Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

December 24, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
40 Taugwonk Road, Stonington, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 114-foot level of the existing 150-foot tower at 40 Taugwonk Road in Stonington, Connecticut (the Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of this tower in 1992. Cellco now intends to modify its facility by replacing three (3) of its existing antennas with three (3) model LNX-6514DS-VTM, 700 MHZ antennas, at the same level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its new 700 MHz antennas and one (1) HYBRIFLEX™ antenna cable attached to the outside of the monopole. Included in Attachment 1 are specifications for Cellco's new antennas, RRHs and antenna cable.

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 George Crouse, Acting First Selectman of the Town of Stonington. A copy of this letter is also being sent to Taugwonk LLC, the owner of the Property.

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 antennas and RRHs will be installed on Cellco's existing antenna platform at the 114-foot level of the 150-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 General Power Density table for Cellco's 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:
George Crouse, Stonington Acting First Selectman
Taugwonk LLC
Sandy M. Carter

ATTACHMENT 1

Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

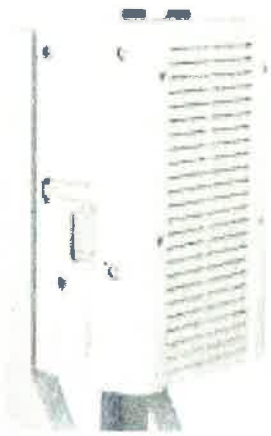
Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.6 kg | 38.8 lb
Model with factory installed AISG 2.0 RET	LNX-6514DS-A1M

Alcatel-Lucent RRH2x40-07-U

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-U is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Band 13). The Alcatel-Lucent RRH2x40-07-U is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-07-U is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-07-U has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 10 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-U is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-U installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-07-U is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-07-U is compact and weights less than 23 kg (50 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

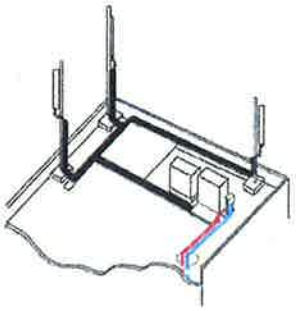
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-07-U provides more RF power while at the same time consuming less electricity.

Features

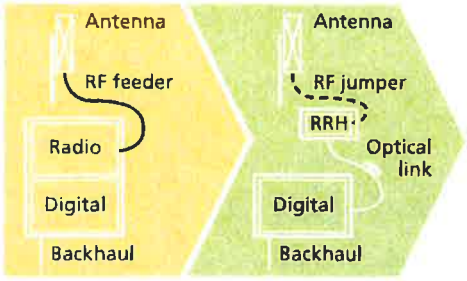
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

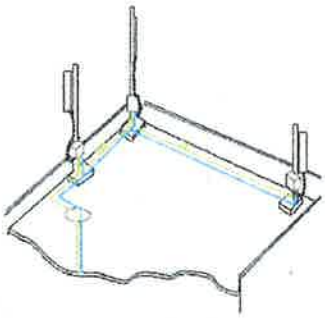
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 390 mm (15.4 in.)
- Width: 380 mm (15 in.)
- Depth: 210 mm (8.2 in.)
- Weight (without mounting kit): less than 23 kg (50 lb)

Power

- Power supply: -48V

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 700 MHz; 3GPP Band 13
- Bandwidth: up to 10 MHz
- RF output power at antenna port:
  - ¬ 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
  - ¬ TMA
  - ¬ Remote electrical tilt (RET) support (AISG v2.0)

Optical characteristics

Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
  - ¬ One SM fiber (9/125 µm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
  - ¬ Two MM fibers (50/125 µm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Alarms and ports

- Six external alarms
- Two optical ports to support daisy-chaining

www.alcatel-lucent.com
CPG2809100913 (09)

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-93-638 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

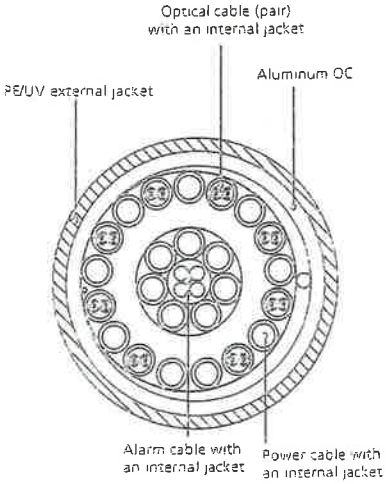


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Stonington								
Tower Height: 150ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T GSM	1	283	153	0.0043	880	0.5867	0.74%	
*AT&T GSM	4	525	153	0.0323	1900	1.0000	3.23%	
*AT&T UMTS	2	565	153	0.0174	880	0.5867	2.96%	
*AT&T UMTS	2	875	153	0.0269	1900	1.0000	2.69%	
*AT&T LTE	1	1615	153	0.0248	734	0.4893	5.07%	
Verizon PCS	**15**	**326**	**114**	**0.1353**	**1970**	**1.0000**	**13.53%**	
Verizon Cellular	**9**	**228**	**114**	**0.0568**	**869**	**0.5793**	**9.80%**	
Verizon AWS	**0**	**1750**	**114**	**0.0000**	**2145**	**1.0000**	**0.00%**	
Verizon 700	**1**	**608**	**114**	**0.0168**	**698**	**0.4973**	**3.38%**	
								41.40%
* Source: Siting Council								

ATTACHMENT 3

Date: **August 27, 2014**

Sean Dempsey
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
(720) 304-6882

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	117880
	Carrier Site Name:	Stonington CT
Crown Castle Designation:	**Crown Castle BU Number:**	841291
	Crown Castle Site Name:	STONINGTON
	Crown Castle JDE Job Number:	300221
	Crown Castle Work Order Number:	918159
	Crown Castle Application Number:	258642 Rev. 6
Engineering Firm Designation:	**Aero Solutions LLC Project Number:**	003-14-0804R1
Site Data:	**40 Taugwondk Road Unit 22, Stonington, New London County, CT**	
	Latitude *41° 22' 58.17"*, Longitude *-71° 54' 6.53"*	
	150 Foot - Monopole Tower	

Dear Sean Dempsey,

Aero Solutions LLC 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 686163, in accordance with application 258642, revision 6.

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

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

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

We at *Aero Solutions LLC* 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: Sina Erturk

Respectfully submitted by:

Shraddha Dharia, PE
Structural Engineer
CT PE# PEN0028187
Expires 01/31/2015

STATE OF CONNECTICUT
SHRADDHA A. DHARIA
No. 28187
LICENSED
PROFESSIONAL ENGINEER

12.18.2014

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Antenna and Cable Information
Table 2 - Existing and Reserved Antenna and Cable Information
Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE
Table 4 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 5 - Section Capacity (Summary)
Table 6 – Tower Components vs. Capacity
4.1) Recommendations

5) APPENDIX A
tnxTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by Spectra Site in September of 2012. 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 GPD Group, in August of 2011. Reinforcement consists of addition of shaft reinforcement between elevations 0' and 120', bridge stiffeners at 110' and anchor rods.

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
114.0	114.0	3	alcatel lucent	RRH2x40 700	1	1-5/8"	
		3	commscope	LNX-6514DS-AIM w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

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
152.0	153.0	6	powerwave technologies	7770.00 w/ Mount Pipe	12	1-5/8"	1
		6	powerwave technologies	LGP13519			
		6	powerwave technologies	LGP21401			
	152.0	1	tower mounts	Platform Mount [LP 101-1]			
114.0	114.0	3	antel	BXA-171085-12BF w/ Mount Pipe			1
		3	antel	BXA-70063/6CF w/ Mount Pipe			2
		6	antel	LPA-80080/6CF w/ Mount Pipe			1
		6	rfs celwave	FD9R6004/2C-3L			2
		1	tower mounts	T-Arm Mount [TA 602-3]	12	1-1/4"	1

Notes:
1) Existing Equipment
2) Equipment To Be Removed

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)
154	154	9	Swedcom	ALP 1101	9	7/8"
114	114	9	Decibel	DB 844H80E-XY	9	1-1/4"

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Wilkinson Engineering	4287404	CCISITES
4-POST-MODIFICATION INSPECTION	GPD Group	4710149	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Wilkinson Engineering	4287402	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Spectra SIte	5110803	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	GPD Group	4945084	CCISITES

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.

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 foundation reinforcing steel was assumed to be 60 ksi and the concrete was assumed to be 3 ksi.

This analysis may be affected if any assumptions are not valid or have been made in error. Aero Solutions LLC 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	150 - 118.75	Pole	TP19.8828x15x0.188	1	-3.5186	619.8130	68.8	Pass
L2	118.75 - 110	Pole	TP21.25x19.8828x1.3959	2	-7.4126	2611.4935	25.1	Pass
L3	110 - 70	Pole	TP27.61x21.25x1.6227	3	-21.8572	3875.2175	40.4	Pass
L4	70 - 67	Pole	TP27.5666x26.5535x1.8474	4	-26.5201	4454.3659	40.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L5	67 - 31.5	Pole	TP33.1x27.5666x1.9102	5	-44.5529	5469.2055	45.5	Pass
L6	31.5 - 30.5	Pole	TP32.6293x31.824x1.9608	6	-50.3581	5639.3096	47.3	Pass
L7	30.5 - 28.5	Pole	TP32.9408x32.6293x1.9543	7	-51.6508	5678.1132	47.7	Pass
L8	28.5 - 17.75	Pole	TP34.6153x32.9408x1.8404	8	-58.4832	5646.1079	51.6	Pass
L9	17.75 - 0	Pole	TP37.38x34.6153x2.1971	9	-72.3895	7238.3097	46.1	Pass
							Summary	
						Pole (L1)	68.8	Pass
						Rating =	68.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	86.1	Pass
1	Base Plate	0	56.1	Pass
1	Base Foundation	0	49.1	Pass
1	Base Foundation Soil Interaction	0	48.8	Pass
1	Flange Connection	110	91.4	Pass

