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

August 29, 2016

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 ("Crown"). The Council approved Cellco's use of the existing tower in 1988 (Docket No. 94). Cellco now intends to modify its facility by replacing three (3) of its antennas with three (3) model LNX-6512DS, 700 MHz antennas and 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 new 2100 MHz antennas, replace six (6) existing coaxial antenna cables and add one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco's new 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 Lynne Vanderslice, First Selectman of the Town of Wilton. The Town of Wilton is the owner of the Property. A copy of this letter is also being sent to Crown, the tower owner.

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).

A copy of the Wilton Assessor's Parcel Map and property owner information is included in Attachment 4.

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,

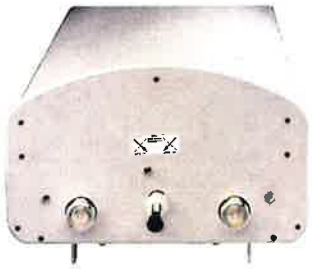
Kenneth C. Baldwin

Enclosures
Copy to:
Lynne Vanderslice, Wilton First Selectman
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®



LNX-6512DS-VTM | LNX-6512DS-A1M

Single Band Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Ideal choice for site collocations and tough zoning restrictions
- Extended elevation tilt for maximum flexibility in urban core areas
- Remote beam tilt management is an optional feature using Andrew's Teletilt® system
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	14.1	15.0
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Vertical, degrees	19.0	17.0
Beam Tilt, degrees	0–15	0–15
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	28	28
CPR at Boresight, dB	12	12
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°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Beamwidth, Horizontal Tolerance, degrees	±3	±3

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Type	Sector
Band	Single band
Brand	DualPol®
Operating Frequency Band	698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2

Product Specifications

LNX-6512DS-VTM | LNX-6512DS-A1M

Wind Loading, maximum	379.8 N @ 150 km/h 85.4 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1232.0 mm | 48.5 in
Width	301.0 mm | 11.9 in
Net Weight, without mounting kit	13.0 kg | 28.7 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6512DS-A1M

Packed Dimensions

Depth	284.0 mm | 11.2 in
Length	1548.0 mm | 60.9 in
Width	411.0 mm | 16.2 in
Shipping Weight	29.5 kg | 65.0 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

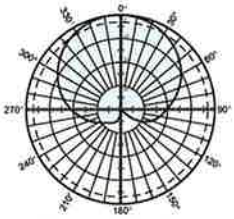
KATHREIN
SCALA DIVISION

742 213V01

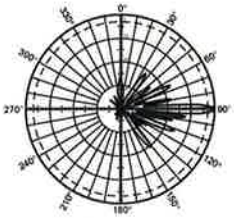
65° Panel Antenna

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° 18	2° 18	4° 16	6° T 15 dB	0° 18	2° 18	4° 17	6° T 16 dB	0° 18	2° 18	4° 18	6° T 18 dB

RoHS Lead-Free

11271-B
936.3740/b

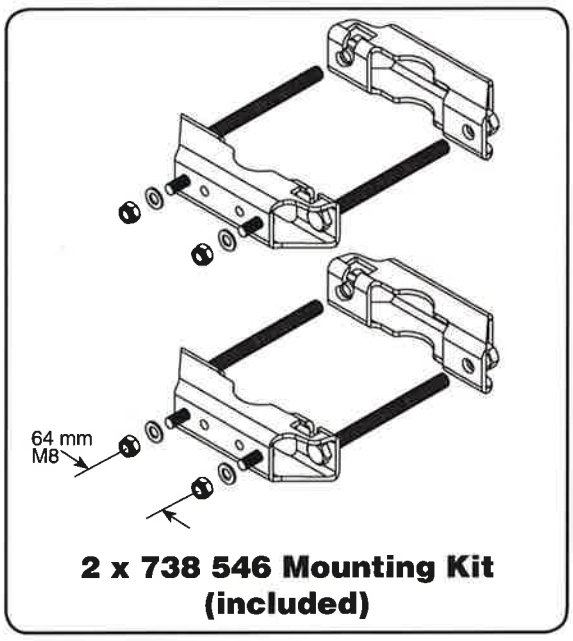
*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

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

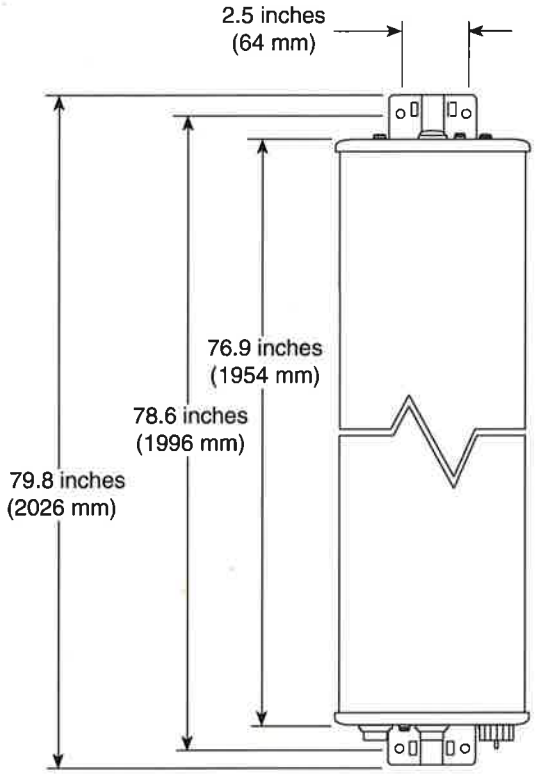
KATHREIN
SCALA DIVISION

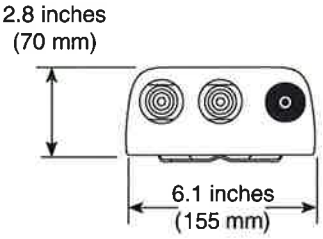
742 213V01

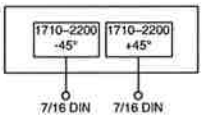
65° Panel Antenna



2 x 738 546 Mounting Kit (included)







Mounting Options:

Model	Description
2 x 738 546 (included)	Mounting Kit for 2 to 4.6 inch (50 to 115 mm) OD mast. 4.4 lb (2 kg)
850 10013	Tilt Mount Kit 0–11 degrees downtilt angle. 7.4 lb (3.7 kg)
742 263	Three-panel Sector Mounting Kit (120 deg. ea.) for 3.5 inch (89 mm) OD mast.

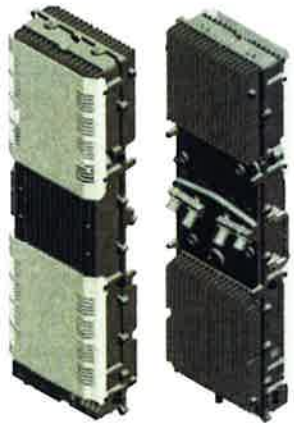
Order Information:

Model	Description
742 213V01	Antenna with 7-16 DIN connectors 0°–6° adjustable electrical downtilt

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
WIRELESS PRODUCT DATASHEET
B4 RRH2X60-4R FOR AWS BAND APPLICATIONS

The Alcatel-Lucent B4 RRH2x60-4R is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the 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 a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent B4 RRH2x60-4R 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.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent B4 RRH2x60-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent B4 RRH2x60-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent B4 RRH2x60-4R is a very cost-effective solution to deploy LTE MIMO.

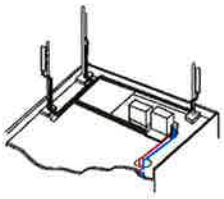
EASY INSTALLATION

The B4 RRH2x60-4R includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

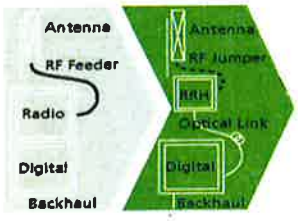
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent B4 RRH2x60-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent B4 RRH2x60-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

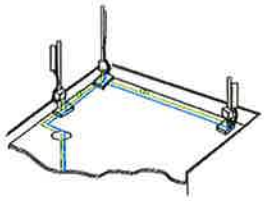
Installation can easily be done by a single person as the Alcatel–Lucent B4 RRH2x60-4R is compact and weighs about 25 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- B4 RRH2x60-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- B4 RRH2x60-4R is optimized for LTE operation
- B4 RRH2x60-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 930x270x146 mm (with solar shield)
- Weight : 25 kg (55 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-38 to -57V)
- Power Consumption: 346W typ. @2x30W (100%RF), 560W typ. @2x60W (100%RF)

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI (3-6) optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 300m using MM fiber, up to 15km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Four external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B
- Health : EN 50385

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-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)

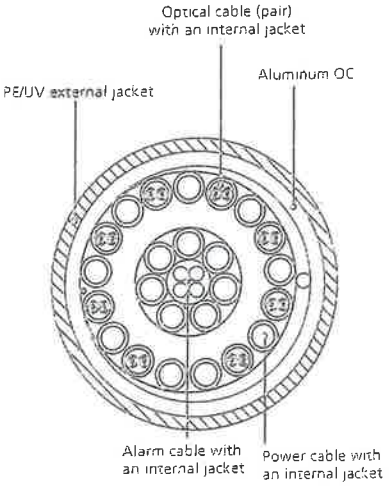


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Site Name: Wilton								
Tower Height: 180Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T	1	500	153	880	0.0083	0.5867	0.14%	
*AT&T	1	500	153	1900	0.0083	1.0000	0.08%	
*AT&T	6	296	153	880	0.0296	0.5867	0.50%	
*AT&T	1	500	153	740	0.0083	0.4933	0.17%	
*MetroPCS	3	444	169	2140	0.0180	1.0000	0.18%	
*Sprint	2	693	143	1900	0.0266	1.0000	0.27%	
*Sprint	1	390	143	850	0.0075	0.5667	0.13%	
*Sprint	2	693	144	2500	0.0262	1.0000	0.26%	
*T-Mobile	2	2334	93	2100	0.2218	1.0000	2.22%	
*T-Mobile	4	1167	93	1900/2100	0.2218	1.0000	2.22%	
*T-Mobile	1	865	93	700	0.0411	0.4667	0.88%	
*Nextel	9	100	180	851	0.0107	0.5673	0.19%	
*Town							4.62%	
Verizon PCS	**1**	**2281**	**163**	**0.0309**	**1970**	**1.0000**	**3.09%**	
Verizon Cellular	**9**	**262**	**163**	**0.0319**	**869**	**0.5793**	**5.51%**	
Verizon AWS	**1**	**2224**	**163**	**0.0301**	**2145**	**1.0000**	**3.01%**	
Verizon 700	**1**	**723**	**163**	**0.0098**	**746**	**0.4973**	**1.97%**	
								25.43%
* Source: Siting Council								

ATTACHMENT 3

Date: **July 20, 2016**

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

Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
(770) 693-0835

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	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:	355200
	Crown Castle Work Order Number:	1256312
	Crown Castle Application Number:	320434 Rev. 6
Engineering Firm Designation:	**Destek Engineering, LLC Project Number:**	1602243
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 Sean Dempsey,

Destek Engineering, 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 926433, in accordance with application 320434, 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:

LC4.5: Modified Structure w/ Existing + Proposed **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 Amendment based upon a wind speed of 85 mph fastest mile.

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

We at *Destek Engineering, 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: Dave Chen, EIT

Respectfully submitted by:

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN 27057
LICENSED
PROFESSIONAL ENGINEER

7/20/2016

Ahmet Colakoglu, PE
President

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 ANSI/EIA RS-222-D 1986. The tower has been modified multiple times in the past to accommodate additional loading.

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
164.0	163.0	3	alcatel lucent	RRH2X60-AWS	7	1-5/8	-
		3	commscope	LNX-6512DS-VTM w/ Mount Pipe			
		3	kathrein	742 213 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
178.0	184.0	1	rfs celwave	PD10017	2	7/8	1
170.0	171.0	3	kathrein	800 10504 w/ Mount Pipe	6 1	1-5/8 1/4	1
		3	kathrein	860 10025			
	170.0	1	tower mounts	Side Arm Mount [SO 103-3]			
164.0	164.0	1	tower mounts	Sector Mount [SM 702-3]	6	1-5/8	1
	163.0	6	rfs celwave	APL868013-42T0 w/ Mount Pipe			
		3	rfs celwave	APX75-866512-CT2 w/ Mount Pipe	6	1-1/4	2
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe	-	-	1
	162.0	6	rfs celwave	FD9R6004/2C-3L			
154.0	158.0	6	ericsson	RRUS-11	12 1 2	1-5/8 3/8 5/8	1
		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]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
146.0	146.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	-	-	1
		3	alcatel lucent	PCS 1900 MHz 4x45W-65MHz			
		3	alcatel lucent	TME-800MHZ 2X50W RRH			
143.0	143.0	9	rfs celwave	ACU-A20-N	3	1-1/4	1
		3	rfs celwave	APXVSPP18-C-A20			
		1	tower mounts	Sector Mount [SM 701-3]			
124.0	131.0	2	rfs celwave	1142-2C	2	1/2	1
	124.0	2	tower mounts	Side Arm Mount [SO 302-1]			
104.0	111.0	1	rfs celwave	1142-2C	1 1	7/8 1/2	1
	108.0	1	rfs celwave	220-3BN			
	104.0	2	tower mounts	Side Arm Mount [SO 302-1]			
93.0	93.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	13	1-1/4	1
		3	ericsson	ERICSSON AIR 21 B2A B4P			
		3	ericsson	ERICSSON AIR 21 B4A B2P			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Sector Mount [SM 402-3]			
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	1
	42.0	1	tower mounts	Side Arm Mount [SO 301-1]			
31.0	32.0	1	gps	GPS_A	1	1/2	1
	31.0	1	tower mounts	Side Arm Mount [SO 701-1]			

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)
179	179	2	Generic	PD10017	2	7/8
165	165	3	Generic	PD1132D	3	7/8
160	160	2	Generic	8' Dishes W/O RAD	2	7/8
140	140	2	Generic	PD10017	2	7/8
125	125	3	Generic	PD1132D	3	7/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	FDH, Job#: 09-04219E G1, dated 04/29/2009	262283	CCISITES
Tower Foundation Drawings	FWT, Job#: 18888-81, dated 05/31/1988	262285	CCISITES
Foundation Mapping	FDH, Job#: 09-11077E N1, dated 08/07/2012	3290324	CCISITES
Tower Manufacturer Drawings	FWT, Job#: 18888-81, dated 05/06/1988	217757	CCISITES
Tower Reinforcement Drawings	HEB, Job#: 98124A, dated 01/07/2000	3290324	CCISITES
Tower Reinforcement Drawings	APT, Job#: CT105271, dated 12/20/2002	801524	CCISITES
Tower Reinforcement Drawings	Paul J. Ford, Job#: 37509-0801, dated 12/08/2009	2434484	CCISITES
Tower Reinforcement Drawings	Destek, Pro. # 1654003,date 1/13/2016	6061656	CCISITES
Post-Modification Inspection	Paul J. Ford, Job#: 37509-0801, dated 01/11/2010	2575710	CCISITES
Structural Analysis Report	B+T Group, Job#: 102920.001.01, dated 11/17/2015	5978416	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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) Tower Modifications as designed by Destek Engineering LLC in January of 2016 (CCIDOCS#: 6061656) will be implemented prior to the installation of any additional appurtenances.

