ROBINSON & COLE LLP

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

February 21, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
128 Mather Street, Wilton, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 163-foot level of the existing 180-foot self-supporting lattice tower at 128 Mather Street in Wilton, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of the existing tower in 1988. Cellco now intends to modify its facility by adding three (3) model 742 213V01, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 163-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's additional antennas, RRHs and HYBRIFLEX™ 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 William F. Brennan, First Selectman for the Town of Wilton. The Town of Wilton is 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. The new antennas and RRHs will be located at the 163-foot level on the 180-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 modified facility 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 worst-case RF emissions calculation 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:
William F. Brennan, Wilton First Selectman
Sandy M. Carter

ATTACHMENT 1

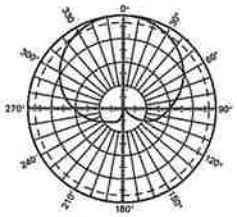
KATHREIN
SCALA DIVISION

742 213V01

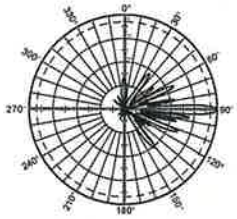
65° Panel Antenna

Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled downtilt is available as a retrofitable option.

- 0-6° downtilt range.
- UV resistant pulltruded fiberglass radome.
- DC Grounded metallic parts for impulse suppression.
- No moving electrical connections.
- Wideband vector dipole technology.
- Optional remote downtilt Control.
- Will accomodate future 3G / UMTS applications.



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–6° electrical downtilt

General specifications:

Frequency range	1710–2200 MHz
VSWR	< 1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Front-to-back ratio (180°±30°)	>30 dB (co-polar) >25 dB (total power)
Maximum input power	300 watts per input (at 50°C)
Electrical downtilt continuously adjustable	0–6 degrees
Connector	2 x 7-16 DIN female
Isolation	>30 dB
Cross polar ratio Main direction 0° Sector ±60°	 25 dB (typical) >10 dB
Tracking, average	0.5 dB
Squint	±2.0°
Weight	19.8 lb (9 kg) 24.3 lb (11 kg) clamps included
Dimensions	76.9 x 6.1 x 2.8 inches (1954 x 155 x 70 mm)
Wind load Front/Side/Rear Mounting category	at 93 mph (150kph) 115 lbf / 32 lbf / 115 lbf (510 N) / (140 N) / (510 N) M (Medium)
Wind survival rating*	120 mph (200 kph)
Shipping dimensions	88 x 6.8 x 3.6 inches (2235 x 172 x 92 mm)
Shipping weight	28.7 lb (13 kg)
Mounting	Fixed mounts for 2 to 4.6 inch (50 to 115 mm) OD masts are included and tilt options are available.
See reverse for order information.	

Specifications:	**1710–1880 MHz**	**1850–1990 MHz**	**1920–2200 MHz**
Gain	19 dBi	19.2 dBi	19.5 dBi
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	4.7° (half-power)	4.5° (half-power)	4.3° (half-power)
Sidelobe suppression for first sidelobe above main beam	0° 2° 4° 6° T 18 18 16 15 dB	0° 2° 4° 6° T 18 18 17 16 dB	0° 2° 4° 6° T 18 18 18 18 dB

RoHS
Lead-Free

*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.

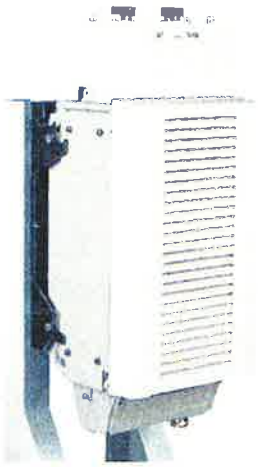
11271-B
936.3740/b

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

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS 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-AWS 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-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS 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-AWS 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-AWS 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-AWS is compact and weighs less than 20 kg (44 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

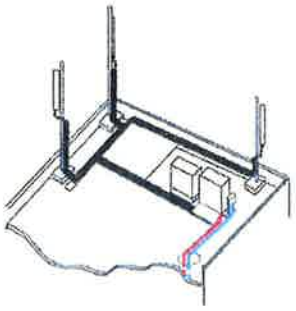
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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-AWS provides more RF power while at the same time consuming less electricity.

Features

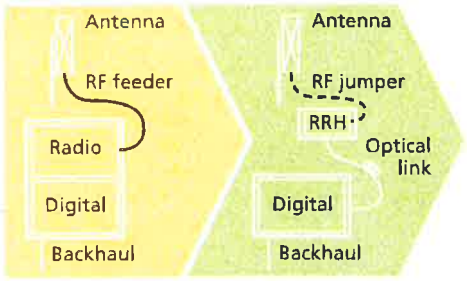
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

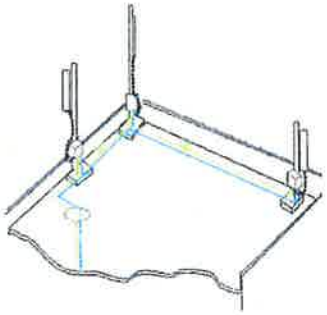
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

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: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - ¬ TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - ¬ One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - ¬ Single mode dual fiber (SM/DF)
- Multi-mode variant
  - ¬ Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

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

Digital Ports and Alarms

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

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[3] 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-95-658 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)

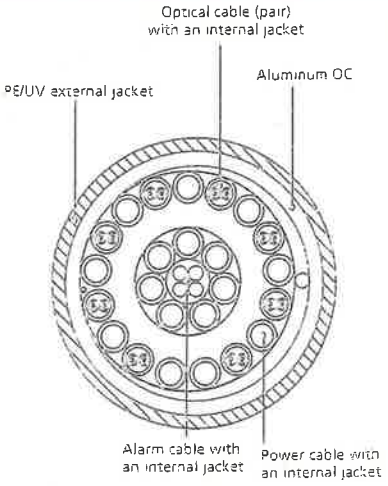


Figure 2: Construction Detail

¹ This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Wilton								
Tower Height: Verizon @ 163ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	1	500	153	0.0077	880	0.5867	1.31%	
*AT&T UMTS	1	500	153	0.0077	1900	1.0000	0.77%	
*AT&T GSM	6	296	153	0.0273	880	0.5867	4.65%	
*AT&T LTE	1	500	153	0.0077	740	0.4933	1.56%	
*MetroPCS	3	443.61	169	0.0168	2140	1.0000	1.68%	
*Sprint CDMA/LTE	2	778	144	0.0270	1970	1.0000	2.70%	
*Sprint CDMA/LTE	1	438	144	0.0076	850	0.5667	1.34%	
*Nextel	9	100	180	0.0100	851	0.5673	1.76%	
*VoiceStream	4	471	96	0.0735	1930	1.0000	7.35%	
*Town							4.62%	
Verizon	**15**	**300**	**163**	**0.0609**	**1970**	**1.0000**	**6.09%**	
Verizon	**9**	**262**	**163**	**0.0319**	**869**	**0.5793**	**5.51%**	
Verizon	**1**	**1750**	**163**	**0.0237**	**2145**	**1.0000**	**2.37%**	
Verizon	**1**	**482**	**163**	**0.0065**	**698**	**0.4653**	**1.40%**	
								43.10%
* Source: Siting Council								

ATTACHMENT 3

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **January 28, 2014**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704.405.6607

Paul J Ford and Company
250 E. Broad St, Suite 600
Columbus, OH 43215
614.221.6679
dcuffman@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Wilton, CT
Crown Castle Designation:	**Crown Castle BU Number:**	806353
	Crown Castle Site Name:	BRG 124 943066
	Crown Castle JDE Job Number:	255389
	Crown Castle Work Order Number:	704386
	Crown Castle Application Number:	210388 Rev. 4
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37514-0096_Rev1
Site Data:	**128 MATHER STREET, WILTON, Fairfield County, CT**	
	Latitude *41° 14' 18.34"*, Longitude *-73° 25' 26.44"*	
	180 Foot - Self Support Tower	

Dear Charles McGuirt,

Paul J Ford and Company is pleased to submit this **"Structural Analysis Report"** to assess 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 612107, in accordance with application 210388, 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:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2005 Connecticut State Building Code based upon 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.

We at *Paul J Ford and Company* 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.

Respectfully submitted by:

Daniel S. Cuffman, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180-ft Self Support tower designed by FWT INC. in May of 1988. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E. The tower and foundation have been previously modified.

