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**
539 Plains Road, Haddam, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains fifteen (15) wireless telecommunications antennas at the top of the existing 180-foot tower at 539 Plains Road in Haddam, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 1986 (Docket No. 58). Cellco now intends to replace nine (9) of its existing antennas with three (3) model SBNHH-1D65B, 700 MHz antennas; three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 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 two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Melissa J. Schlag, First Selectman for the Town of Haddam. A copy of this letter is also being sent to 539 Plains Road LLC, the owner 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 top 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:
Melissa J. Schlag, Haddam First Selectman
539 Plains Road LLC
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

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

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

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

Product Specifications

SBNHH-1D65B

Mechanical Specifications

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

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

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

Regulatory Compliance/Certifications

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

Included Products

Product Specifications

SBNHH-1D65B

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

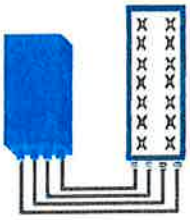
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

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

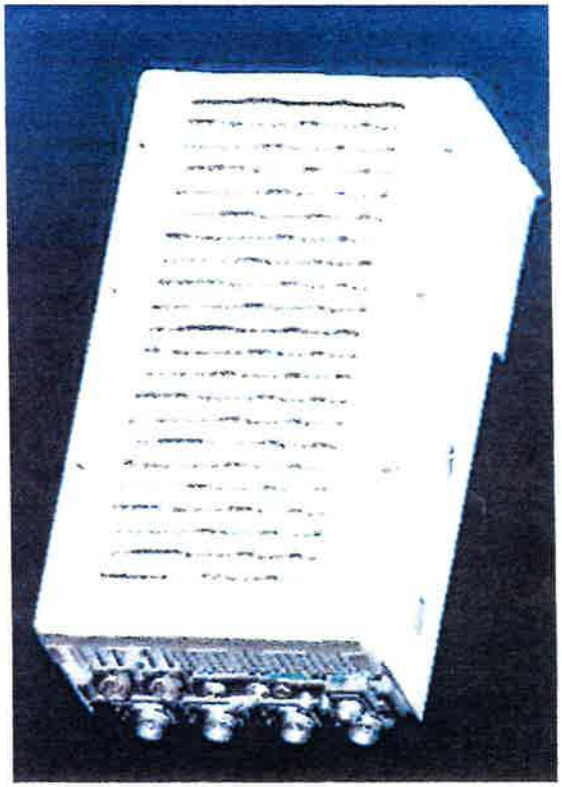
** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

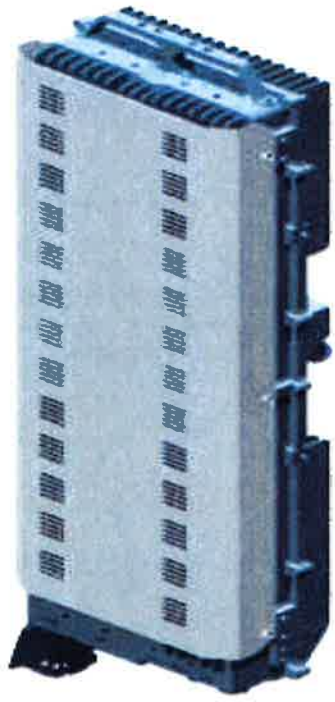
	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	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.

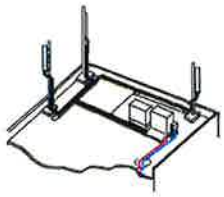
EASY INSTALLATION

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.

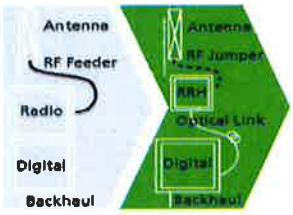
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

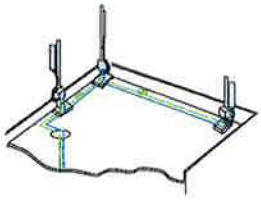
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

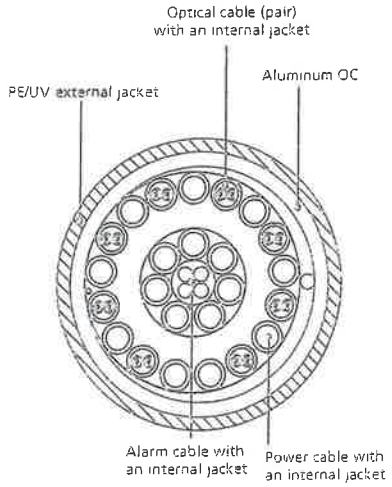


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Haddam								
Tower Height: 180ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Omnipt - VoiceStream	2	247	193	0.0051	1930	1.0000	0.05%	
*Pocket (now MetroPCS)	3	631	135	0.0409	2130	1.0000	0.41%	
*AT&T UMTS	2	565	167	0.0157	880	0.5867	0.27%	
*AT&T UMTS	2	875	167	0.0243	1900	1.0000	0.24%	
*AT&T GSM	1	283	167	0.0039	880	0.5867	0.07%	
*AT&T GSM	4	525	167	0.0291	1900	1.0000	0.29%	
*AT&T LTE	1	1313	167	0.0182	734	0.4893	0.37%	
*Sprint	11	122	150	0.0233	1962.5	1.0000	0.23%	
*Nextel	9	100	144	0.0170	851	0.5673	0.30%	
Verizon PCS	**7**	**2349**	**178**	**0.1866**	**1970**	**1.0000**	**18.66%**	
Verizon Cellular	**9**	**329**	**178**	**0.0336**	**869**	**0.5793**	**5.80%**	
Verizon AWS	**1**	**2306**	**178**	**0.0262**	**2145**	**1.0000**	**2.62%**	
Verizon 700	**1**	**1050**	**178**	**0.0119**	**746**	**0.4973**	**2.40%**	
								31.71%
* Source: Siting Council								

ATTACHMENT 3

August 27, 2015

Mr. David Smith
Crown Castle
3530 Torington Way, Suite 300
Charlotte, NC 28277
(704) 405-6618

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

Subject:	**Structural Modification Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	119739
	Carrier Site Name:	Haddam, CT
Crown Castle Designation:	**Crown Castle BU Number:**	806478
	Crown Castle Site Name:	HRT 080 953381
	Crown Castle JDE Job Number:	342595
	Crown Castle Work Order Number:	1107113
	Crown Castle Application Number:	305905 Rev. 0
Engineering Firm Designation:	**B+T Group Project Number:**	100140.002.01
Site Data:	**539 Plains Rd, Haddam, CT, Middlesex County** **Latitude *41° 26' 35.0"*, Longitude *-72° 30' 22.4"*** **180 Foot - Self-Support Tower**	

Dear Mr. Smith,

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 816869, in accordance with application 305905, 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:

LC4.5: TSA specified load case with proposed modifications **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing 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

Hari G. Rotithor, E.I.
Project Engineer

Chad E. Tuttle, P.E.
Engineer of Record

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft. self-support tower designed by Rohn in December of 1986. The original design code and design wind speed are unknown. This tower has been modified multiple times and those modifications were incorporated in this analysis.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
178.0	178.0	3	Alcatel Lucent	RRH2X60-PCS	2	1-5/8	--
		3	Alcatel Lucent	RRH2x60-700			
		3	Alcatel Lucent	RRH2x60-AWS			
		9	Andrew	SBNHH-1D65B			
		1	RFS Celwave	DB-B1-6C-8AB-0Z			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
182.0	186.0	3	EMS Wireless	RR90-17-02DP	6	1-5/8	1
		1	--	Accelerator			
178.0	178.0	**3**	**Alcatel Lucent**	**RRH2x40-AWS**	--	--	**2**
		3	**Antel**	**BXA-171085-12BF-2**			
		3	**Antel**	**BXA-70063-6CF-2**			
		3	**Kathrein**	**742 213**			
		6	Antel	LPA-80080/6CF	12 1	1-5/8 1-1/4	1
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		6	RFS Celwave	FD9R6004/2C-3L			
		1	--	Sector Mount [SM 510-3]			
165.0	167.0	1	Andrew	DBXNH-6565B-R2M	12 2 1	1-1/4 7/16 3/8	1
		6	Ericsson	RRUS-11			
		2	KMW Communications	AM-X-CD-16-65-00T-RET			
		6	Powerwave Technologies	7770.00			
		1	Raycap	DC6-48-60-18-8F			
	165.0	6	Powerwave Technologies	LGP21401			
		6	Powerwave Technologies	LGP21903			
		1	--	Sector Mount [SM 510-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	150.0	6	Decibel	DB980H90E-M	6	1-5/8	1
		1	--	Sector Mount [SM 504-3]			
141.0	**141.0**	**9**	**Decibel**	**DB844H90E-XY**	**9**	**1-1/4**	**3**
		1	**--**	**Sector Mount [SM 506-3]**			
135.0	135.0	3	Kathrein	742 213	6	1-5/8	1
		1	--	Pipe Mount [PM 601-3]			
50.0	50.0	1	--	Sector Mount [SM 201-1]	1	1/2	1
		1	Unknown	GPS			

Notes:
1) Existing Equipment
2) Equipment to be Removed
3) Abandoned Equipment to be Removed; Not Considered In this Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180	180	4	Generic	3' Side Arm	--	--
		4	Generic	PD10017		
171	171	3	Generic	3' Side Arm	--	--
		6	Generic	PD1132		
161	161	2	Generic	6' Std. Dishes	--	--
100	100	1	Generic	6' Side Arm	--	--
		1	Generic	PD1109		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate, Rev. 0	305905	CCIsites
Tower Manufacturer Drawing	Rohn, File No. 22087JC	1067089	CCIsites
Post Modification Inspection	All-Points Technology, Job No. CT105441	1004663	CCIsites
Tower Modification Drawing	Vertical Structures, Job No. 2008-004-124	1274944	CCIsites
	Vertical Structures, Job No. 2008-004-059	1274944	CCIsites
Post Modification Inspection	Vertical Structures, Job No. 2009-004-004	2393878	CCIsites
Foundation Drawing	Rohn, Drawing No. C821532	300985	CCIsites
	FDH, Project No. 06-0884N	300985	CCIsites
Geotechnical Report	FDH, Project No. 06-0884G	1240448	CCIsites
Antenna Configuration	Failing SA by B+T Group, Project No. 100140.001.01	5837648	CCIsites

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

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

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 160	Leg	ROHN 2 STD	2	-28.696	32.298	88.8	Pass
T2	160 - 155	Leg	ROHN 2.5 EH	39	-38.197	65.602	58.2	Pass
T3	155 - 150	Leg	ROHN 2.5 EH	51	-47.334	65.600	72.2	Pass
T4	150 - 145	Leg	ROHN 2.5 EH	60	-56.498	65.601	86.1	Pass
T5	145 - 140	Leg	ROHN 2.5 EH	69	-66.127	80.226	82.4	Pass
T6	140 - 133.333	Leg	ROHN 3 EH	81	-75.936	83.785	90.6	Pass
T7	133.333 - 126.667	Leg	ROHN 3 EH	90	-87.465	105.784	82.7	Pass
T8	126.667 - 120	Leg	ROHN 3 EH	102	-97.650	114.754	85.1	Pass
T9	120 - 113.333	Leg	ROHN 3.5 EH	144	-108.959	132.149	82.5	Pass
T10	113.333 - 106.667	Leg	ROHN 3.5 EH	156	-119.082	132.181	90.1	Pass
T11	106.667 - 100	Leg	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	168	-129.740	175.138	74.1 78.6 (b)	Pass
T12	100 - 80	Leg	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	177	-158.515	213.471	74.3	Pass
T13	80 - 60	Leg	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	198	-184.413	237.174	77.8 84.6 (b)	Pass
T14	60 - 40	Leg	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	213	-211.632	317.633	66.6	Pass
T15	40 - 30	Leg	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	234	-225.620	287.693	78.4	Pass
T16	30 - 20	Leg	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	243	-239.038	351.475	68.0 71.6 (b)	Pass
T17	20 - 0	Leg	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3' Span)	255	-273.912	340.880	80.4	Pass
T1	180 - 160	Diagonal	L2x2x1/4	10	-5.504	14.519	37.9 70.1 (b)	Pass
T2	160 - 155	Diagonal	L1 3/4x1 3/4x3/16	46	-4.599	5.935	77.5 88.0 (b)	Pass
T3	155 - 150	Diagonal	L1 3/4x1 3/4x3/16	54	-4.433	5.375	82.5 88.8 (b)	Pass
T4	150 - 145	Diagonal	L2x2x1/4	63	-5.248	9.561	54.9 66.8 (b)	Pass
T5	145 - 140	Diagonal	2L1 3/4x1 3/4x3/16x3/16	72	-5.114	8.431	60.7	Pass
T6	140 - 133.333	Diagonal	2L2x2x3/16x1/2	84	-5.701	22.418	25.4 28.6 (b)	Pass
T7	133.333 - 126.667	Diagonal	2L2x2x3/16x1/2	93	-5.933	21.118	28.1 30.2 (b)	Pass
T8	126.667 - 120	Diagonal	2L2x2x3/16x1/2	111	-6.388	22.022	29.0 30.0 (b)	Pass
T9	120 - 113.333	Diagonal	2L2 1/2x2 1/2x3/16x1/2	147	-5.994	31.163	19.2 27.3 (b)	Pass
T10	113.333 - 106.667	Diagonal	2L2 1/2x2 1/2x3/16x1/2	159	-6.220	29.745	20.9 28.3 (b)	Pass
T11	106.667 - 100	Diagonal	2L2 1/2x2 1/2x3/16x1/2	171	-6.276	28.335	22.1 28.6 (b)	Pass
T12	100 - 80	Diagonal	2L3x3x3/16x1/2	180	-6.662	35.498	18.8 30.3 (b)	Pass
T13	80 - 60	Diagonal	2L3x3x3/16x1/4	201	-8.065	26.617	30.3 58.5 (b)	Pass
T14	60 - 40	Diagonal	2L3x3x1/4x1/4	216	-8.363	28.564	29.3 48.7 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T15	40 - 30	Diagonal	2L3 1/2x3 1/2x1/4x1/4	237	-8.822	43.021	20.5 51.4 (b)	Pass
T16	30 - 20	Diagonal	2L3 1/2x3 1/2x1/4x1/4	246	-9.232	38.804	23.8 53.7 (b)	Pass
T17	20 - 0	Diagonal	L4x4x1/4	258	-9.949	13.888	71.6	Pass
T8	126.667 - 120	Horizontal	L2 1/2x2 1/2x1/4	110	-1.694	10.200	16.6 19.7 (b)	Pass
T5	145 - 140	Secondary Horizontal	L2x2x1/4	78	-1.147	12.085	9.5 12.6 (b)	Pass
T7	133.333 - 126.667	Secondary Horizontal	L2x2x1/4	98	-1.517	9.136	16.6 16.7 (b)	Pass
T9	120 - 113.333	Secondary Horizontal	L2 1/2x2 1/2x1/4	152	-1.890	14.035	13.5 22.0 (b)	Pass
T10	113.333 - 106.667	Secondary Horizontal	L2 1/2x2 1/2x1/4	164	-2.066	12.395	16.7 24.1 (b)	Pass
T14	60 - 40	Secondary Horizontal	L3x3x1/4	221	-3.671	8.753	41.9 42.7 (b)	Pass
T16	30 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	252	-4.146	11.483	36.1 48.3 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	6	-0.324	2.830	11.4	Pass
T2	160 - 155	Top Girt	L2x2x1/8	42	-0.300	2.792	10.7	Pass
T8	126.667 - 120	Redund Horz 1 Bracing	L2x2x1/4	119	-1.694	16.656	10.2	Pass
T8	126.667 - 120	Redund Diag 1 Bracing	L2x2x1/4	135	-1.060	15.347	6.9	Pass
				Summary				
						Leg (T6)	90.6	Pass
						Diagonal (T3)	88.8	Pass
						Horizontal (T8)	19.7	Pass
						Secondary Horizontal (T16)	48.3	Pass
						Top Girt (T1)	11.4	Pass
						Redund Horz 1 Bracing (T8)	10.2	Pass
						Redund Diag 1 Bracing (T8)	6.9	Pass
						Bolt Checks	88.8	Pass
						Rating =	90.6	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC4.5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	87.1	Pass
1	Base Foundation (Structure)	Base	14.7	Pass
1	Base Foundation (Soil)	Base	81.9	Pass

