Robinson+Cole

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Also admitted in Massachusetts

May 15, 2017

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
200 Stanley Street, New Britain, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 102-foot level of the existing 192-foot tower at 200 Stanley Street in New Britain, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 2002. Cellco now intends to replace six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs"), and install six (6) new RRHs and two (2) HYBRIFLEX™ fiber optic antenna cables.[1] 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 Erin Stewart, Mayor of the City of New Britain; Louis G. Amodio, Chairperson of New Britain's City Plan Commission; Downes Investments LLC, the owner of the Property; and 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] This notice references modifications previously approved in EM-VER-089-150928. The Council's prior acknowledgement of these modifications expired in October of 2016.

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRH's will be located on its existing platform at the 102-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 worst-case General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

A copy of the New Britain parcel map and property owner information is included in Attachment 4.

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Erin Stewart, New Britain Mayor
Louis G. Amodio, Chairperson, City Plan Commission
Downes Investments LLC
Veronica Harris, Crown Castle

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	1920–2200	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	1920–2200	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®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Included Products

Product Specifications

SBNHH-1D65B

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.

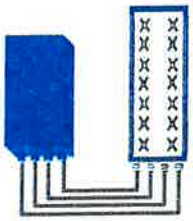
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

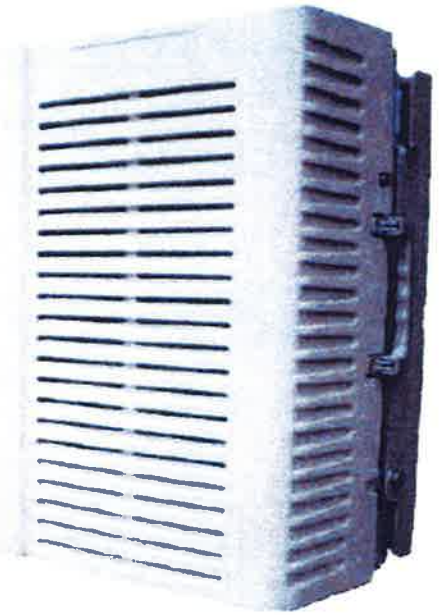
Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Size (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 (@160km/h or 27m/s)	-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 interface	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)



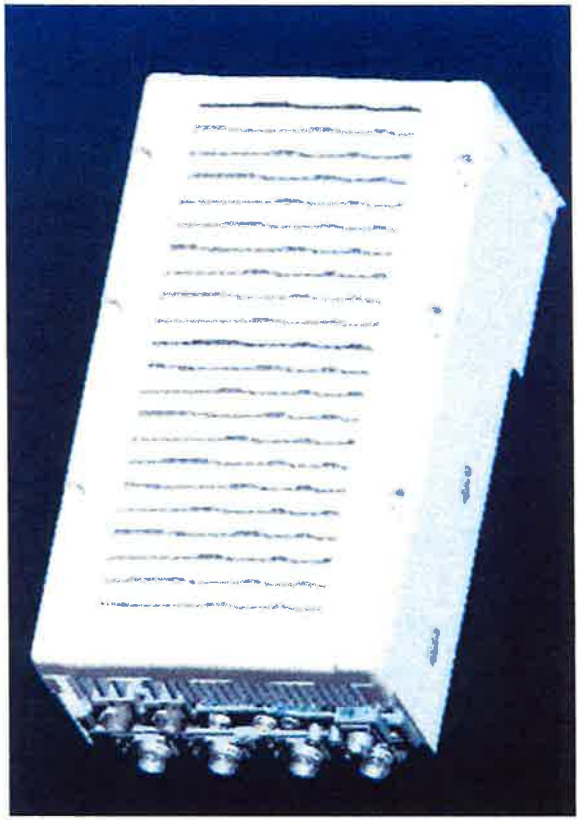
** Not a Verizon Wireless deployed product

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.)

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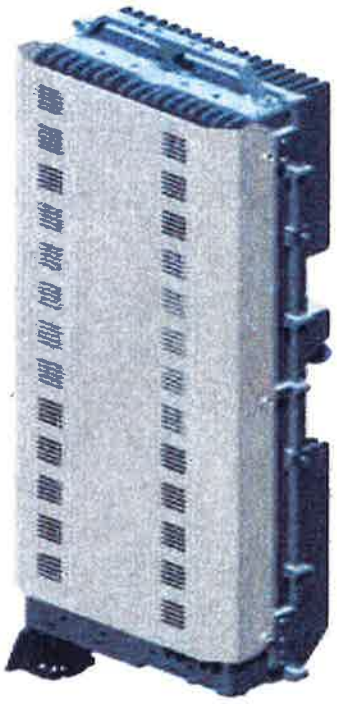
ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

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.

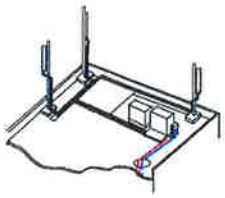
EASY INSTALLATION

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.

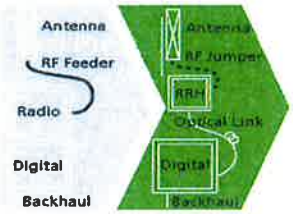
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

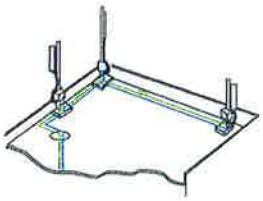
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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 CELLFLEX² accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-99-658 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)

* This data is provisional and subject to change

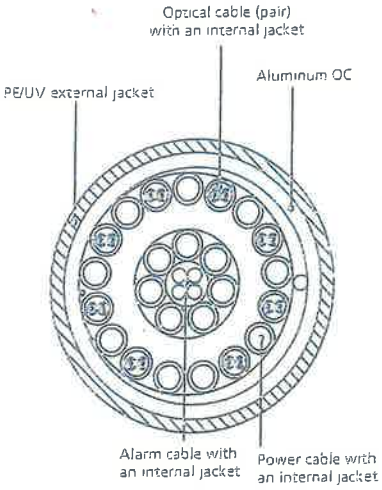


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: New Britain 4								
Tower Height: 192Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T UMTS	2	1077	195	0.0204	1900	1.0000	2.04%	
*AT&T UMTS	2	565	195	0.0107	880	0.5867	1.82%	
*AT&T GSM	1	283	195	0.0027	880	0.5867	0.46%	
*AT&T GSM	4	646	195	0.0244	1900	1.0000	2.44%	
*AT&T LTE	1	1615	195	0.0153	734	0.4893	3.12%	
*Clearwire	2	153	175	0.0036	2496	1.0000	0.36%	
*Clearwire	1	211	175	0.0025	11 GHz	1.0000	0.25%	
*MetroPCS CDMA	3	727	185	0.0229	2135	1.0000	2.29%	
*MetroPCS LTE	1	1200	185	0.0126	2130	1.0000	1.26%	
Verizon PCS	**2**	**399**	**102**	**0.0276**	**1970**	**1.0000**	**2.76%**	
Verizon Cellular	**8**	**380**	**102**	**0.1051**	**869**	**0.5793**	**18.14%**	
Verizon AWS	**1**	**3500**	**102**	**0.1210**	**2145**	**1.0000**	**12.10%**	
Verizon 700	**1**	**2100**	**102**	**0.0726**	**746**	**0.4973**	**14.59%**	
								61.62%
* Source: Siting Council								

ATTACHMENT 3

Date: **April 26, 2017**

Veronica Paine
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430

2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	119669
	Carrier Site Name:	New Britain 4, CT
Crown Castle Designation:	**Crown Castle BU Number:**	803843
	Crown Castle Site Name:	CT NEW BRITAIN 4 CAC 803843
	Crown Castle JDE Job Number:	338053
	Crown Castle Work Order Number:	1397541
	Crown Castle Application Number:	300815 Rev. 2
Engineering Firm Designation:	**Crown Castle Project Number:**	1397541
Site Data:	**200 Stanley Street, New Britain, Hartford County, CT** **Latitude *41° 39' 16.4"*, Longitude *-72° 46' 9.59"*** **192 Foot - Monopole Tower**	

Dear Veronica Paine,

Crown Castle 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 1397541, in accordance with application 300815, revision 2.

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

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

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

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 *Crown Castle* 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: Brad Sparks / Shan

Respectfully submitted by:

Maham Barimani, P. E.
Senior Project Engineer

STATE OF CONNECTICUT
MAHAM BARIMANI
30801
LICENSED
PROFESSIONAL ENGINEER

tnxTower Report - version 7.0.5.1

05-01-2017

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 192 ft. Monopole tower designed by SUMMIT in April of 2001. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 97 mph with no ice, 50 mph with 1-inch ice thickness and 60 mph under service loads, exposure category B.

