Robinson+Cole

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Also admitted in Massachusetts

October 20, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
75 Roberts Road, Groton, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains fifteen (15) wireless telecommunications antennas at the 137 of the existing 144.5-foot tower at 75 Roberts Road in Groton, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 2007. Cellco now intends to replace nine (9) of its existing antennas with three (3) model LNX-6514DS-VTM, 700 MHz antennas; three (3) model HBXX-6517DS-VTM, 1900 MHz antennas and three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to replace three (3) remote radio heads ("RRHs") and install six (6) new RRHs and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mark R. Oefinger, Town Manager of the Town of Groton. A copy of this letter is also being sent to Philip A. Strickland and Daniel J. Perrotta, the owners of the Property and to Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRH's will be located on its existing platform at the 137-foot level of the tower.

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

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

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

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

6. The tower and its foundation, with certain modifications can support Cellco's proposed modifications. (*See* Structural Modifications 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:
Mark R. Oefinger, Groton Town Manager
Philip A. Strickland and Daniel J. Perrotta
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 15.7	0 ° | 15.9
	5 ° | 15.7	5 ° | 15.8
	10 ° | 15.3	10 ° | 15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

* 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®
Band	Single band
Brand	DualPol® | Teletilt®

Product Specifications

LNX-6514DS-VTM

Operating Frequency Band	698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	180.5 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	14.2 kg | 31.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

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

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

Andrew® Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4	0 ° | 18.4	0 ° | 18.7
	3 ° | 18.7	3 ° | 18.7	3 ° | 18.9
	6 ° | 18.4	6 ° | 18.5	6 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9

* 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® quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

HBXX-6517DS-VTM

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

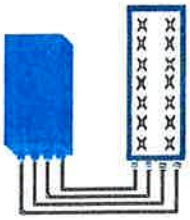
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

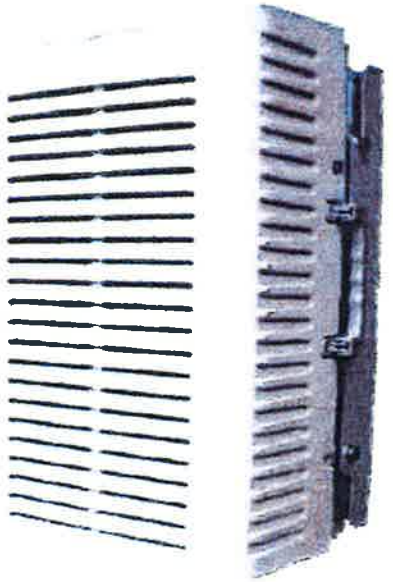
Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W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

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

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



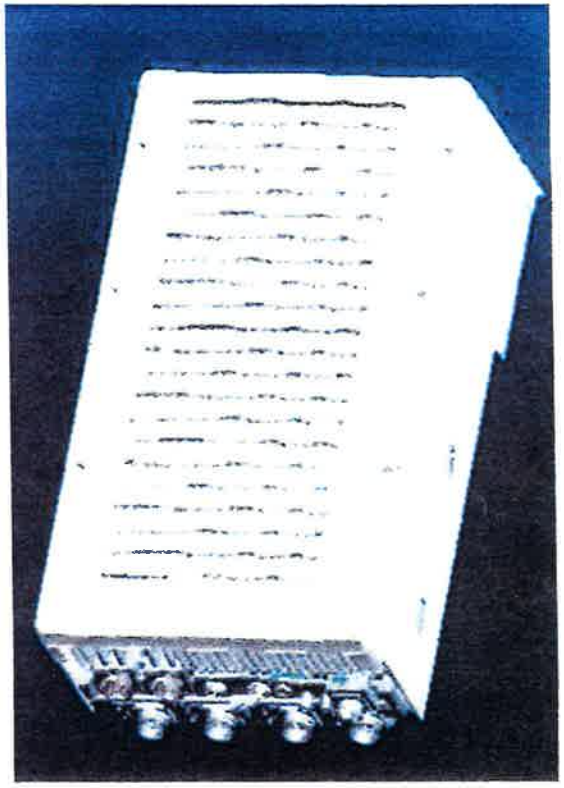
** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

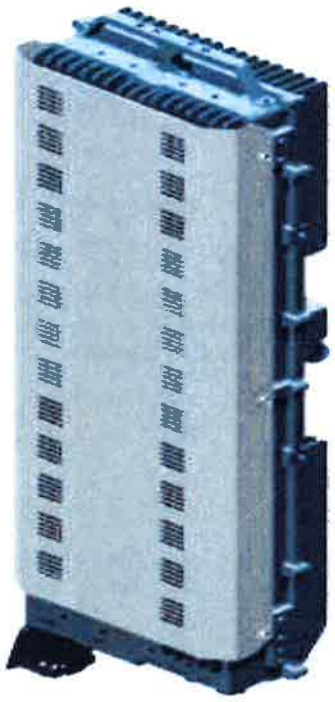
	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental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



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

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

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



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

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

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

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

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

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

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

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

OPTIMIZED TCO

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

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

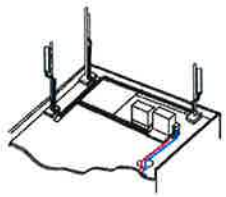
EASY INSTALLATION

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

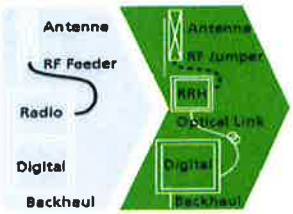
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

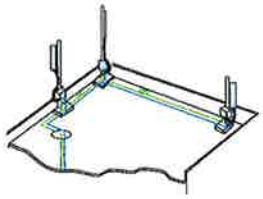
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

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

RF Characteristics

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

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

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

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

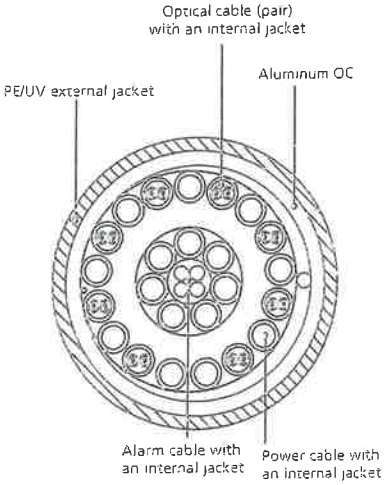


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Groton 5								
Tower Height: 144.5ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint CDMA/LTE	4	693	113	0.0871	1900	1.0000	0.87%	
*Sprint CDMA/LTE	1	390	113	0.0123	850	0.5667	0.22%	
*Sprint CDMA/LTE	2	693	113	0.0435	2500	1.0000	0.44%	
*MetroPCS	3	727	102	0.0851	2140	1.0000	0.85%	
*T-Mobile GSM/UMTS	2	12	126	0.0006	1950	1.0000	0.01%	
*T-Mobile UMTS	2	16	126	0.0008	2100	1.0000	0.01%	
*T-Mobile LTE	2	24	126	0.0012	2100	1.0000	0.01%	
*AT&T UMTS	2	565	147	0.0204	880	0.5867	0.35%	
*AT&T UMTS	2	875	147	0.0317	1900	1.0000	0.32%	
*AT&T GSM	1	283	147	0.0051	880	0.5867	0.09%	
*AT&T GSM	4	525	147	0.0380	1900	1.0000	0.38%	
*AT&T LTE	1	1615	144.75	0.0302	734	0.4893	0.62%	
Verizon PCS	**1**	**1676**	**137**	**0.0321**	**1970**	**1.0000**	**3.21%**	
Verizon Cellular	**9**	**252**	**137**	**0.0434**	**869**	**0.5793**	**7.50%**	
Verizon AWS	**1**	**2530**	**137**	**0.0485**	**2145**	**1.0000**	**4.85%**	
Verizon 700	**1**	**1078**	**137**	**0.0207**	**746**	**0.4973**	**4.15%**	
								23.86%
* Source: Siting Council								

ATTACHMENT 3

July 23, 2015

Mr. Mitchell Abbott
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6612

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

Subject:	**Structural Modification Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	 Groton 5 CT
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	881533 Groton Tower 338289 1083820 300606 Rev. 0
Engineering Firm Designation:	**B+T Group Project Number:**	92739.004.01
Site Data:	**75 Roberts Road, Groton, CT, New London County** **Latitude *41° 21' 36.8"*, Longitude *-72° 2' 55.1"*** **144.5 Foot - Monopole**	

Dear Mr. Abbott,

B+T Group 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 802199, in accordance with application 300606, revision 0.

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:

LC4.8: TSA specified load case with proposed modifications **Sufficient Capacity**
Note: See Table 1 and Table 2 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 *B+T Group* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:
B+T Engineering, Inc.
PEC.0001564; Exp: 02/10/16

Robbie Frazier, E.I.
Project Engineer

Chad E. Tuttle, P.E.
President

TABLE OF CONTENTS

1) INTRODUCTION

This is a 144.5 ft. monopole designed by Engineered Endeavors, Inc. in January of 2001. The monopole was originally designed for a wind speed of 85 mph per TIA/EIA-222-F. This monopole has been modified by Walker Engineering in August of 2007, Vertical Structures Inc. in November of 2008 and Crown Castle in February of 2014 and those modifications were incorporated in this analysis.

2) ANALYSIS CRITERIA

The structural analysis was performed for this monopole 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
135.0	137.0	3	Alcatel Lucent	RRH2X60-AWS	1	1-5/8	--
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2x60-700			
		6	Commscope	HBXX-6517DS-A2M			
		3	Commscope	LNX-6514DS-AIM			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	146.0	12	Powerwave Tech.	7020.00	--	--	1
		6	Powerwave Tech.	7770.00			
	145.0	3	CCI Antennas	HPA-65R-BUU-H8	--	--	2
		3	Ericsson	RRUS 11 B4			
		3	Ericsson	RRUS A2			
		3	Ericsson	RRUS 11	12	1-5/8	1
		6	Kathrein	782-10250	2	3/4	
		6	Powerwave Tech.	LGP21401	1	3/8	
		1	--	Platform Mount [LP 712-1]			
135.0	137.0	**3**	**Alcatel Lucent**	**RRH2X40-AWS**	**6**	**1-5/8**	**3**
		3	**Andrew**	**HBXX-6517DS-VTM**			
		3	**Antel**	**BXA-171063/8CF**			
		3	**Antel**	**BXA-70063-6CF-EDIN-0**			
		3	Andrew	LNX-6512DS-VTM	7	1-5/8	1
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		6	RFS Celwave	FD9R6004/2C-3L			
	135.0	1	--	Platform Mount [LP 712-1]			
		6	**Andrew**	**CBC721-DF**	**--**	**--**	**3**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
125.0	126.0	3	Ericsson	ERICSSON AIR 21 B2A B4P	12 1	1-5/8 1-1/4	1
		3	Ericsson	ERICSSON AIR 21 B4A B2P			
		3	Ericsson	KRY 112 144/1			
	125.0	1	--	Platform Mount [LP 712-1]			
113.0	113.0	3	Alcatel Lucent	TD-RRH8x20-25	3 1	1-1/4 5/8	1
		3	RFS Celwave	APXVSPP18-C-A20			
		3	RFS Celwave	APXVTM14-C-120			
		1	--	Platform Mount [LP 712-1]			
111.0	111.0	3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz	--	--	1
		1	--	Side Arm Mount [SO 102-3]			
	109.0	3	Alcatel Lucent	800MHz 2X50W RRH W/FILTER			
100.0	102.0	3	Kathrein	800 10504	6 1	7/8 5/16	1
	100.0	1	--	Platform Mount [LP 712-1]			
51.0	52.0	1	Lucent	KS24019-L112A	1	1/2	1
	51.0	1	--	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) **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)
145	145	12	Allgon	7120.16	--	--
		1	Generic	Low Profile Platform		
135	135	12	Allgon	7120.16	--	--
		1	Generic	Low Profile Platform		
125	125	9	Allgon	7120.16	--	--
		1	Generic	Low Profile Platform		
115	115	12	Allgon	7120.16	--	--
		1	Generic	Low Profile Platform		
105	105	12	Allgon	7120.16	--	--
		1	Generic	Low Profile Platform		
95	95	12	Allgon	7120.16	--	--
		1	Generic	Low Profile Platform		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate, Rev# 0	300606	CCI Sites
Tower Manufacturer Drawings	EEI, Job No. 8409	1405782	CCI Sites
Foundation Drawing	URS, Project No. F301877.01/F04	1405796	CCI Sites
Geotech Report	Clarence Welti, Date: 03/13/00	1406209	CCI Sites
Tower Modification Drawings	Walker Engineering, Job No. 0705-014VRE	2048224	CCI Sites
	Vertical Structures, Job No. 2008-004-155	2353860	CCI Sites
	CCI, Date: 02/25/14	4491288	CCI Sites
Modification Inspection Report	Vertical Structures, Project No. 2007-004-164	2304223	CCI Sites
	Vertical Structures, Project No. 2009-004-059	2435103	CCI Sites
	SGS, Project No. 145071	5246681	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 06/19/15	CCI Sites

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary) - LC4.8

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	144.5 - 117.567	Pole	TP26.875x21x0.188	1	-7.317	-	73.1	Pass[1]
L2	117.567 - 103.5	Pole	TP29.502x25.659x0.25	2	-11.898	-	98.6	Pass[1]
L3	103.5 - 98.5	Pole	TP30.574x29.502x0.408	3	-14.272	-	93.1	Pass[1]
L4	98.5 - 87.184	Pole	TP33x30.574x0.554	4	-15.866	-	77.4	Pass[1]
L5	87.184 - 77.25	Pole	TP34.646x31.508x0.375	5	-19.605	-	98.8	Pass[1]
L6	77.25 - 57.25	Pole	TP38.956x34.646x0.601	6	-25.576	-	86.5	Pass[1]
L7	57.25 - 42.108	Pole	TP42.219x38.956x0.588	7	-28.636	-	91.3	Pass[1]
L8	42.108 - 31.25	Pole	TP43.794x40.224x0.636	8	-35.922	-	91.2	Pass[1]
L9	31.25 - 0	Pole	TP50.5x43.794x0.562	9	-48.592	-	92.0	Pass[1]
							Summary	
						Pole (L5)	98.8	Pass[1]
						RATING =	**98.8**	**Pass[1]**

Table 6 - Tower Component Stresses vs. Capacity - LC4.8

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	92.9	Pass
1	Base Plate	Base	73.2	Pass
1	Base Foundation (Soil Interaction)	Base	59.8	Pass
1	Base Foundation (Steel)	Base	51.1	Pass

Structure Rating (max from all components) =	**98.8%**

Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
2) The percent capacities shown above (excluding foundations) include the 1/3 increase in allowable stresses as allowed by TIA/EIA-222-F.

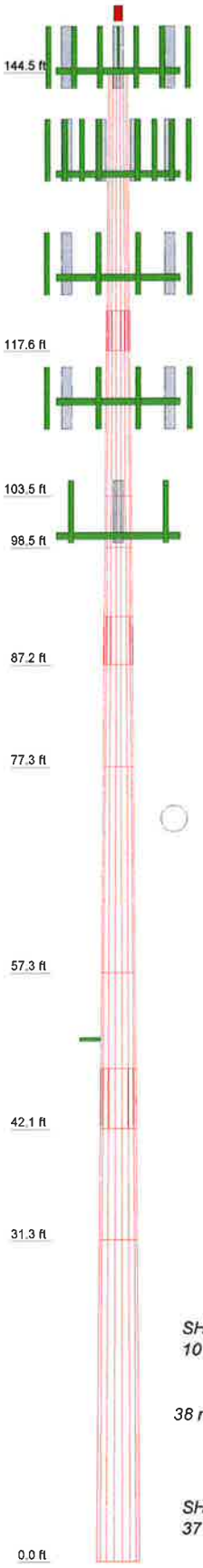
4.1) Recommendations

1) All modifications proposed in this report shall be installed in accordance with the attached drawings (Appendix D) for the determined available structural capacity to be effective.