Structure Rating (max from all components) =	90.6%

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

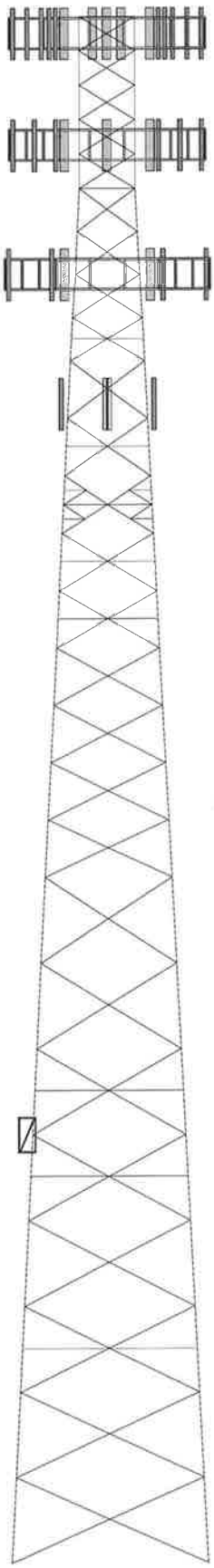
1) All modifications proposed in this report shall be installed in accordance with the attached drawings (Appendix D) for the determined available structural capacity to be effective.

APPENDIX A

TNXTOWER OUTPUT

Section	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	D	C		ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)		B	A	ROHN 3.5 EH		ROHN 3 EH					ROHN 2.5 EH		ROHN 2 STD
Leg Grade						A572-50											
Diagonals	L4x4x1/4	2L3 1/2x3 1/2x1/4x1/4		2L3x3x1/4x1/4	2L3x3x3/16x1/4	2L3x3x3/16x1/2	2L2 1/2x2 1/2x3/16x1/2			2L2x2x3/16x1/2			G	F	E		L2x2x1/4
Diagonal Grade		A572-50			A36									H	A36		A572-50
Top Girts					N.A.												L2x2x1/8
Horizontals					N.A.			I							N.A.		
Sec. Horizontals	N.A.	J	N.A.	L3x3x1/4	N.A.		L2 1/2x2 1/2x1/4		N.A.	L2x2x1/4	N.A.	F			N.A.		
Red. Horizontals			N.A.					L2x2x1/4									
Red. Diagonals			N.A.					L2x2x1/4									
Face Width (ft)	22.8646	20.8646	19.8594	18.8542	16.7708	14.7708	12.6771	11.9974	11.3151	10.6354	9.95833	9.28125	8.60417	8.09115	7.58073	6.0677	6.5625	6.52083
# Panels @ (ft)		2 @ 9.95833		6 @ 10			6 @ 6.66667			K		2 @ 6.66667			4 @ 5		5 @ 4	
Weight (K)	30.1	4.5	3.1	2.6	5.1	3.7	3.8	1.0	0.9	1.0	0.9	0.7	0.6	0.5	0.3	0.2	0.3	1.0

180.0 ft
160.0 ft
155.0 ft
150.0 ft
145.0 ft
140.0 ft
133.3 ft
126.7 ft
120.0 ft
113.3 ft
106.7 ft
100.0 ft
80.0 ft
60.0 ft
40.0 ft
30.0 ft
20.0 ft
0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
19" Accelerator (E)	182	AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	165
(3) RR90-17-02DP w/ Mount Pipe (E)	182	DBXNH-6565B-R2M w/ Mount Pipe (E)	165
(2) LPA-80080/6CF w/ Mount Pipe (E)	178	(2) LGP21401 (E)	165
(2) LPA-80080/6CF w/ Mount Pipe (E)	178	(2) LGP21401 (E)	165
(2) LPA-80080/6CF w/ Mount Pipe (E)	178	(2) LGP21401 (E)	165
(2) FD9R6004/2C-3L (E)	178	(2) RRUS-11 (E)	165
(2) FD9R6004/2C-3L (E)	178	(2) RRUS-11 (E)	165
(2) FD9R6004/2C-3L (E)	178	(2) RRUS-11 (E)	165
DB-T1-6Z-8AB-0Z (E)	178	(2) LGP21903 (E)	165
(3) SBNHH-1D65B w/ Mount Pipe (P)	178	(2) LGP21903 (E)	165
(3) SBNHH-1D65B w/ Mount Pipe (P)	178	(2) LGP21903 (E)	165
(3) SBNHH-1D65B w/ Mount Pipe (P)	178	DC6-48-60-18-8F (E)	165
RRH2x60-700 (P)	178	4.5' x 2" Mount Pipe (E)	165
RRH2x60-700 (P)	178	4.5' x 2" Mount Pipe (E)	165
RRH2x60-700 (P)	178	4.5' x 2" Mount Pipe (E)	165
RRH2X60-PCS (P)	178	Sector Mount [SM 510-3] (E)	165
RRH2X60-PCS (P)	178	(2) DB980H90E-M w/ Mount Pipe (E)	150
RRH2X60-PCS (P)	178	(2) DB980H90E-M w/ Mount Pipe (E)	150
RRH2x60-AWS (P)	178	(2) DB980H90E-M w/ Mount Pipe (E)	150
RRH2x60-AWS (P)	178	6' x 2" Mount Pipe (E)	150
RRH2x60-AWS (P)	178	6' x 2" Mount Pipe (E)	150
DB-B1-6C-8AB-0Z (P)	178	6' x 2" Mount Pipe (E)	150
Sector Mount [SM 510-3] (E)	178	Sector Mount [SM 504-3] (E)	150
(2) 7770.00 w/ Mount Pipe (E)	165	742 213 (E)	135
(2) 7770.00 w/ Mount Pipe (E)	165	742 213 (E)	135
(2) 7770.00 w/ Mount Pipe (E)	165	742 213 (E)	135
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	165	Pipe Mount [PM 601-3] (E)	135
		GPS (E)	50
		Sector Mount [SM 201-1] (E)	50

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	G	2L1 3/4x1 3/4x3/16x3/16
B	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	H	A572-50
C	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	I	L2 1/2x2 1/2x1/4
D	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3'	J	L3 1/2x3 1/2x1/4
		K	2 @ 3.33333

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

MAX. CORNER REACTIONS AT BASE:
DOWN: 273 K
SHEAR: 29 K

UPLIFT: -225 K
SHEAR: 24 K

AXIAL
104 K
SHEAR 14 K *MOMENT 1571 kip-ft*

TORQUE 13 kip-ft
38 mph WIND - 0.750 in ICE
AXIAL
53 K
SHEAR 46 K *MOMENT 5048 kip-ft*

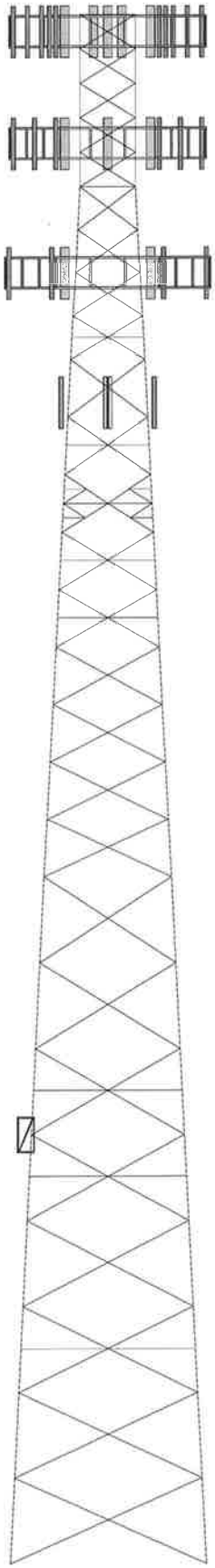
TORQUE 52 kip-ft
REACTIONS - 85 mph WIND

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

Job: 100140.002.01--HRT 080 953381, CT (BU# 806
Project:
Client: Crown Castle | Drawn by: Swathi Shetty | App'd:
Code: TIA/EIA-222-F | Date: 08/20/15 | Scale: NTS
Path: | Dwg No. E-

Section	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	D		C	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)		B	A	ROHN 3.5 EH		ROHN 3 EH			ROHN 2.5 EH			ROHN 2 STD
Leg Grade						A572-50											
Diagonals	L4x4x1/4		2L3 1/2x3 1/2x1/4x1/4	2L3x3x1/4x1/4	2L3x3x3/16x1/4	2L3x3x3/16x1/2	2L2 1/2x2 1/2x3/16x1/2		2L2x2x3/16x1/2				G	F	E		L2x2x1/4
Diagonal Grade			A572-50			A36								H	A36		A572-50
Top Girts					N.A.												L2x2x1/8
Horizontals				N.A.					I						N.A.		
Sec. Horizontals	N.A.	J	N.A.	L3x3x1/4		N.A.		L2 1/2x2 1/2x1/4	N.A.	L2x2x1/4	N.A.	F				N.A.	
Red. Horizontals				N.A.					L2x2x1/4						N.A.		
Red. Diagonals				N.A.					L2x2x1/4						N.A.		
Face Width (ft)	22.8646	20.8646	19.8594	18.8542	16.7708	14.7708	12.6771	11.9974	11.3151	10.6354	9.95833	9.28125	8.60417	7.9115	7.0677	6.5625	6.52083
# Panels @ (ft)		2 @ 9.95833		6 @ 10			6 @ 6.66667				K	2 @ 6.66667		4 @ 5		5 @ 4	
Weight (K)	30.1	4.5	3.1	2.6	5.1	3.7	3.8	1.0	0.9	0.9	1.0	0.7	0.6	0.5	0.3	0.2	0.3	1.0

180.0 ft
160.0 ft
155.0 ft
150.0 ft
145.0 ft
140.0 ft
133.3 ft
126.7 ft
120.0 ft
113.3 ft
106.7 ft
100.0 ft
80.0 ft
60.0 ft
40.0 ft
30.0 ft
20.0 ft
0.0 ft



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	G	2L1 3/4x1 3/4x3/16x3/16
		H	A572-50
B	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	I	L2 1/2x2 1/2x1/4
		J	L3 1/2x3 1/2x1/4
C	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	K	2 @ 3.33333
D	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3'		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Middlesex 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: 90.6%

MAX. CORNER REACTIONS AT BASE:
DOWN: 273 K
SHEAR: 29 K

UPLIFT: -225 K
SHEAR: 24 K

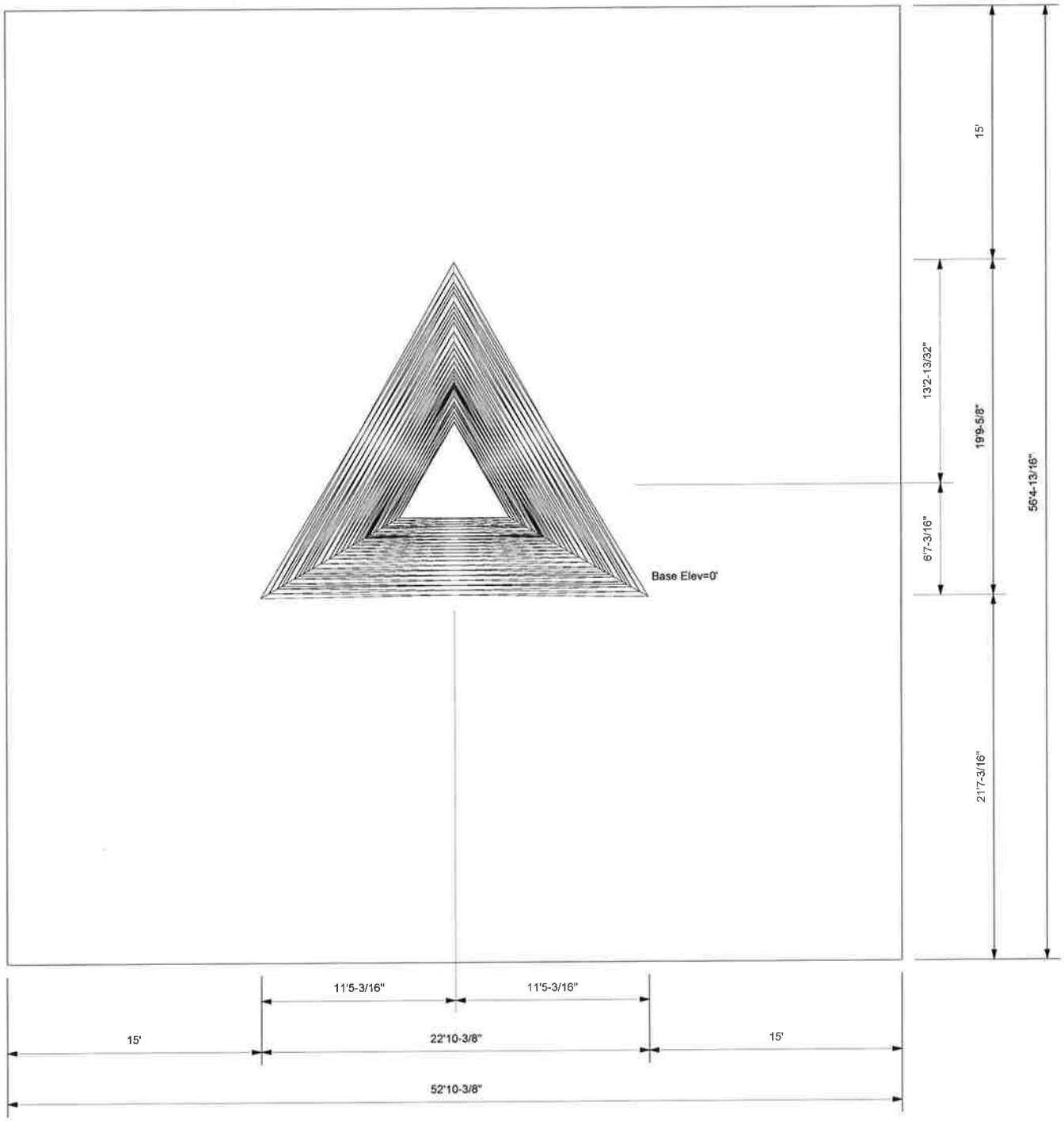
AXIAL
104 K
SHEAR 14 K
MOMENT 1571 kip-ft
TORQUE 13 kip-ft
38 mph WIND - 0.750 in ICE

