.07	2094.29	80.6	Pass
L3	90.25 - 44.5	Pole	TP51.014x40.3023x0.375	3	-28.91	3048.94	80.7	Pass
L4	44.5 - 0	Pole	TP59.61x48.8988x0.5	4	-47.11	4876.78	66.5	Pass
							Summary	
						Pole (L3)	80.7	Pass
						Rating =	80.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Base Plate		71.8%	Pass
1	Anchor Rods		70.1%	Pass
1	Foundation		83.3%	Pass

Structure Rating (max from all components) =	83.3%

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

4.1) Recommendations

The existing tower and its foundations are sufficient for the proposed loads and do not require modifications.

5) DISCLAIMER OF WARRANTIES

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

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

For the purposes of this report, SSOE Group has assumed that all connections in the tower are sufficient to develop the allowable strength of the associated members. SSOE Group has not performed engineering analysis to verify adequacy of these connections.

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

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

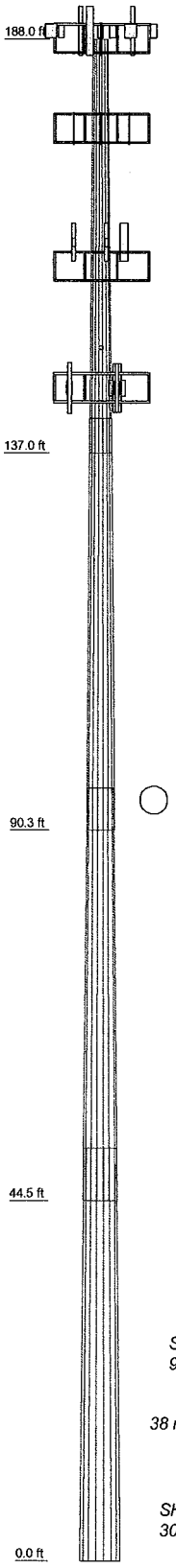
Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as part of our work. We recommend that material of suitable size and strength be purchased from a reputable tower manufacturer.

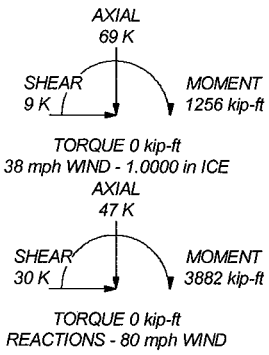
SSOE Group makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. SSOE Group will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any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

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	51.00	51.00	51.00	51.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.5000
Socket Length (ft)	4.25	5.25	6.50	
Top Dia (in)	22.0000	31.3184	40.3023	48.8988
Bot Dia (in)	32.7110	42.0300	51.0140	59.6100
Grade	A607-65			
Weight (K) 34.1	3.7	6.3	9.4	14.8





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 3/4" x 8'	188	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	160
Platform Mount [LP 715-1]	188	ATMAA1412D-1A20	160
(2) RRUS-11	188	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	160
AM-X-CD-16-65-00T-RET w/ Mount Pipe	188	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	160
7770.00 w/ Mount Pipe	188	ATMAA1412D-1A20	160
(2) LGP21401	188	Platform Mount [LP 601-1]	145
DC6-48-60-18-8F	188	GPS_A	145
(2) RRUS-11	188	BXA-80063/6 w/ Mount Pipe	145
AM-X-CD-16-65-00T-RET w/ Mount Pipe	188	BXA-171063-8BF-EDIN-2 w/ Mount Pipe	145
7770.00 w/ Mount Pipe	188	LNX-6512DS-T4M w/ Mount Pipe	145
(2) LGP21401	188	BXA-185090/8CFx2 w/ Mount Pipe	145
(2) RRUS-11	188	RRH 2x40-700 W/SOLAR	145
AM-X-CD-16-65-00T-RET w/ Mount Pipe	188	RRH2x40-AWS	145
7770.00 w/ Mount Pipe	188	DB-T1-6Z-8AB-0Z	145
(2) LGP21401	188	RRH 2x40-700 W/SOLAR	145
(2) 2" x 4' Mount Pipe	188	RRH2x40-AWS	145
(2) 2" x 4' Mount Pipe	188	LNX-6512DS-T4M w/ Mount Pipe	145
(2) 2" x 4' Mount Pipe	188	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	145
Platform Mount [LP 601-1]	177	BXA-185090/8CFx2 w/ Mount Pipe	145
(2) 2" x 4' Mount Pipe	177	BXA-80063/6 w/ Mount Pipe	145
(2) 2" x 4' Mount Pipe	177	RRH 2x40-700 W/SOLAR	145
(2) 2" x 4' Mount Pipe	177	RRH2x40-AWS	145
Platform Mount [LP 601-1]	160	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	145
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	160	BXA-185090/8CFx2 w/ Mount Pipe	145
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	160	BXA-80063/6 w/ Mount Pipe	145
ATMAA1412D-1A20	160	800 10735V01 w/ Mount Pipe	145
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	160		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