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
100.0	102.0	3	alcatel lucent	RRH2X60-AWS	2	1-5/8	-
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		9	andrew	SBNHH-1D65B w/ Mount Pipe			
	100.0	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
193.0	195.0	3	cci antennas	OPA-65R-LCUU-H8 w/ Mount Pipe	1 2	3/8 3/4	2
		2	cci antennas	TPA-65R-LCUUUU-H8 w/ Mount Pipe			
		3	ericsson	RRUS 32 B2			
		3	ericsson	RRUS 32 B30			
		1	quintel tech.	QS66512-3 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		3	ericsson	RRUS-11	6 1 2	1-5/8 3/8 3/4	1
		3	kathrein	800 10121 w/ Mount Pipe			
		6	powerwave tech.	LGP21401			
		1	raycap	DC6-48-60-18-8F			
	193.0	1	tower mounts	Miscellaneous [NA 510-1]			
		1	tower mounts	Platform Mount [LP 1201-1]			
185.0	185.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Platform Mount [LP 1201-1]			
175.0	177.0	1	andrew	PX2F-52	3 3 3 1	1/4 1/2 5/8 5/16	1
		2	andrew	VHLP2-23			
	176.0	3	argus tech.	LLPX310R w/ Mount Pipe			
	175.0	2	dragonwave	HORIZON COMPACT			
		1	motorola	TIMING 2000			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	samsung telecom.	WIMAX DAP HEAD			
		1	tower mounts	Side Arm Mount [SO 101-3]			
100.0	102.0	2	andrew	LNX-6512DS-T4M w/ Mount Pipe	-	-	3
		1	antel	BXA-185090/8CF w/ Mount Pipe			
		6	rfs celwave	APL868013-42T0 w/ Mount Pipe			
		2	antel	BXA-80080/4CF w/ Mount Pipe	12	1-5/8	1
		1	antel	BXA-80090/4CF w/ Mount Pipe			
	100.0	6	rfs celwave	FD9R6004/2C-3L	-	-	3
		1	tower mounts	Pipe Mount [PM 501-3]	-	-	1
		1	tower mounts	T-Arm Mount [TA 602-3]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed, Not Considered In Analysis

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)
192.0	192.0	-	generic	panel antenna (CaAa = 75 sq. ft. total)	-	-
185.0	185.0	-	generic	panel antenna (CaAa = 75 sq. ft. total)	-	-
175.0	175.0	-	generic	panel antenna (CaAa = 75 sq. ft. total)	-	-
165.0	165.0	-	generic	microwave (CaAa = 110 sq. ft.)	-	-
145.0	145.0	-	generic	panel antenna (CaAa = 75 sq. ft. total)	-	-
135.0	135.0	-	generic	microwave (CaAa = 110 sq. ft.)	-	-
115.0	155.0	-	generic	panel antenna (CaAa = 75 sq. ft. total)	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	2384583	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit Manufacturing, LLC	1118798	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit Manufacturing, LLC	925033	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle 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	192 - 151.25	Pole	TP39.245x26x0.313	1	-13.33	2616.03	21.2	Pass
L2	151.25 - 111.25	Pole	TP51.621x36.995x0.438	2	-24.45	4908.93	21.2	Pass
L3	111.25 - 72.75	Pole	TP63.259x48.633x0.5	3	-43.56	6732.82	23.0	Pass
L4	72.75 - 35.75	Pole	TP74.285x59.659x0.563	4	-65.20	8776.63	23.5	Pass
L5	35.75 - 0	Pole	TP84.78x70.154x0.563	5	-97.34	9779.95	27.1	Pass
							Summary	
						Pole (L5)	27.1	Pass
						Rating =	27.1	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	39.3	Pass
1	Base Plate	0	30.4	Pass
1, 2	Base Foundation -structural	0	20.6	Pass
1, 2	Base Foundation - soil Interaction	0	40.4	Pass

Structure Rating (max from all components) =	40.4%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) It is unknown whether the foundation is a drilled shaft or pier and pad. Both designs were analyzed and determined to be sufficient.

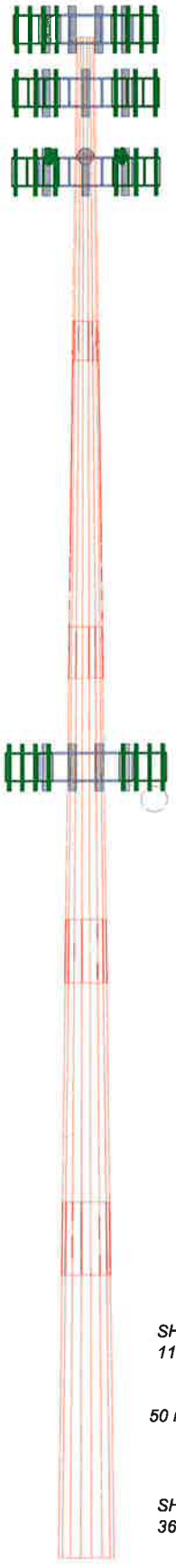
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	40.75	18	0.313	5.00	26.000	39.245		4.4
2	45.00	18	0.438	6.50	36.995	51.621		9.3
3	45.00	18	0.500	8.00	48.633	63.259	A607-65	13.5
4	45.00	18	0.563	9.25	59.659	74.285		18.2
5	45.00	18	0.563		70.154	84.780		21.0
								66.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
800 10121 w/ Mount Pipe	193	LLPX310R w/ Mount Pipe	175
800 10121 w/ Mount Pipe	193	LLPX310R w/ Mount Pipe	175
800 10121 w/ Mount Pipe	193	TIMING 2000	175
RRUS-11	193	WIMAX DAP HEAD	175
RRUS-11	193	WIMAX DAP HEAD	175
RRUS-11	193	WIMAX DAP HEAD	175
(2) LGP21401	193	HORIZON COMPACT	175
(2) LGP21401	193	HORIZON COMPACT	175
(2) LGP21401	193	Side Arm Mount [SO 101-3]	175
DC6-48-60-18-8F	193	6' x 2" Mount Pipe	175
OPA-65R-LCUU-H8 w/ Mount Pipe	193	6' x 2" Mount Pipe	175
OPA-65R-LCUU-H8 w/ Mount Pipe	193	6' x 2" Mount Pipe	175
OPA-65R-LCUU-H8 w/ Mount Pipe	193	VHLP2-23	175
TPA-65R-LCUUUU-H8 w/ Mount Pipe	193	PX2F-52	175
TPA-65R-LCUUUU-H8 w/ Mount Pipe	193	VHLP2-23	175
QS66512-3 w/ Mount Pipe	193	(3) SBNHH-1D65B w/ Mount Pipe	100
RRUS 32 B2	193	(3) SBNHH-1D65B w/ Mount Pipe	100
RRUS 32 B2	193	(3) SBNHH-1D65B w/ Mount Pipe	100
RRUS 32 B2	193	RRH2x60-700	100
RRUS 32 B30	193	RRH2x60-700	100
RRUS 32 B30	193	RRH2x60-700	100
RRUS 32 B30	193	RRH2X60-AWS	100
DC6-48-60-18-8F	193	RRH2X60-AWS	100
Platform Mount [LP 1201-1]	193	RRH2X60-AWS	100
Miscellaneous [NA 510-1]	193	RRH2X60-PCS	100
6' x 2" Mount Pipe	193	RRH2X60-PCS	100
6' x 2" Mount Pipe	193	RRH2X60-PCS	100
6' x 2" Mount Pipe	193	DB-T1-6Z-8AB-0Z	100
Lightning Rod 1"x10'	192	T-Arm Mount [TA 602-3]	100
APXV18-206517S-C w/ Mount Pipe	185	Pipe Mount [PM 501-3]	100
APXV18-206517S-C w/ Mount Pipe	185	(2) 4' ICE SHIELDS	100
APXV18-206517S-C w/ Mount Pipe	185	(2) 4' ICE SHIELDS	100
Platform Mount [LP 1201-1]	185	(2) 4' ICE SHIELDS	100
(3) 6' x 2" Mount Pipe	185	BXA-80080/4CF w/ Mount Pipe	100
(3) 6' x 2" Mount Pipe	185	BXA-80080/4CF w/ Mount Pipe	100
(3) 6' x 2" Mount Pipe	185	BXA-80090/4CF w/ Mount Pipe	100
LLPX310R w/ Mount Pipe	175		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 27.1%

ALL REACTIONS ARE FACTORED

AXIAL 155 K

SHEAR 11 K *MOMENT 1378 kip-ft*

TORQUE 0 kip-ft

50 mph WIND - 1.000 in ICE

AXIAL 97 K

SHEAR 36 K *MOMENT 4420 kip-ft*

TORQUE 2 kip-ft

REACTIONS - 97 mph WIND

CROWN CASTLE
The Foundation for a Wireless World

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX: (724) 416-4623

Job: 803843			
Project: 1397541			
Client: Crown Castle	Drawn by: BSparks	App'd:	
Code: TIA-222-G	Date: 04/26/17	Scale: N	
Path: R:\SA Models - Letters\Work Area\BSparks\WIP\803843 WD 1397541\803843.eri		Dwg No.	

Tower Input Data

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

4) Tower is located in Hartford County, Connecticut.
5) Basic wind speed of 97 mph.
6) Structure Class II.
7) Exposure Category B.
8) Topographic Category 1.
9) Crest Height 0.00 ft.
10) Nominal ice thickness of 1.000 in.
11) Ice thickness is considered to increase with height.
12) Ice density of 56 pcf.
13) A wind speed of 50 mph is used in combination with ice.
14) Temperature drop of 50 °F.
15) Deflections calculated using a wind speed of 60 mph.
16) A non-linear (P-delta) analysis was used.
17) Pressures are calculated at each section.
18) Stress ratio used in pole design is 1.
19) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

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	192.00-151.25	40.75	5.00	18	26.000	39.245	0.313	1.250	A607-65 (65 ksi)
L2	151.25-111.25	45.00	6.50	18	36.995	51.621	0.438	1.750	A607-65 (65 ksi)
L3	111.25-72.75	45.00	8.00	18	48.633	63.259	0.500	2.000	A607-65 (65 ksi)
L4	72.75-35.75	45.00	9.25	18	59.659	74.285	0.563	2.250	A607-65 (65 ksi)
L5	35.75-0.00	45.00		18	70.154	84.780	0.563	2.250	A607-65 (65 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	26.401	25.479	2124.026	9.119	13.208	160.814	4250.848	12.742	4.026	12.883
	39.850	38.616	7394.882	13.821	19.936	370.923	14799.495	19.312	6.357	20.343
L2	39.216	50.764	8571.295	12.978	18.793	456.080	17153.868	25.387	5.741	13.122
	52.417	71.075	23524.065	18.170	26.223	897.062	47079.084	35.544	8.315	19.006
L3	51.529	76.388	22358.991	17.087	24.706	905.012	44747.402	38.201	7.679	15.359
	64.235	99.599	49561.269	22.279	32.136	1542.256	99187.753	49.809	10.254	20.507
L4	63.220	105.509	46553.203	20.979	30.307	1536.069	93167.662	52.765	9.510	16.907
	75.431	131.622	90378.902	26.171	37.737	2394.982	180876.727	65.824	12.084	21.483
L5	74.289	124.246	76019.762	24.705	35.638	2133.110	152139.553	62.135	11.357	20.19
	86.088	150.360	134732.986	29.897	43.068	3128.361	269643.257	75.194	13.931	24.767

