Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

June 9, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
335 South Washington Street, Plainville, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 112-foot level on an existing 121-foot monopole tower at 335 South Washington Street in Plainville, Connecticut (the "Property"). The tower is owned by Crown Castle. Cellco's use of the tower was approved by the Council in 2004. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same 112-foot level on the tower. Cellco also intends to add nine (9) remote radio heads ("RRHs"), one (1) each behind its 700 MHz, 1900 MHz and 2100 MHz antennas and two (2) HYBRIFLEX™ antenna cables attached to the outside of the tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

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 Robert E. Lee, Town Manager of the Town of Plainville. A copy of this letter is also being sent to Display Properties, LLC, the owner of the Property.

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

Robinson+Cole

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be installed on Cellco's existing antenna platform at the 112-foot level on the tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table with Cellco's modified facility is included in Attachment 2.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Robert E. Lee, Plainville Town Manager
Display Properties, LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

SBNHH-1D65B

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

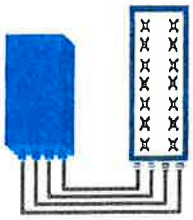
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

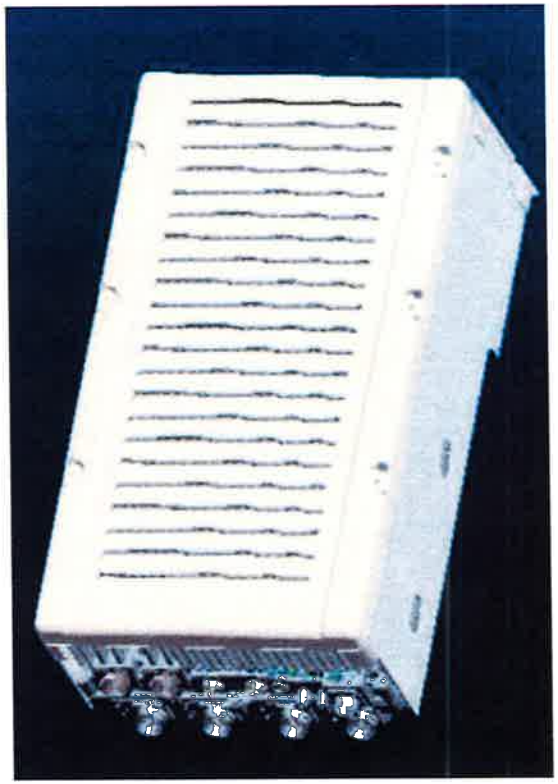
		RRH2x60
RF Output Power		2x60W
Instantaneous Bandwidth		20MHz
Transmitter		2 TX
Receiver	1900 HW version	2 Branch RX – LA6.0.1
	1900A HW version	4 Branch RX – LR13.3
Features		AISG 2.0 for RET/TMA
		Internal Smart Bias-T
Power		-48VDC
CPRI Ports		2 CPRI Rate 3 Ports
External Alarms		4 External User Alarms
Monitor Ports		TX
Environmental		GR487 Compliance
RF Connectors		7/16 DIN (top mounted)

** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**



**- Includes solar shield but not mounting brackets (8 lbs.)

Alcatel-Lucent

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.

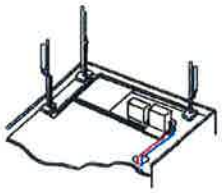
EASY INSTALLATION

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.

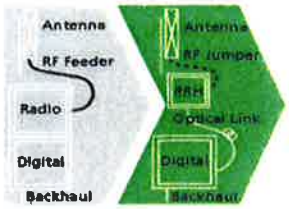
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

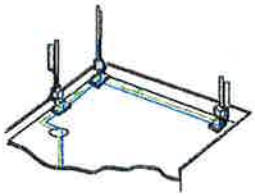
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

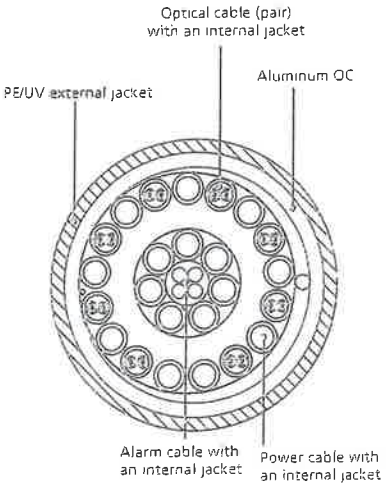


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Southington N (Plainville)								
Tower Height: 121Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T UMTS	2	565	122	0.0273	880	0.5867	4.65%	
*AT&T UMTS	2	875	122	0.0423	1900	1.0000	4.23%	
*AT&T GSM	1	283	122	0.0068	880	0.5867	1.17%	
*AT&T GSM	4	525	122	0.0507	1900	1.0000	5.07%	
*AT&T LTE	1	1313	121	0.0322	734	0.4893	6.59%	
*T-Mobile LTE	2	24	98.5	0.0018	2100	1.0000	0.18%	
*T-Mobile GSM/UMTS	2	12	98.5	0.0009	1950	1.0000	0.09%	
*T-Mobile UMTS	2	12	98.5	0.0009	2100	1.0000	0.09%	
*Clearwire	2	153	88	0.0142	2496	1.0000	1.42%	
*Clearwire	1	211	88	0.0098	11 GHz	1.0000	0.98%	
*MetroPCS CDMA	3	727	76	0.1358	2135	1.0000	13.58%	
*MetroPCS LTE	1	1200	76	0.0747	2130	1.0000	7.47%	
Verizon PCS	**11**	**447**	**112**	**0.1409**	**1970**	**1.0000**	**14.09%**	
Verizon Cellular	**9**	**408**	**112**	**0.1053**	**869**	**0.5793**	**18.17%**	
Verizon AWS	**1**	**1750**	**112**	**0.0502**	**2145**	**1.0000**	**5.02%**	
Verizon 700	**1**	**1050**	**112**	**0.0301**	**746**	**0.4973**	**6.05%**	
								88.84%
* Source: Siting Council								

ATTACHMENT 3

May 11, 2015

Cheryl Schultz
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6632

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
btwo@btgrp.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Southington North, CT
Crown Castle Designation:	**Crown Castle BU Number:**	857012
	Crown Castle Site Name:	Plainville South Washington St
	Crown Castle JDE Job Number:	333072
	Crown Castle Work Order Number:	1056678
	Crown Castle Application Number:	294409 Rev. 3
Engineering Firm Designation:	**B+T Group Project Number:**	93884.002.01
Site Data:	**335 South Washington Street, Plainville, Hartford County, CT** **Latitude *41° 39' 11.03"*, Longitude *-72° 52' 36.9"*** **121 Foot - Monopole Tower**	

Dear Cheryl Schultz,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 784704, in accordance with application 294409, revision 3.

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

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 and Table 2 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 based upon a wind speed of 80 mph fastest mile.

All 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 *B+T Group* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:
B+T Engineering, Inc.

Kyle Frost, E.I.
Project Engineer

Chad E. Tuttle, P.E.
President

STATE OF CONNECTICUT
CHAD E. TUTTLE
No. 23924
LICENSED
PROFESSIONAL ENGINEER
5/11/15

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 121 ft. Monopole tower mapped by B+T Group in May of 2012. The original design speed and codes are unknown.

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 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
110.0	112.0	6	Andrew	SBNHH-1D65B	2	1-5/8	--
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2x60-700			
		3	Alcatel Lucent	RRH2x60-AWS			
		2	Rfs Celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing 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
121.0	122.0	3	Ericsson	RRUS 11 B12	12 2 1	1-5/8 7/8 1/2	1
		3	Ericsson	RRUS-11			
		3	Kmw Comm	AM-X-CD-16-65-00T-RET			
		6	Powerwave Tech	LGP 13901			
		6	Powerwave Tech	LGP21401			
		6	Powerwave Tech	RA21.7770.00			
		1	Raycap	DC6-48-60-18-8F			
	121.0	1	--	Platform Mount [LP 601-1]			
110.0	112.0	**3**	**Antel**	**BXA-171063-8BF-2**	--	--	**2**
		3	**Antel**	**BXA-70063-6CF-2**			
		6	Antel	LPA-80063-4CF-EDIN-5	18	1-5/8	1
	110.0	1	--	Platform Mount [LP 601-1]			
98.0	100.0	3	Andrew	ONEBASE TWIN DUAL DUPLEX TMA	12 1	1-5/8 1-1/4	1
		6	Ericsson	AIR 21			
	98.0	1	--	Platform Mount [LP 601-1]			
86.0	88.0	3	Argus Tech	LLPX310R-V1	2 6	1/2 5/16	1
		3	Dragonwave	A-ANT-18G-2-C			
		3	Dragonwave	HORIZON DUO			
		3	Raycap	DC6-48-60-18-8F			
		3	Samsung	URAS-FLEXIBLE			
	86.0	1	--	Side Arm Mount [SO 103-3]			