APPENDIX A

tnxTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9
Length (ft)	26.933	17.924	5.000	11.316	14.559	20.000	15.142	16.634	31.250
Number of Sides	18	18	18	18	18	18	18	18	18
Thickness (in)	0.188	0.250	0.408	0.554	0.375	0.601	0.588	0.636	0.562
Socket Length (ft)	3.857			4.625			5.776		
Top Dia (in)	21.000	25.659	29.502	30.574	31.508	34.646	38.956	40.224	43.794
Bot Dia (in)	26.875	29.502	30.574	33.000	34.646	38.956	42.219	43.794	50.500
Grade	A572-65			46.174906ksi	46.240546ksi	A572-65	51.758335ksi	51.837723ksi	51.936717ksi 57.502545ksi
Weight (K)	1.3	1.3	0.6	2.0	1.9	4.5	3.7	4.6	10.1 30.1



AXIAL
66 K

SHEAR
10 K

MOMENT
1070 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 0.750 in ICE

AXIAL
49 K

SHEAR
37 K

MOMENT
4081 kip-ft

TORQUE 1 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Strobe (E)	149.5	RRH2X60-PCS (P)	135
Lightning Rod 5/8" x 5' (E)	147	RRH2X60-PCS (P)	135
5' x 2" Pipe Mount (E-For Strobe)	147	RRH2X60-PCS (P)	135
Top Hat (E)	146	RRH2X60-AWS (P)	135
(2) 7770.00 w/ Mount Pipe (E)	145	RRH2X60-AWS (P)	135
(2) 7770.00 w/ Mount Pipe (E)	145	RRH2X60-AWS (P)	135
(2) 7770.00 w/ Mount Pipe (E)	145	DB-T1-6Z-8AB-0Z (P)	135
(2) LGP21401 (E)	145	Platform Mount [LP 712-1] (E)	135
(2) LGP21401 (E)	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe (E)	125
(2) LGP21401 (E)	145		
(2) 782-10250 (E)	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe (E)	125
(2) 782-10250 (E)	145		
(2) 782-10250 (E)	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe (E)	125
(4) 7020.00 (E)	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe (E)	125
(4) 7020.00 (E)	145		
(4) 7020.00 (E)	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe (E)	125
RRUS 11 (E-Azimuth per photo)	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe (E)	125
RRUS 11 (E-Azimuth per photo)	145		
RRUS 11 (E-Azimuth per photo)	145	KRY 112 144/1 (E)	125
HPA-65R-BUU-H8 w/ Mount Pipe (R)	145	KRY 112 144/1 (E)	125
HPA-65R-BUU-H8 w/ Mount Pipe (R)	145	KRY 112 144/1 (E)	125
HPA-65R-BUU-H8 w/ Mount Pipe (R)	145	Platform Mount [LP 712-1] (E)	125
RRUS A2 (R)	145	APXVSPP18-C-A20 w/ Mount Pipe (E)	113
RRUS A2 (R)	145	APXVSPP18-C-A20 w/ Mount Pipe (E)	113
RRUS A2 (R)	145	APXVSPP18-C-A20 w/ Mount Pipe (E)	113
RRUS 11 B4 (R)	145	APXVTM14-C-120 w/ Mount Pipe (E)	113
RRUS 11 B4 (R)	145	APXVTM14-C-120 w/ Mount Pipe (E)	113
RRUS 11 B4 (R)	145	APXVTM14-C-120 w/ Mount Pipe (E)	113
8'x2" Antenna Mount Pipe (E)	145	TD-RRH8x20-25 (E)	113
8'x2" Antenna Mount Pipe (E)	145	TD-RRH8x20-25 (E)	113
8'x2" Antenna Mount Pipe (E)	145	TD-RRH8x20-25 (E)	113
Platform Mount [LP 712-1] (E)	145	Platform Mount [LP 712-1] (E)	113
LNX-6512DS-VTM w/ Mount Pipe (E)	135	PCS 1900MHz 4x45W-65MHz (E)	111
LNX-6512DS-VTM w/ Mount Pipe (E)	135	PCS 1900MHz 4x45W-65MHz (E)	111
LNX-6512DS-VTM w/ Mount Pipe (E)	135	PCS 1900MHz 4x45W-65MHz (E)	111
(2) FD9R6004/2C-3L (E)	135	800MHz 2X50W RRH W/FILTER (E)	111
(2) FD9R6004/2C-3L (E)	135	800MHz 2X50W RRH W/FILTER (E)	111
(2) FD9R6004/2C-3L (E)	135	800MHz 2X50W RRH W/FILTER (E)	111
DB-T1-6Z-8AB-0Z (E)	135	Side Arm Mount [SO 102-3] (E)	111
LNX-6514DS-AIM w/ Mount Pipe (P)	135	800 10504 w/ Mount Pipe (E)	100
LNX-6514DS-AIM w/ Mount Pipe (P)	135	800 10504 w/ Mount Pipe (E)	100
LNX-6514DS-AIM w/ Mount Pipe (P)	135	800 10504 w/ Mount Pipe (E)	100
(2) HBXX-6517DS-A2M w/ Mount Pipe (P)	135	7'x2" Antenna Mount Pipe (E)	100
(2) HBXX-6517DS-A2M w/ Mount Pipe (P)	135	7'x2" Antenna Mount Pipe (E)	100
(2) HBXX-6517DS-A2M w/ Mount Pipe (P)	135	7'x2" Antenna Mount Pipe (E)	100
RRH2x60-700 (P)	135	Platform Mount [LP 712-1] (E)	100
RRH2x60-700 (P)	135	KS24019-L112A (E)	51
RRH2x60-700 (P)	135	Side Arm Mount [SO 701-1] (E)	51

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	51.837723ksi	52 ksi	67 ksi
46.174906ksi	46 ksi	61 ksi	51.936717ksi	52 ksi	67 ksi
46.240546ksi	46 ksi	61 ksi	57.502545ksi	58 ksi	73 ksi
51.758335ksi	52 ksi	67 ksi			

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. Tower Rating: 98.8%

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Tulsa, OK 74119
Phone: (918) 587-4630
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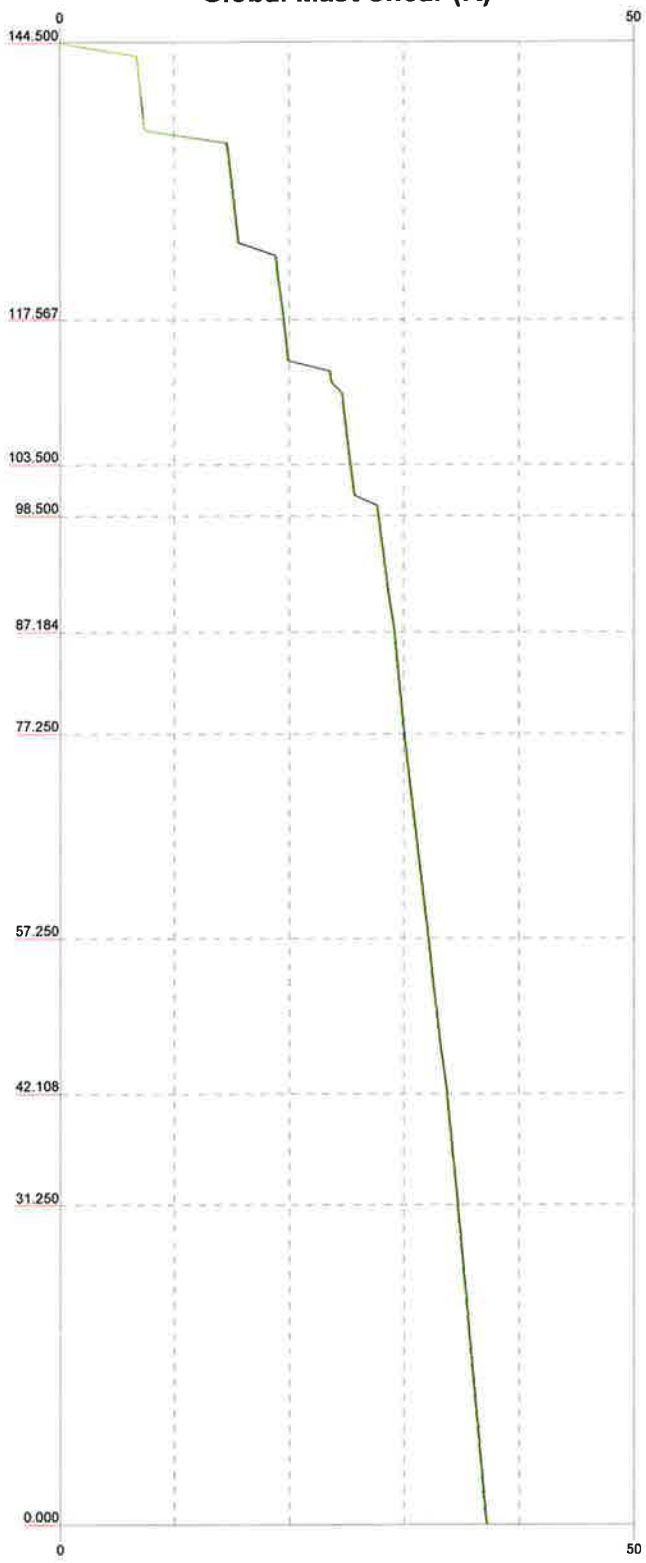
Job: 92739.004.01 - GROTON TOWER, CT (BU# 8815			
Project:			
Client: Crown Castle	Drawn by: ADhumal	App'd:	
Code: TIA/EIA-222-F	Date: 07/23/15	Scale: NTS	
Path:		Dwg No. E-1	

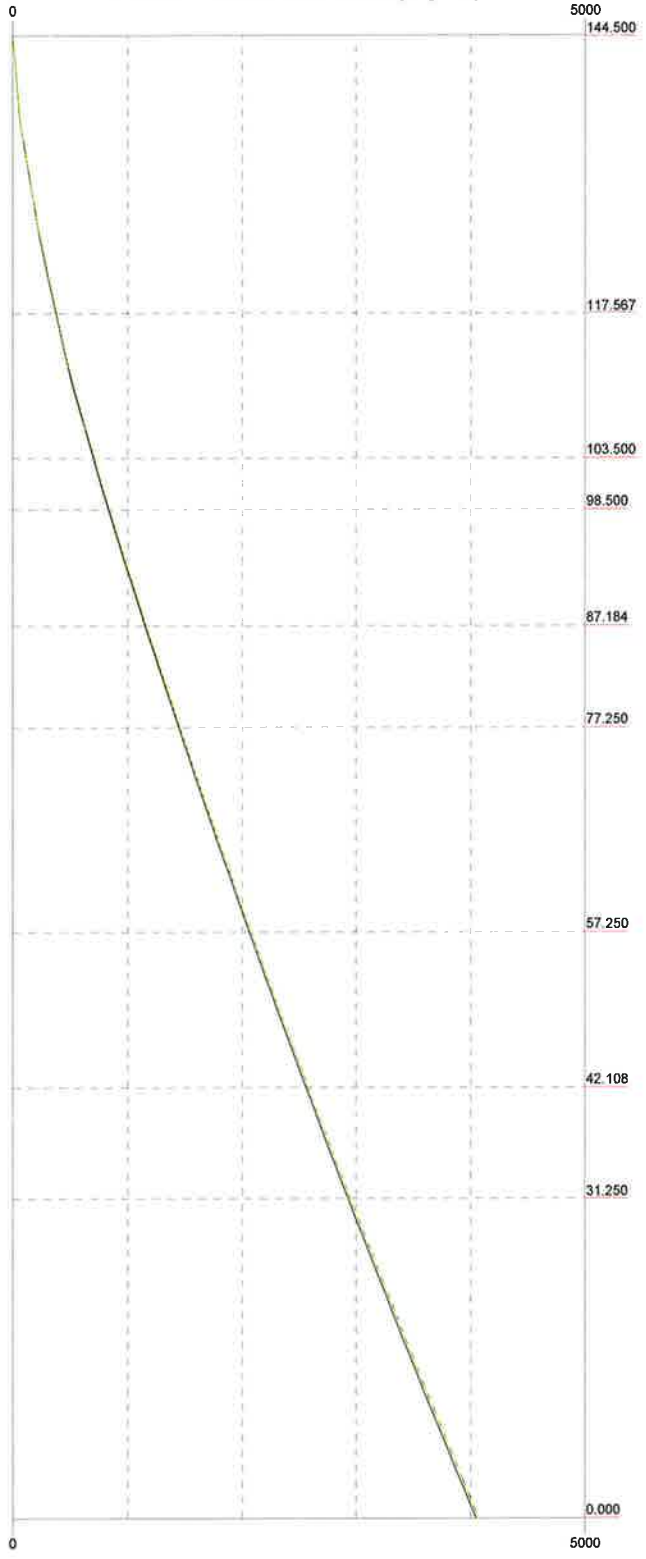
Vx Vz

Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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Phone: (918) 587-4630
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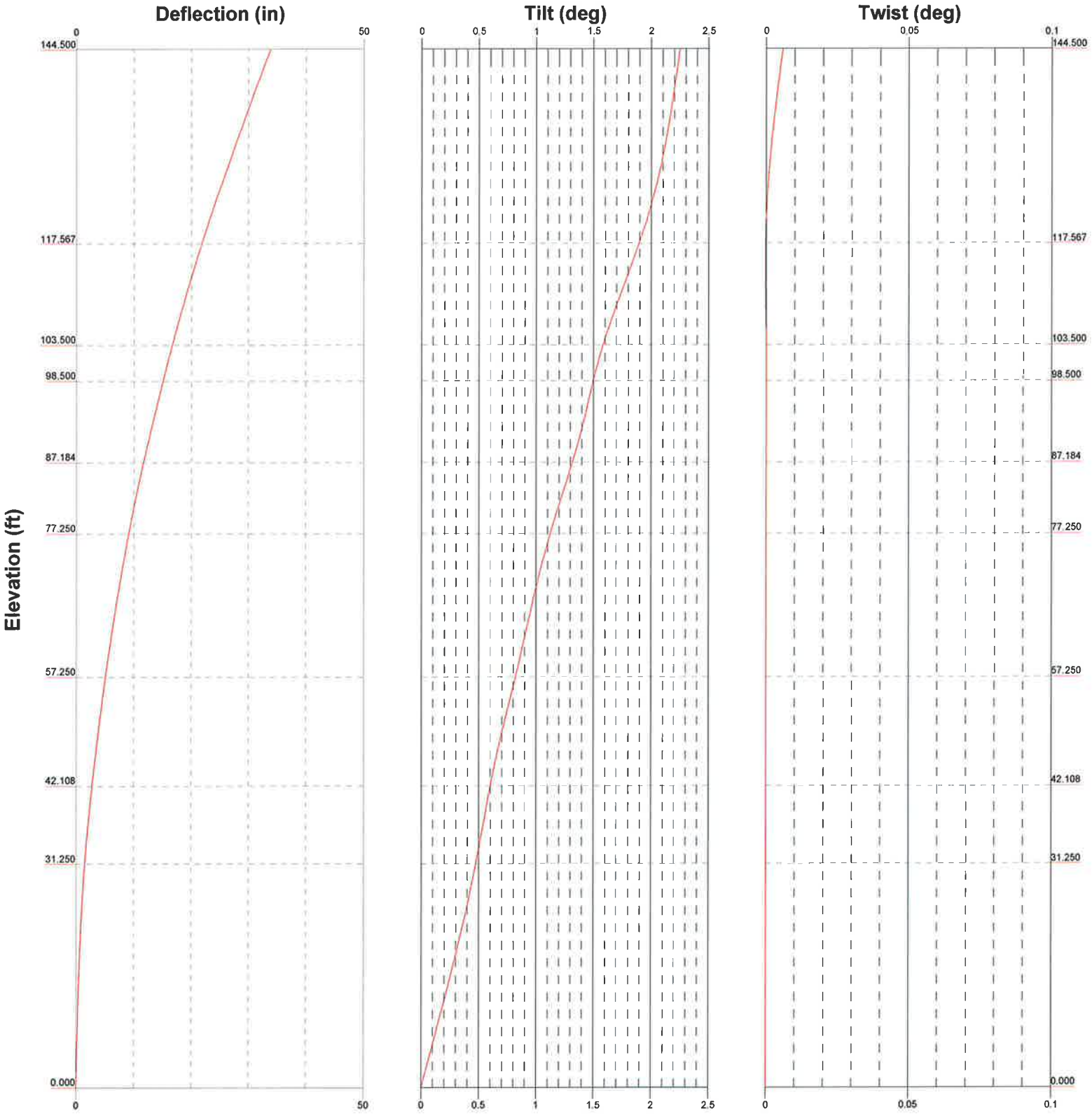
Job: 92739.004.01 - GROTON TOWER, CT (BU# 8815			
Project:			
Client: Crown Castle	Drawn by: ADhumal	App'd:	
Code: TIA/EIA-222-F	Date: 07/23/15	Scale: NTS	
Path:		Dwg No. E-4	

