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

January 29, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
101A Pierce Road, Preston, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 131-foot level of the existing 155-foot tower at 101A Pierce Road in Preston, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of the existing tower in 2009. Cellco now intends to modify its facility by replacing six (6) 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 127-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") behind its antennas and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's additional 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 Congdon, First Selectman for the Town of Preston. A copy of this letter is also being sent to Joan Shea, 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. The proposed modifications will not result in an increase in the height of the existing tower. The new antennas and RRHs will be located at the 131-foot level on the 155-foot tower.

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

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case RF emissions calculation for Cellco's modified facility is included in Attachment 2.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Robert Congdon, Preston First Selectman
Joan Shea
Crown
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	1920–2200	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 (First Lobe), 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, beampeak to 20° above beampeak, 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 km/h | 150 mph

Dimensions

Depth	180.0 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.

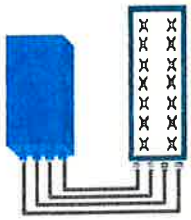
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

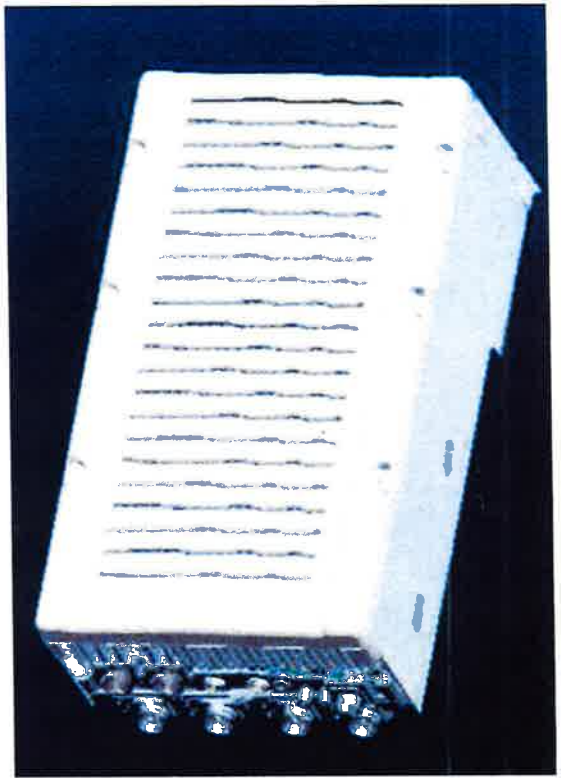
	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor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

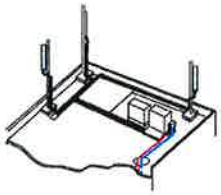
EASY INSTALLATION

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.

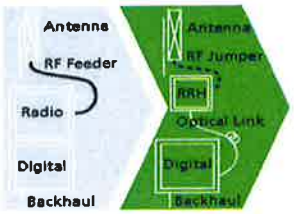
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

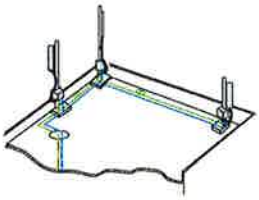
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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 CELLFLEX³ 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-93-658 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)

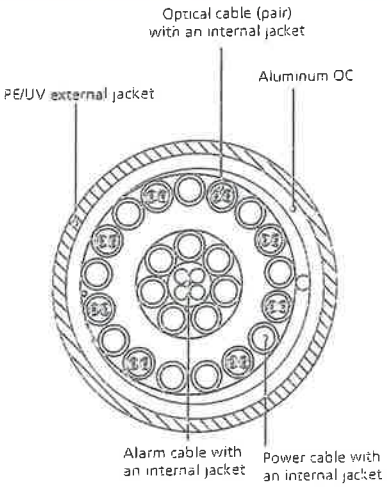


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Preston City								
Tower Height: 155'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T	2	565	144	0.0213	880	0.5867	0.36%	
*AT&T	2	875	144	0.0330	1900	1.0000	0.33%	
*AT&T	1	283	144	0.0053	880	0.5867	0.09%	
*AT&T	4	525	144	0.0397	1900	1.0000	0.40%	
*AT&T	1	1615	144	0.0305	734	0.4893	0.62%	
*Sprint	4	500	150	0.0347	1962.5	1.0000	0.35%	
Verizon	**11**	**438**	**131**	**0.1009**	**1970**	**1.0000**	**10.09%**	
Verizon	**9**	**422**	**131**	**0.0796**	**869**	**0.5793**	**13.74%**	
Verizon	**1**	**1750**	**131**	**0.0367**	**2145**	**1.0000**	**3.67%**	
Verizon	**1**	**1050**	**131**	**0.0220**	**746**	**0.4973**	**4.42%**	
								34.1%
* Source: Siting Council								

ATTACHMENT 3

Date: **November 05, 2015**

Mitchell Abbott
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Black & Veatch Corp.
6800 W. 115th St. Suite 2292
Overland Park, KS 66211
(913) 458-7245

Subject:	**Structural Modification Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	117759
	Carrier Site Name:	Perston City CT
Crown Castle Designation:	**Crown Castle BU Number:**	876366
	Crown Castle Site Name:	WAPPINGERS FALLS / PRESTON CIT
	Crown Castle JDE Job Number:	350229
	Crown Castle Work Order Number:	1144648
	Crown Castle Application Number:	313876 Rev. 4
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	182896
Site Data:	**101 Pierce Road, PRESTON, New London County, CT** **Latitude *41° 32' 17.46"*, Longitude *-71° 57' 6"*** **155 Foot - Monopole Tower**	

Dear Mitchell Abbott,

Black & Veatch Corp. is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 840799, in accordance with application 313876, revision 4.

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

LC4: Modified Structure w/ Existing + Reserved + Proposed **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 TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

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

We at *Black & Veatch Corp.* 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: Andrew H. Siegel, EIT

Respectfully submitted by: Ping Jiang, P.E.

11/06/2015

TABLE OF CONTENTS

1) INTRODUCTION

This is a 155 ft monopole tower mapped by TEP in December of 2007. The manufacturer, original design standard and wind speed are unknown.

The tower has been modified per reinforcement drawings prepared by PSG, in June of 2008. Modifications consist of addition of base plate stiffeners.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
128.0	134.0	3	alcatel lucent	RRH2X60-AWS	2	1-5/8	
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			
	131.0	6	commscope	SBNHH-1D65B w/ Mount Pipe			

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
150.0	152.0	6	decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
	150.0	1	tower mounts	Platform Mount [LP 712-1]			
142.0	142.0	3	ericsson	RRUS 11	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
140.0	140.0	3	kmw communications	AM-X-CD-17-65-00T-RET w/ Mount Pipe	3 12	3/8 1-1/4	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21901			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			
128.0	131.0	6	antel	LPA-80063/6CF w/ Mount Pipe	12	1-5/8"	1
	129.0	3	antel	BXA-185063/12CF w/ Mount Pipe	-	-	2

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	antel	BXA-70063/6CF w/ Mount Pipe			
	128.0	1	tower mounts	T-Arm Mount [TA 602-3]	-	-	1
74.0	74.0	1	lucent	KS24019-L112A	1	1/2	1
		1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
Unknown						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	TEP	2194336	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	TEP (Mapped)	2208798	CCISITES
4-TOWER MANUFACTURER DRAWINGS	TEP (Mapped)	2174297	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PSG	2271037	CCISITES
4-POST-MODIFICATION INSPECTION	PSG	2391519	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Aero Solutions, LLC	5949828	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) The following material grades were assumed based on previous experience with similar towers: Pole Shaft A572-65, Base Plate A572-50, Anchor Rods A615-75, Concrete f'c 3 ksi, and Rebar Yield Strength 60 ksi.
6) The modifications were installed per their corresponding referenced documents.

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch Corp. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
155 - 150	Pole	TP18.157x17.01x0.1875	Pole	0.3%	Pass
150 - 145	Pole	TP19.303x18.157x0.1875	Pole	8.5%	Pass
145 - 140	Pole	TP20.45x19.303x0.1875	Pole	14.8%	Pass
140 - 135	Pole	TP21.597x20.45x0.1875	Pole	28.3%	Pass
135 - 130	Pole	TP22.743x21.597x0.1875	Pole	39.3%	Pass
130 - 127.94	Pole	TP23.89x22.743x0.1875	Pole	50.8%	Pass
127.94 - 122.94	Pole	TP23.987x22.841x0.25	Pole	53.7%	Pass
122.94 - 117.94	Pole	TP25.132x23.987x0.25	Pole	65.4%	Pass
117.94 - 112.94	Pole	TP26.278x25.132x0.25	Pole	75.1%	Pass
112.94 - 107.94	Pole	TP27.424x26.278x0.25	Pole	83.3%	Pass
107.94 - 102.94	Pole	TP28.57x27.424x0.25	Pole	90.2%	Pass
102.94 - 97.94	Pole	TP29.716x28.57x0.25	Pole	96.1%	Pass
97.94 - 97.5	Pole	TP29.816x29.716x0.25	Pole	96.6%	Pass
97.5 - 97.25	Pole + Reinf.	TP29.874x29.816x0.4125	Reinf. 2 Compression	82.1%	Pass
97.25 - 92.25	Pole + Reinf.	TP31.019x29.874x0.4063	Reinf. 2 Compression	87.6%	Pass
92.25 - 88.05	Pole + Reinf.	TP32.91x31.019x0.4	Reinf. 2 Compression	91.8%	Pass
88.05 - 83	Pole	TP32.639x31.482x0.3125	Pole	90.7%	Pass
83 - 78	Pole	TP33.786x32.639x0.3125	Pole	93.3%	Pass
78 - 73	Pole	TP34.932x33.786x0.3125	Pole	95.6%	Pass
73 - 68	Pole	TP36.078x34.932x0.3125	Pole	97.5%	Pass
68 - 67.75	Pole + Reinf.	TP36.135x36.078x0.4875	Reinf. 1 Bolt Shear	80.3%	Pass
67.75 - 62.75	Pole + Reinf.	TP37.281x36.135x0.4875	Reinf. 1 Compression	81.3%	Pass
62.75 - 57.75	Pole + Reinf.	TP38.427x37.281x0.475	Reinf. 1 Compression	83.4%	Pass

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
57.75 - 52.75	Pole + Reinf.	TP39.574x38.427x0.475	Reinf. 1 Compression	85.3%	Pass
52.75 - 50.09	Pole + Reinf.	TP41.35x39.574x0.4688	Reinf. 1 Bolt Shear	87.6%	Pass
50.09 - 44	Pole	TP40.954x39.558x0.375	Pole	89.7%	Pass
44 - 39	Pole	TP42.1x40.954x0.375	Pole	90.4%	Pass
39 - 34	Pole	TP43.246x42.1x0.375	Pole	90.9%	Pass
34 - 29	Pole	TP44.393x43.246x0.375	Pole	91.3%	Pass
29 - 24	Pole	TP45.539x44.393x0.375	Pole	91.7%	Pass
24 - 19	Pole	TP46.685x45.539x0.375	Pole	91.9%	Pass
19 - 14	Pole	TP47.831x46.685x0.375	Pole	92.1%	Pass
14 - 9	Pole	TP48.977x47.831x0.375	Pole	92.2%	Pass
9 - 4	Pole	TP50.123x48.977x0.375	Pole	92.3%	Pass
4 - 0	Pole	TP51.04x50.123x0.375	Pole	92.3%	Pass
				Summary	
			Pole	97.5%	Pass
			Reinforcement	91.8%	Pass
			Overall	97.5%	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC4

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	82.2	Pass
1	Base Plate	0	91.9	Pass
1	Base Foundation	0	51.3	Pass
1	Base Foundation Soil Interaction	0	92.5	Pass

Structure Rating (max from all components) =	97.5%

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

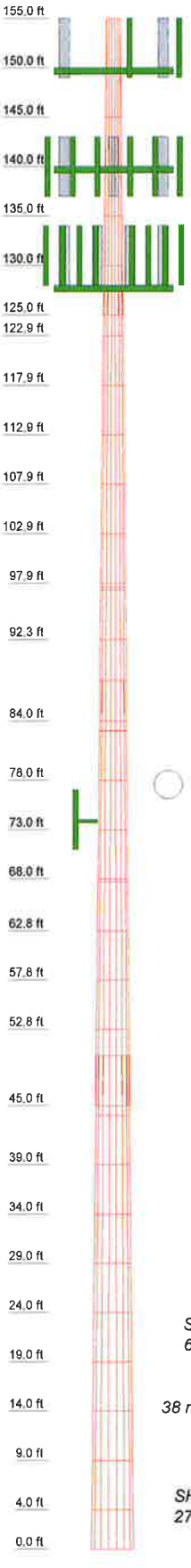
4.1) Recommendations

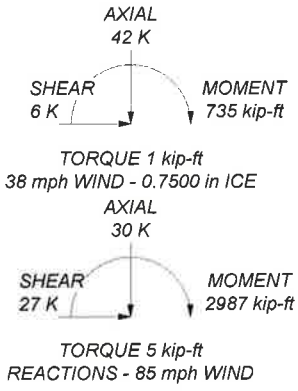
The tower and its foundation will have sufficient capacity to carry the existing, reserved, and proposed loads after installation of the modifications referenced in Appendix D.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Length (ft)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00
Number of Sides	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.1875	0.1875	0.1875	0.1875	0.1875	0.1875	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.3125	0.3125	0.3125	0.3125	0.3125	0.4000	0.4000	0.4000	0.4000	0.4000	0.4750	0.4750	0.4750	0.4750	0.4750	0.4688	0.3750	0.3750	0.3750	0.3750	0.3750	0.3750
Socket Length (ft)						2.94										4.05													5.09							
Top Dia (in)	17.0100	18.1567	19.3033	20.4500	21.5967	22.7433	23.8900	25.0367	26.1833	27.3300	28.4767	29.6233	30.7700	31.9167	33.0633	34.2100	35.3567	36.5033	37.6500	38.7967	39.9433	41.0900	42.2367	43.3833	44.5300	45.6767	46.8233	47.9700	49.1167	50.2633	51.4100				
Bot Dia (in)	18.1567	19.3033	20.4500	21.5967	22.7433	23.8900	25.0367	26.1833	27.3300	28.4767	29.6233	30.7700	31.9167	33.0633	34.2100	35.3567	36.5033	37.6500	38.7967	39.9433	41.0900	42.2367	43.3833	44.5300	45.6767	46.8233	47.9700	49.1167	50.2633	51.4100					
Grade	A572-65																																		
Weight (K)	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.5	0.6	0.6	0.0	0.6	1.1	0.5	0.9	0.9	1.0	0.9	1.5	1.0	0.8	0.9	0.9	0.9	0.9	0.9	1.0	0.8	0.9





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
8'x2" Antenna Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	140
(2) DB980H90E-M w/ Mount Pipe	150	(2) LGP21401	140
(2) DB980H90E-M w/ Mount Pipe	150	(2) LGP21901	140
(2) DB980H90E-M w/ Mount Pipe	150	Platform Mount [LP 303-1]	140
Platform Mount [LP 712-1]	150	(2) LPA-80063/6CF w/ Mount Pipe	128
Transition Ladder	150	(2) SBNHH-1D65B w/ Mount Pipe	128
RRUS 11	142	(2) RRH2x60-700	128
RRUS 11	142	(2) DB-T1-6Z-8AB-0Z	128
RRUS 11	142	RRH2X60-AWS	128
Side Arm Mount [SO 102-3]	142	RRH2X60-PCS	128
AM-X-CD-17-65-00T-RET w/ Mount Pipe	140	(2) LPA-80063/6CF w/ Mount Pipe	128
		(2) SBNHH-1D65B w/ Mount Pipe	128
(2) 7770.00 w/ Mount Pipe	140	RRH2x60-700	128
(2) LGP21401	140	RRH2X60-AWS	128
(2) LGP21901	140	RRH2X60-PCS	128
AM-X-CD-17-65-00T-RET w/ Mount Pipe	140	(2) LPA-80063/6CF w/ Mount Pipe	128
		(2) SBNHH-1D65B w/ Mount Pipe	128
(2) 7770.00 w/ Mount Pipe	140	RRH2X60-AWS	128
(2) LGP21401	140	RRH2X60-PCS	128
(2) LGP21901	140	T-Arm Mount [TA 602-3]	128
DC6-48-60-18-8F	140	KS24019-L112A	74
AM-X-CD-17-65-00T-RET w/ Mount Pipe	140	Side Arm Mount [SO 701-1]	74

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
3. Deflections are based upon a 50 mph wind.

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corp.
6800 W. 115th St. Suite 2292
Overland Park, KS 66211
Phone: (913) 458-7245
FAX: (913) 458-8136

Job: 182896			
Project: BU 876366 WO 1144648			
Client: Crown Castle	Drawn by: Andrew H. Siegel, EIT	App'd:	
Code: TIA/EIA-222-F	Date: 11/05/15	Scale: N	
Path:		Dwg No.	

Tower Input Data

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

1) Basic wind speed of 85 mph.
2) Nominal ice thickness of 0.7500 in.
3) Ice thickness is considered to increase with height.
4) Ice density of 56 pcf.
5) A wind speed of 38 mph is used in combination with ice.
6) Temperature drop of 50 °F.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) 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	155.00-150.00	5.00	0.00	18	17.0100	18.1567	0.1875	0.7500	A572-65 (65 ksi)
L2	150.00-145.00	5.00	0.00	18	18.1567	19.3033	0.1875	0.7500	A572-65 (65 ksi)
L3	145.00-140.00	5.00	0.00	18	19.3033	20.4500	0.1875	0.7500	A572-65 (65 ksi)
L4	140.00-135.00	5.00	0.00	18	20.4500	21.5967	0.1875	0.7500	A572-65 (65 ksi)
L5	135.00-130.00	5.00	0.00	18	21.5967	22.7433	0.1875	0.7500	A572-65 (65 ksi)
L6	130.00-125.00	5.00	2.94	18	22.7433	23.8900	0.1875	0.7500	A572-65 (65 ksi)
L7	125.00-122.94	5.00	0.00	18	22.8408	23.9866	0.2500	1.0000	A572-65 (65 ksi)
L8	122.94-117.94	5.00	0.00	18	23.9866	25.1323	0.2500	1.0000	A572-65 (65 ksi)
L9	117.94-112.94	5.00	0.00	18	25.1323	26.2781	0.2500	1.0000	A572-65 (65 ksi)
L10	112.94-107.94	5.00	0.00	18	26.2781	27.4239	0.2500	1.0000	A572-65

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
L11	107.94-102.94	5.00	0.00	18	27.4239	28.5697	0.2500	1.0000	(65 ksi) A572-65 (65 ksi)
L12	102.94-97.94	5.00	0.00	18	28.5697	29.7155	0.2500	1.0000	A572-65 (65 ksi)
L13	97.94-97.50	0.44	0.00	18	29.7155	29.8164	0.2500	1.0000	A572-65 (65 ksi)
L14	97.50-97.25	0.25	0.00	18	29.8164	29.8736	0.4125	1.6500	A572-65 (65 ksi)
L15	97.25-92.25	5.00	0.00	18	29.8736	31.0194	0.4063	1.6250	A572-65 (65 ksi)
L16	92.25-84.00	8.25	4.05	18	31.0194	32.9100	0.4000	1.6000	A572-65 (65 ksi)
L17	84.00-83.00	5.05	0.00	18	31.4819	32.6395	0.3125	1.2500	A572-65 (65 ksi)
L18	83.00-78.00	5.00	0.00	18	32.6395	33.7856	0.3125	1.2500	A572-65 (65 ksi)
L19	78.00-73.00	5.00	0.00	18	33.7856	34.9317	0.3125	1.2500	A572-65 (65 ksi)
L20	73.00-68.00	5.00	0.00	18	34.9317	36.0778	0.3125	1.2500	A572-65 (65 ksi)
L21	68.00-67.75	0.25	0.00	18	36.0778	36.1352	0.4875	1.9500	A572-65 (65 ksi)
L22	67.75-62.75	5.00	0.00	18	36.1352	37.2813	0.4875	1.9500	A572-65 (65 ksi)
L23	62.75-57.75	5.00	0.00	18	37.2813	38.4274	0.4750	1.9000	A572-65 (65 ksi)
L24	57.75-52.75	5.00	0.00	18	38.4274	39.5735	0.4750	1.9000	A572-65 (65 ksi)
L25	52.75-45.00	7.75	5.09	18	39.5735	41.3500	0.4688	1.8750	A572-65 (65 ksi)
L26	45.00-44.00	6.09	0.00	18	39.5583	40.9542	0.3750	1.5000	A572-65 (65 ksi)
L27	44.00-39.00	5.00	0.00	18	40.9542	42.1003	0.3750	1.5000	A572-65 (65 ksi)
L28	39.00-34.00	5.00	0.00	18	42.1003	43.2464	0.3750	1.5000	A572-65 (65 ksi)
L29	34.00-29.00	5.00	0.00	18	43.2464	44.3926	0.3750	1.5000	A572-65 (65 ksi)
L30	29.00-24.00	5.00	0.00	18	44.3926	45.5387	0.3750	1.5000	A572-65 (65 ksi)
L31	24.00-19.00	5.00	0.00	18	45.5387	46.6848	0.3750	1.5000	A572-65 (65 ksi)
L32	19.00-14.00	5.00	0.00	18	46.6848	47.8309	0.3750	1.5000	A572-65 (65 ksi)
L33	14.00-9.00	5.00	0.00	18	47.8309	48.9770	0.3750	1.5000	A572-65 (65 ksi)
L34	9.00-4.00	5.00	0.00	18	48.9770	50.1231	0.3750	1.5000	A572-65 (65 ksi)
L35	4.00-0.00	4.00		18	50.1231	51.0400	0.3750	1.5000	A572-65 (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	17.2724	10.0115	357.9458	5.9720	8.6411	41.4237	716.3626	5.0067	2.6638	14.207
	18.4368	10.6939	436.2440	6.3791	9.2236	47.2966	873.0620	5.3480	2.8656	15.283
L2	18.4368	10.6939	436.2440	6.3791	9.2236	47.2966	873.0620	5.3480	2.8656	15.283
	19.6011	11.3763	525.2007	6.7861	9.8061	53.5586	1051.0925	5.6892	3.0674	16.359
L3	19.6011	11.3763	525.2007	6.7861	9.8061	53.5586	1051.0925	5.6892	3.0674	16.359
	20.7655	12.0587	625.4963	7.1932	10.3886	60.2099	1251.8156	6.0305	3.2692	17.436
L4	20.7655	12.0587	625.4963	7.1932	10.3886	60.2099	1251.8156	6.0305	3.2692	17.436
	21.9298	12.7411	737.8107	7.6003	10.9711	67.2503	1476.5922	6.3718	3.4710	18.512
L5	21.9298	12.7411	737.8107	7.6003	10.9711	67.2503	1476.5922	6.3718	3.4710	18.512