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
162.0	163.0	3	alcatel lucent	RRH2X40-AWS	7	1-5/8	1
		3	kathrein	742 213 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) Proposed Equipment

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
178.0	184.0	1	rfs celwave	PD10017	2	7/8	
177.0	183.0	12	decibel	DB844H90E-XY w/ Mount Pipe	12	1-1/4	
	177.0	1	tower mounts	Sector Mount [SM 307-3]			
170.0	171.0	3	kathrein	800 10504 w/ Mount Pipe	6	1-5/8	
	170.0	3	kathrein	860 10025			
		1	tower mounts	Side Arm Mount [SO 103-3]			1
162.0	163.0	6	rfs celwave	APL868013-42T0 w/ Mount Pipe	6	1-5/8	
		3	rfs celwave	APX75-866512-CT2 w/ Mount Pipe			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
	162.0	6	rfs celwave	FD9R6004/2C-3L			
		-	-	-	6	1-1/4	2
		1	tower mounts	Sector Mount [SM 602-3]	-	-	
154.0	158.0	6	ericsson	RRUS-11	12 2 1	1-5/8 5/8 3/8	
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21901			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
	154.0	1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Sector Mount [SM 602-3]			
146.0	146.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	-	-	
		3	alcatel lucent	TME-800MHZ 2X50W RRH			1
143.0	143.0	3	alcatel lucent	TME-PCS 1900 MHz 4x45W-65MHz	3	1-1/4	
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 701-3]			
124.0	131.0	2	rfs celwave	1142-2C	2	½	
	124.0	2	tower mounts	Side Arm Mount [SO 306-1]			
104.0	111.0	1	rfs celwave	1142-2C	1 1	7/8 1/2	
	108.0	1	rfs celwave	220-3BN			
	104.0	2	tower mounts	Side Arm Mount [SO 306-1]			
93.0	93.0	3	ems wireless	RR90-17-02DP w/ Mount Pipe	6 1	1-1/4 5/16	
		6	remec	S20057A1			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		1	tower mounts	Side Arm Mount [SO 308-3]			
62.0	65.0	1	gps	GPS_A	1	1/2	1
	62.0	1	tower mounts	Side Arm Mount [SO 301-1]			
42.0	44.0	1	gps	GPS_A	1	1/2	
	42.0	1	tower mounts	Side Arm Mount [SO 301-1]			
31.0	32.0	1	gps	GPS_A	1	1/2	
	31.0	1	tower mounts	Side Arm Mount [SO 301-1]			

Notes:
1) Existing Equipment
2) Equipment to be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
GEOTECHNICAL REPORTS	FDH, 09-04219E G1 - 4/29/2009	262283	CCISITES
POST-MODIFICATION INSPECTION	Paul J. Ford, 37509-0801 - 1/11/2010	2575710	CCISITES
TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FWT, 18888-81 - 5/31/1988	262285	CCISITES
TOWER MANUFACTURER DRAWINGS	FWT, 18888-81 - 5/6/1988	217757	CCISITES
TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Paul J. Ford, 37509-0801 - 12/8/2009	2434484	CCISITES
TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	HEB, 98124A - 1/7/2000	3290324	CCISITES
TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	APT, CT105271 - 1/17/2003	801524	CCISITES
FOUNDATION MAPPING	FDH, 09-11077 E N1 - 8/7/2012	-	-

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.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 168	Leg	Pipe 2.375" x 0.154" (2 STD)	2	-11.43	24.25	47.1	Pass
T2	168 - 160	Leg	Pipe 2.375" x 0.154" (2 STD) (GR)	26	-24.26	35.52	68.3	Pass
T3	160 - 140	Leg	Pipe 3.5" x 0.216" (3 STD) (GR)	40	60.76	62.38	97.4	Pass
T4	140 - 120	Leg	Pipe 4" x 0.318" (3.5 XS) (GR)	67	-106.71	112.76	94.6	Pass
T5	120 - 100	Leg	Pipe 4.5" x 0.337" (4 XS) (GR)	88	122.56	123.38	99.3	Pass
T6	100 - 80	Leg	Pipe 5.563" x 0.375" (5 XS) (GR)	109	147.02	171.09	85.9	Pass
T7	80 - 60	Leg	Pipe 6.625" x 0.432" (6 XS) (GR)	130	167.46	235.28	71.2	Pass
T8	60 - 40	Leg	Pipe 6.625" x 0.432" (6 XS) (GR)	145	188.27	235.28	80.0	Pass
T9	40 - 20	Leg	Pipe 6.625" x 0.432" (6 XS) (GR)	162	207.66	235.28	88.3	Pass
T10	20 - 0	Leg	Pipe 8.625" x 0.500" (8 XS) (GR)	181	226.67	357.27	63.4	Pass
T1	180 - 168	Diagonal	L 2 x 1.5 x 3/16 LLV	10	-1.98	11.64	17.0	Pass
T2	168 - 160	Diagonal	L 2 x 1.5 x 3/16 LLV	28	-3.36	11.64	28.8	Pass
T3	160 - 140	Diagonal	L 2 x 1.5 x 3/16 LLV	43	-4.85	8.26	58.8	Pass
T4	140 - 120	Diagonal	L 2 x 2 x 3/16	70	-5.05	7.23	69.8	Pass
T5	120 - 100	Diagonal	L 2.5 x 2 x 3/16 LLV	91	-5.03	7.03	71.5	Pass
T6	100 - 80	Diagonal	L 2.5 x 2.5 x 3/16	112	-5.26	7.87	66.8	Pass
T7	80 - 60	Diagonal	L 3 x 3 x 3/16	133	-6.28	8.53	73.6	Pass
T8	60 - 40	Diagonal	L 3.5 x 3 x 1/4 LLV	148	-6.65	11.26	59.1	Pass
T9	40 - 20	Diagonal	L 3.5 x 3 x 1/4 LLV	163	-7.50	9.07	82.7	Pass
T10	20 - 0	Diagonal	L 3.5 x 3.5 x 1/4	184	-7.93	10.44	76.0	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-4.20	15.70	26.8	Pass
T1	180 - 168	Top Girt	L 2 x 2 x 3/16	6	-0.25	10.59	2.3	Pass
							Summary	
						Leg (T5)	99.3	Pass
						Diagonal (T9)	82.7	Pass
						Secondary Horizontal (T9)	26.8	Pass
						Top Girt (T1)	2.3	Pass
						Bolt Checks	92.3	Pass
						Rating =	99.3	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
-	Anchor Rods	-	83.8	Pass
1	Base Foundation	-	53.8	Pass
1	Base Foundation Soil Interaction	-	74.6	Pass
Structure Rating (max from all components) =				**99.3%**

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

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

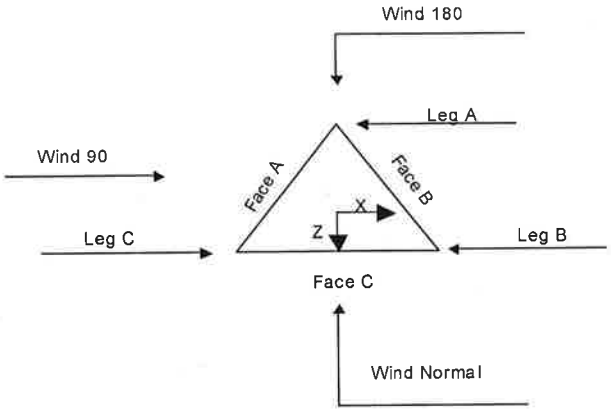
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 20.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

2) Tower is located in Fairfield County, Connecticut.
3) Basic wind speed of 85 mph.
4) Nominal ice thickness of 0.75 in.
5) Ice thickness is considered to increase with height.
6) Ice density of 56 pcf.
7) A wind speed of 38 mph is used in combination with ice.
8) Deflections calculated using a wind speed of 50 mph.
9) A non-linear (P-delta) analysis was used.
10) Grouted pipe f'_c is 7 ksi.
11) Pressures are calculated at each section.
12) Stress ratio used in tower member design is 1.333.

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	



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-168.00			4.00	1	12.00
T2	168.00-160.00			4.00	1	8.00
T3	160.00-140.00			4.00	1	20.00
T4	140.00-120.00			6.00	1	20.00
T5	120.00-100.00			8.00	1	20.00
T6	100.00-80.00			10.00	1	20.00
T7	80.00-60.00			12.00	1	20.00
T8	60.00-40.00			14.00	1	20.00
T9	40.00-20.00			16.00	1	20.00
T10	20.00-0.00			18.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-168.00	4.00	X Brace	No	No	0.00	0.00
T2	168.00-160.00	4.00	X Brace	No	No	0.00	0.00
T3	160.00-140.00	5.00	X Brace	No	No	0.00	0.00
T4	140.00-120.00	6.67	X Brace	No	No	0.00	0.00
T5	120.00-100.00	6.67	X Brace	No	No	0.00	0.00
T6	100.00-80.00	6.67	X Brace	No	No	0.00	0.00
T7	80.00-60.00	10.00	X Brace	No	No	0.00	0.00
T8	60.00-40.00	10.00	X Brace	No	No	0.00	0.00
T9	40.00-20.00	10.00	X Brace	No	Yes	0.00	0.00
T10	20.00-0.00	10.00	X Brace	No	No	0.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-168.00	Pipe	Pipe 2.375" x 0.154" (2 STD)	A53-B-35 (35 ksi)	Single Angle	L 2 x 1.5 x 3/16 LLV	A36 (36 ksi)
T2 168.00-160.00	Grouted Pipe	Pipe 2.375" x 0.154" (2 STD)	A53-B-35 (35 ksi)	Single Angle	L 2 x 1.5 x 3/16 LLV	A36 (36 ksi)
T3 160.00-140.00	Grouted Pipe	Pipe 3.5" x 0.216" (3 STD)	A53-B-35 (35 ksi)	Single Angle	L 2 x 1.5 x 3/16 LLV	A36 (36 ksi)
T4 140.00-120.00	Grouted Pipe	Pipe 4" x 0.318" (3.5 XS)	A53-B-35 (35 ksi)	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)
T5 120.00-100.00	Grouted Pipe	Pipe 4.5" x 0.337" (4 XS)	A53-B-35 (35 ksi)	Single Angle	L 2.5 x 2 x 3/16 LLV	A36 (36 ksi)
T6 100.00-80.00	Grouted Pipe	Pipe 5.563" x 0.375" (5 XS)	A53-B-35 (35 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T7 80.00-60.00	Grouted Pipe	Pipe 6.625" x 0.432" (6 XS)	A53-B-35 (35 ksi)	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)
T8 60.00-40.00	Grouted Pipe	Pipe 6.625" x 0.432" (6 XS)	A53-B-35 (35 ksi)	Single Angle	L 3.5 x 3 x 1/4 LLV	A36 (36 ksi)
T9 40.00-20.00	Grouted Pipe	Pipe 6.625" x 0.432" (6 XS)	A53-B-35 (35 ksi)	Single Angle	L 3.5 x 3 x 1/4 LLV	A36 (36 ksi)
T10 20.00-0.00	Grouted Pipe	Pipe 8.625" x 0.500" (8 XS)	A53-B-35 (35 ksi)	Single Angle	L 3.5 x 3.5 x 1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-168.00	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T9 40.00-20.00	Single Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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
T1 180.00-168.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T2 168.00-160.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T3 160.00-140.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T4 140.00-	0.00	0.38	A36	1	1	1	0.00	0.00