This analysis may be affected if any assumptions are not valid or have been made in error. Destek Engineering, 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
T1	180 - 168	Leg	P2x.154	2	-2.485	24.255	10.2	Pass
T2	168 - 160	Leg	P2x.154 (GR)	25	-9.579	35.519	27.0	Pass
T3	160 - 140	Leg	P3x.216 (GR)	40	43.117	62.382	69.1	Pass
T4	140 - 120	Leg	P3.5x.318 (GR)	67	-86.956	112.762	77.1	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	120 - 100	Leg	P4x.337 (GR)	88	101.066	123.377	81.9 97.5 (b)	Pass
T6	100 - 80	Leg	P5x.375 (GR)	111	125.836	171.092	73.5 89.2 (b)	Pass
T7	80 - 60	Leg	P6x.432 (GR)	132	148.780	235.280	63.2 86.6 (b)[1]	Pass
T8	60 - 40	Leg	P6x.432 (GR)	147	172.342	235.280	73.2 93.5 (b)	Pass
T9	40 - 20	Leg	P6x.432 (GR)	162	194.227	235.280	82.6 88.1 (b)[1]	Pass
T10	20 - 0	Leg	P8x.5 (GR)	183	215.607	357.267	60.3 79.7 (b)	Pass
T1	180 - 168	Diagonal	L2x1 1/2x3/16	10	-0.686	10.631	6.5 9.1 (b)	Pass
T2	168 - 160	Diagonal	L2x1 1/2x3/16	28	-3.148	10.631	29.6 41.4 (b)	Pass
T3	160 - 140	Diagonal	L2x1 1/2x3/16	44	-4.444	6.727	66.1	Pass
T4	140 - 120	Diagonal	L2x2x3/16	71	-4.633	6.300	73.5	Pass
T5	120 - 100	Diagonal	L2 1/2x2x3/16	92	-4.631	6.274	73.8	Pass
T6	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	113	-5.775	7.235	79.8	Pass
T7	80 - 60	Diagonal	L3x3x3/16	134	-6.764	7.915	85.5	Pass
T8	60 - 40	Diagonal	L3 1/2x3x1/4	148	-7.186	10.490	68.5 83.7 (b)	Pass
T9	40 - 20	Diagonal	L3 1/2x3x1/4	166	-7.966	8.503	93.7	Pass
T10	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	187	-8.389	9.847	85.2 97.7 (b)	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-3.986	31.131	12.8 72.5 (b)	Pass
T1	180 - 168	Top Girt	L1 1/2x2x3/16	5	-0.168	7.222	2.3 3.3 (b)	Pass
							Summary	
						Leg (T7)	97.5	Pass
						Diagonal (T10)	97.7	Pass
						Secondary Horizontal (T9)	72.5	Pass
						Top Girt (T1)	3.3	Pass
						Bolt Checks	97.5	Pass
						Rating =	97.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC4.5

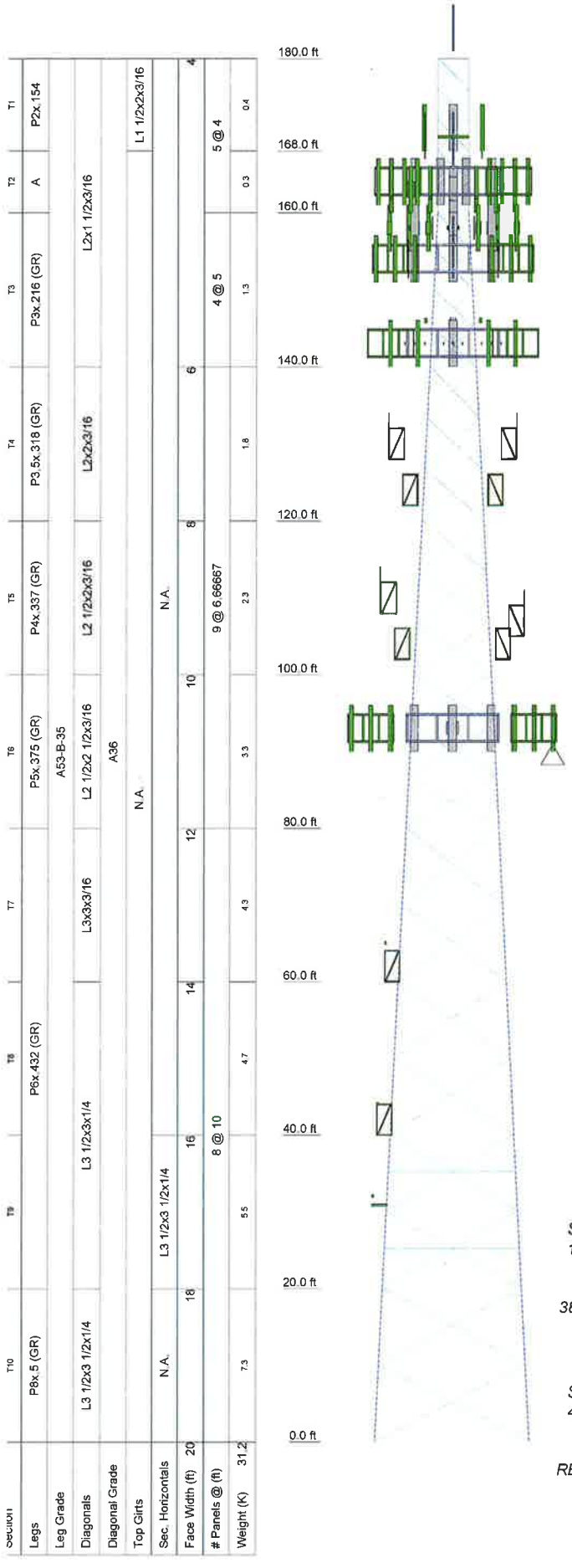
Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	79.7	Pass
1	Base Foundation	0	72.8	Pass
1	Base Foundation Soil Interaction	0	58.6	Pass

Structure Rating (max from all components) =	97.7%

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

4.1) Recommendations

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



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD10017	178	Pipe Mount [PM 601-3]	154
800 10504 w/ Mount Pipe	170	Sector Mount [SM 602-3]	154
800 10504 w/ Mount Pipe	170	TME-800MHZ 2X50W RRH	146
800 10504 w/ Mount Pipe	170	TME-800MHZ 2X50W RRH	146
860 10025	170	TME-800MHZ 2X50W RRH	146
860 10025	170	PCS 1900 MHz 4x45W-65MHz	146
860 10025	170	PCS 1900 MHz 4x45W-65MHz	146
6' x 2" Mount Pipe	170	PCS 1900 MHz 4x45W-65MHz	146
6' x 2" Mount Pipe	170	800 EXTERNAL NOTCH FILTER	146
6' x 2" Mount Pipe	170	800 EXTERNAL NOTCH FILTER	146
Side Arm Mount [SO 103-3]	170	800 EXTERNAL NOTCH FILTER	146
(2) APL868013-42T0 w/ Mount Pipe	164	APXVSPP18-C-A20	143
(2) APL868013-42T0 w/ Mount Pipe	164	APXVSPP18-C-A20	143
(2) APL868013-42T0 w/ Mount Pipe	164	APXVSPP18-C-A20	143
MG D3-800Tx w/ Mount Pipe	164	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	164	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	164	(3) ACU-A20-N	143
(2) FD9R6004/2C-3L	164	Pipe Mount [PM 601-3]	143
(2) FD9R6004/2C-3L	164	Sector Mount [SM 701-3]	143
(2) FD9R6004/2C-3L	164	1142-2C	124
LNX-6512DS-VTM w/ Mount Pipe	164	1142-2C	124
LNX-6512DS-VTM w/ Mount Pipe	164	Side Arm Mount [SO 302-1]	124
LNX-6512DS-VTM w/ Mount Pipe	164	Side Arm Mount [SO 302-1]	124
742 213 w/ Mount Pipe	164	220-3BN	104
742 213 w/ Mount Pipe	164	1142-2C	104
742 213 w/ Mount Pipe	164	Side Arm Mount [SO 302-1]	104
RRH2X60-AWS	164	Side Arm Mount [SO 302-1]	104
RRH2X60-AWS	164	ERICSSON AIR 21 B2A B4P	93
RRH2X60-AWS	164	ERICSSON AIR 21 B2A B4P	93
DB-T1-6Z-8AB-0Z	164	ERICSSON AIR 21 B2A B4P	93
(2) 6' x 2" Mount Pipe	164	ERICSSON AIR 21 B4A B2P	93
(2) 6' x 2" Mount Pipe	164	ERICSSON AIR 21 B4A B2P	93
(2) 6' x 2" Mount Pipe	164	ERICSSON AIR 21 B4A B2P	93
Sector Mount [SM 702-3]	164	LNX-6515DS-VTM w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	LNX-6515DS-VTM w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	LNX-6515DS-VTM w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	KRY 112 144/1	93
P65-16-XLH-RR w/ Mount Pipe	154	KRY 112 144/1	93
P65-16-XLH-RR w/ Mount Pipe	154	KRY 112 144/1	93
P65-16-XLH-RR w/ Mount Pipe	154	RRUS 11 B12	93
(2) LGP21401	154	RRUS 11 B12	93
(2) LGP21401	154	RRUS 11 B12	93
(2) LGP21401	154	Sector Mount [SM 402-3]	93
(2) LGP21901	154	GPS_A	62
(2) LGP21901	154	Side Arm Mount [SO 301-1]	62
(2) LGP21901	154	(2) 3'x8" Knife Plate	60
(2) RRUS-11	154	(2) 3'x8" Knife Plate	60
(2) RRUS-11	154	(2) 3'x8" Knife Plate	60
(2) RRUS-11	154	GPS_A	42
DC6-48-60-18-8F	154	Side Arm Mount [SO 301-1]	42
(2) 5' x 2" Pipe Mount	154	Side Arm Mount [SO 701-1]	31
(2) 5' x 2" Pipe Mount	154	GPS_A	31
(2) 5' x 2" Pipe Mount	154	(2) 3'x8" Knife Plate	20
3' x 2" Pipe Mount	154	(2) 3'x8" Knife Plate	20
3' x 2" Pipe Mount	154	(2) 3'x8" Knife Plate	20
3' x 2" Pipe Mount	154		

MAX
DC
SH
UF
SH

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P2x.154 (GR)		

SHEAR 13 K

TORQ 38 mph WI

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A36	36 ksi	58 ksi

52 K

SHEAR 43 K

TORQUE REACTION

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 7.000 ksi
6. Tower Capacity: 97.7%

DESTEK ENGINEERING
Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
Phone: (770) 693-0835
FAX:

Job: *806353 - BRG 124 943066*
Project: *1602243*
Client: Crown Castle | Drawn by: Ahmet Coakoglu | App'd:
Code: TIA/EIA-222-F | Date: 07/20/16 | Scale: N
Path: | Dwg No.

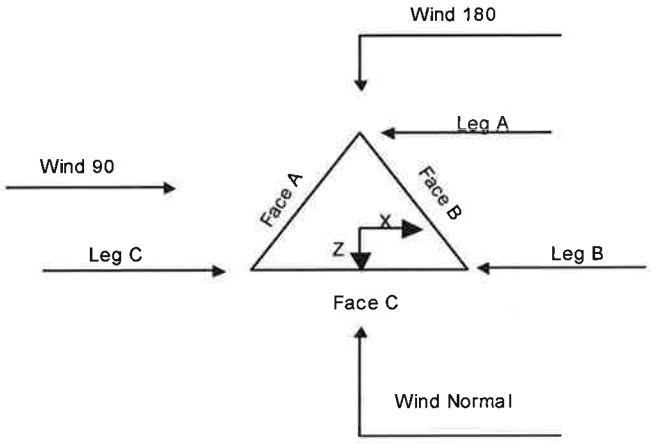
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.000 ft above the ground line.
The base of the tower is set at an elevation of 0.000 ft above the ground line.
The face width of the tower is 4.000 ft at the top and 20.000 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

1) Tower is located in Fairfield County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.750 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56.000 pcf.
6) A wind speed of 38 mph is used in combination with ice.
7) Temperature drop of 50.000 °F.
8) Deflections calculated using a wind speed of 50 mph.
9) Grouted pipe f'_c is 7.000 ksi.
10) Pressures are calculated at each section.
11) Stress ratio used in tower member design is 1.333.
12) 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	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	√ SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
√ Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	**Poles**
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.000-168.000			4.000	1	12.000
T2	168.000-160.000			4.000	1	8.000
T3	160.000-140.000			4.000	1	20.000
T4	140.000-120.000			6.000	1	20.000
T5	120.000-100.000			8.000	1	20.000
T6	100.000-80.000			10.000	1	20.000
T7	80.000-60.000			12.000	1	20.000
T8	60.000-40.000			14.000	1	20.000
T9	40.000-20.000			16.000	1	20.000
T10	20.000-0.000			18.000	1	20.000

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	180.000-168.000	4.000	X Brace	No	No	0.000	0.000
T2	168.000-160.000	4.000	X Brace	No	No	0.000	0.000
T3	160.000-140.000	5.000	X Brace	No	No	0.000	0.000
T4	140.000-120.000	6.667	X Brace	No	No	0.000	0.000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	120.000-100.000	6.667	X Brace	No	No	0.000	0.000
T6	100.000-80.000	6.667	X Brace	No	No	0.000	0.000
T7	80.000-60.000	10.000	X Brace	No	No	0.000	0.000
T8	60.000-40.000	10.000	X Brace	No	No	0.000	0.000
T9	40.000-20.000	10.000	X Brace	No	Yes	0.000	0.000
T10	20.000-0.000	10.000	X Brace	No	No	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.000-168.000	Pipe	P2x.154	A53-B-35 (35 ksi)	Single Angle	L2x1 1/2x3/16	A36 (36 ksi)
T2 168.000-160.000	Grouted Pipe	P2x.154	A53-B-35 (35 ksi)	Single Angle	L2x1 1/2x3/16	A36 (36 ksi)
T3 160.000-140.000	Grouted Pipe	P3x.216	A53-B-35 (35 ksi)	Single Angle	L2x1 1/2x3/16	A36 (36 ksi)
T4 140.000-120.000	Grouted Pipe	P3.5x.318	A53-B-35 (35 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T5 120.000-100.000	Grouted Pipe	P4x.337	A53-B-35 (35 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 100.000-80.000	Grouted Pipe	P5x.375	A53-B-35 (35 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 80.000-60.000	Grouted Pipe	P6x.432	A53-B-35 (35 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T8 60.000-40.000	Grouted Pipe	P6x.432	A53-B-35 (35 ksi)	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)
T9 40.000-20.000	Grouted Pipe	P6x.432	A53-B-35 (35 ksi)	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)
T10 20.000-0.000	Grouted Pipe	P8x.5	A53-B-35 (35 ksi)	Single Angle	L3 1/2x3 1/2x1/4	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 180.000-168.000	Single Angle	L1 1/2x2x3/16	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 40.000-20.000	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	Double Angle Stitch Bolt Spacing Redundants in
T1 180.000-168.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T2 168.000-160.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T3 160.000-140.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T4 140.000-120.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T5 120.000-100.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T6 100.000-80.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T7 80.000-60.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T8 60.000-40.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T9 40.000-20.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T10 20.000-0.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.000-168.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 168.000-160.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 160.000-140.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 140.000-120.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 120.000-100.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 100.000-80.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 80.000-60.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 60.000-40.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 40.000-20.000	No	No	1	1 1	1 1	1 1	1 1	1 1	0.5 0.5	1 1
T10 20.000-0.000	Yes	No	1	1 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		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
T1 180.000-168.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 168.000-160.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 160.000-140.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 140.000-120.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 120.000-100.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 100.000-80.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 80.000-60.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 60.000-40.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 40.000-20.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 20.000-0.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