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
	23.0942	13.4235	862.8241	8.0073	11.5536	74.6800	1726.7835	6.7130	3.6728	19.588
L6	23.0942	13.4235	862.8241	8.0073	11.5536	74.6800	1726.7835	6.7130	3.6728	19.588
	24.2585	14.1060	1001.2168	8.4144	12.1361	82.4989	2003.7509	7.0543	3.8746	20.665
L7	23.8772	17.9258	1155.7846	8.0197	11.6031	99.6099	2313.0900	8.9646	3.5800	14.32
	24.3566	18.8350	1340.7178	8.4265	12.1852	110.0287	2683.1998	9.4193	3.7816	15.127
L8	24.3566	18.8350	1340.7178	8.4265	12.1852	110.0287	2683.1998	9.4193	3.7816	15.127
	25.5201	19.7441	1544.3954	8.8332	12.7672	120.9656	3090.8231	9.8739	3.9833	15.933
L9	25.5201	19.7441	1544.3954	8.8332	12.7672	120.9656	3090.8231	9.8739	3.9833	15.933
	26.6835	20.6533	1767.7219	9.2400	13.3493	132.4206	3537.7697	10.3286	4.1850	16.74
L10	26.6835	20.6533	1767.7219	9.2400	13.3493	132.4206	3537.7697	10.3286	4.1850	16.74
	27.8470	21.5625	2011.6021	9.6467	13.9314	144.3938	4025.8511	10.7833	4.3866	17.546
L11	27.8470	21.5625	2011.6021	9.6467	13.9314	144.3938	4025.8511	10.7833	4.3866	17.546
	29.0105	22.4717	2276.9409	10.0535	14.5134	156.8852	4556.8778	11.2380	4.5883	18.353
L12	29.0105	22.4717	2276.9409	10.0535	14.5134	156.8852	4556.8778	11.2380	4.5883	18.353
	30.1739	23.3809	2564.6433	10.4603	15.0955	169.8947	5132.6613	11.6927	4.7899	19.16
L13	30.1739	23.3809	2564.6433	10.4603	15.0955	169.8947	5132.6613	11.6927	4.7899	19.16
	30.2763	23.4609	2591.0616	10.4961	15.1467	171.0643	5185.5326	11.7327	4.8077	19.231
L14	30.2763	38.4977	4205.1466	10.4384	15.1467	277.6278	8415.8265	19.2525	4.5217	10.962
	30.3345	38.5727	4229.7743	10.4587	15.1758	278.7182	8465.1142	19.2900	4.5318	10.986
L15	30.3345	37.9964	4168.3385	10.4609	15.1758	274.6699	8342.1618	19.0018	4.5428	11.182
	31.4980	39.4738	4673.7283	10.8677	15.7579	296.5964	9353.6065	19.7406	4.7444	11.679
L16	31.4980	38.8744	4604.6439	10.8699	15.7579	292.2122	9215.3468	19.4409	4.7554	11.889
	33.4177	41.2747	5511.3155	11.5411	16.7183	329.6580	11029.882 9	20.6413	5.0882	12.72
L17	32.9102	30.9162	3794.7224	11.0651	15.9928	237.2768	7594.4380	15.4610	4.9908	15.971
	33.1430	32.0643	4233.4079	11.4761	16.5809	255.3190	8472.3863	16.0352	5.1945	16.623
L18	33.1430	32.0643	4233.4079	11.4761	16.5809	255.3190	8472.3863	16.0352	5.1945	16.623
	34.3068	33.2011	4699.8339	11.8830	17.1631	273.8338	9405.8520	16.6037	5.3963	17.268
L19	34.3068	33.2011	4699.8339	11.8830	17.1631	273.8338	9405.8520	16.6037	5.3963	17.268
	35.4706	34.3379	5199.3198	12.2898	17.7453	292.9967	10405.481 0	17.1722	5.5980	17.914
L20	35.4706	34.3379	5199.3198	12.2898	17.7453	292.9967	10405.481 0	17.1722	5.5980	17.914
	36.6344	35.4748	5732.9976	12.6967	18.3275	312.8077	11473.538 8	17.7407	5.7997	18.559
L21	36.6344	55.0698	8812.8362	12.6346	18.3275	480.8519	17637.268 5	27.5402	5.4917	11.265
	36.6926	55.1585	8855.4749	12.6549	18.3567	482.4121	17722.602 0	27.5845	5.5018	11.286
L22	36.6926	55.1585	8855.4749	12.6549	18.3567	482.4121	17722.602 0	27.5845	5.5018	11.286
	37.8564	56.9319	9737.3774	13.0618	18.9389	514.1473	19487.567 5	28.4714	5.7035	11.699
L23	37.8564	55.4910	9497.3741	13.0662	18.9389	501.4748	19007.245 2	27.7508	5.7255	12.054
	39.0202	57.2189	10412.511 9	13.4731	19.5211	533.3974	20838.724 8	28.6149	5.9272	12.478
L24	39.0202	57.2189	10412.511 9	13.4731	19.5211	533.3974	20838.724 8	28.6149	5.9272	12.478
	40.1840	58.9469	11384.625 2	13.8800	20.1033	566.3050	22784.230 6	29.4790	6.1289	12.903
L25	40.1840	58.1806	11240.216 1	13.8822	20.1033	559.1217	22495.222 4	29.0958	6.1399	13.099
	41.9879	60.8236	12842.753 7	14.5128	21.0058	611.3908	25702.406 2	30.4176	6.4526	13.766
L26	41.3532	46.6379	9046.4254	13.9101	20.0956	450.1697	18104.754 3	23.3234	6.3023	16.806
	41.5860	48.2994	10048.159 8	14.4056	20.8047	482.9745	20109.541 2	24.1543	6.5479	17.461
L27	41.5860	48.2994	10048.159 8	14.4056	20.8047	482.9745	20109.541 2	24.1543	6.5479	17.461
	42.7498	49.6636	10923.828 1	14.8125	21.3870	510.7704	21862.030 0	24.8365	6.7497	17.999
L28	42.7498	49.6636	10923.828 1	14.8125	21.3870	510.7704	21862.030 0	24.8365	6.7497	17.999
	43.9136	51.0277	11848.948 0	15.2194	21.9692	539.3439	23713.487 1	25.5187	6.9514	18.537
L29	43.9136	51.0277	11848.948 0	15.2194	21.9692	539.3439	23713.487 1	25.5187	6.9514	18.537
	45.0774	52.3919	12824.877	15.6262	22.5514	568.6950	25666.631	26.2009	7.1531	19.075

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
			9				1			
L30	45.0774	52.3919	12824.877	15.6262	22.5514	568.6950	25666.631	26.2009	7.1531	19.075
			9				1			
	46.2412	53.7560	13852.976	16.0331	23.1336	598.8239	27724.180	26.8831	7.3548	19.613
			1				4			
L31	46.2412	53.7560	13852.976	16.0331	23.1336	598.8239	27724.180	26.8831	7.3548	19.613
			1				4			
	47.4050	55.1202	14934.601	16.4400	23.7159	629.7304	29888.853	27.5653	7.5565	20.151
			0				4			
L32	47.4050	55.1202	14934.601	16.4400	23.7159	629.7304	29888.853	27.5653	7.5565	20.151
			0				4			
	48.5688	56.4844	16071.110	16.8468	24.2981	661.4146	32163.368	28.2476	7.7582	20.689
			9				6			
L33	48.5688	56.4844	16071.110	16.8468	24.2981	661.4146	32163.368	28.2476	7.7582	20.689
			9				6			
	49.7325	57.8485	17263.864	17.2537	24.8803	693.8764	34550.444	28.9298	7.9600	21.227
			2				5			
L34	49.7325	57.8485	17263.864	17.2537	24.8803	693.8764	34550.444	28.9298	7.9600	21.227
			2				5			
	50.8963	59.2127	18514.219	17.6606	25.4625	727.1160	37052.799	29.6120	8.1617	21.764
			1				6			
L35	50.8963	59.2127	18514.219	17.6606	25.4625	727.1160	37052.799	29.6120	8.1617	21.764
			1				6			
	51.8274	60.3040	19556.889	17.9861	25.9283	754.2675	39139.512	30.1577	8.3230	22.195
			5				4			

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 155.00-150.00				1	1	1		
L2 150.00-145.00				1	1	1		
L3 145.00-140.00				1	1	1		
L4 140.00-135.00				1	1	1		
L5 135.00-130.00				1	1	1		
L6 130.00-125.00				1	1	1		
L7 125.00-122.94				1	1	1		
L8 122.94-117.94				1	1	1		
L9 117.94-112.94				1	1	1		
L10 112.94-107.94				1	1	1		
L11 107.94-102.94				1	1	1		
L12 102.94-97.94				1	1	1		
L13 97.94-97.50				1	1	1		
L14 97.50-97.25				1	1	0.959404		
L15 97.25-92.25				1	1	0.960537		
L16 92.25-84.00				1	1	0.964669		
L17 84.00-83.00				1	1	1		
L18 83.00-78.00				1	1	1		
L19 78.00-73.00				1	1	1		

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
L20 73.00-68.00				1	1	1		
L21 68.00-67.75				1	1	0.970517		
L22 67.75-62.75				1	1	0.960253		
L23 62.75-57.75				1	1	0.975304		
L24 57.75-52.75				1	1	0.966		
L25 52.75-45.00				1	1	0.973932		
L26 45.00-44.00				1	1	1		
L27 44.00-39.00				1	1	1		
L28 39.00-34.00				1	1	1		
L29 34.00-29.00				1	1	1		
L30 29.00-24.00				1	1	1		
L31 24.00-19.00				1	1	1		
L32 19.00-14.00				1	1	1		
L33 14.00-9.00				1	1	1		
L34 9.00-4.00				1	1	1		
L35 4.00-0.00				1	1	1		

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	150.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
***								
LDF6-50A(1-1/4")	B	No	Inside Pole	140.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
FB-L98B-002-75000(3/8")	B	No	Inside Pole	140.00 - 0.00	3	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
2" Flex Conduit	B	No	Inside Pole	140.00 - 0.00	1	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
						2" Ice	0.00	0.32
						4" Ice	0.00	0.32
***								
AVA7-50(1-5/8)	B	No	Inside Pole	128.00 - 0.00	12	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70
						1" Ice	0.00	0.70
						2" Ice	0.00	0.70

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.00	0.70
HB158-1-08U8-S8J18(1-5/8)	B	No	CaAa (Out Of Face)	128.00 - 0.00	1	No Ice	0.20	1.30
						1/2" Ice	0.30	2.81
						1" Ice	0.40	4.94
						2" Ice	0.60	11.03
						4" Ice	1.00	30.52
HB158-1-08U8-S8J18(1-5/8)	B	No	CaAa (Out Of Face)	128.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	2.81
						1" Ice	0.00	4.94
						2" Ice	0.00	11.03
						4" Ice	0.00	30.52
***								
LDF4-50A(1/2")	A	No	Inside Pole	74.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
CCI-SFP-060100	A	No	CaAa (Out Of Face)	70.00 - 45.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00
CCI-SFP-060100	B	No	CaAa (Out Of Face)	70.00 - 45.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00
CCI-SFP-060100	C	No	CaAa (Out Of Face)	70.00 - 45.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00
CCI-SFP-045100	A	No	CaAa (Out Of Face)	99.00 - 84.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00
CCI-SFP-045100	B	No	CaAa (Out Of Face)	99.00 - 84.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00
CCI-SFP-045100	C	No	CaAa (Out Of Face)	99.00 - 84.00	1	No Ice	0.17	0.00
						1/2" Ice	0.25	0.00
						1" Ice	0.33	0.00
						2" Ice	0.50	0.00
						4" Ice	0.83	0.00

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	155.00-150.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	150.00-145.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	145.00-140.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L4	140.00-135.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
L5	135.00-130.00	A	0.000	0.000	0.000	0.000	0.02

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
		B	0.000	0.000	0.000	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
L6	130.00-125.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.594	0.08
		C	0.000	0.000	0.000	0.000	0.00
L7	125.00-122.94	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.408	0.04
		C	0.000	0.000	0.000	0.000	0.00
L8	122.94-117.94	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L9	117.94-112.94	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L10	112.94-107.94	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L11	107.94-102.94	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L12	102.94-97.94	A	0.000	0.000	0.000	0.177	0.02
		B	0.000	0.000	0.000	1.167	0.10
		C	0.000	0.000	0.000	0.177	0.00
L13	97.94-97.50	A	0.000	0.000	0.000	0.073	0.00
		B	0.000	0.000	0.000	0.160	0.01
		C	0.000	0.000	0.000	0.073	0.00
L14	97.50-97.25	A	0.000	0.000	0.000	0.042	0.00
		B	0.000	0.000	0.000	0.091	0.00
		C	0.000	0.000	0.000	0.042	0.00
L15	97.25-92.25	A	0.000	0.000	0.000	0.833	0.02
		B	0.000	0.000	0.000	1.823	0.10
		C	0.000	0.000	0.000	0.833	0.00
L16	92.25-84.00	A	0.000	0.000	0.000	1.375	0.04
		B	0.000	0.000	0.000	3.009	0.16
		C	0.000	0.000	0.000	1.375	0.00
L17	84.00-83.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.198	0.02
		C	0.000	0.000	0.000	0.000	0.00
L18	83.00-78.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L19	78.00-73.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L20	73.00-68.00	A	0.000	0.000	0.000	0.333	0.03
		B	0.000	0.000	0.000	1.323	0.10
		C	0.000	0.000	0.000	0.333	0.00
L21	68.00-67.75	A	0.000	0.000	0.000	0.042	0.00
		B	0.000	0.000	0.000	0.091	0.00
		C	0.000	0.000	0.000	0.042	0.00
L22	67.75-62.75	A	0.000	0.000	0.000	0.833	0.03
		B	0.000	0.000	0.000	1.823	0.10
		C	0.000	0.000	0.000	0.833	0.00
L23	62.75-57.75	A	0.000	0.000	0.000	0.833	0.03
		B	0.000	0.000	0.000	1.823	0.10
		C	0.000	0.000	0.000	0.833	0.00
L24	57.75-52.75	A	0.000	0.000	0.000	0.833	0.03
		B	0.000	0.000	0.000	1.823	0.10
		C	0.000	0.000	0.000	0.833	0.00
L25	52.75-45.00	A	0.000	0.000	0.000	1.292	0.04
		B	0.000	0.000	0.000	2.826	0.15
		C	0.000	0.000	0.000	1.292	0.00
L26	45.00-44.00	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.198	0.02
		C	0.000	0.000	0.000	0.000	0.00
L27	44.00-39.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L28	39.00-34.00	A	0.000	0.000	0.000	0.000	0.03

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
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L29	34.00-29.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L30	29.00-24.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L31	24.00-19.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L32	19.00-14.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L33	14.00-9.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L34	9.00-4.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.990	0.10
		C	0.000	0.000	0.000	0.000	0.00
L35	4.00-0.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.792	0.08
		C	0.000	0.000	0.000	0.000	0.00

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	155.00-150.00	A	0.901	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	150.00-145.00	A	0.898	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	145.00-140.00	A	0.894	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L4	140.00-135.00	A	0.890	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.04
		C		0.000	0.000	0.000	0.000	0.00
L5	135.00-130.00	A	0.886	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.04
		C		0.000	0.000	0.000	0.000	0.00
L6	130.00-125.00	A	0.882	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.123	0.09
		C		0.000	0.000	0.000	0.000	0.00
L7	125.00-122.94	A	0.879	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.771	0.05
		C		0.000	0.000	0.000	0.000	0.00
L8	122.94-117.94	A	0.876	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.866	0.13
		C		0.000	0.000	0.000	0.000	0.00
L9	117.94-112.94	A	0.872	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.862	0.13
		C		0.000	0.000	0.000	0.000	0.00
L10	112.94-107.94	A	0.867	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.857	0.13
		C		0.000	0.000	0.000	0.000	0.00
L11	107.94-102.94	A	0.862	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.852	0.13
		C		0.000	0.000	0.000	0.000	0.00
L12	102.94-97.94	A	0.857	0.000	0.000	0.000	0.328	0.02
		B		0.000	0.000	0.000	2.175	0.13
		C		0.000	0.000	0.000	0.328	0.00
L13	97.94-97.50	A	0.854	0.000	0.000	0.000	0.136	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.298	0.01
		C		0.000	0.000	0.000	0.136	0.00
L14	97.50-97.25	A	0.854	0.000	0.000	0.000	0.077	0.00
		B		0.000	0.000	0.000	0.169	0.01
		C		0.000	0.000	0.000	0.077	0.00
L15	97.25-92.25	A	0.851	0.000	0.000	0.000	1.543	0.02
		B		0.000	0.000	0.000	3.384	0.13
		C		0.000	0.000	0.000	1.543	0.00
L16	92.25-84.00	A	0.844	0.000	0.000	0.000	2.535	0.04
		B		0.000	0.000	0.000	5.561	0.21
		C		0.000	0.000	0.000	2.535	0.00
L17	84.00-83.00	A	0.838	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.367	0.03
		C		0.000	0.000	0.000	0.000	0.00
L18	83.00-78.00	A	0.835	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.825	0.13
		C		0.000	0.000	0.000	0.000	0.00
L19	78.00-73.00	A	0.828	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.818	0.13
		C		0.000	0.000	0.000	0.000	0.00
L20	73.00-68.00	A	0.822	0.000	0.000	0.000	0.607	0.03
		B		0.000	0.000	0.000	2.419	0.13
		C		0.000	0.000	0.000	0.607	0.00
L21	68.00-67.75	A	0.818	0.000	0.000	0.000	0.076	0.00
		B		0.000	0.000	0.000	0.166	0.01
		C		0.000	0.000	0.000	0.076	0.00
L22	67.75-62.75	A	0.814	0.000	0.000	0.000	1.512	0.03
		B		0.000	0.000	0.000	3.316	0.13
		C		0.000	0.000	0.000	1.512	0.00
L23	62.75-57.75	A	0.806	0.000	0.000	0.000	1.505	0.03
		B		0.000	0.000	0.000	3.301	0.13
		C		0.000	0.000	0.000	1.505	0.00
L24	57.75-52.75	A	0.798	0.000	0.000	0.000	1.498	0.03
		B		0.000	0.000	0.000	3.286	0.12
		C		0.000	0.000	0.000	1.498	0.00
L25	52.75-45.00	A	0.786	0.000	0.000	0.000	2.307	0.04
		B		0.000	0.000	0.000	5.060	0.19
		C		0.000	0.000	0.000	2.307	0.00
L26	45.00-44.00	A	0.777	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.355	0.02
		C		0.000	0.000	0.000	0.000	0.00
L27	44.00-39.00	A	0.771	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.761	0.12
		C		0.000	0.000	0.000	0.000	0.00
L28	39.00-34.00	A	0.759	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.749	0.12
		C		0.000	0.000	0.000	0.000	0.00
L29	34.00-29.00	A	0.750	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.740	0.12
		C		0.000	0.000	0.000	0.000	0.00
L30	29.00-24.00	A	0.750	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.740	0.12
		C		0.000	0.000	0.000	0.000	0.00
L31	24.00-19.00	A	0.750	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.740	0.12
		C		0.000	0.000	0.000	0.000	0.00
L32	19.00-14.00	A	0.750	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.740	0.12
		C		0.000	0.000	0.000	0.000	0.00
L33	14.00-9.00	A	0.750	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.740	0.12
		C		0.000	0.000	0.000	0.000	0.00
L34	9.00-4.00	A	0.750	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	1.740	0.12
		C		0.000	0.000	0.000	0.000	0.00
L35	4.00-0.00	A	0.750	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	1.392	0.10
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	155.00-150.00	0.0000	0.0000	0.0000	0.0000
L2	150.00-145.00	0.0000	0.0000	0.0000	0.0000
L3	145.00-140.00	0.0000	0.0000	0.0000	0.0000
L4	140.00-135.00	0.0000	0.0000	0.0000	0.0000
L5	135.00-130.00	0.0000	0.0000	0.0000	0.0000
L6	130.00-125.00	0.1469	0.0848	0.2474	0.1428
L7	125.00-122.94	0.2338	0.1350	0.3850	0.2223
L8	122.94-117.94	0.2345	0.1354	0.3867	0.2233
L9	117.94-112.94	0.2354	0.1359	0.3895	0.2249
L10	112.94-107.94	0.2363	0.1364	0.3921	0.2264
L11	107.94-102.94	0.2371	0.1369	0.3943	0.2277
L12	102.94-97.94	0.2286	0.1320	0.3714	0.2145
L13	97.94-97.50	0.2007	0.1159	0.3033	0.1751
L14	97.50-97.25	0.2008	0.1160	0.3036	0.1753
L15	97.25-92.25	0.2017	0.1165	0.3055	0.1764
L16	92.25-84.00	0.2038	0.1177	0.3101	0.1790
L17	84.00-83.00	0.2397	0.1384	0.4013	0.2317
L18	83.00-78.00	0.2400	0.1386	0.4010	0.2315
L19	78.00-73.00	0.2406	0.1389	0.4020	0.2321
L20	73.00-68.00	0.2267	0.1309	0.3643	0.2103
L21	68.00-67.75	0.2088	0.1205	0.3200	0.1848
L22	67.75-62.75	0.2094	0.1209	0.3213	0.1855
L23	62.75-57.75	0.2106	0.1216	0.3234	0.1867
L24	57.75-52.75	0.2117	0.1222	0.3254	0.1879
L25	52.75-45.00	0.2131	0.1230	0.3275	0.1891
L26	45.00-44.00	0.2431	0.1403	0.4038	0.2331
L27	44.00-39.00	0.2433	0.1405	0.4017	0.2319
L28	39.00-34.00	0.2436	0.1407	0.4007	0.2314
L29	34.00-29.00	0.2440	0.1409	0.4002	0.2311
L30	29.00-24.00	0.2443	0.1410	0.4014	0.2317
L31	24.00-19.00	0.2446	0.1412	0.4025	0.2324
L32	19.00-14.00	0.2449	0.1414	0.4036	0.2330
L33	14.00-9.00	0.2452	0.1416	0.4046	0.2336
L34	9.00-4.00	0.2454	0.1417	0.4056	0.2342
L35	4.00-0.00	0.2457	0.1418	0.4065	0.2347