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 192.00-151.25				1	1	1			
L2 151.25-111.25				1	1	1			
L3 111.25-72.75				1	1	1			
L4 72.75-35.75				1	1	1			
L5 35.75-0.00				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 plf
***										

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 plf
***								
LDF7-50A(1-5/8")	A	No	Inside Pole	192.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
FB-L98B-002-75000(3/8")	A	No	Inside Pole	192.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4")	A	No	Inside Pole	192.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
FB-L98B-034-XXXXXX(3/8")	A	No	Inside Pole	192.00 - 0.00	1	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
						1" Ice	0.00	0.05
WR-VG86ST-	A	No	Inside Pole	192.00 - 0.00	2	No Ice	0.00	0.58

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
BRD(3/4")						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" Rigid Conduit	A	No	Inside Pole	192.00 - 0.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
***								
LCF158-50JL(1-5/8)	C	No	Inside Pole	185.00 - 0.00	6	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
***								
FSJ1-50A(1/4")	B	No	Inside Pole	175.00 - 0.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.04
						1" Ice	0.00	0.04
FSJ4-50B(1/2")	B	No	Inside Pole	175.00 - 0.00	3	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
HJ4.5-50(5/8")	B	No	Inside Pole	175.00 - 0.00	3	No Ice	0.00	0.40
						1/2" Ice	0.00	0.40
						1" Ice	0.00	0.40
9207(5/16")	B	No	Inside Pole	175.00 - 0.00	1	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
2" Rigid Conduit	B	No	Inside Pole	175.00 - 0.00	2	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
***								
LDF7-50A(1-5/8")	A	No	Inside Pole	100.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8")	A	No	Inside Pole	100.00 - 0.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
***								

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	192.00-151.25	A	0.000	0.000	0.000	0.000	0.41
		B	0.000	0.000	0.000	0.000	0.19
		C	0.000	0.000	0.000	0.000	0.11
L2	151.25-111.25	A	0.000	0.000	0.000	0.000	0.41
		B	0.000	0.000	0.000	0.000	0.32
		C	0.000	0.000	0.000	0.000	0.12
L3	111.25-72.75	A	0.000	0.000	0.000	0.000	0.73
		B	0.000	0.000	0.000	0.000	0.31
		C	0.000	0.000	0.000	0.000	0.12
L4	72.75-35.75	A	0.000	0.000	0.000	0.000	0.84
		B	0.000	0.000	0.000	0.000	0.29
		C	0.000	0.000	0.000	0.000	0.12
L5	35.75-0.00	A	0.000	0.000	0.000	0.000	0.81
		B	0.000	0.000	0.000	0.000	0.28
		C	0.000	0.000	0.000	0.000	0.11

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	192.00-151.25	A	2.357	0.000	0.000	0.000	0.000	0.41
		B		0.000	0.000	0.000	0.000	0.19
		C		0.000	0.000	0.000	0.000	0.11

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L2	151.25-111.25	A	2.295	0.000	0.000	0.000	0.000	0.41
		B		0.000	0.000	0.000	0.000	0.32
		C		0.000	0.000	0.000	0.000	0.12
L3	111.25-72.75	A	2.215	0.000	0.000	0.000	0.000	0.73
		B		0.000	0.000	0.000	0.000	0.31
		C		0.000	0.000	0.000	0.000	0.12
L4	72.75-35.75	A	2.102	0.000	0.000	0.000	0.000	0.84
		B		0.000	0.000	0.000	0.000	0.29
		C		0.000	0.000	0.000	0.000	0.12
L5	35.75-0.00	A	1.876	0.000	0.000	0.000	0.000	0.81
		B		0.000	0.000	0.000	0.000	0.28
		C		0.000	0.000	0.000	0.000	0.11

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	192.00-151.25	0.000	0.000	0.000	0.000
L2	151.25-111.25	0.000	0.000	0.000	0.000
L3	111.25-72.75	0.000	0.000	0.000	0.000
L4	72.75-35.75	0.000	0.000	0.000	0.000
L5	35.75-0.00	0.000	0.000	0.000	0.000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
Lightning Rod 1"x10'	C	None		0.00	192.00	No Ice	1.00	1.00	0.04
						1/2" Ice	2.02	2.02	0.05
						1" Ice	3.05	3.05	0.06
193									
800 10121 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	5.39 5.81 6.23	4.60 5.35 6.05	0.07 0.11 0.17
800 10121 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	5.39 5.81 6.23	4.60 5.35 6.05	0.07 0.11 0.17
800 10121 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	5.39 5.81 6.23	4.60 5.35 6.05	0.07 0.11 0.17
RRUS-11	A	From Leg	4.00 0.00	0.00	193.00	No Ice 1/2"	2.78 2.99	1.19 1.33	0.05 0.07

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
			2.00			Ice	3.21	1.49	0.09
						1" Ice			
RRUS-11	A	From Leg	4.00	0.00	193.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			2.00			Ice	3.21	1.49	0.09
						1" Ice			
RRUS-11	B	From Leg	4.00	0.00	193.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			2.00			Ice	3.21	1.49	0.09
						1" Ice			
(2) LGP21401	A	From Leg	4.00	0.00	193.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			2.00			Ice	1.38	0.35	0.03
						1" Ice			
(2) LGP21401	B	From Leg	4.00	0.00	193.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			2.00			Ice	1.38	0.35	0.03
						1" Ice			
(2) LGP21401	C	From Leg	4.00	0.00	193.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			2.00			Ice	1.38	0.35	0.03
						1" Ice			
DC6-48-60-18-8F	B	From Leg	4.00	0.00	193.00	No Ice	0.79	0.79	0.02
			0.00			1/2"	1.27	1.27	0.04
			2.00			Ice	1.45	1.45	0.05
						1" Ice			
OPA-65R-LCUU-H8 w/ Mount Pipe	A	From Leg	4.00	0.00	193.00	No Ice	12.98	9.32	0.12
			0.00			1/2"	13.67	10.79	0.21
			2.00			Ice	14.36	12.24	0.32
						1" Ice			
OPA-65R-LCUU-H8 w/ Mount Pipe	B	From Leg	4.00	0.00	193.00	No Ice	12.98	9.32	0.12
			0.00			1/2"	13.67	10.79	0.21
			2.00			Ice	14.36	12.24	0.32
						1" Ice			
OPA-65R-LCUU-H8 w/ Mount Pipe	C	From Leg	4.00	0.00	193.00	No Ice	12.98	9.32	0.12
			0.00			1/2"	13.67	10.79	0.21
			2.00			Ice	14.36	12.24	0.32
						1" Ice			
TPA-65R-LCUUUU-H8 w/ Mount Pipe	A	From Leg	4.00	0.00	193.00	No Ice	13.54	10.96	0.11
			0.00			1/2"	14.24	12.49	0.22
			2.00			Ice	14.95	14.04	0.33
						1" Ice			
TPA-65R-LCUUUU-H8 w/ Mount Pipe	B	From Leg	4.00	0.00	193.00	No Ice	13.54	10.96	0.11
			0.00			1/2"	14.24	12.49	0.22
			2.00			Ice	14.95	14.04	0.33
						1" Ice			
QS66512-3 w/ Mount Pipe	C	From Leg	4.00	0.00	193.00	No Ice	8.37	8.46	0.13
			0.00			1/2"	8.93	9.66	0.21
			2.00			Ice	9.46	10.55	0.29
						1" Ice			
RRUS 32 B2	A	From Leg	4.00	0.00	193.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			2.00			Ice	3.18	2.05	0.10
						1" Ice			
RRUS 32 B2	B	From Leg	4.00	0.00	193.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			2.00			Ice	3.18	2.05	0.10
						1" Ice			
RRUS 32 B2	C	From Leg	4.00	0.00	193.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			2.00			Ice	3.18	2.05	0.10
						1" Ice			
RRUS 32 B30	A	From Leg	4.00	0.00	193.00	No Ice	2.69	1.57	0.06
			0.00			1/2"	2.91	1.76	0.08
			2.00			Ice	3.14	1.95	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice			
RRUS 32 B30	B	From Leg	4.00 0.00 2.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	2.69 2.91 3.14	1.57 1.76 1.95	0.06 0.08 0.10
RRUS 32 B30	C	From Leg	4.00 0.00 2.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	2.69 2.91 3.14	1.57 1.76 1.95	0.06 0.08 0.10
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	0.79 1.27 1.45	0.79 1.27 1.45	0.02 0.04 0.05
Platform Mount [LP 1201-1]	C	None		0.00	193.00	No Ice 1/2" Ice 1" Ice	23.10 26.80 30.50	23.10 26.80 30.50	2.10 2.50 2.90
Miscellaneous [NA 510-1]	C	None		0.00	193.00	No Ice 1/2" Ice 1" Ice	6.00 8.50 11.00	6.00 8.50 11.00	0.26 0.34 0.42
6' x 2" Mount Pipe	A	From Leg	3.00 0.00 0.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	B	From Leg	3.00 0.00 0.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	C	From Leg	3.00 0.00 0.00	0.00	193.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
185									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice	5.40 5.96 6.48	4.70 5.86 6.73	0.05 0.10 0.15
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice	5.40 5.96 6.48	4.70 5.86 6.73	0.05 0.10 0.15
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice	5.40 5.96 6.48	4.70 5.86 6.73	0.05 0.10 0.15
Platform Mount [LP 1201-1]	C	None		0.00	185.00	No Ice 1/2" Ice 1" Ice	23.10 26.80 30.50	23.10 26.80 30.50	2.10 2.50 2.90
(3) 6' x 2" Mount Pipe	A	From Leg	3.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
(3) 6' x 2" Mount Pipe	B	From Leg	3.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
(3) 6' x 2" Mount Pipe	C	From Leg	3.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
175									
LLPX310R w/ Mount Pipe	A	From Leg	3.00 0.00	0.00	175.00	No Ice 1/2"	4.54 4.89	2.98 3.53	0.05 0.08

