Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

February 12, 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 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) HS 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 for 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, with certain modifications, can support Cellco's proposed modifications. (*See* Structural Modification Report included in Attachment 3).

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

Sincerely,

Kenneth C. Baldwin

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

ATTACHMENT 1

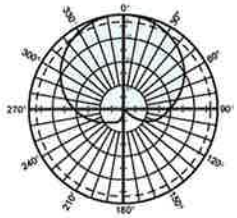
KATHREIN
SCALA DIVISION

742 213V01

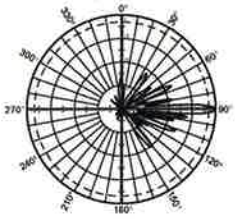
65° Panel Antenna

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

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



Horizontal pattern
±45°- polarization



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

General specifications:

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

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

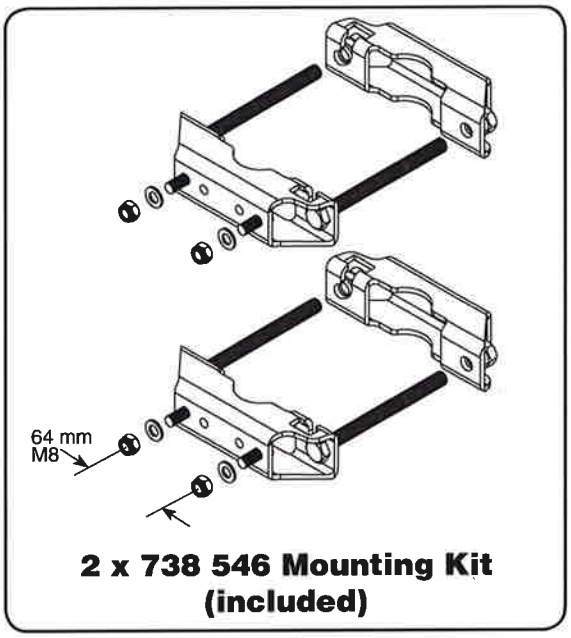
*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

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

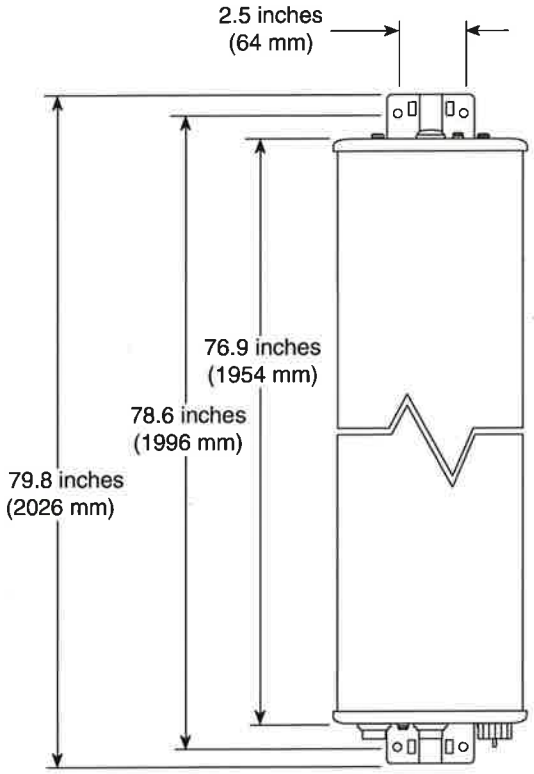
KATHREIN
SCALA DIVISION

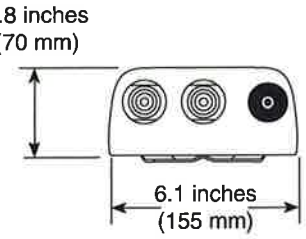
742 213V01

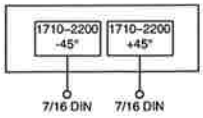
65° Panel Antenna



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
RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS 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 RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows 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 RRH2x60-AWS 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 RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

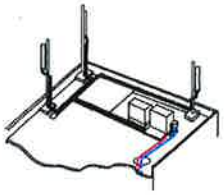
EASY INSTALLATION

The RRH2x60-AWS 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.

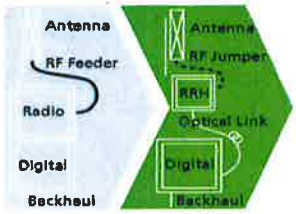
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

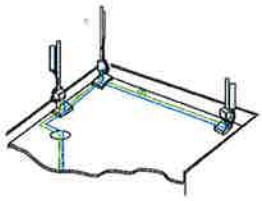
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS 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 : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

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 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 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six 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, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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
Mechanical properties			
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)
Electrical properties			
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)
Fiber Optic properties			
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
DC Power cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-93-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environmental			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

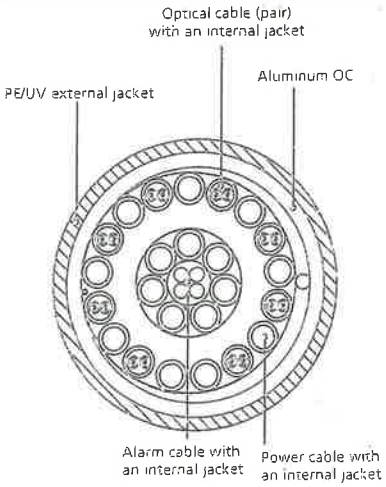


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Wilton								
Tower Height: 180'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T	1	500	153	0.0083	880	0.5867	0.14%	
*AT&T	1	500	153	0.0083	1900	1.0000	0.08%	
*AT&T	6	296	153	0.0296	880	0.5867	0.50%	
*AT&T	1	500	153	0.0083	740	0.4933	0.17%	
*MetroPCS	3	444	169	0.0180	2140	1.0000	0.18%	
*Sprint	2	693	143	0.0266	1900	1.0000	0.27%	
*Sprint	1	390	143	0.0075	850	0.5667	0.13%	
*Sprint	2	693	144	0.0262	2500	1.0000	0.26%	
*T-Mobile	2	2334	93	0.2218	2100	1.0000	2.22%	
*T-Mobile	4	1167	93	0.2218	1900/2100	1.0000	2.22%	
*T-Mobile	1	865	93	0.0411	700	0.4667	0.88%	
*Nextel	9	100	180	0.0107	851	0.5673	0.19%	
*Town							4.62%	
Verizon	**1**	**1235**	**163**	**0.0167**	**1970**	**1.0000**	**1.67%**	
Verizon	**9**	**278**	**163**	**0.0339**	**869**	**0.5793**	**5.85%**	
Verizon	**1**	**1750**	**163**	**0.0237**	**2145**	**1.0000**	**2.37%**	
Verizon	**1**	**508**	**163**	**0.0069**	**746**	**0.4973**	**1.38%**	
								23.1%
* Source: Siting Council								

ATTACHMENT 3

Date: **January 13, 2016**

George Finley
Crown Castle
3530 Toringdon WaySuite 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:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	806353 BRG 124 943066 355200 1170047 320434 Rev. 1
Engineering Firm Designation:	**Destek Engineering, LLC Project Number:**	1654003
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 George Finley,

Destek Engineering, LLC is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 857655, in accordance with application 320434, revision 1.

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 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: Akhil Jayaraj

Respectfully submitted by: 01/13/2016

Ahmet Colakoglu, PE
President

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by FWT Inc. in May of 1988. The tower was originally designed for a wind speed of 85 mph per 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
162.0	163.0	3	alcatel lucent	RRH2X60-AWS	7	1-5/8	-
		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	1-5/8	1
		3	kathrein	860 10025			
	170.0	1	tower mounts	Side Arm Mount [SO 103-3]			
162.0	163.0	6	rfs celwave	APL868013-42T0 w/ Mount Pipe	6	1-5/8	1
		3	rfs celwave	APX75-866512-CT2 w/ Mount Pipe			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
	162.0	-	-	-	6	1-1/4	2
		6	rfs celwave	FD9R6004/2C-3L	-	-	1
		1	tower mounts	Sector Mount [SM 702-3]			
154.0	158.0	6	ericsson	RRUS-11	1 2 12	3/8 5/8 1-5/8	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
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 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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	-2.350	24.255	9.7	Pass
T2	168 - 160	Leg	P2x.154 (GR)	25	-9.382	35.519	26.4	Pass
T3	160 - 140	Leg	P3x.216 (GR)	40	42.601	62.382	68.3	Pass
T4	140 - 120	Leg	P3.5x.318 (GR)	67	-86.525	112.762	76.7	Pass
T5	120 - 100	Leg	P4x.337 (GR)	88	100.845	123.377	81.7 97.3 (b)	Pass
T6	100 - 80	Leg	P5x.375 (GR)	111	125.702	171.092	73.5 89.1 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T7	80 - 60	Leg	P6x.432 (GR)	132	148.699	235.280	63.2 86.5 (b)[1]	Pass
T8	60 - 40	Leg	P6x.432 (GR)	147	172.295	235.280	73.2 93.5 (b)	Pass
T9	40 - 20	Leg	P6x.432 (GR)	162	194.352	235.280	82.6 74.9 (b)[1]	Pass
T10	20 - 0	Leg	P8x.5 (GR)	183	215.658	357.267	60.4 79.7 (b)	Pass
T1	180 - 168	Diagonal	L2x1 1/2x3/16	9	-0.695	10.631	6.5 8.9 (b)	Pass
T2	168 - 160	Diagonal	L2x1 1/2x3/16	28	-2.140	10.631	20.1 27.0 (b)	Pass
T3	160 - 140	Diagonal	L2x1 1/2x3/16	44	-4.493	6.727	66.8	Pass
T4	140 - 120	Diagonal	L2x2x3/16	71	-4.664	6.300	74.0	Pass
T5	120 - 100	Diagonal	L2 1/2x2x3/16	92	-4.651	6.274	74.1	Pass
T6	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	113	-5.789	7.235	80.0	Pass
T7	80 - 60	Diagonal	L3x3x3/16	134	-6.772	7.915	85.6	Pass
T8	60 - 40	Diagonal	L3 1/2x3x1/4	148	-7.147	10.490	68.1 83.2 (b)	Pass
T9	40 - 20	Diagonal	L3 1/2x3x1/4	166	-7.767	8.503	91.3	Pass
T10	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	187	-8.378	9.847	85.1 97.6 (b)	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-3.989	15.696	25.4 72.6 (b)	Pass
T1	180 - 168	Top Girt	L1 1/2x2x3/16	5	-0.081	7.222	1.1 1.6 (b)	Pass
							Summary	
						Leg (T5)	97.3	Pass
						Diagonal (T10)	97.6	Pass
						Secondary Horizontal (T9)	72.6	Pass
						Top Girt (T1)	1.6	Pass
						Bolt Checks	97.6	Pass
						Rating =	97.6	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) =	97.6%