Structure Rating (max from all components) =	91.4%

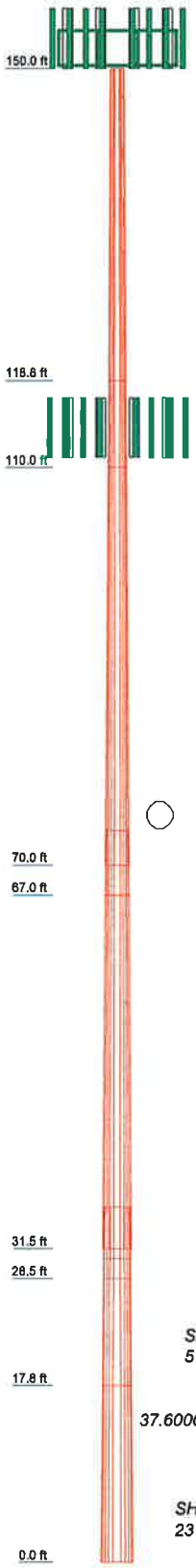
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT



Section	1	2	3	4	5	6	7	8	9
Length (ft)	31.2500	8.7500	40.0000	6.5000	35.5000	2.0000	1.7000	10.7500	17.7500
Number of Sides	12	12	12	12	12	12	12	12	12
Thickness (in)	0.1880	1.3959	1.6227	1.8474	1.9102	1.9608		1.8404	2.1971
Socket Length (ft)			3.5000		4.1700				
Top Dia (in)	15.0000	19.8828	21.2500	25.5535	27.5686	32.2040		32.9408	34.6153
Bot Dia (in)	19.8828	21.2500	27.6100	27.5686	33.1000	32.9408		34.6153	37.3800
Grade	A572-65	A572-65	36.589732ksi	36.463777ksi	36.402486ksi	36.403534ksi	36.409096ksi	36.359546ksi	36.346275ksi
Weight (K)	1.1	2.4	15.2	3.0	19.8	1.2	1.2	6.6	13.6

AXIAL 81 K
SHEAR 5 K
MOMENT 527 kip-ft
TORQUE 0 kip-ft
37.6000 mph WIND - 0.7500 in ICE
AXIAL 72 K
SHEAR 23 K
MOMENT 2219 kip-ft
TORQUE 1 kip-ft
REACTIONS - 85.0000 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	152	(2) LPA-80080/6CF w/ Mount Pipe	114
(2) LGP13519	152	LNX-6514DS-AIM w/ Mount Pipe	114
(2) LGP21401	152	DB-T1-6Z-8AB-0Z	114
(2) 7770.00 w/ Mount Pipe	152	RRH2x40 700	114
(2) LGP13519	152	BXA-171085-12BF w/ Mount Pipe	114
(2) LGP21401	152	(2) LPA-80080/6CF w/ Mount Pipe	114
(2) 7770.00 w/ Mount Pipe	152	LNX-6514DS-AIM w/ Mount Pipe	114
(2) LGP13519	152	RRH2x40 700	114
(2) LGP21401	152	BXA-171085-12BF w/ Mount Pipe	114
Side Arm Mount [SO 203-3]	152	(2) LPA-80080/6CF w/ Mount Pipe	114
Platform Mount [LP 101-1]	152	LNX-6514DS-AIM w/ Mount Pipe	114
RRH2x40 700	114	T-Arm Mount [TA 602-3]	114
BXA-171085-12BF w/ Mount Pipe	114		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	36.414342ksi	36 ksi	51 ksi
36.589732ksi	37 ksi	52 ksi	36.409096ksi	36 ksi	51 ksi
36.463777ksi	36 ksi	51 ksi	36.346275ksi	36 ksi	51 ksi
36.40248ksi	36 ksi	51 ksi	36.359546ksi	36 ksi	51 ksi
36.403534ksi	36 ksi	51 ksi			

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85.0000 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.6000 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.0000 mph wind.
5. TOWER RATING: 68.8%

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
Phone: (720) 304-6882
FAX: (720) 304-6883

Job: *BU#841291 Stonington*			
Project: *Existing 150 ft. Monopole*			
Client: Crown Castle USA	Drawn by: Serturk	App'd:	
Code: TIA/EIA-222-F	Date: 08/27/14	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

4) Tower is located in New London County, Connecticut.
5) Basic wind speed of 85.0000 mph.
6) Nominal ice thickness of 0.7500 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56.0000 pcf.
9) A wind speed of 37.6000 mph is used in combination with ice.
10) Deflections calculated using a wind speed of 50.0000 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) 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	150.0000-118.7500	31.2500	0.0000	12	15.0000	19.8828	0.1880	0.7520	A572-65 (65 ksi)
L2	118.7500-110.0000	8.7500	0.0000	12	19.8828	21.2500	1.3959	5.5834	36.589732ksi (37 ksi)
L3	110.0000-70.0000	40.0000	3.5000	12	21.2500	27.6100	1.6227	6.4908	36.463777ksi (36 ksi)
L4	70.0000-67.0000	6.5000	0.0000	12	26.5535	27.5666	1.8474	7.3896	36.40248ksi (36 ksi)
L5	67.0000-31.5000	35.5000	4.1700	12	27.5666	33.1000	1.9102	7.6408	36.403534ksi (36 ksi)
L6	31.5000-30.5000	5.1700	0.0000	12	31.8240	32.6293	1.9608	7.8430	36.414342ksi (36 ksi)
L7	30.5000-28.5000	2.0000	0.0000	12	32.6293	32.9408	1.9543	7.8171	36.409096ksi (36 ksi)
L8	28.5000-17.7500	10.7500	0.0000	12	32.9408	34.6153	1.8404	7.3616	36.346275ksi (36 ksi)
L9	17.7500-0.0000	17.7500		12	34.6153	37.3800	2.1971	8.7884	36.359546ksi (36 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	15.5291	8.9666	251.0966	5.3027	7.7700	32.3162	508.7897	4.4131	3.5162	18.703
	20.5842	11.9225	590.2762	7.0507	10.2993	57.3123	1196.0596	5.8679	4.8248	25.664
L2	20.5842	83.0926	3624.7576	6.6183	10.2993	351.9422	7344.7417	40.8956	1.5877	1.137
	21.9996	89.2376	4489.8950	7.1078	11.0075	407.8942	9097.7446	43.9200	1.9541	1.4
L3	21.9996	102.5541	5042.6698	7.0266	11.0075	458.1122	10217.816 2	50.4740	1.3462	0.83
	28.5840	135.7856	11704.752 4	9.3035	14.3020	818.4008	23717.001 8	66.8295	3.0507	1.88
L4	28.0550	146.9669	11450.226 3	8.8448	13.7547	832.4584	23201.262 8	72.3326	2.1653	1.172
	28.5391	152.9937	12917.436 0	9.2075	14.2795	904.6125	26174.227 5	75.2988	2.4368	1.319
L5	28.5391	157.8083	13258.948 0	9.1850	14.2795	928.5287	26866.223 4	77.6684	2.2685	1.188
	34.2676	191.8429	23820.843 4	11.1660	17.1458	1389.3107	48267.486 8	94.4193	3.7515	1.964
L6	33.6191	188.5456	21462.341 5	10.6911	16.4848	1301.9437	43488.522 6	92.7964	3.2740	1.67
	33.7803	193.6298	23245.815 6	10.9793	16.9020	1375.3308	47102.324 7	95.2987	3.4898	1.78
L7	33.7803	193.0298	23183.585 0	10.9817	16.9020	1371.6490	46976.228 6	95.0034	3.5072	1.795
	34.1029	194.9901	23897.106 4	11.0932	17.0633	1400.4933	48422.016 5	95.9682	3.5907	1.837
L8	34.1029	184.3035	22753.717 8	11.1340	17.0633	1333.4849	46105.201 1	90.7086	3.8959	2.117
	35.8363	194.2263	26630.266 9	11.7334	17.9307	1485.1771	53960.140 6	95.5923	4.3446	2.361
L9	35.8363	229.3474	30764.955 5	11.6057	17.9307	1715.7698	62338.140 7	112.8778	3.3887	1.542
	38.6986	248.9070	39326.598 8	12.5955	19.3628	2031.0346	79686.351 0	122.5045	4.1296	1.88

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 150.0000-118.7500				1	1	1		
L2 118.7500-110.0000				1	1	0.928354		
L3 110.0000-70.0000				1	1	0.937512		
L4 70.0000-67.0000				1	1	0.912506		
L5 67.0000-31.5000				1	1	0.939185		
L6 31.5000-30.5000				1	1	0.93999		
L7 30.5000-28.5000				1	1	0.941241		
L8 28.5000-17.7500				1	1	0.947169		
L9 17.7500-0.0000				1	1	0.942296		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
**										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	C	No	Inside Pole	150.0000 - 8.0000	0.0000	0	12	No Ice	0.0000	0.8200
								1/2" Ice	0.0000	0.8200
								1" Ice	0.0000	0.8200
								2" Ice	0.0000	0.8200
								4" Ice	0.0000	0.8200
***										
LDF6-50A(1-1/4")	A	No	Inside Pole	114.0000 - 8.0000	0.0000	0	12	No Ice	0.0000	0.6600
								1/2" Ice	0.0000	0.6600
								1" Ice	0.0000	0.6600
								2" Ice	0.0000	0.6600
								4" Ice	0.0000	0.6600
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	114.0000 - 8.0000	-0.4200	0.26	1	No Ice	0.1980	1.3000
								1/2" Ice	0.2980	2.8149
								1" Ice	0.3980	4.9408
								2" Ice	0.5980	11.0250
								4" Ice	0.9980	30.5238
**										
PL1.5	C	No	CaAa (Out Of Face)	70.0000 - 0.0000	0.0000	0	1	No Ice	0.2500	0.0000
								1/2" Ice	0.2500	0.0000
								1" Ice	0.2500	0.0000
								2" Ice	0.2500	0.0000
								4" Ice	0.2500	0.0000
PL1.25	C	No	CaAa (Out Of Face)	120.0000 - 70.0000	0.0000	0	1	No Ice	0.2080	0.0000
								1/2" Ice	0.2080	0.0000
								1" Ice	0.2080	0.0000
								2" Ice	0.2080	0.0000
								4" Ice	0.2080	0.0000
BS	C	No	CaAa (Out Of Face)	112.0000 - 108.0000	0.0000	0	1	No Ice	0.6600	0.0000
								1/2" Ice	0.6600	0.0000
								1" Ice	0.6600	0.0000
								2" Ice	0.6600	0.0000
								4" Ice	0.6600	0.0000
**										