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
			1.00			Ice	5.25	4.09	0.13
						1" Ice			
LLPX310R w/ Mount Pipe	B	From Leg	3.00	0.00	175.00	No Ice	4.54	2.98	0.05
			0.00			1/2"	4.89	3.53	0.08
			1.00			Ice	5.25	4.09	0.13
						1" Ice			
LLPX310R w/ Mount Pipe	C	From Leg	3.00	0.00	175.00	No Ice	4.54	2.98	0.05
			0.00			1/2"	4.89	3.53	0.08
			1.00			Ice	5.25	4.09	0.13
						1" Ice			
TIMING 2000	C	From Leg	3.00	0.00	175.00	No Ice	0.11	0.11	0.00
			0.00			1/2"	0.15	0.15	0.00
			0.00			Ice	0.20	0.20	0.01
						1" Ice			
WIMAX DAP HEAD	A	From Leg	3.00	0.00	175.00	No Ice	1.55	0.68	0.03
			0.00			1/2"	1.70	0.80	0.04
			0.00			Ice	1.87	0.92	0.06
						1" Ice			
WIMAX DAP HEAD	B	From Leg	3.00	0.00	175.00	No Ice	1.55	0.68	0.03
			0.00			1/2"	1.70	0.80	0.04
			0.00			Ice	1.87	0.92	0.06
						1" Ice			
WIMAX DAP HEAD	C	From Leg	3.00	0.00	175.00	No Ice	1.55	0.68	0.03
			0.00			1/2"	1.70	0.80	0.04
			0.00			Ice	1.87	0.92	0.06
						1" Ice			
HORIZON COMPACT	A	From Leg	3.00	0.00	175.00	No Ice	0.72	0.37	0.01
			0.00			1/2"	0.83	0.45	0.02
			0.00			Ice	0.94	0.54	0.03
						1" Ice			
HORIZON COMPACT	C	From Leg	3.00	0.00	175.00	No Ice	0.72	0.37	0.01
			0.00			1/2"	0.83	0.45	0.02
			0.00			Ice	0.94	0.54	0.03
						1" Ice			
Side Arm Mount [SO 101-3]	C	None		0.00	175.00	No Ice	7.50	7.50	0.25
						1/2"	8.90	8.90	0.33
						Ice	10.30	10.30	0.41
						1" Ice			
6' x 2" Mount Pipe	A	From Leg	3.00	0.00	175.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
6' x 2" Mount Pipe	B	From Leg	3.00	0.00	175.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
6' x 2" Mount Pipe	C	From Leg	3.00	0.00	175.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
100									
BXA-80080/4CF w/ Mount Pipe	A	From Leg	4.00	0.00	100.00	No Ice	5.04	4.03	0.03
			0.00			1/2"	5.42	4.65	0.08
			2.00			Ice	5.81	5.28	0.13
						1" Ice			
BXA-80080/4CF w/ Mount Pipe	B	From Leg	4.00	0.00	100.00	No Ice	5.04	4.03	0.03
			0.00			1/2"	5.42	4.65	0.08
			2.00			Ice	5.81	5.28	0.13
						1" Ice			
BXA-80090/4CF w/ Mount Pipe	C	From Leg	4.00	0.00	100.00	No Ice	3.83	3.88	0.03
			0.00			1/2"	4.20	4.49	0.07
			2.00			Ice	4.57	5.11	0.11
						1" Ice			
(3) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.00	100.00	No Ice	8.39	7.08	0.08
			0.00			1/2"	8.95	8.28	0.15

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
			2.00			Ice	9.48	9.19	0.22
						1" Ice			
(3) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.00	100.00	No Ice	8.39	7.08	0.08
			0.00			1/2"	8.95	8.28	0.15
			2.00			Ice	9.48	9.19	0.22
						1" Ice			
(3) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.00	100.00	No Ice	8.39	7.08	0.08
			0.00			1/2"	8.95	8.28	0.15
			2.00			Ice	9.48	9.19	0.22
						1" Ice			
RRH2x60-700	A	From Leg	4.00	0.00	100.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			2.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2x60-700	B	From Leg	4.00	0.00	100.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			2.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2x60-700	C	From Leg	4.00	0.00	100.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			2.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2X60-AWS	A	From Leg	4.00	0.00	100.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			2.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2X60-AWS	B	From Leg	4.00	0.00	100.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			2.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2X60-AWS	C	From Leg	4.00	0.00	100.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			2.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2X60-PCS	A	From Leg	4.00	0.00	100.00	No Ice	2.20	1.72	0.06
			0.00			1/2"	2.39	1.90	0.08
			2.00			Ice	2.59	2.09	0.10
						1" Ice			
RRH2X60-PCS	B	From Leg	4.00	0.00	100.00	No Ice	2.20	1.72	0.06
			0.00			1/2"	2.39	1.90	0.08
			2.00			Ice	2.59	2.09	0.10
						1" Ice			
RRH2X60-PCS	C	From Leg	4.00	0.00	100.00	No Ice	2.20	1.72	0.06
			0.00			1/2"	2.39	1.90	0.08
			2.00			Ice	2.59	2.09	0.10
						1" Ice			
DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.00	100.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice			
T-Arm Mount [TA 602-3]	C	None		0.00	100.00	No Ice	11.59	11.59	0.77
						1/2"	15.44	15.44	0.99
						Ice	19.29	19.29	1.21
						1" Ice			
Pipe Mount [PM 501-3]	C	None		0.00	100.00	No Ice	5.78	5.78	0.16
						1/2"	7.37	7.37	0.18
						Ice	8.96	8.96	0.20
						1" Ice			
(2) 4' ICE SHIELDS	A	From Leg	2.00	0.00	100.00	No Ice	1.40	0.47	0.03
			0.00			1/2"	1.88	0.64	0.10
			0.00			Ice	2.38	0.82	0.17
						1" Ice			
(2) 4' ICE SHIELDS	B	From Leg	2.00	0.00	100.00	No Ice	1.40	0.47	0.03
			0.00			1/2"	1.88	0.64	0.10
			0.00			Ice	2.38	0.82	0.17

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) 4' ICE SHIELDS	C	From Leg	2.00 0.00 0.00	0.00	100.00	1" Ice No Ice 1/2" Ice 1" Ice	1.40 1.88 2.38	0.47 0.64 0.82	0.03 0.10 0.17
***									

Dishes

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 ft^2	Weight K
***											
VHLP2-23	A	Paraboloid w/Shroud (HP)	From Leg	3.00 0.00 2.00	0.00		175.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.00 4.31	0.03 0.03 0.04
PX2F-52	B	Paraboloid w/Radome	From Leg	3.00 0.00 2.00	0.00		175.00	2.09	No Ice 1/2" Ice 1" Ice	3.44 3.72 3.99	0.01 0.02 0.02
VHLP2-23	C	Paraboloid w/Shroud (HP)	From Leg	3.00 0.00 2.00	0.00		175.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.00 4.31	0.03 0.03 0.04
***											

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp

Comb. No.	Description
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	192 - 151.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-31.79	-1.61	2.32
			Max. Mx	8	-13.35	-407.08	-1.06
			Max. My	2	-13.33	1.32	414.98
			Max. Vy	20	-13.63	406.85	3.22
			Max. Vx	2	-13.83	1.32	414.98
			Max. Torque	12			1.26
L2	151.25 - 111.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-48.55	-1.61	2.32
			Max. Mx	8	-24.46	-1008.46	-0.98
			Max. My	2	-24.45	0.96	1024.23
			Max. Vy	20	-17.71	1008.28	5.22
			Max. Vx	2	-17.92	0.96	1024.23
			Max. Torque	22			-1.21
L3	111.25 - 72.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-83.22	-1.80	3.99
			Max. Mx	8	-43.57	-1836.26	-0.91
			Max. My	2	-43.56	0.93	1861.99
			Max. Vy	20	-26.51	1836.13	7.74
			Max. Vx	2	-26.82	0.93	1861.99
			Max. Torque	22			-1.58
L4	72.75 - 35.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-112.55	-1.80	3.99
			Max. Mx	8	-65.21	-2863.23	-1.36
			Max. My	2	-65.20	1.12	2900.07
			Max. Vy	20	-30.87	2863.15	10.10
			Max. Vx	2	-31.18	1.12	2900.07
			Max. Torque	22			-1.58
L5	35.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-154.59	-1.80	3.99
			Max. Mx	8	-97.34	-4367.86	-1.92
			Max. My	2	-97.34	1.36	4418.53
			Max. Vy	20	-35.96	4367.84	13.03
			Max. Vx	2	-36.27	1.36	4418.53

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	22			-1.58

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	154.59	-0.00	0.00
	Max. H_x	20	97.34	35.95	0.06
	Max. H_z	2	97.34	0.01	36.25
	Max. M_x	2	4418.53	0.01	36.25
	Max. M_z	8	4367.86	-35.95	-0.01
	Max. Torsion	10	1.56	-31.16	-18.19
	Min. Vert	7	73.01	-31.05	18.10
	Min. H_x	8	97.34	-35.95	-0.01
	Min. H_z	14	97.34	-0.02	-36.24
	Min. M_x	14	-4415.23	-0.02	-36.24
	Min. M_z	20	-4367.84	35.95	0.06
	Min. Torsion	22	-1.58	31.17	18.20