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)
Information Not Available						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate Revision #3	294409	CCI Sites
Tower Mapping Drawing	B+T Group, Job No.15301	5121623	CCI Sites
Foundation Mapping Drawing	WEI, Project No:2009-805	4566996	CCI Sites
Geotech Report	Tectonic Date:07/15/2005	4566990	CCI Sites
Antenna Configuration	Crown CAD Package	Dated 05/08/2015	CCI Sites

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) Mount areas and weights are assumed based on photographs provided.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	121 - 96	Pole	TP27.56x21.26x0.188	1	-5.227	756.899	47.0	Pass
L2	96 - 48	Pole	TP39.56x26.316x0.25	2	-14.257	1448.344	91.3	Pass
L3	48 - 0	Pole	TP51.56x37.786x0.313	3	-25.934	2384.404	87.4	Pass
							Summary	
						Pole (L2)	91.3	Pass
						Rating =	91.3	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	54.4	Pass
1	Base Plate	Base	88.3	Pass
1	Base Foundation (Structure)	Base	46.4	Pass
1	Base Foundation (Soil Interaction)	Base	53.0	Pass

Structure Rating (max from all components) =	91.3%

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

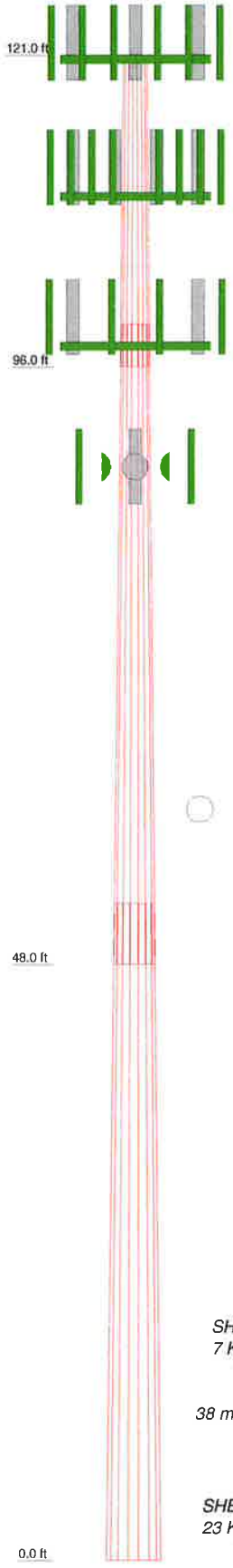
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	25.000	18	0.188	3.450	21.260	27.560		1.2
2	51.450	18	0.250	4.950	26.316	39.560	A572-60	4.5
3	52.950	18	0.313		37.786	51.560		7.9
								13.7



AXIAL
46 K

SHEAR
7 K

MOMENT
649 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 1.000 in ICE

AXIAL
26 K

SHEAR
23 K

MOMENT
2172 kip-ft

TORQUE 1 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) RA21.7770.00 w/ Mount Pipe (E)	121	RRH2x60-700 (P)	110
(2) RA21.7770.00 w/ Mount Pipe (E)	121	RRH2x60-700 (P)	110
(2) RA21.7770.00 w/ Mount Pipe (E)	121	RRH2x60-700 (P)	110
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	121	DB-T1-6Z-8AB-0Z (P)	110
		DB-T1-6Z-8AB-0Z (P)	110
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	121	Platform Mount [LP 601-1] (E)	110
		(2) AIR 21 w/ Mount Pipe (E)	98
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	121	(2) AIR 21 w/ Mount Pipe (E)	98
		(2) AIR 21 w/ Mount Pipe (E)	98
(2) LGP 13901 (E)	121	ONEBASE TWIN DUAL DUPLEX TMA (E)	98
(2) LGP 13901 (E)	121		
(2) LGP 13901 (E)	121	ONEBASE TWIN DUAL DUPLEX TMA (E)	98
(2) LGP21401 (E)	121		
(2) LGP21401 (E)	121	ONEBASE TWIN DUAL DUPLEX TMA (E)	98
(2) LGP21401 (E)	121		
RRUS-11 (E)	121	(2) 6' x 2" Mount Pipe (E)	98
RRUS-11 (E)	121	(2) 6' x 2" Mount Pipe (E)	98
RRUS-11 (E)	121	(2) 6' x 2" Mount Pipe (E)	98
RRUS 11 B12 (E)	121	Platform Mount [LP 601-1] (E)	98
RRUS 11 B12 (E)	121	LLPX310R-V1 w/ Mount Pipe (E)	86
RRUS 11 B12 (E)	121	LLPX310R-V1 w/ Mount Pipe (E)	86
DC6-48-60-18-8F (E-per photo)	121	LLPX310R-V1 w/ Mount Pipe (E)	86
6' x 2" Mount Pipe (E)	121	HORIZON DUO (E)	86
Platform Mount [LP 601-1] (E)	121	HORIZON DUO (E)	86
(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe (E)	110	HORIZON DUO (E)	86
		DC6-48-60-18-8F (E)	86
(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe (E)	110	DC6-48-60-18-8F (E)	86
		DC6-48-60-18-8F (E)	86
(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe (E)	110	URAS-FLEXIBLE (E)	86
		URAS-FLEXIBLE (E)	86
(2) SBNHH-1D65B w/ Mount Pipe (P)	110	URAS-FLEXIBLE (E)	86
(2) SBNHH-1D65B w/ Mount Pipe (P)	110	7'x2" Pipe Mount (E)	86
(2) SBNHH-1D65B w/ Mount Pipe (P)	110	7'x2" Pipe Mount (E)	86
RRH2x60-AWS (P)	110	7'x2" Pipe Mount (E)	86
RRH2x60-AWS (P)	110	Side Arm Mount [SO 103-3] (E)	86
RRH2x60-AWS (P)	110	A-ANT-18G-2-C (E)	86
RRH2X60-PCS (P)	110	A-ANT-18G-2-C (E)	86
RRH2X60-PCS (P)	110	A-ANT-18G-2-C (E)	86
RRH2X60-PCS (P)	110		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-60	60 ksi	75 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 91.3%

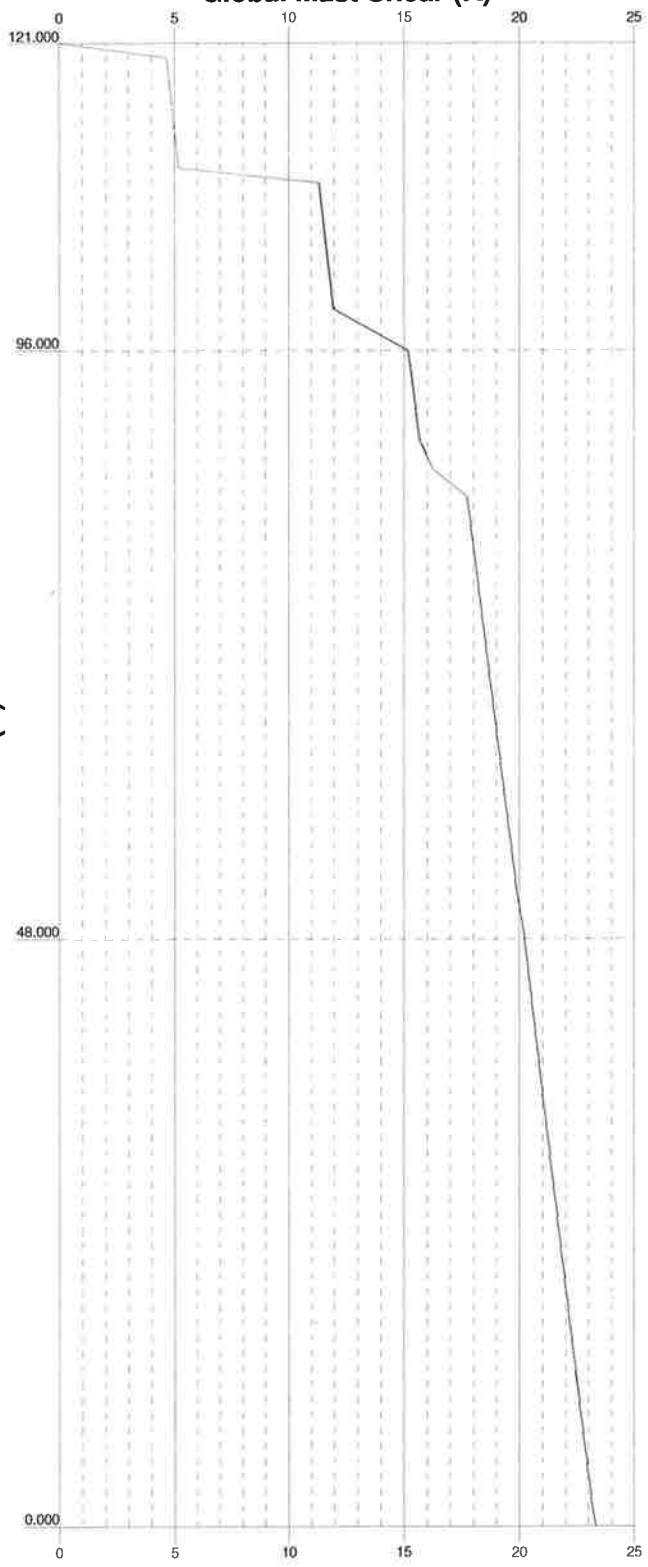
B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: 93884.002.01 - PLAINVILLE SOUTH WASHINGTON ST, CT (BU# 8570		
Project:		
Client: Crown Castle	Drawn by: Ananth Baliga	App'd:
Code: TIA/EIA-222-F	Date: 05/09/15	Scale: NTS
Path:		Dwg No. E-1