Tower Elevation ft	Gusset Area (per face) ft²	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
120.00			(36 ksi)					
T5 120.00-100.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T6 100.00-80.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T7 80.00-60.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T8 60.00-40.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T9 40.00-20.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00
T10 20.00-0.00	0.00	0.38	A36 (36 ksi)	1	1	1	0.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 180.00-168.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 168.00-160.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 160.00-140.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 140.00-120.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 120.00-100.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 100.00-80.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T7 80.00-60.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T8 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T9 40.00-20.00	No	No	1	1	1	1	1	1	1	1	1	0.5	0.5	1	1
T10 20.00-0.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 180.00-168.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 168.00-160.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 160.00-140.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T4 140.00-120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 120.00-100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 100.00-80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 80.00-60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T8 60.00-40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T9 40.00-20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T10 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 180.00-168.00	4.50	4.19	4.50	4.19	0.00	0.00	0.00	0.00
T2 168.00-160.00	4.50	4.19	4.50	4.19	0.00	0.00	0.00	0.00
T3 160.00-140.00	4.60	4.75	4.60	4.75	0.00	0.00	0.00	0.00
T4 140.00-120.00	4.50	5.00	4.00	5.00	0.00	0.00	0.00	0.00
T5 120.00-100.00	3.50	5.25	3.50	5.25	0.00	0.00	0.00	0.00
T6 100.00-80.00	2.50	5.78	2.50	5.78	0.00	0.00	0.00	0.00
T7 80.00-60.00	4.00	6.31	4.00	6.31	0.00	0.00	0.00	0.00
T8 60.00-40.00	4.00	6.31	4.00	6.31	0.00	0.00	0.00	0.00
T9 40.00-20.00	3.90	6.31	3.90	6.31	0.00	0.00	0.00	0.00
T10 20.00-0.00	4.00	7.31	4.00	7.31	0.00	0.00	0.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-168.00	Flange	0.00 A325N	0	0.63 A325N	1	0.63 A325N	1	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T2 168.00-160.00	Flange	0.00 A325N	0	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T3 160.00-140.00	Flange	0.63 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T4 140.00-120.00	Flange	0.75 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T5 120.00-100.00	Flange	0.88 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T6 100.00-80.00	Flange	0.88 A490N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T7 80.00-60.00	Flange	1.00 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T8 60.00-40.00	Flange	1.13 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0
T9 40.00-20.00	Flange	1.13 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.50 A325N	1
T10 20.00-0.00	Flange	1.50 F1554-36	6	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.00 A325N	0

Grouted Pipe Properties

Size	F_y ksi	A_s in^2	A_c in^2	Wt plf	E_c ksi	E_m ksi	F_{ym} ksi
Pipe 2.375" x 0.154" (2 STD) (GR)	35	1.07	3.36	10.65	4769	40914	54
Pipe 3.5" x 0.216" (3 STD) (GR)	35	2.23	7.39	22.98	4769	41656	55
Pipe 4" x 0.318" (3.5 XS) (GR)	35	3.68	8.89	31.03	4769	38218	49
Pipe 4.5" x 0.337" (4 XS) (GR)	35	4.41	11.50	38.95	4769	38952	51
Pipe 5.563" x 0.375" (5 XS) (GR)	35	6.11	18.19	58.70	4769	40357	53
Pipe 6.625" x 0.432" (6 XS) (GR)	35	8.40	26.07	82.91	4769	40832	53
Pipe 8.625" x 0.500" (8 XS) (GR)	35	12.76	45.66	138.56	4769	42650	56

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
2" flat Cable Ladder Rail	C	Yes	Af (CfAe)	180.00 - 5.00	0.00	0	2	2	2.00	2.00	7.00	2.12
5/8" ladder rung (12" long 12" oc)	C	Yes	Ar (CfAe)	180.00 - 5.00	0.00	0	1	1	0.63	0.63		1.04
Safety Line 3/8 ***	C	Yes	Ar (CfAe)	180.00 - 5.00	3.00	0	1	1	0.38	0.38		0.22
1.5" flat Cable Ladder Rail	A	Yes	Af (CfAe)	180.00 - 5.00	0.00	0	2	2	48.00 1.50	1.50	6.00	1.80
FSJ4-50B(1/2")	A	Yes	Ar (CfAe)	42.00 - 5.00	0.00	-0.1	4	4	0.52	0.52		0.14
LDF4-	A	Yes	Ar (CfAe)	62.00 - 42.00	0.00	-0.1	3	3	0.63	0.63		0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
50A(1/2")												
LDF4-50A(1/2")	A	Yes	Ar (CfAe)	124.00 - 62.00	0.00	-0.1	2	2	0.63	0.63		0.15
HB114-1-0813U4-M5J(1 1/4")	A	Yes	Ar (CfAe)	143.00 - 5.00	0.00	-0.075	3	3	1.50 0.50	1.54		1.20
LDF5-50A(7/8")	A	Yes	Ar (CfAe)	178.00 - 5.00	0.00	-0.05	2	1	1.09	1.09		0.33
561(1-5/8")	A	Yes	Ar (CfAe)	162.00 - 5.00	0.00	0	6	2	1.00 0.50	1.63		1.35
HB158-1-08U8-S8J18(1-5/8) ***	A	Yes	Ar (CfAe)	162.00 - 5.00	0.00	0.075	7	4	1.00 0.50	1.98		1.30
1.5" flat Cable Ladder Rail	B	Yes	Af (CfAe)	54.00 - 5.00	0.00	0.12	2	2	36.00 1.50	1.50	6.00	1.80
1.5" flat Cable Ladder Rail	B	Yes	Af (CfAe)	93.00 - 5.00	0.00	0.38	2	2	36.00 1.50	1.50	6.00	1.80
LDF6-50A(1-1/4")	B	Yes	Ar (CfAe)	93.00 - 5.00	0.00	0.15	6	6	1.55 0.50	1.55		0.66
860-10025(5/16)	B	Yes	Ar (CfAe)	93.00 - 5.00	0.00	0.1	1	1	0.31	0.31		0.00
LCF158-50JA-A0(1 5/8")	B	Yes	Ar (CfAe)	154.00 - 5.00	0.00	0.35	12	6	1.00 0.50	1.98		0.08
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	104.00 - 5.00	0.00	0.4	1	1	0.63	0.63		0.15
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	104.00 - 5.00	0.00	0.41	1	1	1.09	1.09		0.33
2" Conduit (1 1/2" EMT)	B	Yes	Ar (CfAe)	104.00 - 5.00	0.00	0.43	1	1	1.74	1.74		1.16
FB-L98B-002-75000(3/8")	B	Yes	Ar (CaAa)	154.00 - 5.00	0.00	0.43	1	1	0.39	0.39		0.06
WR-VG82ST-BRDA(5/8") ***	B	Yes	Ar (CaAa)	154.00 - 5.00	0.00	0.43	2	2	0.65	0.65		0.31
1.5" flat Cable Ladder Rail	C	Yes	Af (CfAe)	180.00 - 5.00	-1.00	-0.35	4	2	36.00 1.50	1.50	6.00	1.80
LDF6-50A(1-1/4")	C	Yes	Ar (CfAe)	177.00 - 5.00	-5.00	-0.35	12	4	1.55 0.50	1.55		0.66
CR 50 1873PE(1-5/8")	C	Yes	Ar (CfAe)	170.00 - 5.00	0.00	-0.35	6	4	1.00 0.50	1.98		0.83
LDF4-50A(1/2") ***	C	Yes	Ar (CfAe)	31.00 - 5.00	-1.00	-0.32	1	1	0.63	0.63		0.15