AXIAL
53 K
SHEAR 46 K
MOMENT 5048 kip-ft
TORQUE 52 kip-ft
REACTIONS - 85 mph WIND

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

Job: 100140.002.01--HRT 080 953381, CT (BU# 806
Project:
Client: Crown Castle | Drawn by: Swathi Shetty | App'd:
Code: TIA/EIA-222-F | Date: 08/20/15 | Scale: NTS
Path: | Dwg No. E-

Plot Plan
Total Area - 0.07 Acres



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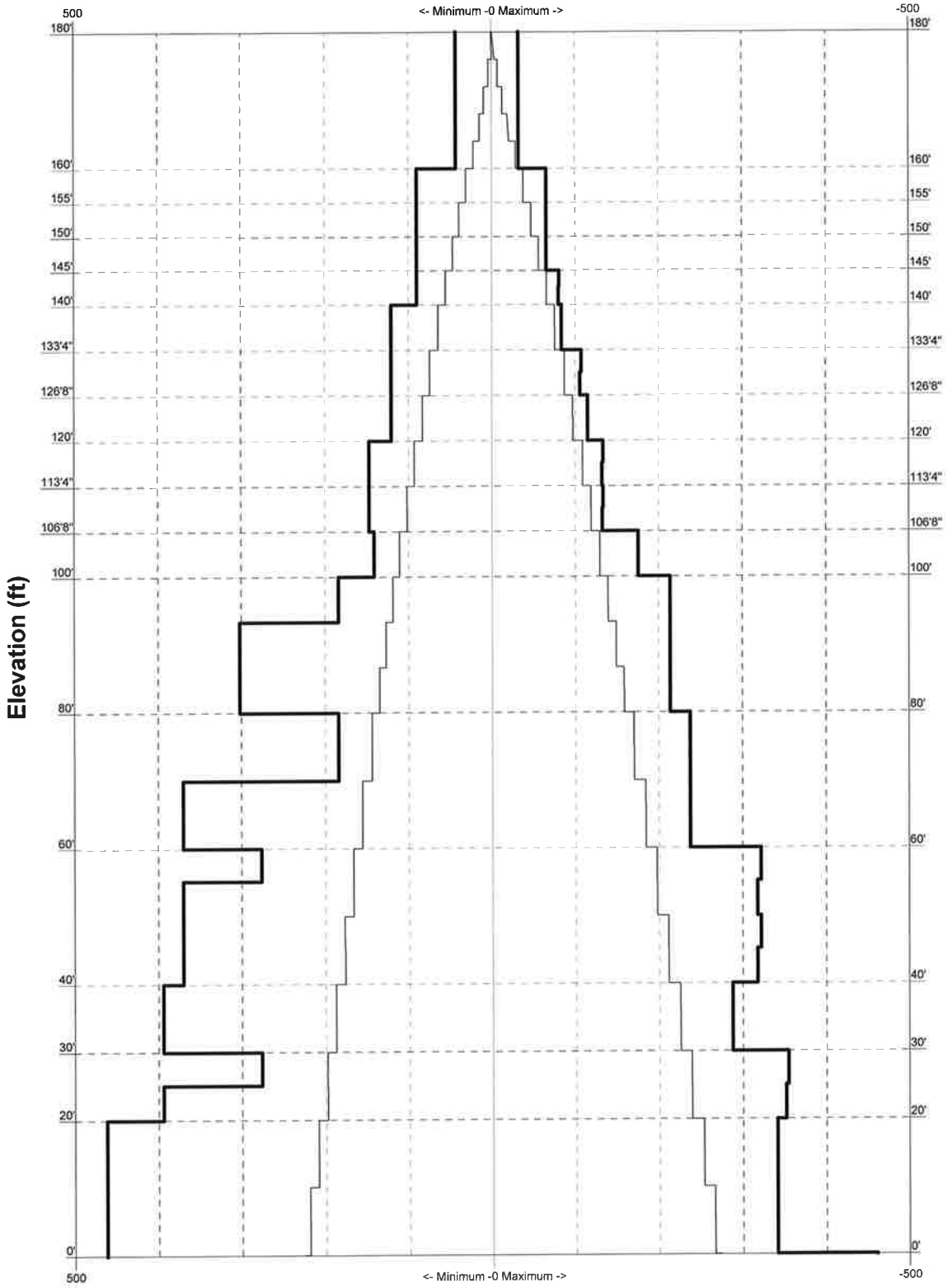
Code: TIA/EIA-222-F		Date: 08/20/15	Scale: NT
Path:			Dwg No. E-

TIA/EIA-222-F - 85 mph/38 mph 0.750 in Ice

Leg Capacity ——— **Leg Compression (K)**



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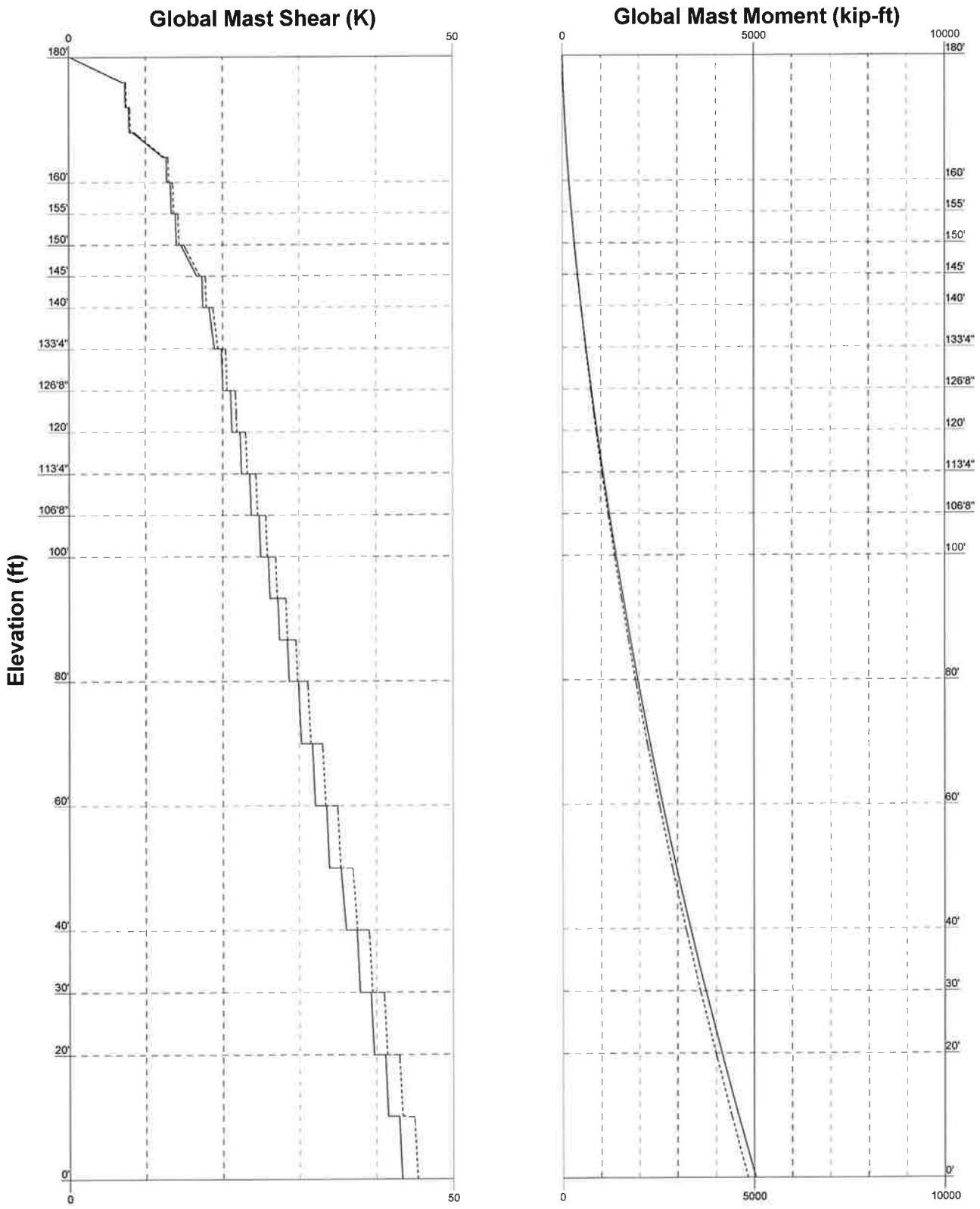
Path:		Dwg No. E-	

Vx Vz

Mx Mz



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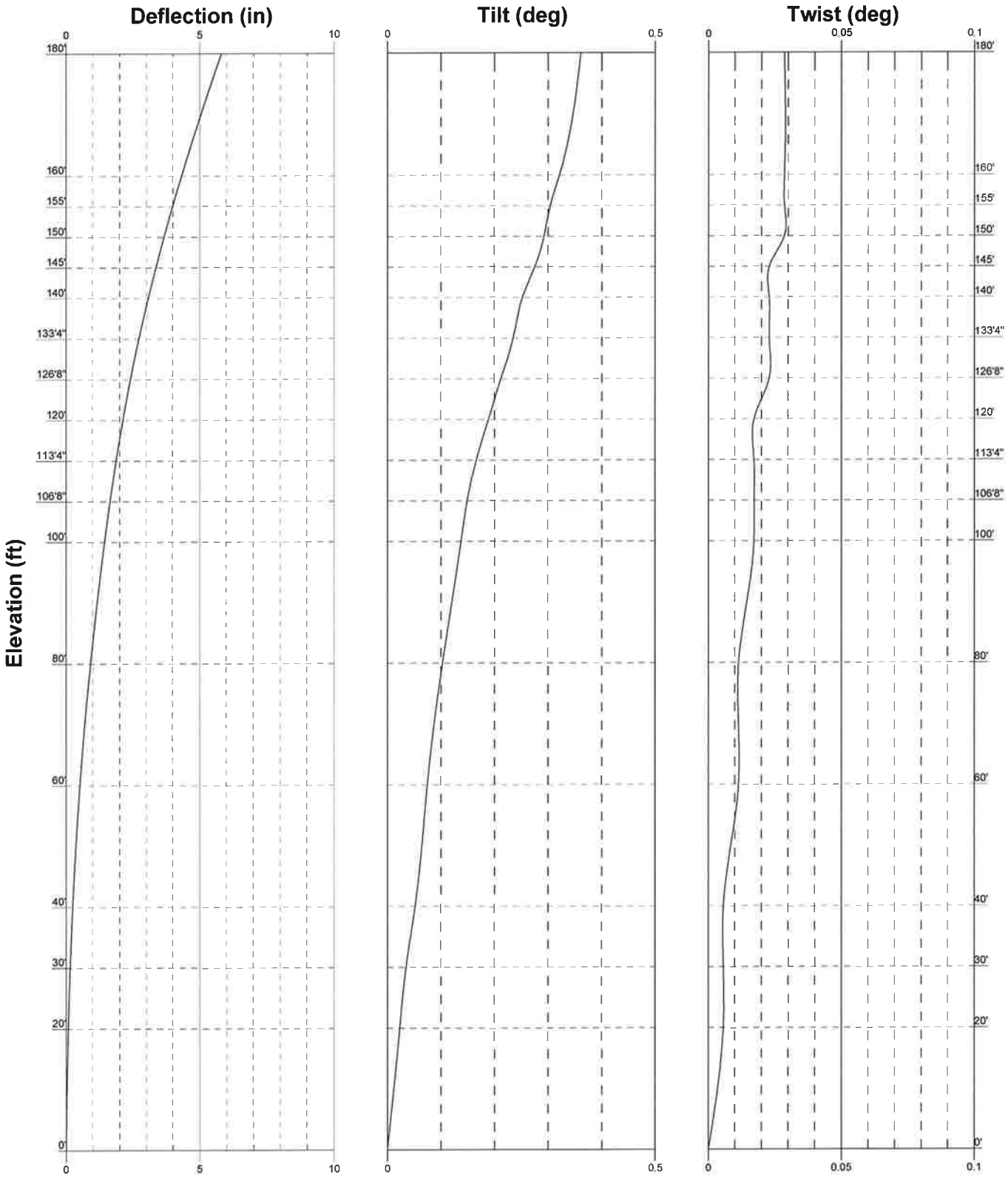
Code: TIA/EIA-222-F	Date: 08/20/15	Scale: NT	
Path:		Dwg No. E-	

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

Maximum Values



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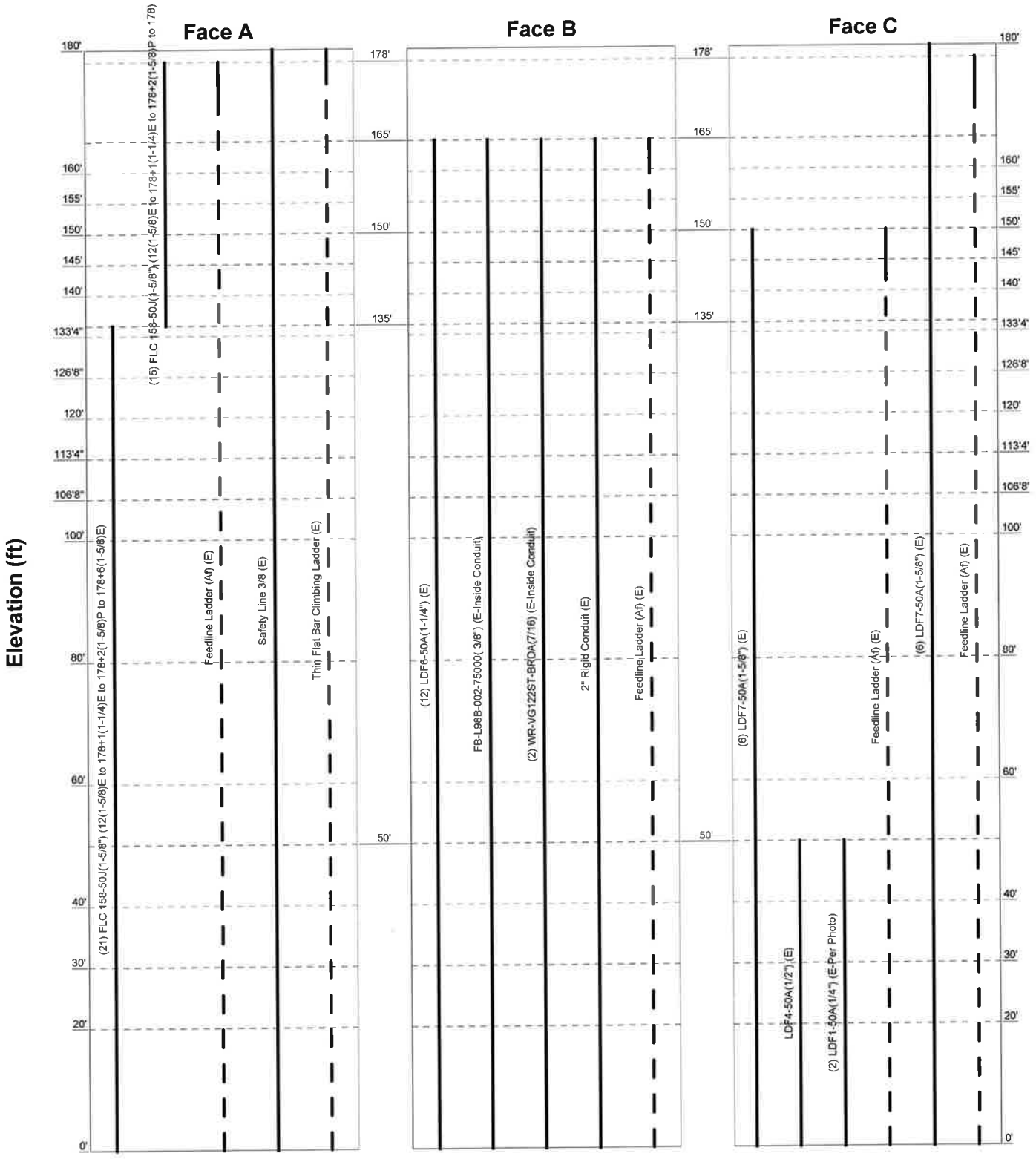
Client: Crown Castle		Drawn by: Swathi Shetty	App'd:
Code: TIA/EIA-222-F		Date: 08/20/15	Scale: NTS
Path:			Dwg No. E-