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
8'x2" Antenna Mount Pipe	B	From Leg	4.00 0.00 5.50	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.04 0.06 0.12 0.30
***									
(2) DB980H90E-M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	60.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55

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) DB980H90E-M w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	60.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	60.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
Platform Mount [LP 712-1]	C	None		0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
Transition Ladder	C	From Leg	2.00 0.00 -3.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.00 8.00 10.00 14.00 22.00	6.00 8.00 10.00 14.00 22.00	0.16 0.24 0.32 0.48 0.80
***									
RRUS 11	A	From Leg	1.00 0.00 0.00	25.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
RRUS 11	B	From Leg	1.00 0.00 0.00	15.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
RRUS 11	C	From Leg	1.00 0.00 0.00	25.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
Side Arm Mount [SO 102-3]	C	None		0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.00 3.48 3.96 4.92 6.84	3.00 3.48 3.96 4.92 6.84	0.08 0.11 0.14 0.20 0.32
***									
AM-X-CD-17-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.55 12.27 13.00 14.45 17.71	8.94 10.45 11.99 14.31 19.14	0.09 0.18 0.27 0.50 1.12
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	A	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	1.97	0.87	0.05
						2" Ice	2.79	1.52	0.14
						4" Ice			
(2) LGP21901	A	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
AM-X-CD-17-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	15.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.55 12.27 13.00 14.45 17.71	8.94 10.45 11.99 14.31 19.14	0.09 0.18 0.27 0.50 1.12
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	15.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	B	From Leg	4.00 0.00 0.00	15.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.36 0.48 0.60 0.87 1.52	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	B	From Leg	4.00 0.00 0.00	15.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
DC6-48-60-18-8F	B	From Leg	4.00 0.00 0.00	15.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	2.57 2.80 3.04 3.54 4.66	0.02 0.04 0.07 0.13 0.30
AM-X-CD-17-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.55 12.27 13.00 14.31 17.71	8.94 10.45 11.99 14.31 19.14	0.09 0.18 0.27 0.50 1.12
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	C	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.36 0.48 0.60 0.87 1.52	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	C	From Leg	4.00 0.00 0.00	25.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
Platform Mount [LP 303-1]	C	None		0.0000	140.00	No Ice 1/2"	14.66 18.87	14.66 18.87	1.25 1.48

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
						Ice	23.08	23.08	1.71
						1" Ice	31.50	31.50	2.18
						2" Ice	48.34	48.34	3.10
						4" Ice			
***									
(2) LPA-80063/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.33 10.90 11.47 12.65 15.11	10.43 11.48 12.40 14.31 18.34	0.05 0.14 0.24 0.46 1.05
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	-30.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.57 9.22 9.84 11.10 13.75	7.00 8.19 9.08 10.90 14.93	0.07 0.13 0.21 0.39 0.90
(2) RRH2x60-700	A	From Leg	4.00 0.00 6.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	1.82 2.08 2.36 2.96 4.25	0.06 0.08 0.11 0.17 0.35
(2) DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 6.00	-30.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
RRH2X60-AWS	A	From Leg	4.00 0.00 6.00	-30.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	2.16 2.44 2.73 3.34 4.66	0.06 0.08 0.11 0.18 0.37
RRH2X60-PCS	A	From Leg	4.00 0.00 6.00	-30.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
(2) LPA-80063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.33 10.90 11.47 12.65 15.11	10.43 11.48 12.40 14.31 18.34	0.05 0.14 0.24 0.46 1.05
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.57 9.22 9.84 11.10 13.75	7.00 8.19 9.08 10.90 14.93	0.07 0.13 0.21 0.39 0.90
RRH2x60-700	B	From Leg	4.00 0.00 6.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	1.82 2.08 2.36 2.96 4.25	0.06 0.08 0.11 0.17 0.35
RRH2X60-AWS	B	From Leg	4.00 0.00 6.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	2.16 2.44 2.73 3.34 4.66	0.06 0.08 0.11 0.18 0.37

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
RRH2X60-PCS	B	From Leg	4.00 0.00 6.00	-20.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
(2) LPA-80063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.33 10.90 11.47 12.65 15.11	10.43 11.48 12.40 14.31 18.34	0.05 0.14 0.24 0.46 1.05
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.57 9.22 9.84 11.10 13.75	7.00 8.19 9.08 10.90 14.93	0.07 0.13 0.21 0.39 0.90
RRH2X60-AWS	C	From Leg	4.00 0.00 6.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	2.16 2.44 2.73 3.34 4.66	0.06 0.08 0.11 0.18 0.37
RRH2X60-PCS	C	From Leg	4.00 0.00 6.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
T-Arm Mount [TA 602-3]	C	None		0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.59 15.44 19.29 26.99 42.39	11.59 15.44 19.29 26.99 42.39	0.77 0.99 1.21 1.64 2.50
***									
KS24019-L112A	C	From Leg	3.00 0.00 0.00	-15.0000	74.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.22 0.30 0.48 0.95	0.16 0.22 0.30 0.48 0.95	0.01 0.01 0.01 0.02 0.06
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	-15.0000	74.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.85 1.14 1.43 2.01 3.17	1.67 2.34 3.01 4.35 7.03	0.07 0.08 0.09 0.12 0.18
***									

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

Comb. No.	Description
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
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	155 - 150	Pole	Max Tension	14	0.00	0.00	-0.00
			Max. Compression	14	-0.28	-0.00	0.00
			Max. Mx	5	-0.15	-0.62	0.00
			Max. My	2	-0.15	-0.00	0.62
			Max. Vy	5	0.25	-0.62	0.00
			Max. Vx	2	-0.25	-0.00	0.62
			Max. Torque	2			-0.00
L2	150 - 145	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-3.46	-0.35	0.88
			Max. Mx	11	-1.69	18.72	-0.34
			Max. My	2	-1.70	-0.10	18.83
			Max. Vy	5	3.38	-18.70	0.12
			Max. Vx	2	-3.38	-0.10	18.83
			Max. Torque	6			2.45
L3	145 - 140	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-4.20	-0.36	0.88
			Max. Mx	11	-2.06	37.33	-0.48
			Max. My	2	-2.07	-0.27	37.37
			Max. Vy	5	4.17	-37.30	0.29
			Max. Vx	2	-4.14	-0.27	37.37
			Max. Torque	6			2.45
L4	140 - 135	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-8.19	-0.63	0.75
			Max. Mx	5	-3.80	-80.52	0.40
			Max. My	2	-3.83	-0.43	79.61
			Max. Vy	5	8.77	-80.52	0.40
			Max. Vx	2	-8.61	-0.43	79.61

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	6			2.42
L5	135 - 130	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-8.60	-0.63	0.77
			Max. Mx	5	-4.08	-125.13	0.50
			Max. My	2	-4.11	-0.52	123.37
			Max. Vy	5	9.07	-125.13	0.50
			Max. Vx	2	-8.90	-0.52	123.37
			Max. Torque	6			2.17
L6	130 - 125	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.52	-1.09	2.63
			Max. Mx	5	-5.49	-168.76	-0.30
			Max. My	2	-5.53	0.84	167.50
			Max. Vy	5	16.53	-168.76	-0.30
			Max. Vx	2	-16.33	0.84	167.50
			Max. Torque	12			-4.84
L7	125 - 122.94	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.32	-1.13	2.64
			Max. Mx	5	-6.06	-252.33	-1.48
			Max. My	2	-6.10	2.02	250.09
			Max. Vy	5	16.90	-252.33	-1.48
			Max. Vx	2	-16.70	2.02	250.09
			Max. Torque	12			-4.84
L8	122.94 - 117.94	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.94	-1.18	2.64
			Max. Mx	5	-6.56	-337.71	-2.67
			Max. My	2	-6.60	3.20	334.49
			Max. Vy	5	17.26	-337.71	-2.67
			Max. Vx	2	-17.07	3.20	334.49
			Max. Torque	12			-4.84
L9	117.94 - 112.94	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.58	-1.23	2.63
			Max. Mx	5	-7.08	-424.90	-3.87
			Max. My	2	-7.12	4.39	420.70
			Max. Vy	5	17.62	-424.90	-3.87
			Max. Vx	2	-17.43	4.39	420.70
			Max. Torque	12			-4.83
L10	112.94 - 107.94	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.24	-1.29	2.63
			Max. Mx	5	-7.64	-513.91	-5.08
			Max. My	2	-7.67	5.58	508.72
			Max. Vy	5	17.99	-513.91	-5.08
			Max. Vx	2	-17.79	5.58	508.72
			Max. Torque	12			-4.83
L11	107.94 - 102.94	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.92	-1.34	2.61
			Max. Mx	5	-8.21	-604.75	-6.29
			Max. My	2	-8.24	6.78	598.57
			Max. Vy	5	18.35	-604.75	-6.29
			Max. Vx	2	-18.16	6.78	598.57
			Max. Torque	12			-4.83
L12	102.94 - 97.94	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.62	-1.39	2.60
			Max. Mx	5	-8.81	-697.48	-7.50
			Max. My	2	-8.84	7.98	690.31
			Max. Vy	5	18.74	-697.48	-7.50
			Max. Vx	2	-18.55	7.98	690.31
			Max. Torque	12			-4.82
L13	97.94 - 97.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.68	-1.40	2.60
			Max. Mx	5	-8.87	-705.73	-7.61
			Max. My	2	-8.90	8.08	698.48
			Max. Vy	5	18.78	-705.73	-7.61
			Max. Vx	2	-18.59	8.08	698.48
			Max. Torque	12			-4.82

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L14	97.5 - 97.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.73	-1.40	2.60
			Max. Mx	5	-8.91	-710.43	-7.67
			Max. My	2	-8.94	8.14	703.13
			Max. Vy	5	18.81	-710.43	-7.67
			Max. Vx	2	-18.61	8.14	703.13
			Max. Torque	12			-4.82
L15	97.25 - 92.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.68	-1.46	2.58
			Max. Mx	5	-9.70	-805.75	-8.89
			Max. My	2	-9.73	9.34	797.46
			Max. Vy	5	19.32	-805.75	-8.89
			Max. Vx	2	-19.13	9.34	797.46
			Max. Torque	12			-4.82
L16	92.25 - 84	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.49	-1.51	2.57
			Max. Mx	5	-10.39	-887.80	-9.91
			Max. My	2	-10.41	10.35	878.67
			Max. Vy	5	19.75	-887.80	-9.91
			Max. Vx	2	-19.56	10.35	878.67
			Max. Torque	12			-4.81
L17	84 - 83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.04	-1.56	2.55
			Max. Mx	5	-11.61	-988.98	-11.15
			Max. My	2	-11.64	11.56	978.84
			Max. Vy	5	20.30	-988.98	-11.15
			Max. Vx	2	-20.10	11.56	978.84
			Max. Torque	12			-4.81
L18	83 - 78	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.92	-1.62	2.53
			Max. Mx	5	-12.38	-1091.38	-12.37
			Max. My	2	-12.41	12.77	1080.25
			Max. Vy	5	20.67	-1091.38	-12.37
			Max. Vx	2	-20.48	12.77	1080.25
			Max. Torque	12			-4.81
L19	78 - 73	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.92	-1.42	2.35
			Max. Mx	5	-13.24	-1195.53	-13.71
			Max. My	2	-13.26	14.16	1183.49
			Max. Vy	5	21.11	-1195.53	-13.71
			Max. Vx	2	-20.92	14.16	1183.49
			Max. Torque	12			-4.81
L20	73 - 68	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.85	-1.47	2.32
			Max. Mx	5	-14.05	-1302.09	-15.02
			Max. My	2	-14.07	15.45	1289.04
			Max. Vy	5	21.52	-1302.09	-15.02
			Max. Vx	2	-21.33	15.45	1289.04
			Max. Torque	12			-4.59
L21	68 - 67.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.92	-1.47	2.32
			Max. Mx	5	-14.11	-1307.47	-15.09
			Max. My	2	-14.13	15.51	1294.38
			Max. Vy	5	21.54	-1307.47	-15.09
			Max. Vx	2	-21.35	15.51	1294.38
			Max. Torque	12			-4.59
L22	67.75 - 62.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.17	-1.53	2.28
			Max. Mx	5	-15.20	-1416.45	-16.39
			Max. My	2	-15.22	16.79	1402.36
			Max. Vy	5	22.05	-1416.45	-16.39
			Max. Vx	2	-21.86	16.79	1402.36
			Max. Torque	12			-4.59
L23	62.75 - 57.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.45	-1.58	2.25
			Max. Mx	5	-16.31	-1527.96	-17.70

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-16.33	18.07	1512.87
			Max. Vy	5	22.56	-1527.96	-17.70
			Max. Vx	2	-22.36	18.07	1512.87
			Max. Torque	12			-4.59
L24	57.75 - 52.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.75	-1.64	2.22
			Max. Mx	5	-17.45	-1641.96	-19.01
			Max. My	2	-17.46	19.35	1625.87
			Max. Vy	5	23.05	-1641.96	-19.01
			Max. Vx	2	-22.86	19.35	1625.87
			Max. Torque	12			-4.59
L25	52.75 - 45	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-28.45	-1.67	2.20
			Max. Mx	5	-18.06	-1703.60	-19.70
			Max. My	2	-18.08	20.03	1686.98
			Max. Vy	5	23.31	-1703.60	-19.70
			Max. Vx	2	-23.11	20.03	1686.98
			Max. Torque	12			-4.59
L26	45 - 44	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.08	-1.74	2.16
			Max. Mx	5	-20.25	-1847.50	-21.30
			Max. My	2	-20.27	21.59	1829.67
			Max. Vy	5	23.93	-1847.50	-21.30
			Max. Vx	2	-23.74	21.59	1829.67
			Max. Torque	12			-4.59
L27	44 - 39	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.26	-1.80	2.12
			Max. Mx	5	-21.30	-1968.00	-22.61
			Max. My	2	-21.31	22.87	1949.17
			Max. Vy	5	24.28	-1968.00	-22.61
			Max. Vx	2	-24.09	22.87	1949.17
			Max. Torque	12			-4.59
L28	39 - 34	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.47	-1.86	2.09
			Max. Mx	5	-22.38	-2090.20	-23.92
			Max. My	2	-22.39	24.15	2070.37
			Max. Vy	5	24.62	-2090.20	-23.92
			Max. Vx	2	-24.42	24.15	2070.37
			Max. Torque	12			-4.58
L29	34 - 29	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.70	-1.93	2.05
			Max. Mx	5	-23.47	-2214.07	-25.22
			Max. My	2	-23.48	25.42	2193.24
			Max. Vy	5	24.94	-2214.07	-25.22
			Max. Vx	2	-24.75	25.42	2193.24
			Max. Torque	12			-4.58
L30	29 - 24	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.97	-1.99	2.02
			Max. Mx	5	-24.60	-2339.58	-26.52
			Max. My	2	-24.61	26.69	2317.77
			Max. Vy	5	25.27	-2339.58	-26.52
			Max. Vx	2	-25.08	26.69	2317.77
			Max. Torque	12			-4.58
L31	24 - 19	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.26	-2.05	1.98
			Max. Mx	5	-25.74	-2466.76	-27.82
			Max. My	2	-25.75	27.95	2443.96
			Max. Vy	5	25.61	-2466.76	-27.82
			Max. Vx	2	-25.42	27.95	2443.96
			Max. Torque	12			-4.58
L32	19 - 14	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38.58	-2.12	1.94
			Max. Mx	5	-26.91	-2595.62	-29.11
			Max. My	2	-26.92	29.21	2571.83
			Max. Vy	5	25.95	-2595.62	-29.11
			Max. Vx	2	-25.76	29.21	2571.83
			Max. Torque	12			-4.58
L33	14 - 9	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-39.93	-2.19	1.90
			Max. Mx	5	-28.11	-2726.18	-30.40
			Max. My	2	-28.11	30.47	2701.41
			Max. Vy	5	26.29	-2726.18	-30.40
			Max. Vx	2	-26.10	30.47	2701.41
			Max. Torque	12			-4.58
L34	9 - 4	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-41.30	-2.26	1.86
			Max. Mx	5	-29.33	-2858.46	-31.69
			Max. My	2	-29.33	31.71	2832.71
			Max. Vy	5	26.63	-2858.46	-31.69
			Max. Vx	2	-26.45	31.71	2832.71
			Max. Torque	12			-4.58
L35	4 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.42	-2.31	1.83
			Max. Mx	5	-30.32	-2965.52	-32.71
			Max. My	2	-30.32	32.71	2938.99
			Max. Vy	5	26.91	-2965.52	-32.71
			Max. Vx	2	-26.73	32.71	2938.99
			Max. Torque	12			-4.58

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	42.42	-0.00	0.00
	Max. H_x	11	30.33	26.90	0.25
	Max. H_z	2	30.33	0.25	26.71
	Max. M_x	2	2938.99	0.25	26.71
	Max. M_z	5	2965.52	-26.90	-0.25
	Max. Torsion	6	4.46	-23.42	-13.58
	Min. Vert	1	30.33	0.00	0.00
	Min. H_x	5	30.33	-26.90	-0.25
	Min. H_z	8	30.33	-0.25	-26.71
	Min. M_x	8	-2937.77	-0.25	-26.71
	Min. M_z	11	-2964.30	26.90	0.25
	Min. Torsion	12	-4.58	23.42	13.58

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	30.33	0.00	0.00	-0.59	-0.60	0.00
Dead+Wind 0 deg - No Ice	30.33	-0.25	-26.71	-2938.99	32.71	3.00
Dead+Wind 30 deg - No Ice	30.33	13.23	-23.01	-2528.76	-1454.33	0.89
Dead+Wind 60 deg - No Ice	30.33	23.17	-13.14	-1440.97	-2551.79	-1.42
Dead+Wind 90 deg - No Ice	30.33	26.90	0.25	32.71	-2965.52	-3.36
Dead+Wind 120 deg - No Ice	30.33	23.42	13.58	1497.34	-2584.85	-4.46
Dead+Wind 150 deg - No Ice	30.33	13.67	23.26	2560.64	-1511.86	-4.41
Dead+Wind 180 deg - No Ice	30.33	0.25	26.71	2937.77	-33.88	-3.16
Dead+Wind 210 deg - No Ice	30.33	-13.23	23.01	2527.52	1453.12	-1.00
Dead+Wind 240 deg - No Ice	30.33	-23.17	13.14	1439.77	2550.55	1.47
Dead+Wind 270 deg - No Ice	30.33	-26.90	-0.25	-33.88	2964.30	3.52
Dead+Wind 300 deg - No Ice	30.33	-23.42	-13.58	-1498.50	2583.66	4.58
Dead+Wind 330 deg - No Ice	30.33	-13.67	-23.26	-2561.82	1510.69	4.37
Dead+Ice+Temp	42.42	0.00	-0.00	-1.83	-2.31	-0.00
Dead+Wind 0 deg+Ice+Temp	42.42	-0.06	-6.33	-727.64	5.95	0.74
Dead+Wind 30	42.42	3.12	-5.45	-626.25	-358.66	0.24