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
PD10017	A	From Leg	0.50 0 6	0.000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.11 5.64 7.19 10.32 14.45	4.11 5.64 7.19 10.32 14.45	0.03 0.06 0.09 0.20 0.54
***									
(4) DB844H90E-XY w/ Mount Pipe	A	From Leg	4.00 0 6	0.000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	4.92 5.60 6.28 7.71 10.83	0.03 0.07 0.12 0.23 0.56
(4) DB844H90E-XY w/ Mount Pipe	B	From Leg	4.00 0 6	0.000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	4.92 5.60 6.28 7.71 10.83	0.03 0.07 0.12 0.23 0.56
(4) DB844H90E-XY w/ Mount Pipe	C	From Leg	4.00 0 6	0.000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.30 3.69 4.12 5.01 6.92	4.92 5.60 6.28 7.71 10.83	0.03 0.07 0.12 0.23 0.56
Sector Mount [SM 307-3]	A	None		0.000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	26.22 36.28 46.34 66.46 106.70	26.22 36.28 46.34 66.46 106.70	1.62 2.15 2.68 3.73 5.85
***									
800 10504 w/ Mount Pipe	A	From Leg	2.00 0 1	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	B	From Leg	2.00 0 1	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	C	From Leg	2.00 0 1	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
860 10025	A	From Leg	2.00 0 0	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.23 0.30 0.48 0.93	0.14 0.20 0.27 0.44 0.88	0.00 0.00 0.01 0.01 0.05
860 10025	B	From Leg	2.00 0 0	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.16 0.23 0.30 0.48 0.93	0.14 0.20 0.27 0.44 0.88	0.00 0.00 0.01 0.01 0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							4" Ice			
860 10025	C	From Leg	2.00	0	0.000	170.00	No Ice	0.16	0.14	0.00
							1/2" Ice	0.23	0.20	0.00
							1" Ice	0.30	0.27	0.01
							2" Ice	0.48	0.44	0.01
							4" Ice	0.93	0.88	0.05
Side Arm Mount [SO 103-3]	A	None			0.000	170.00	No Ice	9.50	9.50	0.22
							1/2" Ice	11.80	11.80	0.32
							1" Ice	14.10	14.10	0.41
							2" Ice	18.70	18.70	0.60
							4" Ice	27.90	27.90	0.97
***										
(2) APL868013-42T0 w/ Mount Pipe	A	From Leg	4.00	0	0.000	162.00	No Ice	2.87	3.73	0.02
				1			1/2" Ice	3.18	4.10	0.05
							1" Ice	3.52	4.48	0.07
							2" Ice	4.27	5.25	0.15
							4" Ice	5.88	6.91	0.35
(2) APL868013-42T0 w/ Mount Pipe	B	From Leg	4.00	0	0.000	162.00	No Ice	2.87	3.73	0.02
				1			1/2" Ice	3.18	4.10	0.05
							1" Ice	3.52	4.48	0.07
							2" Ice	4.27	5.25	0.15
							4" Ice	5.88	6.91	0.35
(2) APL868013-42T0 w/ Mount Pipe	C	From Leg	4.00	0	0.000	162.00	No Ice	2.87	3.73	0.02
				1			1/2" Ice	3.18	4.10	0.05
							1" Ice	3.52	4.48	0.07
							2" Ice	4.27	5.25	0.15
							4" Ice	5.88	6.91	0.35
APX75-866512-CT2 w/ Mount Pipe	A	From Leg	4.00	0	0.000	162.00	No Ice	6.43	3.89	0.04
				1			1/2" Ice	6.92	4.59	0.09
							1" Ice	7.41	5.25	0.14
							2" Ice	8.43	6.63	0.27
							4" Ice	10.58	9.77	0.64
APX75-866512-CT2 w/ Mount Pipe	B	From Leg	4.00	0	0.000	162.00	No Ice	6.43	3.89	0.04
				1			1/2" Ice	6.92	4.59	0.09
							1" Ice	7.41	5.25	0.14
							2" Ice	8.43	6.63	0.27
							4" Ice	10.58	9.77	0.64
APX75-866512-CT2 w/ Mount Pipe	C	From Leg	4.00	0	0.000	162.00	No Ice	6.43	3.89	0.04
				1			1/2" Ice	6.92	4.59	0.09
							1" Ice	7.41	5.25	0.14
							2" Ice	8.43	6.63	0.27
							4" Ice	10.58	9.77	0.64
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.00	0	0.000	162.00	No Ice	3.57	3.42	0.03
				1			1/2" Ice	3.98	4.12	0.07
							1" Ice	4.39	4.78	0.11
							2" Ice	5.33	6.16	0.21
							4" Ice	7.34	9.18	0.52
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.00	0	0.000	162.00	No Ice	3.57	3.42	0.03
				1			1/2" Ice	3.98	4.12	0.07
							1" Ice	4.39	4.78	0.11
							2" Ice	5.33	6.16	0.21
							4" Ice	7.34	9.18	0.52
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.00	0	0.000	162.00	No Ice	3.57	3.42	0.03
				1			1/2" Ice	3.98	4.12	0.07
								4.39	4.78	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							1" Ice	5.33	6.16	0.21
							2" Ice	7.34	9.18	0.52
							4" Ice			
(2) FD9R6004/2C-3L	A	From Leg	4.00	0	0.000	162.00	No Ice	0.37	0.08	0.00
							1/2" Ice	0.45	0.14	0.01
							1" Ice	0.54	0.20	0.01
							2" Ice	0.75	0.34	0.02
							4" Ice	1.28	0.74	0.06
(2) FD9R6004/2C-3L	B	From Leg	4.00	0	0.000	162.00	No Ice	0.37	0.08	0.00
							1/2" Ice	0.45	0.14	0.01
							1" Ice	0.54	0.20	0.01
							2" Ice	0.75	0.34	0.02
							4" Ice	1.28	0.74	0.06
(2) FD9R6004/2C-3L	C	From Leg	4.00	0	0.000	162.00	No Ice	0.37	0.08	0.00
							1/2" Ice	0.45	0.14	0.01
							1" Ice	0.54	0.20	0.01
							2" Ice	0.75	0.34	0.02
							4" Ice	1.28	0.74	0.06
742 213 w/ Mount Pipe	A	From Leg	4.00	0	0.000	162.00	No Ice	5.37	4.62	0.05
							1/2" Ice	5.95	6.00	0.09
							1" Ice	6.50	6.98	0.15
							2" Ice	7.61	8.85	0.28
							4" Ice	9.93	12.79	0.68
742 213 w/ Mount Pipe	B	From Leg	4.00	0	0.000	162.00	No Ice	5.37	4.62	0.05
							1/2" Ice	5.95	6.00	0.09
							1" Ice	6.50	6.98	0.15
							2" Ice	7.61	8.85	0.28
							4" Ice	9.93	12.79	0.68
742 213 w/ Mount Pipe	C	From Leg	4.00	0	0.000	162.00	No Ice	5.37	4.62	0.05
							1/2" Ice	5.95	6.00	0.09
							1" Ice	6.50	6.98	0.15
							2" Ice	7.61	8.85	0.28
							4" Ice	9.93	12.79	0.68
RRH2X40-AWS	A	From Leg	4.00	0	0.000	162.00	No Ice	2.98	1.60	0.04
							1/2" Ice	3.24	1.82	0.06
							1" Ice	3.50	2.06	0.08
							2" Ice	4.07	2.56	0.14
							4" Ice	5.30	3.66	0.29
RRH2X40-AWS	B	From Leg	4.00	0	0.000	162.00	No Ice	2.98	1.60	0.04
							1/2" Ice	3.24	1.82	0.06
							1" Ice	3.50	2.06	0.08
							2" Ice	4.07	2.56	0.14
							4" Ice	5.30	3.66	0.29
RRH2X40-AWS	C	From Leg	4.00	0	0.000	162.00	No Ice	2.98	1.60	0.04
							1/2" Ice	3.24	1.82	0.06
							1" Ice	3.50	2.06	0.08
							2" Ice	4.07	2.56	0.14
							4" Ice	5.30	3.66	0.29
DB-T1-6Z-8AB-0Z	C	From Leg	4.00	0	0.000	162.00	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
Sector Mount [SM 602-3]	A	None			0.000	162.00	No Ice	33.11	33.11	1.54
							1/2" Ice	44.90	44.90	2.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							Ice	56.69	56.69	2.78
							1" Ice	80.27	80.27	4.01
							2" Ice	127.43	127.43	6.49
							4" Ice			
***										
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0	0.000	154.00	No Ice	6.12	4.25	0.06
				4			1/2" Ice	6.63	5.01	0.10
							1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0	0.000	154.00	No Ice	6.12	4.25	0.06
				4			1/2" Ice	6.63	5.01	0.10
							1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0	0.000	154.00	No Ice	6.12	4.25	0.06
				4			1/2" Ice	6.63	5.01	0.10
							1" Ice	7.13	5.71	0.16
							2" Ice	8.16	7.16	0.29
							4" Ice	10.36	10.41	0.66
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.00	0	0.000	154.00	No Ice	8.64	6.36	0.08
				4			1/2" Ice	9.29	7.54	0.14
							1" Ice	9.91	8.43	0.22
							2" Ice	11.18	10.24	0.39
							4" Ice	13.83	14.10	0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.00	0	0.000	154.00	No Ice	8.64	6.36	0.08
				4			1/2" Ice	9.29	7.54	0.14
							1" Ice	9.91	8.43	0.22
							2" Ice	11.18	10.24	0.39
							4" Ice	13.83	14.10	0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.00	0	0.000	154.00	No Ice	8.64	6.36	0.08
				4			1/2" Ice	9.29	7.54	0.14
							1" Ice	9.91	8.43	0.22
							2" Ice	11.18	10.24	0.39
							4" Ice	13.83	14.10	0.89
(2) LGP21901	A	From Leg	4.00	0	0.000	154.00	No Ice	0.27	0.18	0.01
				4			1/2" Ice	0.34	0.25	0.01
							1" Ice	0.43	0.32	0.01
							2" Ice	0.62	0.49	0.02
							4" Ice	1.10	0.94	0.07
(2) LGP21901	B	From Leg	4.00	0	0.000	154.00	No Ice	0.27	0.18	0.01
				4			1/2" Ice	0.34	0.25	0.01
							1" Ice	0.43	0.32	0.01
							2" Ice	0.62	0.49	0.02
							4" Ice	1.10	0.94	0.07
(2) LGP21901	C	From Leg	4.00	0	0.000	154.00	No Ice	0.27	0.18	0.01
				4			1/2" Ice	0.34	0.25	0.01
							1" Ice	0.43	0.32	0.01
							2" Ice	0.62	0.49	0.02
							4" Ice	1.10	0.94	0.07
(2) RRUS-11	A	From Leg	4.00	0	0.000	154.00	No Ice	3.25	1.37	0.05
				4			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

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) RRUS-11	B	From Leg	4.00 0 4	0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	C	From Leg	4.00 0 4	0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
(2) LGP21401	A	From Leg	4.00 0 4	0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Leg	4.00 0 4	0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Leg	4.00 0 4	0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
DC6-48-60-18-8F	B	From Leg	4.00 0 0	0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	2.57 2.80 3.04 3.54 4.66	0.02 0.04 0.07 0.13 0.30
Sector Mount [SM 602-3]	A	None		0.000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.11 44.90 56.69 80.27 127.43	33.11 44.90 56.69 80.27 127.43	1.54 2.16 2.78 4.01 6.49
***									
800 EXTERNAL NOTCH FILTER	A	From Leg	1.00 0 0	0.000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	B	From Leg	1.00 0 0	0.000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	C	From Leg	1.00 0 0	0.000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
TME-800MHZ 2X50W RRH	A	From Leg	1.00 0 0	0.000	146.00	No Ice 1/2" Ice 1" Ice	2.49 2.71 2.93 3.41	2.07 2.27 2.48 2.93	0.05 0.07 0.10 0.16