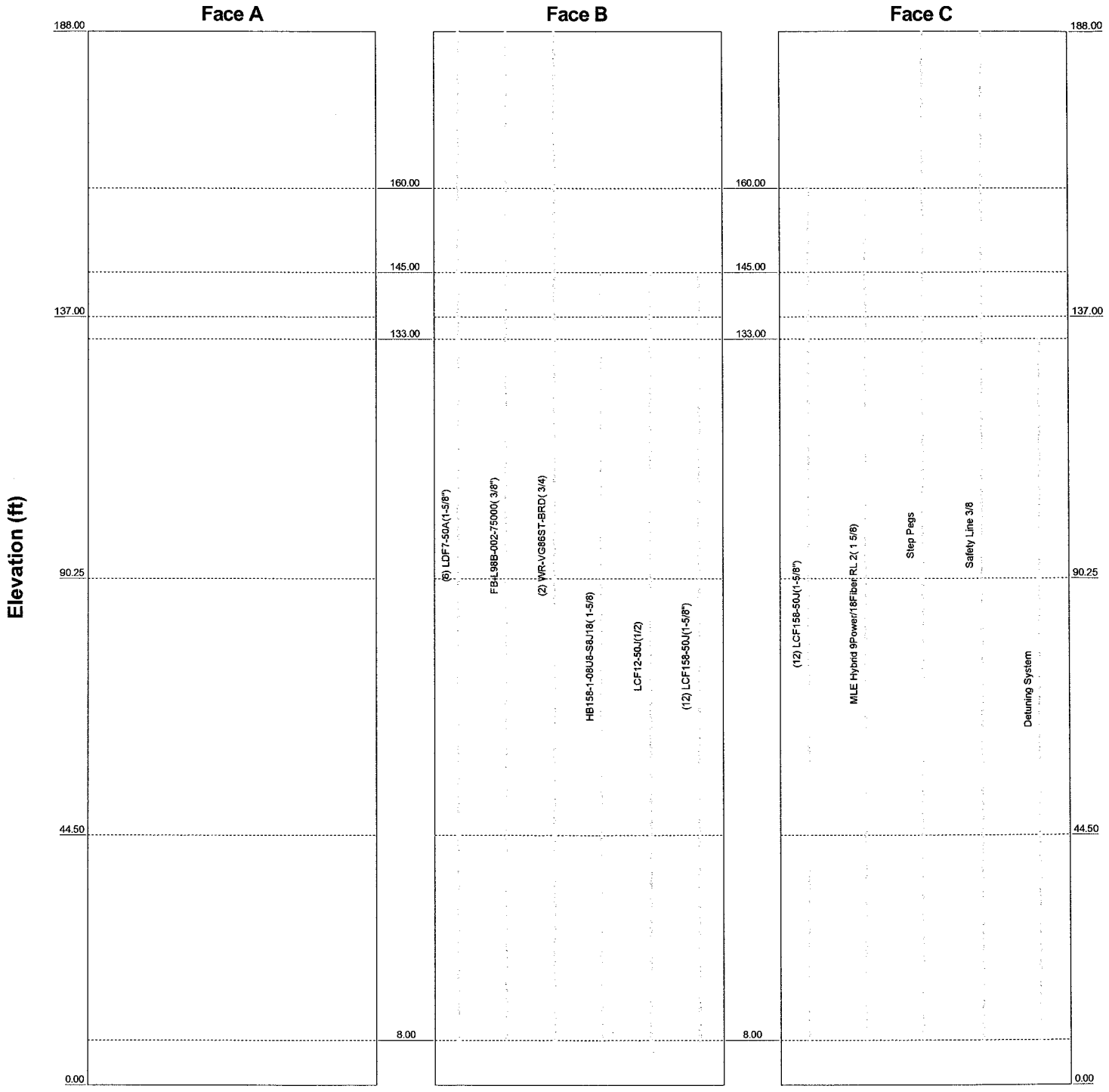
1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 80.7%

SSOE Group
320 Seven Springs Way, Suite 350
Brentwood, TN 37027
Phone: (615) 661-7585
FAX:

Job: *BU 803175*			
Project: *013-00321-00*			
Client: CCI	Drawn by: 14646	App'd:	
Code: TIA/EIA-222-F	Date: 10/23/13	Scale: NTS	
Path:		Dwg No. E-1	

Feed Line Distribution Chart
0' - 188'

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



SSOE Group
320 Seven Springs Way, Suite 350
Brentwood, TN 37027
Phone: (615) 661-7585
FAX:

Job: ***BU 803175***			
Project: ***013-00321-00***			
Client: CCI	Drawn by: 14646	App'd:	
Code: TIA/EIA-222-F	Date: 10/23/13	Scale: NTS	
Path:		Dwg No. E-7	

tnxTower	Job	Page
	BU 803175	1 of 10
SSOE Group 320 Seven Springs Way, Suite 350 Brentwood, TN 37027 Phone: (615) 661-7585 FAX:	Project 013-00321-00	Date 15:08:16 10/23/13
	Client CCI	Designed by 14646

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, 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 Poles
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	√ Include Shear-Torsion Interaction
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Always Use Sub-Critical Flow
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Use Top Mounted Sockets
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	
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	188.00-137.00	51.00	4.25	18	22.0000	32.7110	0.2500	1.0000	A607-65 (65 ksi)
L2	137.00-90.25	51.00	5.25	18	31.3184	42.0300	0.3125	1.2500	A607-65 (65 ksi)
L3	90.25-44.50	51.00	6.50	18	40.3023	51.0140	0.3750	1.5000	A607-65 (65 ksi)
L4	44.50-0.00	51.00		18	48.8988	59.6100	0.5000	2.0000	A607-65 (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	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	33.2156	25.7578	3429.0204	11.5237	16.6172	206.3538	6862.5527	12.8813	5.3171	21.269
L2	32.7080	30.7540	3735.3226	11.0071	15.9098	234.7819	7475.5603	15.3799	4.9620	15.879
	42.6784	41.3785	9098.0688	14.8097	21.3512	426.1143	18208.1091	20.6932	6.8473	21.911
L3	42.0437	47.5235	9571.6471	14.1742	20.4736	467.5120	19155.8888	23.7663	6.4332	17.155
	51.8010	60.2731	19526.7966	17.9768	25.9151	753.4907	39079.2871	30.1423	8.3185	22.183
L4	51.0393	76.8089	22730.9631	17.1816	24.8406	915.0736	45491.8362	38.4117	7.7262	15.452
	60.5296	93.8076	41409.2395	20.9841	30.2819	1367.4593	82872.9664	46.9127	9.6114	19.223

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 188.00-137.00				1	1	1		
L2 137.00-90.25				1	1	1		
L3 90.25-44.50				1	1	1		
L4 44.50-0.00				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")	B	No	Inside Pole	188.00 - 8.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
FB-L98B-002-75000(3/8")	B	No	Inside Pole	188.00 - 8.00	1	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
WR-VG86ST-BRD(3/4)	B	No	Inside Pole	188.00 - 8.00	2	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
						2" Ice	0.00	0.59
						4" Ice	0.00	0.59
LCF158-50J(1-5/8")	C	No	Inside Pole	160.00 - 8.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
						2" Ice	0.00	0.92
						4" Ice	0.00	0.92
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	Inside Pole	160.00 - 8.00	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
HB158-1-08U8-S8J18(	B	No	Inside Pole	145.00 - 8.00	1	No Ice	0.00	1.30

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1-5/8)						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
LCF12-50J(1/2)	B	No	Inside Pole	145.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LCF158-50J(1-5/8")	B	No	Inside Pole	145.00 - 8.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
						2" Ice	0.00	0.92
						4" Ice	0.00	0.92
Step Pegs	C	No	CaAa (Out Of Face)	188.00 - 8.00	1	No Ice	0.08	2.72
						1/2" Ice	0.18	3.51
						1" Ice	0.28	4.92
						2" Ice	0.48	9.56
						4" Ice	0.88	26.18
Safety Line 3/8	C	No	CaAa (Out Of Face)	188.00 - 8.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
Detuning System	C	No	CaAa (Out Of Face)	133.00 - 8.00	1	No Ice	0.05	0.37
						1/2" Ice	0.30	1.90
						1" Ice	0.40	4.03
						2" Ice	0.60	10.14
						4" Ice	1.00	29.69

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	188.00-137.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.41
		C	0.000	0.000	0.000	5.992	0.43
L2	137.00-90.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.87
		C	0.000	0.000	0.000	7.451	0.72
L3	90.25-44.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.85
		C	0.000	0.000	0.000	7.471	0.71
L4	44.50-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.68
		C	0.000	0.000	0.000	5.961	0.56

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	188.00-137.00	A	1.210	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.41

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C		0.000	0.000	0.000	30.668	0.66
L2	137.00-90.25	A	1.159	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.87
		C		0.000	0.000	0.000	47.004	1.14
L3	90.25-44.50	A	1.089	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.85
		C		0.000	0.000	0.000	46.343	1.11
L4	44.50-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.68
		C		0.000	0.000	0.000	35.437	0.85

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	188.00-137.00	-0.1452	0.0838	-0.5777	0.3335
L2	137.00-90.25	-0.1975	0.1140	-0.9438	0.5449
L3	90.25-44.50	-0.2035	0.1175	-1.0020	0.5785
L4	44.50-0.00	-0.1665	0.0961	-0.8394	0.4846