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
deg+Ice+Temp						
Dead+Wind 60 deg+Ice+Temp	42.42	5.46	-3.11	-357.56	-627.81	-0.33
Dead+Wind 90 deg+Ice+Temp	42.42	6.34	0.06	6.43	-729.36	-0.81
Dead+Wind 120 deg+Ice+Temp	42.42	5.52	3.22	368.18	-636.12	-1.07
Dead+Wind 150 deg+Ice+Temp	42.42	3.22	5.51	630.78	-373.07	-1.05
Dead+Wind 180 deg+Ice+Temp	42.42	0.06	6.33	723.85	-10.69	-0.75
Dead+Wind 210 deg+Ice+Temp	42.42	-3.12	5.45	622.46	353.92	-0.25
Dead+Wind 240 deg+Ice+Temp	42.42	-5.46	3.11	353.77	623.06	0.33
Dead+Wind 270 deg+Ice+Temp	42.42	-6.34	-0.06	-10.21	724.62	0.82
Dead+Wind 300 deg+Ice+Temp	42.42	-5.52	-3.22	-371.97	631.38	1.08
Dead+Wind 330 deg+Ice+Temp	42.42	-3.22	-5.51	-634.56	368.33	1.05
Dead+Wind 0 deg - Service	30.33	-0.09	-9.24	-1019.15	10.93	1.07
Dead+Wind 30 deg - Service	30.33	4.58	-7.96	-876.93	-504.51	0.32
Dead+Wind 60 deg - Service	30.33	8.02	-4.55	-499.89	-884.93	-0.51
Dead+Wind 90 deg - Service	30.33	9.31	0.09	10.92	-1028.38	-1.20
Dead+Wind 120 deg - Service	30.33	8.10	4.70	518.64	-896.45	-1.58
Dead+Wind 150 deg - Service	30.33	4.73	8.05	887.22	-524.49	-1.54
Dead+Wind 180 deg - Service	30.33	0.09	9.24	1017.91	-12.16	-1.09
Dead+Wind 210 deg - Service	30.33	-4.58	7.96	875.68	503.27	-0.34
Dead+Wind 240 deg - Service	30.33	-8.02	4.55	498.65	883.69	0.51
Dead+Wind 270 deg - Service	30.33	-9.31	-0.09	-12.16	1027.15	1.22
Dead+Wind 300 deg - Service	30.33	-8.10	-4.70	-519.87	895.22	1.60
Dead+Wind 330 deg - Service	30.33	-4.73	-8.05	-888.46	523.26	1.54

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	-30.33	0.00	0.00	30.33	0.00	0.000%
2	-0.25	-30.33	-26.71	0.25	30.33	26.71	0.000%
3	13.23	-30.33	-23.01	-13.23	30.33	23.01	0.000%
4	23.17	-30.33	-13.14	-23.17	30.33	13.14	0.000%
5	26.90	-30.33	0.25	-26.90	30.33	-0.25	0.000%
6	23.42	-30.33	13.58	-23.42	30.33	-13.58	0.000%
7	13.67	-30.33	23.26	-13.67	30.33	-23.26	0.000%
8	0.25	-30.33	26.71	-0.25	30.33	-26.71	0.000%
9	-13.23	-30.33	23.01	13.23	30.33	-23.01	0.000%
10	-23.17	-30.33	13.14	23.17	30.33	-13.14	0.000%
11	-26.90	-30.33	-0.25	26.90	30.33	0.25	0.000%
12	-23.42	-30.33	-13.58	23.42	30.33	13.58	0.000%
13	-13.67	-30.33	-23.26	13.67	30.33	23.26	0.000%
14	0.00	-42.42	0.00	-0.00	42.42	0.00	0.000%
15	-0.06	-42.42	-6.33	0.06	42.42	6.33	0.000%
16	3.12	-42.42	-5.45	-3.12	42.42	5.45	0.000%
17	5.46	-42.42	-3.11	-5.46	42.42	3.11	0.000%
18	6.34	-42.42	0.06	-6.34	42.42	-0.06	0.000%
19	5.52	-42.42	3.22	-5.52	42.42	-3.22	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
20	3.22	-42.42	5.51	-3.22	42.42	-5.51	0.000%
21	0.06	-42.42	6.33	-0.06	42.42	-6.33	0.000%
22	-3.12	-42.42	5.45	3.12	42.42	-5.45	0.000%
23	-5.46	-42.42	3.11	5.46	42.42	-3.11	0.000%
24	-6.34	-42.42	-0.06	6.34	42.42	0.06	0.000%
25	-5.52	-42.42	-3.22	5.52	42.42	3.22	0.000%
26	-3.22	-42.42	-5.51	3.22	42.42	5.51	0.000%
27	-0.09	-30.33	-9.24	0.09	30.33	9.24	0.000%
28	4.58	-30.33	-7.96	-4.58	30.33	7.96	0.000%
29	8.02	-30.33	-4.55	-8.02	30.33	4.55	0.000%
30	9.31	-30.33	0.09	-9.31	30.33	-0.09	0.000%
31	8.10	-30.33	4.70	-8.10	30.33	-4.70	0.000%
32	4.73	-30.33	8.05	-4.73	30.33	-8.05	0.000%
33	0.09	-30.33	9.24	-0.09	30.33	-9.24	0.000%
34	-4.58	-30.33	7.96	4.58	30.33	-7.96	0.000%
35	-8.02	-30.33	4.55	8.02	30.33	-4.55	0.000%
36	-9.31	-30.33	-0.09	9.31	30.33	0.09	0.000%
37	-8.10	-30.33	-4.70	8.10	30.33	4.70	0.000%
38	-4.73	-30.33	-8.05	4.73	30.33	8.05	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	5	0.00000001	0.00041843
3	Yes	6	0.00000001	0.00024777
4	Yes	6	0.00000001	0.00025193
5	Yes	5	0.00000001	0.00052542
6	Yes	6	0.00000001	0.00022984
7	Yes	6	0.00000001	0.00027455
8	Yes	5	0.00000001	0.00088386
9	Yes	6	0.00000001	0.00023851
10	Yes	6	0.00000001	0.00023514
11	Yes	5	0.00000001	0.00099456
12	Yes	6	0.00000001	0.00027657
13	Yes	6	0.00000001	0.00023115
14	Yes	4	0.00000001	0.00027239
15	Yes	6	0.00000001	0.00015672
16	Yes	6	0.00000001	0.00020135
17	Yes	6	0.00000001	0.00020210
18	Yes	6	0.00000001	0.00015692
19	Yes	6	0.00000001	0.00020261
20	Yes	6	0.00000001	0.00020954
21	Yes	6	0.00000001	0.00015464
22	Yes	6	0.00000001	0.00019460
23	Yes	6	0.00000001	0.00019438
24	Yes	6	0.00000001	0.00015582
25	Yes	6	0.00000001	0.00021105
26	Yes	6	0.00000001	0.00020356
27	Yes	5	0.00000001	0.00013517
28	Yes	5	0.00000001	0.00065811
29	Yes	5	0.00000001	0.00068143
30	Yes	5	0.00000001	0.00016182
31	Yes	5	0.00000001	0.00060338
32	Yes	5	0.00000001	0.00080589
33	Yes	5	0.00000001	0.00017134
34	Yes	5	0.00000001	0.00060996
35	Yes	5	0.00000001	0.00059731
36	Yes	5	0.00000001	0.00019906
37	Yes	5	0.00000001	0.00082126
38	Yes	5	0.00000001	0.00060813

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	155 - 150 (1)	TP18.1567x17.01x0.1875	5.00	0.00	0.0	39.000	10.6939	-0.15	417.06	0.000
L2	150 - 145 (2)	TP19.3033x18.1567x0.1875	5.00	0.00	0.0	39.000	11.3763	-1.69	443.68	0.004
L3	145 - 140 (3)	TP20.45x19.3033x0.1875	5.00	0.00	0.0	39.000	12.0587	-2.06	470.29	0.004
L4	140 - 135 (4)	TP21.5967x20.45x0.1875	5.00	0.00	0.0	39.000	12.7411	-3.81	496.90	0.008
L5	135 - 130 (5)	TP22.7433x21.5967x0.1875	5.00	0.00	0.0	39.000	13.4235	-4.09	523.52	0.008
L6	130 - 125 (6)	TP23.89x22.7433x0.1875	5.00	0.00	0.0	39.000	13.7047	-5.46	534.48	0.010
L7	125 - 122.94 (7)	TP23.9866x22.8408x0.25	5.00	0.00	0.0	39.000	18.8350	-6.03	734.56	0.008
L8	122.94 - 117.94 (8)	TP25.1323x23.9866x0.25	5.00	0.00	0.0	39.000	19.7441	-6.53	770.02	0.008
L9	117.94 - 112.94 (9)	TP26.2781x25.1323x0.25	5.00	0.00	0.0	39.000	20.6533	-7.05	805.48	0.009
L10	112.94 - 107.94 (10)	TP27.4239x26.2781x0.25	5.00	0.00	0.0	39.000	21.5625	-7.61	840.94	0.009
L11	107.94 - 102.94 (11)	TP28.5697x27.4239x0.25	5.00	0.00	0.0	39.000	22.4717	-8.19	876.40	0.009
L12	102.94 - 97.94 (12)	TP29.7155x28.5697x0.25	5.00	0.00	0.0	39.000	23.3809	-8.79	911.86	0.010
L13	97.94 - 97.5 (13)	TP29.8164x29.7155x0.25	0.44	0.00	0.0	39.000	23.4609	-8.85	914.98	0.010
L14	97.5 - 97.25 (14)	TP29.8736x29.8164x0.4125	0.25	0.00	0.0	39.000	38.5727	-8.89	1504.34	0.006
L15	97.25 - 92.25 (15)	TP31.0194x29.8736x0.4063	5.00	0.00	0.0	39.000	39.4738	-9.68	1539.48	0.006
L16	92.25 - 84 (16)	TP32.91x31.0194x0.4	8.25	0.00	0.0	39.000	40.0964	-10.36	1563.76	0.007
L17	84 - 83 (17)	TP32.6395x31.4819x0.3125	5.05	0.00	0.0	39.000	32.0643	-11.59	1250.51	0.009
L18	83 - 78 (18)	TP33.7856x32.6395x0.3125	5.00	0.00	0.0	39.000	33.2011	-12.36	1294.84	0.010
L19	78 - 73 (19)	TP34.9317x33.7856x0.3125	5.00	0.00	0.0	39.000	34.3379	-13.22	1339.18	0.010
L20	73 - 68 (20)	TP36.0778x34.9317x0.3125	5.00	0.00	0.0	39.000	35.4748	-14.03	1383.52	0.010
L21	68 - 67.75 (21)	TP36.1352x36.0778x0.4875	0.25	0.00	0.0	39.000	55.1585	-14.10	2151.18	0.007
L22	67.75 - 62.75 (22)	TP37.2813x36.1352x0.4875	5.00	0.00	0.0	39.000	56.9319	-15.18	2220.35	0.007
L23	62.75 - 57.75 (23)	TP38.4274x37.2813x0.475	5.00	0.00	0.0	39.000	57.2189	-16.30	2231.54	0.007
L24	57.75 - 52.75 (24)	TP39.5735x38.4274x0.475	5.00	0.00	0.0	39.000	58.9469	-17.43	2298.93	0.008
L25	52.75 - 45 (25)	TP41.35x39.5735x0.4688	7.75	0.00	0.0	39.000	59.0877	-18.05	2304.42	0.008
L26	45 - 44 (26)	TP40.9542x39.5582x0.375	6.09	0.00	0.0	39.000	48.2994	-20.24	1883.68	0.011
L27	44 - 39 (27)	TP42.1003x40.9542x0.375	5.00	0.00	0.0	39.000	49.6636	-21.29	1936.88	0.011
L28	39 - 34 (28)	TP43.2464x42.1003x0.375	5.00	0.00	0.0	39.000	51.0277	-22.37	1990.08	0.011
L29	34 - 29 (29)	TP44.3926x43.2464x0.375	5.00	0.00	0.0	39.000	52.3919	-23.47	2043.28	0.011
L30	29 - 24 (30)	TP45.5387x44.3926x0.375	5.00	0.00	0.0	39.000	53.7561	-24.59	2096.49	0.012
L31	24 - 19 (31)	TP46.6848x45.5387x0.375	5.00	0.00	0.0	39.000	55.1202	-25.74	2149.69	0.012
L32	19 - 14 (32)	TP47.8309x46.6848x0.375	5.00	0.00	0.0	39.000	56.4844	-26.91	2202.89	0.012
L33	14 - 9 (33)	TP48.977x47.8309x0.375	5.00	0.00	0.0	39.000	57.8485	-28.11	2256.09	0.012
L34	9 - 4 (34)	TP50.1231x48.977x0.375	5.00	0.00	0.0	39.000	59.2127	-29.33	2309.29	0.013
L35	4 - 0 (35)	TP51.04x50.1231x0.375	4.00	0.00	0.0	39.000	60.3040	-30.32	2351.86	0.013

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	155 - 150 (1)	TP18.1567x17.01x0.1875	0.62	0.157	39.000	0.004	0.00	0.000	39.000	0.000
L2	150 - 145 (2)	TP19.3033x18.1567x0.1875	19.02	4.261	39.000	0.109	0.00	0.000	39.000	0.000
L3	145 - 140 (3)	TP20.45x19.3033x0.1875	37.69	7.512	39.000	0.193	0.00	0.000	39.000	0.000
L4	140 - 135 (4)	TP21.5967x20.45x0.1875	80.73	14.405	39.000	0.369	0.00	0.000	39.000	0.000
L5	135 - 130 (5)	TP22.7433x21.5967x0.1875	125.19	20.117	39.000	0.516	0.00	0.000	39.000	0.000
L6	130 - 125 (6)	TP23.89x22.7433x0.1875	168.93	26.037	39.000	0.668	0.00	0.000	39.000	0.000
L7	125 - 122.94 (7)	TP23.9866x22.8408x0.25	253.28	27.623	39.000	0.708	0.00	0.000	39.000	0.000
L8	122.94 - 117.94 (8)	TP25.1323x23.9866x0.25	339.44	33.673	39.000	0.863	0.00	0.000	39.000	0.000
L9	117.94 - 112.94 (9)	TP26.2781x25.1323x0.25	427.42	38.733	39.000	0.993	0.00	0.000	39.000	0.000
L10	112.94 - 107.94 (10)	TP27.4239x26.2781x0.25	517.21	42.983	39.000	1.102	0.00	0.000	39.000	0.000
L11	107.94 - 102.94 (11)	TP28.5697x27.4239x0.25	608.83	46.569	39.000	1.194	0.00	0.000	39.000	0.000
L12	102.94 - 97.94 (12)	TP29.7155x28.5697x0.25	702.34	49.608	39.000	1.272	0.00	0.000	39.000	0.000
L13	97.94 - 97.5 (13)	TP29.8164x29.7155x0.25	710.66	49.852	39.000	1.278	0.00	0.000	39.000	0.000
L14	97.5 - 97.25 (14)	TP29.8736x29.8164x0.4125	715.40	30.801	39.000	0.790	0.00	0.000	39.000	0.000
L15	97.25 - 92.25 (15)	TP31.0194x29.8736x0.4063	811.50	32.833	39.000	0.842	0.00	0.000	39.000	0.000
L16	92.25 - 84 (16)	TP32.91x31.0194x0.4	894.21	34.504	39.000	0.885	0.00	0.000	39.000	0.000
L17	84 - 83 (17)	TP32.6395x31.4819x0.3125	996.17	46.820	39.000	1.201	0.00	0.000	39.000	0.000
L18	83 - 78 (18)	TP33.7856x32.6395x0.3125	1099.36	48.176	39.000	1.235	0.00	0.000	39.000	0.000
L19	78 - 73 (19)	TP34.9317x33.7856x0.3125	1204.61	49.336	39.000	1.265	0.00	0.000	39.000	0.000
L20	73 - 68 (20)	TP36.0778x34.9317x0.3125	1312.01	50.331	39.000	1.291	0.00	0.000	39.000	0.000
L21	68 - 67.75 (21)	TP36.1352x36.0778x0.4875	1317.43	32.771	39.000	0.840	0.00	0.000	39.000	0.000
L22	67.75 - 62.75 (22)	TP37.2813x36.1352x0.4875	1427.26	33.312	39.000	0.854	0.00	0.000	39.000	0.000
L23	62.75 - 57.75 (23)	TP38.4274x37.2813x0.475	1539.62	34.637	39.000	0.888	0.00	0.000	39.000	0.000
L24	57.75 - 52.75 (24)	TP39.5735x38.4274x0.475	1654.46	35.058	39.000	0.899	0.00	0.000	39.000	0.000
L25	52.75 - 45 (25)	TP41.35x39.5735x0.4688	1716.55	35.712	39.000	0.916	0.00	0.000	39.000	0.000
L26	45 - 44 (26)	TP40.9542x39.5582x0.375	1861.48	46.251	39.000	1.186	0.00	0.000	39.000	0.000
L27	44 - 39 (27)	TP42.1003x40.9542x0.375	1982.87	46.585	39.000	1.194	0.00	0.000	39.000	0.000
L28	39 - 34 (28)	TP43.2464x42.1003x0.375	2105.96	46.856	39.000	1.201	0.00	0.000	39.000	0.000
L29	34 - 29 (29)	TP44.3926x43.2464x0.375	2230.71	47.070	39.000	1.207	0.00	0.000	39.000	0.000
L30	29 - 24 (30)	TP45.5387x44.3926x0.375	2357.10	47.235	39.000	1.211	0.00	0.000	39.000	0.000
L31	24 - 19 (31)	TP46.6848x45.5387x0.375	2485.16	47.357	39.000	1.214	0.00	0.000	39.000	0.000
L32	19 - 14 (32)	TP47.8309x46.6848x0.375	2614.89	47.442	39.000	1.216	0.00	0.000	39.000	0.000
L33	14 - 9 (33)	TP48.977x47.8309x0.375	2746.32	47.495	39.000	1.218	0.00	0.000	39.000	0.000
L34	9 - 4 (34)	TP50.1231x48.977x0.375	2879.47	47.521	39.000	1.219	0.00	0.000	39.000	0.000
L35	4 - 0 (35)	TP51.04x50.1231x0.375	2987.22	47.525	39.000	1.219	0.00	0.000	39.000	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	155 - 150 (1)	TP18.1567x17.01x0.1875	0.25	0.023	26.000	0.002	0.00	0.000	26.000	0.000
L2	150 - 145 (2)	TP19.3033x18.1567x0.1875	3.41	0.299	26.000	0.023	0.10	0.011	26.000	0.000
L3	145 - 140 (3)	TP20.45x19.3033x0.1875	4.19	0.347	26.000	0.027	1.33	0.129	26.000	0.005
L4	140 - 135 (4)	TP21.5967x20.45x0.1875	8.75	0.686	26.000	0.053	0.87	0.076	26.000	0.003
L5	135 - 130 (5)	TP22.7433x21.5967x0.1875	9.04	0.674	26.000	0.052	0.87	0.068	26.000	0.003
L6	130 - 125 (6)	TP23.89x22.7433x0.1875	16.69	1.218	26.000	0.094	4.84	0.364	26.000	0.014
L7	125 - 122.94 (7)	TP23.9866x22.8408x0.25	17.06	0.906	26.000	0.070	4.84	0.257	26.000	0.010
L8	122.94 - 117.94 (8)	TP25.1323x23.9866x0.25	17.42	0.882	26.000	0.068	4.83	0.233	26.000	0.009
L9	117.94 - 112.94 (9)	TP26.2781x25.1323x0.25	17.78	0.861	26.000	0.066	4.83	0.213	26.000	0.008
L10	112.94 - 107.94 (10)	TP27.4239x26.2781x0.25	18.15	0.842	26.000	0.065	4.83	0.195	26.000	0.008
L11	107.94 - 102.94 (11)	TP28.5697x27.4239x0.25	18.52	0.824	26.000	0.063	4.82	0.180	26.000	0.007
L12	102.94 - 97.94 (12)	TP29.7155x28.5697x0.25	18.91	0.809	26.000	0.062	4.82	0.166	26.000	0.006
L13	97.94 - 97.5 (13)	TP29.8164x29.7155x0.25	18.94	0.808	26.000	0.062	4.82	0.165	26.000	0.006
L14	97.5 - 97.25 (14)	TP29.8736x29.8164x0.4125	18.97	0.492	26.000	0.038	4.82	0.101	26.000	0.004
L15	97.25 - 92.25 (15)	TP31.0194x29.8736x0.4063	19.49	0.494	26.000	0.038	4.81	0.095	26.000	0.004
L16	92.25 - 84 (16)	TP32.91x31.0194x0.4	19.91	0.497	26.000	0.038	4.81	0.090	26.000	0.003
L17	84 - 83 (17)	TP32.6395x31.4819x0.3125	20.46	0.638	26.000	0.049	4.81	0.110	26.000	0.004
L18	83 - 78 (18)	TP33.7856x32.6395x0.3125	20.84	0.628	26.000	0.048	4.81	0.103	26.000	0.004
L19	78 - 73 (19)	TP34.9317x33.7856x0.3125	21.29	0.620	26.000	0.048	4.60	0.092	26.000	0.004
L20	73 - 68 (20)	TP36.0778x34.9317x0.3125	21.70	0.612	26.000	0.047	4.59	0.086	26.000	0.003
L21	68 - 67.75 (21)	TP36.1352x36.0778x0.4875	21.72	0.394	26.000	0.030	4.59	0.055	26.000	0.002
L22	67.75 - 62.75 (22)	TP37.2813x36.1352x0.4875	22.23	0.390	26.000	0.030	4.59	0.052	26.000	0.002
L23	62.75 - 57.75 (23)	TP38.4274x37.2813x0.475	22.73	0.397	26.000	0.031	4.59	0.050	26.000	0.002
L24	57.75 - 52.75 (24)	TP39.5735x38.4274x0.475	23.23	0.394	26.000	0.030	4.59	0.047	26.000	0.002
L25	52.75 - 45 (25)	TP41.35x39.5735x0.4688	23.48	0.397	26.000	0.031	4.59	0.046	26.000	0.002
L26	45 - 44 (26)	TP40.9542x39.5582x0.375	24.11	0.499	26.000	0.038	4.47	0.054	26.000	0.002
L27	44 - 39 (27)	TP42.1003x40.9542x0.375	24.46	0.492	26.000	0.038	4.47	0.051	26.000	0.002
L28	39 - 34 (28)	TP43.2464x42.1003x0.375	24.79	0.486	26.000	0.037	4.47	0.048	26.000	0.002
L29	34 - 29 (29)	TP44.3926x43.2464x0.375	25.12	0.479	26.000	0.037	4.47	0.046	26.000	0.002
L30	29 - 24 (30)	TP45.5387x44.3926x0.375	25.45	0.473	26.000	0.036	4.46	0.044	26.000	0.002
L31	24 - 19 (31)	TP46.6848x45.5387x0.375	25.78	0.468	26.000	0.036	4.46	0.041	26.000	0.002
L32	19 - 14 (32)	TP47.8309x46.6848x0.375	26.12	0.462	26.000	0.036	4.46	0.040	26.000	0.002
L33	14 - 9 (33)	TP48.977x47.8309x0.375	26.46	0.457	26.000	0.035	4.46	0.038	26.000	0.001
L34	9 - 4 (34)	TP50.1231x48.977x0.375	26.81	0.453	26.000	0.035	4.46	0.036	26.000	0.001
L35	4 - 0 (35)	TP51.04x50.1231x0.375	27.08	0.449	26.000	0.035	4.46	0.035	26.000	0.001