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

Maximum Values



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Phone: (918) 587-4630
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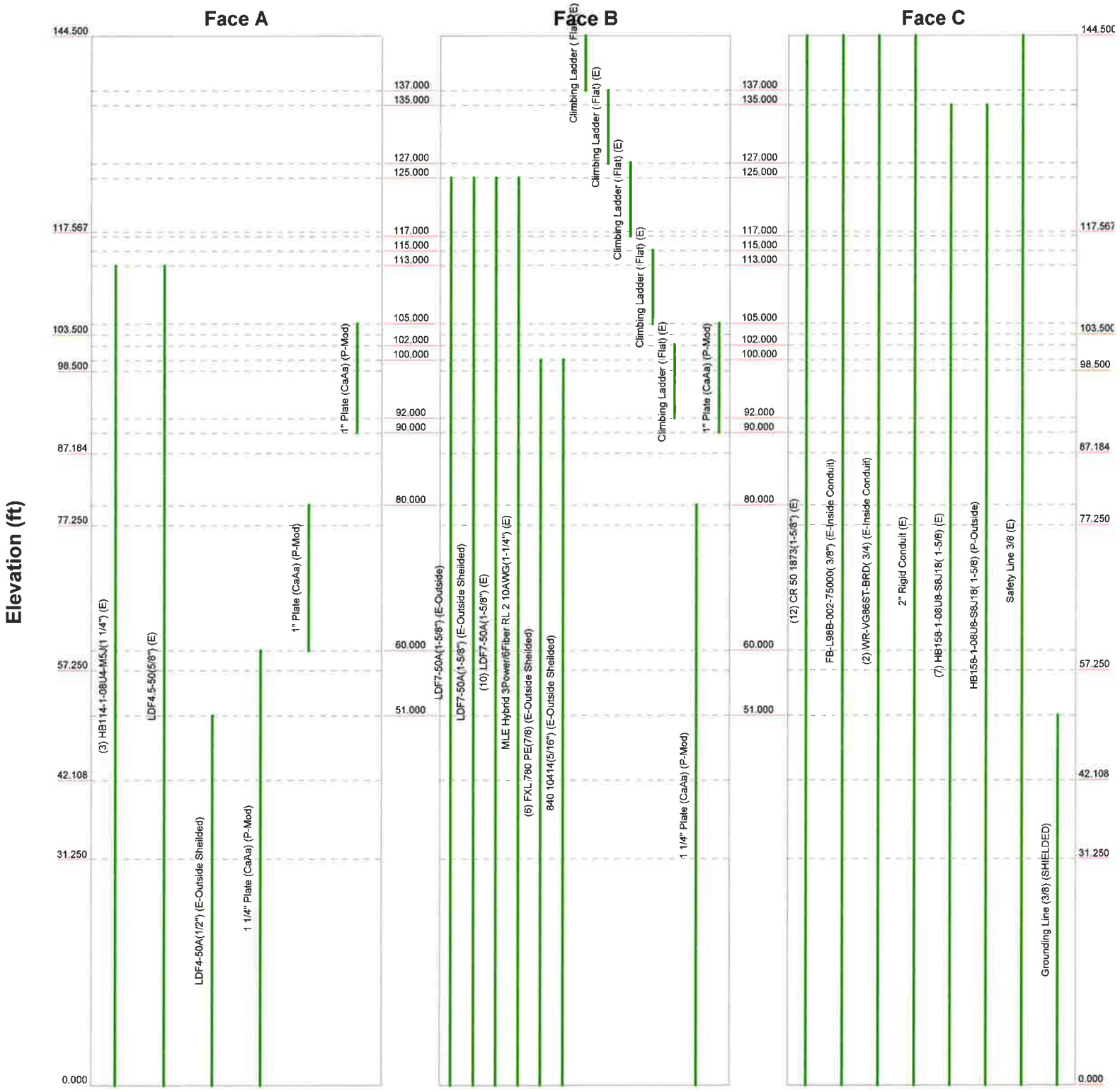
Job: 92739.004.01 - GROTON TOWER, CT (BU# 8815			
Project:			
Client: Crown Castle	Drawn by: ADhumal	App'd:	
Code: TIA/EIA-222-F	Date: 07/23/15	Scale: NTS	
Path:		Dwg No. E-5	

0' - 144'6"

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



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FAX: (918) 587-4630

Job: 92739.004.01 - GROTON TOWER, CT (BU# 8815			
Project:			
Client: Crown Castle	Drawn by: ADhumal	App'd:	
Code: TIA/EIA-222-F	Date: 07/23/15	Scale: NTS	
Path:		Dwg No. E-7	

Tower Input Data

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

Tower is located in New London County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	144.500-117.567	26.933	3.857	18	21.000	26.875	0.188	0.750	A572-65 (65 ksi)
L2	117.567-103.500	17.924	0.000	18	25.659	29.502	0.250	1.000	A572-65 (65 ksi)
L3	103.500-98.500	5.000	0.000	18	29.502	30.574	0.408	1.630	46.174906ksi (46 ksi)
L4	98.500-87.184	11.316	4.625	18	30.574	33.000	0.554	2.214	46.240546ksi (46 ksi)
L5	87.184-77.250	14.559	0.000	18	31.508	34.646	0.375	1.500	A572-65 (65 ksi)
L6	77.250-57.250	20.000	0.000	18	34.646	38.956	0.601	2.403	51.758335ksi (52 ksi)
L7	57.250-42.108	15.142	5.776	18	38.956	42.219	0.588	2.351	51.837723ksi (52 ksi)

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
L8	42.108-31.250	16.634	0.000	18	40.224	43.794	0.636	2.545	51.936717ksi (52 ksi)
L9	31.250-0.000	31.250		18	43.794	50.500	0.562	2.250	57.502545ksi (58 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	21.324	12.386	677.826	7.388	10.668	63.538	1356.544	6.194	3.366	17.952
	27.290	15.882	1429.122	9.474	13.653	104.678	2860.125	7.943	4.400	23.467
L2	26.894	20.162	1644.484	9.020	13.035	126.163	3291.131	10.083	4.076	16.304
	29.957	23.211	2509.217	10.384	14.987	167.428	5021.737	11.608	4.752	19.009
L3	29.957	37.636	4024.853	10.328	14.987	268.559	8055.002	18.821	4.475	10.98
	31.045	39.023	4486.364	10.709	15.531	288.856	8978.630	19.515	4.664	11.443
L4	31.045	52.749	6005.865	10.657	15.531	386.690	12019.632	26.379	4.407	7.96
	33.509	57.012	7582.917	11.518	16.764	452.333	15175.811	28.511	4.834	8.731
L5	33.006	37.056	4537.887	11.052	16.006	283.507	9081.745	18.532	4.885	13.028
	35.180	40.791	6052.683	12.166	17.600	343.901	12113.330	20.399	5.438	14.5
L6	35.180	64.924	9507.149	12.086	17.600	540.177	19026.807	32.468	5.040	8.389
	39.557	73.143	13594.232	13.616	19.790	686.941	27206.352	36.579	5.799	9.651
L7	39.557	71.585	13313.644	13.621	19.790	672.763	26644.807	35.799	5.822	9.904
	42.870	77.673	17007.566	14.779	21.447	792.999	34037.512	38.844	6.396	10.881
L8	42.103	79.934	15826.802	14.054	20.434	774.539	31674.429	39.974	5.960	9.369
	44.469	87.141	20505.780	15.321	22.247	921.723	41038.542	43.579	6.588	10.356
L9	44.469	77.174	18222.386	15.347	22.247	819.086	36468.750	38.594	6.718	11.944
	51.279	89.146	28086.142	17.728	25.654	1094.806	56209.240	44.581	7.898	14.043

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 144.500-117.567				1	1	1		
L2 117.567-103.500				1	1	1		
L3 103.500-98.500				1	1	0.963295		
L4 98.500-87.184				1	1	0.945314		
L5 87.184-77.250				1	1	1		
L6 77.250-57.250				1	1	0.961697		
L7 57.250-42.108				1	1	0.965444		
L8 42.108-31.250				1	1	0.971175		
L9 31.250-0.000				1	1	1.13817		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight klf
CR 50 1873(1-5/8") (E)	C	No	Inside Pole	144.500 - 0.000	0.000	0	12	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
FB-L98B-002-75000(3/8") (E-Inside Conduit)	C	No	Inside Pole	144.500 - 0.000	0.000	0	1	No Ice	0.000	0.000
								1/2" Ice	0.000	0.000
								1" Ice	0.000	0.000
								2" Ice	0.000	0.000
								4" Ice	0.000	0.000
WR-VG86ST-BRD(3/4) (E-Inside Conduit)	C	No	Inside Pole	144.500 - 0.000	0.000	0	2	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
2" Rigid Conduit (E)	C	No	Inside Pole	144.500 - 0.000	0.000	0	1	No Ice	0.000	0.003
								1/2" Ice	0.000	0.003
								1" Ice	0.000	0.003
								2" Ice	0.000	0.003
								4" Ice	0.000	0.003
M HB158-1-08U8-S8J18(1-5/8) (E)	C	No	Inside Pole	135.000 - 0.000	0.000	0	7	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8) (P-Outside)	C	No	CaAa (Out Of Face)	135.000 - 0.000	0.000	0	1	No Ice	0.198	0.001
								1/2" Ice	0.298	0.003
								1" Ice	0.398	0.005
								2" Ice	0.598	0.011
								4" Ice	0.998	0.031
M LDF7-50A(1-5/8") (E-Outside)	B	No	CaAa (Out Of Face)	125.000 - 0.000	0.000	0	1	No Ice	0.198	0.001
								1/2" Ice	0.298	0.002
								1" Ice	0.398	0.004
								2" Ice	0.598	0.011
								4" Ice	0.998	0.030
LDF7-50A(1-5/8") (E-Outside Sheilded)	B	No	CaAa (Out Of Face)	125.000 - 0.000	0.000	0	1	No Ice	0.000	0.001
								1/2" Ice	0.000	0.002
								1" Ice	0.000	0.004
								2" Ice	0.000	0.011
								4" Ice	0.000	0.030
LDF7-50A(1-5/8") (E)	B	No	Inside Pole	125.000 - 0.000	0.000	0	10	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
MLE Hybrid	B	No	Inside Pole	125.000 - 0.000	0.000	0	1	No Ice	0.000	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight klf
3Power/6Fiber RL 2 10AWG(1-1/4') (E) *M*								1/2" Ice	0.000	0.000
								1" Ice	0.000	0.000
								2" Ice	0.000	0.000
								4" Ice	0.000	0.000
HB114-1-08U4-M5J(1 1/4") (E)	A	No	Inside Pole	113.000 - 0.000	0.000	0	3	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
LDF4.5-50(5/8") (E)	A	No	Inside Pole	113.000 - 0.000	0.000	0	1	No Ice	0.000	0.000
								1/2" Ice	0.000	0.000
								1" Ice	0.000	0.000
								2" Ice	0.000	0.000
								4" Ice	0.000	0.000
M FXL 780 PE(7/8) (E-Outside Sheilded)	B	No	CaAa (Out Of Face)	100.000 - 0.000	0.000	0	6	No Ice	0.000	0.000
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.003
								2" Ice	0.000	0.008
								4" Ice	0.000	0.025
840 10414(5/16") (E-Outside Sheilded)	B	No	CaAa (Out Of Face)	100.000 - 0.000	0.000	0	1	No Ice	0.000	0.000
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.002
								2" Ice	0.000	0.006
								4" Ice	0.000	0.021
M LDF4-50A(1/2") (E-Outside Sheilded)	A	No	CaAa (Out Of Face)	51.000 - 0.000	0.000	0	1	No Ice	0.000	0.000
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.002
								2" Ice	0.000	0.007
								4" Ice	0.000	0.023
M Safety Line 3/8 (E)	C	No	CaAa (Out Of Face)	144.500 - 0.000	0.000	0	1	No Ice	0.037	0.000
								1/2" Ice	0.137	0.001
								1" Ice	0.238	0.001
								2" Ice	0.437	0.002
								4" Ice	0.838	0.004
M Grounding Line (3/8) (SHIELDED)	C	No	CaAa (Out Of Face)	51.000 - 0.000	0.000	0	1	No Ice	0.000	0.000
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.002
								4" Ice	0.000	0.004
Climbing Ladder (Flat) (E)	B	No	CaAa (Out Of Face)	144.500 - 137.000	36.000	0	1	No Ice	0.584	0.005
								1/2" Ice	1.030	0.007
								1" Ice	1.476	0.010
								2" Ice	2.368	0.020
								4" Ice	4.151	0.049
Climbing Ladder (Flat) (E)	B	No	CaAa (Out Of Face)	137.000 - 127.000	36.000	0	1	No Ice	0.584	0.005
								1/2" Ice	1.030	0.007
								1" Ice	1.476	0.010
								2" Ice	2.368	0.020
								4" Ice	4.151	0.049
Climbing Ladder (Flat) (E)	B	No	CaAa (Out Of Face)	127.000 - 117.000	36.000	0	1	No Ice	0.584	0.005
								1/2" Ice	1.030	0.007
								1" Ice	1.476	0.010
								2" Ice	2.368	0.020
								4" Ice	4.151	0.049
Climbing	B	No	CaAa (Out Of Face)	115.000 - 105.000	36.000	0	1	No Ice	0.584	0.005

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight klf
Ladder (Flat) (E)								1/2" Ice	1.030	0.007
								1" Ice	1.476	0.010
								2" Ice	2.368	0.020
								4" Ice	4.151	0.049
Climbing Ladder (Flat) (E)	B	No	CaAa (Out Of Face)	102.000 - 92.000	36.000	0	1	No Ice	0.584	0.005
								1/2" Ice	1.030	0.007
								1" Ice	1.476	0.010
								2" Ice	2.368	0.020
								4" Ice	4.151	0.049
@										
1 1/4" Plate (CaAa) (P-Mod)	A	No	CaAa (Out Of Face)	60.000 - 0.000	0.000	0	1	No Ice	0.208	0.017
								1/2" Ice	0.292	0.018
								1" Ice	0.375	0.020
								2" Ice	0.542	0.024
								4" Ice	0.875	0.036
1" Plate (CaAa) (P-Mod)	A	No	CaAa (Out Of Face)	80.000 - 60.000	0.000	0	1	No Ice	0.167	0.014
								1/2" Ice	0.250	0.015
								1" Ice	0.333	0.016
								2" Ice	0.500	0.020
								4" Ice	0.833	0.032
1" Plate (CaAa) (P-Mod)	A	No	CaAa (Out Of Face)	105.000 - 90.000	0.000	0	1	No Ice	0.167	0.014
								1/2" Ice	0.250	0.015
								1" Ice	0.333	0.016
								2" Ice	0.500	0.020
								4" Ice	0.833	0.032
**										
1 1/4" Plate (CaAa) (P-Mod)	B	No	CaAa (Out Of Face)	80.000 - 0.000	0.000	0	1	No Ice	0.208	0.000
								1/2" Ice	0.292	0.000
								1" Ice	0.375	0.000
								2" Ice	0.542	0.000
								4" Ice	0.875	0.000
1" Plate (CaAa) (P-Mod)	B	No	CaAa (Out Of Face)	105.000 - 90.000	0.000	0	1	No Ice	0.167	0.000
								1/2" Ice	0.250	0.000
								1" Ice	0.333	0.000
								2" Ice	0.500	0.000
								4" Ice	0.833	0.000
@										

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	144.500-117.567	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	17.211	0.206
		C	0.000	0.000	0.000	4.462	0.564
L2	117.567-103.500	A	0.000	0.000	0.000	0.250	0.053
		B	0.000	0.000	0.000	9.211	0.196
		C	0.000	0.000	0.000	3.313	0.346
L3	103.500-98.500	A	0.000	0.000	0.000	0.833	0.085
		B	0.000	0.000	0.000	3.869	0.071
		C	0.000	0.000	0.000	1.178	0.123
L4	98.500-87.184	A	0.000	0.000	0.000	1.417	0.154
		B	0.000	0.000	0.000	7.456	0.166
		C	0.000	0.000	0.000	2.665	0.279
L5	87.184-77.250	A	0.000	0.000	0.000	0.458	0.071
		B	0.000	0.000	0.000	2.540	0.118
		C	0.000	0.000	0.000	2.339	0.245

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
L6	77.250-57.250	A	0.000	0.000	0.000	3.448	0.349
		B	0.000	0.000	0.000	8.127	0.237
		C	0.000	0.000	0.000	4.710	0.492
L7	57.250-42.108	A	0.000	0.000	0.000	3.155	0.312
		B	0.000	0.000	0.000	6.153	0.180
		C	0.000	0.000	0.000	3.566	0.375
L8	42.108-31.250	A	0.000	0.000	0.000	2.262	0.224
		B	0.000	0.000	0.000	4.412	0.129
		C	0.000	0.000	0.000	2.557	0.270
L9	31.250-0.000	A	0.000	0.000	0.000	6.510	0.645
		B	0.000	0.000	0.000	12.698	0.371
		C	0.000	0.000	0.000	7.359	0.776