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" Ice	4.46	3.93	0.32
						4" Ice			
TME-800MHZ 2X50W RRH	B	From Leg	1.00 0 0	0.000	146.00	No Ice	2.49	2.07	0.05
						1/2" Ice	2.71	2.27	0.07
						1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
TME-800MHZ 2X50W RRH	C	From Leg	1.00 0 0	0.000	146.00	No Ice	2.49	2.07	0.05
						1/2" Ice	2.71	2.27	0.07
						1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
***									
TME-PCS 1900 MHz 4x45W-65MHz	A	From Leg	2.00 0 0	0.000	143.00	No Ice	2.71	2.61	0.06
						1/2" Ice	2.95	2.85	0.08
						1" Ice	3.20	3.09	0.11
						2" Ice	3.72	3.61	0.17
						4" Ice	4.86	4.74	0.35
TME-PCS 1900 MHz 4x45W-65MHz	B	From Leg	2.00 0 0	0.000	143.00	No Ice	2.71	2.61	0.06
						1/2" Ice	2.95	2.85	0.08
						1" Ice	3.20	3.09	0.11
						2" Ice	3.72	3.61	0.17
						4" Ice	4.86	4.74	0.35
TME-PCS 1900 MHz 4x45W-65MHz	C	From Leg	2.00 0 0	0.000	143.00	No Ice	2.71	2.61	0.06
						1/2" Ice	2.95	2.85	0.08
						1" Ice	3.20	3.09	0.11
						2" Ice	3.72	3.61	0.17
						4" Ice	4.86	4.74	0.35
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	2.00 0 0	0.000	143.00	No Ice	8.50	6.95	0.08
						1/2" Ice	9.15	8.13	0.15
						1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	2.00 0 0	0.000	143.00	No Ice	8.50	6.95	0.08
						1/2" Ice	9.15	8.13	0.15
						1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	2.00 0 0	0.000	143.00	No Ice	8.50	6.95	0.08
						1/2" Ice	9.15	8.13	0.15
						1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
(3) ACU-A20-N	A	From Leg	2.00 0 0	0.000	143.00	No Ice	0.08	0.14	0.00
						1/2" Ice	0.12	0.19	0.00
						1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
(3) ACU-A20-N	B	From Leg	2.00 0 0	0.000	143.00	No Ice	0.08	0.14	0.00
						1/2" Ice	0.12	0.19	0.00
						1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
(3) ACU-A20-N	C	From Leg	2.00 0	0.000	143.00	No Ice	0.08	0.14	0.00
						1/2" Ice	0.12	0.19	0.00

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
			0			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
Sector Mount [SM 701-3]	A	None		0.000	143.00	No Ice	19.73	19.73	0.82
						1/2" Ice	27.41	27.41	1.17
						1" Ice	35.09	35.09	1.51
						2" Ice	50.45	50.45	2.19
						4" Ice	81.17	81.17	3.55
***									
1142-2C	B	From Leg	4.00 0 7	0.000	124.00	No Ice	2.09	2.09	0.02
						1/2" Ice	3.37	3.37	0.04
						1" Ice	4.67	4.67	0.07
						2" Ice	7.32	7.32	0.14
						4" Ice	10.79	10.79	0.39
1142-2C	C	From Leg	4.00 0 7	0.000	124.00	No Ice	2.09	2.09	0.02
						1/2" Ice	3.37	3.37	0.04
						1" Ice	4.67	4.67	0.07
						2" Ice	7.32	7.32	0.14
						4" Ice	10.79	10.79	0.39
Side Arm Mount [SO 306-1]	B	From Leg	2.00 0 0	0.000	124.00	No Ice	0.98	2.18	0.04
						1/2" Ice	1.70	3.80	0.06
						1" Ice	2.42	5.42	0.08
						2" Ice	3.86	8.66	0.12
						4" Ice	6.74	15.14	0.20
Side Arm Mount [SO 306-1]	C	From Leg	2.00 0 0	0.000	124.00	No Ice	0.98	2.18	0.04
						1/2" Ice	1.70	3.80	0.06
						1" Ice	2.42	5.42	0.08
						2" Ice	3.86	8.66	0.12
						4" Ice	6.74	15.14	0.20
***									
220-3BN	B	From Leg	4.00 0 4	0.000	104.00	No Ice	5.72	5.72	0.02
						1/2" Ice	7.83	7.83	0.07
						1" Ice	9.96	9.96	0.12
						2" Ice	14.27	14.27	0.27
						4" Ice	22.63	22.63	0.73
1142-2C	C	From Leg	4.00 0 7	0.000	104.00	No Ice	2.09	2.09	0.02
						1/2" Ice	3.37	3.37	0.04
						1" Ice	4.67	4.67	0.07
						2" Ice	7.32	7.32	0.14
						4" Ice	10.79	10.79	0.39
Side Arm Mount [SO 306-1]	B	From Leg	2.00 0 0	0.000	104.00	No Ice	0.98	2.18	0.04
						1/2" Ice	1.70	3.80	0.06
						1" Ice	2.42	5.42	0.08
						2" Ice	3.86	8.66	0.12
						4" Ice	6.74	15.14	0.20
Side Arm Mount [SO 306-1]	C	From Leg	2.00 0 0	0.000	104.00	No Ice	0.98	2.18	0.04
						1/2" Ice	1.70	3.80	0.06
						1" Ice	2.42	5.42	0.08
						2" Ice	3.86	8.66	0.12
						4" Ice	6.74	15.14	0.20
***									
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00 0 0	0.000	93.00	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.12
						1" Ice	6.59	6.23	0.22

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" Ice	8.73	9.31	0.56
						4" Ice			
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00 0 0	0.000	93.00	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00 0 0	0.000	93.00	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
(2) S20057A1	A	From Leg	4.00 0 0	0.000	93.00	No Ice	0.82	0.39	0.01
						1/2" Ice	0.95	0.49	0.02
						1" Ice	1.09	0.61	0.02
						2" Ice	1.40	0.87	0.04
						4" Ice	2.11	1.50	0.11
(2) S20057A1	B	From Leg	4.00 0 0	0.000	93.00	No Ice	0.82	0.39	0.01
						1/2" Ice	0.95	0.49	0.02
						1" Ice	1.09	0.61	0.02
						2" Ice	1.40	0.87	0.04
						4" Ice	2.11	1.50	0.11
(2) S20057A1	C	From Leg	4.00 0 0	0.000	93.00	No Ice	0.82	0.39	0.01
						1/2" Ice	0.95	0.49	0.02
						1" Ice	1.09	0.61	0.02
						2" Ice	1.40	0.87	0.04
						4" Ice	2.11	1.50	0.11
Side Arm Mount [SO 308-3]	A	None		0.000	93.00	No Ice	4.51	4.51	0.16
						1/2" Ice	7.78	7.78	0.24
						1" Ice	11.05	11.05	0.31
						2" Ice	17.59	17.59	0.47
						4" Ice	30.67	30.67	0.78
***									
GPS_A	C	From Leg	2.00 0 3	0.000	62.00	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
Side Arm Mount [SO 301-1]	C	From Leg	1.00 0 0	0.000	62.00	No Ice	1.00	0.90	0.02
						1/2" Ice	1.39	1.42	0.03
						1" Ice	1.78	1.94	0.04
						2" Ice	2.56	2.98	0.06
						4" Ice	4.12	5.06	0.10
***									
GPS_A	C	From Leg	2.00 0 2	0.000	42.00	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
Side Arm Mount [SO 301-1]	C	From Leg	1.00 0 0	0.000	42.00	No Ice	1.00	0.90	0.02
						1/2" Ice	1.39	1.42	0.03
						1" Ice	1.78	1.94	0.04
						2" Ice	2.56	2.98	0.06
						4" Ice	4.12	5.06	0.10
***									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
GPS_A	C	From Leg	2.00	0	0.000	31.00	No Ice	0.30	0.30	0.00
							1/2" Ice	0.37	0.37	0.00
				1				0.46	0.46	0.01
							1" Ice	0.65	0.65	0.02
							2" Ice	1.15	1.15	0.08
							4" Ice			
Side Arm Mount [SO 301-1]	C	From Leg	1.00	0	0.000	31.00	No Ice	1.00	0.90	0.02
							1/2" Ice	1.39	1.42	0.03
				0				1.78	1.94	0.04
							1" Ice	2.56	2.98	0.06
							2" Ice	4.12	5.06	0.10
							4" Ice			
***										

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 168	6.52	31	0.415	0.035
T2	168 - 160	5.50	31	0.396	0.035
T3	160 - 140	4.87	31	0.361	0.035
T4	140 - 120	3.46	31	0.281	0.030
T5	120 - 100	2.36	31	0.213	0.025
T6	100 - 80	1.56	31	0.153	0.019
T7	80 - 60	0.96	31	0.111	0.014
T8	60 - 40	0.52	31	0.080	0.009
T9	40 - 20	0.23	31	0.049	0.006
T10	20 - 0	0.06	35	0.019	0.003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	PD10017	31	6.35	0.413	0.035	40777
177.00	(4) DB844H90E-XY w/ Mount Pipe	31	6.26	0.412	0.035	40777
170.00	800 10504 w/ Mount Pipe	31	5.67	0.401	0.035	20914
162.00	(2) APL868013-42T0 w/ Mount Pipe	31	5.02	0.370	0.035	20906
154.00	(2) 7770.00 w/ Mount Pipe	31	4.42	0.334	0.034	19011
146.00	800 EXTERNAL NOTCH FILTER	31	3.85	0.303	0.032	15391
143.00	TME-PCS 1900 MHz 4x45W-65MHz	31	3.65	0.292	0.031	14390
124.00	1142-2C	31	2.56	0.227	0.026	15886
104.00	220-3BN	31	1.70	0.164	0.020	22137
93.00	RR90-17-02DP w/ Mount Pipe	31	1.33	0.136	0.017	25771
62.00	GPS_A	31	0.56	0.083	0.010	33932
42.00	GPS_A	31	0.25	0.052	0.006	37981
31.00	GPS_A	31	0.14	0.035	0.005	38801