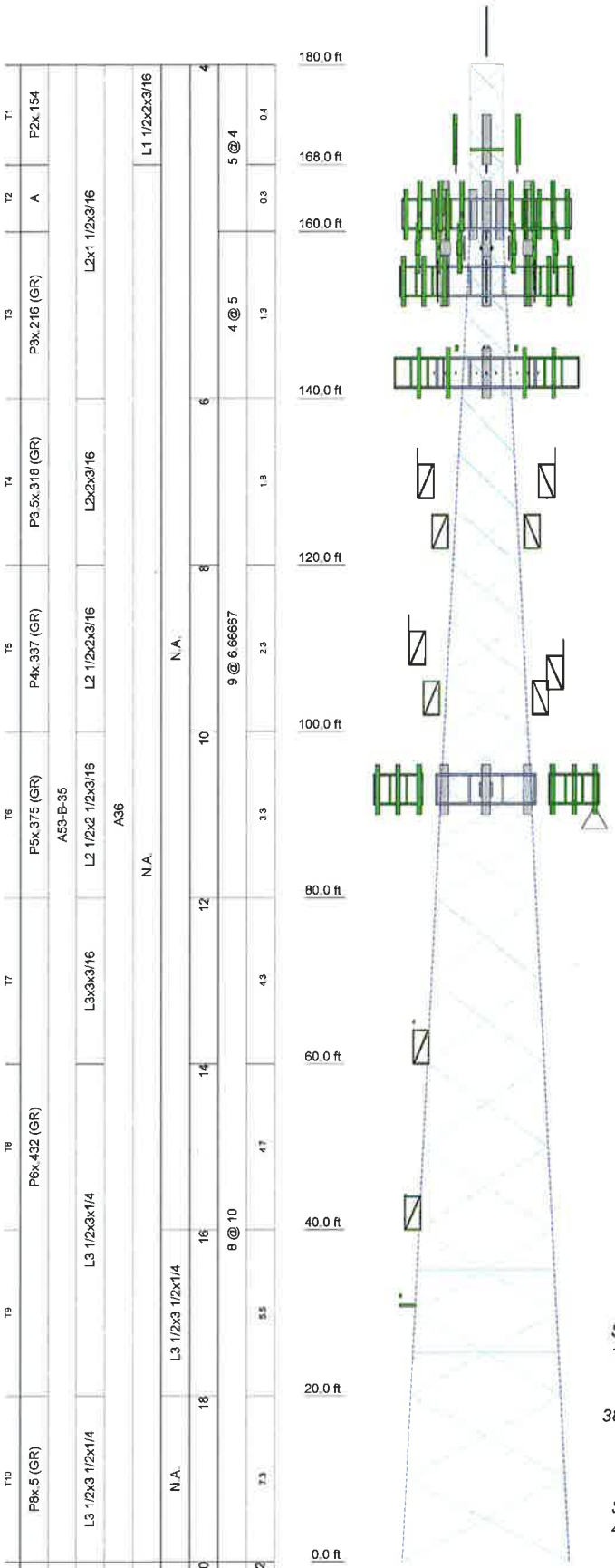
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation will have sufficient capacity to carry the existing, reserved and proposed loads once the proposed modifications as shown in "Appendix D – Tower Modification Drawings" have been installed.

APPENDIX A

TNXTOWER OUTPUT



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	162	APXVSPP18-C-A20	143
(2) APL868013-42T0 w/ Mount Pipe	162	APXVSPP18-C-A20	143
(2) APL868013-42T0 w/ Mount Pipe	162	APXVSPP18-C-A20	143
APX75-866512-CT2 w/ Mount Pipe	162	(3) ACU-A20-N	143
APX75-866512-CT2 w/ Mount Pipe	162	(3) ACU-A20-N	143
APX75-866512-CT2 w/ Mount Pipe	162	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	162	Pipe Mount [PM 601-3]	143
MG D3-800Tx w/ Mount Pipe	162	Sector Mount [SM 701-3]	143
MG D3-800Tx w/ Mount Pipe	162	1142-2C	124
(2) FD9R6004/2C-3L	162	1142-2C	124
(2) FD9R6004/2C-3L	162	Side Arm Mount [SO 302-1]	124
(2) FD9R6004/2C-3L	162	Side Arm Mount [SO 302-1]	124
742 213 w/ Mount Pipe	162	220-3BN	104
742 213 w/ Mount Pipe	162	1142-2C	104
742 213 w/ Mount Pipe	162	Side Arm Mount [SO 302-1]	104
RRH2X60-AWS	162	Side Arm Mount [SO 302-1]	104
RRH2X60-AWS	162	ERICSSON AIR 21 B2A B4P	93
RRH2X60-AWS	162	ERICSSON AIR 21 B2A B4P	93
DB-T1-6Z-8AB-0Z	162	ERICSSON AIR 21 B2A B4P	93
(2) 6' x 2" Mount Pipe	162	ERICSSON AIR 21 B4A B2P	93
(2) 6' x 2" Mount Pipe	162	ERICSSON AIR 21 B4A B2P	93
(2) 6' x 2" Mount Pipe	162	ERICSSON AIR 21 B4A B2P	93
Sector Mount [SM 702-3]	162	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
UP
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 RATING: 97.6%

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

Job:	*806353 - BRG 124 943066*		
Project:	*1654003*		
Client: Crown Castle	Drawn by: Ahmet Colakoglu	App'd:	
Code: TIA/EIA-222-F	Date: 01/13/16	Scale: N	
Path:		Dwg No.	

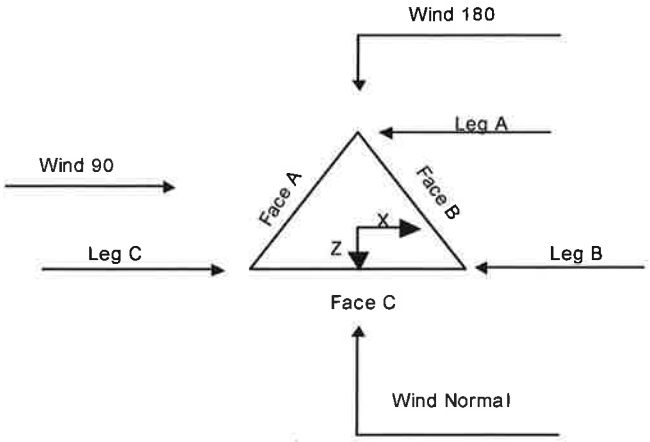
Tower Input Data

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	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
√ Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	√ Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice	
	Capacity Exemption	



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length 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 ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset 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
T1 180.000-168.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T2 168.000-160.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T3 160.000-140.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T4 140.000-120.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T5 120.000-100.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T6 100.000-80.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T7 80.000-60.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T8 60.000-40.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T9 40.000-20.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T10 20.000-0.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 180.000-168.000	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
LDF4-50A(1/2")	C	No	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	1.695	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	5.530	4.560	0.000	0.000	0.147
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	13.825	11.400	0.000	0.000	0.368
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	13.825	11.400	0.000	0.000	0.368
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	13.825	11.400	0.000	0.000	0.368
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	13.825	11.400	0.000	0.000	0.368
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	13.825	11.400	0.000	0.000	0.368
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	13.825	11.400	0.000	0.000	0.368
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	14.403	11.400	0.000	0.000	0.370
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	14.875	11.400	0.000	0.000	0.371

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		2.841	7.179	0.000	0.000	0.229
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		3.994	11.836	0.000	0.000	0.387
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		9.921	29.547	0.000	0.000	0.961
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		9.819	29.479	0.000	0.000	0.951
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		9.702	29.401	0.000	0.000	0.940
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
		C		9.565	29.310	0.000	0.000	0.927
T7	80.000-60.000	A	0.821	14.367	45.187	0.000	0.000	1.507

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
		B		31.136	79.241	0.000	0.000	1.836
		C		9.397	29.198	0.000	0.000	0.912
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		9.181	29.054	0.000	0.000	0.892
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		10.878	28.883	0.000	0.000	0.884
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		12.475	28.883	0.000	0.000	0.897

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	1.295	0.774	1.377
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	1.783	1.189	1.961
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	3.544	2.397	3.940
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	2.528	1.748	2.859
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	2.216	1.965	3.196
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	2.017	1.845	2.981
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	1.396	1.592	2.551
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	1.263	1.769	2.804
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	1.639	2.443	3.824
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	1.115	1.663	2.603

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	0.715	2.201	0.356	1.537
T2	168.000-160.000	2.391	3.886	1.203	2.455
T3	160.000-140.000	2.402	2.233	1.646	1.665
T4	140.000-120.000	3.198	2.743	2.679	2.249
T5	120.000-100.000	3.500	3.099	3.292	2.654
T6	100.000-80.000	8.603	2.244	8.297	2.104
T7	80.000-60.000	11.557	1.912	11.419	1.899
T8	60.000-40.000	12.336	2.060	12.355	2.036

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T9	40.000-20.000	12.296	2.160	12.394	2.231
T10	20.000-0.000	14.286	2.603	15.019	2.931