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	144.500-117.567	A	0.885	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	39.765	0.382
		C		0.000	0.000	0.000	12.310	0.644
L2	117.567-103.500	A	0.867	0.000	0.000	0.000	0.471	0.056
		B		0.000	0.000	0.000	20.253	0.335
		C		0.000	0.000	0.000	8.290	0.404
L3	103.500-98.500	A	0.858	0.000	0.000	0.000	1.548	0.095
		B		0.000	0.000	0.000	8.118	0.138
		C		0.000	0.000	0.000	2.893	0.143
L4	98.500-87.184	A	0.849	0.000	0.000	0.000	2.619	0.172
		B		0.000	0.000	0.000	15.500	0.418
		C		0.000	0.000	0.000	6.508	0.323
L5	87.184-77.250	A	0.837	0.000	0.000	0.000	0.847	0.077
		B		0.000	0.000	0.000	4.616	0.314
		C		0.000	0.000	0.000	5.713	0.283
L6	77.250-57.250	A	0.817	0.000	0.000	0.000	6.170	0.390
		B		0.000	0.000	0.000	14.115	0.612
		C		0.000	0.000	0.000	11.243	0.567
L7	57.250-42.108	A	0.788	0.000	0.000	0.000	5.142	0.355
		B		0.000	0.000	0.000	10.525	0.451
		C		0.000	0.000	0.000	8.336	0.436
L8	42.108-31.250	A	0.759	0.000	0.000	0.000	3.687	0.262
		B		0.000	0.000	0.000	7.547	0.323
		C		0.000	0.000	0.000	5.978	0.318
L9	31.250-0.000	A	0.750	0.000	0.000	0.000	10.417	0.747
		B		0.000	0.000	0.000	21.292	0.895
		C		0.000	0.000	0.000	16.734	0.906

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	144.500-117.567	0.438	0.436	0.647	0.717
L2	117.567-103.500	0.393	0.461	0.569	0.755
L3	103.500-98.500	0.478	0.346	0.662	0.578
L4	98.500-87.184	0.391	0.346	0.540	0.589
L5	87.184-77.250	0.023	0.250	-0.097	0.448
L6	77.250-57.250	0.175	0.176	0.120	0.313
L7	57.250-42.108	0.177	0.135	0.125	0.282
L8	42.108-31.250	0.179	0.136	0.127	0.286
L9	31.250-0.000	0.182	0.139	0.133	0.289

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 5/8" x 5' (E)	C	None			0.000	147.000	No Ice	0.313	0.313	0.031
							1/2" Ice	0.826	0.826	0.035
							1" Ice	1.322	1.322	0.041
							2" Ice	1.957	1.957	0.065
							4" Ice	3.338	3.338	0.159
Strobe (E)	C	None			0.000	149.500	No Ice	5.250	3.500	0.020
							1/2" Ice	5.565	3.777	0.058
							1" Ice	5.890	4.062	0.100
							2" Ice	6.564	4.658	0.198
							4" Ice	8.015	5.954	0.450
5' x 2" Pipe Mount (E-For Strobe)	C	None			0.000	147.000	No Ice	1.000	1.000	0.029
							1/2" Ice	1.393	1.393	0.037
							1" Ice	1.703	1.703	0.048
							2" Ice	2.351	2.351	0.082
							4" Ice	3.778	3.778	0.196
Top Hat (E)	C	None			0.000	146.000	No Ice	3.000	3.000	0.081
							1/2" Ice	3.480	3.480	0.111
							1" Ice	3.960	3.960	0.141
							2" Ice	4.920	4.920	0.201
							4" Ice	6.840	6.840	0.321
M (2) 7770.00 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 1.000		0.000	145.000	No Ice	6.119	4.254	0.055
							1/2" Ice	6.626	5.014	0.103
							1" Ice	7.128	5.711	0.157
							2" Ice	8.164	7.155	0.287
							4" Ice	10.360	10.412	0.665
(2) 7770.00 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 1.000		0.000	145.000	No Ice	6.119	4.254	0.055
							1/2" Ice	6.626	5.014	0.103
							1" Ice	7.128	5.711	0.157
							2" Ice	8.164	7.155	0.287
							4" Ice	10.360	10.412	0.665
(2) 7770.00 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 1.000		0.000	145.000	No Ice	6.119	4.254	0.055
							1/2" Ice	6.626	5.014	0.103
							1" Ice	7.128	5.711	0.157
							2" Ice	8.164	7.155	0.287
							4" Ice	10.360	10.412	0.665

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) LGP21401 (E)	A	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
(2) LGP21401 (E)	B	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
(2) LGP21401 (E)	C	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
(2) 782-10250 (E)	A	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.524 0.631 0.747 1.005 1.625	0.267 0.359 0.460 0.686 1.244	0.006 0.010 0.015 0.030 0.085
(2) 782-10250 (E)	B	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.524 0.631 0.747 1.005 1.625	0.267 0.359 0.460 0.686 1.244	0.006 0.010 0.015 0.030 0.085
(2) 782-10250 (E)	C	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.524 0.631 0.747 1.005 1.625	0.267 0.359 0.460 0.686 1.244	0.006 0.010 0.015 0.030 0.085
(4) 7020.00 (E)	A	From Leg	4.000 0.000 1.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.119 0.171 0.232 0.380 0.779	0.204 0.279 0.363 0.556 1.046	0.002 0.005 0.009 0.022 0.071
(4) 7020.00 (E)	B	From Leg	4.000 0.000 1.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.119 0.171 0.232 0.380 0.779	0.204 0.279 0.363 0.556 1.046	0.002 0.005 0.009 0.022 0.071
(4) 7020.00 (E)	C	From Leg	4.000 0.000 1.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.119 0.171 0.232 0.380 0.779	0.204 0.279 0.363 0.556 1.046	0.002 0.005 0.009 0.022 0.071
RRUS 11 (E-Azimuth per photo)	A	From Leg	4.000 0.000 0.000	90.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS 11 (E-Azimuth per photo)	B	From Leg	4.000 0.000 0.000	90.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS 11 (E-Azimuth per photo)	C	From Leg	4.000 0.000	90.000	145.000	No Ice 1/2" Ice	3.249 3.491	1.373 1.551	0.048 0.068

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
HPA-65R-BUU-H8 w/ Mount Pipe (R)	A	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.533 14.335 15.143 16.708 19.954	9.582 11.052 12.496 14.752 19.462	0.100 0.196 0.303 0.550 1.219
HPA-65R-BUU-H8 w/ Mount Pipe (R)	B	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.533 14.335 15.143 16.708 19.954	9.582 11.052 12.496 14.752 19.462	0.100 0.196 0.303 0.550 1.219
HPA-65R-BUU-H8 w/ Mount Pipe (R)	C	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.533 14.335 15.143 16.708 19.954	9.582 11.052 12.496 14.752 19.462	0.100 0.196 0.303 0.550 1.219
RRUS A2 (R)	A	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.411 2.619 2.837 3.297 4.322	0.533 0.665 0.806 1.114 1.833	0.022 0.035 0.050 0.088 0.203
RRUS A2 (R)	B	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.411 2.619 2.837 3.297 4.322	0.533 0.665 0.806 1.114 1.833	0.022 0.035 0.050 0.088 0.203
RRUS A2 (R)	C	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.411 2.619 2.837 3.297 4.322	0.533 0.665 0.806 1.114 1.833	0.022 0.035 0.050 0.088 0.203
RRUS 11 B4 (R)	A	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
RRUS 11 B4 (R)	B	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
RRUS 11 B4 (R)	C	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
8'x2" Antenna Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.900 2.728 3.401 4.396 6.498	1.900 2.728 3.401 4.396 6.498	0.030 0.044 0.064 0.120 0.301
8'x2" Antenna Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.030 0.044 0.064 0.120

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	6.498	6.498	0.301
8'x2" Antenna Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.900 2.728 3.401 4.396 6.498	1.900 2.728 3.401 4.396 6.498	0.030 0.044 0.064 0.120 0.301
Platform Mount [LP 712-1] (E)	C	None		0.000	145.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.530 29.940 35.350 46.170 67.810	24.530 29.940 35.350 46.170 67.810	1.335 1.646 1.956 2.577 3.820
M LNX-6512DS-VTM w/ Mount Pipe (E)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.791 6.245 6.709 7.667 9.720	4.501 5.170 5.852 7.269 10.366	0.039 0.087 0.140 0.269 0.637
LNX-6512DS-VTM w/ Mount Pipe (E)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.791 6.245 6.709 7.667 9.720	4.501 5.170 5.852 7.269 10.366	0.039 0.087 0.140 0.269 0.637
LNX-6512DS-VTM w/ Mount Pipe (E)	C	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.791 6.245 6.709 7.667 9.720	4.501 5.170 5.852 7.269 10.366	0.039 0.087 0.140 0.269 0.637
(2) FD9R6004/2C-3L (E)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
(2) FD9R6004/2C-3L (E)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
(2) FD9R6004/2C-3L (E)	C	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
DB-T1-6Z-8AB-0Z (E)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.600 5.915 6.240 6.914 8.365	2.333 2.558 2.791 3.284 4.373	0.044 0.080 0.120 0.213 0.455
LNX-6514DS-AIM w/ Mount Pipe (P)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.648 9.305 9.930 11.204 13.872	7.082 8.273 9.185 11.023 15.063	0.065 0.134 0.211 0.393 0.902
LNX-6514DS-AIM w/ Mount Pipe (P)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.648 9.305 9.930 11.204 13.872	7.082 8.273 9.185 11.023 15.063	0.065 0.134 0.211 0.393 0.902

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LNX-6514DS-AIM w/ Mount Pipe (P)	C	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.648 9.305 9.930 11.204 13.872	7.082 8.273 9.185 11.023 15.063	0.065 0.134 0.211 0.393 0.902
(2) HBXX-6517DS-A2M w/ Mount Pipe (P)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
(2) HBXX-6517DS-A2M w/ Mount Pipe (P)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
(2) HBXX-6517DS-A2M w/ Mount Pipe (P)	C	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
RRH2x60-700 (P)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	0.060 0.083 0.109 0.173 0.354
RRH2x60-700 (P)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	0.060 0.083 0.109 0.173 0.354
RRH2x60-700 (P)	C	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	0.060 0.083 0.109 0.173 0.354
RRH2X60-PCS (P)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	0.055 0.075 0.099 0.155 0.313
RRH2X60-PCS (P)	B	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	0.055 0.075 0.099 0.155 0.313
RRH2X60-PCS (P)	C	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	0.055 0.075 0.099 0.155 0.313
RRH2X60-AWS (P)	A	From Leg	4.000 0.000 2.000	0.000	135.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	0.060 0.083 0.109 0.173 0.354
RRH2X60-AWS (P)	B	From Leg	4.000 0.000	0.000	135.000	No Ice 1/2" Ice	3.957 4.272	1.816 2.075	0.060 0.083

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2X60-AWS	C	From Leg	4.000	0.000	135.000	No Ice	3.957	1.816	0.060
(P)			0.000			1/2" Ice	4.272	2.075	0.083
			2.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
DB-T1-6Z-8AB-0Z	B	From Leg	4.000	0.000	135.000	No Ice	5.600	2.333	0.044
(P)			0.000			1/2" Ice	5.915	2.558	0.080
			2.000			1" Ice	6.240	2.791	0.120
						2" Ice	6.914	3.284	0.213
						4" Ice	8.365	4.373	0.455
Platform Mount [LP 712-1]	C	None		0.000	135.000	No Ice	24.530	24.530	1.335
(E)						1/2" Ice	29.940	29.940	1.646
						1" Ice	35.350	35.350	1.956
						2" Ice	46.170	46.170	2.577
						4" Ice	67.810	67.810	3.820
M									
ERICSSON AIR 21 B2A	A	From Leg	4.000	0.000	125.000	No Ice	6.825	5.642	0.112
B4P w/ Mount Pipe			0.000			1/2" Ice	7.347	6.480	0.169
(E)			1.000			1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B2A	B	From Leg	4.000	0.000	125.000	No Ice	6.825	5.642	0.112
B4P w/ Mount Pipe			0.000			1/2" Ice	7.347	6.480	0.169
(E)			1.000			1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B2A	C	From Leg	4.000	0.000	125.000	No Ice	6.825	5.642	0.112
B4P w/ Mount Pipe			0.000			1/2" Ice	7.347	6.480	0.169
(E)			1.000			1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B4A	A	From Leg	4.000	0.000	125.000	No Ice	6.825	5.642	0.112
B2P w/ Mount Pipe			0.000			1/2" Ice	7.347	6.480	0.169
(E)			1.000			1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B4A	B	From Leg	4.000	0.000	125.000	No Ice	6.825	5.642	0.112
B2P w/ Mount Pipe			0.000			1/2" Ice	7.347	6.480	0.169
(E)			1.000			1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B4A	C	From Leg	4.000	0.000	125.000	No Ice	6.825	5.642	0.112
B2P w/ Mount Pipe			0.000			1/2" Ice	7.347	6.480	0.169
(E)			1.000			1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
KRY 112 144/1	A	From Leg	4.000	0.000	125.000	No Ice	0.408	0.204	0.011
(E)			0.000			1/2" Ice	0.497	0.273	0.014
			1.000			1" Ice	0.594	0.351	0.019
						2" Ice	0.815	0.533	0.032
						4" Ice	1.359	0.999	0.082
KRY 112 144/1	B	From Leg	4.000	0.000	125.000	No Ice	0.408	0.204	0.011
(E)			0.000			1/2" Ice	0.497	0.273	0.014
			1.000			1" Ice	0.594	0.351	0.019

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	0.815	0.533	0.032
						4" Ice	1.359	0.999	0.082
KRY 112 144/1	C	From Leg	4.000	0.000	125.000	No Ice	0.408	0.204	0.011
(E)			0.000			1/2" Ice	0.497	0.273	0.014
			1.000			1" Ice	0.594	0.351	0.019
						2" Ice	0.815	0.533	0.032
						4" Ice	1.359	0.999	0.082
Platform Mount [LP 712-1]	C	None		0.000	125.000	No Ice	24.530	24.530	1.335
(E)						1/2" Ice	29.940	29.940	1.646
						1" Ice	35.350	35.350	1.956
						2" Ice	46.170	46.170	2.577
						4" Ice	67.810	67.810	3.820
M									
APXVSPP18-C-A20 w/	A	From Leg	4.000	0.000	113.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.151
(E)			0.000			1" Ice	9.767	9.021	0.227
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
APXVSPP18-C-A20 w/	B	From Leg	4.000	0.000	113.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.151
(E)			0.000			1" Ice	9.767	9.021	0.227
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
APXVSPP18-C-A20 w/	C	From Leg	4.000	0.000	113.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.151
(E)			0.000			1" Ice	9.767	9.021	0.227
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
APXVTM14-C-120 w/	A	From Leg	4.000	0.000	113.000	No Ice	7.134	4.959	0.077
Mount Pipe			0.000			1/2" Ice	7.662	5.754	0.132
(E)			0.000			1" Ice	8.183	6.472	0.193
						2" Ice	9.256	8.010	0.339
						4" Ice	11.526	11.412	0.753
APXVTM14-C-120 w/	B	From Leg	4.000	0.000	113.000	No Ice	7.134	4.959	0.077
Mount Pipe			0.000			1/2" Ice	7.662	5.754	0.132
(E)			0.000			1" Ice	8.183	6.472	0.193
						2" Ice	9.256	8.010	0.339
						4" Ice	11.526	11.412	0.753
APXVTM14-C-120 w/	C	From Leg	4.000	0.000	113.000	No Ice	7.134	4.959	0.077
Mount Pipe			0.000			1/2" Ice	7.662	5.754	0.132
(E)			0.000			1" Ice	8.183	6.472	0.193
						2" Ice	9.256	8.010	0.339
						4" Ice	11.526	11.412	0.753
TD-RRH8x20-25	A	From Leg	4.000	0.000	113.000	No Ice	4.720	1.703	0.070
(E)			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
						2" Ice	5.948	2.622	0.201
						4" Ice	7.314	3.680	0.397
TD-RRH8x20-25	B	From Leg	4.000	0.000	113.000	No Ice	4.720	1.703	0.070
(E)			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
						2" Ice	5.948	2.622	0.201
						4" Ice	7.314	3.680	0.397
TD-RRH8x20-25	C	From Leg	4.000	0.000	113.000	No Ice	4.720	1.703	0.070
(E)			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
						2" Ice	5.948	2.622	0.201