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	150.0000-118.7500	A	0.000	0.000	0.000	0.000	0.0000
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.260	0.3075
L2	118.7500-110.0000	A	0.000	0.000	0.000	0.792	0.0369
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	3.140	0.0861
L3	110.0000-70.0000	A	0.000	0.000	0.000	7.920	0.3688
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	9.640	0.3936
L4	70.0000-67.0000	A	0.000	0.000	0.000	0.594	0.0277
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.750	0.0295
L5	67.0000-31.5000	A	0.000	0.000	0.000	7.029	0.3273
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	8.875	0.3493
L6	31.5000-30.5000	A	0.000	0.000	0.000	0.198	0.0092

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
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.250	0.0098
L7	30.5000-28.5000	A	0.000	0.000	0.000	0.396	0.0184
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.500	0.0197
L8	28.5000-17.7500	A	0.000	0.000	0.000	2.128	0.0991
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	2.688	0.1058
L9	17.7500-0.0000	A	0.000	0.000	0.000	1.931	0.0899
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	4.438	0.0959

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	150.0000-118.7500	A	0.887	0.000	0.000	0.000	0.000	0.0000
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.260	0.3075
L2	118.7500-110.0000	A	0.871	0.000	0.000	0.000	1.488	0.0492
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	3.140	0.0861
L3	110.0000-70.0000	A	0.845	0.000	0.000	0.000	14.683	0.4881
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	9.640	0.3936
L4	70.0000-67.0000	A	0.819	0.000	0.000	0.000	1.101	0.0366
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.750	0.0295
L5	67.0000-31.5000	A	0.787	0.000	0.000	0.000	12.615	0.4244
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	8.875	0.3493
L6	31.5000-30.5000	A	0.750	0.000	0.000	0.000	0.355	0.0120
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.250	0.0098
L7	30.5000-28.5000	A	0.750	0.000	0.000	0.000	0.696	0.0236
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.500	0.0197
L8	28.5000-17.7500	A	0.750	0.000	0.000	0.000	3.741	0.1268
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	2.688	0.1058
L9	17.7500-0.0000	A	0.750	0.000	0.000	0.000	3.393	0.1150
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	4.438	0.0959

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.0000-118.7500	-0.0122	0.0070	-0.0111	0.0064
L2	118.7500-110.0000	-0.3733	0.0491	-0.3382	-0.0881
L3	110.0000-70.0000	-0.2532	-0.2252	-0.2250	-0.4819
L4	70.0000-67.0000	-0.2714	-0.2206	-0.2437	-0.4873
L5	67.0000-31.5000	-0.2759	-0.2242	-0.2515	-0.4822
L6	31.5000-30.5000	-0.2787	-0.2265	-0.2554	-0.4897
L7	30.5000-28.5000	-0.2790	-0.2268	-0.2568	-0.4791
L8	28.5000-17.7500	-0.2802	-0.2277	-0.2584	-0.4821
L9	17.7500-0.0000	-0.2901	-0.0502	-0.2732	-0.2026

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
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.0554 0.1028 0.1566 0.2866 0.6648
(2) LGP13519	A	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.0053 0.0080 0.0119 0.0240 0.0706
(2) LGP21401	A	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.0141 0.0213 0.0303 0.0549 0.1353
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.0554 0.1028 0.1566 0.2866 0.6648
(2) LGP13519	B	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.0053 0.0080 0.0119 0.0240 0.0706
(2) LGP21401	B	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.0141 0.0213 0.0303 0.0549 0.1353
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.0554 0.1028 0.1566 0.2866 0.6648
(2) LGP13519	C	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.0053 0.0080 0.0119 0.0240 0.0706
(2) LGP21401	C	From Leg	4.0000 0.0000 1.0000	30.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.0141 0.0213 0.0303 0.0549 0.1353
Side Arm Mount [SO 203-3]	A	None		0.0000	152.0000	No Ice 1/2" Ice 1" Ice 2" Ice	7.1200 9.8800 12.6400 18.1600 29.2000	7.1200 9.8800 12.6400 18.1600 29.2000	0.3750 0.4606 0.5463 0.7176 1.0602

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
						4" Ice			
Platform Mount [LP 101-1]	C	None		0.0000	152.0000	No Ice	36.2100	36.2100	1.5030
						1/2" Ice	42.8200	42.8200	2.3010
						1" Ice	49.4300	49.4300	3.0990
						2" Ice	62.6500	62.6500	4.6950
						4" Ice	89.0900	89.0900	7.8870
***									
RRH2x40 700	A	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	2.2896	1.2058	0.0500
						1/2" Ice	2.4929	1.3631	0.0668
						1" Ice	2.7048	1.5291	0.0862
						2" Ice	3.1546	1.8868	0.1341
						4" Ice	4.1580	2.7061	0.2706
BXA-171085-12BF w/ Mount Pipe	A	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	4.9710	5.2283	0.0405
						1/2" Ice	5.5211	6.3892	0.0861
						1" Ice	6.0361	7.2610	0.1391
						2" Ice	7.0911	9.0462	0.2708
						4" Ice	9.3593	12.8165	0.6713
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	4.5639	10.7282	0.0462
						1/2" Ice	5.1051	11.9896	0.1127
						1" Ice	5.6116	12.9683	0.1870
						2" Ice	6.6508	14.9795	0.3629
						4" Ice	8.8342	19.2168	0.8571
LNX-6514DS-AIM w/ Mount Pipe	A	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	8.6485	7.0817	0.0646
						1/2" Ice	9.3051	8.2729	0.1337
						1" Ice	9.9298	9.1847	0.2109
						2" Ice	11.2040	11.0232	0.3930
						4" Ice	13.8719	15.0629	0.9024
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	5.6000	2.3333	0.0440
						1/2" Ice	5.9154	2.5580	0.0801
						1" Ice	6.2395	2.7914	0.1202
						2" Ice	6.9136	3.2840	0.2130
						4" Ice	8.3654	4.3728	0.4547
RRH2x40 700	B	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	2.2896	1.2058	0.0500
						1/2" Ice	2.4929	1.3631	0.0668
						1" Ice	2.7048	1.5291	0.0862
						2" Ice	3.1546	1.8868	0.1341
						4" Ice	4.1580	2.7061	0.2706
BXA-171085-12BF w/ Mount Pipe	B	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	4.9710	5.2283	0.0405
						1/2" Ice	5.5211	6.3892	0.0861
						1" Ice	6.0361	7.2610	0.1391
						2" Ice	7.0911	9.0462	0.2708
						4" Ice	9.3593	12.8165	0.6713
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	4.5639	10.7282	0.0462
						1/2" Ice	5.1051	11.9896	0.1127
						1" Ice	5.6116	12.9683	0.1870
						2" Ice	6.6508	14.9795	0.3629
						4" Ice	8.8342	19.2168	0.8571
LNX-6514DS-AIM w/ Mount Pipe	B	From Leg	4.0000 0.0000 0.0000	30.0000	114.0000	No Ice	8.6485	7.0817	0.0646
						1/2" Ice	9.3051	8.2729	0.1337
						1" Ice	9.9298	9.1847	0.2109
						2" Ice	11.2040	11.0232	0.3930
						4" Ice	13.8719	15.0629	0.9024
RRH2x40 700	C	From Leg	4.0000 0.0000 0.0000	10.0000	114.0000	No Ice	2.2896	1.2058	0.0500
						1/2" Ice	2.4929	1.3631	0.0668
						1" Ice	2.7048	1.5291	0.0862

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
						1" Ice	3.1546	1.8868	0.1341
						2" Ice	4.1580	2.7061	0.2706
						4" Ice			
BXA-171085-12BF w/ Mount Pipe	C	From Leg	4.0000 0.0000 0.0000	10.0000	114.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.9710 5.5211 6.0361 7.0911 9.3593	5.2283 6.3892 7.2610 9.0462 12.8165	0.0405 0.0861 0.1391 0.2708 0.6713
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.0000 0.0000 0.0000	10.0000	114.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5639 5.1051 5.6116 6.6508 8.8342	10.7282 11.9896 12.9683 14.9795 19.2168	0.0462 0.1127 0.1870 0.3629 0.8571
LNX-6514DS-AIM w/ Mount Pipe	C	From Leg	4.0000 0.0000 0.0000	10.0000	114.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.0646 0.1337 0.2109 0.3930 0.9024
T-Arm Mount [TA 602-3]	C	None		0.0000	114.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.5900 15.4400 19.2900 26.9900 42.3900	11.5900 15.4400 19.2900 26.9900 42.3900	0.7743 0.9904 1.2064 1.6385 2.5027
***									

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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice

Comb. No.	Description
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 118.75	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-6.6383	0.0000	0.0000
			Max. Mx	5	-3.5194	-169.2261	-0.0114
			Max. My	2	-3.5196	0.0178	169.2227
			Max. Vy	11	-6.2287	169.2261	0.0142
			Max. Vx	2	-6.2285	0.0178	169.2227
			Max. Torque	8			-0.0035
L2	118.75 - 110	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-12.8188	0.0000	0.5570
			Max. Mx	5	-7.4152	-246.8369	-0.1119
			Max. My	2	-7.4167	0.3279	246.9291
			Max. Vy	5	11.9324	-246.8369	-0.1119
			Max. Vx	2	-11.9013	0.3279	246.9291
			Max. Torque	8			-0.4641
L3	110 - 70	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-28.3069	0.0000	0.7989
			Max. Mx	5	-21.8598	-755.2097	-2.9889
			Max. My	2	-21.8610	3.2877	754.2328
			Max. Vy	5	15.9828	-755.2097	-2.9889
			Max. Vx	2	-15.9513	3.2877	754.2328
			Max. Torque	8			-0.5442
L4	70 - 67	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-33.2583	0.0000	0.8443
			Max. Mx	5	-26.5225	-861.6860	-3.5044
			Max. My	2	-26.5237	3.8185	860.5180
			Max. Vy	5	16.7594	-861.6860	-3.5044
			Max. Vx	2	-16.7279	3.8185	860.5180
			Max. Torque	8			-0.5598
L5	67 - 31.5	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-52.2062	0.0000	1.0871
			Max. Mx	5	-44.5543	-1438.0011	-5.9773
			Max. My	2	-44.5549	6.3752	1435.9231
			Max. Vy	5	20.0074	-1438.0011	-5.9773
			Max. Vx	2	-19.9760	6.3752	1435.9231
			Max. Torque	8			-0.6361
L6	31.5 - 30.5	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-58.2983	0.0000	1.1277
			Max. Mx	5	-50.3594	-1542.8717	-6.3839
			Max. My	2	-50.3599	6.7956	1540.6441
			Max. Vy	5	20.5631	-1542.8717	-6.3839
			Max. Vx	2	-20.5317	6.7956	1540.6441
			Max. Torque	8			-0.6487
L7	30.5 - 28.5	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-59.6474	0.0000	1.1438
			Max. Mx	5	-51.6519	-	-6.5407