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	155 - 150 (1)	0.000	0.004	0.000	0.002	0.000	0.004 ✔	1.333	H1-3+VT ✔
L2	150 - 145 (2)	0.004	0.109	0.000	0.023	0.000	0.113 ✔	1.333	H1-3+VT ✔
L3	145 - 140 (3)	0.004	0.193	0.000	0.027	0.005	0.197 ✔	1.333	H1-3+VT ✔
L4	140 - 135 (4)	0.008	0.369	0.000	0.053	0.003	0.378 ✔	1.333	H1-3+VT ✔
L5	135 - 130 (5)	0.008	0.516	0.000	0.052	0.003	0.524 ✔	1.333	H1-3+VT ✔
L6	130 - 125 (6)	0.010	0.668	0.000	0.094	0.014	0.682 ✔	1.333	H1-3+VT ✔
L7	125 - 122.94 (7)	0.008	0.708	0.000	0.070	0.010	0.718 ✔	1.333	H1-3+VT ✔
L8	122.94 - 117.94 (8)	0.008	0.863	0.000	0.068	0.009	0.874 ✔	1.333	H1-3+VT ✔
L9	117.94 - 112.94 (9)	0.009	0.993	0.000	0.066	0.008	1.004 ✔	1.333	H1-3+VT ✔
L10	112.94 - 107.94 (10)	0.009	1.102	0.000	0.065	0.008	1.113 ✔	1.333	H1-3+VT ✔
L11	107.94 - 102.94 (11)	0.009	1.194	0.000	0.063	0.007	1.205 ✔	1.333	H1-3+VT ✔
L12	102.94 - 97.94 (12)	0.010	1.272	0.000	0.062	0.006	1.283 ✔	1.333	H1-3+VT ✔
L13	97.94 - 97.5 (13)	0.010	1.278	0.000	0.062	0.006	1.289 ✔	1.333	H1-3+VT ✔
L14	97.5 - 97.25 (14)	0.006	0.790	0.000	0.038	0.004	0.796 ✔	1.333	H1-3+VT ✔
L15	97.25 - 92.25 (15)	0.006	0.842	0.000	0.038	0.004	0.849 ✔	1.333	H1-3+VT ✔
L16	92.25 - 84 (16)	0.007	0.885	0.000	0.038	0.003	0.892 ✔	1.333	H1-3+VT ✔
L17	84 - 83 (17)	0.009	1.201	0.000	0.049	0.004	1.211 ✔	1.333	H1-3+VT ✔
L18	83 - 78 (18)	0.010	1.235	0.000	0.048	0.004	1.246 ✔	1.333	H1-3+VT ✔
L19	78 - 73 (19)	0.010	1.265	0.000	0.048	0.004	1.276 ✔	1.333	H1-3+VT ✔
L20	73 - 68 (20)	0.010	1.291	0.000	0.047	0.003	1.301 ✔	1.333	H1-3+VT ✔
L21	68 - 67.75 (21)	0.007	0.840	0.000	0.030	0.002	0.847 ✔	1.333	H1-3+VT ✔
L22	67.75 - 62.75 (22)	0.007	0.854	0.000	0.030	0.002	0.861 ✔	1.333	H1-3+VT ✔
L23	62.75 - 57.75 (23)	0.007	0.888	0.000	0.031	0.002	0.896 ✔	1.333	H1-3+VT ✔
L24	57.75 - 52.75 (24)	0.008	0.899	0.000	0.030	0.002	0.907 ✔	1.333	H1-3+VT ✔
L25	52.75 - 45 (25)	0.008	0.916	0.000	0.031	0.002	0.924 ✔	1.333	H1-3+VT ✔
L26	45 - 44 (26)	0.011	1.186	0.000	0.038	0.002	1.197 ✔	1.333	H1-3+VT ✔
L27	44 - 39 (27)	0.011	1.194	0.000	0.038	0.002	1.206 ✔	1.333	H1-3+VT ✔

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
L28	39 - 34 (28)	0.011	1.201	0.000	0.037	0.002	1.213 ✔	1.333	H1-3+VT ✔
L29	34 - 29 (29)	0.011	1.207	0.000	0.037	0.002	1.219 ✔	1.333	H1-3+VT ✔
L30	29 - 24 (30)	0.012	1.211	0.000	0.036	0.002	1.223 ✔	1.333	H1-3+VT ✔
L31	24 - 19 (31)	0.012	1.214	0.000	0.036	0.002	1.227 ✔	1.333	H1-3+VT ✔
L32	19 - 14 (32)	0.012	1.216	0.000	0.036	0.002	1.229 ✔	1.333	H1-3+VT ✔
L33	14 - 9 (33)	0.012	1.218	0.000	0.035	0.001	1.231 ✔	1.333	H1-3+VT ✔
L34	9 - 4 (34)	0.013	1.219	0.000	0.035	0.001	1.232 ✔	1.333	H1-3+VT ✔
L35	4 - 0 (35)	0.013	1.219	0.000	0.035	0.001	1.232 ✔	1.333	H1-3+VT ✔

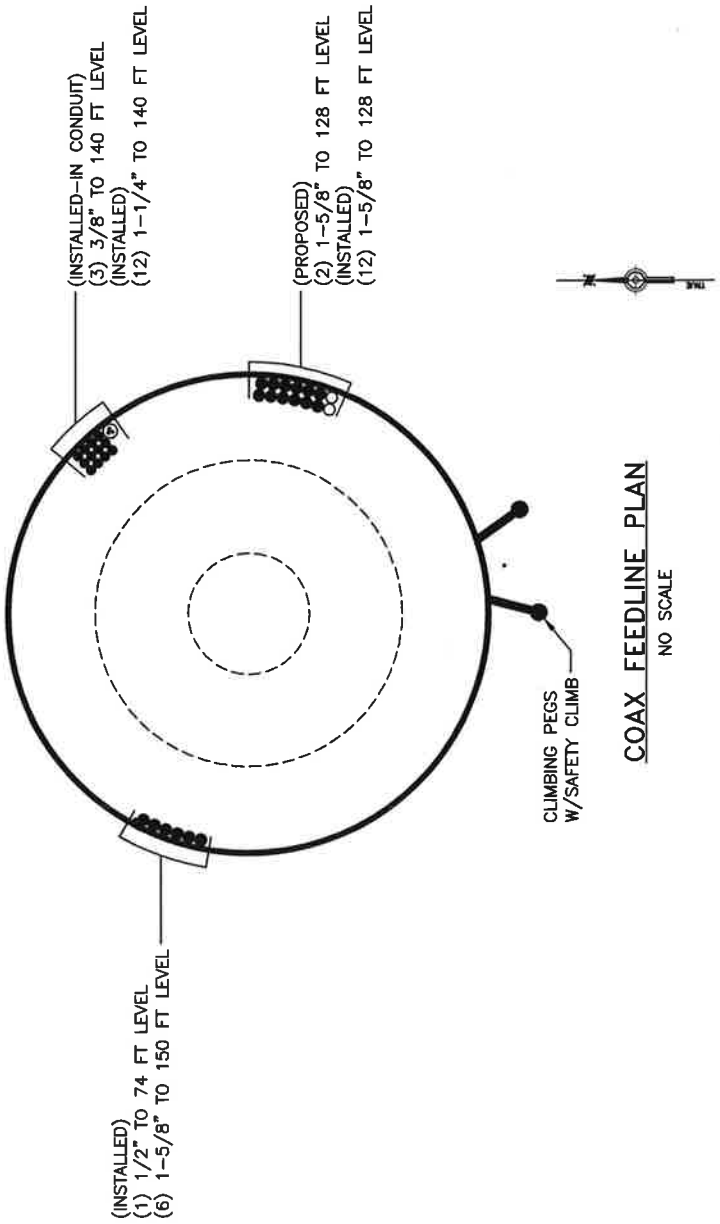
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	155 - 150	Pole	TP18.1567x17.01x0.1875	1	-0.15	555.94	0.3	Pass
L2	150 - 145	Pole	TP19.3033x18.1567x0.1875	2	-1.69	591.42	8.5	Pass
L3	145 - 140	Pole	TP20.45x19.3033x0.1875	3	-2.06	626.90	14.8	Pass
L4	140 - 135	Pole	TP21.5967x20.45x0.1875	4	-3.81	662.37	28.3	Pass
L5	135 - 130	Pole	TP22.7433x21.5967x0.1875	5	-4.09	697.85	39.3	Pass
L6	130 - 125	Pole	TP23.89x22.7433x0.1875	6	-5.46	712.47	51.1	Pass
L7	125 - 122.94	Pole	TP23.9866x22.8408x0.25	7	-6.03	979.17	53.9	Pass
L8	122.94 - 117.94	Pole	TP25.1323x23.9866x0.25	8	-6.53	1026.44	65.5	Pass
L9	117.94 - 112.94	Pole	TP26.2781x25.1323x0.25	9	-7.05	1073.70	75.3	Pass
L10	112.94 - 107.94	Pole	TP27.4239x26.2781x0.25	10	-7.61	1120.97	83.5	Pass
L11	107.94 - 102.94	Pole	TP28.5697x27.4239x0.25	11	-8.19	1168.24	90.4	Pass
L12	102.94 - 97.94	Pole	TP29.7155x28.5697x0.25	12	-8.79	1215.50	96.3	Pass
L13	97.94 - 97.5	Pole	TP29.8164x29.7155x0.25	13	-8.85	1219.66	96.7	Pass
L14	97.5 - 97.25	Pole	TP29.8736x29.8164x0.4125	14	-8.89	2005.29	59.7	Pass
L15	97.25 - 92.25	Pole	TP31.0194x29.8736x0.4063	15	-9.68	2052.13	63.7	Pass
L16	92.25 - 84	Pole	TP32.91x31.0194x0.4	16	-10.36	2084.49	66.9	Pass
L17	84 - 83	Pole	TP32.6395x31.4819x0.3125	17	-11.59	1666.93	90.8	Pass
L18	83 - 78	Pole	TP33.7856x32.6395x0.3125	18	-12.36	1726.02	93.4	Pass
L19	78 - 73	Pole	TP34.9317x33.7856x0.3125	19	-13.22	1785.13	95.7	Pass
L20	73 - 68	Pole	TP36.0778x34.9317x0.3125	20	-14.03	1844.23	97.6	Pass
L21	68 - 67.75	Pole	TP36.1352x36.0778x0.4875	21	-14.10	2867.52	63.6	Pass
L22	67.75 - 62.75	Pole	TP37.2813x36.1352x0.4875	22	-15.18	2959.73	64.6	Pass
L23	62.75 - 57.75	Pole	TP38.4274x37.2813x0.475	23	-16.30	2974.64	67.2	Pass
L24	57.75 - 52.75	Pole	TP39.5735x38.4274x0.475	24	-17.43	3064.47	68.0	Pass
L25	52.75 - 45	Pole	TP41.35x39.5735x0.4688	25	-18.05	3071.79	69.3	Pass
L26	45 - 44	Pole	TP40.9542x39.5582x0.375	26	-20.24	2510.95	89.8	Pass
L27	44 - 39	Pole	TP42.1003x40.9542x0.375	27	-21.29	2581.86	90.5	Pass
L28	39 - 34	Pole	TP43.2464x42.1003x0.375	28	-22.37	2652.78	91.0	Pass
L29	34 - 29	Pole	TP44.3926x43.2464x0.375	29	-23.47	2723.69	91.4	Pass
L30	29 - 24	Pole	TP45.5387x44.3926x0.375	30	-24.59	2794.62	91.8	Pass
L31	24 - 19	Pole	TP46.6848x45.5387x0.375	31	-25.74	2865.54	92.0	Pass
L32	19 - 14	Pole	TP47.8309x46.6848x0.375	32	-26.91	2936.45	92.2	Pass
L33	14 - 9	Pole	TP48.977x47.8309x0.375	33	-28.11	3007.37	92.3	Pass
L34	9 - 4	Pole	TP50.1231x48.977x0.375	34	-29.33	3078.28	92.4	Pass
L35	4 - 0	Pole	TP51.04x50.1231x0.375	35	-30.32	3135.03	92.4	Pass
							Summary	
						Pole (L20)	97.6	Pass
						RATING =	**97.6**	**Pass**

NOTE: Above stress ratios for reinforced sections are approximate. More exact calculations are presented in Appendix C.

APPENDIX B

BASE LEVEL DRAWING



COAX FEEDLINE PLAN

NO SCALE

APPENDIX C

ADDITIONAL CALCULATIONS

Additional Calculations

CCIpole

per TIA-222- F

Site BU: 876366

Work Order: 1144648

CROWN CASTLE

Pole Geometry

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	155	30	2.94	18	17.01	23.89	0.1875	0.75	A572-65
2	127.94	43.94	4.05	18	22.84	32.91	0.25	1	A572-65
3	88.05	43.05	5.09	18	31.48	41.35	0.3125	1.25	A572-65
4	50.09	50.09	0	18	39.56	51.04	0.375	1.5	A572-65

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	47	68	plate	CCI-SFP-060100	3	p						p						p					
2	85.5	97.5	plate	CCI-SFP-045100	3	p						p						p					
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	Bottom Termination Length (in)	Top Termination Length (in)	L_u (in)	Net Area (in^2)	Bolt Hole Size (in)	Reinforcement Material
1	6	1	6	0.5	24.000	24.000	16.000	4.750	1.1875	A572-65
2	4.5	1	4.5	0.5	18.000	18.000	20.000	3.250	1.1875	A572-65

TNX Geometry Input

Increment (ft): 5

	Section Height (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Tapered Pole Grade	Weight Multiplier
1	155 - 150	5		18	17.010	18.157	0.1875	A572-65	1.000
2	150 - 145	5		18	18.157	19.303	0.1875	A572-65	1.000
3	145 - 140	5		18	19.303	20.450	0.1875	A572-65	1.000
4	140 - 135	5		18	20.450	21.597	0.1875	A572-65	1.000
5	135 - 130	5		18	21.597	22.743	0.1875	A572-65	1.000
6	130 - 127.94	5	2.94	18	22.743	23.890	0.1875	A572-65	1.000
7	127.94 - 122.94	5		18	22.841	23.987	0.25	A572-65	1.000
8	122.94 - 117.94	5		18	23.987	25.132	0.25	A572-65	1.000
9	117.94 - 112.94	5		18	25.132	26.278	0.25	A572-65	1.000
10	112.94 - 107.94	5		18	26.278	27.424	0.25	A572-65	1.000
11	107.94 - 102.94	5		18	27.424	28.570	0.25	A572-65	1.000
12	102.94 - 97.94	5		18	28.570	29.716	0.25	A572-65	1.000
13	97.94 - 97.5	0.44		18	29.716	29.816	0.25	A572-65	1.000
14	97.5 - 97.25	0.25		18	29.816	29.874	0.4125	A572-65	0.959
15	97.25 - 92.25	5		18	29.874	31.019	0.40625	A572-65	0.961
16	92.25 - 88.05	8.25	4.05	18	31.019	32.910	0.4	A572-65	0.965
17	88.05 - 83	5.05		18	31.482	32.639	0.3125	A572-65	1.000
18	83 - 78	5		18	32.639	33.786	0.3125	A572-65	1.000
19	78 - 73	5		18	33.786	34.932	0.3125	A572-65	1.000
20	73 - 68	5		18	34.932	36.078	0.3125	A572-65	1.000
21	68 - 67.75	0.25		18	36.078	36.135	0.4875	A572-65	0.971
22	67.75 - 62.75	5		18	36.135	37.281	0.4875	A572-65	0.960
23	62.75 - 57.75	5		18	37.281	38.427	0.475	A572-65	0.975
24	57.75 - 52.75	5		18	38.427	39.574	0.475	A572-65	0.966
25	52.75 - 50.09	7.75	5.09	18	39.574	41.350	0.46875	A572-65	0.974
26	50.09 - 44	6.09		18	39.558	40.954	0.375	A572-65	1.000
27	44 - 39	5		18	40.954	42.100	0.375	A572-65	1.000
28	39 - 34	5		18	42.100	43.246	0.375	A572-65	1.000
29	34 - 29	5		18	43.246	44.393	0.375	A572-65	1.000
30	29 - 24	5		18	44.393	45.539	0.375	A572-65	1.000
31	24 - 19	5		18	45.539	46.685	0.375	A572-65	1.000
32	19 - 14	5		18	46.685	47.831	0.375	A572-65	1.000
33	14 - 9	5		18	47.831	48.977	0.375	A572-65	1.000
34	9 - 4	5		18	48.977	50.123	0.375	A572-65	1.000
35	4 - 0	4		18	50.123	51.040	0.375	A572-65	1.000

TNX Section Forces

Increment (ft):	5	TNX Output		
	Section Height (ft)	P_u (K)	M_{ux} (kip-ft)	V_u (K)
1	155 - 150	0.1462	0.6196	0.2506
2	150 - 145	1.6944	19.017	3.406
3	145 - 140	2.0642	37.707	4.1702
4	140 - 135	3.8114	80.731	8.7454
5	135 - 130	4.0936	125.19	9.0443
6	130 - 127.94	5.4621	168.93	16.686
7	127.94 - 122.94	6.0334	253.28	17.059
8	122.94 - 117.94	6.5291	339.44	17.421
9	117.94 - 112.94	7.0547	427.42	17.784
10	112.94 - 107.94	7.6078	517.21	18.15
11	107.94 - 102.94	8.1863	608.83	18.516
12	102.94 - 97.94	8.7868	702.34	18.906
13	97.94 - 97.5	8.8474	710.66	18.945
14	97.5 - 97.25	8.8905	715.4	18.97
15	97.25 - 92.25	9.6795	811.5	19.486
16	92.25 - 88.05	10.365	894.21	19.913
17	88.05 - 83	11.593	996.18	20.459
18	83 - 78	12.361	1099.4	20.836
19	78 - 73	13.218	1204.6	21.287
20	73 - 68	14.031	1312	21.699
21	68 - 67.75	14.096	1317.4	21.719
22	67.75 - 62.75	15.181	1427.3	22.231
23	62.75 - 57.75	16.296	1539.6	22.732
24	57.75 - 52.75	17.434	1654.5	23.227
25	52.75 - 50.09	18.047	1716.5	23.483
26	50.09 - 44	20.237	1861.5	24.109
27	44 - 39	21.289	1982.9	24.455
28	39 - 34	22.365	2106	24.791
29	34 - 29	23.466	2230.7	25.119
30	29 - 24	24.59	2357.1	25.45
31	24 - 19	25.739	2485.2	25.784
32	19 - 14	26.911	2614.9	26.122
33	14 - 9	28.107	2746.3	26.463
34	9 - 4	29.327	2879.5	26.807
35	4 - 0	30.32	2987.2	27.084