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
Lightning Rod 3/4" x 8'	C	None		0.0000	188.00	No Ice	1.00	1.00	0.11
						1/2" Ice	1.41	1.41	0.11
						1" Ice	2.25	2.25	0.13
						2" Ice	3.67	3.67	0.16
						4" Ice	5.74	5.74	0.31
Platform Mount [LP 715-1]	C	None		0.0000	188.00	No Ice	44.21	44.21	1.77
						1/2" Ice	53.97	53.97	2.32
						1" Ice	63.73	63.73	2.87
						2" Ice	83.25	83.25	3.97
						4" Ice	122.29	122.29	6.16
(2) RRUS-11	A	From Centroid-Face	3.76 1.37 1.00	20.0000	188.00	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Centroid-Face	3.76 1.37 1.00	20.0000	188.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
7770.00 w/ Mount Pipe	A	From Centroid-Fa	3.76 1.37	20.0000	188.00	No Ice	6.22	4.35	0.06
						1/2" Ice	6.77	5.20	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		ce	1.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) LGP21401	A	From	3.76	20.0000	188.00	No Ice	1.29	0.23	0.01
		Centroid-Fa	1.37			1/2" Ice	1.45	0.31	0.02
		ce	1.00			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
DC6-48-60-18-8F	B	From	3.76	10.0000	188.00	No Ice	2.22	2.22	0.02
		Centroid-Fa	1.37			1/2" Ice	2.44	2.44	0.04
		ce	1.00			1" Ice	2.66	2.66	0.06
						2" Ice	3.15	3.15	0.12
						4" Ice	4.21	4.21	0.27
(2) RRUS-11	B	From	3.76	10.0000	188.00	No Ice	3.25	1.37	0.05
		Centroid-Fa	1.37			1/2" Ice	3.49	1.55	0.07
		ce	1.00			1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From	3.76	10.0000	188.00	No Ice	8.50	6.30	0.07
		Centroid-Fa	1.37			1/2" Ice	9.15	7.48	0.14
		ce	1.00			1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
7770.00 w/ Mount Pipe	B	From	3.76	10.0000	188.00	No Ice	6.22	4.35	0.06
		Centroid-Fa	1.37			1/2" Ice	6.77	5.20	0.11
		ce	1.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) LGP21401	B	From	3.76	10.0000	188.00	No Ice	1.29	0.23	0.01
		Centroid-Fa	1.37			1/2" Ice	1.45	0.31	0.02
		ce	1.00			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) RRUS-11	C	From	3.76	20.0000	188.00	No Ice	3.25	1.37	0.05
		Centroid-Fa	1.37			1/2" Ice	3.49	1.55	0.07
		ce	1.00			1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From	3.76	20.0000	188.00	No Ice	8.50	6.30	0.07
		Centroid-Fa	1.37			1/2" Ice	9.15	7.48	0.14
		ce	1.00			1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
7770.00 w/ Mount Pipe	C	From	3.76	20.0000	188.00	No Ice	6.22	4.35	0.06
		Centroid-Fa	1.37			1/2" Ice	6.77	5.20	0.11
		ce	1.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) LGP21401	C	From	3.76	20.0000	188.00	No Ice	1.29	0.23	0.01
		Centroid-Fa	1.37			1/2" Ice	1.45	0.31	0.02
		ce	1.00			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) 2" x 4' Mount Pipe	A	From	3.76	20.0000	188.00	No Ice	0.79	0.79	0.02
		Centroid-Fa	1.37			1/2" Ice	1.03	1.03	0.03
		ce	0.00			1" Ice	1.28	1.28	0.04
						2" Ice	1.81	1.81	0.06