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
PD10017	A	From Leg	0.500 0.000 6.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.114 5.641 7.185 10.323 14.448	4.114 5.641 7.185 10.323 14.448	0.025 0.055 0.095 0.203 0.542
170' Metro PCS									
800 10504 w/ Mount Pipe	A	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.589 4.007 4.422 5.339 7.385	3.178 3.905 4.581 5.982 8.983	0.038 0.070 0.109 0.207 0.514
800 10504 w/ Mount Pipe	B	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.589 4.007 4.422 5.339 7.385	3.178 3.905 4.581 5.982 8.983	0.038 0.070 0.109 0.207 0.514
800 10504 w/ Mount Pipe	C	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.589 4.007 4.422 5.339 7.385	3.178 3.905 4.581 5.982 8.983	0.038 0.070 0.109 0.207 0.514
860 10025	A	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.157 0.221 0.294 0.467 0.915	0.129 0.191 0.262 0.429 0.867	0.001 0.003 0.005 0.013 0.050
860 10025	B	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.157 0.221 0.294 0.467 0.915	0.129 0.191 0.262 0.429 0.867	0.001 0.003 0.005 0.013 0.050
860 10025	C	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.157 0.221 0.294 0.467 0.915	0.129 0.191 0.262 0.429 0.867	0.001 0.003 0.005 0.013 0.050
6' x 2" Mount Pipe	A	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
6' x 2" Mount Pipe	B	From Leg	2.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	3.060	3.060	0.090
						2" Ice	4.702	4.702	0.231
						4" Ice			
6' x 2" Mount Pipe	C	From Leg	2.000 0.000 0.000	0.000	170.000	No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
Side Arm Mount [SO 103-3]	C	None		0.000	170.000	No Ice	9.500	9.500	0.224
						1/2" Ice	11.800	11.800	0.317
						1" Ice	14.100	14.100	0.410
						2" Ice	18.700	18.700	0.596
						4" Ice	27.900	27.900	0.968
163' Verizon									
(2) APL868013-42T0 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	3.104	4.921	0.025
						1/2" Ice	3.476	5.596	0.063
						1" Ice	3.879	6.284	0.108
						2" Ice	4.761	7.712	0.216
						4" Ice	6.660	10.833	0.541
(2) APL868013-42T0 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	3.104	4.921	0.025
						1/2" Ice	3.476	5.596	0.063
						1" Ice	3.879	6.284	0.108
						2" Ice	4.761	7.712	0.216
						4" Ice	6.660	10.833	0.541
(2) APL868013-42T0 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	3.104	4.921	0.025
						1/2" Ice	3.476	5.596	0.063
						1" Ice	3.879	6.284	0.108
						2" Ice	4.761	7.712	0.216
						4" Ice	6.660	10.833	0.541
APX75-866512-CT2 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	6.431	3.894	0.039
						1/2" Ice	6.920	4.587	0.086
						1" Ice	7.412	5.252	0.139
						2" Ice	8.425	6.630	0.267
						4" Ice	10.579	9.771	0.638
APX75-866512-CT2 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	6.431	3.894	0.039
						1/2" Ice	6.920	4.587	0.086
						1" Ice	7.412	5.252	0.139
						2" Ice	8.425	6.630	0.267
						4" Ice	10.579	9.771	0.638
APX75-866512-CT2 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	6.431	3.894	0.039
						1/2" Ice	6.920	4.587	0.086
						1" Ice	7.412	5.252	0.139
						2" Ice	8.425	6.630	0.267
						4" Ice	10.579	9.771	0.638
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	3.570	3.418	0.035
						1/2" Ice	3.979	4.119	0.068
						1" Ice	4.387	4.784	0.108
						2" Ice	5.325	6.164	0.208
						4" Ice	7.341	9.175	0.517
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice	3.570	3.418	0.035
						1/2" Ice	3.979	4.119	0.068
						1" Ice	4.387	4.784	0.108
						2" Ice	5.325	6.164	0.208
						4" Ice	7.341	9.175	0.517
MG D3-800Tx w/ Mount	C	From Leg	4.000	0.000	162.000	No Ice	3.570	3.418	0.035

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
Pipe			0.000 1.000			1/2" Ice 1" Ice 2" Ice 4" Ice	3.979 4.387 5.325 7.341	4.119 4.784 6.164 9.175	0.068 0.108 0.208 0.517
(2) FD9R6004/2C-3L	A	From Leg	4.000 0.000 0.000	0.000	162.000	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 0.000	0.000	162.000	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	C	From Leg	4.000 0.000 0.000	0.000	162.000	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
742 213 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	162.000	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	162.000	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	162.000	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	162.000	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	162.000	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	162.000	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	162.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.600 5.915 6.240 6.914 8.365	2.333 2.558 2.791 3.284 4.373	0.044 0.080 0.120 0.213 0.455

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 6' x 2" Mount Pipe	A	From Leg	3.000 0.000 0.000	0.000	162.000	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	162.000	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	162.000	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	162.000	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 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.288 1.445 1.611 1.969	0.233 0.313 0.403 0.608	0.014 0.021 0.030 0.055

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	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	2.567	2.567	0.019
			0.000			1/2"	2.798	2.798	0.041
			0.000			Ice	3.038	3.038	0.067
						1" Ice	3.543	3.543	0.129
						2" Ice	4.658	4.658	0.299
						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
			0.000			1/2"	1.393	1.393	0.037
			0.000			Ice	1.703	1.703	0.048

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

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

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
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 7.000	0.000	124.000	No Ice	2.092	2.092	0.024
						1/2" Ice	3.374	3.374	0.041
						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 7.000	0.000	124.000	No Ice	2.092	2.092	0.024
						1/2" Ice	3.374	3.374	0.041
						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 0.000	0.000	124.000	No Ice	1.670	3.270	0.055
						1/2" Ice	2.510	4.990	0.088
						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 0.000	0.000	124.000	No Ice	1.670	3.270	0.055
						1/2" Ice	2.510	4.990	0.088
						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 4.000	0.000	104.000	No Ice	5.720	5.720	0.024
						1/2" Ice	7.831	7.831	0.066
						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 7.000	0.000	104.000	No Ice	2.092	2.092	0.024
						1/2" Ice	3.374	3.374	0.041
						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 0.000	0.000	104.000	No Ice	1.670	3.270	0.055
						1/2" Ice	2.510	4.990	0.088
						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 0.000	0.000	104.000	No Ice	1.670	3.270	0.055
						1/2" Ice	2.510	4.990	0.088
						1" Ice	3.350	6.710	0.121
						2" Ice	5.030	10.150	0.187
						4" Ice	8.390	17.030	0.320
93' T-Mobile									
ERICSSON AIR 21 B2A	A	From Leg	3.000	0.000	93.000	No Ice	6.588	4.297	0.092

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
B4P			0.000 0.000			1/2" Ice	7.033 7.488	4.703 5.130	0.133 0.180
						1" Ice	8.422	6.010	0.290
						2" Ice	10.395	7.873	0.580
						4" Ice			
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 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

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
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
Side Arm Mount [SO 701-1]	C	From Leg	1.000 0.000	0.000	31.000	No Ice 1/2"	0.850 1.140	1.670 2.340	0.065 0.079

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			Ice	1.430	3.010	0.093
						1" Ice	2.010	4.350	0.121
						2" Ice	3.170	7.030	0.177
						4" Ice			
C									
*** Knife Plates ***									
(2) 3'x8" Knife Plate	A	From Leg	0.000	0.000	20.000	No Ice	2.333	0.250	0.048
			0.000			1/2"	2.625	0.500	0.054
			0.000			Ice	2.917	0.750	0.060
						1" Ice	3.501	1.250	0.072
						2" Ice	4.669	2.250	0.096
						4" Ice			
(2) 3'x8" Knife Plate	B	From Leg	0.000	0.000	20.000	No Ice	2.333	0.250	0.048
			0.000			1/2"	2.625	0.500	0.054
			0.000			Ice	2.917	0.750	0.060
						1" Ice	3.501	1.250	0.072
						2" Ice	4.669	2.250	0.096
						4" Ice			
(2) 3'x8" Knife Plate	C	From Leg	0.000	0.000	20.000	No Ice	2.333	0.250	0.048
			0.000			1/2"	2.625	0.500	0.054
			0.000			Ice	2.917	0.750	0.060
						1" Ice	3.501	1.250	0.072
						2" Ice	4.669	2.250	0.096
						4" Ice			
(2) 3'x8" Knife Plate	A	From Leg	0.000	0.000	60.000	No Ice	2.333	0.250	0.048
			0.000			1/2"	2.625	0.500	0.054
			0.000			Ice	2.917	0.750	0.060
						1" Ice	3.501	1.250	0.072
						2" Ice	4.669	2.250	0.096
						4" Ice			
(2) 3'x8" Knife Plate	B	From Leg	0.000	0.000	60.000	No Ice	2.333	0.250	0.048
			0.000			1/2"	2.625	0.500	0.054
			0.000			Ice	2.917	0.750	0.060
						1" Ice	3.501	1.250	0.072
						2" Ice	4.669	2.250	0.096
						4" Ice			
(2) 3'x8" Knife Plate	C	From Leg	0.000	0.000	60.000	No Ice	2.333	0.250	0.048
			0.000			1/2"	2.625	0.500	0.054
			0.000			Ice	2.917	0.750	0.060
						1" Ice	3.501	1.250	0.072
						2" Ice	4.669	2.250	0.096
						4" Ice			