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	81.12	0.00	0.00	-0.69	-0.11	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	97.34	-0.01	-36.25	-4418.53	1.36	0.98
0.9 Dead+1.6 Wind 0 deg - No Ice	73.01	-0.01	-36.25	-4396.60	1.38	0.98
1.2 Dead+1.6 Wind 30 deg - No Ice	97.34	17.89	-31.36	-3819.88	-2168.87	0.16
0.9 Dead+1.6 Wind 30 deg - No Ice	73.01	17.89	-31.36	-3800.90	-2158.21	0.16
1.2 Dead+1.6 Wind 60 deg - No Ice	97.34	31.05	-18.10	-2204.76	-3767.30	-0.73
0.9 Dead+1.6 Wind 60 deg - No Ice	73.01	31.05	-18.10	-2193.71	-3748.80	-0.73
1.2 Dead+1.6 Wind 90 deg - No Ice	97.34	35.95	0.01	1.92	-4367.86	-1.42
0.9 Dead+1.6 Wind 90 deg - No Ice	73.01	35.95	0.01	2.12	-4346.39	-1.42
1.2 Dead+1.6 Wind 120 deg - No Ice	97.34	31.16	18.19	2220.96	-3788.74	-1.56
0.9 Dead+1.6 Wind 120 deg - No Ice	73.01	31.16	18.19	2210.25	-3770.10	-1.56
1.2 Dead+1.6 Wind 150 deg - No Ice	97.34	17.98	31.48	3840.00	-2186.39	-1.29
0.9 Dead+1.6 Wind 150 deg - No Ice	73.01	17.98	31.48	3821.33	-2175.63	-1.29
1.2 Dead+1.6 Wind 180 deg - No Ice	97.34	0.02	36.24	4415.23	-4.94	-0.85
0.9 Dead+1.6 Wind 180 deg - No Ice	73.01	0.02	36.24	4393.76	-4.88	-0.85
1.2 Dead+1.6 Wind 210 deg - No Ice	97.34	-17.91	31.35	3816.68	2171.15	-0.18
0.9 Dead+1.6 Wind 210 deg - No Ice	73.01	-17.91	31.35	3798.15	2160.55	-0.18
1.2 Dead+1.6 Wind 240 deg - No Ice	97.34	-31.05	18.12	2206.68	3766.73	0.59
0.9 Dead+1.6 Wind 240 deg	73.01	-31.05	18.12	2196.06	3748.30	0.58

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
- No Ice 1.2 Dead+1.6 Wind 270 deg	97.34	-35.95	-0.06	-13.03	4367.84	1.40
- No Ice 0.9 Dead+1.6 Wind 270 deg	73.01	-35.95	-0.06	-12.74	4346.44	1.39
- No Ice 1.2 Dead+1.6 Wind 300 deg	97.34	-31.17	-18.20	-2223.42	3789.74	1.58
- No Ice 0.9 Dead+1.6 Wind 300 deg	73.01	-31.17	-18.20	-2212.26	3771.17	1.58
- No Ice 1.2 Dead+1.6 Wind 330 deg	97.34	-18.03	-31.45	-3837.25	2194.39	1.33
- No Ice 0.9 Dead+1.6 Wind 330 deg	73.01	-18.03	-31.45	-3818.16	2183.64	1.33
- No Ice 1.2 Dead+1.0 Ice+1.0 Temp	154.59	0.00	-0.00	-3.99	-1.80	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	154.59	0.01	-11.27	-1378.41	-3.38	0.30
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	154.59	5.60	-9.75	-1193.61	-682.65	0.06
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	154.59	9.70	-5.64	-691.72	-1181.71	-0.20
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	154.59	11.21	-0.01	-5.38	-1367.38	-0.41
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	154.59	9.71	5.64	684.37	-1184.97	-0.47
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	154.59	5.60	9.77	1188.52	-683.65	-0.40
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	154.59	-0.00	11.27	1369.60	-1.25	-0.27
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	154.59	-5.60	9.75	1184.81	679.40	-0.06
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	154.59	-9.70	5.64	684.13	1177.79	0.17
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	154.59	-11.21	-0.01	-5.30	1363.59	0.40
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	154.59	-9.72	-5.64	-693.00	1181.43	0.47
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	154.59	-5.61	-9.77	-1195.90	681.77	0.41
Dead+Wind 0 deg - Service	81.12	-0.00	-7.76	-942.92	0.21	0.21
Dead+Wind 30 deg - Service	81.12	3.83	-6.71	-815.24	-462.67	0.04
Dead+Wind 60 deg - Service	81.12	6.64	-3.87	-470.77	-803.58	-0.16
Dead+Wind 90 deg - Service	81.12	7.69	0.00	-0.12	-931.67	-0.31
Dead+Wind 120 deg - Service	81.12	6.67	3.89	473.16	-808.15	-0.34
Dead+Wind 150 deg - Service	81.12	3.85	6.73	818.47	-466.40	-0.28
Dead+Wind 180 deg - Service	81.12	0.01	7.75	941.16	-1.14	-0.18
Dead+Wind 210 deg - Service	81.12	-3.83	6.71	813.50	462.99	-0.04
Dead+Wind 240 deg - Service	81.12	-6.64	3.88	470.11	803.30	0.12
Dead+Wind 270 deg - Service	81.12	-7.69	-0.01	-3.31	931.50	0.30
Dead+Wind 300 deg - Service	81.12	-6.67	-3.89	-474.74	808.20	0.34
Dead+Wind 330 deg - Service	81.12	-3.86	-6.73	-818.95	467.94	0.28

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-81.12	0.00	0.00	81.12	0.00	0.000%
2	-0.01	-97.34	-36.25	0.01	97.34	36.25	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
3	-0.01	-73.01	-36.25	0.01	73.01	36.25	0.000%
4	17.89	-97.34	-31.36	-17.89	97.34	31.36	0.000%
5	17.89	-73.01	-31.36	-17.89	73.01	31.36	0.000%
6	31.05	-97.34	-18.10	-31.05	97.34	18.10	0.000%
7	31.05	-73.01	-18.10	-31.05	73.01	18.10	0.000%
8	35.95	-97.34	0.01	-35.95	97.34	-0.01	0.000%
9	35.95	-73.01	0.01	-35.95	73.01	-0.01	0.000%
10	31.16	-97.34	18.19	-31.16	97.34	-18.19	0.000%
11	31.16	-73.01	18.19	-31.16	73.01	-18.19	0.000%
12	17.98	-97.34	31.48	-17.98	97.34	-31.48	0.000%
13	17.98	-73.01	31.48	-17.98	73.01	-31.48	0.000%
14	0.02	-97.34	36.24	-0.02	97.34	-36.24	0.000%
15	0.02	-73.01	36.24	-0.02	73.01	-36.24	0.000%
16	-17.91	-97.34	31.35	17.91	97.34	-31.35	0.000%
17	-17.91	-73.01	31.35	17.91	73.01	-31.35	0.000%
18	-31.05	-97.34	18.12	31.05	97.34	-18.12	0.000%
19	-31.05	-73.01	18.12	31.05	73.01	-18.12	0.000%
20	-35.95	-97.34	-0.06	35.95	97.34	0.06	0.000%
21	-35.95	-73.01	-0.06	35.95	73.01	0.06	0.000%
22	-31.17	-97.34	-18.20	31.17	97.34	18.20	0.000%
23	-31.17	-73.01	-18.20	31.17	73.01	18.20	0.000%
24	-18.03	-97.34	-31.45	18.03	97.34	31.45	0.000%
25	-18.03	-73.01	-31.45	18.03	73.01	31.45	0.000%
26	0.00	-154.59	0.00	-0.00	154.59	0.00	0.000%
27	0.01	-154.59	-11.27	-0.01	154.59	11.27	0.000%
28	5.60	-154.59	-9.75	-5.60	154.59	9.75	0.000%
29	9.70	-154.59	-5.64	-9.70	154.59	5.64	0.000%
30	11.21	-154.59	-0.01	-11.21	154.59	0.01	0.000%
31	9.71	-154.59	5.64	-9.71	154.59	-5.64	0.000%
32	5.60	-154.59	9.77	-5.60	154.59	-9.77	0.000%
33	-0.00	-154.59	11.27	0.00	154.59	-11.27	0.000%
34	-5.60	-154.59	9.75	5.60	154.59	-9.75	0.000%
35	-9.70	-154.59	5.64	9.70	154.59	-5.64	0.000%
36	-11.21	-154.59	-0.01	11.21	154.59	0.01	0.000%
37	-9.72	-154.59	-5.64	9.72	154.59	5.64	0.000%
38	-5.61	-154.59	-9.77	5.61	154.59	9.77	0.000%
39	-0.00	-81.12	-7.76	0.00	81.12	7.76	0.000%
40	3.83	-81.12	-6.71	-3.83	81.12	6.71	0.000%
41	6.64	-81.12	-3.87	-6.64	81.12	3.87	0.000%
42	7.69	-81.12	0.00	-7.69	81.12	-0.00	0.000%
43	6.67	-81.12	3.89	-6.67	81.12	-3.89	0.000%
44	3.85	-81.12	6.73	-3.85	81.12	-6.73	0.000%
45	0.01	-81.12	7.75	-0.01	81.12	-7.75	0.000%
46	-3.83	-81.12	6.71	3.83	81.12	-6.71	0.000%
47	-6.64	-81.12	3.88	6.64	81.12	-3.88	0.000%
48	-7.69	-81.12	-0.01	7.69	81.12	0.01	0.000%
49	-6.67	-81.12	-3.89	6.67	81.12	3.89	0.000%
50	-3.86	-81.12	-6.73	3.86	81.12	6.73	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	0.00006699
3	Yes	4	0.00000001	0.00003942
4	Yes	4	0.00000001	0.00050553
5	Yes	4	0.00000001	0.00034330
6	Yes	4	0.00000001	0.00050957
7	Yes	4	0.00000001	0.00034635
8	Yes	4	0.00000001	0.00007233
9	Yes	4	0.00000001	0.00004393
10	Yes	4	0.00000001	0.00048739
11	Yes	4	0.00000001	0.00033021
12	Yes	4	0.00000001	0.00053642