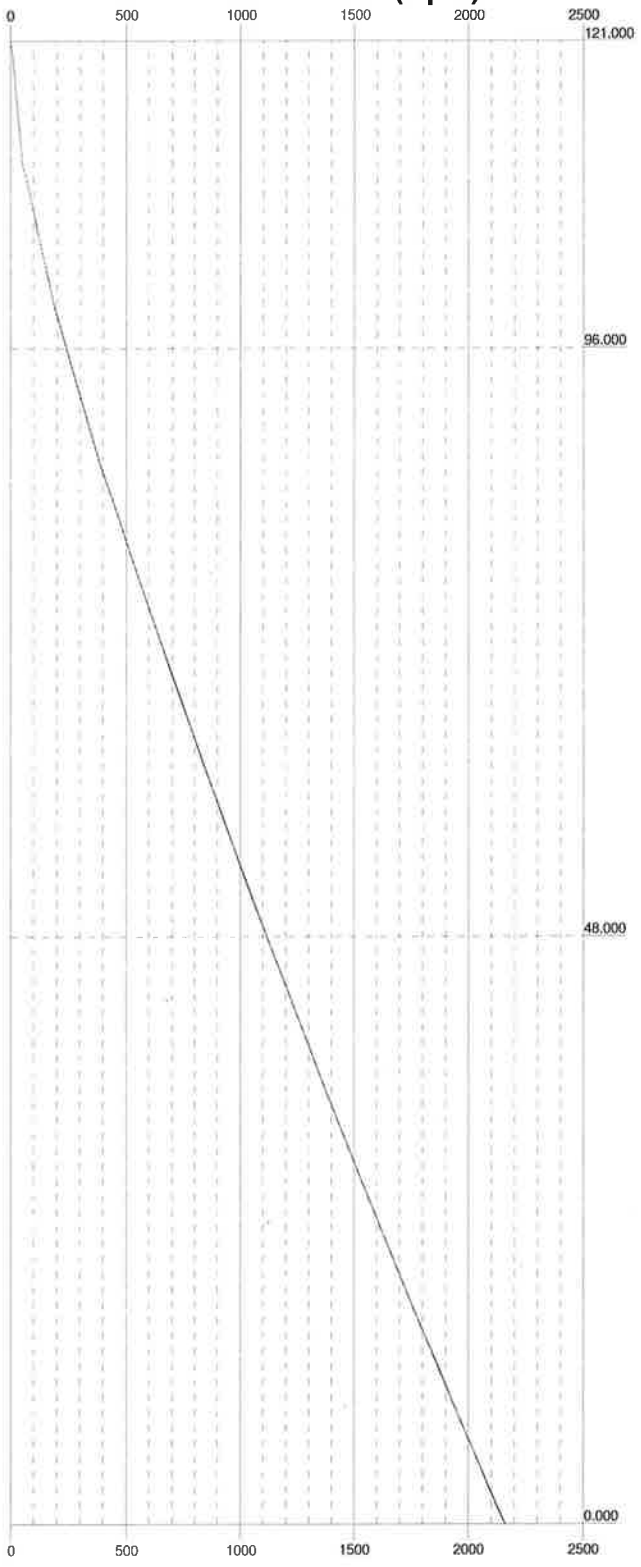
Vx Vz

Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



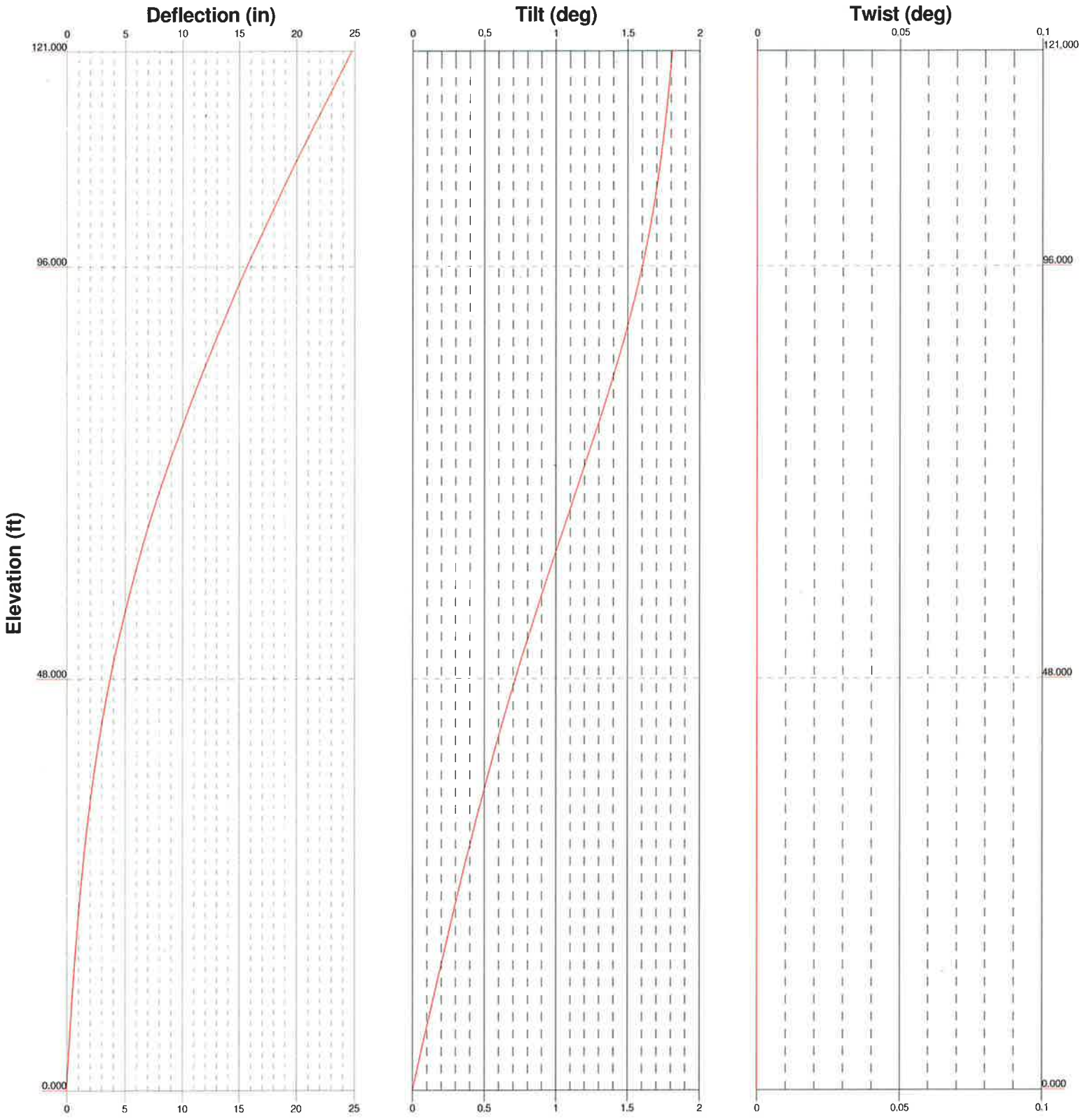
B+T GRP

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: ***93884.002.01 - PLAINVILLE SOUTH WASHINGTON ST, CT (BU# 8570***			
Project:			
Client: Crown Castle	Drawn by: Ananth Baliga	App'd:	
Code: TIA/EIA-222-F	Date: 05/09/15	Scale: NTS	
Path:		Dwg No. E-4	