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice

Comb. No.	Description
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	1.691	-0.106	0.053
			Max. Compression	6	-2.350	-0.013	-0.011
			Max. Mx	11	1.473	-0.220	0.002
			Max. My	8	1.685	0.001	0.220
			Max. Vy	5	-0.177	-0.117	0.003
			Max. Vx	2	0.176	-0.001	0.116
		Diagonal	Max Tension	7	0.665	0.000	0.000
			Max. Compression	7	-0.695	0.000	0.000
			Max. Mx	3	0.329	0.007	-0.001
			Max. My	13	-0.683	-0.001	-0.001
			Max. Vy	17	-0.008	0.007	-0.000
			Max. Vx	13	-0.000	-0.001	-0.001
		Top Girt	Max Tension	10	0.087	0.000	0.000
			Max. Compression	4	-0.081	0.000	0.000
			Max. Mx	14	0.009	-0.012	0.000
			Max. Vy	14	0.012	0.000	0.000
T2	168 - 160	Leg	Max Tension	8	6.402	0.017	-0.369
			Max. Compression	10	-9.382	0.594	-0.329
			Max. Mx	11	5.358	-0.884	-0.038
			Max. My	2	2.721	0.012	-0.895
			Max. Vy	11	-0.794	0.688	0.019
			Max. Vx	8	0.797	-0.006	-0.690
		Diagonal	Max Tension	5	2.008	0.000	0.000
			Max. Compression	10	-2.140	0.000	0.000
			Max. Mx	11	1.988	0.012	0.001
			Max. My	5	0.828	0.006	0.001
			Max. Vy	24	-0.010	0.010	0.000
			Max. Vx	5	-0.000	-0.003	0.001
T3	160 - 140	Leg	Max Tension	4	42.601	-0.336	-0.002
			Max. Compression	10	-50.980	0.345	0.011
			Max. Mx	4	23.057	0.680	-0.017
			Max. My	3	-2.741	-0.014	0.820
			Max. Vy	12	-0.999	-0.317	-0.006
			Max. Vx	9	1.091	-0.019	0.267
		Diagonal	Max Tension	5	4.451	0.000	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. Compression	5	-4.493	0.000	0.000
			Max. Mx	10	3.456	0.023	0.001
			Max. My	5	-4.174	-0.009	-0.002
			Max. Vy	19	-0.012	0.015	0.001
			Max. Vx	5	0.001	0.000	0.000
T4	140 - 120	Leg	Max Tension	4	74.581	-0.287	-0.044
			Max. Compression	10	-86.525	0.328	0.052
			Max. Mx	4	53.193	-0.372	-0.011
			Max. My	9	-3.462	-0.018	0.416
			Max. Vy	8	-0.083	-0.288	0.008
			Max. Vx	10	0.128	-0.149	0.310
		Diagonal	Max Tension	5	5.105	0.000	0.000
			Max. Compression	5	-5.130	0.000	0.000
			Max. Mx	10	3.574	0.025	0.002
			Max. My	23	1.032	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	100.845	-0.368	-0.063
			Max. Compression	10	-116.312	0.424	0.078
			Max. Mx	2	-115.297	0.432	-0.043
			Max. My	9	-5.461	-0.005	0.618
			Max. Vy	8	-0.106	-0.369	0.029
			Max. Vx	9	-0.165	-0.005	0.618
		Diagonal	Max Tension	5	4.616	0.000	0.000
			Max. Compression	5	-4.651	0.000	0.000
			Max. Mx	10	3.403	0.038	0.003
			Max. My	23	1.003	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	125.702	-0.442	0.010
			Max. Compression	10	-146.299	0.795	0.040
			Max. Mx	10	-146.299	0.795	0.040
			Max. My	9	-7.099	-0.018	0.633
			Max. Vy	12	-0.916	-0.607	-0.011
			Max. Vx	9	0.819	-0.007	0.283
		Diagonal	Max Tension	5	5.796	0.000	0.000
			Max. Compression	5	-5.789	0.000	0.000
			Max. Mx	19	1.471	0.042	-0.005
			Max. My	23	-1.568	0.031	0.006
			Max. Vy	21	0.029	0.041	0.005
			Max. Vx	23	-0.002	0.000	0.000
T7	80 - 60	Leg	Max Tension	8	148.699	-0.681	0.042
			Max. Compression	10	-173.527	1.079	0.067
			Max. Mx	10	-173.527	1.079	0.067
			Max. My	9	-8.556	-0.068	1.023
			Max. Vy	4	0.127	-1.015	-0.065
			Max. Vx	9	-0.146	-0.068	1.023
		Diagonal	Max Tension	5	6.716	0.000	0.000
			Max. Compression	5	-6.772	0.000	0.000
			Max. Mx	21	1.530	0.069	0.010
			Max. My	22	1.751	0.069	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	172.295	-0.812	0.041
			Max. Compression	10	-202.410	0.233	0.032
			Max. Mx	10	-187.390	1.079	0.067
			Max. My	9	-11.750	-0.068	1.201
			Max. Vy	12	-0.170	-1.013	-0.009
			Max. Vx	3	-0.152	0.011	-0.792
		Diagonal	Max Tension	11	7.094	0.000	0.000
			Max. Compression	11	-7.147	0.000	0.000
			Max. Mx	19	1.517	0.105	-0.011
			Max. My	22	2.160	0.097	0.014
			Max. Vy	21	0.052	0.098	0.014
			Max. Vx	22	-0.003	0.000	0.000
T9	40 - 20	Leg	Max Tension	8	194.352	0.456	0.034
			Max. Compression	10	-229.865	0.207	0.035
			Max. Mx	25	30.523	-3.338	-0.004
			Max. My	9	-13.299	-0.299	2.372

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	19	0.945	-3.192	0.006
			Max. Vx	9	-0.664	-0.299	2.372
		Diagonal	Max Tension	13	7.399	0.000	0.000
			Max. Compression	2	-7.767	0.000	0.000
			Max. Mx	17	1.070	0.130	-0.014
			Max. My	16	2.176	0.105	-0.016
			Max. Vy	17	0.057	0.130	-0.014
			Max. Vx	16	0.003	0.000	0.000
		Secondary Horizontal	Max Tension	10	3.989	0.000	0.000
			Max. Compression	10	-3.989	0.000	0.000
			Max. Mx	14	0.879	-0.419	0.000
			Max. My	14	0.879	0.000	0.012
			Max. Vy	14	-0.096	0.000	0.000
			Max. Vx	14	-0.003	0.000	0.000
T10	20 - 0	Leg	Max Tension	8	215.658	-1.584	0.032
			Max. Compression	10	-258.185	0.000	-0.000
			Max. Mx	23	-101.596	4.791	-0.010
			Max. My	9	-15.722	-0.149	2.242
			Max. Vy	20	-0.807	-3.208	0.194
			Max. Vx	9	0.333	-0.149	2.242
		Diagonal	Max Tension	13	8.184	0.000	0.000
			Max. Compression	13	-8.378	0.000	0.000
			Max. Mx	17	-0.016	0.181	-0.018
			Max. My	16	4.251	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	264.900	23.562	-12.988
	Max. H_x	10	264.900	23.562	-12.988
	Max. H_z	4	-220.460	-20.380	11.196
	Min. Vert	4	-220.460	-20.380	11.196
	Min. H_x	4	-220.460	-20.380	11.196
	Min. H_z	10	264.900	23.562	-12.988
Leg B	Max. Vert	6	264.363	-23.223	-13.487
	Max. H_x	12	-219.513	20.055	11.655
	Max. H_z	12	-219.513	20.055	11.655
	Min. Vert	12	-219.513	20.055	11.655
	Min. H_x	6	264.363	-23.223	-13.487
	Min. H_z	6	264.363	-23.223	-13.487
Leg A	Max. Vert	2	264.325	0.602	26.890
	Max. H_x	11	16.648	2.546	1.224
	Max. H_z	2	264.325	0.602	26.890
	Min. Vert	8	-220.486	-0.560	-23.248
	Min. H_x	6	-106.177	-2.598	-11.544
	Min. H_z	8	-220.486	-0.560	-23.248

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	52.035	0.000	0.000	4.655	-2.048	0.000
Dead+Wind 0 deg - No Ice	52.035	0.041	-42.850	-4277.809	-9.471	20.746
Dead+Wind 30 deg - No Ice	52.035	20.699	-35.851	-3596.993	-2084.636	21.577
Dead+Wind 60 deg - No Ice	52.035	35.400	-20.486	-2059.122	-3567.269	17.364

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 90 deg - No Ice	52.035	41.327	-0.041	-2.768	-4154.367	8.923
Dead+Wind 120 deg - No Ice	52.035	37.048	21.390	2139.459	-3705.136	-2.387
Dead+Wind 150 deg - No Ice	52.035	20.628	35.810	3598.881	-2071.779	-12.654
Dead+Wind 180 deg - No Ice	52.035	-0.041	40.900	4119.353	5.375	-19.439
Dead+Wind 210 deg - No Ice	52.035	-20.699	35.851	3606.304	2080.540	-21.577
Dead+Wind 240 deg - No Ice	52.035	-37.089	21.461	2152.316	3708.463	-18.359
Dead+Wind 270 deg - No Ice	52.035	-41.327	0.041	12.079	4150.271	-8.923
Dead+Wind 300 deg - No Ice	52.035	-35.360	-20.415	-2046.265	3555.749	2.075
Dead+Wind 330 deg - No Ice	52.035	-20.628	-35.810	-3589.570	2067.682	12.654
Dead+Ice+Temp	94.007	0.000	0.000	15.325	-34.128	0.000
Dead+Wind 0 deg+Ice+Temp	94.007	0.007	-12.872	-1250.266	-35.580	6.373
Dead+Wind 30 deg+Ice+Temp	94.007	5.992	-10.397	-1023.334	-633.407	6.329
Dead+Wind 60 deg+Ice+Temp	94.007	10.121	-5.862	-574.002	-1051.291	5.076
Dead+Wind 90 deg+Ice+Temp	94.007	11.973	-0.007	13.872	-1230.171	2.728
Dead+Wind 120 deg+Ice+Temp	94.007	11.119	6.430	646.862	-1127.307	-0.685
Dead+Wind 150 deg+Ice+Temp	94.007	5.981	10.391	1052.531	-630.891	-3.601
Dead+Wind 180 deg+Ice+Temp	94.007	-0.007	11.712	1191.462	-32.675	-5.520
Dead+Wind 210 deg+Ice+Temp	94.007	-5.992	10.397	1053.983	565.152	-6.329
Dead+Wind 240 deg+Ice+Temp	94.007	-11.126	6.442	649.378	1060.504	-5.688
Dead+Wind 270 deg+Ice+Temp	94.007	-11.973	0.007	16.777	1161.916	-2.728
Dead+Wind 300 deg+Ice+Temp	94.007	-10.115	-5.850	-571.486	981.583	0.444
Dead+Wind 330 deg+Ice+Temp	94.007	-5.981	-10.391	-1021.881	562.636	3.601
Dead+Wind 0 deg - Service	52.035	0.014	-14.827	-1477.166	-4.617	7.179
Dead+Wind 30 deg - Service	52.035	7.162	-12.405	-1241.590	-722.667	7.466
Dead+Wind 60 deg - Service	52.035	12.249	-7.088	-709.454	-1235.689	6.008
Dead+Wind 90 deg - Service	52.035	14.300	-0.014	2.087	-1438.837	3.088
Dead+Wind 120 deg - Service	52.035	12.819	7.401	743.342	-1283.394	-0.826
Dead+Wind 150 deg - Service	52.035	7.138	12.391	1248.332	-718.218	-4.378
Dead+Wind 180 deg - Service	52.035	-0.014	14.152	1428.426	0.520	-6.726
Dead+Wind 210 deg - Service	52.035	-7.162	12.405	1250.901	718.570	-7.466
Dead+Wind 240 deg - Service	52.035	-12.834	7.426	747.791	1281.866	-6.353
Dead+Wind 270 deg - Service	52.035	-14.300	0.014	7.224	1434.740	-3.088
Dead+Wind 300 deg - Service	52.035	-12.235	-7.064	-705.006	1229.023	0.718
Dead+Wind 330 deg - Service	52.035	-7.138	-12.391	-1239.021	714.122	4.378