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 180.000-168.000	Flange	0.000 A325N	0	0.625 A325N	1	0.625 A325N	1	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T2 168.000-160.000	Flange	0.625 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T3 160.000-140.000	Flange	0.625 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T4 140.000-120.000	Flange	0.750 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T5 120.000-100.000	Flange	0.750 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T6 100.000-80.000	Flange	0.875 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T7 80.000-60.000	Flange	0.875 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T8 60.000-40.000	Flange	1.000 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T9 40.000-20.000	Flange	1.000 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.500 A325N	1
T10 20.000-0.000	Flange	1.500 A36	6	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 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
P2x.154 (GR)	35.000	1.075	3.356	10.647	4768.962	40914.218	53.581
P3x.216 (GR)	35.000	2.228	7.393	22.984	4768.962	41656.327	54.738
P3.5x.318 (GR)	35.000	3.678	8.888	31.033	4768.962	38218.387	49.377
P4x.337 (GR)	35.000	4.407	11.497	38.949	4768.962	38951.934	50.521

Size	F_y ksi	A_s in^2	A_c in^2	Wt plf	E_c ksi	E_m ksi	F_{ym} ksi
P5x.375 (GR)	35.000	6.112	18.194	58.701	4768.962	40356.758	52.712
P6x.432 (GR)	35.000	8.405	26.067	82.906	4768.962	40832.181	53.453
P8x.5 (GR)	35.000	12.763	45.664	138.561	4768.962	42650.237	56.288

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 klf
***												
CR 50 1873PE(1-5/8)	C	Yes	Ar (CfAe)	170.000 - 0.000	0.000	-0.35	6	4	0.850 0.750	1.980		0.001
LDF1-50A(1/4")	C	Yes	Ar (CfAe)	170.000 - 0.000	0.000	-0.325	1	1	0.345	0.345		0.000
LDF4-50A(1/2")	C	Yes	Ar (CfAe)	31.000 - 0.000	0.000	-0.32	1	1	0.500	0.630		0.000
Feedline Ladder (Af)	C	Yes	Af (CfAe)	170.000 - 0.000	0.000	-0.36	1	1	3.000	3.000	12.000	0.008
***												
Safety Line 3/8	C	Yes	Ar (CfAe)	180.000 - 0.000	0.000	0	1	1	0.375	0.375		0.000
Climbing Ladder (Flat)	C	Yes	Af (CfAe)	180.000 - 0.000	0.000	0	1	1	3.840	3.840	15.360	0.005
***												
LDF6-50A(1-1/4)	B	Yes	Ar (CfAe)	93.000 - 0.000	0.000	0.1	13	13	0.850 0.750	1.550		0.001
Feedline Ladder (Af)	B	Yes	Af (CfAe)	93.000 - 0.000	0.000	0.1	1	1	3.000	3.000	12.000	0.008
***												
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	104.000 - 0.000	1.000	0.3	1	1	0.630	0.630		0.000
LDF5-50A(7/8)	B	Yes	Ar (CfAe)	104.000 - 0.000	0.000	0.3	1	1	1.090	1.030		0.000
LCF158-50JA-A0(1 5/8")	B	Yes	Ar (CfAe)	154.000 - 0.000	0.000	0.25	12	6	0.850 0.750	1.980		0.000
FB-L98B-002-75000(3/8)	B	Yes	Ar (CfAe)	154.000 - 0.000	0.000	0.35	1	1	0.394	0.000		0.000
WR-VG82ST-BRDA(5/8")	B	Yes	Ar (CfAe)	154.000 - 0.000	0.000	0.35	2	2	0.500	0.000		0.000
2" Rigid Conduit	B	Yes	Ar (CfAe)	154.000 - 0.000	0.000	0.35	1	1	2.000	2.000		0.003
***												
HB114-1-0813U4-M5J(1 1/4")	A	Yes	Ar (CfAe)	143.000 - 0.000	0.000	-0.1	3	3	0.850 0.750	1.540		0.001
FSJ4-50B(1/2)	A	Yes	Ar (CfAe)	42.000 - 0.000	0.000	-0.12	4	2	0.300	0.530		0.000
FSJ4-50B(1/2)	A	Yes	Ar (CfAe)	62.000 - 42.000	0.000	-0.12	3	3	0.300	0.530		0.000
FSJ4-50B(1/2)	A	Yes	Ar (CfAe)	124.000 - 62.000	0.000	-0.12	2	2	0.300	0.530		0.000
***												
561(1-5/8")	A	Yes	Ar (CfAe)	162.000 - 0.000	0.000	0	15	8	0.850 0.750	1.625		0.001
Feedline Ladder (Af)	A	Yes	Af (CfAe)	162.000 - 0.000	0.000	-0.05	1	1	3.000	3.000	12.000	0.008
***												

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight klf
***							

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
T1	180.000-168.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	1.752	4.340	0.000	0.000	0.087
T2	168.000-160.000	A	2.167	0.500	0.000	0.000	0.057
		B	0.000	0.000	0.000	0.000	0.000
		C	5.760	4.560	0.000	0.000	0.148
T3	160.000-140.000	A	22.822	5.000	0.000	0.000	0.584
		B	16.193	0.000	0.000	0.000	0.062
		C	14.400	11.400	0.000	0.000	0.369
T4	140.000-120.000	A	29.720	5.000	0.000	0.000	0.646
		B	23.133	0.000	0.000	0.000	0.089
		C	14.400	11.400	0.000	0.000	0.369
T5	120.000-100.000	A	31.133	5.000	0.000	0.000	0.651
		B	23.687	0.000	0.000	0.000	0.091
		C	14.400	11.400	0.000	0.000	0.369
T6	100.000-80.000	A	31.133	5.000	0.000	0.000	0.651
		B	47.729	3.250	0.000	0.000	0.309
		C	14.400	11.400	0.000	0.000	0.369
T7	80.000-60.000	A	31.222	5.000	0.000	0.000	0.651
		B	59.483	5.000	0.000	0.000	0.422
		C	14.400	11.400	0.000	0.000	0.369
T8	60.000-40.000	A	31.928	5.000	0.000	0.000	0.654
		B	59.483	5.000	0.000	0.000	0.422
		C	14.400	11.400	0.000	0.000	0.369
T9	40.000-20.000	A	31.133	5.000	0.000	0.000	0.656
		B	59.483	5.000	0.000	0.000	0.422
		C	14.977	11.400	0.000	0.000	0.371
T10	20.000-0.000	A	31.133	5.000	0.000	0.000	0.656
		B	59.483	5.000	0.000	0.000	0.422
		C	15.450	11.400	0.000	0.000	0.372

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
T1	180.000-168.000	A	0.916	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		3.204	7.179	0.000	0.000	0.232
T2	168.000-160.000	A	0.909	0.574	3.590	0.000	0.000	0.130
		B		0.000	0.000	0.000	0.000	0.000
		C		5.436	11.836	0.000	0.000	0.398
T3	160.000-140.000	A	0.899	6.541	37.069	0.000	0.000	1.326
		B		13.038	17.092	0.000	0.000	0.557
		C		13.494	29.547	0.000	0.000	0.989
T4	140.000-120.000	A	0.884	11.935	44.083	0.000	0.000	1.513
		B		18.422	24.417	0.000	0.000	0.787
		C		13.341	29.479	0.000	0.000	0.979
T5	120.000-100.000	A	0.867	14.824	45.151	0.000	0.000	1.540
		B		19.896	24.417	0.000	0.000	0.794
		C		13.166	29.401	0.000	0.000	0.967
T6	100.000-80.000	A	0.846	14.618	45.105	0.000	0.000	1.524
		B		29.831	60.089	0.000	0.000	1.511

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		12.960	29.310	0.000	0.000	0.953
T7	80.000-60.000	A	0.821	14.367	45.187	0.000	0.000	1.507
		B		31.136	79.241	0.000	0.000	1.836
		C		12.708	29.198	0.000	0.000	0.936
T8	60.000-40.000	A	0.788	14.042	46.222	0.000	0.000	1.497
		B		30.378	79.169	0.000	0.000	1.793
		C		12.383	29.054	0.000	0.000	0.915
T9	40.000-20.000	A	0.750	13.658	44.892	0.000	0.000	1.474
		B		29.483	79.083	0.000	0.000	1.744
		C		13.952	28.883	0.000	0.000	0.905
T10	20.000-0.000	A	0.750	13.658	44.892	0.000	0.000	1.474
		B		29.483	79.083	0.000	0.000	1.744
		C		15.550	28.883	0.000	0.000	0.918

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	180.000-168.000	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	1.338	0.781	1.423
T2	168.000-160.000	A	0.000	0.457	0.314	0.503
		B	0.000	0.000	0.000	0.000
		C	0.000	1.937	1.216	2.131
T3	160.000-140.000	A	0.000	3.812	2.643	4.238
		B	0.000	2.575	1.539	2.863
		C	0.000	3.849	2.451	4.279
T4	140.000-120.000	A	0.000	3.492	2.406	3.949
		B	0.000	2.624	1.603	2.968
		C	0.000	2.744	1.788	3.103
T5	120.000-100.000	A	0.000	3.291	2.815	4.747
		B	0.000	2.393	1.845	3.452
		C	0.000	2.403	2.010	3.466
T6	100.000-80.000	A	0.000	3.003	2.643	4.437
		B	0.000	4.481	3.729	6.622
		C	0.000	2.185	1.887	3.229
T7	80.000-60.000	A	0.000	2.089	2.286	3.817
		B	0.000	3.844	4.070	7.025
		C	0.000	1.511	1.629	2.760
T8	60.000-40.000	A	0.000	1.932	2.590	4.288
		B	0.000	3.489	4.523	7.745
		C	0.000	1.365	1.810	3.029
T9	40.000-20.000	A	0.000	2.465	3.500	5.752
		B	0.000	4.541	6.246	10.597
		C	0.000	1.847	2.555	4.311
T10	20.000-0.000	A	0.000	1.678	2.382	3.915
		B	0.000	3.091	4.251	7.213
		C	0.000	1.303	1.770	3.039

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.000-168.000	0.734	2.217	0.417	1.587
T2	168.000-160.000	2.474	3.951	1.500	2.695
T3	160.000-140.000	2.473	2.296	1.908	1.897
T4	140.000-120.000	3.286	2.822	3.002	2.540
T5	120.000-100.000	3.601	3.190	3.661	2.987
T6	100.000-80.000	8.691	2.336	8.619	2.441

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T7	80.000-60.000	11.648	2.012	11.756	2.271
T8	60.000-40.000	12.436	2.168	12.722	2.435
T9	40.000-20.000	12.386	2.254	12.714	2.567
T10	20.000-0.000	14.387	2.709	15.384	3.319

Discrete Tower Loads

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
***										
PD10017	A	From Leg	0.500	0.000	178.000	No Ice		4.114	4.114	0.025
			0.000			1/2" Ice		5.641	5.641	0.055
			6.000			1" Ice		7.185	7.185	0.095
						2" Ice		10.323	10.323	0.203
						4" Ice		14.448	14.448	0.542
170' Metro PCS										
800 10504 w/ Mount Pipe	A	From Leg	2.000	0.000	170.000	No Ice		3.589	3.178	0.038
			0.000			1/2" Ice		4.007	3.905	0.070
			1.000			1" Ice		4.422	4.581	0.109
						2" Ice		5.339	5.982	0.207
						4" Ice		7.385	8.983	0.514
800 10504 w/ Mount Pipe	B	From Leg	2.000	0.000	170.000	No Ice		3.589	3.178	0.038
			0.000			1/2" Ice		4.007	3.905	0.070
			1.000			1" Ice		4.422	4.581	0.109
						2" Ice		5.339	5.982	0.207
						4" Ice		7.385	8.983	0.514
800 10504 w/ Mount Pipe	C	From Leg	2.000	0.000	170.000	No Ice		3.589	3.178	0.038
			0.000			1/2" Ice		4.007	3.905	0.070
			1.000			1" Ice		4.422	4.581	0.109
						2" Ice		5.339	5.982	0.207
						4" Ice		7.385	8.983	0.514
860 10025	A	From Leg	2.000	0.000	170.000	No Ice		0.157	0.129	0.001
			0.000			1/2" Ice		0.221	0.191	0.003
			1.000			1" Ice		0.294	0.262	0.005
						2" Ice		0.467	0.429	0.013
						4" Ice		0.915	0.867	0.050
860 10025	B	From Leg	2.000	0.000	170.000	No Ice		0.157	0.129	0.001
			0.000			1/2" Ice		0.221	0.191	0.003
			1.000			1" Ice		0.294	0.262	0.005
						2" Ice		0.467	0.429	0.013
						4" Ice		0.915	0.867	0.050
860 10025	C	From Leg	2.000	0.000	170.000	No Ice		0.157	0.129	0.001
			0.000			1/2" Ice		0.221	0.191	0.003
			1.000			1" Ice		0.294	0.262	0.005
						2" Ice		0.467	0.429	0.013
						4" Ice		0.915	0.867	0.050
6' x 2" Mount Pipe	A	From Leg	2.000	0.000	170.000	No Ice		1.425	1.425	0.022
			0.000			1/2" Ice		1.925	1.925	0.033
			0.000			1" Ice		2.294	2.294	0.048
						2" Ice		3.060	3.060	0.090
						4" Ice		4.702	4.702	0.231
6' x 2" Mount Pipe	B	From Leg	2.000	0.000	170.000	No Ice		1.425	1.425	0.022