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
						1584.1630	
			Max. My	2	-51.6525	6.9581	1581.8779
			Max. Vy	5	20.7452	-	-6.5407
						1584.1630	
			Max. Vx	2	-20.7138	6.9581	1581.8779
			Max. Torque	8			-0.6534
L8	28.5 - 17.75	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-66.7861	0.0000	1.2330
			Max. Mx	5	-58.4839	-	-7.3791
						1812.2797	
			Max. My	2	-58.4843	7.8270	1809.6878
			Max. Vy	5	21.7164	-	-7.3791
						1812.2797	
			Max. Vx	2	-21.6852	7.8270	1809.6878
			Max. Torque	8			-0.6796
L9	17.75 - 0	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	14	-81.2194	0.0000	1.3177
			Max. Mx	5	-72.3895	-	-8.7685
						2211.8647	
			Max. My	2	-72.3895	9.2446	2208.7507
			Max. Vy	5	23.3325	-	-8.7685
						2211.8647	
			Max. Vx	2	-23.3017	9.2446	2208.7507
			Max. Torque	8			-0.7259

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	81.2194	0.0000	0.0000
	Max. H_x	11	72.3929	23.3220	0.0792
	Max. H_z	2	72.3929	0.0792	23.2912
	Max. M_x	2	2208.7507	0.0792	23.2912
	Max. M_z	5	2211.8647	-23.3220	-0.0792
	Max. Torsion	2	0.7228	0.0792	23.2912
	Min. Vert	37	72.3929	7.0024	4.0534
	Min. H_x	5	72.3929	-23.3220	-0.0792
	Min. H_z	8	72.3929	-0.0792	-23.2912
	Min. M_x	8	-2207.7970	-0.0792	-23.2912
	Min. M_z	11	-2211.8647	23.3220	0.0792
	Min. Torsion	8	-0.7259	-0.0792	-23.2912

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	72.3929	0.0000	0.0000	-0.4629	0.0000	0.0000
Dead+Wind 0 deg - No Ice	72.3929	-0.0792	-23.2912	-2208.7507	9.2446	-0.7228
Dead+Wind 30 deg - No Ice	72.3929	11.5924	-20.1311	-1908.2777	-1097.9285	-0.6969
Dead+Wind 60 deg - No Ice	72.3929	20.1578	-11.5770	-1096.6078	-1910.9119	-0.4847
Dead+Wind 90 deg - No Ice	72.3929	23.3220	0.0792	8.7685	-2211.8647	-0.1418
Dead+Wind 120 deg - No Ice	72.3929	20.2370	11.7142	1111.6639	-1920.1514	0.2402
Dead+Wind 150 deg - No Ice	72.3929	11.7296	20.2104	1916.5632	-1113.9389	0.5581
Dead+Wind 180 deg - No Ice	72.3929	0.0792	23.2912	2207.7970	-9.2466	0.7259
Dead+Wind 210 deg - No Ice	72.3929	-11.5924	20.1311	1907.3248	1097.9272	0.6980
Dead+Wind 240 deg - No Ice	72.3929	-20.1578	11.5770	1095.6546	1910.9116	0.4827
Dead+Wind 270 deg - No Ice	72.3929	-23.3220	-0.0792	-9.7227	2211.8647	0.1388
Dead+Wind 300 deg - No Ice	72.3929	-20.2370	-11.7142	-1112.6189	1920.1506	-0.2411
Dead+Wind 330 deg - No Ice	72.3929	-11.7296	-20.2104	-1917.5179	1113.9372	-0.5561

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+Ice	81.2194	0.0000	0.0000	-1.3177	0.0000	0.0000
Dead+Wind 0 deg+Ice	81.2194	-0.0252	-5.3071	-523.6922	2.9652	-0.1539
Dead+Wind 30 deg+Ice	81.2194	2.6381	-4.5834	-452.2320	-259.3471	-0.1576
Dead+Wind 60 deg+Ice	81.2194	4.5946	-2.6317	-259.9642	-452.1676	-0.1191
Dead+Wind 90 deg+Ice	81.2194	5.3199	0.0252	1.5931	-523.8301	-0.0487
Dead+Wind 120 deg+Ice	81.2194	4.6198	2.6754	262.3558	-455.1328	0.0350
Dead+Wind 150 deg+Ice	81.2194	2.6818	4.6087	452.4528	-264.4831	0.1092
Dead+Wind 180 deg+Ice	81.2194	0.0252	5.3071	520.9479	-2.9654	0.1542
Dead+Wind 210 deg+Ice	81.2194	-2.6381	4.5834	449.4877	259.3470	0.1577
Dead+Wind 240 deg+Ice	81.2194	-4.5946	2.6317	257.2199	452.1676	0.1190
Dead+Wind 270 deg+Ice	81.2194	-5.3199	-0.0252	-4.3375	523.8301	0.0484
Dead+Wind 300 deg+Ice	81.2194	-4.6198	-2.6754	-265.1002	455.1327	-0.0350
Dead+Wind 330 deg+Ice	81.2194	-2.6818	-4.6087	-455.1972	264.4829	-0.1090
Dead+Wind 0 deg - Service	72.3929	-0.0274	-8.0592	-764.7609	3.1996	-0.2508
Dead+Wind 30 deg - Service	72.3929	4.0112	-6.9658	-660.7665	-379.9925	-0.2416
Dead+Wind 60 deg - Service	72.3929	6.9750	-4.0059	-379.8481	-661.3659	-0.1677
Dead+Wind 90 deg - Service	72.3929	8.0699	0.0274	2.7223	-765.5268	-0.0488
Dead+Wind 120 deg - Service	72.3929	7.0024	4.0534	384.4353	-664.5654	0.0833
Dead+Wind 150 deg - Service	72.3929	4.0587	6.9932	663.0113	-385.5345	0.1932
Dead+Wind 180 deg - Service	72.3929	0.0274	8.0592	763.8062	-3.1999	0.2511
Dead+Wind 210 deg - Service	72.3929	-4.0112	6.9658	659.8119	379.9924	0.2417
Dead+Wind 240 deg - Service	72.3929	-6.9750	4.0059	378.8934	661.3659	0.1674
Dead+Wind 270 deg - Service	72.3929	-8.0699	-0.0274	-3.6771	765.5268	0.0484
Dead+Wind 300 deg - Service	72.3929	-7.0024	-4.0534	-385.3902	664.5653	-0.0835
Dead+Wind 330 deg - Service	72.3929	-4.0587	-6.9932	-663.9661	385.5343	-0.1929

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.0000	-72.3929	0.0000	0.0000	72.3929	0.0000	0.000%
2	-0.0792	-72.3929	-23.2912	0.0792	72.3929	23.2912	0.000%
3	11.5924	-72.3929	-20.1311	-11.5924	72.3929	20.1311	0.000%
4	20.1578	-72.3929	-11.5770	-20.1578	72.3929	11.5770	0.000%
5	23.3219	-72.3929	0.0792	-23.3220	72.3929	-0.0792	0.000%
6	20.2370	-72.3929	11.7142	-20.2370	72.3929	-11.7142	0.000%
7	11.7296	-72.3929	20.2104	-11.7296	72.3929	-20.2104	0.000%
8	0.0792	-72.3929	23.2912	-0.0792	72.3929	-23.2912	0.000%
9	-11.5924	-72.3929	20.1311	11.5924	72.3929	-20.1311	0.000%
10	-20.1578	-72.3929	11.5770	20.1578	72.3929	-11.5770	0.000%
11	-23.3219	-72.3929	-0.0792	23.3220	72.3929	0.0792	0.000%
12	-20.2370	-72.3929	-11.7142	20.2370	72.3929	11.7142	0.000%
13	-11.7296	-72.3929	-20.2104	11.7296	72.3929	20.2104	0.000%
14	0.0000	-81.2194	0.0000	0.0000	81.2194	0.0000	0.000%
15	-0.0252	-81.2194	-5.3071	0.0252	81.2194	5.3071	0.000%
16	2.6381	-81.2194	-4.5834	-2.6381	81.2194	4.5834	0.000%
17	4.5946	-81.2194	-2.6317	-4.5946	81.2194	2.6317	0.000%
18	5.3199	-81.2194	0.0252	-5.3199	81.2194	-0.0252	0.000%
19	4.6198	-81.2194	2.6754	-4.6198	81.2194	-2.6754	0.000%
20	2.6818	-81.2194	4.6087	-2.6818	81.2194	-4.6087	0.000%
21	0.0252	-81.2194	5.3071	-0.0252	81.2194	-5.3071	0.000%
22	-2.6381	-81.2194	4.5834	2.6381	81.2194	-4.5834	0.000%
23	-4.5946	-81.2194	2.6317	4.5946	81.2194	-2.6317	0.000%
24	-5.3199	-81.2194	-0.0252	5.3199	81.2194	0.0252	0.000%
25	-4.6198	-81.2194	-2.6754	4.6198	81.2194	2.6754	0.000%
26	-2.6818	-81.2194	-4.6087	2.6818	81.2194	4.6087	0.000%
27	-0.0274	-72.3929	-8.0592	0.0274	72.3929	8.0592	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
28	4.0112	-72.3929	-6.9658	-4.0112	72.3929	6.9658	0.000%
29	6.9750	-72.3929	-4.0059	-6.9750	72.3929	4.0059	0.000%
30	8.0699	-72.3929	0.0274	-8.0699	72.3929	-0.0274	0.000%
31	7.0024	-72.3929	4.0534	-7.0024	72.3929	-4.0534	0.000%
32	4.0587	-72.3929	6.9932	-4.0587	72.3929	-6.9932	0.000%
33	0.0274	-72.3929	8.0592	-0.0274	72.3929	-8.0592	0.000%
34	-4.0112	-72.3929	6.9658	4.0112	72.3929	-6.9658	0.000%
35	-6.9750	-72.3929	4.0059	6.9750	72.3929	-4.0059	0.000%
36	-8.0699	-72.3929	-0.0274	8.0699	72.3929	0.0274	0.000%
37	-7.0024	-72.3929	-4.0534	7.0024	72.3929	4.0534	0.000%
38	-4.0587	-72.3929	-6.9932	4.0587	72.3929	6.9932	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	0.00006862
3	Yes	4	0.00000001	0.00085498
4	Yes	4	0.00000001	0.00089443
5	Yes	4	0.00000001	0.00002721
6	Yes	4	0.00000001	0.00091086
7	Yes	4	0.00000001	0.00087663
8	Yes	4	0.00000001	0.00005314
9	Yes	4	0.00000001	0.00090259
10	Yes	4	0.00000001	0.00086275
11	Yes	4	0.00000001	0.00002974
12	Yes	4	0.00000001	0.00088813
13	Yes	4	0.00000001	0.00092273
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00001484
16	Yes	4	0.00000001	0.00003147
17	Yes	4	0.00000001	0.00003431
18	Yes	4	0.00000001	0.00001350
19	Yes	4	0.00000001	0.00003489
20	Yes	4	0.00000001	0.00003196
21	Yes	4	0.00000001	0.00001447
22	Yes	4	0.00000001	0.00003487
23	Yes	4	0.00000001	0.00003168
24	Yes	4	0.00000001	0.00001350
25	Yes	4	0.00000001	0.00003300
26	Yes	4	0.00000001	0.00003631
27	Yes	4	0.00000001	0.00001259
28	Yes	4	0.00000001	0.00004242
29	Yes	4	0.00000001	0.00004697
30	Yes	4	0.00000001	0.00000998
31	Yes	4	0.00000001	0.00004744
32	Yes	4	0.00000001	0.00004350
33	Yes	4	0.00000001	0.00001210
34	Yes	4	0.00000001	0.00004810
35	Yes	4	0.00000001	0.00004313
36	Yes	4	0.00000001	0.00001002
37	Yes	4	0.00000001	0.00004472
38	Yes	4	0.00000001	0.00004908