0' - 180'

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



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Project:			
Client: Crown Castle	Drawn by: Swathi Shetty	App'd:	
Code: TIA/EIA-222-F	Date: 08/20/15	Scale: NT	
Path:		Dwg No. E-	

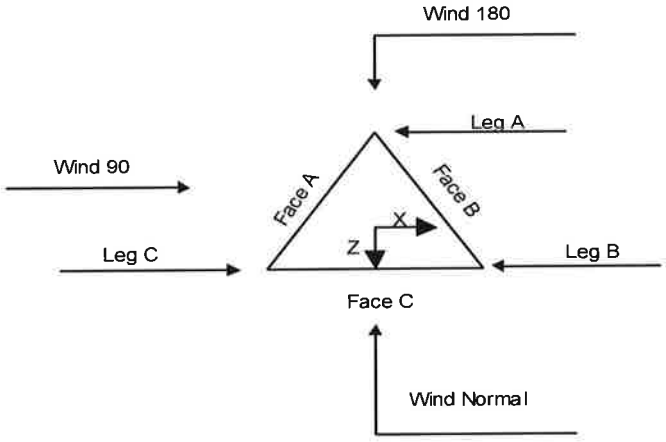
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180' above the ground line.
The base of the tower is set at an elevation of 0' above the ground line.
The face width of the tower is 6'6-1/4" at the top and 22'10-3/8" at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Middlesex 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.
Pressures are calculated at each section.
Stress ratio used in tower member 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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180'-160'			6'6-1/4"	1	20'
T2	160'-155'			6'6-3/4"	1	5'
T3	155'-150'			7'13/16"	1	5'
T4	150'-145'			7'6-31/32"	1	5'
T5	145'-140'			8'1-3/32"	1	5'
T6	140'-133'4"			8'7-1/4"	1	6'8"
T7	133'4"-126'8"			9'3-3/8"	1	6'8"
T8	126'8"-120'			9'11-1/2"	1	6'8"
T9	120'-113'4"			10'7-5/8"	1	6'8"
T10	113'4"-106'8"			11'3-25/32"	1	6'8"
T11	106'8"-100'			11'11-31/32"	1	6'8"
T12	100'-80'			12'8-1/8"	1	20'
T13	80'-60'			14'9-1/4"	1	20'
T14	60'-40'			16'9-1/4"	1	20'
T15	40'-30'			18'10-1/4"	1	10'
T16	30'-20'			19'10-5/16"	1	10'
T17	20'-0'			20'10-3/8"	1	20'

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180'-160'	4'	X Brace	No	No	0.000	0.000
T2	160'-155'	5'	X Brace	No	No	0.000	0.000
T3	155'-150'	5'	X Brace	No	No	0.000	0.000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T4	150'-145'	5'	X Brace	No	No	0.000	0.000
T5	145'-140'	5'	X Brace	No	Yes	0.000	0.000
T6	140'-133'4"	6'8"	X Brace	No	No	0.000	0.000
T7	133'4"-126'8"	6'8"	X Brace	No	Yes	0.000	0.000
T8	126'8"-120'	3'4"	Double K1	No	Yes	0.000	0.000
T9	120'-113'4"	6'8"	X Brace	No	Yes	0.000	0.000
T10	113'4"-106'8"	6'8"	X Brace	No	Yes	0.000	0.000
T11	106'8"-100'	6'8"	X Brace	No	No	0.000	0.000
T12	100'-80'	6'8"	X Brace	No	No	0.000	0.000
T13	80'-60'	10'	X Brace	No	No	0.000	0.000
T14	60'-40'	10'	X Brace	No	Yes	0.000	0.000
T15	40'-30'	10'	X Brace	No	No	0.000	0.000
T16	30'-20'	10'	X Brace	No	Yes	0.000	0.000
T17	20'-0'	9'11-1/2"	X Brace	No	No	0.000	1.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180'-160'	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A572-50 (50 ksi)
T2 160'-155'	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 155'-150'	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T4 150'-145'	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A572-50 (50 ksi)
T5 145'-140'	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Double Equal Angle	2L1 3/4x1 3/4x3/16x3/16	A36 (36 ksi)
T6 140'-133'4"	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Double Equal Angle	2L2x2x3/16x1/2	A36 (36 ksi)
T7 133'4"-126'8"	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Double Equal Angle	2L2x2x3/16x1/2	A36 (36 ksi)
T8 126'8"-120'	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Double Equal Angle	2L2x2x3/16x1/2	A36 (36 ksi)
T9 120'-113'4"	Pipe	ROHN 3.5 EH	A572-50 (50 ksi)	Double Equal Angle	2L2 1/2x2 1/2x3/16x1/2	A36 (36 ksi)
T10 113'4"-106'8"	Pipe	ROHN 3.5 EH	A572-50 (50 ksi)	Double Equal Angle	2L2 1/2x2 1/2x3/16x1/2	A36 (36 ksi)
T11 106'8"-100'	Arbitrary Shape	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Double Equal Angle	2L2 1/2x2 1/2x3/16x1/2	A36 (36 ksi)
T12 100'-80'	Arbitrary Shape	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Double Equal Angle	2L3x3x3/16x1/2	A36 (36 ksi)
T13 80'-60'	Arbitrary Shape	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Double Equal Angle	2L3x3x3/16x1/4	A36 (36 ksi)
T14 60'-40'	Arbitrary Shape	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Double Equal Angle	2L3x3x1/4x1/4	A572-50 (50 ksi)
T15 40'-30'	Arbitrary Shape	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4x1/4	A572-50 (50 ksi)
T16 30'-20'	Arbitrary Shape	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4x1/4	A572-50 (50 ksi)
T17 20'-0'	Arbitrary Shape	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3' Span)	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180'-160'	Single Angle	L2x2x1/8	A36 (36 ksi)	Flat Bar		A36 (36 ksi)
T2 160'-155'	Single Angle	L2x2x1/8	A36 (36 ksi)	Flat Bar		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T8 126'8"-120'	None	Solid Round		A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T5 145'-140'	Equal Angle	L2x2x1/4	A572-50 (50 ksi)	Solid Round		A36 (36 ksi)
T7 133'4"-126'8"	Equal Angle	L2x2x1/4	A572-50 (50 ksi)	Solid Round		A36 (36 ksi)
T9 120'-113'4"	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T10 113'4"-106'8"	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T14 60'-40'	Equal Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T16 30'-20'	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T8 126'8"-120'	A36 (36 ksi)	Horizontal (1)	Equal Angle	L2x2x1/4	1
		Diagonal (1)	Equal Angle	L2x2x1/4	1

Tower Section Geometry *(cont'd)*

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft^2	in					in	in
T1 180'-160'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T2 160'-155'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T3 155'-150'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T4 150'-145'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	0.000	0.000
T5 145'-140'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	53.264	0.000
T6 140'-133'4"	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	32.646	0.000
T7 133'4"-126'8"	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	34.290	0.000
T8 126'8"-120'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	34.626	0.000
T9 120'-113'4"	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	38.550	0.000
T10 113'4"-106'8"	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	40.314	0.000
T11 106'8"-100'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	41.094	0.000
T12 100'-80'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	46.584	0.000
T13 80'-60'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	56.730	0.000
T14 60'-40'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	62.868	0.000
T15 40'-30'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	64.482	0.000
T16 30'-20'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	67.896	0.000
T17 20'-0'	0.000	0.000	A36 (36 ksi)	1.03	1	1.05	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
ft															
T1 180'-160'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 160'-155'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 155'-150'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 150'-145'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 145'-140'	No	No	1	1	1	1	1	1	1	1	1	0.5	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
140'-133'4"				1	1	1	1	1	1	1	1	1	1	1	1
T7	No	No	1	1	1	1	1	1	1	1	1	0.5	1	1	1
133'4"-126'8"				1	1	1	1	1	1	1	1	0.5	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
126'8"-120'				1	1	1	1	1	1	1	1	1	1	1	1
T9	No	No	1	1	1	1	1	1	1	1	1	0.5	1	1	1
120'-113'4"				1	1	1	1	1	1	1	1	0.5	1	1	1
T10	No	No	1	1	1	1	1	1	1	1	1	0.5	1	1	1
113'4"-106'8"				1	1	1	1	1	1	1	1	0.5	1	1	1
T11	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
106'8"-100'				1	1	1	1	1	1	1	1	1	1	1	1
T12 100'-80'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T13 80'-60'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T14 60'-40'	No	No	1	1	1	1	1	1	1	1	1	0.5	1	1	1
				1	1	1	1	1	1	1	1	0.5	1	1	1
T15 40'-30'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T16 30'-20'	No	No	1	1	1	1	1	1	1	1	1	0.5	1	1	1
				1	1	1	1	1	1	1	1	0.5	1	1	1
T17 20'-0'	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 180'-160'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 160'-155'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 155'-150'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 150'-145'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 145'-140'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 140'-133'4"	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 133'4"-126'8"	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 126'8"-120'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 120'-113'4"	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 113'4"-106'8"	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T11 106'8"-100'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T12 100'-80'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T13 80'-60'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T14 60'-40'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T15 40'-30'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T16 30'-20'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T17 20'-0'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 180'-160'	Flange	0.625 A325N	4	0.500 A325X	1	0.500 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T2 160'-155'	Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T3 155'-150'	Flange	0.750 A325N	0	0.500 A325N	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T4 150'-145'	Flange	0.750 A325N	0	0.500 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T5 145'-140'	Flange	0.750 A325N	4	0.500 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	1
T6 140'-133'4"	Flange	0.875 A325N	0	0.500 A325N	2	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T7 133'4"-126'8"	Flange	0.875 A325N	0	0.500 A325N	2	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	1
T8 126'8"-120'	Flange	0.875 A325N	4	0.500 A325N	2	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	1	0.625 A325N	0
T9 120'-113'4"	Flange	0.875 A325N	0	0.500 A325N	2	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	1
T10 113'4"-106'8"	Flange	0.875 A325N	0	0.500 A325N	2	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	1
T11 106'8"-100'	Flange	0.875 A325N	4	0.500 A325N	2	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T12 100'-80'	Flange	1.000 A325N	4	0.500 A325N	2	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T13 80'-60'	Flange	1.000 A325N	4	0.625 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T14 60'-40'	Flange	1.000 A325N	6	0.625 A325N	1	0.625 A325X	0	0.625 A325X	0	0.625 A325X	0	0.625 A325X	0	0.625 A325N	1
T15 40'-30'	Flange	1.000 A325N	0	0.625 A325N	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T16 30'-20'	Flange	1.000 A325N	6	0.625 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	1
T17 20'-0'	Flange	1.000 A449	0	0.625 A325N	2	0.625 A325X	0	0.625 A325X	0	0.625 A325X	0	0.625 A325X	0	0.625 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
FLC 158-50J(1-5/8") (12(1-5/8)E to 178+1(1-1/4)E to 178+2(1-5/8)P to 178+6(1-5/8)E)	A	Yes	Ar (CfAe)	135' - 0'	0.000	0.43	21	13	0.850 0.750	2.015		0.001
FLC 158-50J(1-5/8") (12(1-5/8)E to	A	Yes	Ar (CfAe)	178' - 135'	0.000	0.43	15	7	0.850 0.750	2.015		0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
178+1(1-1/4)E to 178+2(1-5/8)P to 178) Feedline Ladder (Af) (E) ***S***	A	Yes	Af (CfAe)	178' - 0'	0.000	0.43	1	1	3.000	3.000	12.000	0.008
LDF6-50A(1-1/4") (E)	B	Yes	Ar (CfAe)	165' - 0'	0.000	-0.45	12	6	0.850 0.750	1.550		0.001
FB-L98B-002-75000(3/8") (E-Inside Conduit)	B	Yes	Ar (CfAe)	165' - 0'	0.000	-0.41	1	1	0.500	0.000		0.000
WR-VG122ST-BRDA(7/16") (E-Inside Conduit)	B	Yes	Ar (CfAe)	165' - 0'	0.000	-0.41	2	2	0.500	0.000		0.000
2" Rigid Conduit (E)	B	Yes	Ar (CfAe)	165' - 0'	0.000	-0.41	1	1	2.000	2.000		0.003
Feedline Ladder (Af) (E) ***S***	B	Yes	Af (CfAe)	165' - 0'	0.000	-0.45	1	1	3.000	3.000	12.000	0.008
LDF7-50A(1-5/8") (E)	C	Yes	Ar (CfAe)	150' - 0'	0.000	-0.42	6	6	0.850 0.750	1.980		0.001
LDF4-50A(1/2") (E)	C	Yes	Ar (CfAe)	50' - 0'	0.000	-0.39	1	1	0.500	0.630		0.000
LDF1-50A(1/4") (E-Per Photo)	C	Yes	Ar (CfAe)	50' - 0'	0.000	-0.39	2	1	0.250	0.345		0.000
Feedline Ladder (Af) (E) ***S***	C	Yes	Af (CfAe)	150' - 0'	0.000	-0.42	1	1	3.000	3.000	12.000	0.008
LDF7-50A(1-5/8") (E)	C	Yes	Ar (CfAe)	180' - 0'	-1.000	-0.42	6	6	0.850 0.750	1.980		0.001
Feedline Ladder (Af) (E) ***S***	C	Yes	Af (CfAe)	178' - 0'	-1.000	-0.42	1	1	3.000	3.000	12.000	0.008
Safety Line 3/8 (E)	A	Yes	Ar (CfAe)	180' - 0'	0.000	0	1	1	0.375	0.375		0.000
Thin Flat Bar Climbing Ladder (E) ***S***	A	Yes	Af (CfAe)	180' - 0'	0.000	0	1	1	2.000	2.000	8.000	0.004