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 168	18.79	10	1.193	0.101
T2	168 - 160	15.86	10	1.139	0.103
T3	160 - 140	14.03	10	1.040	0.101
T4	140 - 120	9.96	10	0.811	0.087
T5	120 - 100	6.81	10	0.615	0.071
T6	100 - 80	4.49	10	0.441	0.056
T7	80 - 60	2.76	10	0.318	0.040
T8	60 - 40	1.51	10	0.230	0.027
T9	40 - 20	0.67	10	0.142	0.018
T10	20 - 0	0.19	10	0.054	0.008

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	PD10017	10	18.30	1.189	0.102	14291
177.00	(4) DB844H90E-XY w/ Mount Pipe	10	18.05	1.187	0.102	14291
170.00	800 10504 w/ Mount Pipe	10	16.34	1.156	0.103	7330
162.00	(2) APL868013-42T0 w/ Mount Pipe	10	14.48	1.067	0.102	7334
154.00	(2) 7770.00 w/ Mount Pipe	10	12.73	0.965	0.098	6645
146.00	800 EXTERNAL NOTCH FILTER	10	11.10	0.874	0.092	5344
143.00	TME-PCS 1900 MHz 4x45W-65MHz	10	10.52	0.842	0.089	4986
124.00	1142-2C	10	7.37	0.653	0.074	5507
104.00	220-3BN	10	4.90	0.472	0.059	7672
93.00	RR90-17-02DP w/ Mount Pipe	10	3.82	0.392	0.050	8928
62.00	GPS_A	10	1.62	0.239	0.028	11775
42.00	GPS_A	10	0.73	0.151	0.019	13206
31.00	GPS_A	10	0.41	0.100	0.014	13497

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Diagonal	A325N	0.63	1	1.92	4.76	0.403 ✓	1.333	Member Block Shear
		Top Girt	A325N	0.63	1	0.19	4.76	0.040 ✓	1.333	Member Block Shear
T2	168	Diagonal	A325N	0.63	1	3.24	4.76	0.682 ✓	1.333	Member Block Shear
T3	160	Leg	A325N	0.63	4	15.19	13.50	1.125 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	4.77	4.76	1.002 ✓	1.333	Member Block Shear
T4	140	Leg	A325N	0.75	4	23.69	19.44	1.219 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	5.33	4.76	1.121 ✓	1.333	Member Block Shear
T5	120	Leg	A325N	0.88	4	30.64	26.46	1.158 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	5.03	6.44	0.780 ✓	1.333	Bolt Shear
T6	100	Leg	A490N	0.88	4	36.75	32.47	1.132 ✓	1.333	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.63	1	5.28	6.44	0.820 ✓	1.333	Bolt Shear
T7	80	Leg	A325N	1.00	4	41.86	34.56	1.211 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	6.28	6.44	0.975 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.13	4	47.07	43.74	1.076 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	6.65	6.44	1.033 ✓	1.333	Bolt Shear
T9	40	Leg	A325N	1.13	4	51.82	43.74	1.185 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	7.50	6.44	1.164 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.50	1	4.20	4.12	1.018 ✓	1.333	Bolt Shear
T10	20	Leg	F1554-36	1.50	6	37.78	33.82	1.117 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.63	1	7.93	6.44	1.231 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

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 P / P_a
T1	180 - 168	Pipe 2.375" x 0.154" (2 STD)	12.00	4.00	61.0 K=1.00	16.93	1.07	-11.43	18.20	0.628 ✓
T2	168 - 160	Pipe 2.375" x 0.154" (2 STD) (GR)	8.00	4.00	61.0 K=1.00	24.80	1.07	-24.26	26.65	0.910 ✓
T3	160 - 140	Pipe 3.5" x 0.216" (3 STD) (GR)	20.03	5.01	51.7 K=1.00	26.83	2.23	-69.39	59.80	1.160 ✓
T4	140 - 120	Pipe 4" x 0.318" (3.5 XS) (GR)	20.03	6.68	61.3 K=1.00	23.00	3.68	-106.71	84.59	1.261 ✓
T5	120 - 100	Pipe 4.5" x 0.337" (4 XS) (GR)	20.03	6.68	54.3 K=1.00	24.54	4.41	-137.98	108.17	1.276 ✓
T6	100 - 80	Pipe 5.563" x 0.375" (5 XS) (GR)	20.03	6.68	43.6 K=1.00	27.10	6.11	-166.66	165.62	1.006 ✓
T7	80 - 60	Pipe 6.625" x 0.432" (6 XS) (GR)	20.03	10.02	54.8 K=1.00	25.76	8.40	-191.34	216.54	0.884 ✓
T8	60 - 40	Pipe 6.625" x 0.432" (6 XS) (GR)	20.03	10.02	54.8 K=1.00	25.76	8.40	-217.28	216.54	1.003 ✓
T9	40 - 20	Pipe 6.625" x 0.432" (6 XS) (GR)	20.03	5.15	28.2 K=1.00	29.47	8.40	-242.13	247.73	0.977 ✓
T10	20 - 0	Pipe 8.625" x 0.500" (8 XS) (GR)	20.03	10.02	41.8 K=1.00	29.10	12.76	-267.76	371.42	0.721 ✓

Diagonal Design Data (Compression)

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 P / P_a
T1	180 - 168	L 2 x 1.5 x 3/16 LLV	4.63	2.19	91.3 K=1.12	14.05	0.62	-1.98	8.73	0.227 ✓
T2	168 - 160	L 2 x 1.5 x 3/16 LLV	4.63	2.19	91.3	14.05	0.62	-3.36	8.73	0.385

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 $\frac{P}{P_a}$
					K=1.12					✓
T3	160 - 140	L 2 x 1.5 x 3/16 LLV	6.52	3.28	122.1 K=1.00	9.97	0.62	-4.85	6.19	0.784 ✓
T4	140 - 120	L 2 x 2 x 3/16	9.07	4.61	140.3 K=1.00	7.59	0.71	-5.05	5.43	0.930 ✓
T5	120 - 100	L 2.5 x 2 x 3/16 LLV	10.69	5.38	151.3 K=1.00	6.52	0.81	-5.03	5.28	0.953 ✓
T6	100 - 80	L 2.5 x 2.5 x 3/16	12.40	6.23	151.0 K=1.00	6.55	0.90	-5.26	5.91	0.890 ✓
T7	80 - 60	L 3 x 3 x 3/16	15.56	7.92	159.4 K=1.00	5.87	1.09	-6.28	6.40	0.982 ✓
T8	60 - 40	L 3.5 x 3 x 1/4 LLV	17.20	8.73	166.1 K=1.00	5.41	1.56	-6.65	8.45	0.788 ✓
T9	40 - 20	L 3.5 x 3 x 1/4 LLV	18.92	9.73	185.1 K=1.00	4.36	1.56	-7.50	6.80	1.102 ✓
T10	20 - 0	L 3.5 x 3.5 x 1/4	20.53	10.38	179.5 K=1.00	4.63	1.69	-7.93	7.83	1.012 ✓

Secondary Horizontal Design Data (Compression)

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 $\frac{P}{P_a}$
T9	40 - 20	L3 1/2x3 1/2x1/4	17.49	16.93	146.4 K=0.50	6.97	1.69	-4.20	11.77	0.357 ✓

Top Girt Design Data (Compression)

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 $\frac{P}{P_a}$
T1	180 - 168	L 2 x 2 x 3/16	4.00	3.55	114.1 K=1.05	11.11	0.71	-0.25	7.95	0.031 ✓

Tension Checks

Leg Design Data (Tension)

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 $\frac{P}{P_a}$
T1	180 - 168	Pipe 2.375" x 0.154" (2 STD)	12.00	4.00	61.0	21.00	1.07	9.42	22.57	0.417 ✓
T2	168 - 160	Pipe 2.375" x 0.154" (2 STD) (GR)	8.00	4.00	61.0	21.00	1.07	20.29	22.57	0.899 ✓
T3	160 - 140	Pipe 3.5" x 0.216" (3 STD) (GR)	20.03	5.01	51.7	21.00	2.23	60.76	46.80	1.298 ✓
T4	140 - 120	Pipe 4" x 0.318" (3.5 XS) (GR)	20.03	6.68	61.3	21.00	3.68	94.78	77.25	1.227 ✓
T5	120 - 100	Pipe 4.5" x 0.337" (4 XS)	20.03	6.68	54.3	21.00	4.41	122.56	92.56	1.324

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 $\frac{P}{P_a}$
T6	100 - 80	Pipe 5.563" x 0.375" (5 XS) (GR)	20.03	6.68	43.6	21.00	6.11	147.02	128.35	1.145
T7	80 - 60	Pipe 6.625" x 0.432" (6 XS) (GR)	20.03	10.02	54.8	21.00	8.40	167.46	176.50	0.949
T8	60 - 40	Pipe 6.625" x 0.432" (6 XS) (GR)	20.03	10.02	54.8	21.00	8.40	188.27	176.50	1.067
T9	40 - 20	Pipe 6.625" x 0.432" (6 XS) (GR)	20.03	4.87	26.6	21.00	8.40	207.66	176.50	1.177
T10	20 - 0	Pipe 8.625" x 0.500" (8 XS) (GR)	20.03	10.02	41.8	21.00	12.76	226.67	268.02	0.846