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	7.314	3.680	0.397
Platform Mount [LP 712-1] (E)	C	None		0.000	113.000	No Ice	24.530	24.530	1.335
						1/2" Ice	29.940	29.940	1.646
						1" Ice	35.350	35.350	1.956
						2" Ice	46.170	46.170	2.577
						4" Ice	67.810	67.810	3.820
M									
PCS 1900MHz 4x45W-65MHz (E)	A	From Leg	1.000 0.000 0.000	0.000	111.000	No Ice	2.709	2.611	0.060
						1/2" Ice	2.948	2.847	0.083
						1" Ice	3.195	3.092	0.110
						2" Ice	3.716	3.608	0.173
						4" Ice	4.862	4.744	0.347
PCS 1900MHz 4x45W-65MHz (E)	B	From Leg	1.000 0.000 0.000	0.000	111.000	No Ice	2.709	2.611	0.060
						1/2" Ice	2.948	2.847	0.083
						1" Ice	3.195	3.092	0.110
						2" Ice	3.716	3.608	0.173
						4" Ice	4.862	4.744	0.347
PCS 1900MHz 4x45W-65MHz (E)	C	From Leg	1.000 0.000 0.000	0.000	111.000	No Ice	2.709	2.611	0.060
						1/2" Ice	2.948	2.847	0.083
						1" Ice	3.195	3.092	0.110
						2" Ice	3.716	3.608	0.173
						4" Ice	4.862	4.744	0.347
800MHz 2X50W RRH W/FILTER (E)	A	From Leg	1.000 0.000 -2.000	0.000	111.000	No Ice	2.401	2.254	0.064
						1/2" Ice	2.613	2.460	0.086
						1" Ice	2.833	2.675	0.111
						2" Ice	3.300	3.132	0.172
						4" Ice	4.337	4.148	0.338
800MHz 2X50W RRH W/FILTER (E)	B	From Leg	1.000 0.000 -2.000	0.000	111.000	No Ice	2.401	2.254	0.064
						1/2" Ice	2.613	2.460	0.086
						1" Ice	2.833	2.675	0.111
						2" Ice	3.300	3.132	0.172
						4" Ice	4.337	4.148	0.338
800MHz 2X50W RRH W/FILTER (E)	C	From Leg	1.000 0.000 -2.000	0.000	111.000	No Ice	2.401	2.254	0.064
						1/2" Ice	2.613	2.460	0.086
						1" Ice	2.833	2.675	0.111
						2" Ice	3.300	3.132	0.172
						4" Ice	4.337	4.148	0.338
Side Arm Mount [SO 102-3] (E)	C	None		0.000	111.000	No Ice	3.000	3.000	0.081
						1/2" Ice	3.480	3.480	0.111
						1" Ice	3.960	3.960	0.141
						2" Ice	4.920	4.920	0.201
						4" Ice	6.840	6.840	0.321
M									
800 10504 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 2.000	0.000	100.000	No Ice	3.589	3.178	0.038
						1/2" Ice	4.007	3.905	0.070
						1" Ice	4.422	4.581	0.109
						2" Ice	5.339	5.982	0.207
						4" Ice	7.385	8.983	0.514
800 10504 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 2.000	0.000	100.000	No Ice	3.589	3.178	0.038
						1/2" Ice	4.007	3.905	0.070
						1" Ice	4.422	4.581	0.109
						2" Ice	5.339	5.982	0.207
						4" Ice	7.385	8.983	0.514
800 10504 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 2.000	0.000	100.000	No Ice	3.589	3.178	0.038
						1/2" Ice	4.007	3.905	0.070
						1" Ice	4.422	4.581	0.109
						2" Ice	5.339	5.982	0.207

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	7.385	8.983	0.514
7'x2" Antenna Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.663 2.391 2.825 3.706 5.578	1.663 2.391 2.825 3.706 5.578	0.026 0.039 0.056 0.105 0.266
7'x2" Antenna Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.663 2.391 2.825 3.706 5.578	1.663 2.391 2.825 3.706 5.578	0.026 0.039 0.056 0.105 0.266
7'x2" Antenna Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.663 2.391 2.825 3.706 5.578	1.663 2.391 2.825 3.706 5.578	0.026 0.039 0.056 0.105 0.266
Platform Mount [LP 712-1] (E)	C	None		0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.530 29.940 35.350 46.170 67.810	24.530 29.940 35.350 46.170 67.810	1.335 1.646 1.956 2.577 3.820
M KS24019-L112A (E)	C	From Leg	3.000 0.000 1.000	0.000	51.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.156 0.225 0.302 0.484 0.951	0.156 0.225 0.302 0.484 0.951	0.005 0.007 0.009 0.018 0.056
Side Arm Mount [SO 701-1] (E)	C	From Leg	1.500 0.000 0.000	0.000	51.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.850 1.140 1.430 2.010 3.170	1.670 2.340 3.010 4.350 7.030	0.065 0.079 0.093 0.121 0.177
M									

Load Combinations

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

Comb. No.	Description
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 Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	144.5 - 117.567	33.822	31	2.246	0.005
L2	121.424 - 103.5	23.414	31	1.972	0.003
L3	103.5 - 98.5	16.641	31	1.583	0.002
L4	98.5 - 87.184	15.030	31	1.493	0.001
L5	91.809 - 77.25	13.004	31	1.397	0.001
L6	77.25 - 57.25	9.092	31	1.122	0.001
L7	57.25 - 42.108	5.030	37	0.818	0.000
L8	47.884 - 31.25	3.568	37	0.674	0.000
L9	31.25 - 0	1.523	37	0.474	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.500	Strobe	31	33.822	2.246	0.005	13232
147.000	Lightning Rod 5/8" x 5'	31	33.822	2.246	0.005	13232
146.000	Top Hat	31	33.822	2.246	0.005	13232
145.000	(2) 7770.00 w/ Mount Pipe	31	33.822	2.246	0.005	13232
135.000	LNX-6512DS-VTM w/ Mount Pipe	31	29.410	2.160	0.004	6964
125.000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	31	24.937	2.033	0.003	3394
113.000	APXVSPP18-C-A20 w/ Mount Pipe	31	20.041	1.793	0.002	2546
111.000	PCS 1900MHz 4x45W-65MHz	31	19.288	1.747	0.002	2481
100.000	800 10504 w/ Mount Pipe	31	15.503	1.518	0.001	3142
51.000	KS24019-L112A	37	4.031	0.720	0.000	5224

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	144.5 - 117.567	97.272	6	6.463	0.013
L2	121.424 - 103.5	67.409	6	5.676	0.008
L3	103.5 - 98.5	47.945	6	4.562	0.004
L4	98.5 - 87.184	43.310	6	4.303	0.004
L5	91.809 - 77.25	37.480	6	4.028	0.003
L6	77.25 - 57.25	26.215	6	3.235	0.002
L7	57.25 - 42.108	14.510	12	2.358	0.001
L8	47.884 - 31.25	10.293	12	1.944	0.001
L9	31.25 - 0	4.394	12	1.368	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.500	Strobe	6	97.272	6.463	0.013	4735
147.000	Lightning Rod 5/8" x 5'	6	97.272	6.463	0.013	4735
146.000	Top Hat	6	97.272	6.463	0.013	4735
145.000	(2) 7770.00 w/ Mount Pipe	6	97.272	6.463	0.013	4735
135.000	LNX-6512DS-VTM w/ Mount Pipe	6	84.616	6.215	0.011	2491
125.000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	6	71.781	5.852	0.009	1212
113.000	APXVSPP18-C-A20 w/ Mount Pipe	6	57.720	5.164	0.006	903
111.000	PCS 1900MHz 4x45W-65MHz	6	55.556	5.033	0.006	879
100.000	800 10504 w/ Mount Pipe	6	44.671	4.374	0.004	1106
51.000	KS24019-L112A	12	11.628	2.078	0.001	1818

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	144.5 - 117.567 (1)	TP26.875x21x0.188	26.933	0.000	0.0	39.000	15.382	-7.317	599.886	0.012
L2	117.567 - 103.5 (2)	TP29.502x25.659x0.25	17.924	0.000	0.0	39.000	23.211	-11.898	905.238	0.013
L3	103.5 - 98.5 (3)	TP30.574x29.502x0.408	5.000	0.000	0.0	27.705	39.023	-14.272	1081.120	0.013
L4	98.5 - 87.184 (4)	TP33x30.574x0.554	11.316	0.000	0.0	27.744	55.270	-15.866	1533.420	0.010
L5	87.184 - 77.25 (5)	TP34.646x31.508x0.375	14.559	0.000	0.0	39.000	40.791	-19.605	1590.840	0.012
L6	77.25 - 57.25 (6)	TP38.956x34.646x0.601	20.000	0.000	0.0	31.055	73.143	-25.576	2271.470	0.011
L7	57.25 - 42.108 (7)	TP42.219x38.956x0.588	15.142	0.000	0.0	31.103	75.351	-28.636	2343.610	0.012
L8	42.108 - 31.25 (8)	TP43.794x40.224x0.636	16.634	0.000	0.0	31.162	87.141	-35.922	2715.500	0.013
L9	31.25 - 0 (9)	TP50.5x43.794x0.562	31.250	0.000	0.0	34.502	89.146	-48.592	3075.660	0.016

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	144.5 - 117.567 (1)	TP26.875x21x0.188	307.397	37.579	39.000	0.964	0.000	0.000	39.000	0.000
L2	117.567 - 103.5 (2)	TP29.502x25.659x0.25	708.164	50.756	39.000	1.301	0.000	0.000	39.000	0.000
L3	103.5 - 98.5 (3)	TP30.574x29.502x0.408	840.625	34.922	27.705	1.260	0.000	0.000	27.705	0.000
L4	98.5 - 87.184 (4)	TP33x30.574x0.554	1029.942	29.089	27.744	1.048	0.000	0.000	27.744	0.000
L5	87.184 - 77.25 (5)	TP34.646x31.508x0.375	1459.475	50.927	39.000	1.306	0.000	0.000	39.000	0.000
L6	77.25 - 57.25 (6)	TP38.956x34.646x0.601	2083.025	36.388	31.055	1.172	0.000	0.000	31.055	0.000
L7	57.25 - 42.108 (7)	TP42.219x38.956x0.588	2389.050	38.431	31.103	1.236	0.000	0.000	31.103	0.000
L8	42.108 - 31.25 (8)	TP43.794x40.224x0.636	2955.258	38.475	31.162	1.235	0.000	0.000	31.162	0.000
L9	31.25 - 0 (9)	TP50.5x43.794x0.562	4081.317	44.735	34.502	1.297	0.000	0.000	34.502	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	144.5 - 117.567 (1)	TP26.875x21x0.188	19.199	1.248	26.000	0.096	0.029	0.002	26.000	0.000
L2	117.567 - 103.5 (2)	TP29.502x25.659x0.25	25.477	1.098	26.000	0.084	0.060	0.002	26.000	0.000
L3	103.5 - 98.5 (3)	TP30.574x29.502x0.408	27.905	0.715	18.470	0.077	0.063	0.001	18.470	0.000
L4	98.5 - 87.184 (4)	TP33x30.574x0.554	28.699	0.519	18.496	0.056	0.069	0.001	18.496	0.000
L5	87.184 - 77.25 (5)	TP34.646x31.508x0.375	30.169	0.740	26.000	0.057	0.090	0.002	26.000	0.000
L6	77.25 - 57.25 (6)	TP38.956x34.646x0.601	32.240	0.441	20.703	0.043	0.101	0.001	20.703	0.000
L7	57.25 - 42.108 (7)	TP42.219x38.956x0.588	33.197	0.441	20.735	0.042	0.295	0.002	20.735	0.000
L8	42.108 - 31.25 (8)	TP43.794x40.224x0.636	34.814	0.400	20.775	0.038	0.299	0.002	20.775	0.000
L9	31.25 - 0 (9)	TP50.5x43.794x0.562	37.285	0.418	23.001	0.036	0.307	0.002	23.001	0.000

Pole Interaction Design Data

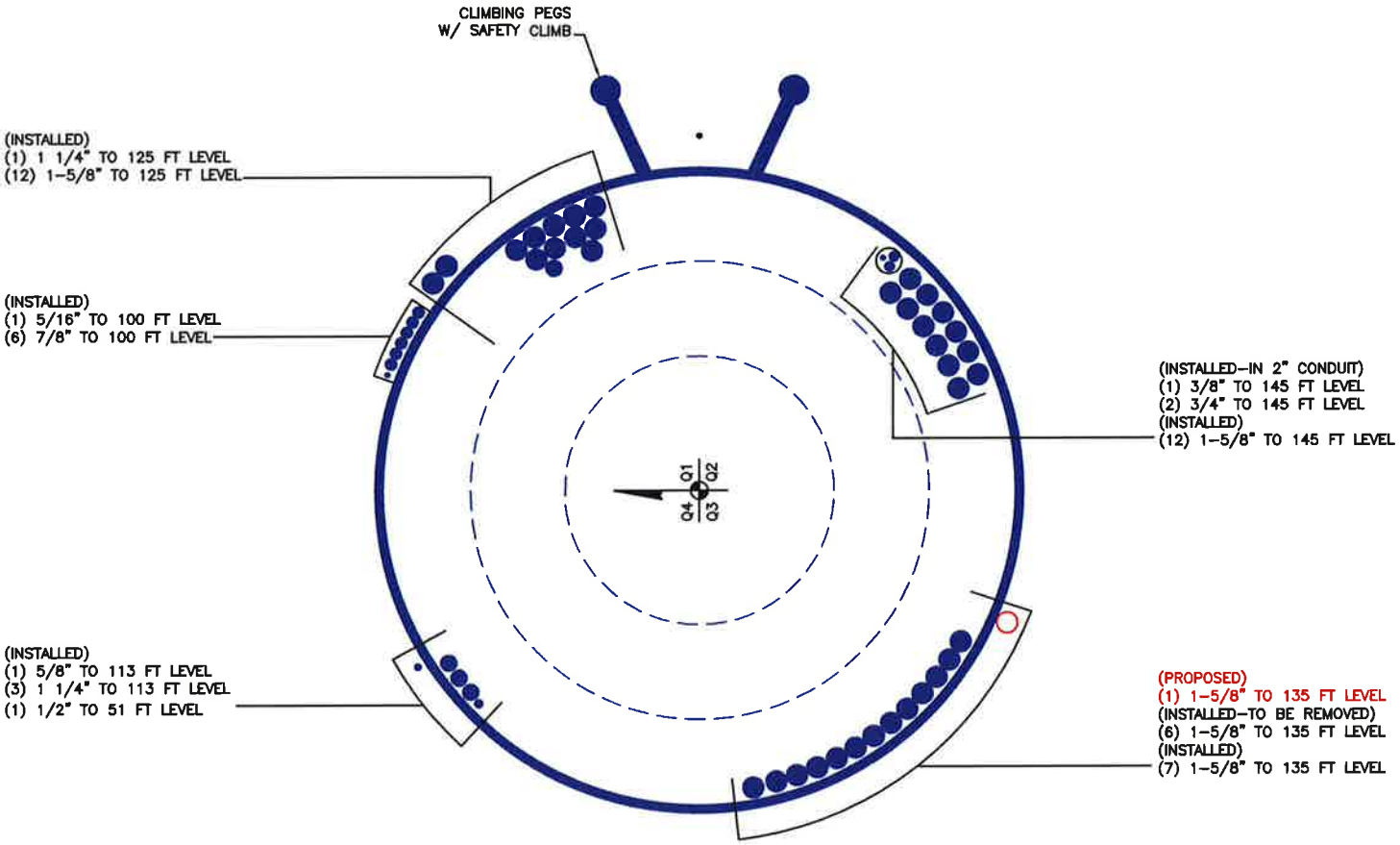
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	144.5 - 117.567 (1)	0.012	0.964	0.000	0.096	0.000	0.978 ✔	1.333	H1-3+VT ✔
L2	117.567 - 103.5 (2)	0.013	1.301	0.000	0.084	0.000	1.316 ✔	1.333	H1-3+VT ✔
L3	103.5 - 98.5 (3)	0.013	1.260	0.000	0.077	0.000	1.275 ✔	1.333	H1-3+VT ✔
L4	98.5 - 87.184 (4)	0.010	1.048	0.000	0.056	0.000	1.060 ✔	1.333	H1-3+VT ✔
L5	87.184 - 77.25 (5)	0.012	1.306	0.000	0.057	0.000	1.319 ✔	1.333	H1-3+VT ✔
L6	77.25 - 57.25 (6)	0.011	1.172	0.000	0.043	0.000	1.183 ✔	1.333	H1-3+VT ✔
L7	57.25 - 42.108 (7)	0.012	1.236	0.000	0.042	0.000	1.248 ✔	1.333	H1-3+VT ✔
L8	42.108 - 31.25 (8)	0.013	1.235	0.000	0.038	0.000	1.248 ✔	1.333	H1-3+VT ✔
L9	31.25 - 0 (9)	0.016	1.297	0.000	0.036	0.000	1.313 ✔	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	144.5 - 117.567	Pole	TP26.875x21x0.188	1	-7.317	799.648	73.1	Pass
L2	117.567 - 103.5	Pole	TP29.502x25.659x0.25	2	-11.898	1206.682	98.6	Pass
L3	103.5 - 98.5	Pole	TP30.574x29.502x0.408	3	-14.272	1441.133	93.1	Pass
L4	98.5 - 87.184	Pole	TP33x30.574x0.554	4	-15.866	2044.049	77.4	Pass
L5	87.184 - 77.25	Pole	TP34.646x31.508x0.375	5	-19.605	2120.590	98.8	Pass
L6	77.25 - 57.25	Pole	TP38.956x34.646x0.601	6	-25.576	3027.869	86.5	Pass
L7	57.25 - 42.108	Pole	TP42.219x38.956x0.588	7	-28.636	3124.032	91.3	Pass
L8	42.108 - 31.25	Pole	TP43.794x40.224x0.636	8	-35.922	3619.761	91.2	Pass
L9	31.25 - 0	Pole	TP50.5x43.794x0.562	9	-48.592	4099.855	92.0	Pass
							Summary	
						Pole (L5)	98.8	Pass
						RATING =	**98.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT : 881533

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforced Pole Stress and Effective Thickness Check