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	3.11	3.11	0.16
(2) 2" x 4' Mount Pipe	B	From Centroid-Face	3.76 1.37 0.00	10.0000	188.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.02 0.03 0.04 0.06 0.16
(2) 2" x 4' Mount Pipe	C	From Centroid-Face	3.76 1.37 0.00	20.0000	188.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.02 0.03 0.04 0.06 0.16
Platform Mount [LP 601-1]	C	None		0.0000	177.00	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
(2) 2" x 4' Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.02 0.03 0.04 0.06 0.16
(2) 2" x 4' Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.02 0.03 0.04 0.06 0.16
(2) 2" x 4' Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.02 0.03 0.04 0.06 0.16
Platform Mount [LP 601-1]	C	None		0.0000	160.00	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
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Centroid-Leg	2.83 2.83 3.00	45.0000	160.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Centroid-Leg	2.83 2.83 3.00	45.0000	160.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ATMAA1412D-1A20	A	From Centroid-Leg	2.83 2.83 3.00	45.0000	160.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.17 1.31 1.47 1.81 2.58	0.47 0.57 0.69 0.95 1.57	0.01 0.02 0.03 0.06 0.14
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Centroid-Leg	2.57 3.06 3.00	50.0000	160.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A	B	From	2.57	50.0000	160.00	No Ice	6.83	5.64	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
B2P w/ Mount Pipe		Centroid-Leg	3.06 3.00			1/2" Ice	7.35	6.48	0.17
						1" Ice	7.86	7.26	0.23
						2" Ice	8.93	8.86	0.38
						4" Ice	11.18	12.29	0.81
ATMAA1412D-1A20	B	From Centroid-Leg	2.57 3.06 3.00	50.0000	160.00	No Ice	1.17	0.47	0.01
						1/2" Ice	1.31	0.57	0.02
						1" Ice	1.47	0.69	0.03
						2" Ice	1.81	0.95	0.06
						4" Ice	2.58	1.57	0.14
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Centroid-Leg	2.00 3.46 3.00	60.0000	160.00	No Ice	6.83	5.64	0.11
						1/2" Ice	7.35	6.48	0.17
						1" Ice	7.86	7.26	0.23
						2" Ice	8.93	8.86	0.38
						4" Ice	11.18	12.29	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Centroid-Leg	2.00 3.46 3.00	60.0000	160.00	No Ice	6.83	5.64	0.11
						1/2" Ice	7.35	6.48	0.17
						1" Ice	7.86	7.26	0.23
						2" Ice	8.93	8.86	0.38
						4" Ice	11.18	12.29	0.81
ATMAA1412D-1A20	C	From Centroid-Leg	2.00 3.46 3.00	60.0000	160.00	No Ice	1.17	0.47	0.01
						1/2" Ice	1.31	0.57	0.02
						1" Ice	1.47	0.69	0.03
						2" Ice	1.81	0.95	0.06
						4" Ice	2.58	1.57	0.14
Platform Mount [LP 601-1]	C	None		0.0000	145.00	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
GPS_A	A	From Centroid-Leg	4.00 0.00 5.00	0.0000	145.00	No Ice	0.30	0.30	0.00
						1/2" Ice	0.37	0.37	0.00
						1" Ice	0.46	0.46	0.01
						2" Ice	0.65	0.65	0.02
						4" Ice	1.15	1.15	0.08
BXA-80063/6 w/ Mount Pipe	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	7.98	5.41	0.04
						1/2" Ice	8.62	6.56	0.10
						1" Ice	9.23	7.42	0.17
						2" Ice	10.47	9.20	0.33
						4" Ice	13.08	12.95	0.79
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.18	3.35	0.03
						1/2" Ice	3.56	3.97	0.06
						1" Ice	3.96	4.60	0.10
						2" Ice	4.85	5.89	0.19
						4" Ice	6.77	8.89	0.49
LNX-6512DS-T4M w/ Mount Pipe	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	5.85	4.55	0.05
						1/2" Ice	6.31	5.23	0.09
						1" Ice	6.77	5.91	0.15
						2" Ice	7.74	7.34	0.28
						4" Ice	9.80	10.46	0.65
BXA-185090/8CFx2 w/ Mount Pipe	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.16	3.33	0.03
						1/2" Ice	3.53	3.94	0.06
						1" Ice	3.94	4.56	0.10
						2" Ice	4.83	5.86	0.19
						4" Ice	6.73	8.84	0.49
RRH 2x40-700 W/SOLAR	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.31	1.94	0.05
						1/2" Ice	3.55	2.14	0.08
						1" Ice	3.80	2.35	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	4.33	2.79	0.17
						4" Ice	5.50	3.78	0.35
RRH2x40-AWS	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.44	2.43	0.12
						4" Ice	4.36	3.27	0.20
DB-T1-6Z-8AB-0Z	A	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	5.60	2.33	0.04
						1/2" Ice	5.92	2.56	0.08
						1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
RRH 2x40-700 W/SOLAR	B	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.31	1.94	0.05
						1/2" Ice	3.55	2.14	0.08
						1" Ice	3.80	2.35	0.10
						2" Ice	4.33	2.79	0.17
						4" Ice	5.50	3.78	0.35
RRH2x40-AWS	B	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.44	2.43	0.12
						4" Ice	4.36	3.27	0.20
LNX-6512DS-T4M w/ Mount Pipe	B	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	5.85	4.55	0.05
						1/2" Ice	6.31	5.23	0.09
						1" Ice	6.77	5.91	0.15
						2" Ice	7.74	7.34	0.28
						4" Ice	9.80	10.46	0.65
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	B	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	5.03	5.29	0.04
						1/2" Ice	5.58	6.46	0.09
						1" Ice	6.10	7.35	0.14
						2" Ice	7.17	9.15	0.27
						4" Ice	9.44	12.95	0.68
BXA-185090/8CFx2 w/ Mount Pipe	B	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.16	3.33	0.03
						1/2" Ice	3.53	3.94	0.06
						1" Ice	3.94	4.56	0.10
						2" Ice	4.83	5.86	0.19
						4" Ice	6.73	8.84	0.49
BXA-80063/6 w/ Mount Pipe	B	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	7.98	5.41	0.04
						1/2" Ice	8.62	6.56	0.10
						1" Ice	9.23	7.42	0.17
						2" Ice	10.47	9.20	0.33
						4" Ice	13.08	12.95	0.79
RRH 2x40-700 W/SOLAR	C	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.31	1.94	0.05
						1/2" Ice	3.55	2.14	0.08
						1" Ice	3.80	2.35	0.10
						2" Ice	4.33	2.79	0.17
						4" Ice	5.50	3.78	0.35
RRH2x40-AWS	C	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.44	2.43	0.12
						4" Ice	4.36	3.27	0.20
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	C	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	5.03	5.29	0.04
						1/2" Ice	5.58	6.46	0.09
						1" Ice	6.10	7.35	0.14
						2" Ice	7.17	9.15	0.27
						4" Ice	9.44	12.95	0.68