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000 0.000			1/2" Ice 1" Ice 2" Ice 4" Ice	1.925 2.294 3.060 4.702	1.925 2.294 3.060 4.702	0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	C	From Leg	2.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
Side Arm Mount [SO 103-3]	C	None		0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.500 11.800 14.100 18.700 27.900	9.500 11.800 14.100 18.700 27.900	0.224 0.317 0.410 0.596 0.968
163' Verizon									
(2) APL868013-42T0 w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.104 3.476 3.879 4.761 6.660	4.921 5.596 6.284 7.712 10.833	0.025 0.063 0.108 0.216 0.541
(2) APL868013-42T0 w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.104 3.476 3.879 4.761 6.660	4.921 5.596 6.284 7.712 10.833	0.025 0.063 0.108 0.216 0.541
(2) APL868013-42T0 w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.104 3.476 3.879 4.761 6.660	4.921 5.596 6.284 7.712 10.833	0.025 0.063 0.108 0.216 0.541
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.570 3.979 4.387 5.325 7.341	3.418 4.119 4.784 6.164 9.175	0.035 0.068 0.108 0.208 0.517
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.570 3.979 4.387 5.325 7.341	3.418 4.119 4.784 6.164 9.175	0.035 0.068 0.108 0.208 0.517
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.570 3.979 4.387 5.325 7.341	3.418 4.119 4.784 6.164 9.175	0.035 0.068 0.108 0.208 0.517
(2) FD9R6004/2C-3L	A	From Leg	4.000 0.000 -2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
(2) FD9R6004/2C-3L	B	From Leg	4.000 0.000 -2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
(2) FD9R6004/2C-3L	C	From Leg	4.000 0.000 -2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
LNX-6512DS-VTM w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.849 6.307 6.774 7.739 9.803	4.545 5.225 5.912 7.341 10.456	0.047 0.095 0.150 0.279 0.650
LNX-6512DS-VTM w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.849 6.307 6.774 7.739 9.803	4.545 5.225 5.912 7.341 10.456	0.047 0.095 0.150 0.279 0.650
LNX-6512DS-VTM w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.849 6.307 6.774 7.739 9.803	4.545 5.225 5.912 7.341 10.456	0.047 0.095 0.150 0.279 0.650
742 213 w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.373 5.950 6.501 7.611 9.933	4.620 6.000 6.982 8.852 12.794	0.049 0.094 0.146 0.277 0.683
742 213 w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.373 5.950 6.501 7.611 9.933	4.620 6.000 6.982 8.852 12.794	0.049 0.094 0.146 0.277 0.683
742 213 w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.373 5.950 6.501 7.611 9.933	4.620 6.000 6.982 8.852 12.794	0.049 0.094 0.146 0.277 0.683
RRH2X60-AWS	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	2.158 2.441 2.733 3.342 4.665	0.060 0.084 0.112 0.180 0.369
RRH2X60-AWS	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	2.158 2.441 2.733 3.342 4.665	0.060 0.084 0.112 0.180 0.369
RRH2X60-AWS	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	2.158 2.441 2.733 3.342 4.665	0.060 0.084 0.112 0.180 0.369
DB-T1-6Z-8AB-0Z	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.600 5.915 6.240 6.914	2.333 2.558 2.791 3.284	0.044 0.080 0.120 0.213

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	8.365	4.373	0.455
						4" Ice			
(2) 6' x 2" Mount Pipe	A	From Leg	3.000 0.000 0.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
(2) 6' x 2" Mount Pipe	B	From Leg	3.000 0.000 0.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
(2) 6' x 2" Mount Pipe	C	From Leg	3.000 0.000 0.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
Sector Mount [SM 702-3]	C	None		0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	37.400 54.200 71.000 104.600 171.800	37.400 54.200 71.000 104.600 171.800	1.551 2.352 3.153 4.755 7.959
154' AT&T									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.637 9.290 9.910 11.176 13.829	6.362 7.538 8.427 10.239 14.099	0.079 0.144 0.218 0.393 0.886
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.637 9.290 9.910 11.176 13.829	6.362 7.538 8.427 10.239 14.099	0.079 0.144 0.218 0.393 0.886
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.637 9.290 9.910 11.176 13.829	6.362 7.538 8.427 10.239 14.099	0.079 0.144 0.218 0.393 0.886
(2) LGP21401	A	From Leg	4.000 0.000	0.000	154.000	No Ice 1/2"	1.288 1.445	0.233 0.313	0.014 0.021

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			4.000			Ice	1.611	0.403	0.030
						1" Ice	1.969	0.608	0.055
						2" Ice	2.788	1.121	0.135
						4" Ice			
(2) LGP21401	B	From Leg	4.000	0.000	154.000	No Ice	1.288	0.233	0.014
			0.000			1/2"	1.445	0.313	0.021
			4.000			Ice	1.611	0.403	0.030
						1" Ice	1.969	0.608	0.055
						2" Ice	2.788	1.121	0.135
						4" Ice			
(2) LGP21401	C	From Leg	4.000	0.000	154.000	No Ice	1.288	0.233	0.014
			0.000			1/2"	1.445	0.313	0.021
			4.000			Ice	1.611	0.403	0.030
						1" Ice	1.969	0.608	0.055
						2" Ice	2.788	1.121	0.135
						4" Ice			
(2) LGP21901	A	From Leg	1.000	0.000	154.000	No Ice	0.270	0.184	0.006
			0.000			1/2"	0.343	0.248	0.008
			4.000			Ice	0.425	0.322	0.011
						1" Ice	0.616	0.494	0.022
						2" Ice	1.101	0.943	0.066
						4" Ice			
(2) LGP21901	B	From Leg	1.000	0.000	154.000	No Ice	0.270	0.184	0.006
			0.000			1/2"	0.343	0.248	0.008
			4.000			Ice	0.425	0.322	0.011
						1" Ice	0.616	0.494	0.022
						2" Ice	1.101	0.943	0.066
						4" Ice			
(2) LGP21901	C	From Leg	1.000	0.000	154.000	No Ice	0.270	0.184	0.006
			0.000			1/2"	0.343	0.248	0.008
			4.000			Ice	0.425	0.322	0.011
						1" Ice	0.616	0.494	0.022
						2" Ice	1.101	0.943	0.066
						4" Ice			
(2) RRUS-11	A	From Leg	4.000	0.000	154.000	No Ice	3.249	1.373	0.048
			0.000			1/2"	3.491	1.551	0.068
			4.000			Ice	3.741	1.738	0.092
						1" Ice	4.268	2.138	0.150
						2" Ice	5.426	3.042	0.310
						4" Ice			
(2) RRUS-11	B	From Leg	4.000	0.000	154.000	No Ice	3.249	1.373	0.048
			0.000			1/2"	3.491	1.551	0.068
			4.000			Ice	3.741	1.738	0.092
						1" Ice	4.268	2.138	0.150
						2" Ice	5.426	3.042	0.310
						4" Ice			
(2) RRUS-11	C	From Leg	4.000	0.000	154.000	No Ice	3.249	1.373	0.048
			0.000			1/2"	3.491	1.551	0.068
			4.000			Ice	3.741	1.738	0.092
						1" Ice	4.268	2.138	0.150
						2" Ice	5.426	3.042	0.310
						4" Ice			
DC6-48-60-18-8F	B	From Leg	4.000	0.000	154.000	No Ice	1.266	1.266	0.019
			0.000			1/2"	1.456	1.456	0.034
			0.000			Ice	1.658	1.658	0.051
						1" Ice	2.093	2.093	0.094
						2" Ice	3.098	3.098	0.214
						4" Ice			
(2) 5' x 2" Pipe Mount	A	From Leg	4.000	0.000	154.000	No Ice	1.000	1.000	0.029
			0.000			1/2"	1.393	1.393	0.037
			0.000			Ice	1.703	1.703	0.048
						1" Ice	2.351	2.351	0.082
						2" Ice	3.778	3.778	0.196
						4" Ice			
(2) 5' x 2" Pipe Mount	B	From Leg	4.000	0.000	154.000	No Ice	1.000	1.000	0.029

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
			0.000			1/2"	1.393	1.393	0.037
			0.000			Ice	1.703	1.703	0.048
						1" Ice	2.351	2.351	0.082
						2" Ice	3.778	3.778	0.196
						4" Ice			
(2) 5' x 2" Pipe Mount	C	From Leg	4.000	0.000	154.000	No Ice	1.000	1.000	0.029
			0.000			1/2"	1.393	1.393	0.037
			0.000			Ice	1.703	1.703	0.048
						1" Ice	2.351	2.351	0.082
						2" Ice	3.778	3.778	0.196
						4" Ice			
3' x 2" Pipe Mount	A	From Leg	0.500	0.000	154.000	No Ice	0.583	0.583	0.011
			0.000			1/2"	0.770	0.770	0.017
			4.000			Ice	0.967	0.967	0.024
						1" Ice	1.417	1.417	0.047
						2" Ice	2.536	2.536	0.126
						4" Ice			
3' x 2" Pipe Mount	B	From Leg	0.500	0.000	154.000	No Ice	0.583	0.583	0.011
			0.000			1/2"	0.770	0.770	0.017
			4.000			Ice	0.967	0.967	0.024
						1" Ice	1.417	1.417	0.047
						2" Ice	2.536	2.536	0.126
						4" Ice			
3' x 2" Pipe Mount	C	From Leg	0.500	0.000	154.000	No Ice	0.583	0.583	0.011
			0.000			1/2"	0.770	0.770	0.017
			4.000			Ice	0.967	0.967	0.024
						1" Ice	1.417	1.417	0.047
						2" Ice	2.536	2.536	0.126
						4" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	154.000	No Ice	4.390	4.390	0.195
						1/2"	5.480	5.480	0.237
						Ice	6.570	6.570	0.280
						1" Ice	8.750	8.750	0.365
						2" Ice	13.110	13.110	0.534
						4" Ice			
Sector Mount [SM 602-3]	C	None		0.000	154.000	No Ice	33.110	33.110	1.541
						1/2"	44.900	44.900	2.159
						Ice	56.690	56.690	2.777
						1" Ice	80.270	80.270	4.014
						2" Ice	127.430	127.430	6.487
						4" Ice			
146' Sprint									
TME-800MHZ 2X50W RRH	A	From Leg	1.000	0.000	146.000	No Ice	2.490	2.068	0.053
			0.000			1/2"	2.706	2.271	0.074
			0.000			Ice	2.931	2.481	0.098
						1" Ice	3.407	2.928	0.157
						2" Ice	4.462	3.927	0.318
						4" Ice			
TME-800MHZ 2X50W RRH	B	From Leg	1.000	0.000	146.000	No Ice	2.490	2.068	0.053
			0.000			1/2"	2.706	2.271	0.074
			0.000			Ice	2.931	2.481	0.098
						1" Ice	3.407	2.928	0.157
						2" Ice	4.462	3.927	0.318
						4" Ice			
TME-800MHZ 2X50W RRH	C	From Leg	1.000	0.000	146.000	No Ice	2.490	2.068	0.053
			0.000			1/2"	2.706	2.271	0.074
			0.000			Ice	2.931	2.481	0.098
						1" Ice	3.407	2.928	0.157
						2" Ice	4.462	3.927	0.318
						4" Ice			
PCS 1900 MHz 4x45W-65MHz	A	From Leg	1.000	0.000	146.000	No Ice	2.709	2.611	0.060
			0.000			1/2"	2.948	2.847	0.083
			0.000			Ice	3.195	3.092	0.110
						1" Ice	3.716	3.608	0.173
						2" Ice	4.862	4.744	0.347

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
							4" Ice			
PCS 1900 MHz 4x45W-65MHz	B	From Leg	1.000	0.000	0.000	146.000	No Ice	2.709	2.611	0.060
			0.000				1/2" Ice	2.948	2.847	0.083
			0.000				1" Ice	3.195	3.092	0.110
							2" Ice	3.716	3.608	0.173
							4" Ice	4.862	4.744	0.347
PCS 1900 MHz 4x45W-65MHz	C	From Leg	1.000	0.000	0.000	146.000	No Ice	2.709	2.611	0.060
			0.000				1/2" Ice	2.948	2.847	0.083
			0.000				1" Ice	3.195	3.092	0.110
							2" Ice	3.716	3.608	0.173
							4" Ice	4.862	4.744	0.347
800 EXTERNAL NOTCH FILTER	A	From Leg	1.000	0.000	0.000	146.000	No Ice	0.770	0.375	0.011
			0.000				1/2" Ice	0.890	0.465	0.017
			0.000				1" Ice	1.018	0.563	0.024
							2" Ice	1.301	0.787	0.045
							4" Ice	1.970	1.337	0.114
800 EXTERNAL NOTCH FILTER	B	From Leg	1.000	0.000	0.000	146.000	No Ice	0.770	0.375	0.011
			0.000				1/2" Ice	0.890	0.465	0.017
			0.000				1" Ice	1.018	0.563	0.024
							2" Ice	1.301	0.787	0.045
							4" Ice	1.970	1.337	0.114
800 EXTERNAL NOTCH FILTER	C	From Leg	1.000	0.000	0.000	146.000	No Ice	0.770	0.375	0.011
			0.000				1/2" Ice	0.890	0.465	0.017
			0.000				1" Ice	1.018	0.563	0.024
							2" Ice	1.301	0.787	0.045
							4" Ice	1.970	1.337	0.114
143' Sprint										
APXVSPP18-C-A20	A	From Leg	2.000	0.000	0.000	143.000	No Ice	8.260	5.283	0.057
			0.000				1/2" Ice	8.807	5.736	0.107
			0.000				1" Ice	9.364	6.196	0.162
							2" Ice	10.502	7.138	0.292
							4" Ice	12.882	9.273	0.634
APXVSPP18-C-A20	B	From Leg	2.000	0.000	0.000	143.000	No Ice	8.260	5.283	0.057
			0.000				1/2" Ice	8.807	5.736	0.107
			0.000				1" Ice	9.364	6.196	0.162
							2" Ice	10.502	7.138	0.292
							4" Ice	12.882	9.273	0.634
APXVSPP18-C-A20	C	From Leg	2.000	0.000	0.000	143.000	No Ice	8.260	5.283	0.057
			0.000				1/2" Ice	8.807	5.736	0.107
			0.000				1" Ice	9.364	6.196	0.162
							2" Ice	10.502	7.138	0.292
							4" Ice	12.882	9.273	0.634
(3) ACU-A20-N	A	From Leg	1.000	0.000	0.000	143.000	No Ice	0.078	0.136	0.001
			0.000				1/2" Ice	0.121	0.189	0.002
			0.000				1" Ice	0.173	0.251	0.004
							2" Ice	0.302	0.400	0.012
							4" Ice	0.665	0.802	0.045
(3) ACU-A20-N	B	From Leg	1.000	0.000	0.000	143.000	No Ice	0.078	0.136	0.001
			0.000				1/2" Ice	0.121	0.189	0.002
			0.000				1" Ice	0.173	0.251	0.004
							2" Ice	0.302	0.400	0.012
							4" Ice	0.665	0.802	0.045
(3) ACU-A20-N	C	From Leg	1.000	0.000	0.000	143.000	No Ice	0.078	0.136	0.001
			0.000				1/2" Ice	0.121	0.189	0.002
			0.000				1" Ice	0.173	0.251	0.004