TIA/EIA-222-F - Service - 50 mph

Maximum Values

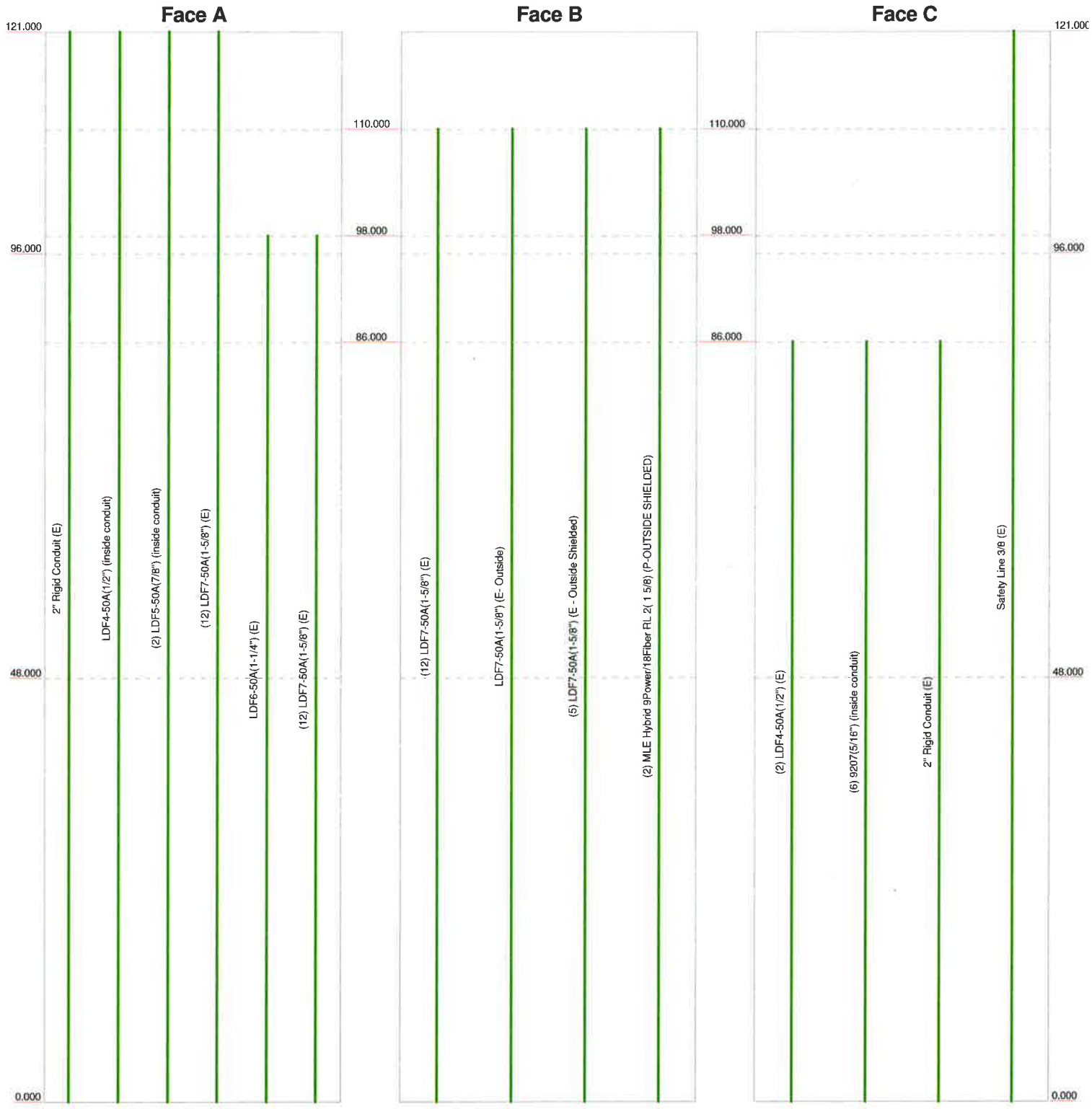


B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: 93884.002.01 - PLAINVILLE SOUTH WASHINGTON ST, CT (BU# 8570			
Project:			
Client: Crown Castle	Drawn by: Ananth Baliga	App'd:	
Code: TIA/EIA-222-F	Date: 05/09/15	Scale: NTS	
Path:		Dwg No. E-5	

0' - 121'

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



B+T GRP

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job:	***93884.002.01 - PLAINVILLE SOUTH WASHINGTON ST, CT (BU# 8570***		
Project:			
Client: Crown Castle		Drawn by: Ananth Baliga	App'd:
Code: TIA/EIA-222-F		Date: 05/09/15	Scale: NTS
Path:			Dwg No. E-7

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.000 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	121.000-96.000	25.000	3.450	18	21.260	27.560	0.188	0.750	A572-60 (60 ksi)
L2	96.000-48.000	51.450	4.950	18	26.316	39.560	0.250	1.000	A572-60 (60 ksi)
L3	48.000-0.000	52.950		18	37.786	51.560	0.313	1.250	A572-60 (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	21.588	12.541	703.548	7.481	10.800	65.143	1408.022	6.272	3.412	18.196
	27.985	16.290	1542.017	9.717	14.000	110.140	3086.062	8.147	4.521	24.11
L2	27.623	20.683	1775.365	9.253	13.368	132.804	3553.065	10.343	4.192	16.766
	40.170	31.192	6089.667	13.955	20.096	303.022	12187.346	15.599	6.523	26.09
L3	39.676	37.169	6594.148	13.303	19.195	343.532	13196.974	18.588	6.100	19.521
	52.355	50.831	16866.014	18.193	26.192	643.926	33754.220	25.420	8.525	27.279

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 121.000-96.000				1	1	1		
L2 96.000-48.000				1	1	1		
L3 48.000-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

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
2" Rigid Conduit (E)	A	No	Inside Pole	121.000 - 0.000	1	No Ice	0.000	0.003
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.003
						2" Ice	0.000	0.003
						4" Ice	0.000	0.003
LDF4-50A(1/2") (inside conduit)	A	No	Inside Pole	121.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
LDF5-50A(7/8") (inside conduit)	A	No	Inside Pole	121.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
LDF7-50A(1-5/8") (E)	A	No	Inside Pole	121.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
AB								
LDF7-50A(1-5/8") (E)	B	No	Inside Pole	110.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF7-50A(1-5/8") (E- Outside)	B	No	CaAa (Out Of Face)	110.000 - 0.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
						2" Ice	0.598	0.011
						4" Ice	0.998	0.030
LDF7-50A(1-5/8") (E - Outside Shielded)	B	No	CaAa (Out Of Face)	110.000 - 0.000	5	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.011
						4" Ice	0.000	0.030
MLE Hybrid 9Power/18Fiber RL 2(1 5/8) (P-OUTSIDE SHIELDED)	B	No	CaAa (Out Of Face)	110.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.029
AB								
LDF6-50A(1-1/4") (E)	A	No	Inside Pole	98.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF7-50A(1-5/8") (E)	A	No	Inside Pole	98.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
AB								
LDF4-50A(1/2") (E)	C	No	Inside Pole	86.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
9207(5/16") (inside conduit)	C	No	Inside Pole	86.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
2" Rigid Conduit (E)	C	No	Inside Pole	86.000 - 0.000	1	No Ice	0.000	0.003
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.003
						2" Ice	0.000	0.003
						4" Ice	0.000	0.003
AB								
Safety Line 3/8 (E)	C	No	CaAa (Out Of Face)	121.000 - 0.000	1	No Ice	0.037	0.000
						1/2" Ice	0.137	0.001
						1" Ice	0.238	0.001
						2" Ice	0.437	0.002
						4" Ice	0.838	0.004
AB								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	121.000-96.000	A	0.000	0.000	0.000	0.000	0.357
		B	0.000	0.000	0.000	2.772	0.237
		C	0.000	0.000	0.000	0.938	0.005
L2	96.000-48.000	A	0.000	0.000	0.000	0.000	1.150
		B	0.000	0.000	0.000	9.504	0.811
		C	0.000	0.000	0.000	1.800	0.265
L3	48.000-0.000	A	0.000	0.000	0.000	0.000	1.150
		B	0.000	0.000	0.000	9.504	0.811
		C	0.000	0.000	0.000	1.800	0.332

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	121.000-96.000	A	1.153	0.000	0.000	0.000	0.000	0.357
		B		0.000	0.000	0.000	6.000	0.735
		C		0.000	0.000	0.000	6.702	0.036
L2	96.000-48.000	A	1.096	0.000	0.000	0.000	0.000	1.150
		B		0.000	0.000	0.000	20.571	2.518
		C		0.000	0.000	0.000	12.867	0.324
L3	48.000-0.000	A	1.000	0.000	0.000	0.000	0.000	1.150
		B		0.000	0.000	0.000	20.030	2.389
		C		0.000	0.000	0.000	12.326	0.388

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	121.000-96.000	0.096	0.108	-0.014	0.291
L2	96.000-48.000	0.192	0.163	0.158	0.396
L3	48.000-0.000	0.196	0.166	0.170	0.412

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) RA21.7770.00 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice	7.031 7.608 8.165	5.002 5.960 6.747	0.060 0.114 0.175