Solution Summary

Load Comb.	Sum of Applied Forces PX	PY	PZ	Sum of Reactions PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-52.035	0.000	0.000	52.035	0.000	0.000%
2	0.041	-52.035	-42.850	-0.041	52.035	42.850	0.000%
3	20.699	-52.035	-35.851	-20.699	52.035	35.851	0.000%
4	35.400	-52.035	-20.486	-35.400	52.035	20.486	0.000%
5	41.327	-52.035	-0.041	-41.327	52.035	0.041	0.000%
6	37.048	-52.035	21.390	-37.048	52.035	-21.390	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
7	20.628	-52.035	35.810	-20.628	52.035	-35.810	0.000%
8	-0.041	-52.035	40.900	0.041	52.035	-40.900	0.000%
9	-20.699	-52.035	35.851	20.699	52.035	-35.851	0.000%
10	-37.089	-52.035	21.461	37.089	52.035	-21.461	0.000%
11	-41.327	-52.035	0.041	41.327	52.035	-0.041	0.000%
12	-35.359	-52.035	-20.415	35.360	52.035	20.415	0.000%
13	-20.628	-52.035	-35.810	20.628	52.035	35.810	0.000%
14	0.000	-94.007	0.000	-0.000	94.007	-0.000	0.000%
15	0.007	-94.007	-12.872	-0.007	94.007	12.872	0.000%
16	5.992	-94.007	-10.397	-5.992	94.007	10.397	0.000%
17	10.121	-94.007	-5.862	-10.121	94.007	5.862	0.000%
18	11.973	-94.007	-0.007	-11.973	94.007	0.007	0.000%
19	11.119	-94.007	6.430	-11.119	94.007	-6.430	0.000%
20	5.981	-94.007	10.391	-5.981	94.007	-10.391	0.000%
21	-0.007	-94.007	11.712	0.007	94.007	-11.712	0.000%
22	-5.992	-94.007	10.397	5.992	94.007	-10.397	0.000%
23	-11.126	-94.007	6.442	11.126	94.007	-6.442	0.000%
24	-11.973	-94.007	0.007	11.973	94.007	-0.007	0.000%
25	-10.115	-94.007	-5.850	10.115	94.007	5.850	0.000%
26	-5.981	-94.007	-10.391	5.981	94.007	10.391	0.000%
27	0.014	-52.035	-14.827	-0.014	52.035	14.827	0.000%
28	7.162	-52.035	-12.405	-7.162	52.035	12.405	0.000%
29	12.249	-52.035	-7.088	-12.249	52.035	7.088	0.000%
30	14.300	-52.035	-0.014	-14.300	52.035	0.014	0.000%
31	12.819	-52.035	7.401	-12.819	52.035	-7.401	0.000%
32	7.138	-52.035	12.391	-7.138	52.035	-12.391	0.000%
33	-0.014	-52.035	14.152	0.014	52.035	-14.152	0.000%
34	-7.162	-52.035	12.405	7.162	52.035	-12.405	0.000%
35	-12.834	-52.035	7.426	12.834	52.035	-7.426	0.000%
36	-14.300	-52.035	0.014	14.300	52.035	-0.014	0.000%
37	-12.235	-52.035	-7.064	12.235	52.035	7.064	0.000%
38	-7.138	-52.035	-12.391	7.138	52.035	12.391	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 168	5.549	35	0.306	0.026
T2	168 - 160	4.780	35	0.303	0.027
T3	160 - 140	4.275	35	0.292	0.027
T4	140 - 120	3.102	35	0.242	0.023
T5	120 - 100	2.161	35	0.188	0.019
T6	100 - 80	1.447	35	0.138	0.015
T7	80 - 60	0.910	35	0.101	0.011
T8	60 - 40	0.508	35	0.074	0.007
T9	40 - 20	0.230	35	0.046	0.005
T10	20 - 0	0.067	35	0.018	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.000	PD10017	35	5.420	0.306	0.026	288220
170.000	800 10504 w/ Mount Pipe	35	4.907	0.304	0.027	141893
162.000	(2) APL868013-42T0 w/ Mount Pipe	35	4.400	0.295	0.027	61214
154.000	(2) 7770.00 w/ Mount Pipe	35	3.905	0.279	0.026	33231
146.000	TME-800MHZ 2X50W RRH	35	3.433	0.258	0.024	22297
143.000	APXVSPP18-C-A20	35	3.265	0.250	0.024	19896

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.000	1142-2C	35	2.330	0.198	0.020	20290
104.000	220-3BN	35	1.574	0.147	0.016	25685
93.000	ERICSSON AIR 21 B2A B4P	35	1.241	0.123	0.014	30106
62.000	GPS_A	35	0.543	0.077	0.008	38228
60.000	(2) 3'x8" Knife Plate	35	0.508	0.074	0.007	38407
42.000	GPS_A	35	0.253	0.049	0.005	42153
31.000	GPS_A	35	0.143	0.033	0.004	42263
20.000	(2) 3'x8" Knife Plate	35	0.067	0.018	0.002	43608

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 168	16.002	10	0.882	0.075
T2	168 - 160	13.786	10	0.872	0.077
T3	160 - 140	12.331	10	0.841	0.077
T4	140 - 120	8.950	10	0.696	0.067
T5	120 - 100	6.238	10	0.541	0.056
T6	100 - 80	4.178	10	0.397	0.044
T7	80 - 60	2.628	10	0.292	0.032
T8	60 - 40	1.468	10	0.213	0.022
T9	40 - 20	0.666	10	0.133	0.014
T10	20 - 0	0.195	10	0.051	0.007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.000	PD10017	10	15.631	0.882	0.075	101650
170.000	800 10504 w/ Mount Pipe	10	14.154	0.876	0.077	50012
162.000	(2) APL868013-42T0 w/ Mount Pipe	10	12.692	0.851	0.077	21491
154.000	(2) 7770.00 w/ Mount Pipe	10	11.266	0.804	0.075	11617
146.000	TME-800MHZ 2X50W RRH	10	9.907	0.744	0.070	7756
143.000	APXVSPP18-C-A20	10	9.421	0.720	0.069	6913
124.000	1142-2C	10	6.724	0.572	0.058	7048
104.000	220-3BN	10	4.545	0.423	0.046	8925
93.000	ERICSSON AIR 21 B2A B4P	10	3.585	0.355	0.040	10456
62.000	GPS_A	10	1.568	0.221	0.022	13243
60.000	(2) 3'x8" Knife Plate	10	1.468	0.213	0.022	13304
42.000	GPS_A	10	0.731	0.141	0.015	14601
31.000	GPS_A	10	0.413	0.094	0.011	14636
20.000	(2) 3'x8" Knife Plate	10	0.195	0.051	0.007	15099