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	0.302	0.400	0.012
							2" Ice	0.665	0.802	0.045
							4" Ice			
Pipe Mount [PM 601-3]	C	None			0.000	143.000	No Ice	4.390	4.390	0.195
							1/2" Ice	5.480	5.480	0.237
							1" Ice	6.570	6.570	0.280
							2" Ice	8.750	8.750	0.365
							4" Ice	13.110	13.110	0.534
Sector Mount [SM 701-3]	C	None			0.000	143.000	No Ice	19.730	19.730	0.825
							1/2" Ice	27.410	27.410	1.166
							1" Ice	35.090	35.090	1.507
							2" Ice	50.450	50.450	2.189
							4" Ice	81.170	81.170	3.553
124' Wilton										
1142-2C	B	From Leg	4.000		0.000	124.000	No Ice	2.092	2.092	0.024
			0.000				1/2" Ice	3.374	3.374	0.041
			7.000				1" Ice	4.673	4.673	0.066
							2" Ice	7.320	7.320	0.140
							4" Ice	10.794	10.794	0.392
1142-2C	C	From Leg	4.000		0.000	124.000	No Ice	2.092	2.092	0.024
			0.000				1/2" Ice	3.374	3.374	0.041
			7.000				1" Ice	4.673	4.673	0.066
							2" Ice	7.320	7.320	0.140
							4" Ice	10.794	10.794	0.392
Side Arm Mount [SO 302-1]	B	From Leg	2.000		0.000	124.000	No Ice	1.670	3.270	0.055
			0.000				1/2" Ice	2.510	4.990	0.088
			0.000				1" Ice	3.350	6.710	0.121
							2" Ice	5.030	10.150	0.187
							4" Ice	8.390	17.030	0.320
Side Arm Mount [SO 302-1]	C	From Leg	2.000		0.000	124.000	No Ice	1.670	3.270	0.055
			0.000				1/2" Ice	2.510	4.990	0.088
			0.000				1" Ice	3.350	6.710	0.121
							2" Ice	5.030	10.150	0.187
							4" Ice	8.390	17.030	0.320
104' Wilton										
220-3BN	B	From Leg	4.000		0.000	104.000	No Ice	5.720	5.720	0.024
			0.000				1/2" Ice	7.831	7.831	0.066
			4.000				1" Ice	9.959	9.959	0.120
							2" Ice	14.265	14.265	0.270
							4" Ice	22.633	22.633	0.734
1142-2C	C	From Leg	4.000		0.000	104.000	No Ice	2.092	2.092	0.024
			0.000				1/2" Ice	3.374	3.374	0.041
			7.000				1" Ice	4.673	4.673	0.066
							2" Ice	7.320	7.320	0.140
							4" Ice	10.794	10.794	0.392
Side Arm Mount [SO 302-1]	B	From Leg	2.000		0.000	104.000	No Ice	1.670	3.270	0.055
			0.000				1/2" Ice	2.510	4.990	0.088
			0.000				1" Ice	3.350	6.710	0.121
							2" Ice	5.030	10.150	0.187
							4" Ice	8.390	17.030	0.320
Side Arm Mount [SO 302-1]	C	From Leg	2.000		0.000	104.000	No Ice	1.670	3.270	0.055
			0.000				1/2" Ice	2.510	4.990	0.088
			0.000				1" Ice	3.350	6.710	0.121
							2" Ice	5.030	10.150	0.187
							4" Ice	8.390	17.030	0.320

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
93' T-Mobile										
ERICSSON AIR 21 B2A B4P	A	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.588 7.033 7.488 8.422 10.395	4.297 4.703 5.130 6.010 7.873	0.092 0.133 0.180 0.290 0.580
ERICSSON AIR 21 B2A B4P	B	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.588 7.033 7.488 8.422 10.395	4.297 4.703 5.130 6.010 7.873	0.092 0.133 0.180 0.290 0.580
ERICSSON AIR 21 B2A B4P	C	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.588 7.033 7.488 8.422 10.395	4.297 4.703 5.130 6.010 7.873	0.092 0.133 0.180 0.290 0.580
ERICSSON AIR 21 B4A B2P	A	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.576 7.021 7.475 8.408 10.378	4.288 4.695 5.121 6.000 7.860	0.092 0.133 0.180 0.290 0.580
ERICSSON AIR 21 B4A B2P	B	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.576 7.021 7.475 8.408 10.378	4.288 4.695 5.121 6.000 7.860	0.092 0.133 0.180 0.290 0.580
ERICSSON AIR 21 B4A B2P	C	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.576 7.021 7.475 8.408 10.378	4.288 4.695 5.121 6.000 7.860	0.092 0.133 0.180 0.290 0.580
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.683 12.404 13.135 14.601 17.875	9.842 11.366 12.914 15.267 20.139	0.083 0.173 0.273 0.506 1.151
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.683 12.404 13.135 14.601 17.875	9.842 11.366 12.914 15.267 20.139	0.083 0.173 0.273 0.506 1.151
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.683 12.404 13.135 14.601 17.875	9.842 11.366 12.914 15.267 20.139	0.083 0.173 0.273 0.506 1.151
KRY 112 144/1	A	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.204 0.273 0.351 0.533 0.999	0.011 0.014 0.019 0.032 0.082
KRY 112 144/1	B	From Leg	3.000 0.000 0.000		0.000	93.000	No Ice 1/2" Ice 1" Ice	0.408 0.497 0.594 0.815	0.204 0.273 0.351 0.533	0.011 0.014 0.019 0.032

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice 4" Ice	1.359	0.999	0.082
KRY 112 144/1	C	From Leg	3.000 0.000 0.000	0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.204 0.273 0.351 0.533 0.999	0.011 0.014 0.019 0.032 0.082
RRUS 11 B12	A	From Leg	3.000 0.000 0.000	0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
RRUS 11 B12	B	From Leg	3.000 0.000 0.000	0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
RRUS 11 B12	C	From Leg	3.000 0.000 0.000	0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
Sector Mount [SM 402-3]	C	None		0.000	93.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	18.910 26.780 34.650 50.390 81.870	18.910 26.780 34.650 50.390 81.870	0.851 1.233 1.616 2.381 3.910
62' Verizon GPS_A	C	From Leg	2.000 0.000 3.000	0.000	62.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.297 0.374 0.459 0.655 1.151	0.297 0.374 0.459 0.655 1.151	0.001 0.005 0.010 0.025 0.079
Side Arm Mount [SO 301-1]	C	From Leg	1.000 0.000 0.000	0.000	62.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.000 1.390 1.780 2.560 4.120	0.900 1.420 1.940 2.980 5.060	0.023 0.033 0.042 0.061 0.100
42' Verizon GPS_A	C	From Leg	2.000 0.000 2.000	0.000	42.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.297 0.374 0.459 0.655 1.151	0.297 0.374 0.459 0.655 1.151	0.001 0.005 0.010 0.025 0.079
Side Arm Mount [SO 301-1]	C	From Leg	1.000 0.000 0.000	0.000	42.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.000 1.390 1.780 2.560 4.120	0.900 1.420 1.940 2.980 5.060	0.023 0.033 0.042 0.061 0.100
31' Verizon GPS_A	C	From Leg	2.000 0.000 1.000	0.000	31.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.297 0.374 0.459 0.655 1.151	0.297 0.374 0.459 0.655 1.151	0.001 0.005 0.010 0.025 0.079

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
Side Arm Mount [SO 701-1]	C	From Leg	1.000	0.000	0.000	31.000	No Ice	0.850	1.670	0.065
			0.000				1/2" Ice	1.140	2.340	0.079
			0.000				1" Ice	1.430	3.010	0.093
							2" Ice	2.010	4.350	0.121
							4" Ice	3.170	7.030	0.177
C *** Knife Plates ***										
(2) 3'x8" Knife Plate	A	From Leg	0.000	0.000	0.000	20.000	No Ice	2.333	0.250	0.048
			0.000				1/2" Ice	2.625	0.500	0.054
			0.000				1" Ice	2.917	0.750	0.060
							2" Ice	3.501	1.250	0.072
							4" Ice	4.669	2.250	0.096
(2) 3'x8" Knife Plate	B	From Leg	0.000	0.000	0.000	20.000	No Ice	2.333	0.250	0.048
			0.000				1/2" Ice	2.625	0.500	0.054
			0.000				1" Ice	2.917	0.750	0.060
							2" Ice	3.501	1.250	0.072
							4" Ice	4.669	2.250	0.096
(2) 3'x8" Knife Plate	C	From Leg	0.000	0.000	0.000	20.000	No Ice	2.333	0.250	0.048
			0.000				1/2" Ice	2.625	0.500	0.054
			0.000				1" Ice	2.917	0.750	0.060
							2" Ice	3.501	1.250	0.072
							4" Ice	4.669	2.250	0.096
(2) 3'x8" Knife Plate	A	From Leg	0.000	0.000	0.000	60.000	No Ice	2.333	0.250	0.048
			0.000				1/2" Ice	2.625	0.500	0.054
			0.000				1" Ice	2.917	0.750	0.060
							2" Ice	3.501	1.250	0.072
							4" Ice	4.669	2.250	0.096
(2) 3'x8" Knife Plate	B	From Leg	0.000	0.000	0.000	60.000	No Ice	2.333	0.250	0.048
			0.000				1/2" Ice	2.625	0.500	0.054
			0.000				1" Ice	2.917	0.750	0.060
							2" Ice	3.501	1.250	0.072
							4" Ice	4.669	2.250	0.096
(2) 3'x8" Knife Plate	C	From Leg	0.000	0.000	0.000	60.000	No Ice	2.333	0.250	0.048
			0.000				1/2" Ice	2.625	0.500	0.054
			0.000				1" Ice	2.917	0.750	0.060
							2" Ice	3.501	1.250	0.072
							4" Ice	4.669	2.250	0.096

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice

Comb. No.	Description
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 168	Leg	Max Tension	4	1.854	-0.096	0.047
			Max. Compression	6	-2.485	-0.077	-0.041
			Max. Mx	5	-0.243	-0.187	0.004
			Max. My	8	1.845	-0.001	0.192
			Max. Vy	5	0.185	-0.187	0.004
			Max. Vx	2	-0.179	-0.051	0.163
		Diagonal	Max Tension	6	0.676	0.000	0.000
			Max. Compression	12	-0.686	0.000	0.000
			Max. Mx	10	-0.263	0.014	-0.000
			Max. My	3	-0.640	-0.001	0.003
			Max. Vy	16	0.009	0.009	-0.000
			Max. Vx	3	-0.001	0.006	0.003
		Top Girt	Max Tension	10	0.184	0.000	0.000
			Max. Compression	4	-0.168	0.000	0.000
			Max. Mx	14	0.019	-0.012	0.000
			Max. Vy	14	0.012	0.000	0.000
T2	168 - 160	Leg	Max Tension	4	8.135	-0.028	0.009
			Max. Compression	10	-9.579	-0.024	0.029
			Max. Mx	5	-0.355	-0.187	0.004
			Max. My	9	-0.391	0.093	-0.169
			Max. Vy	5	-1.409	0.008	0.066
			Max. Vx	8	-1.393	-0.005	-0.029
		Diagonal	Max Tension	5	3.072	0.000	0.000
			Max. Compression	11	-3.148	0.000	0.000
			Max. Mx	9	1.834	0.024	0.003
			Max. My	11	3.057	0.010	0.006
			Max. Vy	26	-0.011	0.013	0.001
			Max. Vx	11	0.002	0.010	0.006
T3	160 - 140	Leg	Max Tension	4	43.117	-0.376	-0.004
			Max. Compression	10	-51.522	0.324	0.011
			Max. Mx	4	13.932	-0.544	-0.012
			Max. My	3	-2.736	-0.018	0.786
			Max. Vy	12	-1.050	-0.543	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	9	1.030	-0.018	0.240
		Diagonal	Max Tension	5	4.399	0.000	0.000
			Max. Compression	5	-4.444	0.000	0.000
			Max. Mx	10	3.565	0.025	0.002
			Max. My	13	2.698	0.011	0.004
			Max. Vy	19	-0.012	0.015	0.001
			Max. Vx	13	-0.001	0.000	0.000
T4	140 - 120	Leg	Max Tension	4	74.943	-0.285	-0.044
			Max. Compression	10	-86.956	0.332	0.052
			Max. Mx	4	53.720	-0.354	-0.011
			Max. My	9	-3.473	-0.019	0.461
			Max. Vy	8	-0.083	-0.286	0.008
			Max. Vx	10	0.130	-0.148	0.321
		Diagonal	Max Tension	5	5.068	0.000	0.000
			Max. Compression	5	-5.090	0.000	0.000
			Max. Mx	10	3.582	0.026	0.002
			Max. My	23	1.030	0.022	0.003
			Max. Vy	21	0.017	0.020	-0.002
			Max. Vx	23	-0.001	0.000	0.000
T5	120 - 100	Leg	Max Tension	4	101.066	-0.369	-0.063
			Max. Compression	10	-116.621	0.424	0.078
			Max. Mx	2	-115.606	0.433	-0.043
			Max. My	9	-5.472	-0.005	0.619
			Max. Vy	8	-0.106	-0.370	0.029
			Max. Vx	9	-0.166	-0.005	0.619
		Diagonal	Max Tension	5	4.595	0.000	0.000
			Max. Compression	5	-4.631	0.000	0.000
			Max. Mx	10	3.401	0.038	0.003
			Max. My	23	0.996	0.034	0.004
			Max. Vy	21	0.023	0.032	0.004
			Max. Vx	23	-0.001	0.000	0.000
T6	100 - 80	Leg	Max Tension	8	125.836	-0.445	0.010
			Max. Compression	10	-146.534	0.795	0.041
			Max. Mx	10	-146.534	0.795	0.041
			Max. My	9	-7.110	-0.019	0.633
			Max. Vy	12	-0.916	-0.607	-0.011
			Max. Vx	9	0.820	-0.007	0.284
		Diagonal	Max Tension	5	5.781	0.000	0.000
			Max. Compression	5	-5.775	0.000	0.000
			Max. Mx	19	1.465	0.042	-0.005
			Max. My	23	-1.572	0.031	0.006
			Max. Vy	21	0.029	0.042	0.005
			Max. Vx	23	-0.002	0.000	0.000
T7	80 - 60	Leg	Max Tension	8	148.780	-0.693	0.043
			Max. Compression	10	-173.716	1.057	0.067
			Max. Mx	10	-173.716	1.057	0.067
			Max. My	9	-8.570	-0.071	1.021
			Max. Vy	4	0.122	-0.984	-0.065
			Max. Vx	9	-0.146	-0.071	1.021
		Diagonal	Max Tension	5	6.703	0.000	0.000
			Max. Compression	5	-6.764	0.000	0.000
			Max. Mx	21	1.519	0.069	0.010
			Max. My	22	1.837	0.066	0.010
			Max. Vy	21	0.039	0.069	0.010
			Max. Vx	22	-0.002	0.000	0.000
T8	60 - 40	Leg	Max Tension	8	172.342	-0.910	0.043
			Max. Compression	10	-202.567	-0.107	0.029
			Max. Mx	10	-187.550	1.057	0.067
			Max. My	9	-11.757	-0.056	0.956
			Max. Vy	12	-0.173	-0.909	-0.016
			Max. Vx	3	-0.147	0.016	-0.790
		Diagonal	Max Tension	11	7.122	0.000	0.000
			Max. Compression	11	-7.186	0.000	0.000
			Max. Mx	10	5.450	0.105	0.010
			Max. My	22	2.151	0.098	0.014
			Max. Vy	21	0.052	0.099	0.014
			Max. Vx	22	-0.003	0.000	0.000
T9	40 - 20	Leg	Max Tension	8	194.227	1.383	0.018
			Max. Compression	10	-229.854	-0.384	0.031