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	9.310	8.370	0.322
						4" Ice	11.721	11.872	0.746
(2) RA21.7770.00 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.031 7.608 8.165 9.310 11.721	5.002 5.960 6.747 8.370 11.872	0.060 0.114 0.175 0.322 0.746
(2) RA21.7770.00 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.031 7.608 8.165 9.310 11.721	5.002 5.960 6.747 8.370 11.872	0.060 0.114 0.175 0.322 0.746
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	A	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.074 0.139 0.212 0.385 0.874
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	B	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.074 0.139 0.212 0.385 0.874
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	C	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.074 0.139 0.212 0.385 0.874
(2) LGP 13901 (E)	A	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.586 0.692 0.807 1.062 1.677	0.280 0.363 0.455 0.665 1.189	0.010 0.014 0.020 0.036 0.094
(2) LGP 13901 (E)	B	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.586 0.692 0.807 1.062 1.677	0.280 0.363 0.455 0.665 1.189	0.010 0.014 0.020 0.036 0.094
(2) LGP 13901 (E)	C	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.586 0.692 0.807 1.062 1.677	0.280 0.363 0.455 0.665 1.189	0.010 0.014 0.020 0.036 0.094
(2) LGP21401 (E)	A	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
(2) LGP21401 (E)	B	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
(2) LGP21401 (E)	C	From Leg	4.000 0.000 1.000	0.000	121.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135

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
RRUS-11	A	From Leg	4.000	0.000	121.000	No Ice	3.249	1.373	0.048
(E)			0.000			1/2" Ice	3.491	1.551	0.068
			1.000			1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
RRUS-11	B	From Leg	4.000	0.000	121.000	No Ice	3.249	1.373	0.048
(E)			0.000			1/2" Ice	3.491	1.551	0.068
			1.000			1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
RRUS-11	C	From Leg	4.000	0.000	121.000	No Ice	3.249	1.373	0.048
(E)			0.000			1/2" Ice	3.491	1.551	0.068
			1.000			1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
RRUS 11 B12	A	From Leg	4.000	0.000	121.000	No Ice	3.306	1.361	0.051
(E)			0.000			1/2" Ice	3.550	1.540	0.072
			1.000			1" Ice	3.802	1.728	0.095
						2" Ice	4.334	2.130	0.153
						4" Ice	5.501	3.038	0.314
RRUS 11 B12	B	From Leg	4.000	0.000	121.000	No Ice	3.306	1.361	0.051
(E)			0.000			1/2" Ice	3.550	1.540	0.072
			1.000			1" Ice	3.802	1.728	0.095
						2" Ice	4.334	2.130	0.153
						4" Ice	5.501	3.038	0.314
RRUS 11 B12	C	From Leg	4.000	0.000	121.000	No Ice	3.306	1.361	0.051
(E)			0.000			1/2" Ice	3.550	1.540	0.072
			1.000			1" Ice	3.802	1.728	0.095
						2" Ice	4.334	2.130	0.153
						4" Ice	5.501	3.038	0.314
DC6-48-60-18-8F	A	From Leg	2.000	0.000	121.000	No Ice	1.266	1.266	0.020
(E-per photo)			0.000			1/2" Ice	1.456	1.456	0.035
			1.000			1" Ice	1.658	1.658	0.053
						2" Ice	2.093	2.093	0.095
						4" Ice	3.098	3.098	0.215
6' x 2" Mount Pipe	C	From Leg	2.000	0.000	121.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
Platform Mount [LP 601-1]	C	None		0.000	121.000	No Ice	28.470	28.470	1.122
(E)						1/2" Ice	33.590	33.590	1.514
						1" Ice	38.710	38.710	1.905
						2" Ice	48.950	48.950	2.689
						4" Ice	69.430	69.430	4.255
AB									
(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe	A	From Leg	4.000	0.000	110.000	No Ice	7.242	7.213	0.038
(E)			0.000			1/2" Ice	7.713	7.909	0.104
			2.000			1" Ice	8.194	8.622	0.176
						2" Ice	9.187	10.104	0.343
						4" Ice	11.312	13.335	0.794
(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe	B	From Leg	4.000	0.000	110.000	No Ice	7.242	7.213	0.038
(E)			0.000			1/2" Ice	7.713	7.909	0.104
			2.000			1" Ice	8.194	8.622	0.176
						2" Ice	9.187	10.104	0.343
						4" Ice	11.312	13.335	0.794
(2) LPA-80063-4CF-EDIN-5	C	From Leg	4.000	0.000	110.000	No Ice	7.242	7.213	0.038

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
w/ Mount Pipe			0.000			1/2" Ice	7.713	7.909	0.104
(E)			2.000			1" Ice	8.194	8.622	0.176
						2" Ice	9.187	10.104	0.343
						4" Ice	11.312	13.335	0.794
(2) SBNHH-1D65B w/	A	From Leg	4.000	0.000	110.000	No Ice	8.637	7.071	0.066
Mount Pipe			0.000			1/2" Ice	9.293	8.260	0.135
(P)			2.000			1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
(2) SBNHH-1D65B w/	B	From Leg	4.000	0.000	110.000	No Ice	8.637	7.071	0.066
Mount Pipe			0.000			1/2" Ice	9.293	8.260	0.135
(P)			2.000			1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
(2) SBNHH-1D65B w/	C	From Leg	4.000	0.000	110.000	No Ice	8.637	7.071	0.066
Mount Pipe			0.000			1/2" Ice	9.293	8.260	0.135
(P)			2.000			1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
RRH2x60-AWS	A	From Leg	4.000	0.000	110.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-AWS	B	From Leg	4.000	0.000	110.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-AWS	C	From Leg	4.000	0.000	110.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2X60-PCS	A	From Leg	4.000	0.000	110.000	No Ice	2.567	2.011	0.055
(P)			0.000			1/2" Ice	2.791	2.218	0.075
			2.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2X60-PCS	B	From Leg	4.000	0.000	110.000	No Ice	2.567	2.011	0.055
(P)			0.000			1/2" Ice	2.791	2.218	0.075
			2.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2X60-PCS	C	From Leg	4.000	0.000	110.000	No Ice	2.567	2.011	0.055
(P)			0.000			1/2" Ice	2.791	2.218	0.075
			2.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2x60-700	A	From Leg	4.000	0.000	110.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-700	B	From Leg	4.000	0.000	110.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-700	C	From Leg	4.000	0.000	110.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
DB-T1-6Z-8AB-0Z	A	From Leg	4.000	0.000	110.000	No Ice	5.600	2.333	0.044
(P)			0.000			1/2" Ice	5.915	2.558	0.080
			2.000			1" Ice	6.240	2.791	0.120
						2" Ice	6.914	3.284	0.213
						4" Ice	8.365	4.373	0.455
DB-T1-6Z-8AB-0Z	B	From Leg	4.000	0.000	110.000	No Ice	5.600	2.333	0.044
(P)			0.000			1/2" Ice	5.915	2.558	0.080
			2.000			1" Ice	6.240	2.791	0.120
						2" Ice	6.914	3.284	0.213
						4" Ice	8.365	4.373	0.455
Platform Mount [LP 601-1]	C	None		0.000	110.000	No Ice	28.470	28.470	1.122
(E)						1/2" Ice	33.590	33.590	1.514
						1" Ice	38.710	38.710	1.905
						2" Ice	48.950	48.950	2.689
						4" Ice	69.430	69.430	4.255
AB									
(2) AIR 21 w/ Mount Pipe	A	From Leg	4.000	0.000	98.000	No Ice	6.624	5.470	0.100
(E)			0.000			1/2" Ice	7.131	6.281	0.155
			2.000			1" Ice	7.637	7.039	0.217
						2" Ice	8.678	8.609	0.363
						4" Ice	10.885	11.963	0.777
(2) AIR 21 w/ Mount Pipe	B	From Leg	4.000	0.000	98.000	No Ice	6.624	5.470	0.100
(E)			0.000			1/2" Ice	7.131	6.281	0.155
			2.000			1" Ice	7.637	7.039	0.217
						2" Ice	8.678	8.609	0.363
						4" Ice	10.885	11.963	0.777
(2) AIR 21 w/ Mount Pipe	C	From Leg	4.000	0.000	98.000	No Ice	6.624	5.470	0.100
(E)			0.000			1/2" Ice	7.131	6.281	0.155
			2.000			1" Ice	7.637	7.039	0.217
						2" Ice	8.678	8.609	0.363
						4" Ice	10.885	11.963	0.777
ONEBASE TWIN DUAL	A	From Leg	4.000	0.000	98.000	No Ice	0.674	0.306	0.011
DUPLEX TMA			0.000			1/2" Ice	0.786	0.392	0.016
(E)			2.000			1" Ice	0.908	0.486	0.022
						2" Ice	1.176	0.699	0.040
						4" Ice	1.816	1.231	0.103
ONEBASE TWIN DUAL	B	From Leg	4.000	0.000	98.000	No Ice	0.674	0.306	0.011
DUPLEX TMA			0.000			1/2" Ice	0.786	0.392	0.016
(E)			2.000			1" Ice	0.908	0.486	0.022
						2" Ice	1.176	0.699	0.040
						4" Ice	1.816	1.231	0.103
ONEBASE TWIN DUAL	C	From Leg	4.000	0.000	98.000	No Ice	0.674	0.306	0.011
DUPLEX TMA			0.000			1/2" Ice	0.786	0.392	0.016
(E)			2.000			1" Ice	0.908	0.486	0.022
						2" Ice	1.176	0.699	0.040
						4" Ice	1.816	1.231	0.103
(2) 6' x 2" Mount Pipe	A	From Leg	4.000	0.000	98.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			2.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	4.702	4.702	0.231
(2) 6' x 2" Mount Pipe (E)	B	From Leg	4.000 0.000 2.000	0.000	98.000	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 (E)	C	From Leg	4.000 0.000 2.000	0.000	98.000	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
Platform Mount [LP 601-1] (E)	C	None		0.000	98.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.470 33.590 38.710 48.950 69.430	28.470 33.590 38.710 48.950 69.430	1.122 1.514 1.905 2.689 4.255
*******									
LLPX310R-V1 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.065 5.480 5.905 6.788 8.704	2.983 3.526 4.086 5.313 8.131	0.045 0.083 0.126 0.232 0.544
LLPX310R-V1 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.065 5.480 5.905 6.788 8.704	2.983 3.526 4.086 5.313 8.131	0.045 0.083 0.126 0.232 0.544
LLPX310R-V1 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.065 5.480 5.905 6.788 8.704	2.983 3.526 4.086 5.313 8.131	0.045 0.083 0.126 0.232 0.544
HORIZON DUO (E)	A	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.547 0.648 0.759 1.005 1.601	0.343 0.426 0.518 0.728 1.252	0.007 0.012 0.018 0.036 0.097
HORIZON DUO (E)	B	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.547 0.648 0.759 1.005 1.601	0.343 0.426 0.518 0.728 1.252	0.007 0.012 0.018 0.036 0.097
HORIZON DUO (E)	C	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.547 0.648 0.759 1.005 1.601	0.343 0.426 0.518 0.728 1.252	0.007 0.012 0.018 0.036 0.097
DC6-48-60-18-8F (E)	A	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.266 1.456 1.658 2.093 3.098	1.266 1.456 1.658 2.093 3.098	0.020 0.035 0.053 0.095 0.215
DC6-48-60-18-8F (E)	B	From Leg	4.000 0.000 2.000	0.000	86.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.266 1.456 1.658 2.093 3.098	1.266 1.456 1.658 2.093 3.098	0.020 0.035 0.053 0.095 0.215