Diagonal Design Data (Tension)

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 $\frac{P}{P_a}$
T1	180 - 168	L 2 x 1.5 x 3/16 LLV	4.63	2.19	63.2	29.00	0.36	1.92	10.45	0.183
T2	168 - 160	L 2 x 1.5 x 3/16 LLV	4.63	2.19	63.2	29.00	0.36	3.24	10.45	0.310
T3	160 - 140	L 2 x 1.5 x 3/16 LLV	6.52	3.28	92.9	29.00	0.36	4.77	10.45	0.456
T4	140 - 120	L 2 x 2 x 3/16	8.11	4.14	83.0	29.00	0.43	5.33	12.49	0.427
T5	120 - 100	L 2.5 x 2 x 3/16 LLV	10.69	5.38	110.7	29.00	0.50	4.87	14.54	0.335
T6	100 - 80	L 2.5 x 2.5 x 3/16	12.40	6.23	98.2	29.00	0.57	5.14	16.56	0.310
T7	80 - 60	L 3 x 3 x 3/16	15.56	7.92	103.1	29.00	0.71	6.07	20.65	0.294
T8	60 - 40	L 3.5 x 3 x 1/4 LLV	17.20	8.73	116.7	29.00	1.03	6.46	29.85	0.216
T9	40 - 20	L 3.5 x 3 x 1/4 LLV	18.92	9.73	127.9	29.00	1.03	6.84	29.85	0.229
T10	20 - 0	L 3.5 x 3.5 x 1/4	20.53	10.38	115.8	29.00	1.13	7.44	32.68	0.228

Secondary Horizontal Design Data (Tension)

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 $\frac{P}{P_a}$
T9	40 - 20	L3 1/2x3 1/2x1/4	17.49	16.93	186.4	29.00	1.15	4.20	33.36	0.126

Top Girt Design Data (Tension)

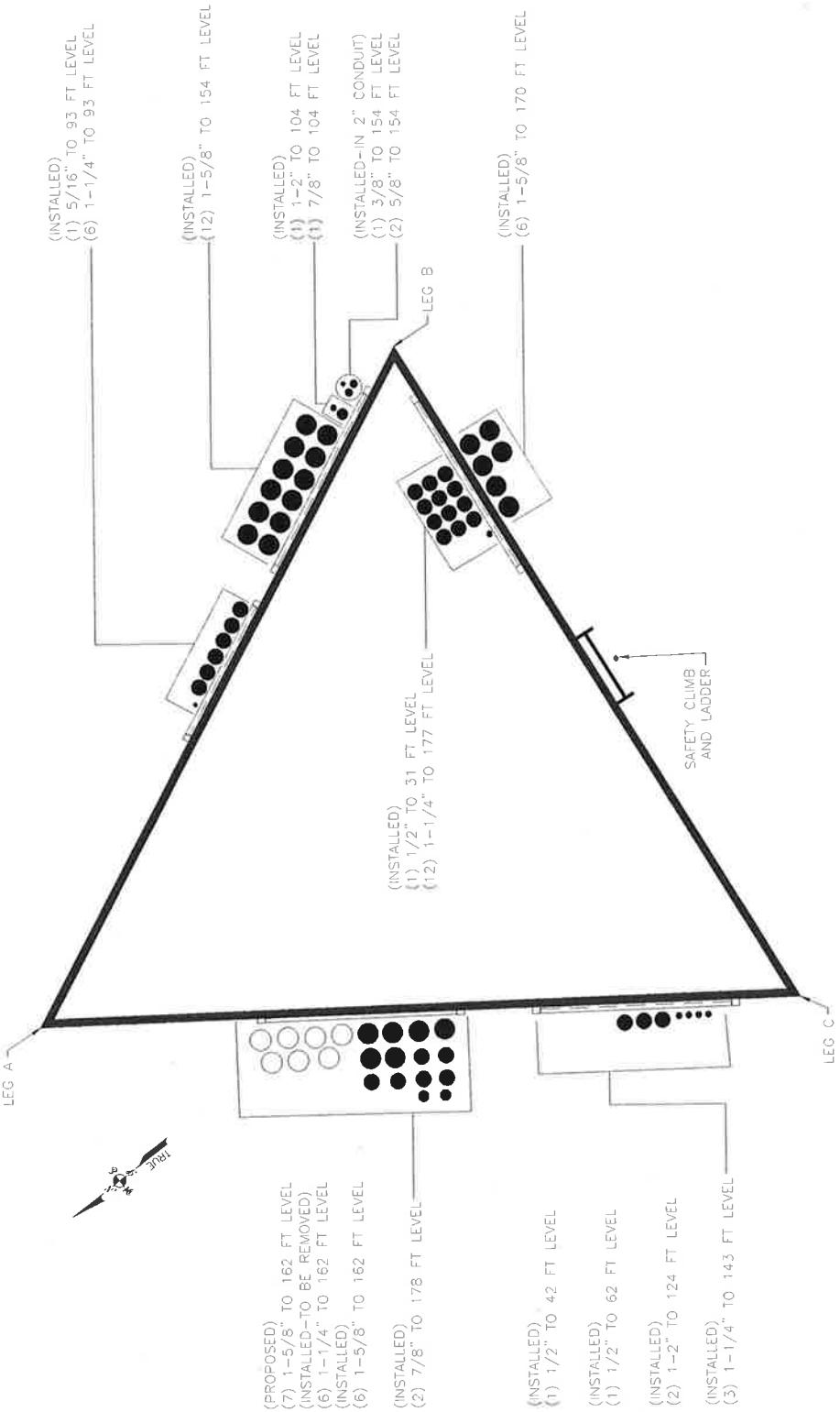
Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 168	L 2 x 2 x 3/16	4.00	3.55	73.9	29.00	0.43	0.19	12.49	0.015 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 168	Leg	Pipe 2.375" x 0.154" (2 STD)	2	-11.43	24.25	47.1	Pass
T2	168 - 160	Leg	Pipe 2.375" x 0.154" (2 STD) (GR)	26	-24.26	35.52	68.3	Pass
T3	160 - 140	Leg	Pipe 3.5" x 0.216" (3 STD) (GR)	40	60.76	62.38	97.4	Pass
T4	140 - 120	Leg	Pipe 4" x 0.318" (3.5 XS) (GR)	67	-106.71	112.76	94.6	Pass
T5	120 - 100	Leg	Pipe 4.5" x 0.337" (4 XS) (GR)	88	122.56	123.38	99.3	Pass
T6	100 - 80	Leg	Pipe 5.563" x 0.375" (5 XS) (GR)	109	147.02	171.09	85.9	Pass
T7	80 - 60	Leg	Pipe 6.625" x 0.432" (6 XS) (GR)	130	167.46	235.28	71.2	Pass
T8	60 - 40	Leg	Pipe 6.625" x 0.432" (6 XS) (GR)	145	188.27	235.28	80.0	Pass
T9	40 - 20	Leg	Pipe 6.625" x 0.432" (6 XS) (GR)	162	207.66	235.28	88.3	Pass
T10	20 - 0	Leg	Pipe 8.625" x 0.500" (8 XS) (GR)	181	226.67	357.27	63.4	Pass
T1	180 - 168	Diagonal	L 2 x 1.5 x 3/16 LLV	10	-1.98	11.64	17.0	Pass
T2	168 - 160	Diagonal	L 2 x 1.5 x 3/16 LLV	28	-3.36	11.64	28.8	Pass
T3	160 - 140	Diagonal	L 2 x 1.5 x 3/16 LLV	43	-4.85	8.26	58.8	Pass
T4	140 - 120	Diagonal	L 2 x 2 x 3/16	70	-5.05	7.23	69.8	Pass
T5	120 - 100	Diagonal	L 2.5 x 2 x 3/16 LLV	91	-5.03	7.03	71.5	Pass
T6	100 - 80	Diagonal	L 2.5 x 2.5 x 3/16	112	-5.26	7.87	66.8	Pass
T7	80 - 60	Diagonal	L 3 x 3 x 3/16	133	-6.28	8.53	73.6	Pass
T8	60 - 40	Diagonal	L 3.5 x 3 x 1/4 LLV	148	-6.65	11.26	59.1	Pass
T9	40 - 20	Diagonal	L 3.5 x 3 x 1/4 LLV	163	-7.50	9.07	82.7	Pass
T10	20 - 0	Diagonal	L 3.5 x 3.5 x 1/4	184	-7.93	10.44	76.0	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-4.20	15.70	26.8	Pass
T1	180 - 168	Top Girt	L 2 x 2 x 3/16	6	-0.25	10.59	2.3	Pass
						Summary		
						Leg (T5)	99.3	Pass
						Diagonal (T9)	82.7	Pass
						Secondary Horizontal (T9)	26.8	Pass
						Top Girt (T1)	2.3	Pass
						Bolt Checks	92.3	Pass
						RATING =	**99.3**	**Pass**