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	19	-91.980	-3.388	0.003
			Max. My	9	-12.839	-0.294	1.775
			Max. Vy	10	-1.067	3.042	-0.014
			Max. Vx	9	-0.437	-0.294	1.775
		Diagonal	Max Tension	13	7.518	0.097	0.002
			Max. Compression	2	-7.966	0.000	0.000
			Max. Mx	19	1.274	0.130	0.009
			Max. My	10	-7.536	0.011	0.012
			Max. Vy	17	0.056	0.129	-0.007
			Max. Vx	16	-0.003	0.000	0.000
		Secondary Horizontal	Max Tension	10	3.986	0.000	0.000
			Max. Compression	10	-3.986	0.054	0.005
			Max. Mx	24	-0.401	0.112	0.022
			Max. My	18	-0.075	0.080	0.024
			Max. Vy	24	-0.059	0.112	0.022
			Max. Vx	18	-0.004	0.000	0.000
T10	20 - 0	Leg	Max Tension	8	215.607	-1.701	0.034
			Max. Compression	10	-258.248	0.000	-0.000
			Max. Mx	23	-101.805	4.850	-0.010
			Max. My	9	-15.748	-0.136	2.302
			Max. Vy	19	-0.832	-3.388	0.003
			Max. Vx	9	0.339	-0.136	2.302
		Diagonal	Max Tension	13	8.177	0.000	0.000
			Max. Compression	13	-8.389	0.000	0.000
			Max. Mx	17	-0.022	0.181	-0.018
			Max. My	16	4.232	0.096	-0.021
			Max. Vy	17	0.069	0.181	-0.018
			Max. Vx	16	0.004	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	10	264.985	23.585	-12.999
	Max. H_x	10	264.985	23.585	-12.999
	Max. H_z	4	-220.411	-20.372	11.191
	Min. Vert	4	-220.411	-20.372	11.191
	Min. H_x	4	-220.411	-20.372	11.191
	Min. H_z	10	264.985	23.585	-12.999
Leg B	Max. Vert	6	264.452	-23.246	-13.497
	Max. H_x	12	-219.460	20.048	11.648
	Max. H_z	12	-219.460	20.048	11.648
	Min. Vert	12	-219.460	20.048	11.648
	Min. H_x	6	264.452	-23.246	-13.497
	Min. H_z	6	264.452	-23.246	-13.497
Leg A	Max. Vert	2	264.409	0.601	26.915
	Max. H_x	11	16.657	2.525	1.236
	Max. H_z	2	264.409	0.601	26.915
	Min. Vert	8	-220.438	-0.558	-23.239
	Min. H_x	6	-106.204	-2.578	-11.538
	Min. H_z	8	-220.438	-0.558	-23.239

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	52.070	0.000	0.000	4.689	-2.087	0.000
Dead+Wind 0 deg - No Ice	52.070	0.041	-42.838	-4279.069	-9.510	20.719

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+Wind 30 deg - No Ice	52.070	20.694	-35.843	-3598.365	-2085.486	21.578
Dead+Wind 60 deg - No Ice	52.070	35.379	-20.473	-2058.757	-3566.734	17.396
Dead+Wind 90 deg - No Ice	52.070	41.317	-0.041	-2.734	-4156.028	8.991
Dead+Wind 120 deg - No Ice	52.070	37.038	21.384	2140.140	-3706.295	-2.306
Dead+Wind 150 deg - No Ice	52.070	20.623	35.802	3600.321	-2072.629	-12.587
Dead+Wind 180 deg - No Ice	52.070	-0.041	40.875	4118.725	5.337	-19.395
Dead+Wind 210 deg - No Ice	52.070	-20.694	35.843	3607.744	2081.313	-21.578
Dead+Wind 240 deg - No Ice	52.070	-37.079	21.455	2152.997	3709.545	-18.413
Dead+Wind 270 deg - No Ice	52.070	-41.317	0.041	12.113	4151.855	-8.991
Dead+Wind 300 deg - No Ice	52.070	-35.338	-20.402	-2045.900	3555.138	2.000
Dead+Wind 330 deg - No Ice	52.070	-20.623	-35.802	-3590.942	2068.456	12.587
Dead+Ice+Temp	94.242	0.000	0.000	15.960	-34.810	0.000
Dead+Wind 0 deg+Ice+Temp	94.242	0.007	-12.882	-1252.475	-36.263	6.566
Dead+Wind 30 deg+Ice+Temp	94.242	5.998	-10.407	-1025.213	-635.541	6.574
Dead+Wind 60 deg+Ice+Temp	94.242	10.131	-5.867	-574.828	-1054.504	5.319
Dead+Wind 90 deg+Ice+Temp	94.242	11.984	-0.007	14.507	-1233.756	2.923
Dead+Wind 120 deg+Ice+Temp	94.242	11.128	6.435	648.919	-1130.452	-0.591
Dead+Wind 150 deg+Ice+Temp	94.242	5.986	10.400	1055.680	-633.025	-3.650
Dead+Wind 180 deg+Ice+Temp	94.242	-0.007	11.723	1195.020	-33.357	-5.682
Dead+Wind 210 deg+Ice+Temp	94.242	-5.998	10.407	1057.132	565.921	-6.574
Dead+Wind 240 deg+Ice+Temp	94.242	-11.135	6.447	651.435	1062.284	-5.975
Dead+Wind 270 deg+Ice+Temp	94.242	-11.984	0.007	17.413	1164.136	-2.923
Dead+Wind 300 deg+Ice+Temp	94.242	-10.124	-5.856	-572.312	983.431	0.363
Dead+Wind 330 deg+Ice+Temp	94.242	-5.986	-10.400	-1023.760	563.405	3.650
Dead+Wind 0 deg - Service	52.070	0.014	-14.823	-1477.580	-4.655	7.169
Dead+Wind 30 deg - Service	52.070	7.161	-12.402	-1242.042	-722.986	7.467
Dead+Wind 60 deg - Service	52.070	12.242	-7.084	-709.306	-1235.529	6.019
Dead+Wind 90 deg - Service	52.070	14.297	-0.014	2.121	-1439.437	3.111
Dead+Wind 120 deg - Service	52.070	12.816	7.399	743.600	-1283.820	-0.798
Dead+Wind 150 deg - Service	52.070	7.136	12.388	1248.853	-718.537	-4.355
Dead+Wind 180 deg - Service	52.070	-0.014	14.144	1428.231	0.482	-6.711
Dead+Wind 210 deg - Service	52.070	-7.161	12.402	1251.421	718.813	-7.467
Dead+Wind 240 deg - Service	52.070	-12.830	7.424	748.049	1282.215	-6.371
Dead+Wind 270 deg - Service	52.070	-14.297	0.014	7.258	1435.264	-3.111
Dead+Wind 300 deg - Service	52.070	-12.228	-7.060	-704.857	1228.787	0.692
Dead+Wind 330 deg - Service	52.070	-7.136	-12.388	-1239.474	714.364	4.355

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-52.070	0.000	0.000	52.070	0.000	0.000%
2	0.041	-52.070	-42.838	-0.041	52.070	42.838	0.000%
3	20.694	-52.070	-35.843	-20.694	52.070	35.843	0.000%
4	35.379	-52.070	-20.473	-35.379	52.070	20.473	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
5	41.317	-52.070	-0.041	-41.317	52.070	0.041	0.000%
6	37.038	-52.070	21.384	-37.038	52.070	-21.384	0.000%
7	20.623	-52.070	35.802	-20.623	52.070	-35.802	0.000%
8	-0.041	-52.070	40.875	0.041	52.070	-40.875	0.000%
9	-20.694	-52.070	35.843	20.694	52.070	-35.843	0.000%
10	-37.079	-52.070	21.455	37.079	52.070	-21.455	0.000%
11	-41.317	-52.070	0.041	41.317	52.070	-0.041	0.000%
12	-35.338	-52.070	-20.402	35.338	52.070	20.402	0.000%
13	-20.623	-52.070	-35.802	20.623	52.070	35.802	0.000%
14	0.000	-94.242	0.000	-0.000	94.242	-0.000	0.000%
15	0.007	-94.242	-12.882	-0.007	94.242	12.882	0.000%
16	5.998	-94.242	-10.407	-5.998	94.242	10.407	0.000%
17	10.131	-94.242	-5.867	-10.131	94.242	5.867	0.000%
18	11.984	-94.242	-0.007	-11.984	94.242	0.007	0.000%
19	11.128	-94.242	6.435	-11.128	94.242	-6.435	0.000%
20	5.986	-94.242	10.400	-5.986	94.242	-10.400	0.000%
21	-0.007	-94.242	11.723	0.007	94.242	-11.723	0.000%
22	-5.998	-94.242	10.407	5.998	94.242	-10.407	0.000%
23	-11.135	-94.242	6.447	11.135	94.242	-6.447	0.000%
24	-11.984	-94.242	0.007	11.984	94.242	-0.007	0.000%
25	-10.124	-94.242	-5.856	10.124	94.242	5.856	0.000%
26	-5.986	-94.242	-10.400	5.986	94.242	10.400	0.000%
27	0.014	-52.070	-14.823	-0.014	52.070	14.823	0.000%
28	7.161	-52.070	-12.402	-7.161	52.070	12.402	0.000%
29	12.242	-52.070	-7.084	-12.242	52.070	7.084	0.000%
30	14.297	-52.070	-0.014	-14.297	52.070	0.014	0.000%
31	12.816	-52.070	7.399	-12.816	52.070	-7.399	0.000%
32	7.136	-52.070	12.388	-7.136	52.070	-12.388	0.000%
33	-0.014	-52.070	14.144	0.014	52.070	-14.144	0.000%
34	-7.161	-52.070	12.402	7.161	52.070	-12.402	0.000%
35	-12.830	-52.070	7.424	12.830	52.070	-7.424	0.000%
36	-14.297	-52.070	0.014	14.297	52.070	-0.014	0.000%
37	-12.228	-52.070	-7.060	12.228	52.070	7.060	0.000%
38	-7.136	-52.070	-12.388	7.136	52.070	12.388	0.000%

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	0.625	1	0.676	5.573	0.121 ✓	1.333	Member Block Shear
		Top Girt	A325N	0.625	1	0.184	4.214	0.044 ✓	1.333	Member Block Shear
T2	168	Leg	A325N	0.625	4	1.647	13.499	0.122 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	3.072	5.573	0.551 ✓	1.333	Member Block Shear
T3	160	Leg	A325N	0.625	4	10.779	13.498	0.799 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	4.399	5.573	0.789 ✓	1.333	Member Block Shear
T4	140	Leg	A325N	0.750	4	18.736	19.439	0.964 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	5.068	5.573	0.909 ✓	1.333	Member Block Shear
T5	120	Leg	A325N	0.750	4	25.267	19.439	1.300 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	4.631	6.443	0.719 ✓	1.333	Bolt Shear
T6	100	Leg	A325N	0.875	4	31.459	26.458	1.189 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	5.781	6.443	0.897 ✓	1.333	Bolt Shear
T7	80	Leg	A325N	0.875	4	37.195	26.458	1.406 ✗	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	6.764	6.443	1.050 ✓	1.333	Bolt Shear

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
T8	60	Leg	A325N	1.000	4	43.085	34.557	1.247 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	7.186	6.443	1.115 ✓	1.333	Bolt Shear
T9	40	Leg	A325N	1.000	4	48.458	34.556	1.402 ✗	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	7.966	6.443	1.236 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.500	1	3.986	4.123	0.967 ✓	1.333	Bolt Shear
T10	20	Leg	A36	1.500	6	35.934	33.823	1.062 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	8.389	6.443	1.302 ✓	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	P2x.154	12.000	4.000	61.0 K=1.00	16.934	1.075	-2.485	18.196	0.137 ✓
T2	168 - 160	P2x.154 (GR)	8.000	4.000	61.0 K=1.00	24.797	1.075	-9.579	26.646	0.359 ✓
T3	160 - 140	P3x.216 (GR)	20.033	5.008	51.7 K=1.00	26.834	2.228	-51.522	59.799	0.862 ✓
T4	140 - 120	P3.5x.318 (GR)	20.033	6.678	61.3 K=1.00	22.997	3.678	-86.956	84.593	1.028 ✓
T5	120 - 100	P4x.337 (GR)	20.033	6.678	54.3 K=1.00	24.542	4.407	-116.621	108.166	1.078 ✓
T6	100 - 80	P5x.375 (GR)	20.033	6.678	43.6 K=1.00	27.097	6.112	-146.534	165.618	0.885 ✓
T7	80 - 60	P6x.432 (GR)	20.033	10.017	54.8 K=1.00	25.763	8.405	-173.716	216.537	0.802 ✓
T8	60 - 40	P6x.432 (GR)	20.033	10.017	54.8 K=1.00	25.763	8.405	-202.567	216.537	0.935 ✓
T9	40 - 20	P6x.432 (GR)	20.033	5.151	28.2 K=1.00	29.474	8.405	-229.854	247.729	0.928 ✓
T10	20 - 0	P8x.5 (GR)	20.033	10.017	41.8 K=1.00	29.102	12.763	-258.248	371.416	0.695 ✓

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	L2x1 1/2x3/16	5.657	2.543	101.1 K=1.07	12.841	0.621	-0.686	7.976	0.086 ✓
T2	168 - 160	L2x1 1/2x3/16	5.657	2.543	101.1 K=1.07	12.841	0.621	-3.148	7.976	0.395 ✓
T3	160 - 140	L2x1 1/2x3/16	7.621	3.637	135.6 K=1.00	8.126	0.621	-4.444	5.047	0.881 ✓
T4	140 - 120	L2x2x3/16	10.162	4.935	150.3	6.610	0.715	-4.633	4.726	0.980