13	Yes	4	0.00000001	0.00036488
14	Yes	4	0.00000001	0.00006530
15	Yes	4	0.00000001	0.00003802
16	Yes	4	0.00000001	0.00049499
17	Yes	4	0.00000001	0.00033595
18	Yes	4	0.00000001	0.00049141
19	Yes	4	0.00000001	0.00033362
20	Yes	4	0.00000001	0.00007479
21	Yes	4	0.00000001	0.00004586
22	Yes	4	0.00000001	0.00053921
23	Yes	4	0.00000001	0.00036691
24	Yes	4	0.00000001	0.00049249
25	Yes	4	0.00000001	0.00033342
26	Yes	4	0.00000001	0.00000401
27	Yes	5	0.00000001	0.00005887
28	Yes	5	0.00000001	0.00006012
29	Yes	5	0.00000001	0.00005983
30	Yes	5	0.00000001	0.00005825
31	Yes	5	0.00000001	0.00005953
32	Yes	5	0.00000001	0.00005958
33	Yes	5	0.00000001	0.00005800
34	Yes	5	0.00000001	0.00005907
35	Yes	5	0.00000001	0.00005891
36	Yes	5	0.00000001	0.00005776
37	Yes	5	0.00000001	0.00005963
38	Yes	5	0.00000001	0.00006005
39	Yes	4	0.00000001	0.00000939
40	Yes	4	0.00000001	0.00001209
41	Yes	4	0.00000001	0.00001216
42	Yes	4	0.00000001	0.00000934
43	Yes	4	0.00000001	0.00001188
44	Yes	4	0.00000001	0.00001266
45	Yes	4	0.00000001	0.00000932
46	Yes	4	0.00000001	0.00001188
47	Yes	4	0.00000001	0.00001181
48	Yes	4	0.00000001	0.00000933
49	Yes	4	0.00000001	0.00001275
50	Yes	4	0.00000001	0.00001196

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	192 - 151.25	8.60	50	0.45	0.00
L2	156.25 - 111.25	5.47	50	0.36	0.00
L3	117.75 - 72.75	2.99	50	0.25	0.00
L4	80.75 - 35.75	1.38	50	0.16	0.00
L5	45 - 0	0.43	50	0.09	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.00	800 10121 w/ Mount Pipe	50	8.60	0.45	0.00	108242
192.00	Lightning Rod 1"x10'	50	8.60	0.45	0.00	108242
185.00	APXV18-206517S-C w/ Mount Pipe	50	7.95	0.44	0.00	77316
177.00	VHLP2-23	50	7.23	0.42	0.00	36080
175.00	LLPX310R w/ Mount Pipe	50	7.05	0.41	0.00	31836
100.00	BXA-80080/4CF w/ Mount Pipe	50	2.13	0.20	0.00	24661

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	192 - 151.25	40.30	24	2.13	0.01
L2	156.25 - 111.25	25.65	24	1.69	0.00
L3	117.75 - 72.75	14.00	24	1.17	0.00
L4	80.75 - 35.75	6.45	24	0.75	0.00
L5	45 - 0	2.04	24	0.40	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.00	800 10121 w/ Mount Pipe	24	40.30	2.13	0.01	23209
192.00	Lightning Rod 1"x10'	24	40.30	2.13	0.01	23209
185.00	APXV18-206517S-C w/ Mount Pipe	24	37.28	2.05	0.01	16578
177.00	VHLP2-23	24	33.88	1.95	0.00	7736
175.00	LLPX310R w/ Mount Pipe	24	33.04	1.93	0.00	6825
100.00	BXA-80080/4CF w/ Mount Pipe	24	9.99	0.96	0.00	5259

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	192 - 151.25 (1)	TP39.245x26x0.313	40.75	0.00	0.0	37.004	-13.33	2616.03	0.005
L2	151.25 - 111.25 (2)	TP51.621x36.995x0.438	45.00	0.00	0.0	68.141	-24.45	4908.93	0.005
L3	111.25 - 72.75 (3)	TP63.259x48.633x0.5	45.00	0.00	0.0	95.472	-43.56	6732.82	0.006
L4	72.75 - 35.75 (4)	TP74.285x59.659x0.563	45.00	0.00	0.0	126.255	-65.20	8776.63	0.007
L5	35.75 - 0 (5)	TP84.78x70.154x0.563	45.00	0.00	0.0	150.360	-97.34	9779.95	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	192 - 151.25 (1)	TP39.245x26x0.313	415.78	2005.88	0.207	0.00	2005.88	0.000
L2	151.25 - 111.25 (2)	TP51.621x36.995x0.438	1025.63	4948.21	0.207	0.00	4948.21	0.000
L3	111.25 - 72.75 (3)	TP63.259x48.633x0.5	1863.70	8325.20	0.224	0.00	8325.20	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L4	72.75 - 35.75 (4)	TP74.285x59.659x0.563	2901.85	12761.33	0.227	0.00	12761.33	0.000
L5	35.75 - 0 (5)	TP84.78x70.154x0.563	4420.39	16956.67	0.261	0.00	16956.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	192 - 151.25 (1)	TP39.245x26x0.313	13.85	1308.01	0.011	1.11	4016.68	0.000
L2	151.25 - 111.25 (2)	TP51.621x36.995x0.438	17.93	2454.46	0.007	1.11	9908.50	0.000
L3	111.25 - 72.75 (3)	TP63.259x48.633x0.5	26.82	3366.41	0.008	1.33	16670.75	0.000
L4	72.75 - 35.75 (4)	TP74.285x59.659x0.563	31.18	4388.32	0.007	1.33	25554.00	0.000
L5	35.75 - 0 (5)	TP84.78x70.154x0.563	36.27	4889.97	0.007	1.33	33954.83	0.000

Pole Interaction Design Data

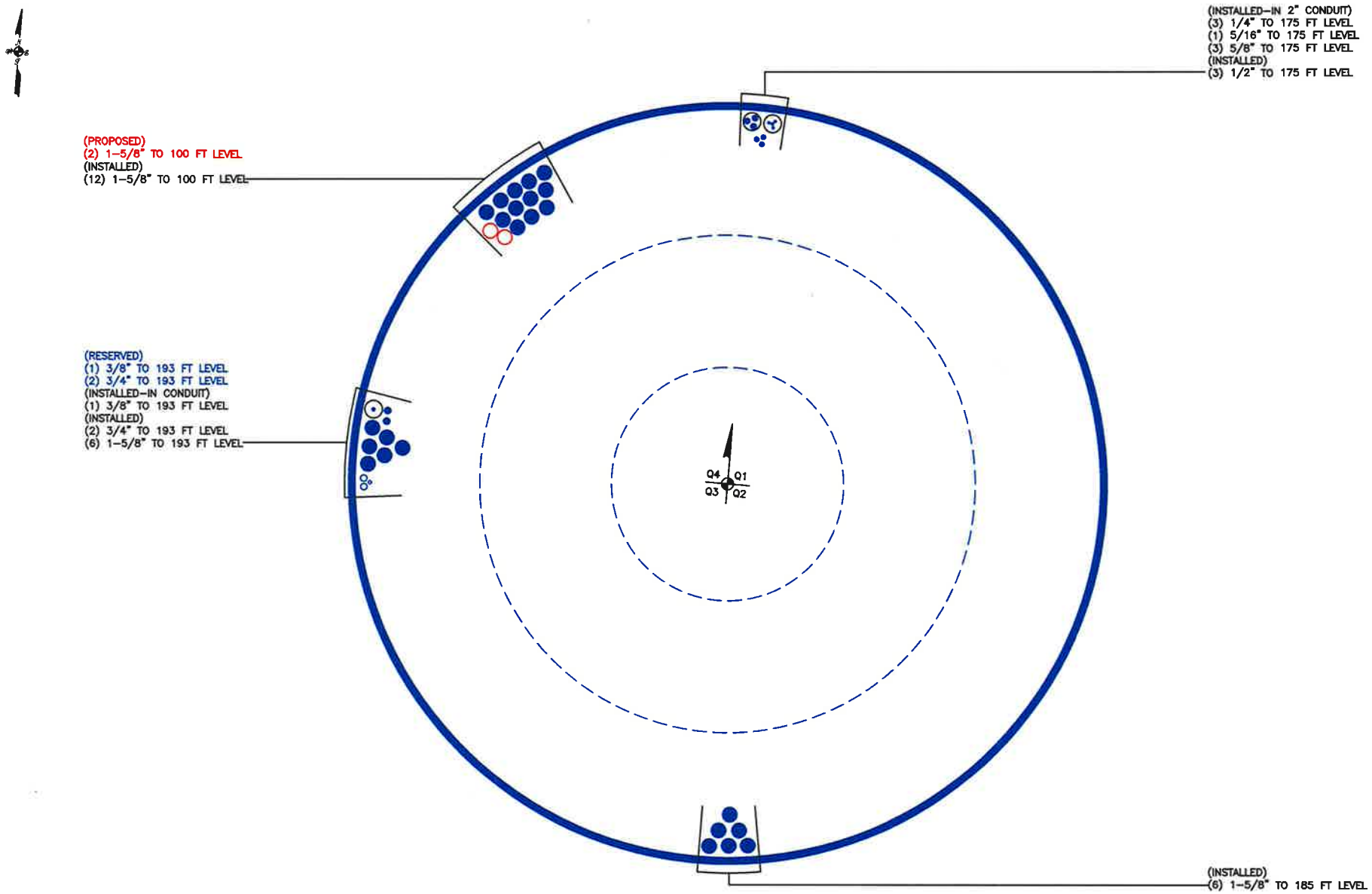
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	192 - 151.25 (1)	0.005	0.207	0.000	0.011	0.000	0.212 ✔	1.000	4.8.2 ✔
L2	151.25 - 111.25 (2)	0.005	0.207	0.000	0.007	0.000	0.212 ✔	1.000	4.8.2 ✔
L3	111.25 - 72.75 (3)	0.006	0.224	0.000	0.008	0.000	0.230 ✔	1.000	4.8.2 ✔
L4	72.75 - 35.75 (4)	0.007	0.227	0.000	0.007	0.000	0.235 ✔	1.000	4.8.2 ✔
L5	35.75 - 0 (5)	0.010	0.261	0.000	0.007	0.000	0.271 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	192 - 151.25	Pole	TP39.245x26x0.313	1	-13.33	2616.03	21.2	Pass
L2	151.25 - 111.25	Pole	TP51.621x36.995x0.438	2	-24.45	4908.93	21.2	Pass
L3	111.25 - 72.75	Pole	TP63.259x48.633x0.5	3	-43.56	6732.82	23.0	Pass
L4	72.75 - 35.75	Pole	TP74.285x59.659x0.563	4	-65.20	8776.63	23.5	Pass
L5	35.75 - 0	Pole	TP84.78x70.154x0.563	5	-97.34	9779.95	27.1	Pass
							Summary	
						Pole (L5)	27.1	Pass
						RATING =	**27.1**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 803843 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *803843*
Site Name: *CT NEW BRITAIN 4 CAC 803*
App #: *300815 - Rev 2*