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight klf
S							

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180'-160'	A	21.782	7.833	0.000	0.000	0.484
		B	4.708	1.250	0.000	0.000	0.097
		C	19.800	4.500	0.000	0.000	0.250
T2	160'-155'	A	6.033	2.083	0.000	0.000	0.132
		B	4.708	1.250	0.000	0.000	0.097
		C	4.950	1.250	0.000	0.000	0.067
T3	155'-150'	A	6.033	2.083	0.000	0.000	0.132
		B	4.708	1.250	0.000	0.000	0.097
		C	4.950	1.250	0.000	0.000	0.067
T4	150'-145'	A	6.033	2.083	0.000	0.000	0.132
		B	4.708	1.250	0.000	0.000	0.097
		C	9.900	2.500	0.000	0.000	0.133
T5	145'-140'	A	6.033	2.083	0.000	0.000	0.132
		B	4.708	1.250	0.000	0.000	0.097
		C	9.900	2.500	0.000	0.000	0.133
T6	140'-133'4"	A	9.724	2.778	0.000	0.000	0.185
		B	6.278	1.667	0.000	0.000	0.130
		C	13.200	3.333	0.000	0.000	0.178
T7	133'4"-126'8"	A	14.761	2.778	0.000	0.000	0.213
		B	6.278	1.667	0.000	0.000	0.130
		C	13.200	3.333	0.000	0.000	0.178
T8	126'8"-120'	A	14.761	2.778	0.000	0.000	0.213
		B	6.278	1.667	0.000	0.000	0.130
		C	13.200	3.333	0.000	0.000	0.178
T9	120'-113'4"	A	14.761	2.778	0.000	0.000	0.213
		B	6.278	1.667	0.000	0.000	0.130
		C	13.200	3.333	0.000	0.000	0.178
T10	113'4"-106'8"	A	14.761	2.778	0.000	0.000	0.213
		B	6.278	1.667	0.000	0.000	0.130
		C	13.200	3.333	0.000	0.000	0.178
T11	106'8"-100'	A	14.761	2.778	0.000	0.000	0.213
		B	6.278	1.667	0.000	0.000	0.130
		C	13.200	3.333	0.000	0.000	0.178
T12	100'-80'	A	44.283	8.333	0.000	0.000	0.639
		B	18.833	5.000	0.000	0.000	0.389
		C	39.600	10.000	0.000	0.000	0.533
T13	80'-60'	A	44.283	8.333	0.000	0.000	0.639
		B	18.833	5.000	0.000	0.000	0.389
		C	39.600	10.000	0.000	0.000	0.533
T14	60'-40'	A	44.283	8.333	0.000	0.000	0.639
		B	18.833	5.000	0.000	0.000	0.389
		C	40.413	10.000	0.000	0.000	0.535
T15	40'-30'	A	22.142	4.167	0.000	0.000	0.319
		B	9.417	2.500	0.000	0.000	0.195
		C	20.613	5.000	0.000	0.000	0.269
T16	30'-20'	A	22.142	4.167	0.000	0.000	0.319
		B	9.417	2.500	0.000	0.000	0.195
		C	20.613	5.000	0.000	0.000	0.269
T17	20'-0'	A	44.283	8.333	0.000	0.000	0.639

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		B	18.833	5.000	0.000	0.000	0.389
		C	41.225	10.000	0.000	0.000	0.538

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	180'-160'	A	0.913	9.430	37.473	0.000	0.000	1.377
		B		4.523	6.966	0.000	0.000	0.274
		C		6.343	29.909	0.000	0.000	0.712
T2	160'-155'	A	0.905	2.504	10.251	0.000	0.000	0.376
		B		4.495	6.961	0.000	0.000	0.273
		C		1.579	7.648	0.000	0.000	0.184
T3	155'-150'	A	0.901	2.498	10.247	0.000	0.000	0.375
		B		4.483	6.959	0.000	0.000	0.272
		C		1.576	7.647	0.000	0.000	0.184
T4	150'-145'	A	0.898	2.492	10.243	0.000	0.000	0.374
		B		4.471	6.957	0.000	0.000	0.271
		C		3.146	15.289	0.000	0.000	0.366
T5	145'-140'	A	0.894	2.486	10.239	0.000	0.000	0.374
		B		4.459	6.955	0.000	0.000	0.271
		C		3.140	15.285	0.000	0.000	0.366
T6	140'-133'4"	A	0.889	3.304	16.033	0.000	0.000	0.533
		B		5.925	9.270	0.000	0.000	0.360
		C		4.177	20.373	0.000	0.000	0.486
T7	133'4"-126'8"	A	0.884	3.292	23.188	0.000	0.000	0.640
		B		5.902	9.266	0.000	0.000	0.359
		C		4.165	20.365	0.000	0.000	0.484
T8	126'8"-120'	A	0.879	3.280	23.179	0.000	0.000	0.638
		B		5.877	9.262	0.000	0.000	0.358
		C		4.152	20.357	0.000	0.000	0.483
T9	120'-113'4"	A	0.873	3.267	23.171	0.000	0.000	0.636
		B		5.851	9.258	0.000	0.000	0.357
		C		4.139	20.348	0.000	0.000	0.481
T10	113'4"-106'8"	A	0.867	3.254	23.162	0.000	0.000	0.634
		B		5.824	9.253	0.000	0.000	0.355
		C		4.126	20.339	0.000	0.000	0.479
T11	106'8"-100'	A	0.860	3.239	23.152	0.000	0.000	0.632
		B		5.795	9.248	0.000	0.000	0.354
		C		4.111	20.330	0.000	0.000	0.477
T12	100'-80'	A	0.846	9.623	69.393	0.000	0.000	1.882
		B		17.196	27.713	0.000	0.000	1.053
		C		12.240	60.926	0.000	0.000	1.418
T13	80'-60'	A	0.821	9.456	69.281	0.000	0.000	1.858
		B		16.861	27.657	0.000	0.000	1.037
		C		12.072	60.815	0.000	0.000	1.396
T14	60'-40'	A	0.788	9.239	69.137	0.000	0.000	1.827
		B		16.428	27.585	0.000	0.000	1.017
		C		15.296	60.670	0.000	0.000	1.405
T15	40'-30'	A	0.755	4.509	34.495	0.000	0.000	0.898
		B		7.994	13.756	0.000	0.000	0.499
		C		9.148	30.262	0.000	0.000	0.704
T16	30'-20'	A	0.750	4.492	34.483	0.000	0.000	0.895
		B		7.958	13.750	0.000	0.000	0.497
		C		9.113	30.250	0.000	0.000	0.702
T17	20'-0'	A	0.750	8.983	68.967	0.000	0.000	1.790
		B		15.917	27.500	0.000	0.000	0.994
		C		18.225	60.500	0.000	0.000	1.403

Feed Line Shielding

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T1	180'-160'	A	0.000	4.727	3.140	5.177
		B	0.000	1.137	0.632	1.245
		C	0.000	3.597	2.576	3.940
T2	160'-155'	A	0.000	1.391	0.858	1.401
		B	0.000	1.229	0.630	1.237
		C	0.000	0.995	0.655	1.002
T3	155'-150'	A	0.000	0.964	0.573	0.935
		B	0.000	0.851	0.421	0.826
		C	0.000	0.689	0.438	0.669
T4	150'-145'	A	0.000	0.939	0.642	1.047
		B	0.000	0.829	0.471	0.923
		C	0.000	1.344	0.981	1.497
T5	145'-140'	A	0.000	1.312	0.822	1.340
		B	0.000	1.158	0.604	1.182
		C	0.000	1.878	1.256	1.917
T6	140'-133'4"	A	0.000	1.109	0.780	1.247
		B	0.000	0.861	0.495	0.968
		C	0.000	1.398	1.031	1.572
T7	133'4"-126'8"	A	0.000	2.059	1.505	2.329
		B	0.000	1.176	0.682	1.330
		C	0.000	1.911	1.419	2.162
T8	126'8"-120'	A	0.000	4.625	3.515	5.434
		B	0.000	2.638	1.592	3.099
		C	0.000	4.292	3.314	5.043
T9	120'-113'4"	A	0.000	1.974	1.831	2.827
		B	0.000	1.125	0.829	1.611
		C	0.000	1.832	1.726	2.623
T10	113'4"-106'8"	A	0.000	1.937	1.811	2.794
		B	0.000	1.102	0.820	1.590
		C	0.000	1.797	1.707	2.592
T11	106'8"-100'	A	0.000	1.321	1.246	1.920
		B	0.000	0.751	0.564	1.091
		C	0.000	1.226	1.175	1.782
T12	100'-80'	A	0.000	3.806	4.389	6.748
		B	0.000	2.157	1.988	3.825
		C	0.000	3.531	4.138	6.260
T13	80'-60'	A	0.000	2.611	3.116	4.771
		B	0.000	1.472	1.412	2.691
		C	0.000	2.421	2.938	4.425
T14	60'-40'	A	0.000	3.468	4.333	6.599
		B	0.000	1.943	1.963	3.697
		C	0.000	3.364	4.152	6.400
T15	40'-30'	A	0.000	1.129	1.727	2.616
		B	0.000	0.628	0.782	1.456
		C	0.000	1.141	1.682	2.643
T16	30'-20'	A	0.000	1.606	2.477	3.748
		B	0.000	0.893	1.122	2.083
		C	0.000	1.622	2.412	3.785
T17	20'-0'	A	0.000	2.187	3.855	5.833
		B	0.000	1.216	1.746	3.242
		C	0.000	2.209	3.753	5.890

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	180'-160'	4.491	-6.651	2.488	-4.801
T2	160'-155'	4.302	-11.305	2.477	-8.323
T3	155'-150'	5.145	-13.389	3.163	-10.462
T4	150'-145'	10.047	-7.738	6.653	-6.734
T5	145'-140'	9.787	-7.493	6.068	-6.123
T6	140'-133'4"	10.975	-10.018	7.573	-9.013
T7	133'4"-126'8"	9.637	-13.154	6.380	-11.383
T8	126'8"-120'	8.030	-10.913	4.194	-7.945
T9	120'-113'4"	9.743	-13.190	6.605	-11.711
T10	113'4"-106'8"	10.209	-13.773	6.937	-12.242
T11	106'8"-100'	12.035	-16.188	8.566	-14.894
T12	100'-80'	12.111	-16.205	8.828	-15.275
T13	80'-60'	14.265	-18.972	10.881	-18.530
T14	60'-40'	14.180	-18.263	11.103	-17.192
T15	40'-30'	15.861	-19.853	13.549	-19.170
T16	30'-20'	14.274	-17.838	11.973	-17.004
T17	20'-0'	16.595	-20.694	14.353	-20.254

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	K
19" Accelerator (E)	B	From Leg	0.000 0' 4'	0.000	182'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.600 8.110 8.620 9.640 11.680	7.600 8.110 8.620 9.640 11.680	0.250 0.331 0.412 0.574 0.898
(3) RR90-17-02DP w/ Mount Pipe (E)	B	From Leg	0.000 0' 4'	0.000	182'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000 0.000	0.034 0.072 0.115 0.224 0.557
S									
(2) LPA-80080/6CF w/ Mount Pipe (E)	A	From Leg	4.000 0' 0'	0.000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.564 5.105 5.612 6.651 8.834	10.728 11.990 12.968 14.980 19.217	0.046 0.113 0.187 0.363 0.857
(2) LPA-80080/6CF w/ Mount Pipe (E)	B	From Leg	4.000 0' 0'	0.000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.564 5.105 5.612 6.651 8.834	10.728 11.990 12.968 14.980 19.217	0.046 0.113 0.187 0.363 0.857
(2) LPA-80080/6CF w/ Mount Pipe (E)	C	From Leg	4.000 0' 0'	0.000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.564 5.105 5.612 6.651 8.834	10.728 11.990 12.968 14.980 19.217	0.046 0.113 0.187 0.363 0.857
(2) FD9R6004/2C-3L (E)	A	From Leg	4.000 0' 0'	0.000	178'	No Ice 1/2" Ice 1" Ice	0.367 0.451 0.543	0.085 0.136 0.196	0.003 0.005 0.009

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	0.755	0.343	0.020
						4" Ice	1.281	0.740	0.063
(2) FD9R6004/2C-3L (E)	B	From Leg	4.000 0' 0'	0.000	178'	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
						1" Ice	0.543	0.196	0.009
						2" Ice	0.755	0.343	0.020
						4" Ice	1.281	0.740	0.063
(2) FD9R6004/2C-3L (E)	C	From Leg	4.000 0' 0'	0.000	178'	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
						1" Ice	0.543	0.196	0.009
						2" Ice	0.755	0.343	0.020
						4" Ice	1.281	0.740	0.063
DB-T1-6Z-8AB-0Z (E)	B	From Leg	4.000 0' 0'	0.000	178'	No Ice	5.600	2.333	0.044
						1/2" Ice	5.915	2.558	0.080
						1" Ice	6.240	2.791	0.120
						2" Ice	6.914	3.284	0.213
						4" Ice	8.365	4.373	0.455
(3) SBNHH-1D65B w/ Mount Pipe (P)	A	From Leg	4.000 0' 0'	0.000	178'	No Ice	8.637	7.071	0.066
						1/2" Ice	9.293	8.260	0.135
						1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
(3) SBNHH-1D65B w/ Mount Pipe (P)	B	From Leg	4.000 0' 0'	0.000	178'	No Ice	8.637	7.071	0.066
						1/2" Ice	9.293	8.260	0.135
						1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
(3) SBNHH-1D65B w/ Mount Pipe (P)	C	From Leg	4.000 0' 0'	0.000	178'	No Ice	8.637	7.071	0.066
						1/2" Ice	9.293	8.260	0.135
						1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
RRH2x60-700 (P)	A	From Leg	4.000 0' 0'	0.000	178'	No Ice	3.957	1.816	0.060
						1/2" Ice	4.272	2.075	0.083
						1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-700 (P)	B	From Leg	4.000 0' 0'	0.000	178'	No Ice	3.957	1.816	0.060
						1/2" Ice	4.272	2.075	0.083
						1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-700 (P)	C	From Leg	4.000 0' 0'	0.000	178'	No Ice	3.957	1.816	0.060
						1/2" Ice	4.272	2.075	0.083
						1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2X60-PCS (P)	A	From Leg	4.000 0' 0'	0.000	178'	No Ice	2.567	2.011	0.055
						1/2" Ice	2.791	2.218	0.075
						1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2X60-PCS (P)	B	From Leg	4.000 0' 0'	0.000	178'	No Ice	2.567	2.011	0.055
						1/2" Ice	2.791	2.218	0.075
						1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2X60-PCS	C	From Leg	4.000	0.000	178'	No Ice	2.567	2.011	0.055