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=1.00					✔
T5	120 - 100	L2 1/2x2x3/16	11.744	5.701	160.2 K=1.00	5.818	0.809	-4.631	4.706	0.984 ✔
T6	100 - 80	L2 1/2x2 1/2x3/16	13.438	6.498	157.5 K=1.00	6.017	0.902	-5.775	5.427	1.064 ✔
T7	80 - 60	L3x3x3/16	16.803	8.223	165.6 K=1.00	5.447	1.090	-6.764	5.938	1.139 ✔
T8	60 - 40	L3 1/2x3x1/4	18.448	9.047	172.1 K=1.00	5.044	1.560	-7.186	7.869	0.913 ✔
T9	40 - 20	L3 1/2x3x1/4	20.158	10.049	191.1 K=1.00	4.089	1.560	-7.966	6.379	1.249 ✔
T10	20 - 0	L3 1/2x3 1/2x1/4	21.916	10.690	184.8 K=1.00	4.371	1.690	-8.389	7.387	1.136 ✔

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	17.486	16.934	93.2 K=0.50	13.819	1.690	-3.986	23.354	0.171 ✔

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	L1 1/2x2x3/16	4.000	3.510	130.8 K=1.00	8.724	0.621	-0.168	5.418	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	P2x.154	12.000	4.000	61.0	21.000	1.075	1.854	22.565	0.082 ✔
T2	168 - 160	P2x.154 (GR)	8.000	4.000	61.0	21.000	1.075	6.586	22.565	0.292 ✔
T3	160 - 140	P3x.216 (GR)	20.033	5.008	51.7	21.000	2.228	43.117	46.798	0.921 ✔
T4	140 - 120	P3.5x.318 (GR)	20.033	6.678	61.3	21.000	3.678	74.943	77.247	0.970 ✔
T5	120 - 100	P4x.337 (GR)	20.033	6.678	54.3	21.000	4.407	101.066	92.556	1.092 ✔
T6	100 - 80	P5x.375 (GR)	20.033	6.678	43.6	21.000	6.112	125.836	128.351	0.980 ✔
T7	80 - 60	P6x.432 (GR)	20.033	10.017	54.8	21.000	8.405	148.780	176.504	0.843

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 $\frac{P}{P_a}$
T8	60 - 40	P6x.432 (GR)	20.033	10.017	54.8	21.000	8.405	172.342	176.504	0.976 ✔
T9	40 - 20	P6x.432 (GR)	20.033	4.865	26.6	21.000	8.405	194.227	176.504	1.100 ✔
T10	20 - 0	P8x.5 (GR)	20.033	10.017	41.8	21.000	12.763	215.607	268.017	0.804 ✔

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	L2x1 1/2x3/16	5.657	2.543	73.4	29.000	0.360	0.676	10.450	0.065 ✔
T2	168 - 160	L2x1 1/2x3/16	5.657	2.543	73.4	29.000	0.360	3.072	10.450	0.294 ✔
T3	160 - 140	L2x1 1/2x3/16	7.621	3.637	103.3	29.000	0.360	4.399	10.450	0.421 ✔
T4	140 - 120	L2x2x3/16	9.197	4.474	89.9	29.000	0.431	5.068	12.493	0.406 ✔
T5	120 - 100	L2 1/2x2x3/16	11.744	5.701	117.0	29.000	0.501	4.595	14.537	0.316 ✔
T6	100 - 80	L2 1/2x2 1/2x3/16	13.438	6.498	102.5	29.000	0.571	5.781	16.560	0.349 ✔
T7	80 - 60	L3x3x3/16	16.803	8.223	107.0	29.000	0.712	6.703	20.649	0.325 ✔
T8	60 - 40	L3 1/2x3x1/4	18.448	9.047	120.8	29.000	1.029	7.122	29.852	0.239 ✔
T9	40 - 20	L3 1/2x3x1/4	20.158	10.049	132.1	29.000	1.029	7.518	29.852	0.252 ✔
T10	20 - 0	L3 1/2x3 1/2x1/4	21.916	10.690	119.3	29.000	1.127	8.177	32.679	0.250 ✔

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	17.486	16.934	186.4	29.000	1.150	3.986	33.359	0.119 ✔

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	L1 1/2x2x3/16	4.000	3.510	103.8	29.000	0.360	0.184	10.450	0.018 ✔

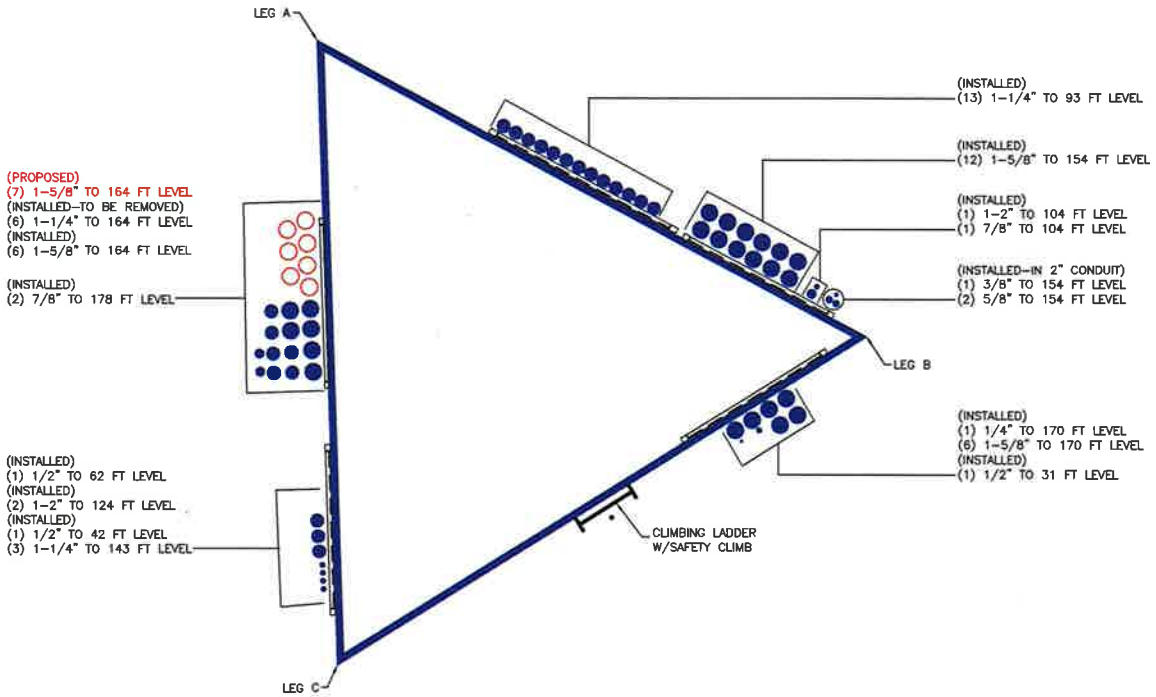
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 168	Leg	P2x.154	2	-2.485	24.255	10.2	Pass
T2	168 - 160	Leg	P2x.154 (GR)	25	-9.579	35.519	27.0	Pass
T3	160 - 140	Leg	P3x.216 (GR)	40	43.117	62.382	69.1	Pass
T4	140 - 120	Leg	P3.5x.318 (GR)	67	-86.956	112.762	77.1	Pass
T5	120 - 100	Leg	P4x.337 (GR)	88	101.066	123.377	81.9	Pass
T6	100 - 80	Leg	P5x.375 (GR)	111	125.836	171.092	97.5 (b) 73.5	Pass
T7	80 - 60	Leg	P6x.432 (GR)	132	148.780	235.280	89.2 (b) 63.2	Fail ✗
T8	60 - 40	Leg	P6x.432 (GR)	147	172.342	235.280	105.5 (b) 73.2	Pass
T9	40 - 20	Leg	P6x.432 (GR)	162	194.227	235.280	93.5 (b) 82.6	Fail ✗
T10	20 - 0	Leg	P8x.5 (GR)	183	215.607	357.267	105.2 (b) 60.3	Pass
T1	180 - 168	Diagonal	L2x1 1/2x3/16	10	-0.686	10.631	79.7 (b) 6.5	Pass
T2	168 - 160	Diagonal	L2x1 1/2x3/16	28	-3.148	10.631	9.1 (b) 29.6	Pass
T3	160 - 140	Diagonal	L2x1 1/2x3/16	44	-4.444	6.727	41.4 (b) 66.1	Pass
T4	140 - 120	Diagonal	L2x2x3/16	71	-4.633	6.300	73.5	Pass
T5	120 - 100	Diagonal	L2 1/2x2x3/16	92	-4.631	6.274	73.8	Pass
T6	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	113	-5.775	7.235	79.8	Pass
T7	80 - 60	Diagonal	L3x3x3/16	134	-6.764	7.915	85.5	Pass
T8	60 - 40	Diagonal	L3 1/2x3x1/4	148	-7.186	10.490	68.5	Pass
T9	40 - 20	Diagonal	L3 1/2x3x1/4	166	-7.966	8.503	83.7 (b) 93.7	Pass
T10	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	187	-8.389	9.847	85.2	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-3.986	31.131	97.7 (b) 12.8	Pass
T1	180 - 168	Top Girt	L1 1/2x2x3/16	5	-0.168	7.222	72.5 (b) 2.3	Pass
							3.3 (b)	
							Summary	
						Leg (T7)	105.5	Fail ✗
						Diagonal (T10)	97.7	Pass
						Secondary Horizontal (T9)	72.5	Pass
						Top Girt (T1)	3.3	Pass
						Bolt Checks	105.5	Fail ✗
						RATING =	**105.5***	**Fail ✗**

*Due to limitations of the TNXTOWER software when analyzing leg connection with additional knife plates, the above output has not been used to determine the governing tower usage. Please see additional calculation results in Appendix C which are based on the Section forces generated in this output.

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806353 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

CALCULATION SHEET

Leg Splice Connection Check - 60'

Input Proporties:

$E := 60ft$ — Elevation of leg splice connection

$F_y := 35ksi$ — Yield stress of leg

$F_u := 60ksi$ — Tensile stress of leg

$b := 3 \cdot in$ — Knife Plate Width

$t := 0.75 \cdot in$ — Knife Plate thickness

$F_{ukp} := 65ksi$ — Ultimate strength of Knife plate steel

$F_{ykp} := 50ksi$ — Yield Strength of Knife plate Steel

$n_{pl} := 2$ — Number of Knife Plates

$d_{bolt} := 0.875 \cdot in$ — Diameter of flange bolts

$n := 4$ — Number of flange bolts

Input Loads:

$Code := "TIA\text{-}F"$ — Version of the TIA

$T_u := 148.78kip$ — Maximum leg tension load

$P_u := 173.72kip$ — Maximum leg compression load

$ASIF := 1.333$

Leg Capacity:

leg above splice

$A_{gt} := 7.88in^2$ — Gross area of top leg (P6x0.432)

$GrossAllowableTension_{top} := 0.6 \cdot F_y \cdot A_{gt} = 165.48 \cdot kip$

Leg below splice

$A_{gb} := 7.88in^2$ — Gross area of top leg (P6x0.432)

$GrossAllowableTension_{bottom} := 0.6 \cdot F_y \cdot A_{gb} = 165.48 \cdot kip$

Bolt Capacity:

$A_{bolt} := \frac{\pi \cdot d_{bolt}^2}{4} = 0.6013 \cdot in^2$ — Area of bolt

$F_a := 44ksi$ — Allowable stress of the bolt material (ksi).

$BTAllowableLoad := F_a \cdot A_{bolt} \cdot n = 105.8 \cdot kip$

CALCULATION SHEET

DESTEK ENGINEERING

Knife Plate Capacity:

COMPRESSION CHECK

$K := 1$

$L_{kp} := 2ft$

$A_{kp} := b \cdot t = 2.25 \cdot in^2$ Area of the knife plate

$I_{kp} := \frac{\left(b \cdot t^3\right)}{12} = 0.1055 \cdot in^4$

$r_{kp} := \sqrt{\frac{I_{kp}}{A_{kp}}} = 0.2165 \cdot in$

$E := 29000ksi$

$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_{ykp}}} = 106.999$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)^2}{2 \cdot C_c^2}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)}{8 \cdot C_c} - \dfrac{\left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot L_{kp}}{r_{kp}} \le C_c \quad = 12.2 \cdot ksi \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)^2} & \text{if } \dfrac{K \cdot L_{kp}}{r_{kp}} > C_c \end{cases}$$

$P_a := F_a \cdot n_{pl} \cdot A_{kp} = 54.7 \cdot kip$

CALCULATION SHEET

DESTEK ENGINEERING

TENSILE CHECK:

$R_{tkp} := 0.6 F_{ykp} \cdot n_{pl} \cdot A_{kp} = 135 \cdot kip$ Nominal Tensile strength of Knife Plates

$R_{kpc} := \frac{n_{pl} A_{kp}}{(A_{gb} + n_{pl} A_{kp})} = 36.3 \cdot \%$ Percent of compressive load in knife plates

$R_{lc} := 1 - R_{kpc} = 63.7 \cdot \%$ Percent of compressive load in tower legs

$R_{kpt} := \frac{n_{pl} A_{kp}}{(A_{gt} + n_{pl} A_{kp})} = 36.3 \cdot \%$ Percent of tensile load in knife plates

$R_{lt} := 1 - R_{kpt} = 63.7 \cdot \%$ Percent of tensile load in tower legs

Summary:

$LegAboveTension := T_u = 148.78 \cdot kip$

$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension < ASIF \cdot GrossAllowableTension_{top} \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{top}} = 67.45 \cdot \%$

$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension < ASIF \cdot GrossAllowableTension_{bottom} \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{bottom}} = 67.45 \cdot \%$

$Test := \begin{cases} \text{"Pass"} & \text{if } R_{kpt} \cdot LegAboveTension < ASIF \cdot R_{tkp} \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot R_{tkp}} = 30.05 \cdot \%$

$Test := \begin{cases} \text{"Pass"} & \text{if } R_{lt} \cdot LegAboveTension < ASIF \cdot BTAllowableLoad \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot BTAllowableLoad} = 38.33 \cdot \%$

CALCULATION SHEET

DESTEK ENGINEERING

$LegAboveCompression := P_u = 173.72 \cdot kip$

$$Test := \begin{cases} \text{"Pass"} & \text{if } R_{kpc} \cdot LegAboveCompression < ASIF \cdot P_a \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

$Test = \text{"Pass"}$

$$StressRatio := \frac{R_{kpc} \cdot LegAboveCompression}{ASIF \cdot P_a} = 86.62 \cdot \%$$

CALCULATION SHEET

DESTEK ENGINEERING

Leg Splice Connection Check - 20'

Input Properties:

$E := 60ft$	Elevation of leg splice connection
$F_y := 35ksi$	Yield stress of leg
$F_u := 60ksi$	Tensile stress of leg
$b := 3 \cdot in$	Knife Plate Width
$t := 1.0 \cdot in$	Knife Plate thickness
$F_{ukp} := 65ksi$	Ultimate strength of Knife plate steel
$F_{ykp} := 50ksi$	Yield Strength of Knife plate Steel
$n_{pl} := 2$	Number of Knife Plates
$d_{bolt} := 1.0 \cdot in$	Diameter of flange bolts
$n := 4$	Number of flange bolts

Input Loads:

$Code := "TIA-F"$	Version of the TIA
$T_u := 194.24kip$	Maximum leg tension load
$P_u := 229.89kip$	Maximum leg compression load

$ASIF := 1.333$

Leg Capacity:

leg above splice

$A_{gt} := 7.88in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{top} := 0.6 \cdot F_y \cdot A_{gt} = 165.48 \cdot kip$

Leg below splice

$A_{gb} := 11.9in^2$ Gross area of top leg (P8x0.5)

$GrossAllowableTension_{bottom} := 0.6 \cdot F_y \cdot A_{gb} = 249.9 \cdot kip$

Bolt Capacity:

$A_{bolt} := \frac{\pi \cdot d_{bolt}^2}{4} = 0.7854 \cdot in^2$ Area of bolt

$F_a := 44ksi$ Allowable stress of the bolt material (ksi).