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	0.665	5.573	0.119 ✔	1.333	Member Block Shear
		Top Girt	A325N	0.625	1	0.087	4.214	0.021 ✔	1.333	Member Block 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
T2	168	Leg	A325N	0.625	4	1.601	13.493	0.119 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	2.008	5.573	0.360 ✓	1.333	Member Block Shear
T3	160	Leg	A325N	0.625	4	10.650	13.498	0.789 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	4.451	5.573	0.799 ✓	1.333	Member Block Shear
T4	140	Leg	A325N	0.750	4	18.645	19.439	0.959 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	5.105	5.573	0.916 ✓	1.333	Member Block Shear
T5	120	Leg	A325N	0.750	4	25.211	19.439	1.297 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	4.651	6.443	0.722 ✓	1.333	Bolt Shear
T6	100	Leg	A325N	0.875	4	31.426	26.458	1.188 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	5.796	6.443	0.900 ✓	1.333	Bolt Shear
T7	80	Leg	A325N	0.875	4	37.175	26.458	1.405 ✗	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	6.772	6.443	1.051 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.000	4	43.074	34.557	1.246 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	7.147	6.443	1.109 ✓	1.333	Bolt Shear
T9	40	Leg	A325N	1.000	4	48.482	34.557	1.403 ✗	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	7.767	6.443	1.205 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.500	1	3.989	4.123	0.967 ✓	1.333	Bolt Shear
T10	20	Leg	A36	1.500	6	35.943	33.823	1.063 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	8.378	6.443	1.300 ✓	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 $\frac{P}{P_a}$
T1	180 - 168	P2x.154	12.000	4.000	61.0 K=1.00	16.934	1.075	-2.350	18.196	0.129 ✓
T2	168 - 160	P2x.154 (GR)	8.000	4.000	61.0 K=1.00	24.797	1.075	-9.382	26.646	0.352 ✓
T3	160 - 140	P3x.216 (GR)	20.033	5.008	51.7 K=1.00	26.834	2.228	-50.980	59.799	0.853 ✓
T4	140 - 120	P3.5x.318 (GR)	20.033	6.678	61.3 K=1.00	22.997	3.678	-86.525	84.593	1.023 ✓
T5	120 - 100	P4x.337 (GR)	20.033	6.678	54.3 K=1.00	24.542	4.407	-116.312	108.166	1.075 ✓
T6	100 - 80	P5x.375 (GR)	20.033	6.678	43.6 K=1.00	27.097	6.112	-146.299	165.618	0.883 ✓
T7	80 - 60	P6x.432 (GR)	20.033	10.017	54.8 K=1.00	25.763	8.405	-173.527	216.537	0.801 ✓
T8	60 - 40	P6x.432 (GR)	20.033	10.017	54.8 K=1.00	25.763	8.405	-202.410	216.537	0.935 ✓
T9	40 - 20	P6x.432 (GR)	20.033	5.151	28.2 K=1.00	29.474	8.405	-229.865	247.729	0.928 ✓
T10	20 - 0	P8x.5 (GR)	20.033	10.017	41.8 K=1.00	29.102	12.763	-258.185	371.416	0.695

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 $\frac{P}{P_a}$
										✔

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 $\frac{P}{P_a}$
T1	180 - 168	L2x1 1/2x3/16	5.657	2.543	101.1 K=1.07	12.841	0.621	-0.695	7.976	0.087 ✔
T2	168 - 160	L2x1 1/2x3/16	5.657	2.543	101.1 K=1.07	12.841	0.621	-2.140	7.976	0.268 ✔
T3	160 - 140	L2x1 1/2x3/16	7.621	3.637	135.6 K=1.00	8.126	0.621	-4.493	5.047	0.890 ✔
T4	140 - 120	L2x2x3/16	10.162	4.935	150.3 K=1.00	6.610	0.715	-4.664	4.726	0.987 ✔
T5	120 - 100	L2 1/2x2x3/16	11.744	5.701	160.2 K=1.00	5.818	0.809	-4.651	4.706	0.988 ✔
T6	100 - 80	L2 1/2x2 1/2x3/16	13.438	6.498	157.5 K=1.00	6.017	0.902	-5.789	5.427	1.067 ✔
T7	80 - 60	L3x3x3/16	16.803	8.223	165.6 K=1.00	5.447	1.090	-6.772	5.938	1.141 ✔
T8	60 - 40	L3 1/2x3x1/4	18.448	9.047	172.1 K=1.00	5.044	1.560	-7.147	7.869	0.908 ✔
T9	40 - 20	L3 1/2x3x1/4	20.158	10.049	191.1 K=1.00	4.089	1.560	-7.767	6.379	1.218 ✔
T10	20 - 0	L3 1/2x3 1/2x1/4	21.916	10.690	184.8 K=1.00	4.371	1.690	-8.378	7.387	1.134 ✔

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	146.4 K=0.50	6.967	1.690	-3.989	11.775	0.339 ✔

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	-0.081	5.418	0.015 ✔

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	1.691	22.565	0.075 ✔
T2	168 - 160	P2x.154 (GR)	8.000	4.000	61.0	21.000	1.075	6.402	22.565	0.284 ✔
T3	160 - 140	P3x.216 (GR)	20.033	5.008	51.7	21.000	2.228	42.601	46.798	0.910 ✔
T4	140 - 120	P3.5x.318 (GR)	20.033	6.678	61.3	21.000	3.678	74.581	77.247	0.965 ✔
T5	120 - 100	P4x.337 (GR)	20.033	6.678	54.3	21.000	4.407	100.845	92.556	1.090 ✔
T6	100 - 80	P5x.375 (GR)	20.033	6.678	43.6	21.000	6.112	125.702	128.351	0.979 ✔
T7	80 - 60	P6x.432 (GR)	20.033	10.017	54.8	21.000	8.405	148.699	176.504	0.842 ✔
T8	60 - 40	P6x.432 (GR)	20.033	10.017	54.8	21.000	8.405	172.295	176.504	0.976 ✔
T9	40 - 20	P6x.432 (GR)	20.033	4.865	26.6	21.000	8.405	194.352	176.504	1.101 ✔
T10	20 - 0	P8x.5 (GR)	20.033	10.017	41.8	21.000	12.763	215.658	268.017	0.805 ✔

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	0.665	10.450	0.064 ✔
T2	168 - 160	L2x1 1/2x3/16	5.657	2.543	73.4	29.000	0.360	2.008	10.450	0.192 ✔
T3	160 - 140	L2x1 1/2x3/16	7.621	3.637	103.3	29.000	0.360	4.451	10.450	0.426 ✔
T4	140 - 120	L2x2x3/16	9.197	4.474	89.9	29.000	0.431	5.105	12.493	0.409 ✔
T5	120 - 100	L2 1/2x2x3/16	11.744	5.701	117.0	29.000	0.501	4.616	14.537	0.318 ✔
T6	100 - 80	L2 1/2x2 1/2x3/16	13.438	6.498	102.5	29.000	0.571	5.796	16.560	0.350 ✔
T7	80 - 60	L3x3x3/16	16.803	8.223	107.0	29.000	0.712	6.716	20.649	0.325 ✔
T8	60 - 40	L3 1/2x3x1/4	18.448	9.047	120.8	29.000	1.029	7.094	29.852	0.238 ✔
T9	40 - 20	L3 1/2x3x1/4	20.158	10.049	132.1	29.000	1.029	7.399	29.852	0.248 ✔
T10	20 - 0	L3 1/2x3 1/2x1/4	21.916	10.690	119.3	29.000	1.127	8.184	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	3.989	33.359	0.120

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 $\frac{P}{P_a}$
										✓

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	0.087	10.450	0.008 ✓

Section Capacity Table

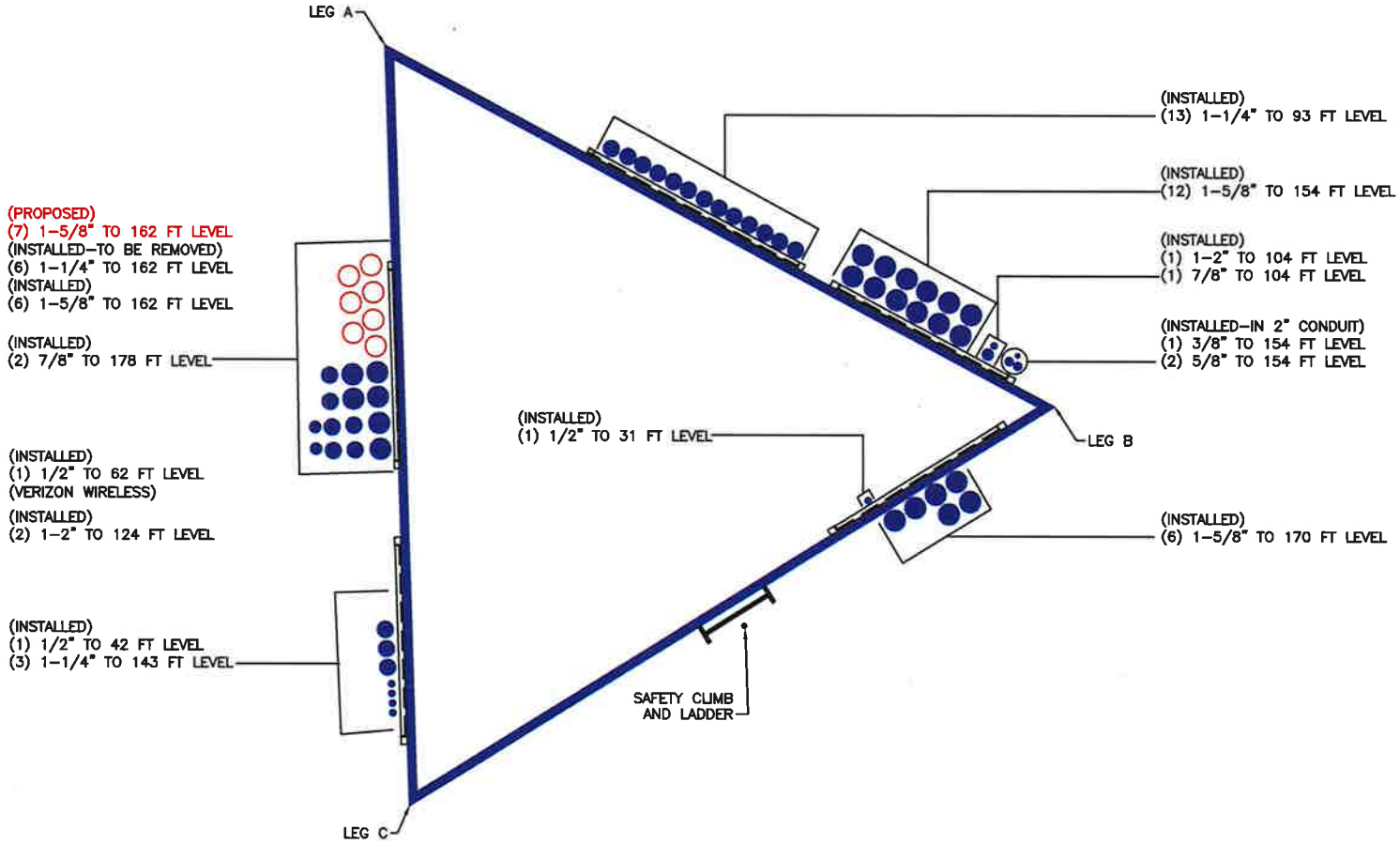
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 168	Leg	P2x.154	2	-2.350	24.255	9.7	Pass
T2	168 - 160	Leg	P2x.154 (GR)	25	-9.382	35.519	26.4	Pass
T3	160 - 140	Leg	P3x.216 (GR)	40	42.601	62.382	68.3	Pass
T4	140 - 120	Leg	P3.5x.318 (GR)	67	-86.525	112.762	76.7	Pass
T5	120 - 100	Leg	P4x.337 (GR)	88	100.845	123.377	81.7 97.3 (b)	Pass
T6	100 - 80	Leg	P5x.375 (GR)	111	125.702	171.092	73.5 89.1 (b)	Pass
T7	80 - 60	Leg	P6x.432 (GR)	132	148.699	235.280	63.2 105.4 (b)	Fail ✗
T8	60 - 40	Leg	P6x.432 (GR)	147	172.295	235.280	73.2 93.5 (b)	Pass
T9	40 - 20	Leg	P6x.432 (GR)	162	194.352	235.280	82.6 105.2 (b)	Fail ✗
T10	20 - 0	Leg	P8x.5 (GR)	183	215.658	357.267	60.4 79.7 (b)	Pass
T1	180 - 168	Diagonal	L2x1 1/2x3/16	9	-0.695	10.631	6.5 8.9 (b)	Pass
T2	168 - 160	Diagonal	L2x1 1/2x3/16	28	-2.140	10.631	20.1 27.0 (b)	Pass
T3	160 - 140	Diagonal	L2x1 1/2x3/16	44	-4.493	6.727	66.8	Pass
T4	140 - 120	Diagonal	L2x2x3/16	71	-4.664	6.300	74.0	Pass
T5	120 - 100	Diagonal	L2 1/2x2x3/16	92	-4.651	6.274	74.1	Pass
T6	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	113	-5.789	7.235	80.0	Pass
T7	80 - 60	Diagonal	L3x3x3/16	134	-6.772	7.915	85.6	Pass
T8	60 - 40	Diagonal	L3 1/2x3x1/4	148	-7.147	10.490	68.1 83.2 (b)	Pass
T9	40 - 20	Diagonal	L3 1/2x3x1/4	166	-7.767	8.503	91.3	Pass
T10	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	187	-8.378	9.847	85.1 97.6 (b)	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-3.989	15.696	25.4 72.6 (b)	Pass
T1	180 - 168	Top Girt	L1 1/2x2x3/16	5	-0.081	7.222	1.1 1.6 (b)	Pass
						Summary		
						Leg (T7)	105.4	Fail ✗
						Diagonal (T10)	97.6	Pass
						Secondary Horizontal (T9)	72.6	Pass
						Top Girt (T1)	1.6	Pass
						Bolt Checks	105.4	Fail ✗