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
155 - 150	Pole	TP18.157x17.01x0.1875	Pole	0.3%	Pass
150 - 145	Pole	TP19.303x18.157x0.1875	Pole	8.5%	Pass
145 - 140	Pole	TP20.45x19.303x0.1875	Pole	14.8%	Pass
140 - 135	Pole	TP21.597x20.45x0.1875	Pole	28.3%	Pass
135 - 130	Pole	TP22.743x21.597x0.1875	Pole	39.3%	Pass
130 - 127.94	Pole	TP23.89x22.743x0.1875	Pole	50.8%	Pass
127.94 - 122.94	Pole	TP23.987x22.841x0.25	Pole	53.7%	Pass
122.94 - 117.94	Pole	TP25.132x23.987x0.25	Pole	65.4%	Pass
117.94 - 112.94	Pole	TP26.278x25.132x0.25	Pole	75.1%	Pass
112.94 - 107.94	Pole	TP27.424x26.278x0.25	Pole	83.3%	Pass
107.94 - 102.94	Pole	TP28.57x27.424x0.25	Pole	90.2%	Pass
102.94 - 97.94	Pole	TP29.716x28.57x0.25	Pole	96.1%	Pass
97.94 - 97.5	Pole	TP29.816x29.716x0.25	Pole	96.6%	Pass
97.5 - 97.25	Pole + Reinf.	TP29.874x29.816x0.4125	Reinf. 2 Compression	82.1%	Pass
97.25 - 92.25	Pole + Reinf.	TP31.019x29.874x0.4063	Reinf. 2 Compression	87.6%	Pass
92.25 - 88.05	Pole + Reinf.	TP32.91x31.019x0.4	Reinf. 2 Compression	91.8%	Pass
88.05 - 83	Pole	TP32.639x31.482x0.3125	Pole	90.7%	Pass
83 - 78	Pole	TP33.786x32.639x0.3125	Pole	93.3%	Pass
78 - 73	Pole	TP34.932x33.786x0.3125	Pole	95.6%	Pass
73 - 68	Pole	TP36.078x34.932x0.3125	Pole	97.5%	Pass
68 - 67.75	Pole + Reinf.	TP36.135x36.078x0.4875	Reinf. 1 Bolt Shear	80.3%	Pass
67.75 - 62.75	Pole + Reinf.	TP37.281x36.135x0.4875	Reinf. 1 Compression	81.3%	Pass
62.75 - 57.75	Pole + Reinf.	TP38.427x37.281x0.475	Reinf. 1 Compression	83.4%	Pass
57.75 - 52.75	Pole + Reinf.	TP39.574x38.427x0.475	Reinf. 1 Compression	85.3%	Pass
52.75 - 50.09	Pole + Reinf.	TP41.35x39.574x0.4688	Reinf. 1 Bolt Shear	87.6%	Pass
50.09 - 44	Pole	TP40.954x39.558x0.375	Pole	89.7%	Pass
44 - 39	Pole	TP42.1x40.954x0.375	Pole	90.4%	Pass
39 - 34	Pole	TP43.246x42.1x0.375	Pole	90.9%	Pass
34 - 29	Pole	TP44.393x43.246x0.375	Pole	91.3%	Pass
29 - 24	Pole	TP45.539x44.393x0.375	Pole	91.7%	Pass
24 - 19	Pole	TP46.685x45.539x0.375	Pole	91.9%	Pass
19 - 14	Pole	TP47.831x46.685x0.375	Pole	92.1%	Pass
14 - 9	Pole	TP48.977x47.831x0.375	Pole	92.2%	Pass
9 - 4	Pole	TP50.123x48.977x0.375	Pole	92.3%	Pass
4 - 0	Pole	TP51.04x50.123x0.375	Pole	92.3%	Pass
				Summary	
			Pole	97.5%	Pass
			Reinforcement	91.8%	Pass
			Overall	97.5%	Pass

Additional Calculations

Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity		
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1	R2
155 - 150	436	n/a	436	10.69	n/a	10.69	0.3%		
150 - 145	525	n/a	525	11.38	n/a	11.38	8.5%		
145 - 140	625	n/a	625	12.06	n/a	12.06	14.8%		
140 - 135	738	n/a	738	12.74	n/a	12.74	28.3%		
135 - 130	863	n/a	863	13.42	n/a	13.42	39.3%		
130 - 127.94	918	n/a	918	13.70	n/a	13.70	50.8%		
127.94 - 122.94	1340	n/a	1340	18.83	n/a	18.83	53.7%		
122.94 - 117.94	1544	n/a	1544	19.74	n/a	19.74	65.4%		
117.94 - 112.94	1767	n/a	1767	20.65	n/a	20.65	75.1%		
112.94 - 107.94	2011	n/a	2011	21.56	n/a	21.56	83.3%		
107.94 - 102.94	2276	n/a	2276	22.47	n/a	22.47	90.2%		
102.94 - 97.94	2564	n/a	2564	23.38	n/a	23.38	96.1%		
97.94 - 97.5	2590	n/a	2590	23.46	n/a	23.46	96.6%		
97.5 - 97.25	2605	1620	4226	23.51	13.50	37.01	58.9%		82.1%
97.25 - 92.25	2919	1742	4661	24.41	13.50	37.91	62.9%		87.6%
92.25 - 88.05	3202	1848	5050	25.18	13.50	38.68	65.9%		91.8%
88.05 - 83	4232	n/a	4232	32.06	n/a	32.06	90.7%		
83 - 78	4698	n/a	4698	33.20	n/a	33.20	93.3%		
78 - 73	5197	n/a	5197	34.34	n/a	34.34	95.6%		
73 - 68	5731	n/a	5731	35.47	n/a	35.47	97.5%		
68 - 67.75	5759	3131	8889	35.53	18.00	53.53	62.3%	80.3%	
67.75 - 62.75	6329	3325	9654	36.67	18.00	54.67	64.2%	81.3%	
62.75 - 57.75	6936	3525	10462	37.80	18.00	55.80	65.9%	83.4%	
57.75 - 52.75	7581	3732	11313	38.94	18.00	56.94	67.4%	85.3%	
52.75 - 50.09	7940	3844	11784	39.55	18.00	57.55	68.2%	87.6%	
50.09 - 44	10045	n/a	10045	48.30	n/a	48.30	89.7%		
44 - 39	10920	n/a	10920	49.66	n/a	49.66	90.4%		
39 - 34	11845	n/a	11845	51.03	n/a	51.03	90.9%		
34 - 29	12820	n/a	12820	52.39	n/a	52.39	91.3%		
29 - 24	13848	n/a	13848	53.75	n/a	53.75	91.7%		
24 - 19	14929	n/a	14929	55.12	n/a	55.12	91.9%		
19 - 14	16065	n/a	16065	56.48	n/a	56.48	92.1%		
14 - 9	17258	n/a	17258	57.85	n/a	57.85	92.2%		
9 - 4	18508	n/a	18508	59.21	n/a	59.21	92.3%		
4 - 0	19550	n/a	19550	60.30	n/a	60.30	92.3%		

Note: Section capacity checked in 5 degree increments.

BLACK & VEATCH

Owner:	CROWN CASTLE	Prepared By:	AHS
Project Name:	CMRP - WAPPINGERS FALLS/PRESTON CIT	Date:	11/2/15
Project No.	182896	Verified By:	
Title:	ANCHOR ROD CALCULATION RESULTS	Date:	11/3/2015
		Page:	

ANCHOR ROD CALCULATION

TIA-EIA-222

Anchor Rod Input

Description	Symbol	Value	Unit	Code
TIA Code		F		
ASIF		1.333		
Failure		95%		
eta Factor		0.50		
Moment	M	2987.2	kip-ft	
Axial	P	30.32	kip	
Shear	S	27.084	kip	
Base Plate Type		Circular		

		1st BC	2nd BC	3rd BC	4th BC	
Quantity	QTY	12	3			
Diameter	Db	2.25	1.75			in
Material	RMat	#18J	A193 B7			
Bolt Circle	BC	62.5	71.09			in
Square Base Plate Bolt Spacing	B_sp	1	-	-	-	in

Anchor Rod Results

		1st BC	2nd BC	3rd BC	4th BC	
Bolt Group Area	rAg	47.71	7.22			in^2
Bolt Group MOIx	rMOI	23297	4558			in^4
Moment		2498.4	488.8			kip-ft
Axial		26.3	4.0			kip
Shear		27.1	0.0			kip
Tension Load	Tbolt	152.3	108.7			kip
Allowable load	ATBolt	194.8	132.3			kip
Anchor Rod Capacity	RStress	78.2%	82.2%			

BU: 876366
WO: 1144648

Done By: AHS
Checked By: PJD
Date: 11/3/2015

CROWN CASTLE

Additional Anchor Rod Calculations - Rev F.

Tower Reactions From tnx

$Moment := 2987.2 \cdot kip \cdot ft$ $Axial := 30.32 \cdot kip$ $Shear := 27.084 \cdot kip$

Calculation of Reactions to Existing and New Anchor Rods

$N_{existing} := 12$
$BC_{existing} := 62.5 \cdot in$
$D_{existing} := 2.25 \cdot in$

Gross: $A_{existing} := \left(\frac{1}{4}\right) \cdot \pi \cdot D_{existing}^2 = 3.98 \cdot in^2$

$N_{new} := 3$
$BC_{new} := 71.09 \cdot in$
$D_{new} := 1.75 \cdot in$

$Fu_{rod} := 100ksi$

Gross: $A_{new} := \left(\frac{1}{4}\right) \cdot \pi \cdot D_{new}^2 = 2.41 \cdot in^2$

Net $An_{new} := 1.9in^2$

Anchor Rod Bracket Calculations

Bracket Design Load

$P_n := (.33) Fu_{rod} \cdot A_{new} \cdot (1.333) = 105.81 \cdot kip$

Pipe Design (Bearing Capacity):

TRY :

Size :=
- ○ HSS 3.5x3.5x0.3125
- ○ HSS 4x4x0.375
- ◉ HSS 4x4x0.5
- ○ HSS 5x5x0.5

$F_{ypipe} := 46 \cdot ksi$

Check = "OK"

Horizontal and Vertical Weld to Pole Checks

Bracket plate thickness	$T := 1.25 \cdot in$	
Pole Grade	$Fy_{pole} := 65ksi$	$Fu_{pole} := 80ksi$
Base Plate Grade	$Fy_{base} := 50ksi$	$Fu_{base} := 65ksi$
Bracket Plate Grade	$Fy_{plate} := 65ksi$	$Fu_{plate} := 80ksi$
Height of vertical weld from base plate	$H := 30 \cdot in$	
	$Notch := .75 \cdot in$	
Plate width	$W := 7.9275 \cdot in$	
Gap between Base Plate and Pipe	$Gap := 0 \cdot in$	
Vertical fillet weld size (bracket to pole) in sixteenths of an inch	$D_{vpole} := 5$	$weldsize_{pole} := \frac{D_{vpole}}{16} = \frac{5}{16}$
Weld Material Grade	$F_{EXX} := 70ksi$	

Check = "OK"

Vertical Weld to Pipe (weld on both sides)

Length of Vertical Weld to Pipe	$l_{vweldpipe} := 24in$	
Vertical fillet weld size (bracket to pipe) in sixteenths of an inch	$D_{vpipe} := 5$	$weldsize_{pipe} = \frac{5}{16}$ Dvpipe = weld size in sixteenths of an inch
Electrode Strength Coefficient	$C_1 := 1.00$	AISC, 13th Edition, Table 8-4 pg 8-66
Coefficient for eccentrically Loaded Weld Groups	$C := 3.72$	

Check = "OK"

Plate Check:

Bracket plate thickness	$T = 1.25 \cdot in$
Plate Fy	$Fy_{plate} = 65 \cdot ksi$

Check = "OK"

Embedment Depth Calculations:

Projected Embedment Depth:	$L_{em} := 5 \cdot ft$	
Yield Strength of Rebar:	$f_y := 60ksi$	
Concrete Strength:	$f'_c := 3000psi$	
Transverse Reinforcement Index:	$k_{rt} := 0$	k_{rt} can be taken as 0 for design per ACI 318
Rebar Location Factor:	$\psi_t := 1$	1.0 typical for vertical pier application
Rebar Coating Factor:	$\psi_e := 1$	1.0 non coated rebar
Rebar Size Factor:	$\psi_s := 1$	0.8 for No. 6 and smaller bars, 1.0 for No. 7 and larger bars
Concrete Weight Factor:	$\lambda := 1 \cdot \sqrt{psi}$	1.0 for normal weight concrete
Pier Diameter:	$D_{pier} := 7ft$	
Cover:	$c_c := 3in$	
Rebar Size:	$d_s := 11$	$d_b := \frac{d_s}{8} in = 1.38 \cdot in$
Tie Size:	$Tie := 4$	
Number of Vertical Rebar:	$n := 32$	

Check = "OK"

Anchor Rod Pullout Test:

$$\phi_p := 0.75$$

$$Pullout := \frac{\phi_p \cdot Fu_{rod} \cdot An_{new}}{1.6} = 89.06 \cdot kip$$

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

TIA Rev F

Site Data

BU#: *876366*
Site Name: *WAPPINGERS FALLS / PR*
App #: *313876 Rev 4*

Pole Manufacturer:	*Other*

Reactions		
Moment:	2498	ft-kips
Axial:	26	kips
Shear:	27	kips

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

Stiffened
Service, ASD
Fty*ASIF

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	62.5	in

Plate Data		
Diam:	68	in
Thick:	1.75	in
Grade:	50	ksi
Single-Rod B-eff:	13.50	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Groove	
Groove Depth:	0.3125	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	<-- Disregard
Fillet V. Weld:	0.25	in
Width:	7.5	in
Height:	23	in
Thick:	0.625	in
Notch:	0	in
Grade:	50	ksi
Weld str.:	80	ksi

Pole Data		
Diam:	51.04	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Base Plate Results — Flexural Check

Base Plate Stress:	46.0 ksi	
Allowable Plate Stress:	50.0 ksi	
Base Plate Stress Ratio:	91.9%	Pass

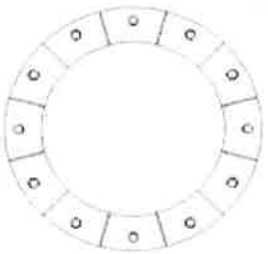
Stiffened
Service, ASD
0.75*Fy*ASIF
Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	53.1%	Pass
Vertical Weld:	40.7%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	14.2%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	54.1%	Pass
Plate Comp. (AISC Bracket):	63.4%	Pass

Pole Results

Pole Punching Shear Check:	7.8%	Pass



* 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

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#: *876366*
Site Name: *WAPPINGERS FALLS/PRESTON (*
App #: *313876 Rev 4*

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	2987.2	ft-kips **(* Note)**
Max. Service Shaft P:	30.32	kips
Max Axial Force Type:	Comp.	

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

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Load Factor	Shaft Factored Loads		
1.30	Mu:	3883.36	ft-kips
1.30	Pu:	39.416	kips

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	6.30	ft
Vert. Cage Diameter =	75.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	32	
As Total=	49.92	in^2
A s/ Aconc, Rho:	0.0090	0.90%

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=	2002

Seismic Properties

Seismic Design Category =	B
Seismic Risk =	**Low**

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

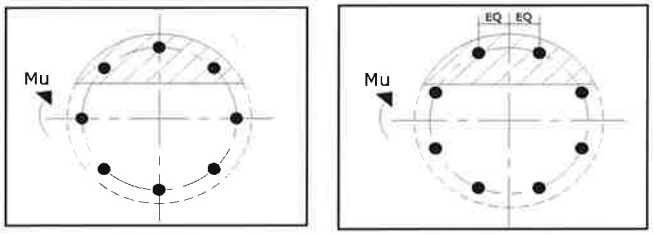
ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **16.47** in
Extreme Steel Strain, ϵt: **0.0115**
ϵt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.90%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8839.70	kips
at Mu=(ϕ=0.65)Mn=	5368.18	ft-kips
Max Tu, (φ=0.9) Tn =	2695.68	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	39.42	kips
Drilled Shaft Moment Capacity, φMn:	**7574.09**	ft-kips
Drilled Shaft Superimposed Mu:	**3883.36**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**51.3%**

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *876366*
Site Name: *WAPPINGERS FALLS/PRESTON CIT*
App #: *313876 Rev 4*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	0	in
Pier Dist. Above Grade:	6	in
Pad Bearing Depth, D:	6.5	ft
Pad Thickness, T:	2.50	ft
Pad Width=Length, L:	24	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	11.00	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	121.00	ft^2
Pier Height:	4.50	ft
Soil (above pad) Height:	4.00	ft

Soil Parameters		
Unit Weight, γ:	100.0	pcf
Ultimate Bearing Capacity, qn:	5.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	22.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	3.75	ksf
Passive Pres. Coeff., Kp	2.20	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	36.6	kips
Pad Force Location Above D:	1.15	ft
ϕ(Passive Pressure Moment):	42.08	ft-kips
Factored O.T. M(WL), "1.6W":	4288.7	ft-kips
Factored OT (MW-Msoil), M1	4246.59	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	1.62	ft
Sum of Soil Wedges Wt:	18.92	kips
Soil Wedges ecc, K1:	7.77	ft
Ftg+Soil above Pad wt:	479.7	kips
Unfactored (Total ftg-soil Wt):	498.59	kips
1.2D. **No Soil Wedges.**	641.62	kips
0.9D. **With Soil Wedges**	508.47	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	20.9	kips
Unfactored WL Axial, PW:	30.32	kips
Unfactored WL Shear, V:	27.084	kips
Unfactored WL Moment, M:	2987.2	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	66.012	kips
0.90	0.9D+1.6W, Pu:	59.742	kips
1.35	Vu:	36.5634	kips
	Mu:	4032.72	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	641.62	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	4246.59	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	6.62	ft
Orthogonal qu=	2.48	ksf
qu/ϕ*qn Ratio=	**66.24%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	4.68	ft
Diagonal qu=	2.99	ksf
qu/ϕ*qn Ratio=	**79.81%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	508.47	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	4114.35	ft-kips

Orthogonal ecc3 = M2/P2 =	8.09	ft
Ortho Non Bearing Length,NBL=	16.18	ft
Orthogonal qu=	2.71	ksf
Diagonal qu=	3.22	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	2987.20		
M Orthogonal:	3396.33	**87.95%**	**Pass**
M Diagonal:	3230.07	**92.48%**	**Pass**

APPENDIX D

REQUIRED MODIFICATION DRAWINGS

MONOPOLE REINFORCEMENT DRAWINGS

SITE NAME: WAPPINGERS FALLS / PRESTON CIT
BU NUMBER: 876366

SITE ADDRESS:
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

ATTENTION ALL CONTRACTORS

ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT 800-788-7011.

CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS BASED ON THE REQUIREMENTS OF TIA/EIA-222-F STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS USING A FASTEST MILE WIND SPEED OF 85 MPH WITH NO ICE, 37.6 MPH WITH 0.75 INCH ICE THICKNESS AND 50 MPH UNDER SERVICE LOADS, EXPOSURE CATEGORY C.

TOWER INFORMATION

TOWER MANUFACTURER / DWG#:	UNKNOWN / DWG #UNKNOWN
TOWER HEIGHT / TYPE:	155 FT MONOPOLE TOWER
TOWER LOCATION: DATUM: NAD 1983	LATITUDE 41° 32' 17.46" LONGITUDE -71° 57' 6"
STRUCTURAL DESIGN DRAWING:	B&V / WO #1144648
STRUCTURAL ANALYSIS REPORT:	AERO SOLUTIONS / WO #1137608
APPLICATION ID:	313876 REV #4

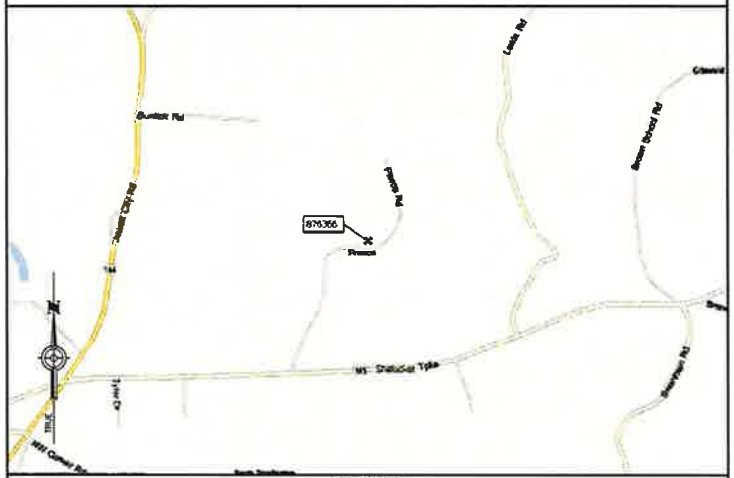
PROJECT CONTACTS

CROWN PROJECT MANAGER
DAN VADNEY
(518) 373-3510
DAN.VADNEY@CROWNSCASTLE.COM

CROWN CONSTRUCTION MANAGER
JASON D'AMICO
(860) 209-0104
JASON.D'AMICO.VENDOR@CROWNCASTLE.COM

BLACK & VEATCH CONTACTS
CROWNCASTLERFI@BV.COM
PATRICK DAVIS
(913) 458-6984
ERIC S. BRANDSTADTER, P.E.
(913) 458-7360

LOCATION MAP



DRIVING DIRECTIONS

FROM ROUTE 2 GO NORTH ON ROUTE 164. GO RIGHT ON ROUTE 165 EAST, GO LEFT ON PIERCE ROAD.