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 118.75	15.8562	37	1.2931	0.0006
L2	118.75 - 110	8.9092	37	0.7066	0.0006
L3	110 - 70	7.6527	37	0.6636	0.0006
L4	73.5 - 67	3.3892	37	0.4404	0.0003
L5	67 - 31.5	2.8075	37	0.4089	0.0002
L6	35.67 - 30.5	0.7867	37	0.2074	0.0001
L7	30.5 - 28.5	0.5716	37	0.1873	0.0001
L8	28.5 - 17.75	0.4958	37	0.1742	0.0001
L9	17.75 - 0	0.1863	37	0.1010	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.0000	(2) 7770.00 w/ Mount Pipe	37	15.8562	1.2931	0.0007	12852
114.0000	RRH2x40 700	37	8.1973	0.6796	0.0006	4014

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 118.75	45.7657	12	3.7331	0.0016
L2	118.75 - 110	25.7255	12	2.0401	0.0018
L3	110 - 70	22.0985	12	1.9161	0.0016
L4	73.5 - 67	9.7886	12	1.2719	0.0008
L5	67 - 31.5	8.1087	12	1.1811	0.0007
L6	35.67 - 30.5	2.2725	12	0.5989	0.0003
L7	30.5 - 28.5	1.6510	12	0.5411	0.0003
L8	28.5 - 17.75	1.4323	12	0.5031	0.0002
L9	17.75 - 0	0.5383	12	0.2918	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.0000	(2) 7770.00 w/ Mount Pipe	12	45.7657	3.7331	0.0020	4478
114.0000	RRH2x40 700	12	23.6707	1.9624	0.0017	1395

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	150 - 118.75 (1)	TP19.8828x15x0.188	31.2500	0.0000	0.0	39.0000	11.9225	-3.5186	464.9760	0.008

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 $\frac{P}{P_a}$
L2	118.75 - 110 (2)	TP21.25x19.8828x1.3959	8.7500	0.0000	0.0	21.9538	89.2376	-7.4126	1959.1100	0.004
L3	110 - 70 (3)	TP27.61x21.25x1.6227	40.0000	0.0000	0.0	21.8783	132.8780	-21.8572	2907.1400	0.008
L4	70 - 67 (4)	TP27.5666x26.5535x1.8474	6.5000	0.0000	0.0	21.8415	152.9940	-26.5201	3341.6100	0.008
L5	67 - 31.5 (5)	TP33.1x27.5666x1.9102	35.5000	0.0000	0.0	21.8421	187.8450	-44.5529	4102.9300	0.011
L6	31.5 - 30.5 (6)	TP32.6293x31.824x1.9608	5.1700	0.0000	0.0	21.8486	193.6300	-50.3581	4230.5400	0.012
L7	30.5 - 28.5 (7)	TP32.9408x32.6293x1.9543	2.0000	0.0000	0.0	21.8455	194.9900	-51.6508	4259.6500	0.012
L8	28.5 - 17.75 (8)	TP34.6153x32.9408x1.8404	10.7500	0.0000	0.0	21.8078	194.2260	-58.4832	4235.6400	0.014
L9	17.75 - 0 (9)	TP37.38x34.6153x2.1971	17.7500	0.0000	0.0	21.8157	248.9070	-72.3895	5430.0900	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	150 - 118.75 (1)	TP19.8828x15x0.188	169.2358	35.4345	39.0000	0.909	0.0000	0.0000	39.0000	0.000
L2	118.75 - 110 (2)	TP21.25x19.8828x1.3959	247.2233	7.2732	21.9538	0.331	0.0000	0.0000	21.9538	0.000
L3	110 - 70 (3)	TP27.61x21.25x1.6227	757.8892	11.6193	21.8783	0.531	0.0000	0.0000	21.8783	0.000
L4	70 - 67 (4)	TP27.5666x26.5535x1.8474	864.7833	11.4716	21.8415	0.525	0.0000	0.0000	21.8415	0.000
L5	67 - 31.5 (5)	TP33.1x27.5666x1.9102	1443.1000	13.0168	21.8421	0.596	0.0000	0.0000	21.8421	0.000
L6	31.5 - 30.5 (6)	TP32.6293x31.824x1.9608	1548.3000	13.5092	21.8486	0.618	0.0000	0.0000	21.8486	0.000
L7	30.5 - 28.5 (7)	TP32.9408x32.6293x1.9543	1589.7250	13.6214	21.8455	0.624	0.0000	0.0000	21.8455	0.000
L8	28.5 - 17.75 (8)	TP34.6153x32.9408x1.8404	1818.5250	14.6934	21.8078	0.674	0.0000	0.0000	21.8078	0.000
L9	17.75 - 0 (9)	TP37.38x34.6153x2.1971	2219.2083	13.1118	21.8157	0.601	0.0000	0.0000	21.8157	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	150 - 118.75 (1)	TP19.8828x15x0.188	6.2293	0.5225	26.0000	0.041	0.0027	0.0003	26.0000	0.000
L2	118.75 - 110 (2)	TP21.25x19.8828x1.3959	11.9810	0.1343	14.6359	0.019	0.4246	0.0056	14.6359	0.000
L3	110 - 70 (3)	TP27.61x21.25x1.6227	16.0460	0.1208	14.5855	0.017	0.2545	0.0017	14.5855	0.000
L4	70 - 67 (4)	TP27.5666x26.5535x1.8474	16.8243	0.1100	14.5610	0.015	0.2500	0.0015	14.5610	0.000
L5	67 - 31.5 (5)	TP33.1x27.5666x1.9102	20.0702	0.1068	14.5614	0.015	0.2347	0.0009	14.5614	0.000
L6	31.5 - 30.5 (6)	TP32.6293x31.824x1.9608	20.6261	0.1065	14.5657	0.015	0.2318	0.0009	14.5657	0.000
L7	30.5 - 28.5 (7)	TP32.9408x32.6293x1.9543	20.8080	0.1067	14.5636	0.015	0.2308	0.0009	14.5636	0.000
L8	28.5 - 17.75	TP34.6153x32.9408x1.84	21.778	0.1121	14.538	0.016	0.2255	0.0008	14.538	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 $\frac{f_{vt}}{F_{vt}}$
	(8)	04	5		5				5	
L9	17.75 - 0 (9)	TP37.38x34.6153x2.1971	23.3935	0.0940	14.5438	0.013	0.2411	0.0006	14.5438	0.000