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
						RATING =	105.4	Fail X

*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

DESTEK ENGINEERING

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:

$Code := "TIA-F"$ — Version of the TIA

$T_u := 148.70kip$ — Maximum leg tension load

$P_u := 173.53kip$ — 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).

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

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:

$LegAboveTension := T_u = 148.7 \cdot kip$

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

Test = "Pass"

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{top}} = 67.41 \cdot \%$

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

Test = "Pass"

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{bottom}} = 67.41 \cdot \%$

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

Test = "Pass"

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot R_{tkp}} = 30.04 \cdot \%$

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

Test = "Pass"

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot BTAllowableLoad} = 38.31 \cdot \%$

CALCULATION SHEET

DESTEK ENGINEERING

$LegAboveCompression := P_u = 173.53 \cdot kip$

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

$Test = \text{"Pass"}$

$$StressRatio := \frac{R_{kpc} \cdot LegAboveCompression}{ASIF \cdot P_a} = 86.53 \cdot \%$$

CALCULATION SHEET

Leg Splice Connection Check - 20'

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

$t := 1.0 \cdot in$ 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

$T_u := 194.35kip$ Maximum leg tension load

$P_u := 229.86kip$ 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

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

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

$E := 29000ksi$

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

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

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

CALCULATION SHEET

DESTEK ENGINEERING

TENSILE CHECK:

$R_{tkp} := 0.6 F_{ykp} \cdot n_{pl} \cdot A_{kp} = 180 \cdot kip$ 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:

$LegAboveTension := T_u = 194.35 \cdot kip$

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

$Test = \text{"Pass"}$

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{top}} = 88.11 \cdot \%$

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

$Test = \text{"Pass"}$

$StressRatio := \frac{LegAboveTension}{ASIF \cdot GrossAllowableTension_{bottom}} = 58.34 \cdot \%$

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

$Test = \text{"Pass"}$

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot R_{tkp}} = 35.01 \cdot \%$

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

$Test = \text{"Pass"}$

$StressRatio := \frac{R_{kpt} \cdot LegAboveTension}{ASIF \cdot BTAllowableLoad} = 45.59 \cdot \%$

CALCULATION SHEET

DESTEK ENGINEERING

$LegAboveCompression := P_u = 229.86 \cdot kip$

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

$Test = \text{"Pass"}$

$$StressRatio := \frac{R_{kpc} \cdot LegAboveCompression}{ASIF \cdot P_a} = 74.88 \cdot \%$$

CCI Foundation Tool Suite - SS Drilled Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 1/13/2016

BU:	806353
Site Name:	BRG 124 943066
App Number:	320434 Rev.1
Work Order:	1170047

CROWN CASTLE

Self-Support Drilled Pier

Input

Criteria

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

Forces

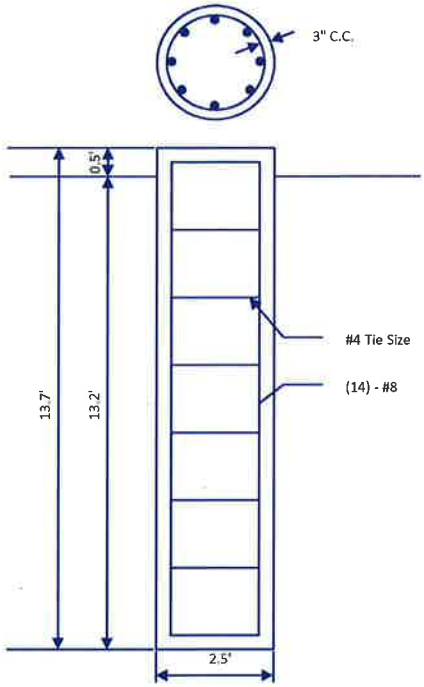
Compression	265 kips
Compression Shear	27 kips
Uplift	220 kips
Uplift Shear	23 kips
Add'l Moment	0 k-ft
Swelling Force	0 kips

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
Soil Cone:	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
Uplift Capacity (k), ϕTn:	505.7 kips
Uplift (k), Tu:	265.0 kips
RATING:	52.41%

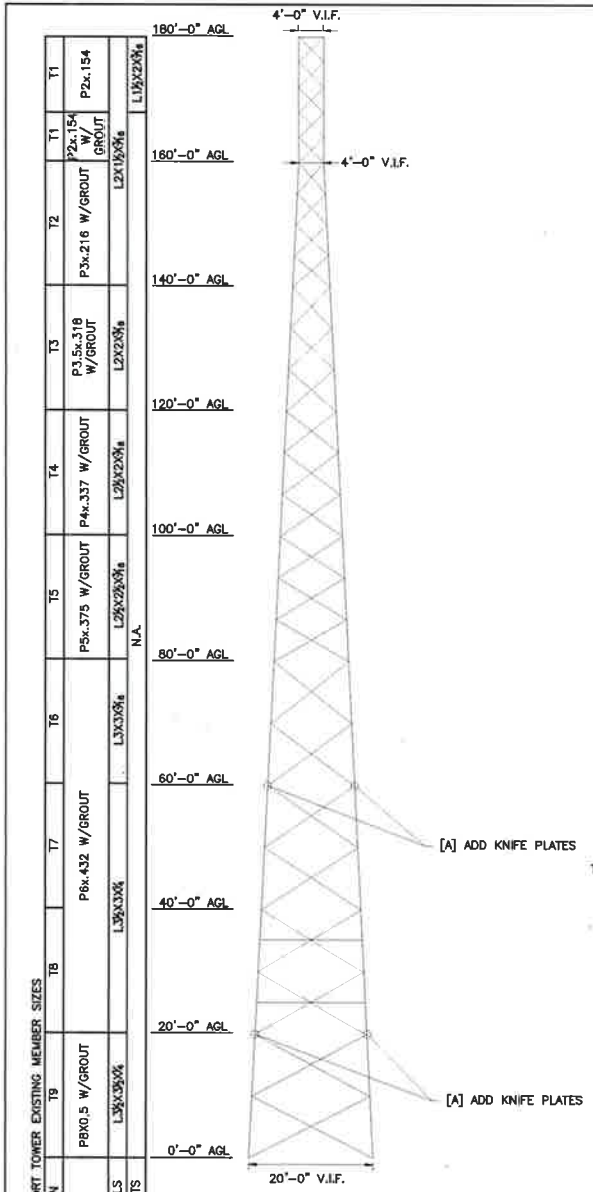
Concrete/Steel Check	Uplift Case		Comp case	
Mu (from soil analysis)	209.6	k-ft	246.0	k-ft
ϕMn	287.8	k-ft	543.3	k-ft
RATING:	72.83%		45.29%	

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%

APPENDIX D

TOWER MODIFICATION DRAWINGS



1 S1 **TOWER ELEVATION** 1" = 20'

NOTES:

1. UPGRADE DESIGN VALID FOR APPURTENANCES LISTED IN DESTEK ANALYSIS REPORT DATED 01/13/2016. CONTRACTOR TO REVIEW AND SHOULD ADHERE TO THE REPORT.