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
(P)			0' 0'			1/2" Ice	2.791	2.218	0.075
						1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2x60-AWS	A	From Leg	4.000	0.000	178'	No Ice	3.957	1.816	0.060
(P)			0'			1/2" Ice	4.272	2.075	0.083
			0'			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-AWS	B	From Leg	4.000	0.000	178'	No Ice	3.957	1.816	0.060
(P)			0'			1/2" Ice	4.272	2.075	0.083
			0'			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	178'	No Ice	3.957	1.816	0.060
(P)			0'			1/2" Ice	4.272	2.075	0.083
			0'			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-B1-6C-8AB-0Z	A	From Leg	4.000	0.000	178'	No Ice	5.600	2.333	0.044
(P)			0'			1/2" Ice	5.915	2.558	0.080
			0'			1" Ice	6.240	2.791	0.120
						2" Ice	6.914	3.284	0.213
						4" Ice	8.365	4.373	0.455
Sector Mount [SM 510-3]	C	None		0.000	178'	No Ice	40.100	40.100	2.396
(E)						1/2" Ice	57.330	57.330	3.089
						1" Ice	74.560	74.560	3.782
						2" Ice	109.020	109.020	5.167
						4" Ice	177.940	177.940	7.937
S									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	165'	No Ice	6.119	4.254	0.055
(E)			0'			1/2" Ice	6.626	5.014	0.103
			2'			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	B	From Leg	4.000	0.000	165'	No Ice	6.119	4.254	0.055
(E)			0'			1/2" Ice	6.626	5.014	0.103
			2'			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	C	From Leg	4.000	0.000	165'	No Ice	6.119	4.254	0.055
(E)			0'			1/2" Ice	6.626	5.014	0.103
			2'			1" Ice	7.128	5.711	0.157
						2" Ice	8.164	7.155	0.287
						4" Ice	10.360	10.412	0.665
AM-X-CD-16-65-00T-RET	A	From Leg	4.000	0.000	165'	No Ice	8.498	6.304	0.074
w/ Mount Pipe			0'			1/2" Ice	9.149	7.479	0.139
(E)			2'			1" Ice	9.767	8.368	0.212
						2" Ice	11.031	10.179	0.385
						4" Ice	13.679	14.024	0.874
AM-X-CD-16-65-00T-RET	B	From Leg	4.000	0.000	165'	No Ice	8.498	6.304	0.074
w/ Mount Pipe			0'			1/2" Ice	9.149	7.479	0.139
(E)			2'			1" Ice	9.767	8.368	0.212
						2" Ice	11.031	10.179	0.385
						4" Ice	13.679	14.024	0.874
DBXNH-6565B-R2M w/	C	From Leg	4.000	0.000	165'	No Ice	8.729	7.160	0.080
Mount Pipe			0'			1/2" Ice	9.391	8.360	0.150
(E)			2'			1" Ice	10.021	9.289	0.228

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	11.304	11.142	0.411
						4" Ice	13.990	15.200	0.925
(2) LGP21401 (E)	A	From Leg	4.000 0' 0'	0.000	165'	No Ice	1.288	0.233	0.014
						1/2" Ice	1.445	0.313	0.021
						1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
						4" Ice	2.788	1.121	0.135
(2) LGP21401 (E)	B	From Leg	4.000 0' 0'	0.000	165'	No Ice	1.288	0.233	0.014
						1/2" Ice	1.445	0.313	0.021
						1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
						4" Ice	2.788	1.121	0.135
(2) LGP21401 (E)	C	From Leg	4.000 0' 0'	0.000	165'	No Ice	1.288	0.233	0.014
						1/2" Ice	1.445	0.313	0.021
						1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
						4" Ice	2.788	1.121	0.135
(2) RRUS-11 (E)	A	From Leg	4.000 0' 2'	0.000	165'	No Ice	3.249	1.373	0.048
						1/2" Ice	3.491	1.551	0.068
						1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
(2) RRUS-11 (E)	B	From Leg	4.000 0' 2'	0.000	165'	No Ice	3.249	1.373	0.048
						1/2" Ice	3.491	1.551	0.068
						1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
(2) RRUS-11 (E)	C	From Leg	4.000 0' 2'	0.000	165'	No Ice	3.249	1.373	0.048
						1/2" Ice	3.491	1.551	0.068
						1" Ice	3.741	1.738	0.092
						2" Ice	4.268	2.138	0.150
						4" Ice	5.426	3.042	0.310
(2) LGP21903 (E)	A	From Leg	4.000 0' 0'	0.000	165'	No Ice	0.270	0.184	0.011
						1/2" Ice	0.343	0.248	0.013
						1" Ice	0.425	0.322	0.017
						2" Ice	0.616	0.494	0.028
						4" Ice	1.101	0.943	0.072
(2) LGP21903 (E)	B	From Leg	4.000 0' 0'	0.000	165'	No Ice	0.270	0.184	0.011
						1/2" Ice	0.343	0.248	0.013
						1" Ice	0.425	0.322	0.017
						2" Ice	0.616	0.494	0.028
						4" Ice	1.101	0.943	0.072
(2) LGP21903 (E)	C	From Leg	4.000 0' 0'	0.000	165'	No Ice	0.270	0.184	0.011
						1/2" Ice	0.343	0.248	0.013
						1" Ice	0.425	0.322	0.017
						2" Ice	0.616	0.494	0.028
						4" Ice	1.101	0.943	0.072
DC6-48-60-18-8F (E)	B	From Leg	4.000 0' 2'	0.000	165'	No Ice	1.467	1.467	0.019
						1/2" Ice	1.667	1.667	0.037
						1" Ice	1.878	1.878	0.057
						2" Ice	2.333	2.333	0.105
						4" Ice	3.378	3.378	0.239
4.5' x 2" Mount Pipe (E)	A	From Leg	4.000 0' 0'	0.000	165'	No Ice	1.024	1.024	0.002
						1/2" Ice	1.298	1.298	0.010
						1" Ice	1.580	1.580	0.021
						2" Ice	2.174	2.174	0.054
						4" Ice	3.574	3.574	0.164
4.5' x 2" Mount Pipe	B	From Leg	4.000	0.000	165'	No Ice	1.024	1.024	0.002

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
(E)			0' 0'			1/2" Ice	1.298	1.298	0.010
						1" Ice	1.580	1.580	0.021
						2" Ice	2.174	2.174	0.054
						4" Ice	3.574	3.574	0.164
4.5' x 2" Mount Pipe	C	From Leg	4.000	0.000	165'	No Ice	1.024	1.024	0.002
(E)			0'			1/2" Ice	1.298	1.298	0.010
			0'			1" Ice	1.580	1.580	0.021
						2" Ice	2.174	2.174	0.054
						4" Ice	3.574	3.574	0.164
Sector Mount [SM 510-3]	C	None		0.000	165'	No Ice	40.100	40.100	2.396
(E)						1/2" Ice	57.330	57.330	3.089
						1" Ice	74.560	74.560	3.782
						2" Ice	109.020	109.020	5.167
						4" Ice	177.940	177.940	7.937
S									
(2) DB980H90E-M w/ Mount Pipe	A	From Leg	4.000	0.000	150'	No Ice	4.036	3.619	0.030
(E)			0'			1/2" Ice	4.499	4.481	0.066
			0'			1" Ice	4.947	5.219	0.109
						2" Ice	5.870	6.744	0.216
						4" Ice	8.046	9.995	0.549
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	4.000	0.000	150'	No Ice	4.036	3.619	0.030
(E)			0'			1/2" Ice	4.499	4.481	0.066
			0'			1" Ice	4.947	5.219	0.109
						2" Ice	5.870	6.744	0.216
						4" Ice	8.046	9.995	0.549
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	4.000	0.000	150'	No Ice	4.036	3.619	0.030
(E)			0'			1/2" Ice	4.499	4.481	0.066
			0'			1" Ice	4.947	5.219	0.109
						2" Ice	5.870	6.744	0.216
						4" Ice	8.046	9.995	0.549
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	150'	No Ice	1.425	1.425	0.022
(E)			0'			1/2" Ice	1.925	1.925	0.033
			0'			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
6' x 2" Mount Pipe	B	From Leg	4.000	0.000	150'	No Ice	1.425	1.425	0.022
(E)			0'			1/2" Ice	1.925	1.925	0.033
			0'			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
6' x 2" Mount Pipe	C	From Leg	4.000	0.000	150'	No Ice	1.425	1.425	0.022
(E)			0'			1/2" Ice	1.925	1.925	0.033
			0'			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
Sector Mount [SM 504-3]	C	None		0.000	150'	No Ice	34.250	34.250	1.708
(E)						1/2" Ice	48.980	48.980	2.286
						1" Ice	63.710	63.710	2.864
						2" Ice	93.170	93.170	4.020
						4" Ice	152.090	152.090	6.333
S									
S									
742 213	A	From Leg	1.000	0.000	135'	No Ice	5.135	2.869	0.022
(E)			0'			1/2" Ice	5.609	3.483	0.047
			0'			1" Ice	6.090	3.946	0.078
						2" Ice	7.074	4.893	0.158
						4" Ice	9.130	6.876	0.394
742 213	B	From Leg	1.000	0.000	135'	No Ice	5.135	2.869	0.022

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
(E)			0'			1/2" Ice	5.609	3.483	0.047
			0'			1" Ice	6.090	3.946	0.078
						2" Ice	7.074	4.893	0.158
						4" Ice	9.130	6.876	0.394
742 213	C	From Leg	1.000	0.000	135'	No Ice	5.135	2.869	0.022
(E)			0'			1/2" Ice	5.609	3.483	0.047
			0'			1" Ice	6.090	3.946	0.078
						2" Ice	7.074	4.893	0.158
						4" Ice	9.130	6.876	0.394
Pipe Mount [PM 601-3]	C	None		0.000	135'	No Ice	4.390	4.390	0.195
(E)						1/2" Ice	5.480	5.480	0.237
						1" Ice	6.570	6.570	0.280
						2" Ice	8.750	8.750	0.365
						4" Ice	13.110	13.110	0.534
S									
GPS	C	From Leg	1.500	0.000	50'	No Ice	0.175	0.175	0.000
(E)			0'			1/2" Ice	0.238	0.238	0.002
			0'			1" Ice	0.309	0.309	0.005
						2" Ice	0.477	0.477	0.014
						4" Ice	0.918	0.918	0.053
Sector Mount [SM 201-1]	C	From Leg	0.750	0.000	50'	No Ice	17.890	5.840	0.361
(E)			0'			1/2" Ice	24.350	9.070	0.497
			0'			1" Ice	30.810	12.300	0.632
						2" Ice	43.730	18.760	0.903
						4" Ice	69.570	31.680	1.445
S									

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	5.803	27	0.360	0.031
T2	160 - 155	4.324	27	0.319	0.029
T3	155 - 150	3.985	27	0.306	0.027
T4	150 - 145	3.662	27	0.291	0.026
T5	145 - 140	3.358	27	0.274	0.025
T6	140 - 133.333	3.075	27	0.254	0.024
T7	133.333 - 126.667	2.727	27	0.234	0.022
T8	126.667 - 120	2.409	27	0.211	0.021
T9	120 - 113.333	2.123	27	0.188	0.020
T10	113.333 - 106.667	1.869	27	0.168	0.018
T11	106.667 - 100	1.643	27	0.147	0.017
T12	100 - 80	1.440	27	0.136	0.016
T13	80 - 60	0.919	27	0.104	0.012

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T14	60 - 40	0.522	27	0.077	0.009
T15	40 - 30	0.243	27	0.049	0.006
T16	30 - 20	0.146	27	0.036	0.005
T17	20 - 0	0.078	27	0.022	0.004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182'	19" Accelerator	27	5.803	0.360	0.031	70090
178'	(2) LPA-80080/6CF w/ Mount Pipe	27	5.651	0.356	0.031	70090
165'	(2) 7770.00 w/ Mount Pipe	27	4.679	0.331	0.030	23363
150'	(2) DB980H90E-M w/ Mount Pipe	27	3.662	0.291	0.026	16660
135'	742 213	27	2.811	0.239	0.023	17667
50'	GPS	27	0.368	0.063	0.008	41948

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	16.535	2	1.025	0.091
T2	160 - 155	12.320	2	0.909	0.084
T3	155 - 150	11.353	2	0.872	0.079
T4	150 - 145	10.435	2	0.828	0.075
T5	145 - 140	9.569	2	0.779	0.071
T6	140 - 133.333	8.763	2	0.724	0.068
T7	133.333 - 126.667	7.772	2	0.665	0.065
T8	126.667 - 120	6.866	2	0.601	0.061
T9	120 - 113.333	6.052	2	0.535	0.057
T10	113.333 - 106.667	5.327	2	0.477	0.053
T11	106.667 - 100	4.684	2	0.418	0.050
T12	100 - 80	4.106	2	0.386	0.046
T13	80 - 60	2.622	2	0.295	0.036
T14	60 - 40	1.491	2	0.218	0.026
T15	40 - 30	0.696	2	0.139	0.019
T16	30 - 20	0.420	2	0.101	0.015
T17	20 - 0	0.226	2	0.064	0.012

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182'	19" Accelerator	2	16.535	1.025	0.091	25021
178'	(2) LPA-80080/6CF w/ Mount Pipe	2	16.101	1.015	0.090	25021
165'	(2) 7770.00 w/ Mount Pipe	2	13.332	0.942	0.087	8340
150'	(2) DB980H90E-M w/ Mount Pipe	2	10.435	0.828	0.075	5841
135'	742 213	2	8.011	0.679	0.065	6201
50'	GPS	2	1.052	0.178	0.022	14730