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
DC6-48-60-18-8F	C	From Leg	4.000	0.000	86.000	No Ice	1.266	1.266	0.020
(E)			0.000			1/2" Ice	1.456	1.456	0.035
			2.000			1" Ice	1.658	1.658	0.053
						2" Ice	2.093	2.093	0.095
						4" Ice	3.098	3.098	0.215
URAS-FLEXIBLE	A	From Leg	4.000	0.000	86.000	No Ice	1.804	0.778	0.033
(E)			0.000			1/2" Ice	1.988	0.918	0.045
			2.000			1" Ice	2.180	1.067	0.058
						2" Ice	2.589	1.391	0.094
						4" Ice	3.512	2.143	0.201
URAS-FLEXIBLE	B	From Leg	4.000	0.000	86.000	No Ice	1.804	0.778	0.033
(E)			0.000			1/2" Ice	1.988	0.918	0.045
			2.000			1" Ice	2.180	1.067	0.058
						2" Ice	2.589	1.391	0.094
						4" Ice	3.512	2.143	0.201
URAS-FLEXIBLE	C	From Leg	4.000	0.000	86.000	No Ice	1.804	0.778	0.033
(E)			0.000			1/2" Ice	1.988	0.918	0.045
			2.000			1" Ice	2.180	1.067	0.058
						2" Ice	2.589	1.391	0.094
						4" Ice	3.512	2.143	0.201
7'x2" Pipe Mount	A	From Leg	2.000	0.000	86.000	No Ice	1.663	1.663	0.026
(E)			0.000			1/2" Ice	2.391	2.391	0.039
			2.000			1" Ice	2.825	2.825	0.056
						2" Ice	3.706	3.706	0.105
						4" Ice	5.578	5.578	0.266
7'x2" Pipe Mount	B	From Leg	2.000	0.000	86.000	No Ice	1.663	1.663	0.026
(E)			0.000			1/2" Ice	2.391	2.391	0.039
			2.000			1" Ice	2.825	2.825	0.056
						2" Ice	3.706	3.706	0.105
						4" Ice	5.578	5.578	0.266
7'x2" Pipe Mount	C	From Leg	2.000	0.000	86.000	No Ice	1.663	1.663	0.026
(E)			0.000			1/2" Ice	2.391	2.391	0.039
			2.000			1" Ice	2.825	2.825	0.056
						2" Ice	3.706	3.706	0.105
						4" Ice	5.578	5.578	0.266
Side Arm Mount [SO 103-3]	C	None		0.000	86.000	No Ice	9.500	9.500	0.224
(E)						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
*******									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
A-ANT-18G-2-C	A	Paraboloid w/o	From	1.000	30.000		86.000	2.175	No Ice	3.720	0.030
(E)		Radome	Leg	0.000					1/2" Ice	4.010	0.030

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
				2.000					1" Ice	4.300	0.360
									2" Ice	4.880	0.065
									4" Ice	6.040	0.188
A-ANT-18G-2-C (E)	B	Paraboloid w/o Radome	From Leg	1.000 0.000 2.000	30.000		86.000	2.175	No Ice 1/2" Ice 1" Ice	3.720 4.010 4.300	0.030 0.030 0.360
									2" Ice	4.880	0.065
									4" Ice	6.040	0.188
A-ANT-18G-2-C (E)	C	Paraboloid w/o Radome	From Leg	1.000 0.000 2.000	30.000		86.000	2.175	No Ice 1/2" Ice 1" Ice	3.720 4.010 4.300	0.030 0.030 0.360
									2" Ice	4.880	0.065
									4" Ice	6.040	0.188
AB											

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+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

Comb. No.	Description
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	121 - 96	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-13.817	-0.953	0.121
			Max. Mx	5	-5.240	-189.821	-0.647
			Max. My	2	-5.234	0.533	190.513
			Max. Vy	11	-11.962	189.401	0.796
			Max. Vx	8	12.027	-0.898	-190.339
			Max. Torque	6			0.375
L2	96 - 48	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-30.322	-3.365	-1.328
			Max. Mx	11	-14.265	1016.489	3.241
			Max. My	8	-14.265	-0.196	-1018.257
			Max. Vy	11	-19.850	1016.489	3.241
			Max. Vx	8	19.835	-0.196	-1018.257
			Max. Torque	11			-0.607
L3	48 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-46.364	-6.678	-3.371
			Max. Mx	11	-25.935	2158.569	5.880
			Max. My	8	-25.935	1.839	-2160.476
			Max. Vy	11	-23.328	2158.569	5.880
			Max. Vx	8	23.312	1.839	-2160.476
			Max. Torque	11			-0.569

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	20	46.364	-3.335	-5.777
	Max. H_x	11	25.953	23.307	0.056
	Max. H_z	2	25.953	0.160	23.291
	Max. M_x	2	2159.474	0.160	23.291
	Max. M_z	5	2156.980	-23.262	-0.056
	Max. Torsion	6	0.242	-20.195	-11.603
	Min. Vert	1	25.953	0.000	0.000
	Min. H_x	5	25.953	-23.262	-0.056
	Min. H_z	8	25.953	0.049	-23.291
	Min. M_x	8	-2160.476	0.049	-23.291
	Min. M_z	11	-2158.569	23.307	0.056
	Min. Torsion	3	-0.565	-11.605	20.212