Pole Interaction Design Data

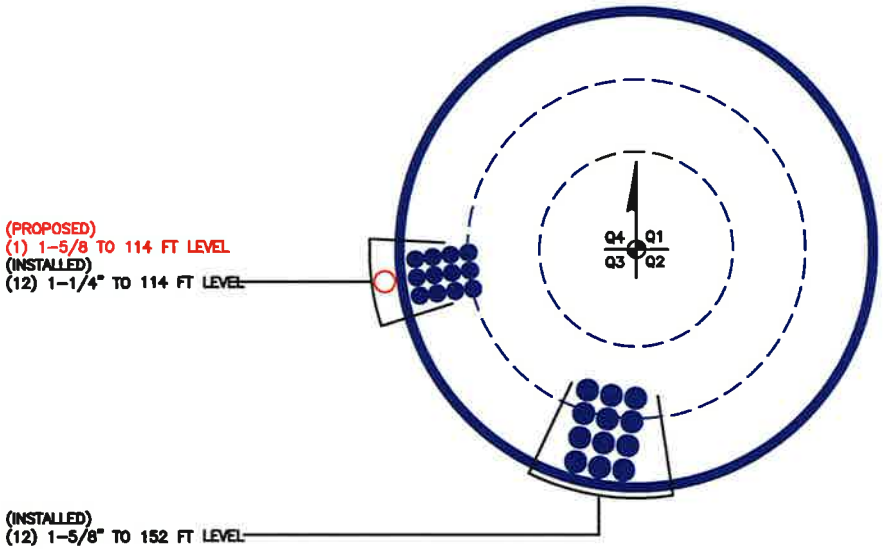
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 118.75 (1)	0.008	0.909	0.000	0.041	0.000	0.917 ✔	1.333	H1-3+VT ✔
L2	118.75 - 110 (2)	0.004	0.331	0.000	0.019	0.000	0.335 ✔	1.333	H1-3+VT ✔
L3	110 - 70 (3)	0.008	0.531	0.000	0.017	0.000	0.539 ✔	1.333	H1-3+VT ✔
L4	70 - 67 (4)	0.008	0.525	0.000	0.015	0.000	0.533 ✔	1.333	H1-3+VT ✔
L5	67 - 31.5 (5)	0.011	0.596	0.000	0.015	0.000	0.607 ✔	1.333	H1-3+VT ✔
L6	31.5 - 30.5 (6)	0.012	0.618	0.000	0.015	0.000	0.630 ✔	1.333	H1-3+VT ✔
L7	30.5 - 28.5 (7)	0.012	0.624	0.000	0.015	0.000	0.636 ✔	1.333	H1-3+VT ✔
L8	28.5 - 17.75 (8)	0.014	0.674	0.000	0.016	0.000	0.688 ✔	1.333	H1-3+VT ✔
L9	17.75 - 0 (9)	0.013	0.601	0.000	0.013	0.000	0.614 ✔	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	150 - 118.75	Pole	TP19.8828x15x0.188	1	-3.5186	619.8130	68.8	Pass
L2	118.75 - 110	Pole	TP21.25x19.8828x1.3959	2	-7.4126	2611.4935	25.1	Pass
L3	110 - 70	Pole	TP27.61x21.25x1.6227	3	-21.8572	3875.2175	40.4	Pass
L4	70 - 67	Pole	TP27.5666x26.5535x1.8474	4	-26.5201	4454.3659	40.0	Pass
L5	67 - 31.5	Pole	TP33.1x27.5666x1.9102	5	-44.5529	5469.2055	45.5	Pass
L6	31.5 - 30.5	Pole	TP32.6293x31.824x1.9608	6	-50.3581	5639.3096	47.3	Pass
L7	30.5 - 28.5	Pole	TP32.9408x32.6293x1.9543	7	-51.6508	5678.1132	47.7	Pass
L8	28.5 - 17.75	Pole	TP34.6153x32.9408x1.8404	8	-58.4832	5646.1079	51.6	Pass
L9	17.75 - 0	Pole	TP37.38x34.6153x2.1971	9	-72.3895	7238.3097	46.1	Pass
							Summary	
						Pole (L1)	68.8	Pass
						RATING =	**68.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED)
(1) 1-5/8 TO 114 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 114 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 152 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforced Pole Stress
and Effective Thickness Check

AeroSolutions LLC
3900 Thilsen Parkway, Suite 180
Dundee, OR 97115
720-504-4287

Section	Elevation (ft)	Moment (ft-kip)	Compressive (kip)	Shear (kip)	Torsion (kip-ft)	Number of Sides	OD (in)	Thickness (in)	Yield Strength (ksi)	Flat Width (in)	Area (in²)	Moment of Inertia (in⁴)	Percent of Compact e Moment of Inertia	Angle Offset to Pole Flat	Distance to Extreme Fiber (in)	Section Modulus (in³)	Torsion Constant (in⁴)	Polygonal Compact Criterion	Allowable Bending Stress (ksi)	Allowable Bending Moment Strength (ft-kip)	Allowable Axial Stress (ksi)	Allowable Shear Stress (ksi)	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Stress Ratio	Moment in Pole when Reinforce d	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Reinforced Pole Stress Ratio	Qty	Model	Position (F-Flat, C-Corner)	Gap Between Pole and Back of Rein. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in⁴)	Axial Force (ksi)	Stress Ratio	Centroid Offset (in)	Area (in²)	Moment of Inertia (in⁴)	Controlling Stress Ratio	Thickness (in)	Weight Multiplier	Derated Yield Stress (ksi)	% Error in Derated Yield Stress
Section	Elevation	Moment	Compressive	Shear	Torsion	PoleSides	PoleOD	PoleT	PoleFy	PoleW	PoleA	PoleI	PoleIPer	PoleOffset	PoleC	PoleS	PoleJ	PoleQ	PoleAllowB	PoleMAllowB	PoleAllowA	PoleAllowV	PoleFbUnit	PoleFaUnit	PoleFvUnit	PoleFtUnit	PoleUR	RebarMoment	RebarFbUnit	RebarFaUnit	RebarFvUnit	RebarFtUnit	RebarUR	Rein1Qty	Rein1Model	Rein1Pos	Rein1Gap	Rein1TC	Rein1Total	Rein1P	Rein1SR	CentroidOffset	CompArea	CompI	CompSR	ZRatio	ZWeight	ZDerated	ZDRatio
1	150	9.6	2.8	3.9	0.0	12	15.0000	0.1880	65	3.52	8.9	251	100%	TRUE	7.73	32	492	151	52.0	180.1	52.0	36.7	3.6	0.26	0.00	0.00	0.073	9.6	3.6	0.26	0.00	0.00	0.073									0.000	8.9	251	0.073	0.1880	1.00	65.0	0.0%
2	118.75	169.2	3.5	6.2	0.0	12	19.8828	0.1880	65	4.02	11.9	590	100%	TRUE	10.28	57	1196	207	52.0	249.1	52.0	36.7	25.3	0.30	0.00	0.00	0.485	169.2	25.3	0.30	0.00	0.00	0.485									0.000	11.9	590	0.485	0.1880	1.00	65.0	0.0%
3	110	247.2	7.4	12.0	0.4	12	21.2500	1.0563	36	2.96	67.9	9571	79%	15	10.61	327	6957	16	19.8	793.5	19.8	18.3	9.1	0.11	0.00	0.01	0.519	194.4	7.1	0.11	0.00	0.00	0.252	2	PL1.25x6-10	F	0	TEC	960	58.0	0.199	0.000	82.8	4481	0.252	1.0563	0.93	33.5	6.8%
4	73.5	737.9	21.9	18.0	0.3	12	27.0520	1.2625	36	3.92	102.1	8683	79%	15	13.79	630	17295	19	19.8	1513.4	19.8	18.2	34.4	0.21	0.00	0.00	0.505	599.8	11.4	0.21	0.00	0.00	0.404	3	PL1.25x6-10	F	0	TEC	2282	85.1	0.271	0.000	124.4	10972	0.404	1.2625	0.94	35.0	1.9%
5	70	814.8	23.0	18.5	0.3	12	27.6200	2.5001	36	0.83	200.1	17933	87%	15	13.84	1152	31578	1	26.8	2764.7	26.8	19.2	8.9	0.13	0.00	0.00	0.299	709.1	7.6	0.13	0.00	0.00	0.283	3	PL1.25x6-10	F	0	TEC	2379	93.9	0.278	0.000	222.6	18321	0.283	0.9796	0.95	35.0	1.2%
6	70	814.8	23.0	18.5	0.3	12	27.6200	2.5001	36	0.83	200.1	17933	82%	15	13.84	1152	31578	1	26.8	2764.7	23.8	19.2	8.9	0.13	0.00	0.00	0.299	471.5	7.0	0.13	0.00	0.00	0.267	3	PL1.0x7-10	F	0	TEC	3656	74.7	0.283	0.000	231.6	19107	0.267	0.9796	0.91	35.0	3.2%
7	62	864.9	28.5	18.8	0.3	12	27.9646	1.2818	36	3.92	104.1	9528	74%	15	14.04	679	18872	18	26.8	1820.2	23.8	19.2	25.3	0.25	0.00	0.00	0.548	637.7	13.3	0.25	0.00	0.00	0.469	3	PL1.0x7-10	F	0	TEC	3594	118.6	0.319	0.000	239.6	12922	0.469	1.0476	0.91	32.0	1.1%
8	35.67	1443.1	44.6	20.1	0.2	12	32.4500	1.4691	36	4.76	144.9	17761	79%	15	16.54	1074	35170	19	26.8	2577.3	26.8	19.2	19.1	0.31	0.00	0.00	0.537	1186.9	12.8	0.31	0.00	0.00	0.455	3	PL1.5x7-10	F	0	TEC	4626	133.5	0.399	0.000	376.6	23366	0.455	1.4162	0.94	34.0	1.1%
9	31.5	1527.7	48.7	20.5	0.2	12	33.1000	2.9892	36	0.86	283.5	32596	87%	15	16.61	1963	64342	2	26.8	4779.6	23.8	19.2	8.2	0.18	0.00	0.00	0.350	1552.3	8.1	0.18	0.00	0.00	0.289	3	PL1.0x7-10	F	0	TEC	4781	86.2	0.292	0.000	515.0	37377	0.289	1.5952	0.94	36.0	3.1%
10	30.5	1568.5	50.6	20.6	0.2	12	32.6293	1.5200	36	4.87	150.5	19598	80%	15	16.62	1119	36833	18	26.8	2686.7	23.8	19.2	18.6	0.35	0.00	0.00	0.588	1234.4	13.3	0.35	0.00	0.00	0.473	3	PL1.5x7-10	F	0	TEC	4934	138.5	0.379	0.000	182.0	23252	0.473	1.5600	0.94	36.0	1.2%
11	18.5	1589.7	51.7	20.8	0.2	12	32.9456	1.5200	36	4.79	152.2	19385	80%	15	16.78	1142	37933	19	26.8	2739.9	23.8	19.2	18.7	0.34	0.00	0.00	0.592	1274.4	13.4	0.34	0.00	0.00	0.477	3	PL1.5x7-10	F	0	TEC	4738	139.8	0.376	0.000	183.5	23903	0.477	1.5563	0.94	36.0	1.1%
12	17.75	1818.9	58.5	21.8	0.2	12	34.6193	1.4434	36	5.41	152.5	21452	80%	15	17.66	1213	42409	23	26.8	3211.3	23.8	19.2	18.0	0.38	0.00	0.00	0.578	1493.3	14.5	0.38	0.00	0.00	0.516	3	PL1.5x7-10	F	0	TEC	5025	150.3	0.408	0.000	184.0	26835	0.516	1.4436	0.95	36.0	1.0%
13	0	2228.2	72.4	23.4	0.2	12	37.5800	1.4967	36	5.88	192.5	31330	80%	15	19.05	1644	62996	19	26.8	3943.5	23.8	19.2	24.2	0.58	0.00	0.00	0.870	1788.4	12.9	0.58	0.00	0.00	0.691	4	PL1.5x7-10	F	0	TEC	8025	153.7	0.397	0.000	256.5	39336	0.691	2.2393	0.94	36.0	1.0%
																											0.885																					0.885				