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.625	4	5.537	13.499	0.410 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.500	1	5.504	5.890	0.934 ✓	1.333	Bolt Shear
		Top Girt	A325N	0.500	1	0.388	2.719	0.143 ✓	1.333	Member Bearing
T2	160	Diagonal	A325N	0.500	1	4.466	3.806	1.173 ✓	1.333	Member Block Shear
		Top Girt	A325N	0.500	1	0.348	2.719	0.128 ✓	1.333	Member Bearing
T3	155	Diagonal	A325N	0.500	1	4.508	3.806	1.184 ✓	1.333	Member Block Shear
T4	150	Diagonal	A325X	0.500	1	5.248	5.890	0.891 ✓	1.333	Bolt Shear
T5	145	Leg	A325N	0.750	4	13.820	19.439	0.711 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.500	1	5.155	7.612	0.677 ✓	1.333	Member Block Shear
		Secondary Horizontal	A325X	0.625	1	1.147	6.805	0.169 ✓	1.333	Member Block Shear
T6	140	Diagonal	A325N	0.500	2	2.800	7.341	0.381 ✓	1.333	Member Block Shear
T7	133.333	Diagonal	A325N	0.500	2	2.958	7.341	0.403 ✓	1.333	Member Block Shear
		Secondary Horizontal	A325X	0.625	1	1.517	6.805	0.223 ✓	1.333	Member Block Shear
T8	126.667	Leg	A325N	0.875	4	20.836	26.454	0.788 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.500	2	2.935	7.341	0.400 ✓	1.333	Member Block Shear
		Horizontal	A325N	0.625	1	1.694	6.443	0.263 ✓	1.333	Bolt Shear
T9	120	Diagonal	A325N	0.500	2	2.997	8.247	0.363 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.625	1	1.890	6.443	0.293 ✓	1.333	Bolt Shear
T10	113.333	Diagonal	A325N	0.500	2	3.110	8.247	0.377 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.625	1	2.066	6.443	0.321 ✓	1.333	Bolt Shear
T11	106.667	Leg	A325N	0.875	4	27.708	26.458	1.047 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.500	2	3.146	8.247	0.382 ✓	1.333	Bolt Shear
T12	100	Leg	A325N	1.000	4	33.664	34.557	0.974 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.500	2	3.331	8.247	0.404 ✓	1.333	Bolt Shear
T13	80	Leg	A325N	1.000	4	38.961	34.557	1.127 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	7.948	10.195	0.780 ✓	1.333	Member Bearing
T14	60	Leg	A325N	1.000	6	29.459	34.557	0.852 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	8.363	12.885	0.649 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.625	1	3.671	6.443	0.570 ✓	1.333	Bolt Shear
T15	40	Diagonal	A325N	0.625	1	8.822	12.885	0.685 ✓	1.333	Bolt Shear
T16	30	Leg	A325N	1.000	6	32.995	34.557	0.955 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.625	1	9.232	12.885	0.716 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.625	1	4.146	6.443	0.643 ✓	1.333	Bolt Shear
T17	20	Diagonal	A325N	0.625	2	4.975	6.443	0.772 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 2 STD	20'	4'	61.0 K=1.00	22.549	1.075	-28.696	24.230	1.184 ✓
T2	160 - 155	ROHN 2.5 EH	5'3/32"	5'3/32"	65.0 K=1.00	21.838	2.254	-38.197	49.214	0.776 ✓
T3	155 - 150	ROHN 2.5 EH	5'3/32"	5'3/32"	65.0 K=1.00	21.838	2.254	-47.334	49.212	0.962 ✓
T4	150 - 145	ROHN 2.5 EH	5'3/32"	5'3/32"	65.0 K=1.00	21.838	2.254	-56.498	49.213	1.148 ✓
T5	145 - 140	ROHN 2.5 EH	5'3/32"	2'6-31/32"	33.5 K=1.00	26.707	2.254	-66.127	60.185	1.099 ✓
T6	140 - 133.333	ROHN 3 EH	6'8-1/8"	6'8-1/8"	70.5 K=1.00	20.841	3.016	-75.936	62.854	1.208 ✓
T7	133.333 - 126.667	ROHN 3 EH	6'8-1/8"	3'5-15/32"	36.5 K=1.00	26.313	3.016	-87.465	79.358	1.102 ✓
T8	126.667 - 120	ROHN 3 EH	6'8-1/8"	1'8-1/32"	17.6 K=1.00	28.544	3.016	-97.650	86.087	1.134 ✓
T9	120 - 113.333	ROHN 3.5 EH	6'8-1/8"	3'5-5/16"	31.6 K=1.00	26.951	3.678	-108.959	99.136	1.099 ✓
T10	113.333 - 106.667	ROHN 3.5 EH	6'8-1/8"	3'5-1/4"	31.6 K=1.00	26.957	3.678	-119.082	99.160	1.201 ✓
T11	106.667 - 100	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	6'8-1/8"	6'8-1/8"	78.7 K=1.00	19.264	6.820	-129.740	131.386	0.987 ✓
T12	100 - 80	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'7/16"	6'8-5/32"	68.5 K=1.00	21.214	7.549	-158.515	160.143	0.990 ✓
T13	80 - 60	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'13/32"	10'7/32"	78.9 K=1.00	19.227	9.254	-184.413	177.925	1.036 ✓
T14	60 - 40	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'7/16"	5'1-13/16"	40.6 K=1.00	25.749	9.254	-211.632	238.284	0.888 ✓
T15	40 - 30	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	10'7/32"	10'7/32"	64.7 K=1.00	21.900	9.855	-225.620	215.824	1.045 ✓
T16	30 - 20	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	10'7/32"	5'1-19/32"	33.1 K=1.00	26.755	9.855	-239.038	263.672	0.907 ✓
T17	20 - 0	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'13/32"	9'11-11/16"	63.3 K=1.00	22.146	11.547	-273.912	255.724	1.071 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/4	7'8-3/16"	3'7-15/32"	113.4 K=1.02	11.612	0.938	-5.504	10.892	0.505 ✓
T2	160 - 155	L1 3/4x1 3/4x3/16	8'5-7/16"	4'1-9/16"	144.3 K=1.00	7.169	0.621	-4.599	4.452	1.033 ✓
T3	155 - 150	L1 3/4x1 3/4x3/16	8'10-7/16'	4'4-3/32"	151.7	6.492	0.621	-4.433	4.032	1.099

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 $\frac{P}{P_a}$
T4	150 - 145	L2x2x1/4	9'3-9/16"	4'6-5/8"	139.7 K=1.00	7.647	0.938	-5.248	7.173	0.732 ✓
T5	145 - 140	2L1 3/4x1 3/4x3/16x3/16	9'8-25/32"	4'10-1/2"	171.3 K=1.00	5.091	1.242	-5.114	6.325	0.809 ✓
T6	140 - 133.333	2L 'a' > 28.068 in - 72 2L2x2x3/16x1/2	11'1-7/8"	5'5-9/32"	109.3 K=1.03	11.763	1.430	-5.701	16.818	0.339 ✓
T7	133.333 - 126.667	2L 'a' > 32.286 in - 84 2L2x2x3/16x1/2	11'8-15/32"	5'10-9/16"	114.3 K=1.00	11.081	1.430	-5.933	15.842	0.374 ✓
T8	126.667 - 120	2L 'a' > 33.766 in - 93 2L2x2x3/16x1/2	6'3-5/16"	5'9-1/4"	110.9 K=1.00	11.555	1.430	-6.388	16.520	0.387 ✓
T9	120 - 113.333	2L 'a' > 26.251 in - 111 2L2 1/2x2 1/2x3/16x1/2	12'10-1/8"	6'5-3/32"	100.2 K=1.00	12.954	1.805	-5.994	23.378	0.256 ✓
T10	113.333 - 106.667	2L 'a' > 36.772 in - 147 2L2 1/2x2 1/2x3/16x1/2	13'5-5/32"	6'8-5/8"	104.8 K=1.00	12.365	1.805	-6.220	22.314	0.279 ✓
T11	106.667 - 100	2L 'a' > 38.454 in - 159 2L2 1/2x2 1/2x3/16x1/2	14'5/16"	6'10-3/16"	109.2 K=1.03	11.778	1.805	-6.276	21.256	0.295 ✓
T12	100 - 80	2L 'a' > 40.534 in - 171 2L3x3x3/16x1/2	15'10-21/32"	7'9-5/32"	104.4 K=1.05	12.217	2.180	-6.662	26.630	0.250 ✓
T13	80 - 60	2L3x3x3/16x1/4	19'1-3/16"	9'5-7/16"	127.7 K=1.00	9.161	2.180	-8.065	19.967	0.404 ✓
T14	60 - 40	2L 'a' > 54.001 in - 201 2L3x3x1/4x1/4	20'10-5/8"	10'5-11/16"	141.5 K=1.00	7.453	2.875	-8.363	21.429	0.390 ✓
T15	40 - 30	2L 'a' > 60.029 in - 216 2L3 1/2x3 1/2x1/4x1/4	21'9-15/32"	10'8-31/32"	125.0 K=1.00	9.563	3.375	-8.822	32.274	0.273 ✓
T16	30 - 20	2L 'a' > 61.711 in - 237 2L3 1/2x3 1/2x1/4x1/4	22'8-1/4"	11'3-25/32"	131.6 K=1.00	8.625	3.375	-9.232	29.110	0.317 ✓
T17	20 - 0	2L 'a' > 64.727 in - 246 L4x4x1/4	24'5-3/4"	12'1/8"	166.8 K=0.92	5.370	1.940	-9.949	10.419	0.955 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T8	126.667 - 120	L2 1/2x2 1/2x1/4	10'3-9/16"	9'9-3/16"	152.4 K=1.00	6.430	1.190	-1.694	7.652	0.221 ✓

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T5	145 - 140	L2x2x1/4	8'4-3/32"	8'1-3/16"	124.3 K=0.50	9.665	0.938	-1.147	9.066	0.127 ✓
T7	133.333 - 126.667	L2x2x1/4	9'7-9/32"	9'3-25/32"	143.0 K=0.50	7.307	0.938	-1.517	6.854	0.221 ✓
T9	120 - 113.333	L2 1/2x2 1/2x1/4	10'11-19/32"	10'7-9/16"	129.9 K=0.50	8.848	1.190	-1.890	10.529	0.180 ✓
T10	113.333 - 106.667	L2 1/2x2 1/2x1/4	11'7-3/4"	11'3-3/4"	138.2 K=0.50	7.814	1.190	-2.066	9.298	0.222 ✓
T14	60 - 40	L3x3x1/4	18'3-13/16"	17'10-1/4"	181.0 K=0.50	4.560	1.440	-3.671	6.567	0.559 ✓
T16	30 - 20	L3 1/2x3 1/2x1/4	20'4-3/16"	19'9-9/16"	171.2 K=0.50	5.097	1.690	-4.146	8.615	0.481 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	180 - 160	L2x2x1/8	6'6-1/4"	6'1-3/8"	184.6 K=1.00	4.384	0.484	-0.324	2.123	0.153 ✓
T2	160 - 155	L2x2x1/8	6'6-3/4"	6'1-7/8"	185.8 K=1.00	4.324	0.484	-0.300	2.095	0.143 ✓

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T8	126.667 - 120	L2x2x1/4	2'6-7/8"	2'5-1/8"	97.3 K=1.31	13.321	0.938	-1.694	12.495	0.136 ✓

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T8	126.667 - 120	L2x2x1/4	3'1-21/32"	2'11-9/16"	105.5 K=1.16	12.274	0.938	-1.060	11.513	0.092 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 2 STD	20'	4'	61.0	30.000	1.075	22.148	32.236	0.687 ✓
T2	160 - 155	ROHN 2.5 EH	5'3/32"	5'3/32"	65.0	30.000	2.254	31.042	67.606	0.459 ✓
T3	155 - 150	ROHN 2.5 EH	5'3/32"	5'3/32"	65.0	30.000	2.254	39.266	67.606	0.581 ✓
T4	150 - 145	ROHN 2.5 EH	5'3/32"	5'3/32"	65.0	30.000	2.254	46.665	67.606	0.690 ✓
T5	145 - 140	ROHN 2.5 EH	5'3/32"	2'5-1/8"	31.5	30.000	2.254	55.291	67.606	0.818 ✓
T6	140 - 133.333	ROHN 3 EH	6'8-1/8"	6'8-1/8"	70.5	30.000	3.016	64.106	90.478	0.709 ✓
T7	133.333 - 126.667	ROHN 3 EH	6'8-1/8"	3'2-21/32"	34.0	30.000	3.016	74.338	90.478	0.822 ✓
T8	126.667 - 120	ROHN 3 EH	6'8-1/8"	1'8-1/32"	17.6	30.000	3.016	83.435	90.478	0.922 ✓
T9	120 - 113.333	ROHN 3.5 EH	6'8-1/8"	3'2-27/32"	29.7	30.000	3.678	93.118	110.352	0.844 ✓
T10	113.333 - 106.667	ROHN 3.5 EH	6'8-1/8"	3'2-29/32"	29.8	30.000	3.678	101.897	110.352	0.923 ✓
T11	106.667 - 100	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	6'8-1/8"	6'8-1/8"	78.7	30.000	6.820	110.831	204.612	0.542 ✓
T12	100 - 80	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'7/16"	6'8-5/32"	68.5	30.000	7.549	134.655	226.470	0.595 ✓
T13	80 - 60	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'13/32"	10'7/32"	78.9	30.000	9.254	155.846	277.620	0.561 ✓
T14	60 - 40	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'7/16"	4'10-13/32"	38.3	30.000	9.254	176.933	277.620	0.637 ✓
T15	40 - 30	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	10'7/32"	10'7/32"	64.7	30.000	9.855	187.858	295.647	0.635 ✓
T16	30 - 20	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	10'7/32"	4'10-5/8"	31.5	30.000	9.855	198.185	295.647	0.670 ✓
T17	20 - 0	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3' Span)	20'13/32"	1"	0.5	30.000	11.547	225.627	346.410	0.651 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/4	7'8-3/16"	3'7-15/32"	73.4	32.500	0.586	5.319	19.055	0.279 ✓
T2	160 - 155	L1 3/4x1 3/4x3/16	8'5-7/16"	4'1-9/16"	94.6	29.000	0.378	4.466	10.960	0.407 ✓
T3	155 - 150	L1 3/4x1 3/4x3/16	8'10-7/16'	4'4-3/32"	99.3	29.000	0.378	4.508	10.960	0.411

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 $\frac{P}{P_a}$
T4	150 - 145	L2x2x1/4	9'3-9/16"	4'6-5/8"	91.8	32.500	0.586	5.105	19.055	0.268 ✓
T5	145 - 140	2L1 3/4x1 3/4x3/16x3/16	9'8-25/32"	4'10-1/2"	109.0	29.000	0.756	5.155	21.920	0.235 ✓
T6	140 - 133.333	2L 'a' > 28.068 in - 73 2L2x2x3/16x1/2	11'1-7/8"	5'5-9/32"	109.0	29.000	0.896	5.600	25.998	0.215 ✓
T7	133.333 - 126.667	2L 'a' > 32.286 in - 85 2L2x2x3/16x1/2	11'8-15/32"	5'10-9/16"	114.3	29.000	0.896	5.915	25.998	0.228 ✓
T8	126.667 - 120	2L 'a' > 33.766 in - 94 2L2x2x3/16x1/2	6'3-5/16"	5'9-1/4"	71.4	29.000	0.896	5.869	25.998	0.226 ✓
T9	120 - 113.333	2L 'a' > 26.251 in - 114 2L2 1/2x2 1/2x3/16x1/2	12'10-1/8"	6'5-3/32"	99.1	29.000	1.178	5.948	34.154	0.174 ✓
T10	113.333 - 106.667	2L 'a' > 36.772 in - 148 2L2 1/2x2 1/2x3/16x1/2	13'5-5/32"	6'8-5/8"	103.6	29.000	1.178	6.064	34.154	0.178 ✓
T11	106.667 - 100	2L 'a' > 38.454 in - 160 2L2 1/2x2 1/2x3/16x1/2	14'5/16"	6'10-3/16"	108.2	29.000	1.178	6.293	34.154	0.184 ✓
T12	100 - 80	2L 'a' > 40.534 in - 172 2L3x3x3/16x1/2	15'10-21/32"	7'9-5/32"	101.3	29.000	1.459	6.626	42.310	0.157 ✓
T13	80 - 60	2L3x3x3/16x1/4	19'1-3/16"	9'5-7/16"	122.3	29.000	1.424	7.948	41.291	0.192 ✓
T14	60 - 40	2L 'a' > 54.001 in - 202 2L3x3x1/4x1/4	20'10-5/8"	10'5-11/16"	135.1	32.500	1.875	8.250	60.938	0.135 ✓
T15	40 - 30	2L 'a' > 60.029 in - 217 2L3 1/2x3 1/2x1/4x1/4	21'9-15/32"	10'8-31/32"	119.5	32.500	2.250	8.763	73.125	0.120 ✓
T16	30 - 20	2L 'a' > 61.711 in - 238 2L3 1/2x3 1/2x1/4x1/4	22'8-1/4"	11'3-25/32"	124.4	32.500	2.250	9.088	73.125	0.124 ✓
T17	20 - 0	2L 'a' > 64.727 in - 247 L4x4x1/4	24'5-3/4"	12'1/8"	117.2	32.500	1.314	9.699	42.717	0.227 ✓