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
BXA-185090/8CFx2 w/ Mount Pipe	C	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	3.16	3.33	0.03
						1/2" Ice	3.53	3.94	0.06
						1" Ice	3.94	4.56	0.10
						2" Ice	4.83	5.86	0.19
						4" Ice	6.73	8.84	0.49
BXA-80063/6 w/ Mount Pipe	C	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	7.98	5.41	0.04
						1/2" Ice	8.62	6.56	0.10
						1" Ice	9.23	7.42	0.17
						2" Ice	10.47	9.20	0.33
						4" Ice	13.08	12.95	0.79
800 10735V01 w/ Mount Pipe	C	From Centroid-Leg	3.46 2.00 0.00	30.0000	145.00	No Ice	9.04	5.49	0.06
						1/2" Ice	9.72	6.71	0.12
						1" Ice	10.37	7.69	0.19
						2" Ice	11.69	9.56	0.36
						4" Ice	14.45	13.51	0.85

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	188 - 137 (1)	TP32.711x22x0.25	51.00	0.00	0.0	39.000	25.0495	-10.30	976.93	0.011
L2	137 - 90.25 (2)	TP42.03x31.3184x0.3125	51.00	0.00	0.0	39.000	40.2848	-18.07	1571.11	0.012
L3	90.25 - 44.5 (3)	TP51.014x40.3023x0.375	51.00	0.00	0.0	39.000	58.6481	-28.91	2287.28	0.013
L4	44.5 - 0 (4)	TP59.61x48.8988x0.5	51.00	0.00	0.0	39.000	93.8076	-47.11	3658.50	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	188 - 137 (1)	TP32.711x22x0.25	468.58	28.818	39.000	0.739	0.00	0.000	39.000	0.000
L2	137 - 90.25 (2)	TP42.03x31.3184x0.3125	1393.75	41.419	39.000	1.062	0.00	0.000	39.000	0.000
L3	90.25 - 44.5 (3)	TP51.014x40.3023x0.375	2464.99	41.471	39.000	1.063	0.00	0.000	39.000	0.000
L4	44.5 - 0 (4)	TP59.61x48.8988x0.5	3881.88	34.065	39.000	0.873	0.00	0.000	39.000	0.000

Pole Shear Design Data

tnxTower	Job	Page
	BU 803175	10 of 10
SSOE Group 320 Seven Springs Way, Suite 350 Brentwood, TN 37027 Phone: (615) 661-7585 FAX:	Project 013-00321-00	Date 15:08:16 10/23/13
	Client CCI	Designed by 14646

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	188 - 137 (1)	TP32.711x22x0.25	18.29	0.730	26.000	0.056	0.18	0.005	26.000	0.000
L2	137 - 90.25 (2)	TP42.03x31.3184x0.3125	22.17	0.550	26.000	0.042	0.14	0.002	26.000	0.000
L3	90.25 - 44.5 (3)	TP51.014x40.3023x0.375	25.87	0.441	26.000	0.034	0.10	0.001	26.000	0.000
L4	44.5 - 0 (4)	TP59.61x48.8988x0.5	29.61	0.316	26.000	0.024	0.06	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	188 - 137 (1)	0.011	0.739	0.000	0.056	0.000	0.750 ✓	1.333	H1-3+VT ✓
L2	137 - 90.25 (2)	0.012	1.062	0.000	0.042	0.000	1.074 ✓	1.333	H1-3+VT ✓
L3	90.25 - 44.5 (3)	0.013	1.063	0.000	0.034	0.000	1.076 ✓	1.333	H1-3+VT ✓
L4	44.5 - 0 (4)	0.013	0.873	0.000	0.024	0.000	0.886 ✓	1.333	H1-3+VT ✓