DRAWING INDEX

SHEET NO:	SHEET TITLE
TM-1	TITLE PAGE
TM-2	MODIFICATION INSPECTION CHECKLIST
TM-3	NOTES
TM-4	NEXGEN2 BOLT SPECIFICATIONS & TIGHTENING PROCEDURE
TM-5	FORGBOLT BOLT SPECIFICATIONS & TIGHTENING PROCEDURE
TM-6	TOWER ELEVATION
TM-7	TOWER SECTIONS
TM-8	BASE PLATE ANCHOR ROD CHAIRS

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIA NG
J0767
LICENSED PROFESSIONAL ENGINEER
11/06/2015

BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE
TITLE PAGE

SHEET NUMBER
TM-1

MODIFICATION INSPECTION NOTES

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD.
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION ITSELF, NOR DOES THE MODIFICATION INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD AT ALL TIMES.
3. ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE CROWN ENG-BUL-10173, "APPROVED MI VENDORS".
4. TO ENSURE THAT THE REQUIREMENTS OF THE MODIFICATION INSPECTION ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS PO OR PAYMENT IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN COMMUNICATION WITH THE OTHER PARTY. CONTACT LISTED ON TITLE SHEET SHALL BE CONTACTED IF SPECIFIC INSPECTOR CONTACT INFORMATION IS NOT KNOWN.
5. ALL REQUEST FOR INFORMATION (RFI'S) SHALL BE MADE AVAILABLE TO THE MODIFICATION INSPECTOR BY GC.
6. REFER TO CROWN ENG-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

MODIFICATION INSPECTOR

1. THE MODIFICATION INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PURCHASE ORDER (PO) OR PAYMENT FOR THE MODIFICATION INSPECTION TO:
   - REVIEW THE REQUIREMENTS OF THE MODIFICATION INSPECTION CHECKLIST.
   - WORK WITH GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
   - DISCUSS ANY SITE SPECIFIC INSPECTIONS OR CONCERNS.
2. THE MODIFICATION INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTOR (GC) INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MODIFICATION INSPECTION REPORT TO CROWN.

GENERAL CONTRACTOR

1. THE GC IS REQUIRED TO CONTACT THE MODIFICATION INSPECTOR AS SOON AS RECEIVING A PO OR PAYMENT FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO:
   - REVIEW THE REQUIREMENTS OF THE MODIFICATION INSPECTION CHECKLIST.
   - WORK WITH MODIFICATION INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE MODIFICATION INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
   - BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
2. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MODIFICATION INSPECTION CHECKLIST AND CROWN ENG-SOW-10007.

RECOMMENDATIONS

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

CANCELLATION OR DELAY IN SCHEDULED MODIFICATION INSPECTION

1. IF THE GC AND MODIFICATION INSPECTOR AGREE TO A DATE ON WHICH THE MODIFICATION INSPECTION WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, THE TOWER OWNER SHALL NOT BE RESPONSIBLE FOR COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC). EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. IF THE MODIFICATION INSTALLATION SHOULD FAIL THE MODIFICATION INSPECTION ("FAILED MODIFICATION INSPECTION"), THE GC SHALL WORK WITH MODIFICATION INSPECTOR TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:
   - CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENTAL MODIFICATION INSPECTION.
   - OR, WITH TOWER OWNER'S APPROVAL, THE GC MAY WORK WITH ENGINEER OF RECORD TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

VERIFICATION INSPECTIONS

1. TOWER OWNER RESERVES THE RIGHT TO CONDUCT A VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MODIFICATION INSPECTION(S) ON TOWER MODIFICATION PROJECTS.
2. ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH CROWN ENG-SOW-10007.
3. VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MODIFICATION INSPECTION" OR "PASS AS NOTED MODIFICATION INSPECTION" REPORT FOR THE ORIGINAL PROJECT.

REQUIRED PHOTOS

1. BETWEEN THE GC AND THE MODIFICATION INSPECTOR, THE FOLLOWING PHOTOGRAPHS ARE TO BE TAKEN AND INCLUDED IN THE MODIFICATION INSPECTION REPORT:
   - PRE-CONSTRUCTION GENERAL SITE CONDITIONS.
   - PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION.
     - RAW MATERIALS
     - PHOTOS OF CRITICAL DETAILS
     - FOUNDATION MODIFICATIONS
     - REBAR PLACEMENT
     - FOUNDATION DEPTH VERIFICATION
     - SOIL COMPACTION PROCESS
     - COLD GALVANIZED VERIFICATION
     - GUY WIRE GROUNDING SYSTEM VERIFICATION
     - POST INSTALL ANCHOR DRILL HOLE DIAMETER AND DEPTH
     - WELD PREPARATION
     - WELD INSTALLATION PRIOR TO SURFACE COATING
     - BOLT INSTALLATION AND TORQUE
     - FINAL INSTALLED CONDITION
     - SURFACE COATING REPAIR
   - POST CONSTRUCTION PHOTOGRAPHS.
     - FINAL IN FIELD CONDITION
   - ANY OTHER PHOTOS DEEMED RELEVANT TO SHOW COMPLETE DETAILS OF MODIFICATION.

   THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS PLEASE REFER TO CROWN ENG-SOW-10007.
2. PHOTOS OF ABOVE GROUND MODIFICATIONS TAKEN FROM GROUND LEVEL SHALL BE CONSIDERED INADEQUATE.

MODIFICATION INSPECTION CHECKLIST

BEFORE CONSTRUCTION		DURING CONSTRUCTION		AFTER CONSTRUCTION	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED	REPORT ITEM	CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED	REPORT ITEM	CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED	REPORT ITEM
X	MODIFICATION INSPECTION CHECKLIST DRAWING	X	CONSTRUCTION INSPECTION	X	MODIFICATION INSPECTOR REDLINE OR RECORD DRAWING(S)
X	FABRICATOR QUALITY MANAGEMENT DOCUMENTATION	–	FOUNDATION INSPECTION/REBAR INSPECTION	X	POST INSTALLED ANCHOR ROD PULL-OUT TESTING (OR ALTERNATE MANUFACTURER'S APPROVED METHOD)
X	FABRICATOR CERTIFIED WELD INSPECTION	–	CONCRETE COMPRESSIVE STRENGTH AND SLUMP TESTS (7 DAY AND 28 DAY CYLINDER BREAKS - REPORT REQUIRED)	–	HELICAL PILE PULL-OUT TESTING (OR ALTERNATE MANUFACTURER'S APPROVED METHOD)
X	MATERIAL TEST REPORTS	X	POST INSTALLED ANCHOR ROD VERIFICATION	–	HOLLOW BAR ANCHOR PULL-OUT TESTING (OR ALTERNATE MANUFACTURER'S APPROVED METHOD)
–	FABRICATION NDE INSPECTION	–	BASE PLATE GROUT VERIFICATION	X	PHOTOGRAPHS
X	PACKING SLIPS	X	THIRD PARTY CERTIFIED WELD INSPECTION (NDE REPORT REQUIRED)	ADDITIONAL TESTING AND INSPECTIONS:	
X	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033	–	EARTHWORK: LIFT PLACEMENT AND DENSITY (REPORT REQUIRED)		
ADDITIONAL TESTING AND INSPECTIONS:		X	ON-SITE COLD GALVANIZED VERIFICATION		
		–	GUY WIRE TENSION REPORT		
		X	GC AS-BUILT DOCUMENTS		
		ADDITIONAL TESTING AND INSPECTIONS:			

NOTE: NDE DENOTES NON-DESTRUCTIVE EXAMINATION

NOTE: X DENOTES A DOCUMENT REQUIRED FOR THE MODIFICATION INSPECTION REPORT
– DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MODIFICATION INSPECTION REPORT

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIANG
J0767
LICENSED PROFESSIONAL ENGINEER
11/06/2015

BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE
MODIFICATION INSPECTION CHECKLIST

SHEET NUMBER
TM-2

GENERAL NOTES

1. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED, THAT HE IS PROPERLY LICENSED, AND THAT HE IS PROPERLY REGISTERED TO DO THIS WORK IN THE STATE AND/OR COUNTY IN WHICH IT IS TO BE PERFORMED.
2. THE GENERAL NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE STRUCTURE AND SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS.
3. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVALS FROM ALL AUTHORITIES HAVING JURISDICTION FOR THIS PROJECT AND SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
5. ERECT GUARDS AND BARRIERS PER APPLICABLE LABOR AND CONSTRUCTION SAFETY REGULATIONS.
6. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, POSSIBLE INTERFERENCES, AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO THE ENGINEER OF RECORD (EOR) AND FIELD PERSONNEL IMMEDIATELY. ANY AND ALL FIELD CHANGES SHALL BE APPROVED AND DOCUMENTED BY THE EOR PRIOR TO FIELD IMPLEMENTATION.
7. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR TWO (2) YEARS FROM THE DATE OF COMPLETED CONSTRUCTION.
8. USE ONLY THE LATEST ISSUES OF ANY APPLICABLE CODES, STANDARDS, OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES AND SPECIFICATIONS, UNO.
9. ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH ANSI, ASTM, ACI, TIA, AND AISC STANDARDS AS REFERENCED IN THE APPLICABLE CODE.
10. STRUCTURAL ELEMENTS SHOWN ON THESE DRAWINGS ARE DESIGNED IN ACCORDANCE WITH APPLICABLE BUILDING CODES/STANDARDS. ALL CONSTRUCTION, EXCEPT WHERE NOTED OTHERWISE, SHALL COMPLY WITH THOSE CODES/STANDARDS.
11. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS, AND IN CONFORMANCE WITH THE DRAWINGS. ANY AND ALL SUBSTITUTIONS MUST BE DULY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER OF RECORD PRIOR TO FABRICATION AND INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
12. ALL MANUFACTURER'S HARDWARE ASSEMBLY INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION PROCEDURES MEET THE REQUIREMENTS OF OSHA, THE OWNER, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS. CONSTRUCTION SHALL BE PERFORMED ONLY IN "GOOD WEATHER". "GOOD WEATHER" MEANS LITTLE OR NO WIND AND RAIN AND MINIMUM TEMPERATURE OF 50 DEGREES F. CONTACT ENGINEER FOR ADDITIONAL INSTRUCTIONS IF "GOOD WEATHER" CANNOT BE ACHIEVED.
14. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIAL ACCESS, WITH THE RESIDENT LEASING AGENT.
15. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES OR BURIED SERVICES AFFECTED BY THIS CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR TEMPORARILY RELOCATING ANY LINES OR STRUTS AS NECESSARY TO COMPLETE THE REQUIRED WORK.
16. STRUCTURAL DESIGN IS FOR THE COMPLETE CONDITION ONLY. THE CONTRACTOR MUST BE COGNIZANT THAT THE REMOVAL OF ANY STRUCTURAL COMPONENT OF AN EXISTING TOWER HAS THE POTENTIAL TO CAUSE THE PARTIAL OR COMPLETE COLLAPSE OF THE STRUCTURE. ALL NECESSARY PRECAUTIONS MUST BE TAKEN TO ENSURE STRUCTURAL INTEGRITY, INCLUDING, BUT NOT LIMITED TO, ENGINEERING ASSESSMENT OF CONSTRUCTION STRESSES WITH INSTALLATION MAXIMUM WIND SPEED AND/OR TEMPORARY BRACING AND SHORING.
17. DO NOT SCALE DRAWINGS.
18. FOR THIS ANALYSIS AND MODIFICATION, THE TOWER HAS BEEN ASSUMED TO BE IN GOOD CONDITION WITHOUT ANY DEFECTS. IF THE CONTRACTOR DISCOVERS ANY INDICATION OF AN EXISTING STRUCTURAL DEFECT, CONTACT THE ENGINEER OF RECORD IMMEDIATELY.
19. MODIFICATION WORK SHALL BE COMPLETED IN CALM WIND CONDITIONS / OR APPROPRIATE WIND SPEED FOR THE TYPE OF MODIFICATION WORK TO BE INSTALLED.
20. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE ENGINEER OF RECORD.
21. CONTRACTOR TO VERIFY REQUIRED STEEL PLATE LENGTHS FROM BOTTOM OF SECTION TO BOTTOM OF NEXT SECTION.
22. THESE DRAWINGS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES.
23. ALL CHANGES/ALTERNATES/REVISIONS TO THESE DRAWINGS SHALL BE DOCUMENTED BY REQUEST FOR INFORMATION (RFI) FORM APPROVED BY ENGINEER OF RECORD. FINAL WORK AUTHORIZATION AND ALL CHANGE ORDERS SHALL BE APPROVED BY CLIENT AND/OR CLIENT REPRESENTATIVE PRIOR TO PROCEEDING WITH ANY WORK THAT DEVIATES FROM THE ORIGINAL DESIGN, SCOPE, PRICE AND/OR SCHEDULE.
24. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/TIA-1019 (LATEST EDITION), OSHA, AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.
25. IN THE EVENT OF AN EMERGENCY, CONTRACTOR SHALL CONTACT BLACK & VEATCH AND CROWN CASTLE PERSONNEL TO REPORT ANY EVENT OR EMERGENCY INCIDENT AT ANY CROWN CASTLE TOWER SITE PER THE CONTACT INFORMATION PROVIDED ON SHEET TM-1.

STRUCTURAL STEEL NOTES

1. DESIGN, FABRICATION, ERECTION, ALTERATION AND MAINTENANCE SHALL CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE (UNO):
   A. TIA-222: STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
   B. TIA-1019-A: INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
   C. AISC: MANUAL OF STEEL CONSTRUCTION
2. ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS, UNO.
   A. STRUCTURAL STEEL, ASTM A572 GRADE 65 (FY = 65KSI).
   B. ALL BOLTS, ASTM A325 TYPE 1 GALVANIZED HIGH STRENGTH BOLTS.
   C. ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
   D. ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.
3. ALL HOLES SHALL BE CUT WITH A GRINDER OR DRILLED. HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER OF RECORD.
4. ALL FASTENERS SHALL NOT BE REUSED.
5. A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED ASTM A325 BOLTS.
6. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH SUCH THAT THE END OF THE BOLT BE AT LEAST FLUSH WITH THE FACE OF THE NUT. IT IS NOT PERMITTED FOR THE BOLT END TO BE BELOW THE FACE OF THE NUT AFTER TIGHTENING IS COMPLETED.
7. HOT-DIP GALVANIZE ALL ITEMS, UNO.
   GALVANIZE PER ASTM A123, ASTM A153/A153M OR ASTM A653 G90, AS APPLICABLE.
8. FOR A LIST OF CROWN APPROVED COLD GALVANIZING COMPOUNDS, REFER TO CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN".
9. AFTER FINAL INSPECTION, ALL EXPOSED STRUCTURAL STEEL AS THE RESULT OF THIS SCOPE OF WORK INCLUDING WELDS, FIELD DRILLED HOLES, AND SHAFT INTERIORS (WHERE ACCESSIBLE), SHALL BE CLEANED AND COLD GALVANIZING APPLIED BY BRUSH IN ACCORDANCE WITH CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN". PHOTO DOCUMENTATION IS REQUIRED TO BE SUBMITTED TO THE MI INSPECTOR.

WELDING NOTES

1. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE-STEEL".
2. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.
3. ALL ARC WELDING ON CROWN STRUCTURES SHALL BE DONE IN ACCORDANCE WITH THE CROWN ENG-PLN-10015, "CUTTING AND WELDING SAFETY PLAN" AND AWS D1.1 (LATEST EDITION). THIS SHALL INCLUDE A CERTIFIED WELDING INSPECTOR (CWI) FOR ACCEPTANCE OR REJECTION OF ALL WELDING OPERATIONS, PRE-DURING-POST, USING THE ACCEPTANCE CRITERIA OF AWS D1.1. THE CWI SHALL WORK WITH THE GC ON THE LEVEL OF INTERACTION NEEDED TO CONDUCT THE WELDING INSPECTION. THE CERTIFIED WELDING INSPECTION IS THE RESPONSIBILITY OF THE GC.
4. FOR ALL WELDING, USE E80XX ELECTRODES FOR SMAW PROCESS AND E8XT-XX ELECTRODES FOR FCAW PROCESS, UNO.
5. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING.
6. REPAIR THE GALVANIZED COATING. ALL AREAS AFFECTED BY THE FIELD DRILLING, FIELD GRINDING AND FIELD WELDING, BOTH INSIDE AND OUTSIDE THE MONOPOLE, SHALL BE REPAIRED PER CROWN DOCUMENT ENG-STD-10149. PRODUCTS TO BE APPLIED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. AREAS THAT HAVE BEEN TOUCHED UP SHOULD BE INSPECTED AS PART OF THE ROUTINE MAINTENANCE OS THE STRUCTURE. NO SPRAY PAINT IS ALLOWED. AFTER ZINC-RICH PAINT IS DRY, OVERCOAT WITH OWNER'S PAINT SPECIFICATIONS, APPLIED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
7. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0° F. WHEN THE TEMPERATURE IS BETWEEN 0° F AND 32° F, PREHEAT AND MAINTAIN THE STEEL IN THE VICINITY OF THE WELD AREA AT 70° F DURING THE WELDING PROCESS.
8. DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.
9. FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.
10. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.
11. MOVE ALL COAX AND OTHER FLAMMABLE MATERIALS FROM ANY AREA THAT MAY BE HEATED DURING CONSTRUCTION.
12. CONTRACTOR SHALL MAKE PROPER PRECAUTIONS AND PROCEDURES TO PROTECT THE STRUCTURE FROM CATCHING FIRE DURING ALL WELDING OPERATIONS. THE FOLLOWING FIRE SAFETY PREVENTION PROTOCOL IS THE MINIMUM REQUIREMENTS DURING WELDING OPERATIONS. ALSO REFERENCE CROWN DOCUMENT ENG-BUL-10172 FOR ADDITIONAL WELDING REQUIREMENTS.
   - 500 GALLON WATER TANK WITH PUMP TO BE ON SITE AT ALL TIMES.
   - 2 FIRE EXTINGUISHERS ON SITE AT ALL TIMES.
   - 2 MAN FIRE WATCH ON ANY ADJACENT STRUCTURES, FIELDS AND POLE.
   - INTERMITTENT COOLING OF WELDED SURFACE TO REDUCE HEAT IN STRUCTURE.

NEW ANCHOR ROD TARGET TENSION LOADING [1]

CROWN PART #	ROD DIAMETER (IN)	LENGTH (IN)	MATERIAL	HOLE DIAMETER (IN)	EMBEDMENT DEPTH (IN)	TARGET TENSION LOAD (KIPS)	NOTES
CCI-AR-0175	1.75	120	A193 GR B7	2	60	111	2, 3
CCI-AR-0225	2.25	132	A193 GR B7	2.5	72	190	2, 3

NOTES

1. TARGET TENSION LOAD PER SECTION 1.4.6 OF CROWN DOCUMENT ENG-PRC-10119 REVISION G: PULL-OUT TESTING POST-INSTALLED ANCHOR RODS, FOR SPECIFICATIONS.
2. CONTRACTOR MAY SUBSTITUTE F1554-105 FOR A193 GR B7.
3. MATERIAL IS TO BE ALL-THREADED ROD.