$BTAllowableLoad := F_a \cdot A_{bolt} \cdot n = 138.2 \cdot kip$

CALCULATION SHEET

DESTEK ENGINEERING

Knife Plate Capacity:

COMPRESSION CHECK

$K := 1$

$L_{kp} := 2ft$

$A_{kp} := b \cdot t = 3 \cdot in^2$ Area of the knife plate

$I_{kp} := \frac{(b \cdot t^3)}{12} = 0.25 \cdot in^4$

$r_{kp} := \sqrt{\frac{I_{kp}}{A_{kp}}} = 0.2887 \cdot in$

$E := 29000ksi$

$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_{ykp}}} = 106.999$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)^2}{2 \cdot C_c^2}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)}{8 \cdot C_c} - \dfrac{\left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot L_{kp}}{r_{kp}} \le C_c \quad = 12.9 \cdot ksi \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\dfrac{K \cdot L_{kp}}{r_{kp}}\right)^2} & \text{if } \dfrac{K \cdot L_{kp}}{r_{kp}} > C_c \end{cases}$$

$P_a := F_a \cdot n_{pl} \cdot A_{kp} = 77.2 \cdot kip$

CALCULATION SHEET

DESTEK ENGINEERING

TENSILE CHECK:

$R_{tkp} := 0.6F_{ykp} \cdot n_{pl} \cdot A_{kp} = 180 \cdot kip$ Nominal Tensile strength of Knife Plates

$R_{kpc} := \frac{n_{pl} A_{kp}}{(A_{gb} + n_{pl} A_{kp})} = 33.5 \cdot \%$ Percent of compressive load in knife plates

$R_{lc} := 1 - R_{kpc} = 66.5 \cdot \%$ Percent of compressive load in tower legs

$R_{kpt} := \frac{n_{pl} A_{kp}}{(A_{gt} + n_{pl} A_{kp})} = 43.2 \cdot \%$ Percent of tensile load in knife plates

$R_{lt} := 1 - R_{kpt} = 56.8 \cdot \%$ Percent of tensile load in tower legs

Summary:

$LegAboveTension := T_u = 194.24 \cdot kip$

$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension < ASIF \cdot GrossAllowableTension_{top} \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{top}} = 88.06 \cdot \%$

$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension < ASIF \cdot GrossAllowableTension_{bottom} \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{bottom}} = 58.31 \cdot \%$

$Test := \begin{cases} \text{"Pass"} & \text{if } R_{kpt} \cdot LegAboveTension < ASIF \cdot R_{tkp} \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot R_{tkp}} = 34.99 \cdot \%$

$Test := \begin{cases} \text{"Pass"} & \text{if } R_{lt} \cdot LegAboveTension < ASIF \cdot BTAllowableLoad \\ \text{"Fail "} & \text{otherwise} \end{cases}$

Test = "Pass"

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot BTAllowableLoad} = 45.57 \cdot \%$

CALCULATION SHEET

DESTEK ENGINEERING

$LegAboveCompression := P_u = 229.89 \cdot kip$

$$Test := \begin{cases} \text{"Pass"} & \text{if } R_{kpc} \cdot LegAboveCompression < ASIF \cdot P_a \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

$Test = \text{"Pass"}$

$$StressRatio := \frac{R_{kpc} \cdot LegAboveCompression}{ASIF \cdot P_a} = 74.89 \cdot \%$$

CCI Foundation Tool Suite - SS Drilled Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 7/20/2016

BU:	806353
Site Name:	BRG 124 943066
App Number:	320434 rev 6
Work Order:	1256312

CROWN CASTLE

Self-Support Drilled Pier

Input

Criteria

TIA Revision:	F
ACI 318 Revision:	2002
Seismic Category:	B

Forces

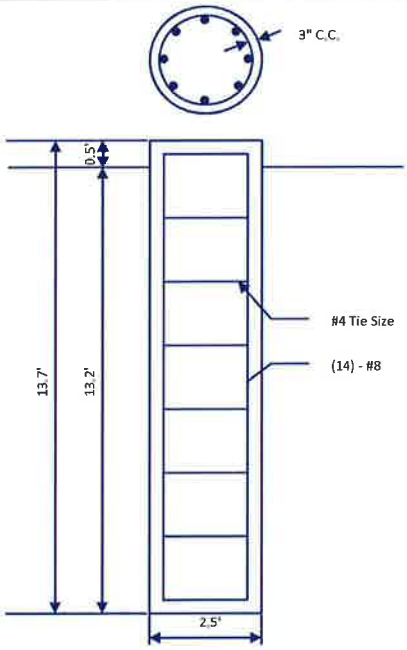
Compression	265 kips
Compression Shear	27 kips
Uplift	220 kips
Uplift Shear	23 kips
Add'l Moment	0 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	2.5 ft
Ext. above grade:	0.5 ft
Depth below grade:	13.2 ft
Bell Diameter:	ft
Bell Angle:	deg

Material Properties

Number of Rebar:	14
Rebar Size:	8
Tie Size	4
Rebar tensile strength:	60 ksi
Concrete Strength:	3000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	3 in



Soil Profile 806353 - SOIL

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	5	0	5	110	0	0	0	0	0	
2	1	5	6	110	0	30	0.772	0.772	0	
3	7.2	6	13.2	140	8000	0	4.402	4.402	56.3	

Analysis Results

Soil Lateral Capacity	Uplift case		Comp. case	
Depth to Zero Shear:	7.2	ft	7.2	ft
Max Moment, Mu:	161.2	k-ft	189.2	k-ft
Soil Safety Factor:	8.9		7.6	
Safety Factor Req'd:	2		2	
RATING:	22.38%		26.28%	

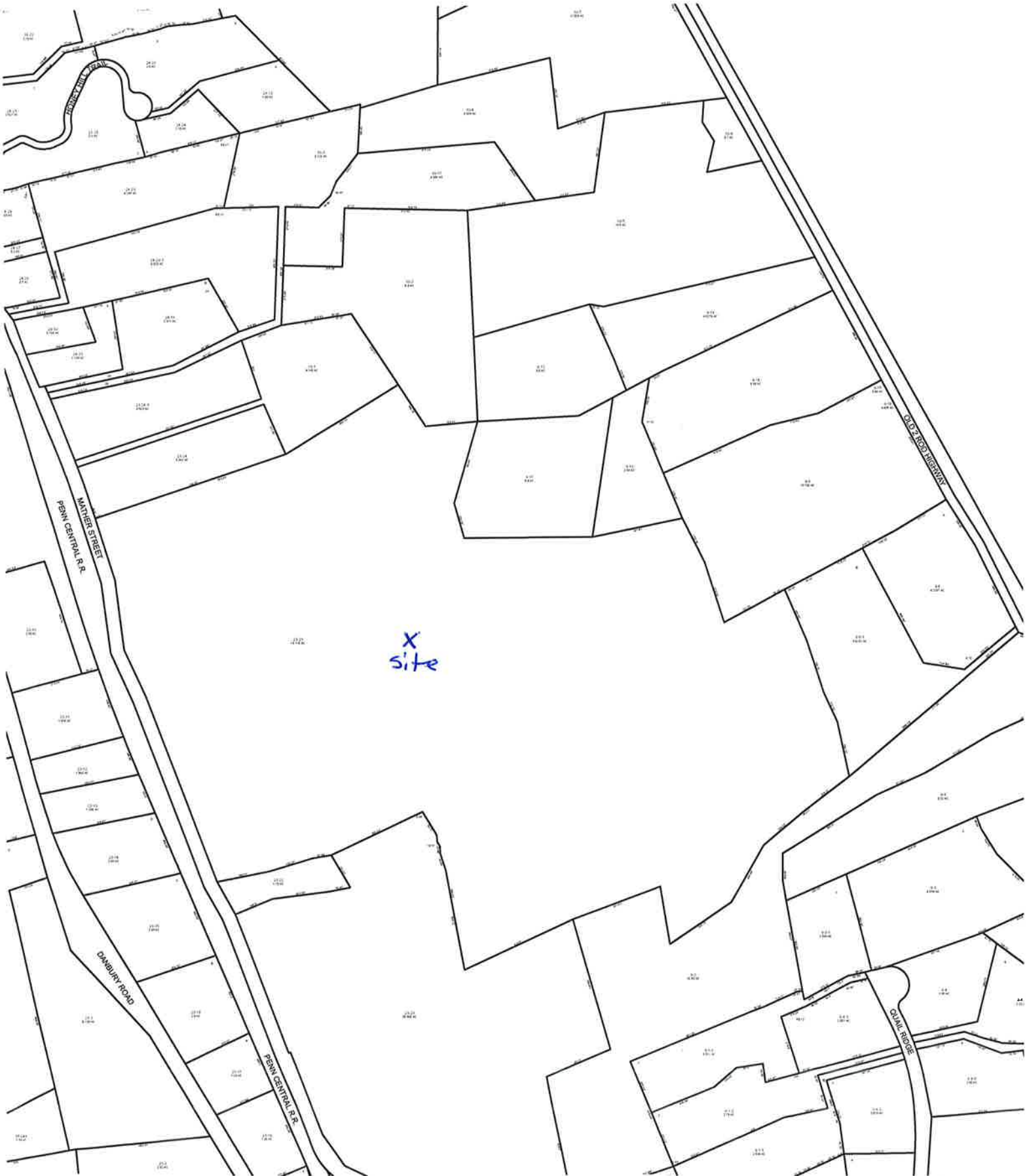
Soil Axial Capacity	
Concrete Weight:	8.1 kips
Skin Friction:	127.5 kips
Rock Anchor Capacity	240.0 kips
Uplift Capacity (k), ϕTn:	375.6 kips
Uplift (k), Tu:	220.0 kips
RATING:	58.58%
Skin Friction (k):	127.5 kips
End Bearing (k):	138.2 kips
Rock Anchor Capacity:	240.0 Kips
Comp. Capacity (k), ϕCn:	505.7 kips
Comp. (k), Cu:	265.0 kips
RATING:	52.41%

Concrete/Steel Check	Uplift Case		Comp case	
Mu (from soil analysis)	209.6	k-ft	246.0	k-ft
ϕMn	287.8	k-ft	543.3	k-ft
RATING:	72.83%		45.29%	

rho provided	1.56	
rho required	0.33	OK
Rebar Spacing	3.9	
Spacing required	16.0	OK
Dev. Length required	5.8	
Dev. Length provided	43.8	OK

Overall Foundation Rating: 72.83%

ATTACHMENT 4


FRANCY HILL TRAIL
MATHER STREET
PENN CENTRAL R.R.
OLD 7 ROD HIGHWAY
X
site
DANBURY ROAD
PENN CENTRAL R.R.
QUAIL RIDGE

MATHER ST

Location	MATHER ST	**Mblu**	23/ / 23/ /
Acct#	006497	**Owner**	WILTON TOWN OF
Assessment	$6,999,790	**Appraisal**	$9,999,700
PID	1065	**Building Count**	2

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$45,500	$9,954,200	$9,999,700
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$31,850	$6,967,940	$6,999,790

Owner of Record

Owner	WILTON TOWN OF
Co-Owner	
Address	238 DANBURY RD WILTON, CT 06897

Sale Price	$0
Certificate	
Book & Page	1151/0195
Sale Date	02/02/1999
Instrument	00

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
WILTON TOWN OF	$0		1151/0195	00	02/02/1999
	$0		0112/0179	00	05/01/1965

Building Information

Building 1 : Section 1

Year Built:	
Living Area:	0
Replacement Cost:	$0
Building Percent Good:	
Replacement Cost Less Depreciation:	$0

Building Attributes

Field	Description
Style	Vacant Land
Model	
Grade:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Elevator	
Fireplaces	
Sauna	
Spa/Jet Tub	
Whirlpool Tub	
Cath. Ceil	

Building Photo

(http://images.vgsi.com/photos/WiltonCTPhotos//default.jpg)

Building Layout

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Building 2 : Section 1

Year Built: 1988
Living Area: 1,200
Replacement Cost: $62,291
Building Percent Good: 73
Replacement Cost Less Depreciation: $45,500

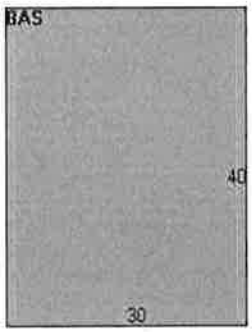
Building Attributes : Bldg 2 of 2	
Field	**Description**
STYLE	Service Shop
MODEL	Commercial
Grade	Below Average
Occupancy	1

Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Dirt/None
Interior Floor 2	
Heating Fuel	None
Heating Type	None
AC Type	None
Bldg Use	Ex Com MDL-96
Fireplace	
Elevator	
Cath Ceil	
Sauna	
1st Floor Use:	21I
Heat/AC	None
Frame Type	Steel
Baths/Plumbing	None
Ceiling/Wall	Sus Ceil Min W
Rooms/Prtns	Average
Wall Height	11
% Comn Wall	0

Building Photo

(http://images.vgsi.com/photos/WiltonCTPhotos//\00\00\78/11

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	1,200	1,200
		1,200	1,200

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 21V
Description Ex Com MDL-00
Zone R-2
Neighborhood 4000

Land Line Valuation

Size (Acres) 74.12
Frontage
Depth
Assessed Value $6,967,940

Alt Land Appr Category No

Appraised Value $9,954,200

Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$45,500	$9,954,200	$9,999,700
2013	$45,500	$9,954,200	$9,999,700
2012	$45,500	$9,954,200	$9,999,700

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$31,850	$6,967,940	$6,999,790
2013	$31,850	$6,967,940	$6,999,790
2012	$31,850	$6,967,940	$6,999,790