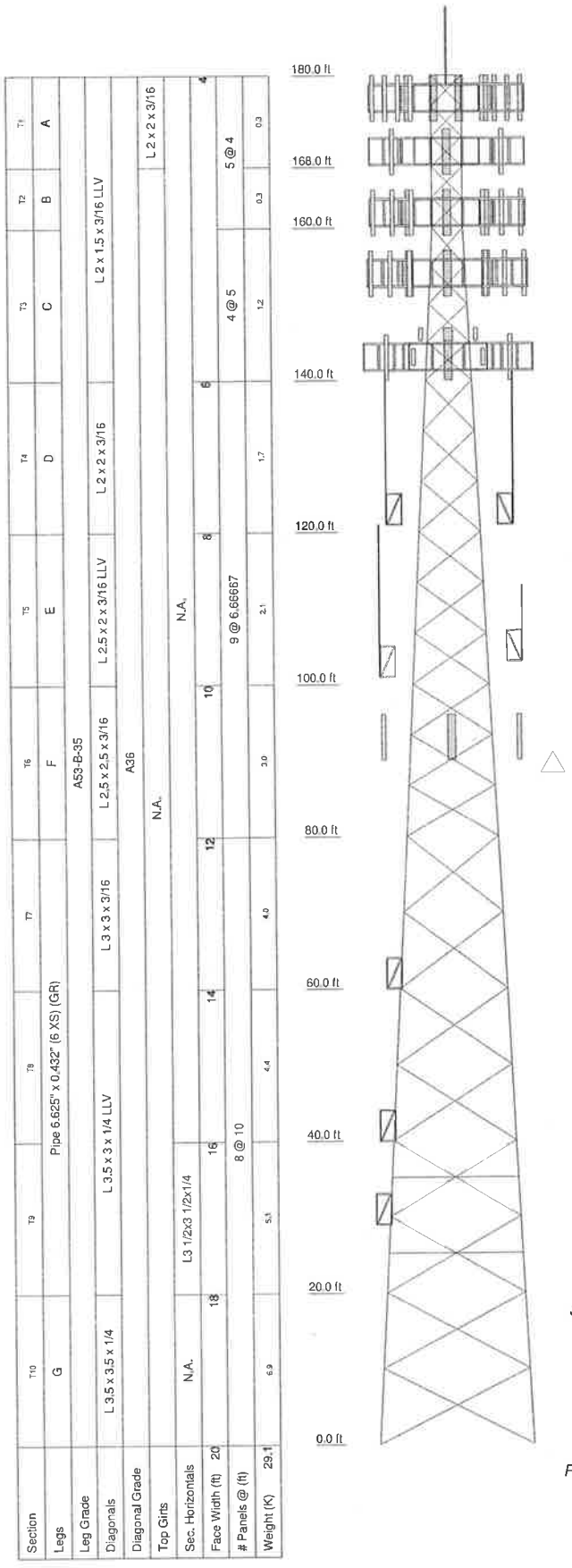
APPENDIX B

BASE LEVEL DRAWING


(INSTALLED)
(1) 5/16" TO 93 FT LEVEL
(6) 1-1/4" TO 93 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 154 FT LEVEL
(INSTALLED)
(1) 1-2" TO 104 FT LEVEL
(1) 7/8" TO 104 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 154 FT LEVEL
(2) 5/8" TO 154 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 170 FT LEVEL
LEG B
SAFETY CLIMB AND LADDER
(INSTALLED)
(1) 1/2" TO 31 FT LEVEL
(12) 1-1/4" TO 177 FT LEVEL
LEG A
LEG C
TRUE
(PROPOSED)
(7) 1-5/8" TO 162 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-1/4" TO 162 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 162 FT LEVEL
(INSTALLED)
(2) 7/8" TO 178 FT LEVEL
(INSTALLED)
(1) 1/2" TO 42 FT LEVEL
(INSTALLED)
(1) 1/2" TO 62 FT LEVEL
(INSTALLED)
(2) 1-2" TO 124 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 143 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD10017	178	(2) RRUS-11	154
(4) DB844H90E-XY w/ Mount Pipe	177	(2) LGP21401	154
(4) DB844H90E-XY w/ Mount Pipe	177	(2) LGP21401	154
(4) DB844H90E-XY w/ Mount Pipe	177	(2) LGP21401	154
Sector Mount [SM 307-3]	177	DC6-48-60-18-8F	154
800 10504 w/ Mount Pipe	170	Sector Mount [SM 602-3]	154
800 10504 w/ Mount Pipe	170	800 EXTERNAL NOTCH FILTER	146
800 10504 w/ Mount Pipe	170	800 EXTERNAL NOTCH FILTER	146
860 10025	170	800 EXTERNAL NOTCH FILTER	146
860 10025	170	TME-800MHZ 2X50W RRH	146
860 10025	170	TME-800MHZ 2X50W RRH	146
Side Arm Mount [SO 103-3]	170	TME-800MHZ 2X50W RRH	146
(2) APL868013-42T0 w/ Mount Pipe	162	TME-PCS 1900 MHz 4x45W-65MHz	143
(2) APL868013-42T0 w/ Mount Pipe	162	TME-PCS 1900 MHz 4x45W-65MHz	143
(2) APL868013-42T0 w/ Mount Pipe	162	TME-PCS 1900 MHz 4x45W-65MHz	143
APX75-866512-CT2 w/ Mount Pipe	162	APXVSPP18-C-A20 w/ Mount Pipe	143
APX75-866512-CT2 w/ Mount Pipe	162	APXVSPP18-C-A20 w/ Mount Pipe	143
APX75-866512-CT2 w/ Mount Pipe	162	APXVSPP18-C-A20 w/ Mount Pipe	143
MG D3-800Tx w/ Mount Pipe	162	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	162	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	162	(3) ACU-A20-N	143
(2) FD9R6004/2C-3L	162	Sector Mount [SM 701-3]	143
(2) FD9R6004/2C-3L	162	1142-2C	124
(2) FD9R6004/2C-3L	162	1142-2C	124
742 213 w/ Mount Pipe	162	Side Arm Mount [SO 306-1]	124
742 213 w/ Mount Pipe	162	Side Arm Mount [SO 306-1]	124
742 213 w/ Mount Pipe	162	220-3BN	104
RRH2X40-AWS	162	1142-2C	104
RRH2X40-AWS	162	Side Arm Mount [SO 306-1]	104
RRH2X40-AWS	162	Side Arm Mount [SO 306-1]	104
DB-T1-6Z-8AB-0Z	162	RR90-17-02DP w/ Mount Pipe	93
Sector Mount [SM 602-3]	162	RR90-17-02DP w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	RR90-17-02DP w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	(2) S20057A1	93
(2) 7770.00 w/ Mount Pipe	154	(2) S20057A1	93
P65-16-XLH-RR w/ Mount Pipe	154	(2) S20057A1	93
P65-16-XLH-RR w/ Mount Pipe	154	Side Arm Mount [SO 308-3]	93
P65-16-XLH-RR w/ Mount Pipe	154	GPS_A	62
(2) LGP21901	154	Side Arm Mount [SO 301-1]	62
(2) LGP21901	154	GPS_A	42
(2) LGP21901	154	Side Arm Mount [SO 301-1]	42
(2) RRUS-11	154	GPS_A	31
(2) RRUS-11	154	Side Arm Mount [SO 301-1]	31

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 2.375" x 0.154" (2 STD)	E	Pipe 4.5" x 0.337" (4 XS) (GR)
B	Pipe 2.375" x 0.154" (2 STD) (GR)	F	Pipe 5.563" x 0.375" (5 XS) (GR)
C	Pipe 3.5" x 0.216" (3 STD) (GR)	G	Pipe 8.625" x 0.500" (8 XS) (GR)
D	Pipe 4" x 0.318" (3.5 XS) (GR)		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	58 ksi	A36	36 ksi	58 ksi

MAX. CC
DOWI
SHEA
UPLI
SHEAR: 23 K
AX.
952

SHEAR
13 K

TORQUE 6 kip-ft
38 mph WIND - 0.75 in ICE

AXIAL
48 K

SHEAR
42 K

MOMENT
4467 kip-ft

TORQUE 27 kip-ft
REACTIONS - 85 mph WIND

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. Grouted pipe f'c is 7 ksi
6. TOWER RATING: 99.3%

Paul J Ford and Company
250 E. Broad St, Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: 180-ft S/S Tower - Wilton, CT			
Project: PJF# 37514-0096 (BU# 806353)			
Client: Crown Castle	Drawn by: Daniel S. Cuffman	App'd:	
Code: TIA/EIA-222-F	Date: 01/28/14	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2014\37514-0096 BU 806353\WO 794386 BU 806353\37514-0096_Rev1.eri		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Job Number: 37514-0096_Rev1
Site Number: BU 806353
Site Name: BRG 124 943066

Page: 1
By: DSC
Date: 1/28/2014

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =			k-ft
Shear, V =	26.0	23.0	kips
Axial Load, P =	274.0	-231.0	kips
OTM =	6.5	5.8	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Self-Supported
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	2.5	ft
Height Above Grade =	0.25	ft
Depth Below Grade =	13.5	ft
fc' =	3	ksi
εc =	0.003	in/in
Mat Ftdn. Cap Width =	5	ft
Mat Ftdn. Cap Length =	12	ft
Depth Below Grade =	5	ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00 + Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	14	
Rebar Size =	#8	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#4	
Side Clear Cover to Ties =	3	in

Soil Parameters

Water Table Depth =	99.00	ft
Depth to Ignore Soil =	5.00	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strength = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	110	0	30	Sand	0	0	0	5
2	99	140	8000	0	Clay	56000	8000	8000	104
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	10.16	ft, from Grade
Bending Moment, M =	270.59	k-ft, from COR
Resisting Moment, Ma =	1510.86	k-ft, from COR

MOMENT RATIO = 17.9% OK

Shear, V =	26.00	kips
Resisting Shear, Va =	145.17	kips

SHEAR RATIO = 17.9% OK

Soil Results: Uplift

Uplift, T =	231.00	kips
Allowable Uplift Cap., Ta =	309.84	kips

UPLIFT RATIO = 74.6% OK

Soil Results: Compression

Compression, C =	274.00	kips
Allowable Comp. Cap., Ca =	389.81	kips

COMPRESSION RATIO = 70.3% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	2.36	sq in
Actual Steel Area =	11.06	sq in
Allowable Min Axial, Pa =	-459.42	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	975.15	kips, Where Ma = 0 k-ft

Axial Load, P =	-176.03	kips @ 6.00 ft Below Grade
Moment, M =	137.41	k-ft @ 6.00 ft Below Grade
Allowable Moment, Ma =	255.53	k-ft

MOMENT RATIO = 53.8% OK