AeroSolutions LLC
Engineering Your Tower Modifications
3000 Marcona Parkway, Suite 100
Boulder, CO 80301
720-514-9862

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
91.5	98.5	3	CCI-1x4.5	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1						1						1				

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0	31.25	3	CCI-1.25x8.5	F	T&C
31.25	57.25	3	CCI-1.25x6.5	F	T&C
57.25	77.25	3	CCI-1.25x6.5	F	T&C
91.5	103.5	3	CCI-1x4.5	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1								1						1		
			1						1						1		
			1						1						1		
		1						1						1			

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^3)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ Increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
CCI-1x4.5	15.3	4.50	0.38	7.59	0.5	0	1	4.5	0	0	1.21875	65	80	0.80	20	1.00	20	128.8	171.7	Rupture	193.1	Rupture
CCI-1.25x6.5	27.6	8.13	1.06	28.61	0.625	0	1.25	6.5	0	0	1.21875	65	80	0.80	19	1.00	19	260.4	347.2	Compress.	391.4	Rupture
CCI-1.25x8.5	36.2	10.63	1.38	63.97	0.625	0	1.25	8.5	0	0	1.21875	65	80	0.80	17	1.00	17	350.9	467.9	Compress.	541.4	Rupture

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	881533
Name:	GROTON TOWER
App. #:	300606; Revision # 0

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Base Reactions		
Moment:	4081	ft-kip
Axial:	49	kip
Shear:	37	kip
Base Plate Type:	Circular	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	102%
eta Factor:	0.50

Original Anchor Rod Data		
Quantity:	16	
Diameter:	2.25	in
Material:	A615 GR 75	
Bolt Circle:	59.0	in
Bolt Spacing:		in
Bolt Group Area:	63.62	in^2
Bolt Group MOIx:	27698	in^4

Reactions Seen by Original AR Group		
Moment:	3194.0	kip-ft
Axial:	48.6	kip
Shear:	37.3	kip

Original AR Capacity Check		
Tension Load:	159.1	kip
Allowable load:	194.8	kip
AR Capacity:	81.7%	Pass

First Added Anchor Rod Data		
Quantity:	7	
Diameter:	1.75	in
Material:	A615 GR 75	
Bolt Circle:	62.6	in
Bolt Group Area:	16.84	in^2
Bolt Group MOIx:	7695	in^4

Reactions Seen by First Added AR Group		
Moment:	887.4	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

First Added AR Capacity Check		
Tension Load:	105.9	kip
Allowable load:	113.9	kip
AR Capacity:	92.9%	Pass

Second Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Third Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

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

TIA Rev F

Site Data

BU#: *881533*
Site Name: *GROTON TOWER*
App #: *300606; Revision # 0*

Pole Manufacturer:	*Other*

Reactions		
Moment:	3190	ft-kips
Axial:	49	kips
Shear:	37	kips

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	59	in

Plate Data		
Diam:	65	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	10.02	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.625	in
Fillet V. Weld:	0.375	in
Width:	6.75	in
Height:	17.75	in
Thick:	0.625	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	50.5	in
Thick:	0.4375	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	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	159.1 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	81.6% Pass	

Base Plate Results

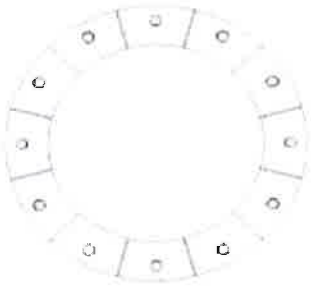
	Flexural Check	Stiffened
Base Plate Stress:	41.8 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	69.6% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	63.1% Pass
Vertical Weld:	41.4% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	22.7% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	67.6% Pass
Plate Comp. (AISC Bracket):	73.2% Pass

Pole Results

Pole Punching Shear Check:	10.5% 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

PROJECT	**92739.004.01 - GROTON TOWER,CT**		
SUBJECT	**Foundation Analysis**		
DATE	**07/23/15**	PAGE 1	OF 1

B+T GRP
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630

Monopole Pad & Pier Foundation Analysis

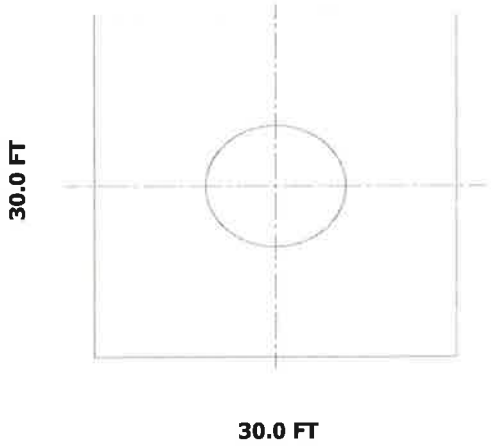
Rev. Type: F

Design Loads:

	Input unfactored loads	
Shear:	37.0	kips
Moment:	4,081.0	ft-kips
Tower Height:	144.5	ft
Tower Weight:	49.0	kips

Pad & Pier Dimensions / Properties:

Pole Diameter at Base:	50.50	in
Bearing Depth:	5.0	ft
Pad Width:	30.0	ft
Neglected Depth:	3.3	ft
Thickness:	5.0	ft
Pier Diameter:	0.0	ft
Pier Height Above Grade:	0.0	ft
BP Dist. Above Pier:	0.0	in
Clear Cover:	4.0	in
Pad Rebar Size:	8	
Pad Rebar Quanity:	44	
Rebar Yield Strength:	60000	psi
Concrete Strength:	4000	psi
Concrete Unit Weight:	0.15	kcf



Soil Data:

	Allowable Values	
Soil Unit Weight:	0.120	kcf
Ult. Bearing Capacity:	24.000	ksf
Angle of Friction:	30.000	deg
Cohesion:	0.000	ksf
Passive Pressure:	0.000	ksf
Base Friction:	0.200	

** Notes:

Summary of Results

Overturning	59.8%
Shear Capacity	51.1%
Bearing	11.2%
Pad Shear - 1-way	30.6%
Pad Shear - 2-way	3.5%
Pad Moment Capacity	35.6%

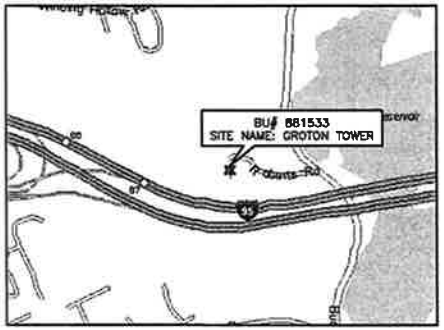
APPENDIX D

TOWER MODIFICATION DRAWINGS

TOWER MODIFICATION DRAWINGS PREPARED FOR: CROWN CASTLE

SITE NAME: GROTON TOWER
BU NUMBER: 881533

SITE ADDRESS:
75 ROBERTS ROAD
GROTON, CT 06340
NEW LONDON COUNTY, USA



MAP

DIRECTIONS

95 N TO 117 S TO BUDDINGTON RD. RIGHT ON BUDDINGTON TO ROBERTS RD. LEFT ON ROBERTS RD TO TOP OF HILL. *NOTE* ZAKJAK PLOWS SITE

PROJECT CONTACTS:

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

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

3. B+T GROUP RFI CONTACT
ROBBIE FRAZIER
(918) 587-4630
RFRAZIER@BTGRP.COM
MODDWGS@BTGRP.COM
1717 S BOULDER AVENUE, SUITE 300
TULSA, OK 74119

TOWER INFORMATION

TOWER MANUFACTURER / DWG #:	EEI / GS52968
TOWER HEIGHT / TYPE:	144.5' MONOPOLE
TOWER LOCATION:	LAT. 41° 21' 36.8"
DATUM: (NAD 1983)	LONG. -72° 2' 55.1"
	ELEV. 125 FT AMSL
STRUCTURAL DESIGN DRAWING REPORT:	B+T GROUP / WO. # 1083820
STRUCTURAL ANALYSIS REPORT:	B+T GROUP / WO. # 1079352
STRUCTURAL ANALYSIS DATE:	06/22/15
APPLICATION ID / REVISION #:	300606 / 0
CCISITES DOCUMENT ID:	5756537

CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS BASED ON 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.

DRAWINGS INCLUDED

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.

B+T GRP
1717 S. BOULDER AVE.
SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

CROWN CASTLE

ISSUED FOR:

REV	DATE	DESCRIPTION
0	07/23/15	ISSUED FOR CONSTRUCTION

PROJECT NO:	92739.004.01
PROJECT ENG:	ROBBIE FRAZIER
DRAWN BY:	UUJ / GLS
CHECKED BY:	SSC

B+T ENGINEERING, INC.
PEC.0001564
Expires 02/10/16

STATE OF CONNECTICUT · CHRISTOPHER TUTTLE · No. 23924 · LICENSED PROFESSIONAL ENGINEER · 7/23/15

GROTON TOWER
881533
75 ROBERTS ROAD
GROTON, CT
EXISTING 144.5' MONOPOLE

SHEET TITLE
TITLE SHEET

SHEET NUMBER:	REVISION:
S1	0

MI CHECKLIST

REQUIRED	REPORT ITEM	BRIEF DESCRIPTION
	PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWING	THIS CHECKLIST SHALL BE INCLUDED IN THE MI REPORT.
X	EOR APPROVAL	ONCE THE PRE-MODIFICATION MAPPING IS COMPLETE AND PRIOR TO FABRICATION, THE CONTRACTOR SHALL PROVIDE DETAILED ASSEMBLY DRAWINGS AND/OR SHOP DRAWINGS AS NECESSARY FOR NON-STANDARD PARTS. THESE ARE TO INCLUDE, BUT ARE NOT LIMITED TO, A VISUAL LAYOUT OF NEW REINFORCEMENT, EXISTING REINFORCEMENT CONFIGURATION, PORTHOLES, MOUNTS, STEP PEGS, SAFETY CLIMBS AND ANY OTHER MISCELLANEOUS ITEMS WHICH MAY AFFECT SUCCESSFUL INSTALLATION OF MODIFICATIONS ON THE TOWER. THESE DRAWINGS SHALL BE SUBMITTED TO THE EOR FOR APPROVAL. APPROVED ASSEMBLY/SHOP DRAWINGS SHALL BE SUBMITTED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	FABRICATION INSPECTION	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	FABRICATOR CERTIFIED WELD INSPECTION	A VISUAL OBSERVATION BY A CWI OF A PORTION OF WELDING ON THE PROPOSED STRUCTURAL MEMBERS IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	MATERIAL TEST REPORT (MTR)	MILL CERTIFICATION SHALL BE PROVIDED FOR ALL STEEL AS SPECIFIED IN THE MODIFICATION DRAWINGS AND THIS DOCUMENTATION SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
N/A	FABRICATOR NDE INSPECTION	CRITICAL SHOP WELDS THAT REQUIRE TESTING (PER ENG-STD-10069) ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED WELD INSPECTOR SHALL PERFORM NON-DESTRUCTIVE EXAMINATION AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	NDE REPORT OF MONOPOLE BASE PLATE	A NDE (PER ENG-SOW-10033) OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	THE MATERIAL SHIPPING LIST SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
	CONSTRUCTION (PERFORMED BY CONTRACTOR)	
X	CONSTRUCTION INSPECTIONS	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS.
N/A	FOUNDATION INSPECTIONS	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
N/A	CONCRETE COMP. STRENGTH AND SLUMP TESTS	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	POST INSTALLED ANCHOR ROD VERIFICATION	POST INSTALLED ANCHOR ROD VERIFICATION SHALL BE PERFORMED IN ACCORDANCE WITH CROWN REQUIREMENTS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	BASE PLATE GROUT VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS INSTALLED IN ACCORDANCE WITH CROWN ENG-PRC-10012 FOR INCLUSION IN THE MI REPORT.
X	CONTRACTOR'S CERTIFIED WELD INSPECTION	A CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST AS NECESSARY ALL FIELD WELDS. CWI SHALL FOLLOW ALL THE PROCEDURES SPECIFIED IN CROWN STANDARD DOCUMENTS ENG-SOW-10066, ENG-STD-10069 AND SRV-STD-10159. A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. FULL PENETRATION WELDS IN THE VICINITY OF BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.
N/A	EARTHWORK: LIFT AND DENSITY	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	ON SITE COLD GALVANIZING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED IN ACCORDANCE WITH ENG-BUL-10149.
N/A	GUY WIRE TENSION REPORT	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT TO THE MI INSPECTOR INDICATING THE TEMPERATURE AND TENSION IN EVERY GUY CABLE AS PART OF PLUMB AND TENSION PROCEDURE FOR INCLUSION IN THE MI REPORT.
X	GC AS-BUILT DOCUMENTS	THE GENERAL CONTRACTOR SHALL SUBMIT A COPY OF THE CONTRACT DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD.
	POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTORS REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
X	POST INSTALLED ANCHOR ROD PULL-OUT TESTING	POST-INSTALLED ANCHOR RODS SHALL BE TESTED IN ACCORDANCE WITH ENG-PRC-10119 AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PHOTOGRAPHS	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI WHICH DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
ADDITIONAL TESTING AND INSPECTIONS:		

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE MI REPORT AND N/A DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT

MODIFICATION INSPECTION NOTES:

GENERAL

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

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

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

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

REFER TO ENG-SOW-10007 : MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

MI INSPECTOR

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

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

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

GENERAL CONTRACTOR

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

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

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

RECOMMENDATIONS

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

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

CANCELLATION OR DELAYS IN SCHEDULED MI

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

CORRECTION OF FAILING MI'S

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

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

MI VERIFICATION INSPECTIONS

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

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

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

REQUIRED PHOTOS

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

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

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

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

B+T GRP
1717 S. BOULDER AVE.
SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

CROWN CASTLE

ISSUED FOR:

REV	DATE	DESCRIPTION
0	07/23/15	ISSUED FOR CONSTRUCTION

PROJECT NO:	92739.004.01
PROJECT ENG:	ROBBIE FRAZIER
DRAWN BY:	UJJ / GLS
CHECKED BY:	SSC

B+T ENGINEERING, INC.
PEC.0001564
Expires 02/10/16

GROTON TOWER
881533

75 ROBERTS ROAD
GROTON, CT

EXISTING 144.5' MONOPOLE

SHEET TITLE
MODIFICATION INSPECTION NOTES AND CHECKLIST

SHEET NUMBER:	REVISION:
S2	0

NOTES:

1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRE-TENSIONED 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.

GENERAL NOTES

1.1 ALL WORK SHALL COMPLY WITH THE TIA/EIA-222-F STANDARD AS WELL AS ANY OTHER GOVERNING BUILDING CODES.
1.2 FIELD WORK WILL BE DONE AROUND EXISTING COAXIAL CABLE AND EQUIPMENT. ALL WORK SHALL BE DONE IN A MANNER SUCH THAT NO DAMAGE OCCURS TO THE EXISTING EQUIPMENT OR THE STRUCTURE.
1.3 A MINIMUM OF TWO COATS OF ZINGA COLD GALVANIZING COMPOUND (OR APPROVED EQUIVALENT) SHALL BE APPLIED TO ANY FIELD CUTS OR FIELD DRILLED HOLES.
1.4 THE USE OF A GAS TORCH OR WELDER WILL NOT BE PERMITTED ON THE TOWER WITHOUT THE CONSENT OF THE OWNER.
1.5 IN LIEU OF TEMPORARY BRACING CONTRACTOR MAY HAVE A STABILITY ANALYSIS PERFORMED BY AN ENGINEER LICENSED IN THE STATE THE TOWER IS LOCATED. THE ANALYSIS SHALL USE A MINIMUM WIND SPEED OF 45 mph (3-SEC) PER TIA-1019.
1.6 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 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.

FABRICATION

2.1 ALL WORK SHALL BE DONE IN ACCORDANCE WITH A.I.S.C. "SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."
2.2 STRUCTURAL STEEL SHALL MEET THE FOLLOWING SPECIFICATIONS:

	YIELD	ASTM SPECS
A. STEEL SHAPES AND PLATES, U.N.O.	65ksi	A572
B. STEEL TUBE (HSS)	46ksi	A500 GR B

2.3 ALL NEW MATERIAL INCLUDING STRUCTURAL STEEL AND FASTENERS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 AND A153.
2.4 WELDING SHALL MEET ANSI/AWS D1.1 STRUCTURAL WELDING CODE (LATEST REVISION). ELECTRODES SHALL BE E80 SERIES.
2.5 CONTRACTOR SHALL PROVIDE SHOP FABRICATION DRAWINGS TO B+T GROUP 5 DAYS PRIOR TO FABRICATION.

KEY NOTES

(#) TOWER MODIFICATION I.D.