Tower Mast Reaction Summary

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 Only	25.953	0.000	0.000	0.493	-1.155	0.000
Dead+Wind 0 deg - No Ice	25.953	-0.160	-23.291	-2159.474	14.608	0.471
Dead+Wind 30 deg - No Ice	25.953	11.605	-20.212	-1873.092	-1075.531	0.565
Dead+Wind 60 deg - No Ice	25.953	20.140	-11.507	-1065.822	-1866.927	0.155
Dead+Wind 90 deg - No Ice	25.953	23.262	0.056	6.886	-2156.980	-0.089
Dead+Wind 120 deg - No Ice	25.953	20.195	11.603	1077.871	-1873.289	-0.242
Dead+Wind 150 deg - No Ice	25.953	11.701	20.267	1880.456	-1086.577	-0.072
Dead+Wind 180 deg - No Ice	25.953	-0.049	23.291	2160.476	1.839	-0.236
Dead+Wind 210 deg - No Ice	25.953	-11.583	20.174	1870.671	1071.186	-0.129
Dead+Wind 240 deg - No Ice	25.953	-20.035	11.688	1083.122	1855.152	0.076
Dead+Wind 270 deg - No Ice	25.953	-23.307	-0.056	-5.880	2158.569	0.518
Dead+Wind 300 deg - No Ice	25.953	-20.091	-11.784	-1093.162	1861.517	0.470
Dead+Wind 330 deg - No Ice	25.953	-11.679	-20.229	-1876.031	1082.234	0.505
Dead+Ice+Temp	46.364	0.000	0.000	3.371	-6.678	0.000
Dead+Wind 0 deg+Ice+Temp	46.364	-0.040	-6.642	-636.006	-2.691	0.099
Dead+Wind 30 deg+Ice+Temp	46.364	3.313	-5.764	-551.213	-325.165	0.151
Dead+Wind 60 deg+Ice+Temp	46.364	5.746	-3.286	-312.789	-559.419	0.070
Dead+Wind 90 deg+Ice+Temp	46.364	6.636	0.013	4.954	-645.213	0.024
Dead+Wind 120 deg+Ice+Temp	46.364	5.759	3.309	322.281	-560.967	-0.011
Dead+Wind 150 deg+Ice+Temp	46.364	3.335	5.777	559.570	-327.848	0.025
Dead+Wind 180 deg+Ice+Temp	46.364	-0.014	6.642	642.814	-5.790	-0.039
Dead+Wind 210 deg+Ice+Temp	46.364	-3.307	5.754	557.109	311.147	-0.037
Dead+Wind 240 deg+Ice+Temp	46.364	-5.719	3.333	323.937	543.424	-0.009
Dead+Wind 270 deg+Ice+Temp	46.364	-6.648	-0.013	1.856	632.779	0.089
Dead+Wind 300 deg+Ice+Temp	46.364	-5.732	-3.356	-319.812	544.974	0.071
Dead+Wind 330 deg+Ice+Temp	46.364	-3.329	-5.767	-551.850	313.831	0.088
Dead+Wind 0 deg - Service	25.953	-0.063	-9.098	-843.954	4.987	0.184
Dead+Wind 30 deg - Service	25.953	4.533	-7.895	-731.988	-421.207	0.222
Dead+Wind 60 deg - Service	25.953	7.867	-4.495	-416.381	-730.602	0.061
Dead+Wind 90 deg - Service	25.953	9.087	0.022	2.998	-844.004	-0.035
Dead+Wind 120 deg - Service	25.953	7.889	4.532	421.707	-733.096	-0.095
Dead+Wind 150 deg - Service	25.953	4.571	7.917	735.486	-425.530	-0.029
Dead+Wind 180 deg - Service	25.953	-0.019	9.098	844.957	-0.006	-0.093
Dead+Wind 210 deg - Service	25.953	-4.525	7.880	731.651	418.061	-0.051
Dead+Wind 240 deg - Service	25.953	-7.826	4.566	423.753	724.552	0.030
Dead+Wind 270 deg - Service	25.953	-9.104	-0.022	-1.994	843.179	0.204
Dead+Wind 300 deg - Service	25.953	-7.848	-4.603	-427.072	727.047	0.185
Dead+Wind 330 deg - Service	25.953	-4.562	-7.902	-733.143	422.384	0.198

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	-25.953	0.000	0.000	25.953	0.000	0.000%
2	-0.160	-25.953	-23.291	0.160	25.953	23.291	0.000%
3	11.605	-25.953	-20.212	-11.605	25.953	20.212	0.000%
4	20.140	-25.953	-11.507	-20.140	25.953	11.507	0.000%
5	23.262	-25.953	0.056	-23.262	25.953	-0.056	0.000%
6	20.195	-25.953	11.603	-20.195	25.953	-11.603	0.000%
7	11.701	-25.953	20.267	-11.701	25.953	-20.267	0.000%
8	-0.049	-25.953	23.291	0.049	25.953	-23.291	0.000%
9	-11.583	-25.953	20.174	11.583	25.953	-20.174	0.000%
10	-20.035	-25.953	11.688	20.035	25.953	-11.688	0.000%
11	-23.307	-25.953	-0.056	23.307	25.953	0.056	0.000%
12	-20.091	-25.953	-11.784	20.091	25.953	11.784	0.000%
13	-11.679	-25.953	-20.229	11.679	25.953	20.229	0.000%
14	0.000	-46.364	0.000	-0.000	46.364	-0.000	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
15	-0.040	-46.364	-6.642	0.040	46.364	6.642	0.000%
16	3.313	-46.364	-5.764	-3.313	46.364	5.764	0.000%
17	5.746	-46.364	-3.286	-5.746	46.364	3.286	0.000%
18	6.636	-46.364	0.013	-6.636	46.364	-0.013	0.000%
19	5.759	-46.364	3.309	-5.759	46.364	-3.309	0.000%
20	3.335	-46.364	5.777	-3.335	46.364	-5.777	0.000%
21	-0.014	-46.364	6.642	0.014	46.364	-6.642	0.000%
22	-3.307	-46.364	5.754	3.307	46.364	-5.754	0.000%
23	-5.719	-46.364	3.333	5.719	46.364	-3.333	0.000%
24	-6.648	-46.364	-0.013	6.648	46.364	0.013	0.000%
25	-5.732	-46.364	-3.356	5.732	46.364	3.356	0.000%
26	-3.329	-46.364	-5.767	3.329	46.364	5.767	0.000%
27	-0.063	-25.953	-9.098	0.063	25.953	9.098	0.000%
28	4.533	-25.953	-7.895	-4.533	25.953	7.895	0.000%
29	7.867	-25.953	-4.495	-7.867	25.953	4.495	0.000%
30	9.087	-25.953	0.022	-9.087	25.953	-0.022	0.000%
31	7.889	-25.953	4.532	-7.889	25.953	-4.532	0.000%
32	4.571	-25.953	7.917	-4.571	25.953	-7.917	0.000%
33	-0.019	-25.953	9.098	0.019	25.953	-9.098	0.000%
34	-4.525	-25.953	7.880	4.525	25.953	-7.880	0.000%
35	-7.826	-25.953	4.566	7.826	25.953	-4.566	0.000%
36	-9.104	-25.953	-0.022	9.104	25.953	0.022	0.000%
37	-7.848	-25.953	-4.603	7.848	25.953	4.603	0.000%
38	-4.562	-25.953	-7.902	4.562	25.953	7.902	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00006645
3	Yes	5	0.00000001	0.00025083
4	Yes	5	0.00000001	0.00024586
5	Yes	4	0.00000001	0.00006470
6	Yes	5	0.00000001	0.00024590
7	Yes	5	0.00000001	0.00025239
8	Yes	4	0.00000001	0.00011954
9	Yes	5	0.00000001	0.00024632
10	Yes	5	0.00000001	0.00024560
11	Yes	4	0.00000001	0.00034421
12	Yes	5	0.00000001	0.00025434
13	Yes	5	0.00000001	0.00024560
14	Yes	4	0.00000001	0.00002119
15	Yes	5	0.00000001	0.00011364
16	Yes	5	0.00000001	0.00017588
17	Yes	5	0.00000001	0.00017335
18	Yes	5	0.00000001	0.00011510
19	Yes	5	0.00000001	0.00017653
20	Yes	5	0.00000001	0.00017868
21	Yes	5	0.00000001	0.00011461
22	Yes	5	0.00000001	0.00017084
23	Yes	5	0.00000001	0.00017116
24	Yes	5	0.00000001	0.00011281
25	Yes	5	0.00000001	0.00017196
26	Yes	5	0.00000001	0.00017020
27	Yes	4	0.00000001	0.00004226

28	Yes	4	0.00000001	0.00093028
29	Yes	4	0.00000001	0.00089705
30	Yes	4	0.00000001	0.00003212
31	Yes	4	0.00000001	0.00089428
32	Yes	4	0.00000001	0.00093802
33	Yes	4	0.00000001	0.00003713
34	Yes	4	0.00000001	0.00089531
35	Yes	4	0.00000001	0.00088859
36	Yes	4	0.00000001	0.00007510
37	Yes	4	0.00000001	0.00094699
38	Yes	4	0.00000001	0.00088703

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	121 - 96	24.754	32	1.808	0.002
L2	99.45 - 48	16.841	32	1.644	0.001
L3	52.95 - 0	4.518	32	0.806	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
121.000	(2) RA21.7770.00 w/ Mount Pipe	32	24.754	1.808	0.002	17961
110.000	(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe	32	20.631	1.740	0.002	8164
98.000	(2) AIR 21 w/ Mount Pipe	32	16.342	1.627	0.001	4123
88.000	A-ANT-18G-2-C	32	13.073	1.483	0.001	3594
86.000	LLPX310R-V1 w/ Mount Pipe	32	12.458	1.449	0.001	3509

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	121 - 96	63.178	7	4.619	0.005
L2	99.45 - 48	42.996	7	4.200	0.003
L3	52.95 - 0	11.542	7	2.061	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
121.000	(2) RA21.7770.00 w/ Mount Pipe	7	63.178	4.619	0.005	7119
110.000	(2) LPA-80063-4CF-EDIN-5 w/ Mount Pipe	7	52.663	4.444	0.004	3235
98.000	(2) AIR 21 w/ Mount Pipe	7	41.722	4.156	0.003	1632
88.000	A-ANT-18G-2-C	7	33.382	3.787	0.003	1420
86.000	LLPX310R-V1 w/ Mount Pipe	7	31.812	3.702	0.003	1386