2. CONTRACTOR TO REMOVE AND REATTACH EXISTING APPURTENANCES AS NEEDED.

3. ALL DIMENSIONS ARE BASED ON A STRUCTURAL ANALYSIS REPORT PREPARED BY B+T GROUP, DATED 11/17/2015.

4. CONTRACTOR TO FIELD VERIFY EXISTING TOWER MEMBER SIZES AND TOWER DIMENSIONS IN THE VICINITY OF THE UPGRADE, BEFORE FABRICATION OF STEEL AND COMMENCEMENT OF WORK. ANY DISCREPANCY SHOULD BE REPORTED TO DESTEK IMMEDIATELY FOR FURTHER EVALUATION.

5. DO NOT PERFORM THE WORK ON THE TOWER WHEN WINDS GUST MORE THAN 20 MPH AT THE GROUND LEVEL.

6. NEW TOWER REACTIONS:

LEG COMPRESSION:	265 KIPS
LEG SHEAR:	27 KIPS
LEG UPLIFT:	220 KIPS

7. CONTRACTOR TO HAVE THE SAFETY CLIMB INTACT AND FUNCTIONAL AFTER WORK IS COMPLETE.

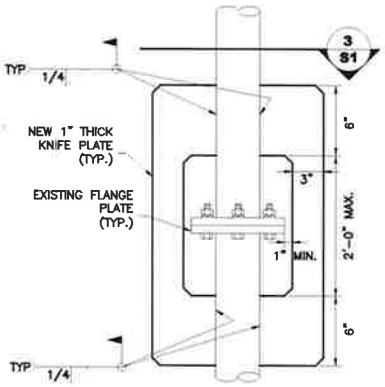
8. TOWER WILL BECOME UNSTABLE WHEN MEMBERS ARE DISCONNECTED OR BEING REPLACED. CONTRACTOR IS FULLY RESPONSIBLE TO MAINTAIN STABILITY OF THE TOWER DURING WORK AND SHOULD CONSULT WITH AN ENGINEER.

9. DESTEK DISCLAIMS ANY LIABILITY ARISING FROM THE ORIGINAL MATERIAL, FABRICATION OR ERECTION OF THE TOWER.

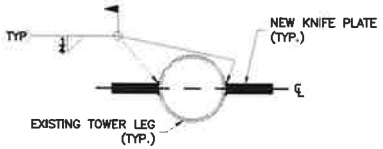
10. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/TIA 1019 (LATEST EDITION), OSHA, AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

TOWER MODIFICATION SCHEDULE

	FROM (FT)	TO (FT)	MODIFICATION	REFERENCE SHEET
A	20'-0"	20'-0"	ADD 1" THICK KNIFE PLATES	S1
	60'-0"	60'-0"		
NOTES: APPLY INDICATED MODIFICATIONS TO ALL 3 TOWER LEGS				



2 S1 **KNIFE PLATE DETAIL** N.T.S.



3 S1 **KNIFE PLATE DETAIL** N.T.S.

1. DESIGN INFORMATION AND GENERAL REQUIREMENTS

1.1 CODES
a. 2005 CT STATE BUILDING CODE WITH 2009 AMENDMENT
b. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ASCE/SEI 7-02, AMERICAN SOCIETY OF CIVIL ENGINEERS
c. STEEL CONSTRUCTION MANUAL, 9TH EDITION, AMERICAN INSTITUTE OF STEEL CONSTRUCTION
d. STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES, ANSI/TIA-222-F, TELECOMMUNICATIONS INDUSTRY ASSOCIATION
e. BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI 318-02

1.2 GENERAL
a. PRIOR TO PURCHASE OR FABRICATION OF MATERIAL, THE CONTRACTOR SHALL PERFORM AN INSPECTION VERIFYING MEMBER DIMENSIONS AND BOLT SIZES. SHOULD THE CONTRACTOR DISCOVER ANY DAMAGED OR MISSING MEMBERS OR THE MEMBER OR BOLT SIZES DO NOT MATCH THOSE LISTED, DESTEK SHALL BE NOTIFIED IMMEDIATELY.
b. CONTRACTOR TO REPLACE ALL BOLTS REMOVED WITH NEW BOLTS OF SAME TYPE, UNLESS NOTED OTHERWISE.

1.3 LOADS & DESIGN CRITERIA
WIND LOADING: Vasd=85MPH; EXPOSURE C

2. STRUCTURAL STEEL

2.1 MATERIALS
a. STRUCTURAL STEEL . . . . . ASTM A992
ANGLE & PLATE . . . . . ASTM A572-50
PIPE . . . . . ASTM A53 GRADE B (OR Fy>35KSI)
HSS ROUND . . . . . ASTM A500 GRADE C (Fy>46KSI)
BARS (SOLID RODS) . . . . . ASTM A572 GRADE 50
b. BOLTS . . . . . ASTM A325X U.N.O.
c. WELDING ELECTRODES . . . . . AWS A5.1 (E70XX)
d. STEEL CONSTRUCTION SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, AISC 335-89s1"
e. WELDING SHALL CONFORM TO AWS D1.1/D1.3/D1.7 AS APPLICABLE.
f. THE FABRICATOR SHALL FURNISH CHECKED SHOP AND ERECTION DRAWINGS TO THE ENGINEER, AND OBTAIN APPROVAL PRIOR TO FABRICATING ANY STRUCTURAL STEEL. SHOP DRAWINGS SHALL CONFORM TO "DETAILING FOR STEEL CONSTRUCTION, 2ND EDITION"
g. POOR MATCHING OF HOLES SHALL BE CORRECTED BY DRILLING TO THE NEXT LARGER SIZE. WELDING FOR RE-DRILLING WILL NOT BE PERMITTED.

2.2 CONNECTIONS
a. SHOP CONNECTIONS MAY BE BOLTED OR WELDED
b. FIELD CONNECTIONS BOLTED WITH A325-X BOLTS, (INSTALLED SNUG TIGHT) UNLESS OTHERWISE SPECIFIED OR IF WELDED CONNECTIONS ARE NOTED ON DRAWINGS
c. FIELD CONNECTIONS SHALL BE MADE WITH A325-X BOLTS AND HARDENED WASHERS EXCEPT AS INDICATED ON THE DESIGN DRAWINGS
d. CONNECTIONS NOT SHOWN ON DRAWINGS SHALL BE DESIGNED BY THE STEEL FABRICATOR. CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH AISC "SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS" AND "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
e. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT PRIOR WRITTEN APPROVAL OF ENGINEER.
f. BOLT HOLES SHALL BE CUT, DRILLED OR PUNCHED AT RIGHT ANGLES TO THE SURFACE OF THE METAL AND SHALL NOT BE MADE OR ENLARGED BY BURNING. HOLES SHALL BE CLEAN CUT WITHOUT TORN OR RAGGED EDGES. OUTSIDE BURRS RESULTING FROM DRILLING OR REAMING OPERATION SHALL BE REMOVED WITH A TOOL MAKING A 1/16 INCH BEVEL. BOLT HOLES SHALL BE 1/16 INCH OVERSIZE.

2.3 FINISHES
a. STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION PER ASTM A123
b. BOLTS AND NUTS SHALL BE HOT DIP GALVANIZED PER ASTM A153.
c. ALL SURFACES DAMAGED DURING THE WORK SHALL BE PAINTED WITH COLD GALVANIZING COMPOUND TWICE. THE PAINT SHOULD BE AT LEAST 93% PURE ZINC. RUST-OLEUM PROFESSIONAL, (MODEL# 7585838) OR SIMILAR.

2.4 WELDING
a. CONTRACTOR TO TAKE ALL NECESSARY PRECAUTIONS FOR FIRE PREVENTION DURING WELDING, SUCH AS; INSTALLING 3000 (NFPA 701) FIRE BLANKET AROUND COAX. MORE SPLATTER AND SPARKS SHOULD BE ANTICIPATED WHILE WELDING ON GALVANIZED SURFACE. COAX IS FLAMMABLE AND SHALL CATCH FIRE IF NOT PROTECTED. WATER SHALL BE ON SITE OF ADEQUATE AMOUNT AND AVAILABLE AT SHORT NOTICE AT ALL TIMES DURING WELDING ACTIVITY. CONTRACTOR SHOULD BE ABLE TO TRANSPORT THE WATER TO THE HEIGHT WELDING BEING PERFORMED.
b. WELDING ON GALVANIZED SURFACE SHOULD BE DONE WITH EXTREME CAUTION. IF THE WELD MATERIAL IS CONTAMINATED WITH ZINC, IT DOES NOT PROVIDE A STRUCTURAL WELD. GRIND GALVANIZING BEFORE WELDING.
c. WELDING CERTIFICATE MUST BE PROVIDED PRIOR TO WELDING. ALL WELDING SHALL BE PERFORMED BY AWS QUALIFIED WELDER WHO HAS EXPERIENCE WITH GALVANIZED SURFACES.

STATE OF CONNECTICUT
AHMET COLAKOGLU
01/13/16

Ahmet Colakoglu, PE
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PREPARED FOR:
CROWN CASTLE

NUM	DATE	DESCRIPTION:
A	1/13/2016	ISSUED FOR CONSTRUCTION

SITE ADDRESS:
128 MATHER STREET,
WILTON, CT 06897

CARRIER DESIGNATION:
CARRIER: VERIZON WIRELESS
SITE NUMBER: N/A
SITE NAME: WILTON, CT

CROWN CASTLE DESIGNATION:
BU NUMBER: 806353
SITE NAME: BRG 124 943066
WO. NUMBER: 1170047
APPLICATION NUMBER: 320434 REV.1

DESIGNED: AJ
DRAWN: AJ
CHECKED: AC

JOB # 1654003

S1 STRUCTURAL DETAILS

MODIFICATION INSPECTION NOTES

MI CHECKLIST

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

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

GENERAL

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

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

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

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

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

MI INSPECTOR

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

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

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

GENERAL CONTRACTOR

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

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

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

RECOMMENDATIONS

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

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

CANCELLATION OR DELAYS IN SCHEDULED MI

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

CORRECTION OF FAILING MI'S

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

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

MI VERIFICATION INSPECTIONS

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

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

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

REQUIRED PHOTOS

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

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

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

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

01/13/16

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