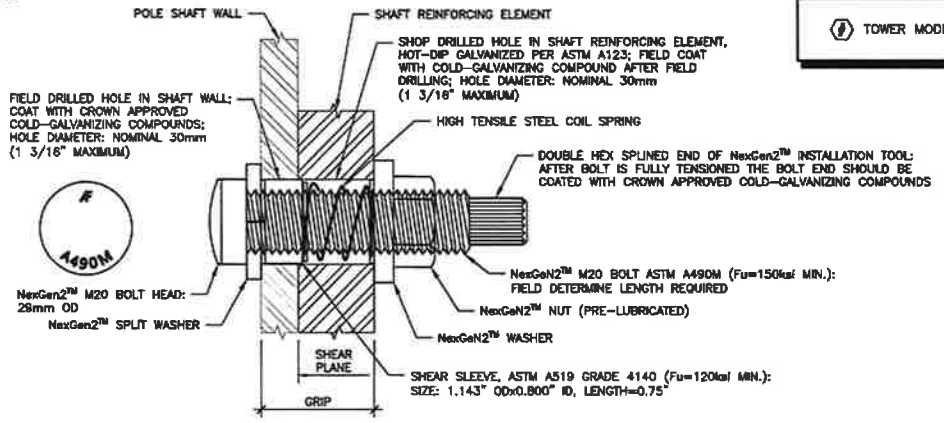
NEXGEN2 BLIND BOLT ASSEMBLY - PATENT PENDING -

INTERIOR OF POLE SHAFT	EXTERIOR OF POLE SHAFT

	SLEEVE LENGTH	MIN. GRIP RANGE	MAX. GRIP RANGE
M20x95	3/4"	1 1/16"	2 3/16"
M20x135	1 7/8"	2 1/16"	3 11/16"
M20x165	2 7/8"	3 3/16"	4 15/16"
M20x250	4"	4 5/16"	8 5/16"

NOTES:

1. ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30mm DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1 3/16".
2. NexGen2™ COMPLETE ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AS APPROPRIATE.
3. INSTALL PER MANUFACTURER'S INSTRUCTIONS.



TYPICAL NG2 BOLT DETAIL

1 TYPICAL NG2 BOLT DETAIL
SCALE: N.T.S.

B+T GRP
1717 S. BOULDER AVE.
SUITE 300
TULSA, OK 74119
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STATE OF CONNECTICUT * CHAD TUTTLE * NO. 23924 LICENSED PROFESSIONAL ENGINEER 7/23/15

GROTON TOWER
881533

79 ROBERTS ROAD
GROTON, CT

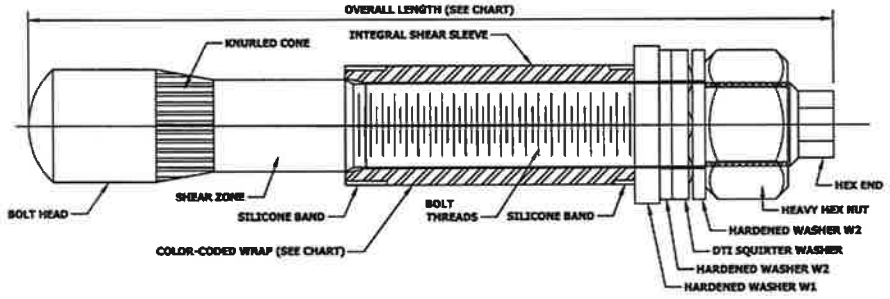
EXISTING 144.5' MONOPOLE

SHEET TITLE
GENERAL NOTES, NG2 BOLT NOTES AND DETAIL

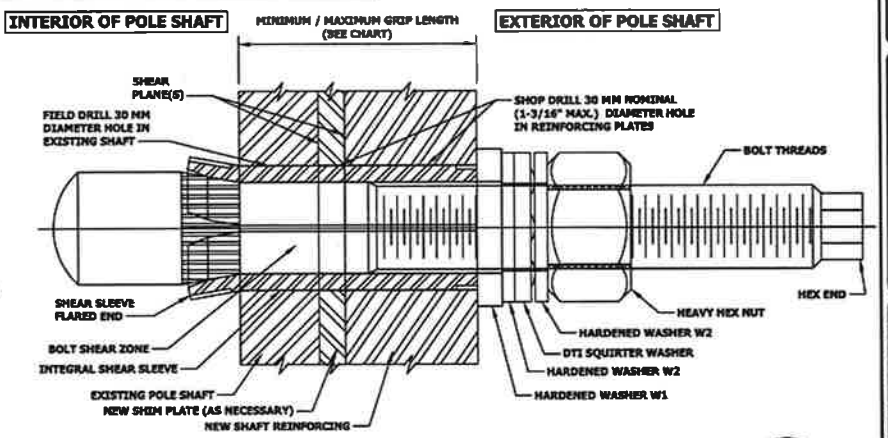
SHEET NUMBER: S3
REVISION: 0

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.

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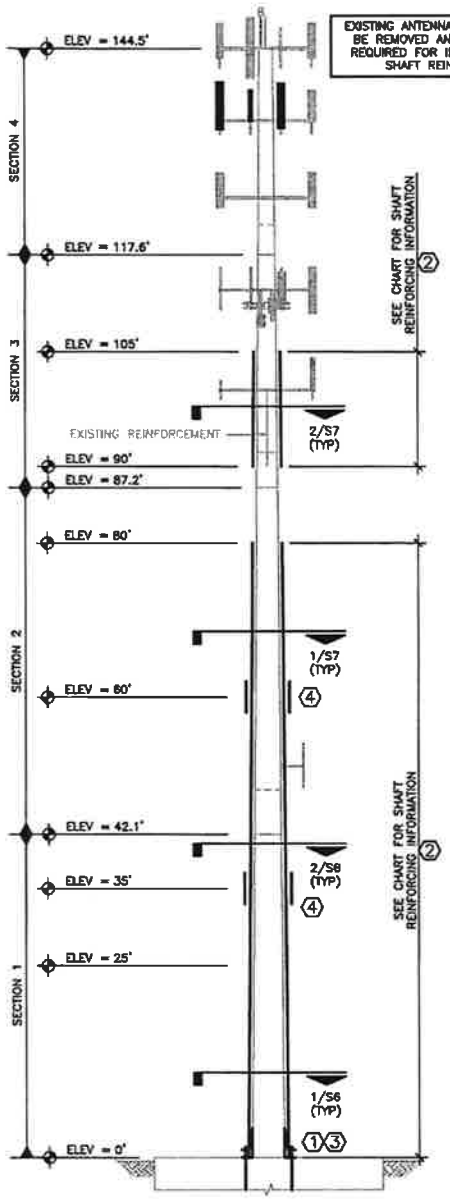
GROTON TOWER
881533

75 ROBERTS ROAD
GROTON, CT

EXISTING 144.5' MONOPOLE

SHEET TITLE
FORGBOLT NOTES AND DETAILS

SHEET NUMBER:	REVISION:
S4	0



1 TOWER ELEVATION
SCALE: N.T.S.

EXISTING ANTENNA MOUNTS SHALL BE REMOVED AND MODIFIED AS REQUIRED FOR INSTALLATION OF SHAFT REINFORCING.

CCI: FLAT PLATE-BILL OF MATERIALS (65KSI)

BOTTOM ELEVATION	TOP ELEVATION	FLAT PLATE DESIGNATION*	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	FLAT #	BOLTS PER PLATE	TOTAL BOLT QTY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	TOTAL STEEL WEIGHT	
0'	35'	CCI-WCFP-08512535	35'-0"	3	2, 10 & 16	35	105	WELD	15	17"	3793	LBS.
25'	80'	CCI-SFP-08512535	35'-0"	1	4	40	40	11	11	19"	967	LBS.
35'	60'	CCI-SFP-06512525	25'-0"	2	10 & 16	34	68	11	11	19"	1381	LBS.
60'	80'	CCI-SFP--06512520	20'-0"	3	4, 10 & 16	31	93	11	11	19"	1658	LBS.
90'	105'	CCI-SFP-04510015	15'-0"	3	3, 9 & 15	19	57	6	6	20"	689	LBS.
* SEE CMRP 65 KSI PARTS CATALOG EDITION 2 REV. 1 FOR PART DETAILS							363				8488	LBS.
** UNIQUE PART. SEE PART DETAIL SHEET D2												
ALL BOLTS SHALL BE PRE-APPROVED BLIND M20 BOLTS WITH HIGH STRENGTH SHEAR SLEEVES (ASTM A519 WITH MIN. Fu=120 KSI). CONTACT SUPPLIER FOR MATERIAL (PLATE AND BOLTS) AND INSTALLATION PROCEDURES.												

EXISTING MEMBER SCHEDULE

SECTION	NUMBER OF SIDES	THICKNESS	BOTTOM DIAMETER	TOP DIAMETER	LAP SPLICE
1	18	0.438"	50.500"	40.224"	69"
2	18	0.375"	42.219"	31.508"	56"
3	18	0.250"	33.000"	25.659"	46"
4	18	0.188"	26.875"	21.000"	---

NOTES:
1. BLIND BOLTS ARE TO BE 20mm DIAMETER WITH CORRESPONDING 29mm DIAMETER SLEEVE WITH SPECIFIED STEEL GRADE.
2. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATOR IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS. 1-800-831-3275 FOR PRODUCT INFORMATION.
3. ALL SHIMS SHALL BE ASTM A36.
4. HOLES FOR BOLTS AND SHEAR SLEEVES ARE 30mm UNLESS NOTED OTHERWISE.
5. SHOP WELDS ARE ASSUMED E80XX OR GREATER, PER STANDARD SPLICE DETAIL.
6. IF SCOPE OF MODIFICATION REQUIRES REMOVAL OF TOWER ID TAG, IT MUST BE REPLACED.
7. 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 OR TOWER OWNER.
8. WHERE POSSIBLE, CLIMBING HARDWARE SHOULD REMAIN IN-LINE ALONG THE POLE. IF AN OBSTRUCTION CAUSES A LATERAL OFFSET OF 2'-0" OR MORE, CLIMBING ANCHORS SHALL BE PROVIDED AT EACH CHANGE IN ALIGNMENT. IF NEW REINFORCEMENT REQUIRES STEP BOLT BRACKETS, INSTALL PRIOR TO GALVANIZATION OF STEEL.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER FITTING OF REINFORCEMENT ON MONOPOLES. 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 THICKNESSES SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED.

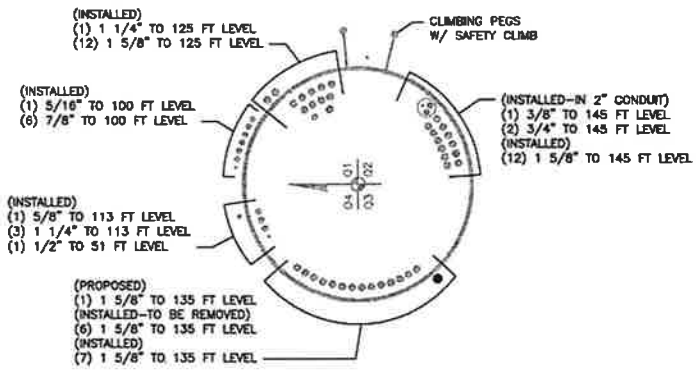
TOWER MODIFICATIONS:

1. REMOVE EXISTING BASE PLATE STIFFENERS
   RE: SHEET S6.
2. INSTALL NEW REINFORCING ELEMENTS
   RE: SHEET S6 AND S7.
3. INSTALL NEW ANCHOR RODS AND ANCHOR ROD BRACKETS WITH FOOT PADS
   RE: SHEET S6.
4. INSTALL NEW IN-LINE SPLICE
   RE: SHEET S8.

* CONTRACTOR SHALL BUDGET A SITE VISIT TO CHECK CRITICAL DIMENSIONS AND VERIFY UNKNOWN CONDITIONS PRIOR TO STEEL FABRICATION.
** THE NEW AND EXISTING TRANSMISSION LINES MUST BE DISTRIBUTED AS SHOWN IN THE TX LINE DIST. DIAGRAM RE: DETAIL 2/S5.
*** CONTRACTOR SHALL PROVIDE TEMPORARY BRACING FOR ALL REMOVE AND REPLACE PROCEDURES.
**** MODIFICATIONS SHALL BE COMPLETED PRIOR TO ADDING THE PROPOSED APPURTENANCES.

EXISTING TOWER HAS BEEN PREVIOUSLY MODIFIED

REFERENCE DRAWINGS BY:	DATE
WALKER ENGINEERING INCORPORATED	08/01/07
VERTICAL STRUCTURES, INC.	11/25/08
CROWN CASTLE	02/25/14



2 TX LINE DISTRIBUTION DIAGRAM
SCALE: N.T.S.

B+T GRP
1717 S. BOULDER AVE.
SUITE 300
TULSA, OK 74119
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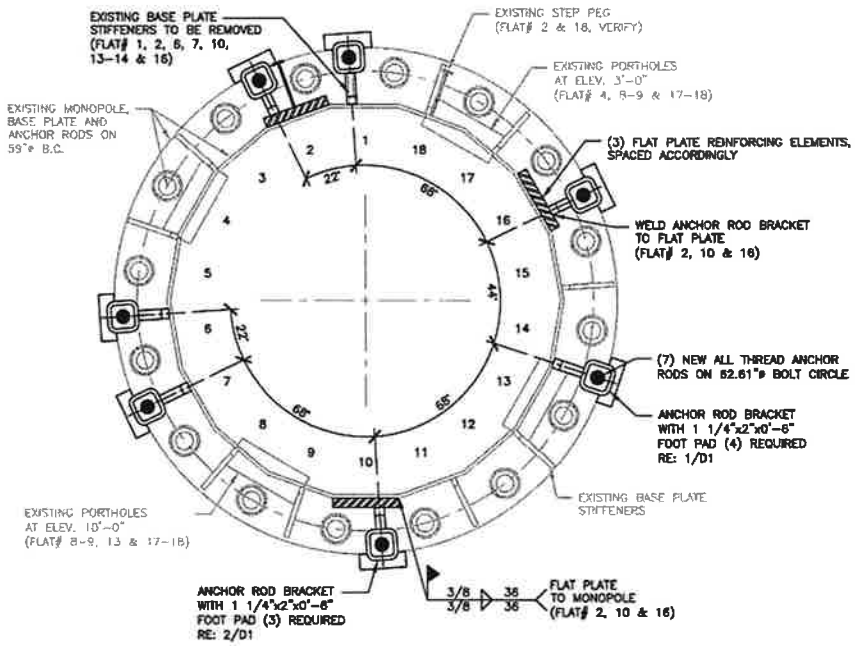
STATE OF CONNECTICUT
CHAD TUTTLE
No. 23924
LICENSED
PROFESSIONAL ENGINEER
7/24/15

GROTON TOWER
881533
75 ROBERTS ROAD
GROTON, CT
EXISTING 144.5' MONOPOLE

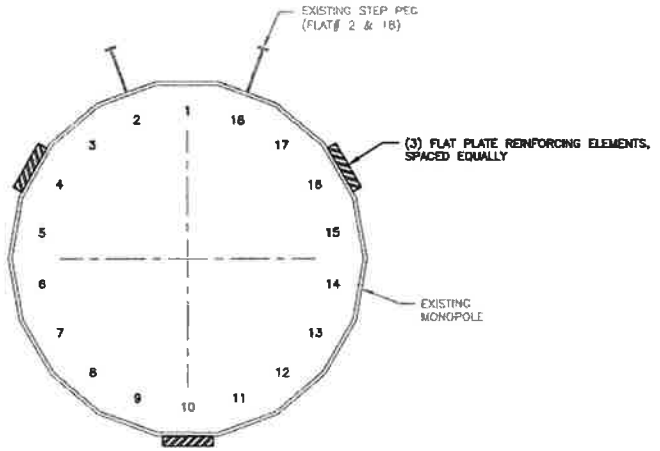
SHEET TITLE
TOWER ELEV., SCHEDULE AND TX LINE DIST. DIAGRAM

SHEET NUMBER:	REVISION:
S5	0

CONTRACTOR TO INCLUDE PROVISION FOR RELOCATION / REPLACEMENT OF EXISTING CLIMBING PEGS AS REQUIRED



1 TOWER SECTION (0'-35')
SCALE: N.T.S.



2 TOWER SECTION (25'-60')
SCALE: N.T.S.

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GROTON TOWER
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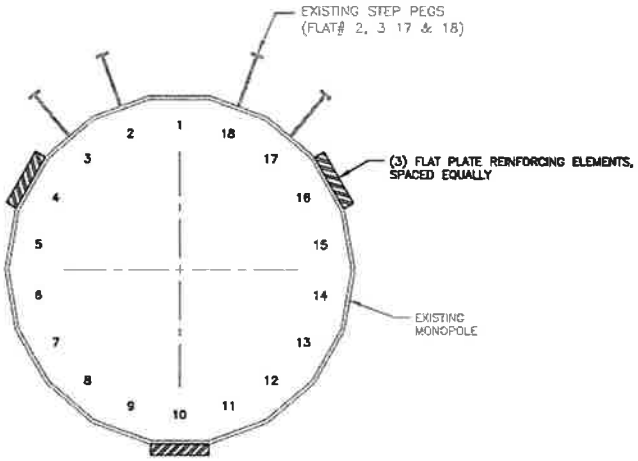
75 ROBERTS ROAD
GROTON, CT