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	121 - 96 (1)	TP27.56x21.26x0.188	25.000	0.000	0.0	36.000	15.773	-5.227	567.816	0.009
L2	96 - 48 (2)	TP39.56x26.316x0.25	51.450	0.000	0.0	36.000	30.181	-14.257	1086.530	0.013
L3	48 - 0 (3)	TP51.56x37.786x0.313	52.950	0.000	0.0	35.190	50.831	-25.934	1788.750	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	121 - 96 (1)	TP27.56x21.26x0.188	190.882	22.189	36.000	0.616	0.000	0.000	36.000	0.000
L2	96 - 48 (2)	TP39.56x26.316x0.25	1023.358	43.296	36.000	1.203	0.000	0.000	36.000	0.000
L3	48 - 0 (3)	TP51.56x37.786x0.313	2171.808	40.473	35.190	1.150	0.000	0.000	35.190	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	121 - 96 (1)	TP27.56x21.26x0.188	12.061	0.765	24.000	0.064	0.361	0.020	24.000	0.001
L2	96 - 48 (2)	TP39.56x26.316x0.25	19.949	0.661	24.000	0.055	0.044	0.001	24.000	0.000
L3	48 - 0 (3)	TP51.56x37.786x0.313	23.424	0.461	24.000	0.038	0.072	0.001	24.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	121 - 96 (1)	0.009	0.616	0.000	0.064	0.001	0.627 ✔	1.333	H1-3+VT ✔
L2	96 - 48 (2)	0.013	1.203	0.000	0.055	0.000	1.217 ✔	1.333	H1-3+VT ✔
L3	48 - 0 (3)	0.014	1.150	0.000	0.038	0.000	1.165 ✔	1.333	H1-3+VT ✔

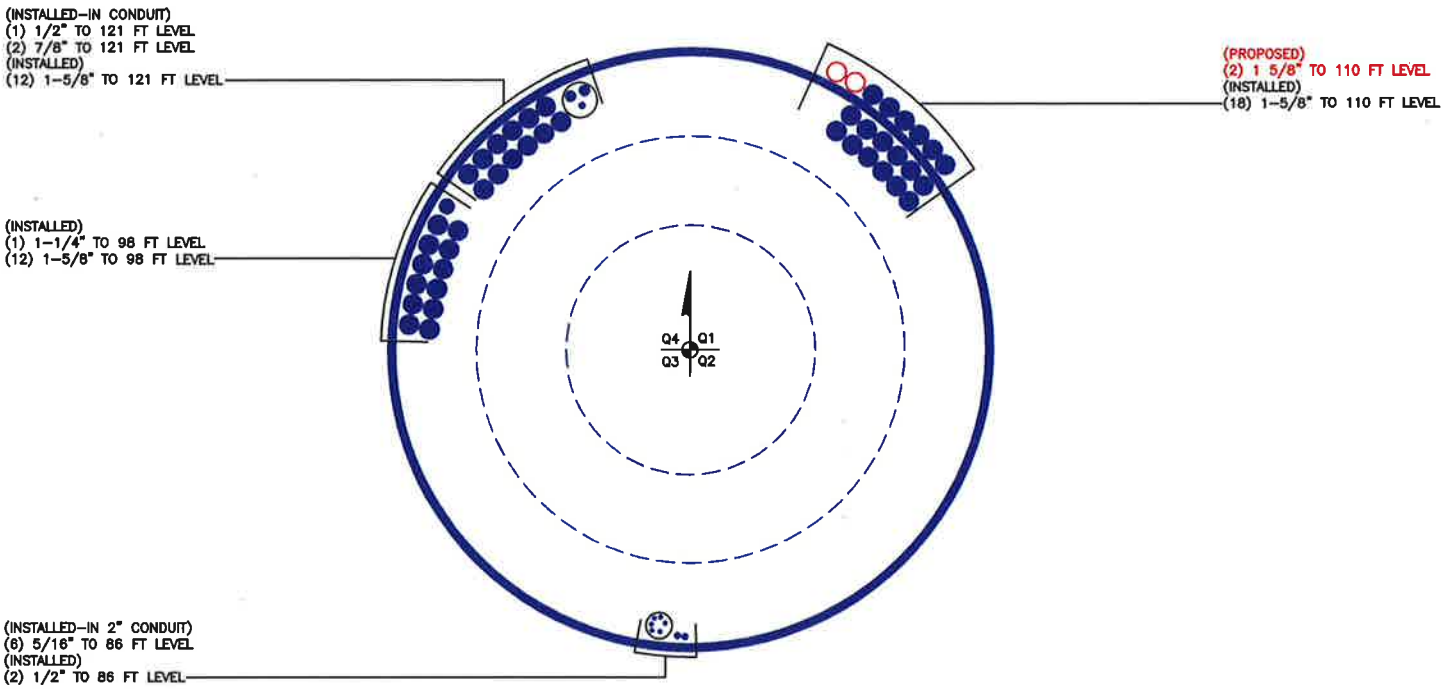
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	121 - 96	Pole	TP27.56x21.26x0.188	1	-5.227	756.899	47.0	Pass
L2	96 - 48	Pole	TP39.56x26.316x0.25	2	-14.257	1448.344	91.3	Pass
L3	48 - 0	Pole	TP51.56x37.786x0.313	3	-25.934	2384.404	87.4	Pass
						Summary		
						Pole (L2)	91.3	Pass
						RATING =	**91.3**	**Pass**

Program Version 6.1.4.1

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 857012

APPENDIX C

ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#: *857012*
Site Name: *PLAINVILLE SOUTH WASH*
App #: *294409 Revision # 3*
Pole Manufacturer: *Other*

Reactions		
Moment:	2172	ft-kips
Axial:	26	kips
Shear:	23	kips

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	60.56	in

Plate Data		
Diam:	66	in
Thick:	2	in
Grade:	50	ksi
Single-Rod B-eff:	10.23	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	51.56	in
Thick:	0.3125	in
Grade:	60	ksi
# of Sides:	18	"0" IF Round
Fu	76	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Anchor Rod Results

		Rigid
Maximum Rod Tension:	106.0 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	54.4% Pass	

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	44.1 ksi	Service ASD
Allowable Plate Stress:	50.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	88.3% Pass	Y.L. Length: 31.77

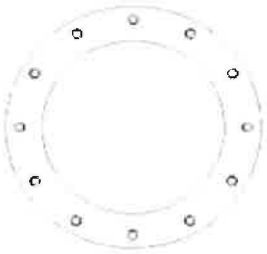
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a



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

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

CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 5/9/2015

BU:	857012
Site Name:	PLAINVILLE SOUTH WASHINGTON ST, CT
App Number:	294409: Rev. 3
Work Order:	1056678

CROWN CASTLE

Monopole Drilled Pier

Input

Criteria

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

Forces

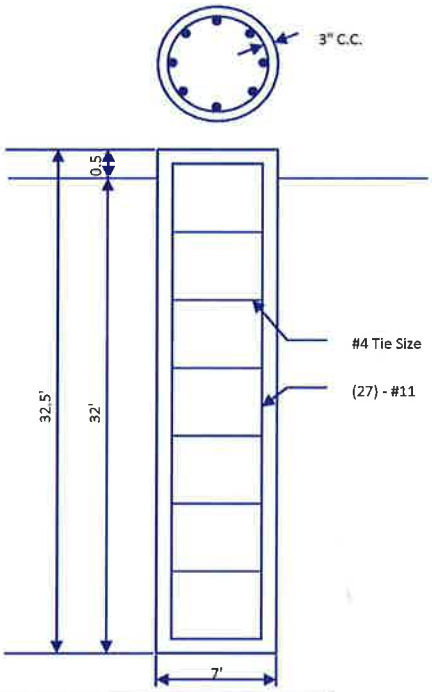
Compression	26 kips
Shear	23 kips
Moment	2172 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	7 ft
Ext. above grade:	0.5 ft
Depth below grade:	32 ft

Material Properties

Number of Rebar:	27
Rebar Size:	11
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: 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	3.5	0	3.5	55	0	0	0	0	0	
2	9.5	3.5	13	55		33	0.315	0.315	0	
3	6	13	19	45		28	0.5	0.5	0	
4	4	19	23	55		33	0.64	0.64	0	
5	9	23	32	40		28	0.755	0.755	6.4	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	7.52 ft
Max Moment, Mu:	2322.81 k-ft
Soil Safety Factor:	3.77
Safety Factor Req'd:	2
RATING:	53.0%

Soil Axial Capacity

Skin Friction (k):	168.75 kips
End Bearing (k):	123.15 kips
Comp. Capacity (k), ϕCn:	291.90 kips
Comp. (k), Cu:	33.80 kips
RATING:	11.6%

Concrete/Steel Check

Mu (from soil analysis)	3019.65 k-ft
ϕMn	6502.19 k-ft
RATING:	46.4%

rho provided	0.76
rho required	0.33 OK
Rebar Spacing	7.39
Spacing required	22.56 OK
Dev. Length required	24.23
Dev. Length provided	61.78 OK

Overall Foundation Rating: 53.0%