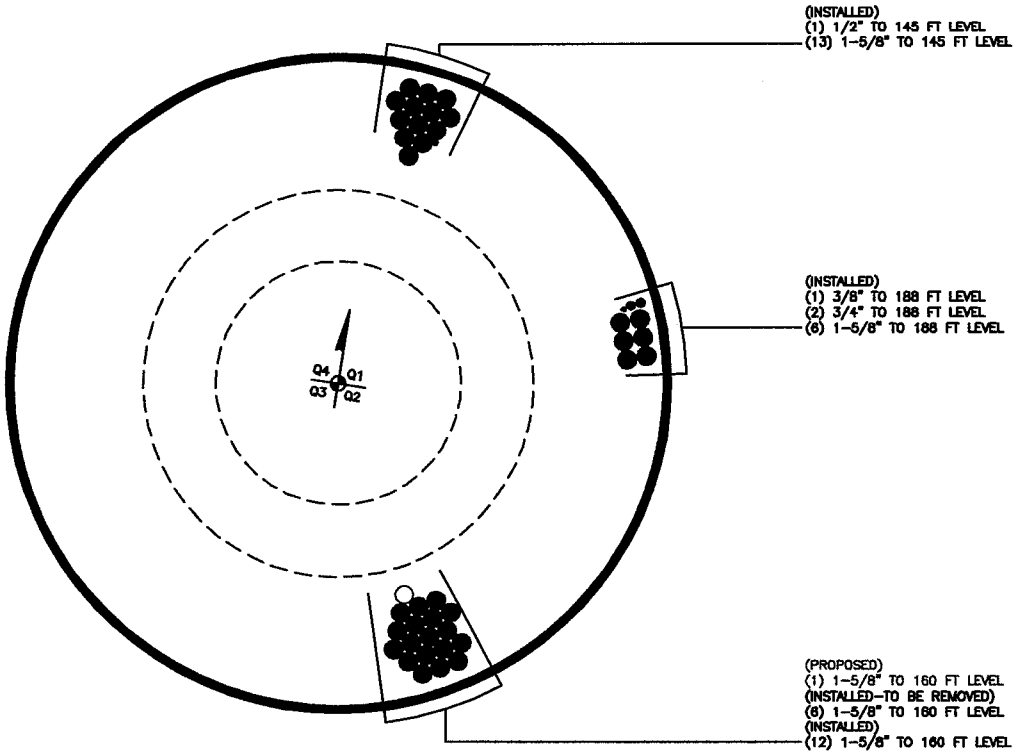
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	188 - 137	Pole	TP32.711x22x0.25	1	-10.30	1302.25	56.3	Pass
L2	137 - 90.25	Pole	TP42.03x31.3184x0.3125	2	-18.07	2094.29	80.6	Pass
L3	90.25 - 44.5	Pole	TP51.014x40.3023x0.375	3	-28.91	3048.94	80.7	Pass
L4	44.5 - 0	Pole	TP59.61x48.8988x0.5	4	-47.11	4876.78	66.5	Pass

Summary	ELC:	Existing/Proposed/Reserved
Pole (L3)	80.7	Pass
Rating =	80.7	Pass

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 803175 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *803175*
Site Name: *CT New Britain 3CAC*
App #:

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	67	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	66	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	16	in

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

Pole Data		
Diam:	59.61	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	0	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3881.88	ft-kips
Unfactored Axial, P:	47.13	kips
Unfactored Shear, V:	29.58	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	136.7 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	70.1% Pass

Base Plate Results Flexural Check

Base Plate Stress:	35.9 ksi
Allowable PL Bending Stress:	50.0 ksi
Base Plate Stress Ratio:	71.8% Pass

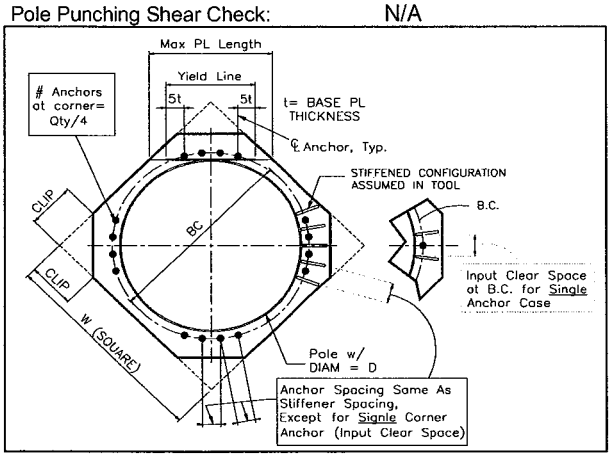
PL Ref. Data
Yield Line (in):
33.73
Max PL Length:
33.73

N/A - Unstiffened
Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *803175*
Site Name: *CT New Britain 3 CAC*
App #: *200695 Rev. 4*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	3	in
Pier Dist. Above Grade:	3	in
Pad Bearing Depth, D:	5.92	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	26	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	8	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	64.00	ft^2
Pier Height:	3.17	ft
Soil (above pad) Height:	2.92	ft