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	93	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	91	in
Thick:	3.25	in
Grade:	55	ksi
Clip Distance:	9	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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:	84.78	in
Thick:	0.5625	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	4420	ft-kips
Factored Axial, Pu:	97	kips
Factored Shear, Vu:	36	kips

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	102.1 Kips
Axial Design Strength, Φ*Fu*Anet:	260.0 Kips
Anchor Rod Stress Ratio:	39.3% **Pass**

Base Plate Results	Flexural Check
Base Plate Stress:	15.1 ksi
PL Design Bending Strength, Φ*Fy:	49.5 ksi
Base Plate Stress Ratio:	30.4% **Pass**

PL Ref. Data
Yield Line (in): 43.91
Max PL Length: 43.91

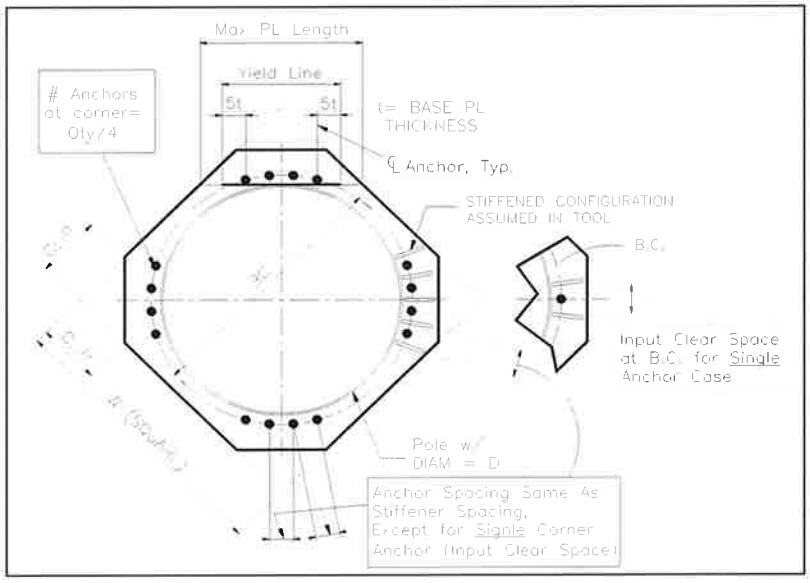
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	N/A



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

CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 4/27/2017

BU:	803843
Site Name:	CT NEW BRITAIN 4 CAC 803843
App Number:	300815
Work Order:	1397541

CROWN CASTLE

Monopole Drilled Pier

Input

Criteria

TIA Revision:	G
ACI 318 Revision:	2008
Seismic Category:	B

Forces

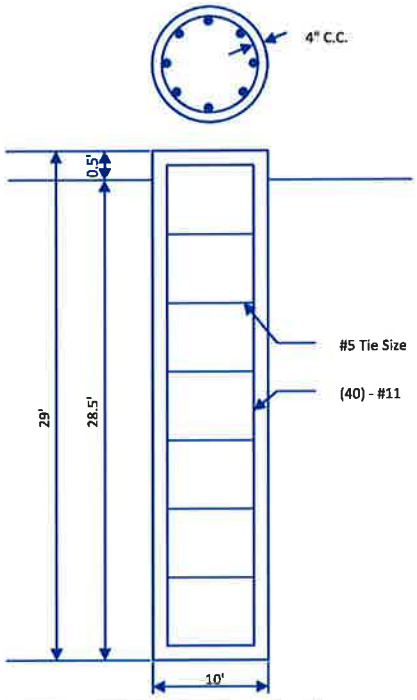
Compression	97 kips
Shear	36 kips
Moment	4420 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	10 ft
Ext. above grade:	0.5 ft
Depth below grade:	28.5 ft

Material Properties

Number of Rebar:	40
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	3000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	4 in



Soil Profile: 1

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	115	0	0	0	0	0	
2	8	5	13	115	0	30			0	
3	2	13	15	52.6	0	30			0	
4	13.5	15	28.5	70	0	34			24	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	7.25 ft
Max Moment, Mu:	4712.32 k-ft
Soil Safety Factor:	3.96
Safety Factor Req'd:	1.33
RATING:	33.6%

Soil Axial Capacity

Skin Friction (k):	359.67 kips
End Bearing (k):	1413.72 kips
Comp. Capacity (k), ϕCn:	1773.38 kips
Comp. (k), Cu:	97.00 kips
RATING:	5.5%

Concrete/Steel Check

Mu (from soil analysis)	4712.32 k-ft
ϕMn	14439.79 k-ft
RATING:	32.6%

rho provided	0.55	
rho required	0.33	OK
Rebar Spacing	7.18	
Spacing required	22.56	OK
Dev. Length required	20.91	
Dev. Length provided	61.78	OK

Overall Foundation Rating: 33.6%

Pier and Pad Foundation

BU # : 803843
Site Name: CT NEW BRITAIN 4 CAC 803843
App. Number: 300815 Rev. 2

TIA-222 Revision:	G
Tower Type:	Monopole

Block Foundation?:	☐

Superstructure Analysis Reactions		
Compression, P_{comp}:	97	kips
Base Shear, Vu_comp:	36	kips
Moment, M_u:	4420	ft-kips
Tower Height, **H**:	192	ft
BP Dist. Above Fdn, bp_{dist}:	4	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, **dpier**:	10.0	ft
Ext. Above Grade, **E**:	0.5	ft
Pier Rebar Size, **Sc**:	11	
Pier Rebar Quantity, **mc**:	64	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	10	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties		
Depth, **D**:	7.0	ft
Pad Width, **W**:	32.5	ft
Pad Thickness, **T**:	4.0	ft
Pad Rebar Size, **Sp**:	11	
Pad Rebar Quantity, **mp**:	60	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	125	pcf
Ultimate Gross Bearing, Qult:	6.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	32	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.5	
Neglected Depth, **N**:	5.0	ft
Groundwater Depth, **gw**:	13	ft

<--Toggle between Gross and Net

Foundation Analysis Checks				
	Capacity	**Demand**	**Rating**	**Check**
Lateral (Sliding) (kips)	497.83	36.00	**7.2%**	**Pass**
Bearing Pressure (ksf)	4.50	1.82	**40.4%**	**Pass**
*Overturning (kip*ft)*	12690.90	4702.00	**37.1%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	22111.16	4546.00	**20.6%**	**Pass**
Pier Compression (kip)	37491.77	146.48	**0.4%**	**Pass**
*Pad Flexure (kip*ft)*	16873.89	1489.04	**8.8%**	**Pass**
Pad Shear - 1-way (kips)	1374.11	179.51	**13.1%**	**Pass**
Pad Shear - 2-way (kips)	3605.94	146.48	**4.1%**	**Pass**

Soil Rating:	**40.4%**
Structural Rating:	**20.6%**

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

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

Site Data

BU#: *803843*
Site Name: *CT NEW BRITAIN 4 CAC 803843*
App #: *300815 Rev. 2*

Loads Already Factored		
For M (WL):	1.00	
For P (DL):	1.00	

Pier Properties		
Concrete:		
Pier Diameter =	10.0	ft
Concrete Area =	11309.7	in^2
Reinforcement:		
Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	9.30	ft
Vert. Cage Diameter =	111.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	64	
As Total=	99.84	in^2
A s/ Aconc, Rho:	0.0088	0.88%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.88%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	17979.33	kips
at Mu=(ϕ=0.65)Mn=	15804.14	ft-kips
Max Tu, (φ=0.9) Tn =	5391.36	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces		
TIA Revision:	G	
Max. Factored Shaft Mu:	4546	ft-kips **(* Note)**
Max. Factored Shaft Pu:	97	kips
Max Axial Force Type:	Comp.	

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

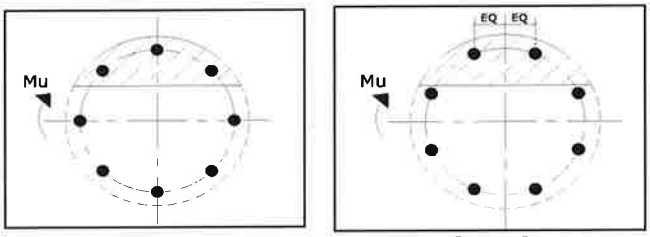
Load Factor	Shaft Factored Loads		
1.00	Mu:	4546	ft-kips
1.00	Pu:	97	kips

Material Properties		
Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	
ACI 318 Code		
Select Analysis ACI Code=	2005	

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

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**22.87**	in
Extreme Steel Strain, εt:	**0.0122**	
εt > 0.0050, Tension Controlled		
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	87.30	kips
Drilled Shaft Moment Capacity, φMn:	**22111.16**	ft-kips
Drilled Shaft Superimposed Mu:	**4546.00**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**20.6%**