DETAIL DRAWINGS SHALL GOVERN OVER ANY VARIANCE FROM THIS SHEET

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIANG
30767
LICENSED PROFESSIONAL ENGINEER

11/06/2015

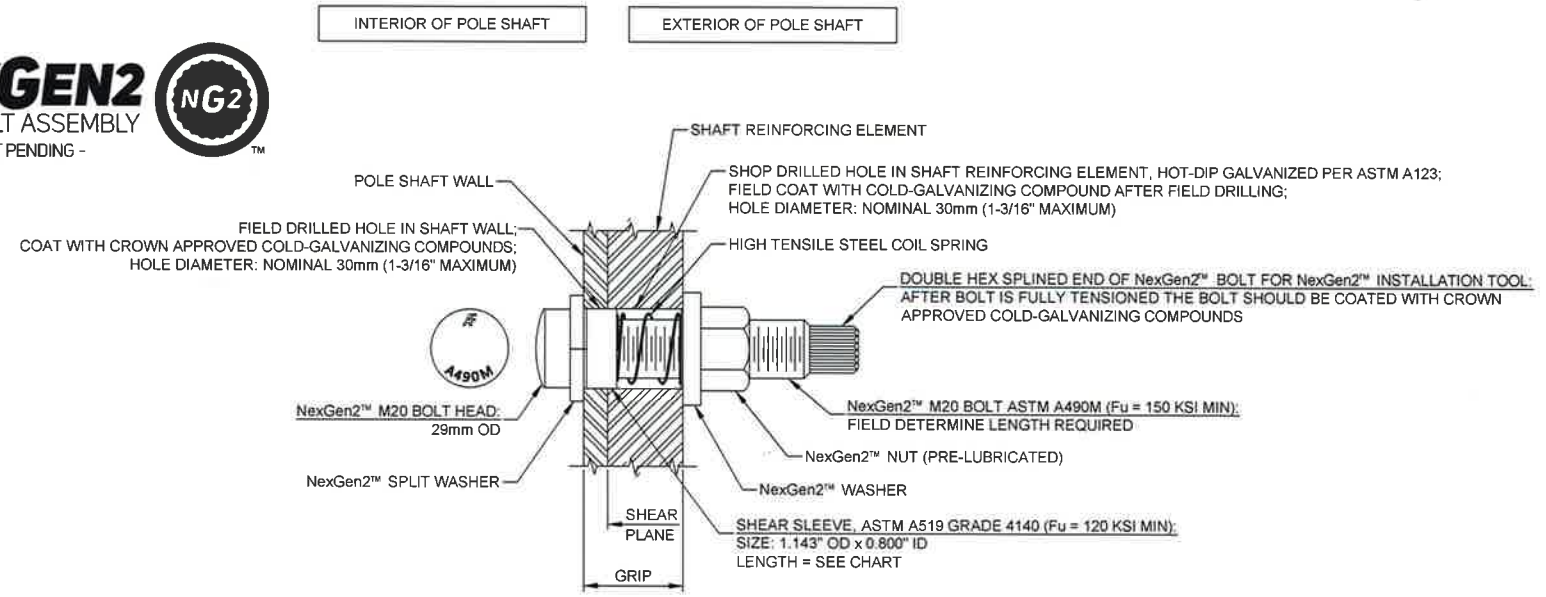
BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE
NOTES

SHEET NUMBER
TM-3

NEXGEN2 BLIND BOLT ASSEMBLY

- PATENT PENDING -



TYPICAL NG2™ BOLT DETAIL

PART NUMBER	BOLT LENGTH	SLEEVE LENGTH	MIN GRIP RANGE	MAX GRIP RANGE
M20x36	M20x95	11/16"	15/16"	1-7/16"
M20x48	M20x95	1-3/16"	1-7/16"	1-7/8"
M20x57	M20x95	1-5/8"	1-7/8"	2-1/4"
M20x68	M20x135	2"	2-1/4"	2-11/16"
M20x96	M20x135	2-7/16"	2-11/16"	3-3/4"
M20x127	M20x165	3"	3-3/4"	5"
M20x212	M20x250	4"	5"	8-5/16"

MANUFACTURER:
ALLFASTENERS
15401 COMMERCE PARK DRIVE, BROOKPARK, OHIO, USA 44142
PHONE: 440-232-6060
WEBSITE: WWW.ALLFASTENERS.COM

NOTE: ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30mm DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1-3/16".

NOTE: NexGen2™ COMPLETE ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AS APPROPRIATE.

NOTE: INSTALL PER MANUFACTURER'S INSTRUCTIONS.

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIANG
30767
LICENSED PROFESSIONAL ENGINEER
11/06/2015

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

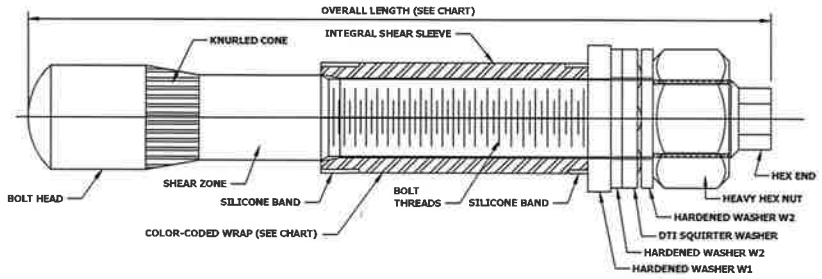
SHEET TITLE
NEXGEN2 BOLT SPECS & TIGHTENING PROCEDURE

SHEET NUMBER
TM-4

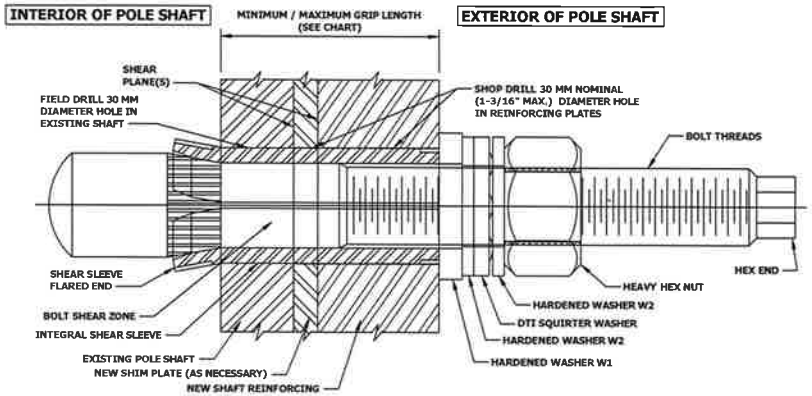
FORGBolt™ NOTE SHEET: A325/PC8.8 LANDSCAPE VERSION DATE 01/29/2015; Rev. 1.0 04/23/2015

NOTES: 1. **ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.**

2. **ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.**



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2

BOLT HOLE NOTES:

1. **ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".**
2. **ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.**

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
PHONE: **888-926-4857**
EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com

CONTAINS PROPRIETARY INFORMATION
PATENT PENDING

FORGBolt™

AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)

GROUP A		FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code
FORGBolt™ A325 - PC8.8	1	**135**	5.31	1.3	3/8" to 1"	--	**RED**
	2	**160**	6.30	1.6	3/4" to 1-1/2"	--	**GREEN**
	3	**195**	7.68	1.9	1-1/4" to 2-1/4"	--	**BLUE**
	4	**260**	10.24	2.6	2" to 3-1/2"	Splice Bolt	**YELLOW**
	5	**365**	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	**ORANGE**
	6	**440**	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	**BLACK**
DTI Note		Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirter' DTI that is compatible with a M20-PC8.8 bolt.					

FORGBolt™ Installation

Follow all Manufacturer/Distributer Recommendations for Installation, Tightening, and Inspection.

1. FIELD DRILL HOLES TO 30 MM DIAMETER.
2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
4. HAND TIGHTEN NUT TO FINGER TIGHT.
5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

PREPARED FOR:
CROWN CASTLE

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

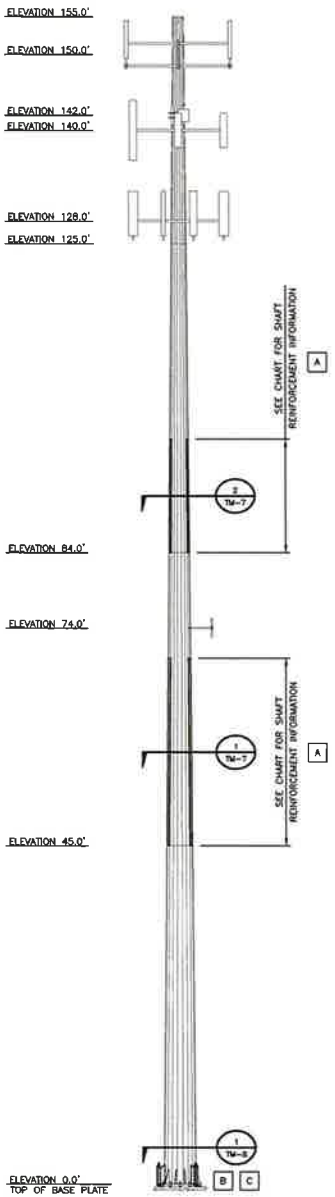
REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIANG
30767
LICENSED PROFESSIONAL ENGINEER
11/06/2015

BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE
FORGBOLT BOLT SPECS & TIGHTENING PROCEDURE

SHEET NUMBER
TM-5



TOWER ELEVATION
NO SCALE

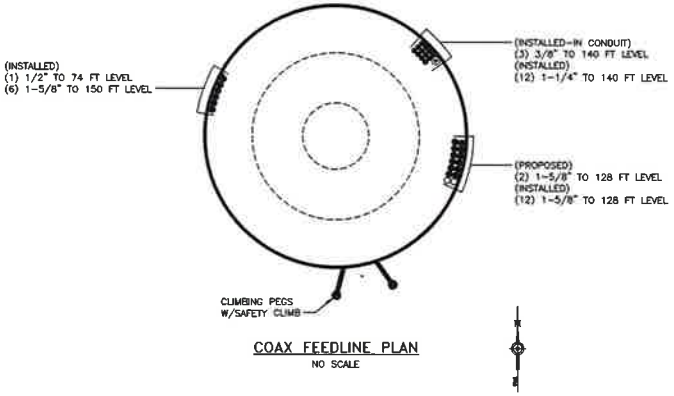
POLE MODIFICATION SCHEDULE			
CALLOUT	ELEVATION (FT)	MODIFICATION	REFERENCE SHEET
A	45.0 – 70.0 84.0 – 99.0	INSTALL NEW FLAT PLATE REINFORCEMENT	TM-7
B	0.0	INSTALL (3) NEW CCI-AR-0175 A193 GR B7 HOT DIP GALVANIZED ALL-THREAD BAR WITH ANCHOR ROD CHAIRS	TM-8
C	0.0	REMOVE (3) EXISTING BASE PLATE STIFFENERS TO ACCOMMODATE INSTALLATION OF NEW ANCHOR ROD CHAIRS	TM-8

CONTRACTOR SHALL FIELD VERIFY AND MEASURE DIMENSIONS OF THE SITE STRUCTURE BEFORE FABRICATION OF MATERIALS FOR ALL TOWER MODIFICATION INSTALLATIONS.

CCI FLAT PLATE (65 KSI) REINFORCEMENT SCHEDULE										
BOTTOM ELEVATION	TOP ELEVATION	PART NUMBER	FLATS / DEGREES (°)	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAX INTERMEDIATE BOLT SPACING	BOLT QUANTITY PER PLATE	STEEL WEIGHT PER PLATE (BLACK)	TOTAL BOLT QUANTITY	TOTAL STEEL WEIGHT (BLACK)
45'-0"	70'-0"	CCI-SFP-06010025	1, 7, 13	8	8	1'-4"	31	510.0	93	1530.0
84'-0"	99'-0"	CCI-SFP-04510015	1, 7, 13	6	6	1'-8"	19	229.5	57	688.5
								TOTAL	150	2218.5

NOTES FOR CROWN REINFORCING (65 KSI) MATERIAL

1. DO NOT WELD WITHOUT APPROVAL FROM THE EOR.
2. SHIMS FOR MONOPOLE REINFORCEMENT MEMBER SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. SHIM THICKNESS SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED. TIGHTENING BOLTS TO COLD BEND THE STEEL PLATES IN LIEU OF SHIMS IS STRICTLY PROHIBITED AND WILL BE CAUSE FOR REJECTION.
3. ALL FLAT PLATE REINFORCEMENT IS TO BE INSTALLED CENTERED ON ITS DESIGNATED FLAT, UNO.
4. SEE CMRP 65 KSI PARTS CATALOG 2nd EDITION FOR PART DETAILS.
5. TOWER SHAFT REINFORCEMENTS MAY BE INSTALLED WITH ALLFASTENERS NEXGEN2 BLIND BOLT ASSEMBLY, AS DETAILED ON SHEET TM-4, OR FORGBOLTS, AS DETAILED ON SHEET TM-5.



COAX FEEDLINE PLAN
NO SCALE

EXISTING FEEDLINE PLAN SHOWN ON THIS DRAWING IS BASED ON CURRENT BEST KNOWLEDGE OF THE EXISTING CONDITION. IF THE EXISTING FEEDLINE LAYOUT IS NOT AS SHOWN ON THIS DRAWING CONTRACTOR SHALL NOTIFY ENGINEER.

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

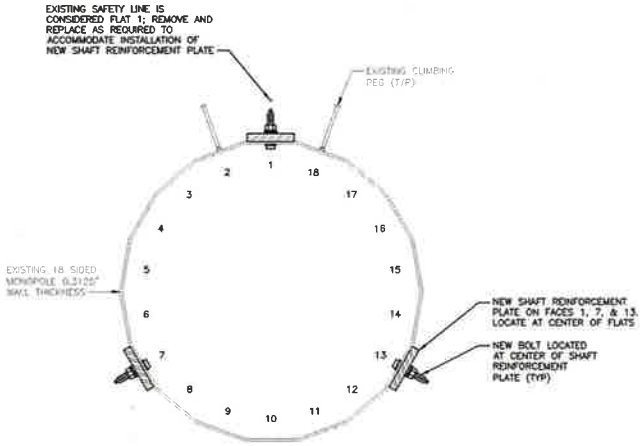
PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

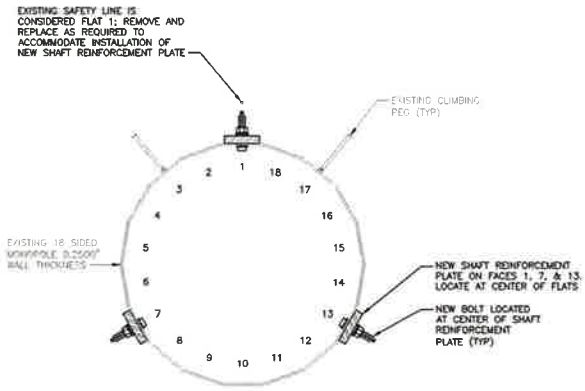
BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE
TOWER ELEVATION

SHEET NUMBER
TM-6



SECTION 1
NO SCALE



SECTION 2
NO SCALE

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIANG
30787
LICENSED PROFESSIONAL ENGINEER

11/06/2015

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

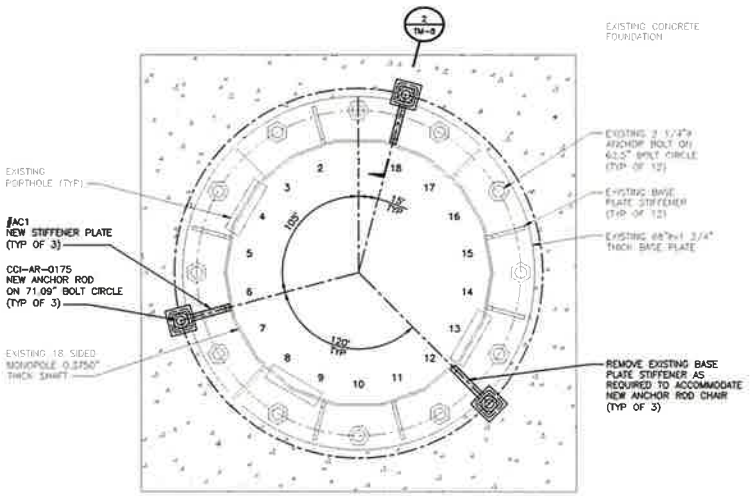
BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE

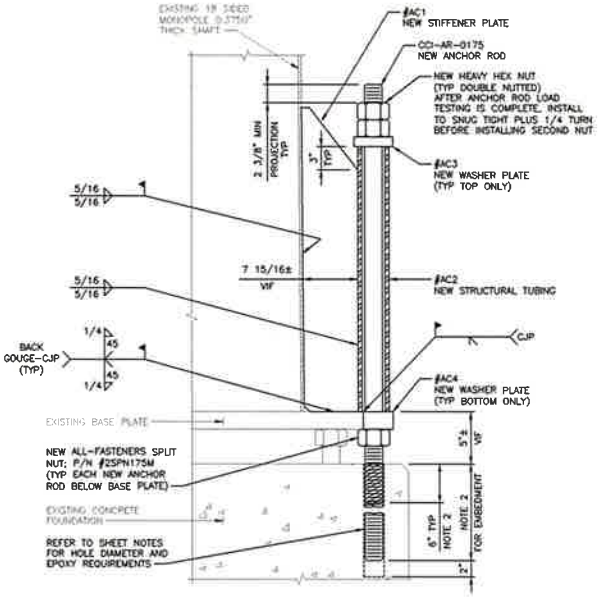
TOWER SECTIONS

SHEET NUMBER

TM-7



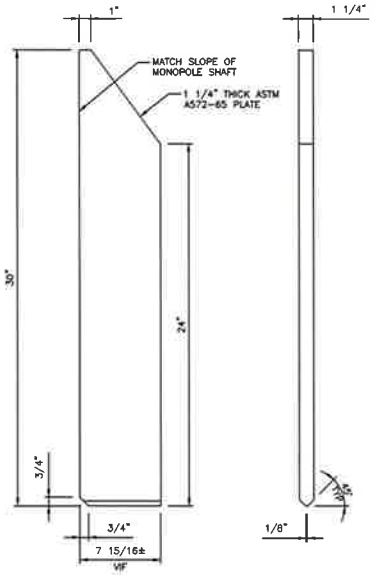
SECTION 1
ANCHOR ROD PLAN
NO SCALE



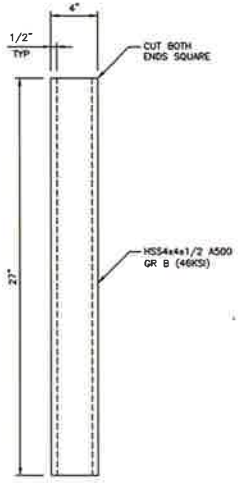
SECTION 2
NO SCALE

NOTES

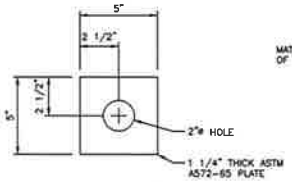
1. ALL HSS SHAPES SHALL BE A500 GRADE B, 46 KSI.
2. NEW ANCHOR RODS TO BE DRILLED AND EPOXIED INTO FOUNDATION USING HILTI HIT-RE 500-SD EPOXY PER MANUFACTURER'S SPECIFICATIONS. ANCHOR ROD TO BE WRAPPED IN BOND BREAKER TAPE FOR 6" FROM TOP OF FOUNDATION. CONTRACTOR TO HAMMER DRILL HOLE WITH CARBIDE BIT (OR EQUIVALENT). FOR CORE DRILLING OPTION, CLEAN AND MECHANICALLY ROUGHEN HOLES PRIOR TO ANCHOR INSTALLATION. REFERENCE TABLE ON SHEET TM-3 FOR REQUIRED HOLE DIAMETER, EMBEDMENT DEPTH, AND ANCHOR ROD LENGTH.
3. ALL NEW ANCHOR RODS SHALL BE INSTALLED WITH DOUBLE HEAVY HEX NUTS ON THE TOP OF THE NEW ANCHOR ROD CHAIR AND ONE LEVELING HEAVY HEX NUT ON THE BOTTOM OF THE NEW ANCHOR ROD CHAIR. CONTRACTOR SHALL CAREFULLY REMOVE EXISTING GROUT AS NECESSARY TO ENSURE PROPER INSTALLATION OF LEVELING NUTS.
4. TAKE ALL MEASUREMENTS NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING DRILLING OPERATIONS. NOTIFY CROWN CASTLE IMMEDIATELY IF EXISTING REINFORCING BARS ARE ENCOUNTERED AND INTERFERE WITH PLACEMENT OF NEW ANCHORS. MINOR ADJUSTMENTS TO PROPOSED LOCATION OF NEW ANCHORS MAY BE REQUIRED.
5. NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN & GROUT HAVE CURED, NEW ANCHOR ROD REINFORCING SHALL HAVE TARGET TENSION LOAD APPLIED. REFERENCE TABLE ON SHEET TM-3 FOR REQUIRED TARGET TENSION LOAD VALUES.



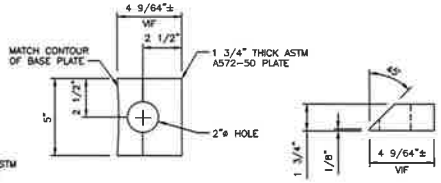
#AC1
STIFFENER PLATE
NO SCALE



#AC2
STRUCTURAL TUBING
NO SCALE



#AC3
WASHER PLATE
NO SCALE



#AC4
WASHER PLATE
NO SCALE

PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO:	182896
DRAWN BY:	TYW
CHECKED BY:	AHS

REV	DATE	DESCRIPTION
0	11/04/15	ISSUED FOR CONSTRUCTION

STATE OF CONNECTICUT
PING JIANG
30787
LICENSED PROFESSIONAL ENGINEER
11/06/2015

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876366
WO #1144648
WAPPINGERS FALLS / PRESTON CIT
101 PIERCE ROAD
PRESTON, CT 06365
NEW LONDON COUNTY, USA

SHEET TITLE
BASE PLATE
ANCHOR ROD CHAIRS

SHEET NUMBER
TM-8