Soil Parameters		
Unit Weight, γ:	110.0	pcf
Ultimate Bearing Capacity, qn:	12.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	30.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	9.00	ksf
Passive Pres. Coeff., Kp	3.00	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	39.9	kips
Pad Force Location Above D:	1.33	ft
ϕ(Passive Pressure Moment):	53.12	ft-kips
Factored O.T. M(WL), "1.6W":	5496.9	ft-kips
Factored OT (MW-Msoil), M1	5443.78	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	1.69	ft
Sum of Soil Wedges Wt:	18.38	kips
Soil Wedges ecc, K1:	7.45	ft
Ftg+Soil above Pad wt:	531.2	kips
Unfactored (Total ftg-soil Wt):	549.58	kips
1.2D. **No Soil Wedges.**	694.00	kips
0.9D. **With Soil Wedges**	537.04	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	47.13	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	29.58	kips
Unfactored WL Moment, M:	3881.88	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	56.556	kips
0.90	0.9D+1.6W, Pu:	42.417	kips
1.35	Vu:	39.933	kips
	Mu:	5240.538	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	694.00	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5443.78	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	7.84	ft
Orthogonal qu=	2.59	ksf
qu/ϕ*qn Ratio=	**28.76%**	Pass

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	5.55	ft
Diagonal qu=	3.12	ksf
qu/ϕ*qn Ratio=	**34.69%**	Pass

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	537.04	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	5320.53	ft-kips

Orthogonal ecc3 = M2/P2 =	9.91	ft
Ortho Non Bearing Length,NBL=	19.81	ft
Orthogonal qu=	3.34	ksf
Diagonal qu=	3.74	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	3881.88		
M Orthogonal:	4658.50	**83.33%**	Pass
M Diagonal:	4658.50		Pass

Monopole or Self Support Pad Foundation Reinforcing
CT New Britain 3 CAC - BU#: 803175
SSOE Project Number: 013-00321-00

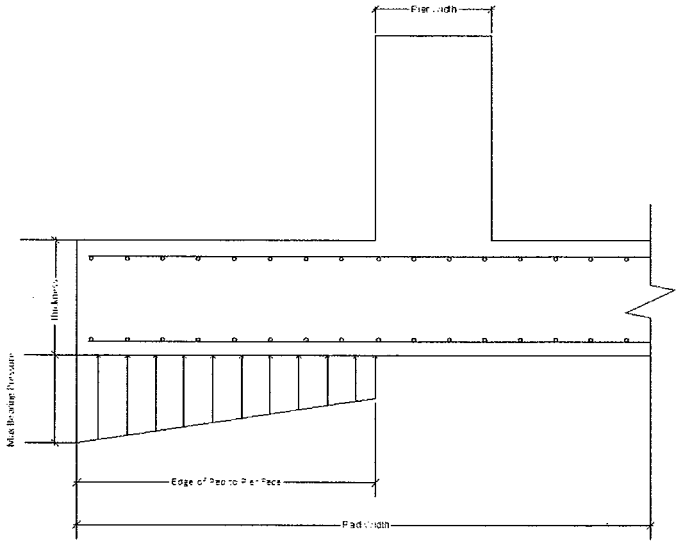
Analysis Code	F
Axial Force	47.13 k

Pad Geometry & Reinforcing	
Pad Length	26 ft
Pad Width	26 ft
Pad Thickness	3 ft
Pad Top Rebar Size	# 11
Pad Top Rebar Quantity	35
Pad Bottom Rebar Size	# 11
Pad Bottom Rebar Quantity	35
Clear Cover	4 in
f_c'	3 ksi
Rebar Fy	60 ksi
Pier Shape	Square
Pier Rebar Size	# 11
Pier Rebar Quantity	36
Pier Diameter	8 ft

Bearing Calculation	
Max Bearing Pressure	3.34 ksf
Edge of Pad to Pier Face	9 ft
Distance Between Piers	0 ft
ecc3 (From Crown Spreadsheet)	9.91
Non-Bearing Length	19.82 ft

Reinforcing Calculations		
Minimum Reinforcement Check		
A_s Min =	0.7776	in^2/ft
As =	4.2	in^2/ft
		OK
Punching Shear		
φ (Shear) =	0.75	
V_u =	61.27 k	
ϕV_c =	3288.67 k	
Shear Capacity	1.9%	OK
Pad Flexure		
φ (Tension) =	0.9	
M_u	93.11 k-ft	
ϕM_n =	400.71 k-ft	
Moment Capacity	23.2%	OK
Beam Shear		
V_u	13.38 k	
ϕV_n =	39.19 k	
Shear Capacity	34.1%	OK
Pier Compression		
P_u	61.269 k	
ϕP_n =	18484.526 k	
Compression Capacity	0.3%	OK
Plain Concrete Interaction		
Moment Capacity	n/a	OK
Shear Capacity	n/a	OK
Pier Compression Capacity	n/a	OK

Overall Capacity	34.1%	OK



SSOE Pad Reinforcement (Bearing on Rock) - v1.6