EXISTING 144.5' MONOPOLE

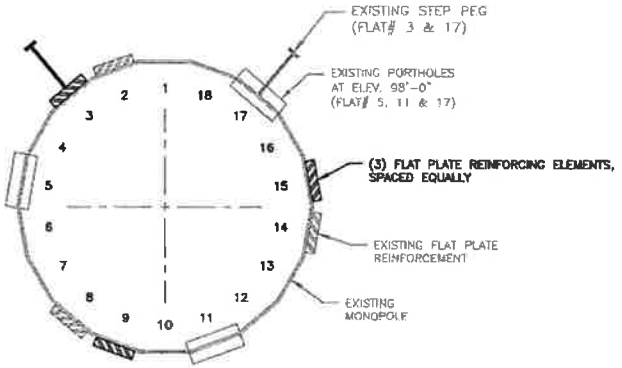
SHEET TITLE
TOWER SECTIONS
(0'-35' AND 25'-60')

SHEET NUMBER:	REVISION:
S6	0



1 TOWER SECTION (60'-80')
SCALE: N.T.S.

CONTRACTOR TO INCLUDE PROVISION FOR RELOCATION / REPLACEMENT OF EXISTING CLIMBING PEGS AS REQUIRED



2 TOWER SECTION (90'-105')
SCALE: N.T.S.

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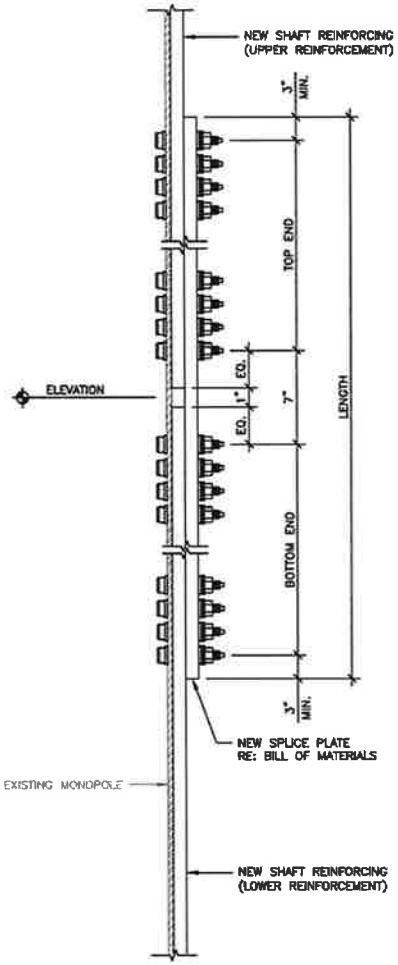
EXISTING 144.5' MONOPOLE

SHEET TITLE
TOWER SECTIONS
(60'-80' AND 90'-105')

SHEET NUMBER:	REVISION:
S7	0



1 FLAT PLATE IN-LINE SPLICE DETAIL
SCALE: N.T.S.

SPLICE PLATE-BILL OF MATERIALS (65KSI)										
ELEVATION	WIDTH	THICKNESS	LENGTH	QTY	QTY OF BOLTS (TOP END)	QTY OF BOLTS (BOTTOM END)	BOLTS PER SPLICE	TOTAL BOLTS	TOTAL STEEL WEIGHT	
35'-0"	6 1/2"	1 1/4"	7'-1"	2	11	15	26	52	392	LBS.
60'-0"	6 1/2"	1 1/4"	6'-1"	3	11	11	22	66	505	LBS.
							TOTAL:	118	897	LBS.

* O.C. DISTANCE ON TERMINATION BOLTS TO BE 3 IN. U.N.O.
** USE SHIM PLATES AS REQUIRED.
*** BOLT QTY INCLUDED IN S5 BILL OF MATERIALS
**** STEEL WEIGHT NOT INCLUDED IN S5 BILL OF MATERIALS.

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STATE OF CONNECTICUT
GRAND TUPPER
No. 23124
LICENSED
PROFESSIONAL ENGINEER
7/23/15

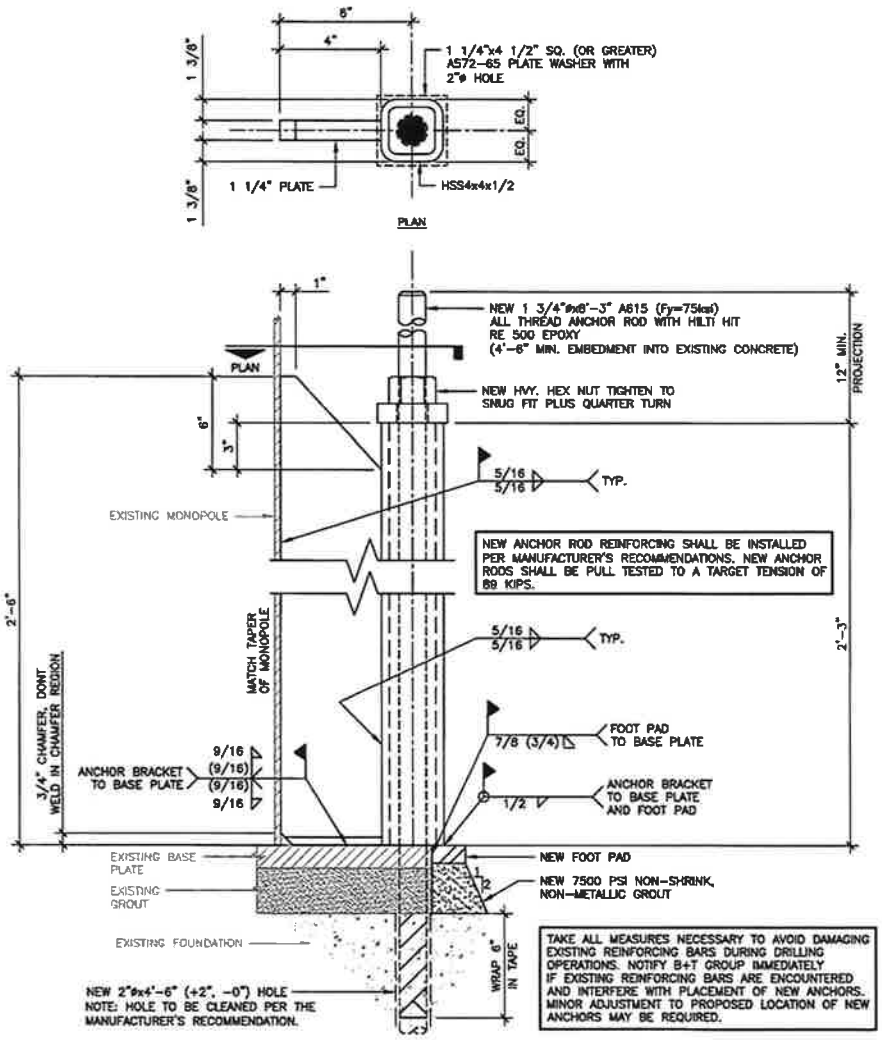
GROTON TOWER
881533

75 ROBERTS ROAD
GROTON, CT

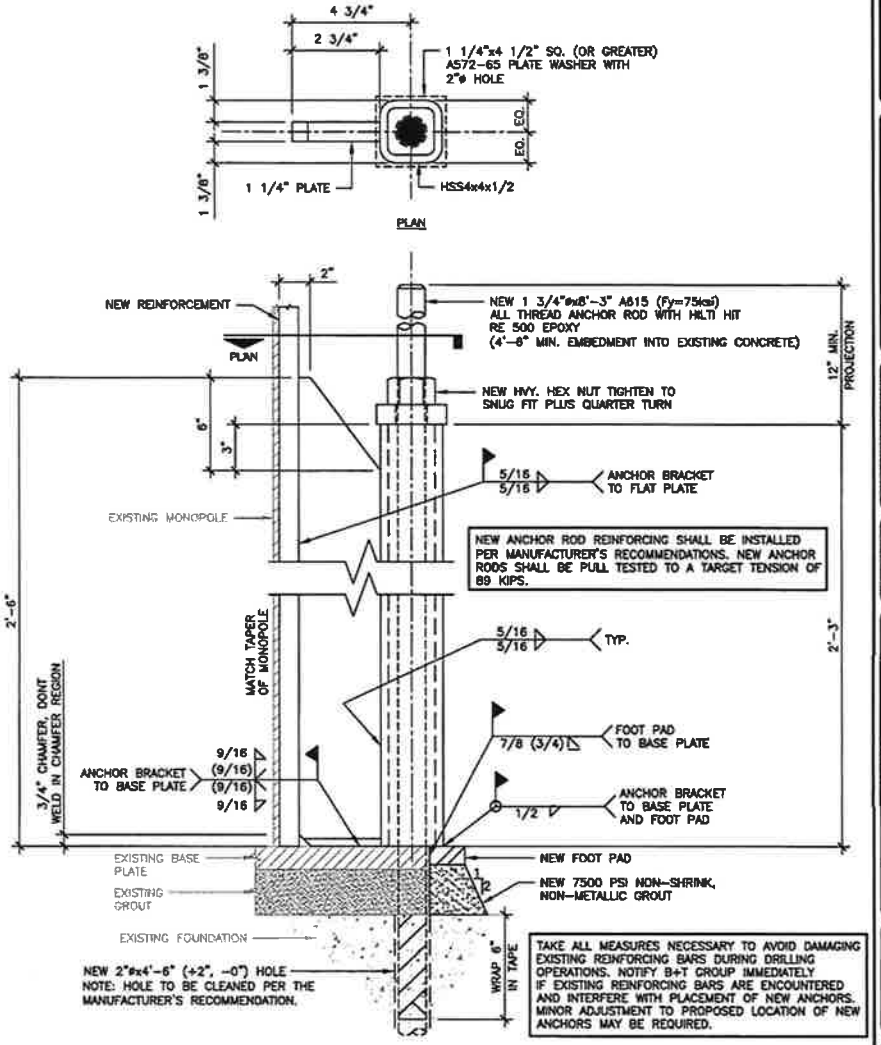
EXISTING 144.5' MONOPOLE

SHEET TITLE
IN-LINE SPLICE DETAIL

SHEET NUMBER: S8
REVISION: 0



1 ANCHOR ROD BRACKET DETAIL
SCALE: N.T.S.



2 ANCHOR ROD BRACKET DETAIL
SCALE: N.T.S.

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PEC.0001564
Expires 02/10/18

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.

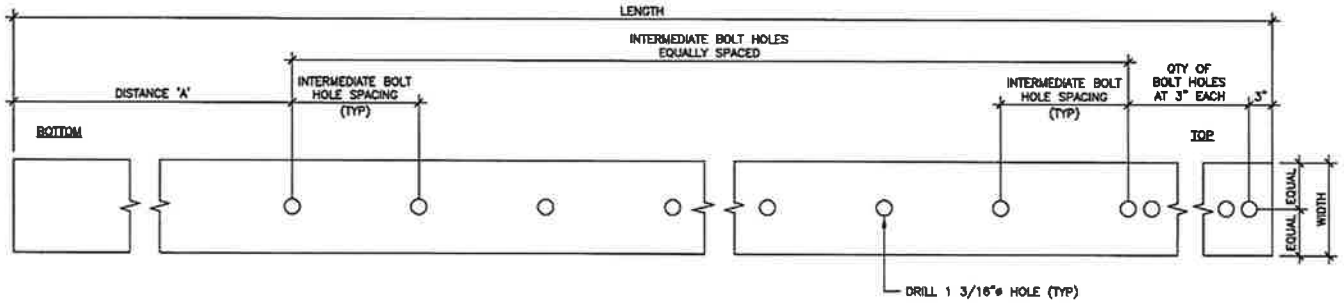
GROTON TOWER
881533

75 ROBERTS ROAD
GROTON, CT

EXISTING 144.5' MONOPOLE

SHEET TITLE
ANCHOR ROD BRACKET DETAILS

SHEET NUMBER:	REVISION:
D1	0



1 PART DETAIL
SCALE: N.T.S.

FLAT PLATE DESIGNATION	BLACK WEIGHT (LBS)	WIDTH	THICKNESS	LENGTH	DISTANCE 'A'	TOTAL QTY OF 1 3/16"Ø BOLT HOLES	QTY OF BOLT HOLES (BOTTOM END)	QTY OF BOLT HOLES (TOP END)	INTERMEDIATE BOLT HOLE SPACING
CCI-WCFP-08512535	1264	8 1/2"	1 1/4"	35'-0"	2'-11"	35	WELD	15	1'-5"

B+T GRP
1717 S. BOULDER AVE.
SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

CROWN CASTLE

ISSUED FOR:

REV	DATE	DESCRIPTION
0	07/23/15	ISSUED FOR CONSTRUCTION

PROJECT NO:	92739.004.01
PROJECT ENG:	ROBBIE FRAZIER
DRAWN BY:	UUJ / GLS
CHECKED BY:	SSC

B+T ENGINEERING, INC.
PEC.0001564
Expires 02/10/16

STATE OF CONNECTICUT
CHAD TUTTLE
No. 23924
LICENSED
PROFESSIONAL ENGINEER
7/23/15

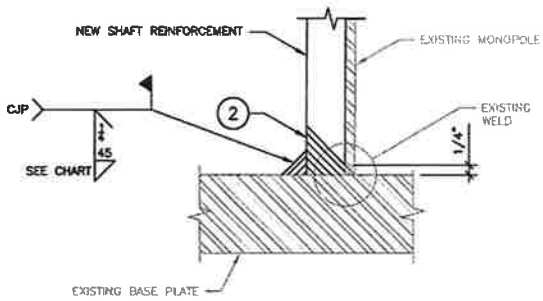
GROTON TOWER
881533

75 ROBERTS ROAD
GROTON, CT

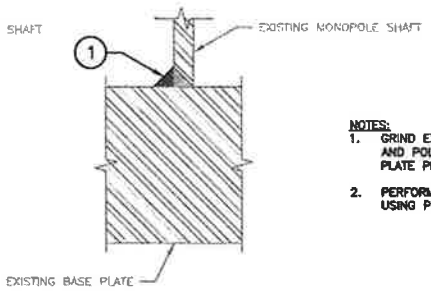
EXISTING 144.5' MONOPOLE

SHEET TITLE
PART DETAIL

SHEET NUMBER: D2
REVISION: 0



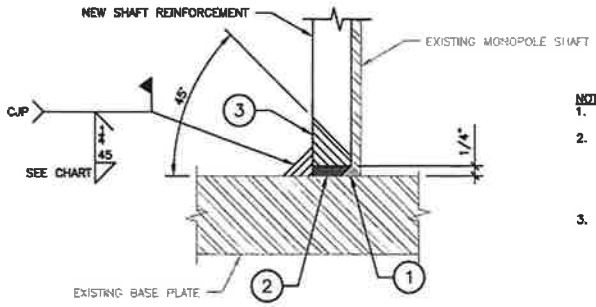
1 WELD DETAIL-OPTION 1
SCALE: N.T.S.



EXISTING WELD

NOTES:
1. GRIND EXISTING FILLET WELD FLUSH TO BASE PLATE AND POLE FOR THE WIDTH OF THE REINFORCEMENT PLATE PLUS 1/4" ON EACH SIDE (DO NOT OVER GRIND)
2. PERFORM CJP WELD WITH REINFORCING FILLET WELD USING POLE AS BACKING BAR

PART NUMBER	PLATE SIZE	MINIMUM REINFORCING WELD
CCI-WSFP-040075 CCI-WAFP-040075	3/4" x 4"	1/4"
CCI-WSFP-045100 CCI-WAFP-045100	1" x 4 1/2"	1/4"
CCI-WSFP-060100 CCI-WAFP-060100	1" x 6"	3/8"
CCI-WSFP-065125 CCI-WAFP-065125	1 1/4" x 6 1/2"	1/2"
CCI-WSFP-085125 CCI-WAFP-085125	1 1/4" x 8 1/2"	5/8"



2 WELD DETAIL-OPTION 2
SCALE: N.T.S.

NOTES:
1. CLEAN EXISTING WELD FROM GALVANIZING
2. BUILD A PLATFORM WITH WELD AT THE SAME HEIGHT OF THE EXISTING FILLET WELD (TO REDUCE THE AMOUNT OF WELD TO BUILD THE PLATFORM, IT IS ALLOWABLE TO PARTIALLY GRIND THE HEIGHT OF THE EXISTING FILLET WELD TO A 1/4" MINIMUM)
3. PERFORM CJP WELD WITH REINFORCING FILLET WELD USING POLE AS BACKING BAR

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CROWN CASTLE

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Expires 02/10/16

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.

GROTON TOWER
881533

75 ROBERTS ROAD
GROTON, CT

EXISTING 144.5' MONOPOLE

SHEET TITLE
DETAILS

SHEET NUMBER: D3
REVISION: 0