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6582

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
Model	*Wt*	*A*	*Ix*	*Iy*	*Y*	*X*	*Tw*	*W*	*Wf*	*Tf*	*Dh*	*Fy*	*Fu*	*Kx*	*Lx*	*Ky*	*Ly*	*PAll*	*PallInc*	*Ptype ASD*	*phiPn*	*Ptype LRFD*
PL1.5x7-18	35.7	10.50	1.97	42.88	0.75	0	1.5	7	0	0	1.21875	50	65	0.80	18	1.00	18	278.8	371.7	Rupture	418.2	Rupture
PL1.25x6-18	25.5	7.50	0.98	22.50	0.625	0	1.25	6	0	0	1.21875	50	65	0.80	18	1.00	18	191.7	255.6	Rupture	287.5	Rupture
PL1.25x4-18	17.0	5.00	0.65	6.67	0.625	0	1.25	4	0	0	1.21875	50	65	0.80	18	1.00	18	110.4	147.3	Rupture	165.7	Rupture

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	17.75	4	PL1.5x7-18	F	T&C
17.75	30.5	3	PL1.5x7-18	F	T&C
30.5	70	3	PL1.5x7-18	F	T&C
70	110	3	L1.25x6-18	F	T&C
110	118.75	3	L1.25x4-18	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1			1			1			1								
1				1				1									
1				1				1									
1				1				1									
1				1				1									

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	841291
Name:	STONINGTON
App. #:	258642 R6

Flange Height:	110	ft

System Reactions		
Moment:	247.2	kip-ft
Axial:	7.4	kip
Shear:	12.0	kip

Pole Geometry		
Upper Pole OD:	21.25	in
Upper Pole Thick:	1.0563	in
Lower Pole OD:	21.25	in
Lower Pole Thick:	1.2423	in
Flange Plate OD:	28.50	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	100%

Outer Bolt Group Data		
Quantity:	12	
Diameter:	1	in
Material:	A325	
Bolt Circle:	24.25	in
Bolt Group Area:	9.42	in^2
Bolt Group MOIx:	693	in^4

Reactions Seen by Outer Bolt Group		
Moment:	58.6	kip-ft
Axial:	7.4	kip
Shear:	4.6	kip

Outer Bolt Capacity Check		
Max Tension:	9.0	kip
Allowable Tension:	46.1	kip
Max Shear:	0.4	kip
Allowable Shear:	23.0	kip
Bolt Capacity	19.6%	Pass

Inner Bolt Group Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Inner Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data		
Quantity:	3	
Type:	Write In	
Circle:	34.50	in
Individual Area:	5.00	in^2
BS #1 Group Area:	15.00	in^2
BS #1 Group MOIx:	2232	in^4

Reactions Seen by BS #1 Group		
Moment:	188.7	kip-ft
Axial:	0.0	kip
Shear:	7.4	kip

BS #1 Capacity Check		
Max Tension:	87.5	kip
Max Compression:	43.7	kip
Allowable Axial:	133.7	kip
Max Shear:	1.5	kip
Allowable Shear:	100.0	kip
Bolt Capacity	65.4%	Pass

BS #1 Upper Weld Capacity		
Eccentricity (ex):	6.625	in
Weld Length (l):	18.0	in
Weld Factor (a):	0.368	
Weld Size (D):	4	16TH
Weld Coef. (C):	1.00	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	91.4%	Pass

BS #1 Lower Weld Capacity		
Eccentricity (ex):	6.625	in
Weld Length (l):	18.0	in
Weld Factor (a):	0.368	
Weld Size (D):	4	16TH
Weld Coef. (C):	1.00	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	91.4%	Pass

Bridge Stiffener #2 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #2 Group Area:	0.00	in^2
BS #2 Group MOIx:	0	in^4

Reactions Seen by BS #2 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #2 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

BS #2 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

BS #2 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Bridge Stiffener #3 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4

Reactions Seen by BS #3 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

BS #3 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

BS #3 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Rev.4.1

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *841291*
Site Name: *STONINGTON*
App #: *258642 R6*

Pole Manufacturer:	Other

Reactions		
Moment:	58.56531	ft-kips
Axial:	7.4126	kips
Shear:	4.6230872	kips
Elevation:	110	feet

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

Bolt Data			
Qty:	12		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	120	<-- Disregard	Bolt Fty: 44.00
N/A:	90	<-- Disregard	
Circle (in.):	24.25		

Plate Data		
Diam:	28.5	in
Thick, t:	1	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	5.69	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
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:	21.25	in
Thick:	1.056283	in
Grade:	36	ksi
# of Sides:	12	"0" IF Round
Fu	58	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07 kips
Max Bolt directly applied T:	9.04 Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	0.910 in
Min PL "treq" for actual **T w/ Pry:**	0.300 in
Min PL "t1" for actual **T w/o Pry:**	0.403 in
T allowable w/o Prying:	46.07 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	9.04 kips
Non-Prying Bolt Stress Ratio, T/B:	19.6% **Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	11.1 ksi
Allowable Plate Stress:	60.0 ksi
Compression Plate Stress Ratio:	18.5% **Pass**
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	9.0% **Pass**

n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a

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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *841291*
Site Name: *STONINGTON*
App #: *258642 R6*

Pole Manufacturer:	Other

Bolt Data			
Qty:	12		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	120	<-- Disregard	Bolt Fty: 44.00
N/A:	90	<-- Disregard	
Circle (in.):	24.25		

Plate Data		
Diam:	28.5	in
Thick, t:	1	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	5.69	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
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:	21.25	in
Thick:	1.242265	in
Grade:	36	ksi
# of Sides:	12	"0" IF Round
Fu	58	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	58.56531	ft-kips
Axial:	7.4126	kips
Shear:	4.6230872	kips
Elevation:	110	feet

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

Flange Bolt Results

Bolt Tension Capacity, B:	46.07 kips
Max Bolt directly applied T:	9.04 Kips
Min. PL "tc" for B cap. w/o Pry:	0.910 in
Min PL "treq" for actual T w/ Pry:	0.300 in
Min PL "t1" for actual T w/o Pry:	0.403 in
T allowable w/o Prying:	46.07 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	9.04 kips
Non-Prying Bolt Stress Ratio, T/B:	19.6% Pass

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	11.1 ksi
Allowable Plate Stress:	60.0 ksi
Compression Plate Stress Ratio:	18.5% Pass
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	9.0% Pass

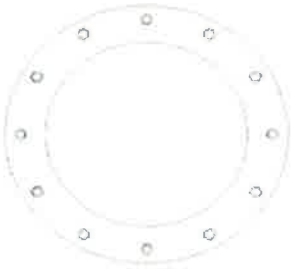
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a



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

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

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	841291
Name:	STONINGTON
App. #:	258642 R6

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Base Reactions		
Moment:	2219	ft-kip
Axial:	72	kip
Shear:	23	kip
Base Plate Type:	Square	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	100%
eta Factor:	0.50

Original Anchor Rod Data		
Quantity:	8	
Diameter:	2.25	in
Material:	A615 GR 75	
Bolt Circle:	44.0	in
Bolt Spacing:	6	in
Bolt Group Area:	31.81	in^2
Bolt Group MOIx:	7698	in^4

Reactions Seen by Original AR Group		
Moment:	1189.6	kip-ft
Axial:	72.4	kip
Shear:	23.4	kip

Original AR Capacity Check		
Tension Load:	151.7	kip
Allowable load:	194.8	kip
AR Capacity:	77.8%	Pass

First Added Anchor Rod Data		
Quantity:	8	
Diameter:	1.25	in
Material:	A615 GR 75	
Bolt Circle:	44.0	in
Bolt Group Area:	9.82	in^2
Bolt Group MOIx:	2376	in^4

Reactions Seen by First Added AR Group		
Moment:	367.2	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

First Added AR Capacity Check		
Tension Load:	50.1	kip
Allowable load:	58.1	kip
AR Capacity:	86.1%	Pass

Second Added Anchor Rod Data		
Quantity:	8	
Diameter:	1.50	in
Material:	F1554 GR 105	
Bolt Circle:	49.3	in
Bolt Group Area:	14.14	in^2
Bolt Group MOIx:	4286	in^4

Reactions Seen by Second Added AR Group		
Moment:	662.4	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	80.7	kip
Allowable load:	97.2	kip
AR Capacity:	83.1%	Pass

Third Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Rev.4.1

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
720-304-6882
www.AeroSolutionsLLC.com

Anchor Rod Embedment (v1.2)

Analysis Standard					
TIA Code:	*TIACode*	F			
Allowable Stress Increase:	*ASIF*	1.333			
Dimensions and Properties					
Pier Diameter:	*PierDia*	72	in		
Concrete Strength:	*Fc*	3000	psi		
Clear Cover, Side:	*cc.side*	2.5	in		
Clear Cover, Top:	*cc.top*	2.5	in		
Rebar Yield Strength:	*BarFy*	60	ksi		
Rebar Tie Size:	*TieSize*	4			
Rebar Tie Diameter:	*TieDia*	0.50	in		
Vertical Bar Quantity:	*BarQty*	48			
Vertical Bar Size:	*BarSize*	9			
Vertical Bar Diameter:	*BarDia*	1.128	in		
Vertical Bar Area:	*BarArea*	1.00	in		
Vertical Bar Circle Diameter:	*BarBC*	64.9	in		
Vertical Bar Spacing:	*BarSp*	4.2	in		
Vertical Bar Radial Angle Between:	*BarAngle*	7.5	deg		
Anchor Rod Type:	*RodType*	Other			
Anchor Rod Diameter:	*RodDia*	1.5	in		
Anchor Rod Threads per Inch:	*RodThreads*	6			
Anchor Rod Net Area Through Threads:	*RodArea*	1.41	sq in		
Anchor Rod Circle Diameter:	*RodBC*	49.25	in		
Anchor Rod Material:	*RodMatl*	1554 GR 105			
Anchor Rod Yield Strength:	*RodFy*	105	ksi		
Anchor Rod Ultimate Strength:	*RodFu*	125	ksi		
Anchor Rod Loading					
Anchor Rod Tensile Requirement:	*RodP*	97.2	kip		
Anchor Rod Design Criteria:	*DesCrit*	Analysis			
Development Length of Vertical Rebar					
Reinforcement Location Factor[1]:	*Alpha*	1.0		ACI 12.2.4	
Coating Factor[1]:	*Beta*	1.0		ACI 12.2.4	
Lightweight Aggregate Concrete Factor[1]:	*Lambda*	1.0		ACI 12.2.4	
Reinforcement Size Factor[1]:	*Gamma*	1.0		ACI 12.2.4	
Transverse Reinforcement Ratio[2]:	*Ktr*	0.0	in	ACI 12.2.4	
Maximum Spacing or Cover Dimension:	*Cover*	2.12	in	ACI 12.2.4	
Development Length:	*Ld*	49.3	in	ACI 12.2.3	
Reinforcment Stress Ratio[3]:	*SR*	0.49			
Reduced Development Length:	*Ld.red*	24.2	in	ACI 12.2.5	Used only if DesCrit = "Analysis"
Force Transfer Length					
Angle to Vertical Bar:	*Angle*	3.8	deg		
Distance to Farthest Bar:	*BarDist*	8.0	in		
Epoxy Bond					
Epoxy Ultimate Bond Stress:	*EpoxyBond*	1800	psi		
Factor of Safety:	*EpoxyFS*	3			
Bond Length Required:	*EpoxyL*	34.4	in		
Embedment Length					
Total Required Embedment Length:	*EmbedIn*	**42**	**in**	**Epoxy Length Controls**	
	EmbedFt	**3.5**	**ft**		
Actual Embedment length:	*ActEmbed*	5.0	ft		
Embedment Capacity	*EmbedCap*	**70.4%**			

Notes:
(1) These factors are typically 1.0 for most tower foundations.
(2) This factor is typically 0 inches for most tower foundations.
(3) Stress ratio of reinforcement can be entered to reduce required development length. Only to be used in already installed desperate situations.
(4) This is consistent with on CCI Foundations Criteria Item AC-1, dated 06/01/2010.