USGS Design Maps Summary Report

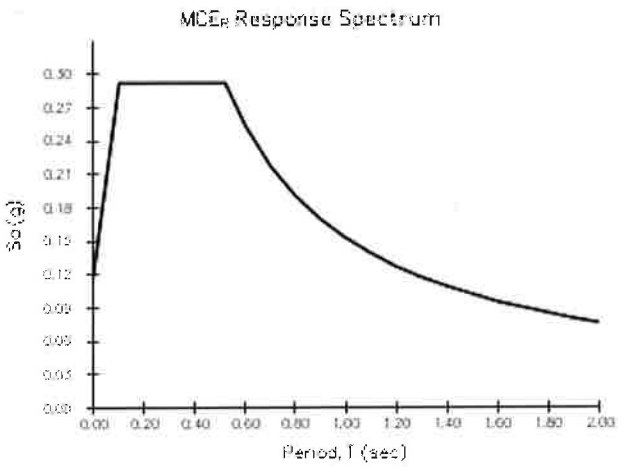
User–Specified Input

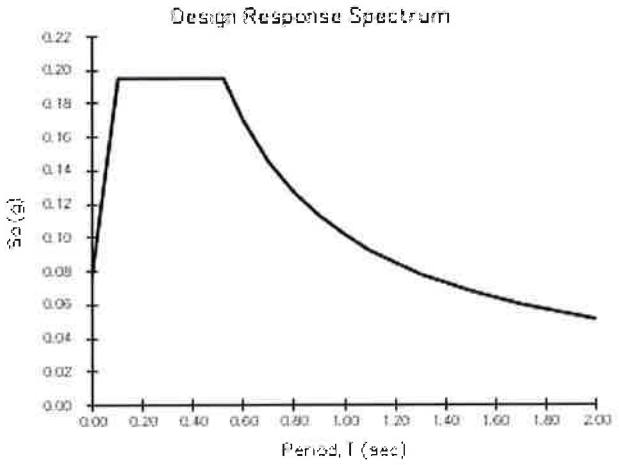
Report Title	803843 Wed April 26, 2017 13:12:10 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	41.65456°N, 72.76933°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S =	0.183 g	S_{MS} =	0.292 g	S_{DS} =	0.195 g
S_1 =	0.064 g	S_{M1} =	0.153 g	S_{D1} =	0.102 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





CCISeismic - Design Category

Per *2012/2015 IBC*

Site BU:	803843
Work Order:	1397541
Application:	300815 Rev. 2

	Degrees	Minutes	Seconds		
Site Latitude =	41	39	16.40	41.6546	degrees
Site Longitude =	-72	46	9.59	-72.7693	degrees
Ground Supported Structure =	Yes				
Structure Class =	II			*(Table 2-1)*	
Site Class =	D - Stiff Soil			*(Table 2-11)*	

Spectral response acceleration short periods, S_S =	0.183	USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.064	

Importance Factor, I =	1.0	*(Table 2-3)*
Acceleration-based site coefficient, F_a =	1.6	*(Table 2-12)*
Velocity-based site coefficient, F_v =	2.4	*(Table 2-13)*

Design spectral response acceleration short period, S_{DS} =	0.195	*(2.7.6)*
Design spectral response acceleration 1 s period, S_{D1} =	0.102	*(2.7.6)*

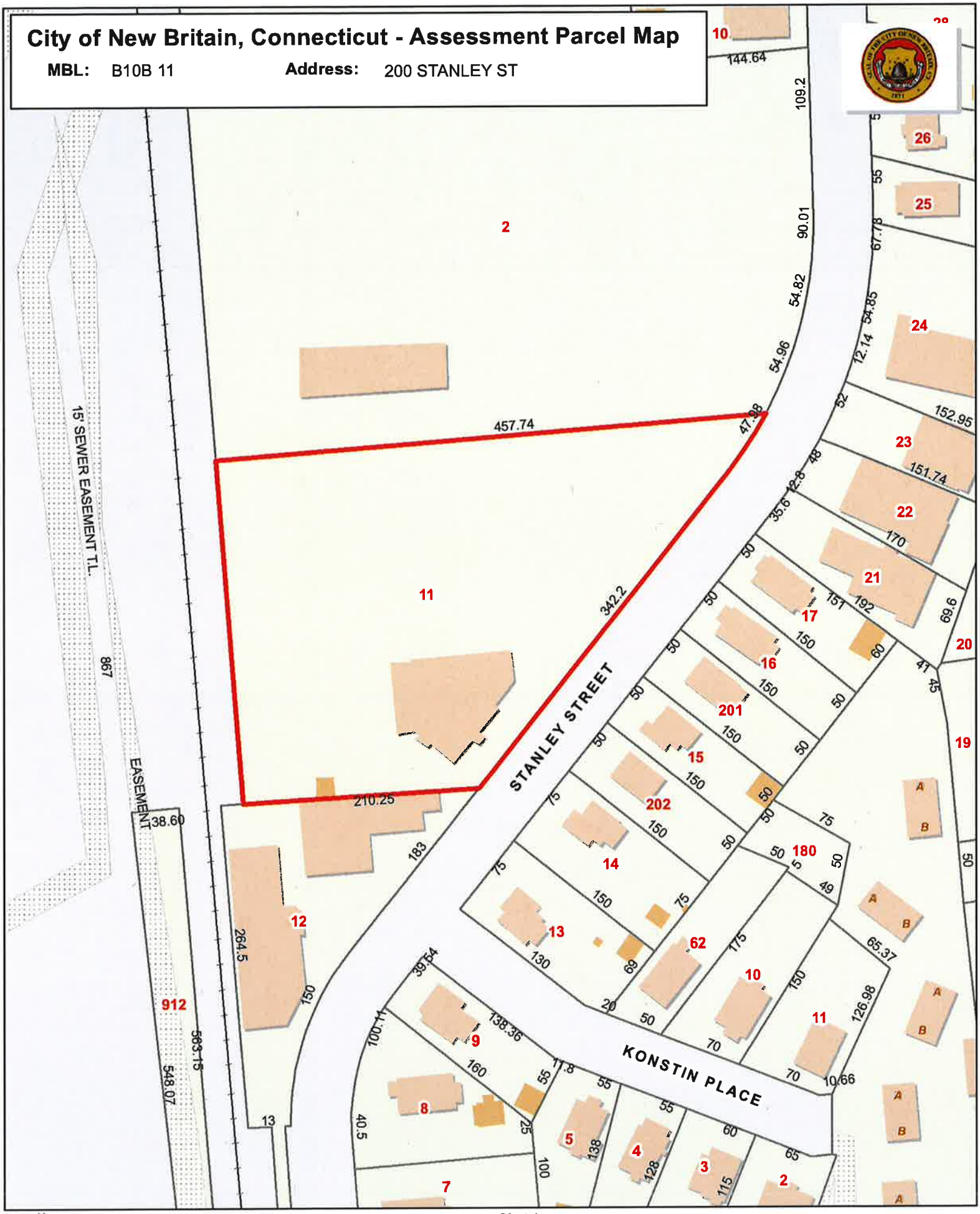
Seismic Design Category - Short Period Response =	B	*ASCE 7-05 Table 11.6-1*
Seismic Design Category - 1s Period Response =	B	*ASCE 7-05 Table 11.6-2*

Worst Case Seismic Design Category =	B	*ASCE 7-05 Tables 11.6-1 and 6-2*

ATTACHMENT 4

City of New Britain, Connecticut - Assessment Parcel Map

MBL: B10B 11 **Address:** 200 STANLEY ST



Approximate Scale:

1 inch = 100 feet

Disclaimer:
This map is for informational purposes only.
All information is subject to verification by any user.
The City of New Britain and its mapping contractors
assume no legal responsibility for the information contained herein.

Map Produced Feb 2017

City of New Britain, CT

Property Listing Report

Map Block Lot: B10B 11 | Account: 81300200

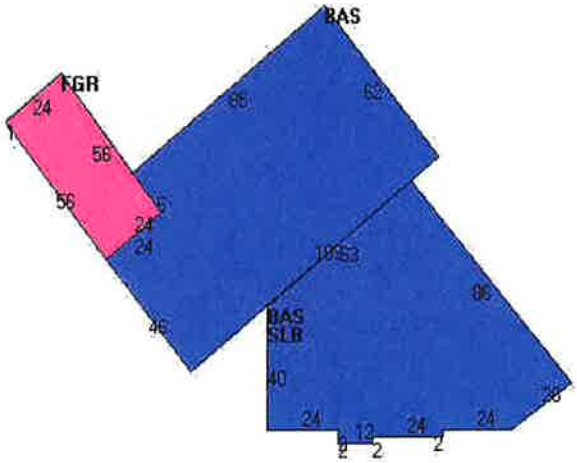
Property Information

Property Location	200 STANLEY ST
Owner	DOWNES INVESTMENTS LLC
Co-Owner	
Mailing Address	PO BOX 1508 NEW BRITAIN CT 06050-1508
Land Use	3400 Office Bld MDL-94
Land Class	C
Zoning Code	I2
Census Tract	415500

Neighborhood	107H
Acreage	2.18
Utilities	All Public
Lot Setting/Desc	Level
Additional Info	

Photo

Sketch



Primary Construction Details

Year Built	1954
Stories	1
Building Style	Office
Building Use	Comm/Ind
Building Condition	C
Floors	Carpet
Total Rooms	

Bedrooms	
Full Bathrooms	0
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	Flat
Roof Cover	T&G/Rubber

Exterior Walls	Block/Concrete
Interior Walls	Drywall
Heating Type	99
Heating Fuel	Yes
AC Type	Central
Gross Bldg Area	13283
Total Living Area	11912

Report Created On 5/11/2017

City of New Britain, CT

Property Listing Report | Map Block Lot **B10B 11** | Account **81300200**

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	560400	392280
Extras	0	0
Improvements	645500	451850
Outbuildings	85100	59570
Land	165400	115780
Total	810900	567630

Outbuilding and Extra Items

Type	Description
Fence - Chain	2520.00 L.F.
PreCastConcCel	240.00 S.F.
Fence-8' Chain	168.00 L.F.
Paving Asphalt	10000.00 S.F.

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Garage	1371	0
First Floor	11912	11912
Slab	0	0
Total Area	13283	11912

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
DOWNES INVESTMENTS LLC	1827/ 193	10/17/2011	327818
DOWNES INVESTMENTS LLC	1386/ 135	10/16/2001	
DOWNES INVESTMENTS LLC	1351/ 908	11/3/2000	
JOHN E DOWNES TRUSTEE	1104/ 267	7/3/1991	
DOWNES JOHN E	1105/ 413	6/24/1991	
	1096/ 23	2/20/1991	
FRANK E DOWNES	363/ 493	1/13/1953	
LANDERS FRARY + CLARK	168/ 438	1/1/1900	

Report Created On **5/11/2017**