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
720-304-6882
www.AeroSolutionsLLC.com

Anchor Rod Embedment (v1.2)

Analysis Standard					
TIA Code:	*TIACode*	F			
Allowable Stress Increase:	*ASIF*	1.333			
Dimensions and Properties					
Pier Diameter:	*PierDia*	72	in		
Concrete Strength:	*Fc*	3000	psi		
Clear Cover, Side:	*cc.side*	2.5	in		
Clear Cover, Top:	*cc.top*	2.5	in		
Rebar Yield Strength:	*BarFy*	60	ksi		
Rebar Tie Size:	*TieSize*	4			
Rebar Tie Diameter:	*TieDia*	0.50	in		
Vertical Bar Quantity:	*BarQty*	48			
Vertical Bar Size:	*BarSize*	9			
Vertical Bar Diameter:	*BarDia*	1.128	in		
Vertical Bar Area:	*BarArea*	1.00	in		
Vertical Bar Circle Diameter:	*BarBC*	64.9	in		
Vertical Bar Spacing:	*BarSp*	4.2	in		
Vertical Bar Radial Angle Between:	*BarAngle*	7.5	deg		
Anchor Rod Type:	*RodType*	Other			
Anchor Rod Diameter:	*RodDia*	1.25	in		
Anchor Rod Threads per Inch:	*RodThreads*	7			
Anchor Rod Net Area Through Threads:	*RodArea*	0.97	sq in		
Anchor Rod Circle Diameter:	*RodBC*	44	in		
Anchor Rod Material:	*RodMatl*	A615-75			
Anchor Rod Yield Strength:	*RodFy*	75	ksi		
Anchor Rod Ultimate Strength:	*RodFu*	100	ksi		
Anchor Rod Loading					
Anchor Rod Tensile Requirement:	*RodP*	54.0	kip		
Anchor Rod Design Criteria:	*DesCrit*	Analysis			
Development Length of Vertical Rebar					
Reinforcement Location Factor[1]:	*Alpha*	1.0		ACI 12.2.4	
Coating Factor[1]:	*Beta*	1.0		ACI 12.2.4	
Lightweight Aggregate Concrete Factor[1]:	*Lambda*	1.0		ACI 12.2.4	
Reinforcement Size Factor[1]:	*Gamma*	1.0		ACI 12.2.4	
Transverse Reinforcement Ratio[2]:	*Ktr*	0.0	in	ACI 12.2.4	
Maximum Spacing or Cover Dimension:	*Cover*	2.12	in	ACI 12.2.4	
Development Length:	*Ld*	49.3	in	ACI 12.2.3	
Reinforcment Stress Ratio[3]:	*SR*	0.49			
Reduced Development Length:	*Ld.red*	24.2	in	ACI 12.2.5	Used only if DesCrit = "Analysis"
Force Transfer Length					
Angle to Vertical Bar:	*Angle*	3.8	deg		
Distance to Farthest Bar:	*BarDist*	10.6	in		
Epoxy Bond					
Epoxy Ultimate Bond Stress:	*EpoxyBond*	1800	psi		
Factor of Safety:	*EpoxyFS*	3			
Bond Length Required:	*EpoxyL*	22.9	in		
Embedment Length					
Total Required Embedment Length:	*EmbedIn*	**39**	**in**	**Rebar Length Controls**	
	EmbedFt	**3.3**	**ft**		
Actual Embedment length:	*ActEmbed*	5.0	ft		
Embedment Capacity	*EmbedCap*	**65.8%**			

Notes:
(1) These factors are typically 1.0 for most tower foundations.
(2) This factor is typically 0 inches for most tower foundations.
(3) Stress ratio of reinforcement can be entered to reduce required development length. Only to be used in already installed desperate situations.
(4) This is consistent with on CCI Foundations Criteria Item AC-1, dated 06/01/2010.

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

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#: *841291*
Site Name: *STONINGTON*
App #: *258642 R6*

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	44	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	44	in
Thick:	2.75	in
Grade:	60	ksi
Clip Distance:	0	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:	37.38	in
Thick:	1.694683	in
Grade:	36	ksi
# of Sides:	12	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	1189.623	ft-kips
Unfactored Axial, P:	72.3895	kips
Unfactored Shear, V:	23.393488	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	153.2 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	78.6% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	33.7 ksi
Allowable PL Bending Stress:	60.0 ksi
Base Plate Stress Ratio:	56.1% **Pass**

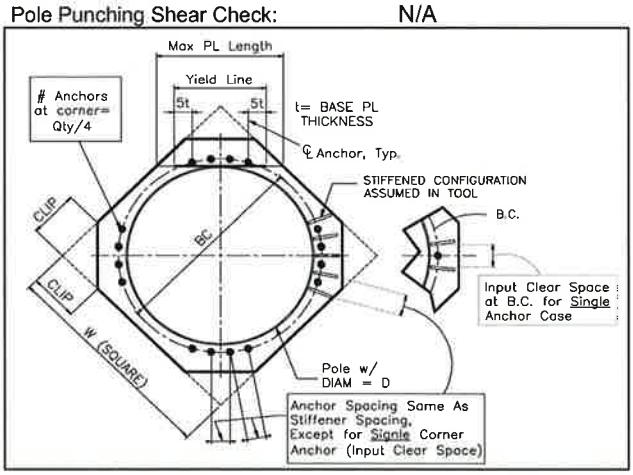
N/A - Unstiffened

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#: *841291*
Site Name: *STONINGTON*
App #: *258642 R6*

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:	0	in
Pier Dist. Above Grade:	1	in
Pad Bearing Depth, D:	8	ft
Pad Thickness, T:	3.5	ft
Pad Width=Length, L:	22	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	6	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	36.00	ft^2
Pier Height:	4.58	ft
Soil (above pad) Height:	4.50	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	18.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	38.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	13.50	ksf
Passive Pres. Coeff., Kp	4.20	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	31.6	kips
Pad Force Location Above D:	1.59	ft
ϕ(Passive Pressure Moment):	50.11	ft-kips
Factored O.T. M(WL), "1.6W":	3251.2	ft-kips
Factored OT (MW-Msoil), M1	3201.11	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	3.52	ft
Sum of Soil Wedges Wt:	45.40	kips
Soil Wedges ecc, K1:	9.68	ft
Ftg+Soil above Pad wt:	530.9	kips
Unfactored (Total ftg-soil Wt):	576.25	kips
1.2D. **No Soil Wedges.**	723.89	kips
0.9D. **With Soil Wedges**	583.77	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:	72.3895	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	23.39349	kips
Unfactored WL Moment, M:	2219.211	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	86.8674	kips
0.90	0.9D+1.6W, Pu:	65.15055	kips
1.35	Vu:	31.58121	kips
	Mu:	2995.935	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	723.89	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	3201.11	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	4.42	ft
Orthogonal qu=	2.70	ksf
qu/ϕ*qn Ratio=	**19.99%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	3.13	ft
Diagonal qu=	2.92	ksf
qu/ϕ*qn Ratio=	**21.62%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	583.77	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	2805.44	ft-kips

Orthogonal ecc3 = M2/P2 =	4.81	ft
Ortho Non Bearing Length,NBL=	9.61	ft
Orthogonal qu=	2.26	ksf
Diagonal qu=	2.53	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	2219.21		
M Orthogonal:	4543.98	**48.84%**	**Pass**
M Diagonal:	4543.98	**48.84%**	**Pass**

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *841291*
Site Name: *STONINGTON*
App #: *258642 R6*

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	6.0	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	2.50	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	5.41	ft
Vert. Cage Diameter =	64.87	in
Vertical Bar Size =	9	
Bar Diameter =	1.13	in
Bar Area =	1	in^2
Number of Bars =	48	
As Total=	48	in^2
A s/ Aconc, Rho:	0.0118	1.18%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	1.18%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	6832.77	kips
at Mu=(ϕ=0.65)Mn=	3541.21	ft-kips
Max Tu, (φ=0.9) Tn =	2592	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2326.431	ft-kips **(* Note)**
Max. Service Shaft P:	72.3895	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.30	Mu:	3024.36	ft-kips
1.30	Pu:	94.10635	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

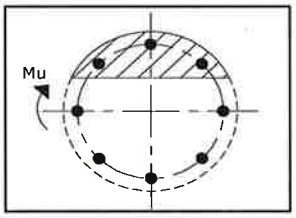
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

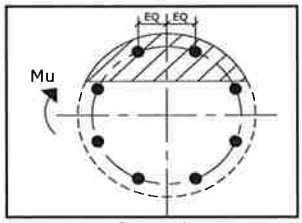
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**16.23**	in
Extreme Steel Strain, εt:	**0.0096**	
εt > 0.0050, Tension Controlled		
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	94.11	kips
Drilled Shaft Moment Capacity, φMn:	**6165.07**	ft-kips
Drilled Shaft Superimposed Mu:	**3024.36**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**49.1%**