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T8	126.667 - 120	L2 1/2x2 1/2x1/4	10'3-9/16"	9'9-3/16"	156.1	29.000	0.752	1.694	21.804	0.078 ✓

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T5	145 - 140	L2x2x1/4	8'4-3/32"	8'1-3/16"	159.6	32.500	0.563	1.147	18.293	0.063 ✓
T7	133.333 - 126.667	L2x2x1/4	9'7-9/32"	9'3-25/32"	183.6	32.500	0.563	1.517	18.293	0.083 ✓
T9	120 - 113.333	L2 1/2x2 1/2x1/4	10'11-19/32"	10'7-9/16"	165.9	29.000	0.752	1.890	21.804	0.087 ✓
T10	113.333 - 106.667	L2 1/2x2 1/2x1/4	11'7-3/4"	11'3-3/4"	176.5	29.000	0.752	2.066	21.804	0.095 ✓
T14	60 - 40	L3x3x1/4	18'3-13/16"	17'10-1/4"	230.4	29.000	0.939	3.671	27.242	0.135 ✓
T16	30 - 20	L3 1/2x3 1/2x1/4	20'4-3/16"	19'9-9/16"	218.0	29.000	1.127	4.146	32.679	0.127 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	6'6-1/4"	6'1-3/8"	121.2	29.000	0.305	0.388	8.836	0.044 ✓
T2	160 - 155	L2x2x1/8	6'6-3/4"	6'1-7/8"	122.0	29.000	0.305	0.348	8.836	0.039 ✓

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T8	126.667 - 120	L2x2x1/4	2'6-7/8"	2'5-1/8"	47.8	21.600	0.938	1.709	20.261	0.084 ✓

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T8	126.667 - 120	L2x2x1/4	3'1-21/32"	2'11-9/16"	58.4	21.600	0.938	1.033	20.261	0.051 ✓

Section Capacity Table

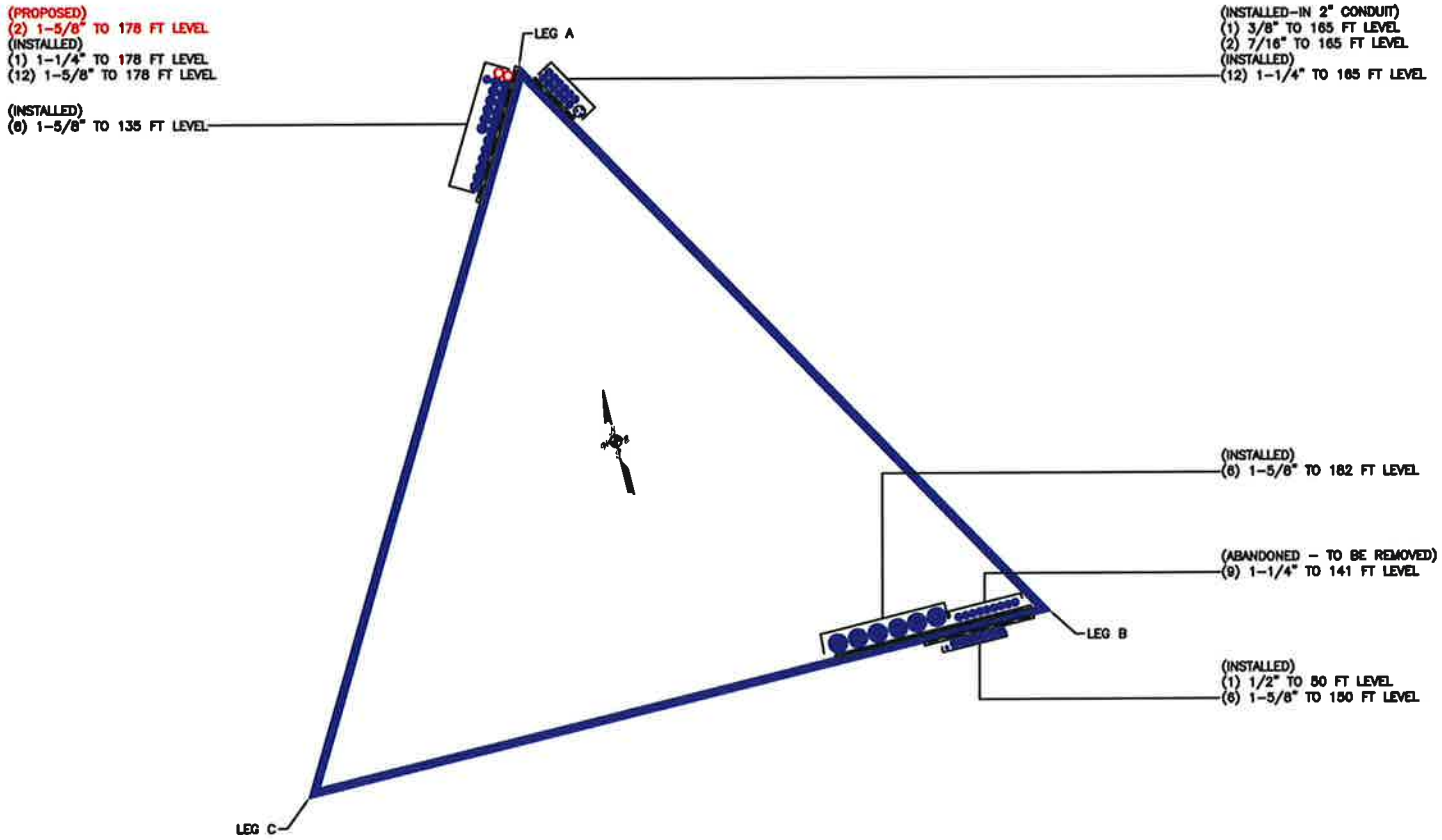
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 2 STD	2	-28.696	32.298	88.8	Pass
T2	160 - 155	Leg	ROHN 2.5 EH	39	-38.197	65.602	58.2	Pass
T3	155 - 150	Leg	ROHN 2.5 EH	51	-47.334	65.600	72.2	Pass
T4	150 - 145	Leg	ROHN 2.5 EH	60	-56.498	65.601	86.1	Pass
T5	145 - 140	Leg	ROHN 2.5 EH	69	-66.127	80.226	82.4	Pass
T6	140 - 133.333	Leg	ROHN 3 EH	81	-75.936	83.785	90.6	Pass
T7	133.333 - 126.667	Leg	ROHN 3 EH	90	-87.465	105.784	82.7	Pass
T8	126.667 - 120	Leg	ROHN 3 EH	102	-97.650	114.754	85.1	Pass
T9	120 - 113.333	Leg	ROHN 3.5 EH	144	-108.959	132.149	82.5	Pass
T10	113.333 - 106.667	Leg	ROHN 3.5 EH	156	-119.082	132.181	90.1	Pass
T11	106.667 - 100	Leg	ROHN 3.5 EH Reinforced w/ 2" B7 S.R. (3' Span)	168	-129.740	175.138	74.1 78.6 (b)	Pass
T12	100 - 80	Leg	ROHN 4 EH Reinforced w/ 2" B7 S.R. (3' Span)	177	-158.515	213.471	74.3	Pass
T13	80 - 60	Leg	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	198	-184.413	237.174	77.8 84.6 (b)	Pass
T14	60 - 40	Leg	ROHN 5 EH Reinforced w/ 2" B7 S.R. (3' Span)	213	-211.632	317.633	66.6	Pass
T15	40 - 30	Leg	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	234	-225.620	287.693	78.4	Pass
T16	30 - 20	Leg	ROHN 6 EHS Reinforced w/ 2" B7 S.R. (3' Span)	243	-239.038	351.475	68.0 71.6 (b)	Pass
T17	20 - 0	Leg	ROHN 6 EH Reinforced w/ 2" B7 S.R. (3' Span)	255	-273.912	340.880	80.4	Pass
T1	180 - 160	Diagonal	L2x2x1/4	10	-5.504	14.519	37.9 70.1 (b)	Pass
T2	160 - 155	Diagonal	L1 3/4x1 3/4x3/16	46	-4.599	5.935	77.5 88.0 (b)	Pass
T3	155 - 150	Diagonal	L1 3/4x1 3/4x3/16	54	-4.433	5.375	82.5 88.8 (b)	Pass
T4	150 - 145	Diagonal	L2x2x1/4	63	-5.248	9.561	54.9 66.8 (b)	Pass
T5	145 - 140	Diagonal	2L1 3/4x1 3/4x3/16x3/16	72	-5.114	8.431	60.7	Pass
T6	140 - 133.333	Diagonal	2L2x2x3/16x1/2	84	-5.701	22.418	25.4 28.6 (b)	Pass
T7	133.333 - 126.667	Diagonal	2L2x2x3/16x1/2	93	-5.933	21.118	28.1 30.2 (b)	Pass
T8	126.667 - 120	Diagonal	2L2x2x3/16x1/2	111	-6.388	22.022	29.0 30.0 (b)	Pass
T9	120 - 113.333	Diagonal	2L2 1/2x2 1/2x3/16x1/2	147	-5.994	31.163	19.2 27.3 (b)	Pass
T10	113.333 - 106.667	Diagonal	2L2 1/2x2 1/2x3/16x1/2	159	-6.220	29.745	20.9 28.3 (b)	Pass
T11	106.667 - 100	Diagonal	2L2 1/2x2 1/2x3/16x1/2	171	-6.276	28.335	22.1 28.6 (b)	Pass
T12	100 - 80	Diagonal	2L3x3x3/16x1/2	180	-6.662	35.498	18.8 30.3 (b)	Pass
T13	80 - 60	Diagonal	2L3x3x3/16x1/4	201	-8.065	26.617	30.3 58.5 (b)	Pass
T14	60 - 40	Diagonal	2L3x3x1/4x1/4	216	-8.363	28.564	29.3 48.7 (b)	Pass
T15	40 - 30	Diagonal	2L3 1/2x3 1/2x1/4x1/4	237	-8.822	43.021	20.5 51.4 (b)	Pass
T16	30 - 20	Diagonal	2L3 1/2x3 1/2x1/4x1/4	246	-9.232	38.804	23.8 53.7 (b)	Pass
T17	20 - 0	Diagonal	L4x4x1/4	258	-9.949	13.888	71.6	Pass
T8	126.667 - 120	Horizontal	L2 1/2x2 1/2x1/4	110	-1.694	10.200	16.6 19.7 (b)	Pass

tnxTower	Job	Page
B+T Group 1717 S.Boulder Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 587-4630	100140.002.01--HRT 080 953381, CT (BU# 806478)	28 of 28
	Project	Date 16:03:13 08/20/15
	Client Crown Castle	Designed by Swathi Shetty

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T5	145 - 140	Secondary Horizontal	L2x2x1/4	78	-1.147	12.085	9.5 12.6 (b)	Pass
T7	133.333 - 126.667	Secondary Horizontal	L2x2x1/4	98	-1.517	9.136	16.6 16.7 (b)	Pass
T9	120 - 113.333	Secondary Horizontal	L2 1/2x2 1/2x1/4	152	-1.890	14.035	13.5 22.0 (b)	Pass
T10	113.333 - 106.667	Secondary Horizontal	L2 1/2x2 1/2x1/4	164	-2.066	12.395	16.7 24.1 (b)	Pass
T14	60 - 40	Secondary Horizontal	L3x3x1/4	221	-3.671	8.753	41.9 42.7 (b)	Pass
T16	30 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	252	-4.146	11.483	36.1 48.3 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	6	-0.324	2.830	11.4	Pass
T2	160 - 155	Top Girt	L2x2x1/8	42	-0.300	2.792	10.7	Pass
T8	126.667 - 120	Redund Horz 1 Bracing	L2x2x1/4	119	-1.694	16.656	10.2	Pass
T8	126.667 - 120	Redund Diag 1 Bracing	L2x2x1/4	135	-1.060	15.347	6.9	Pass
							Summary	
						Leg (T6)	90.6	Pass
						Diagonal (T3)	88.8	Pass
						Horizontal (T8)	19.7	Pass
						Secondary Horizontal (T16)	48.3	Pass
						Top Girt (T1)	11.4	Pass
						Redund Horz 1 Bracing (T8)	10.2	Pass
						Redund Diag 1 Bracing (T8)	6.9	Pass
						Bolt Checks	88.8	Pass
						RATING =	**90.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806478 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Anchor Rod Check for Self Supporting Towers

TIA-222-F Rev. 6.1

Site Data	
BU#:	806478
Site Name:	HRT 080 953381
App #:	305905 Rev. 0

Reactions		
Eta Factor, η	0.5	Detail Type
Uplift	225	kips
Shear, Vu:	24	kips

l_{ar}:		in
$Mu = 0.65*l_{ar}*V_u$		ft-kips

Anchor Rod Data			
Qty:	6	2	
Diam:	1	1	in
Rod Material:	A449 (1/4 to 1	A193 Gr B7	
Strength (Fu):	120	125	ksi
Yield (Fy):	92	105	ksi
Net Area (An):	3.64	1.21	in^2
* Rod Circle:		in	
* e:		in	
* # of Rods		1 or 2	

Mu= Pu x e:		ft-kips

** Only enter rod circle, offset (e) and number of anchor rods at the extreme fiber to consider if eccentric load due to leg reinforcement exist.*

Anchor Rod Results:	Existing	New	
Max Rod (Cu+ Vu/ń):	36.13	28.1	Kips
Allowable Bolt Load	41.5	43.1	Kips
Anchor Rod Stress Ratio:	87.1%	65.3%	

If Applicable;

Anchor Rod Results with Bending Considered:

When the clear distance from the top of concrete to the bottom of level nut excceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied (see Figure 4-4 of Rev. G):

$$(V_u/\phi R_{nv})^2 + [(P_u/\phi R_{nt}) + (M_u/\phi R_{nm})]^2 <= 1$$

$\phi R_{nv}=\phi*0.45*F_{ub}*A_b=$		kips
$\phi R_{nt}=\phi*F_u*A_{net}=$		kips
$\phi R_{nm}=\phi*F_y*Z=$		ft-kips

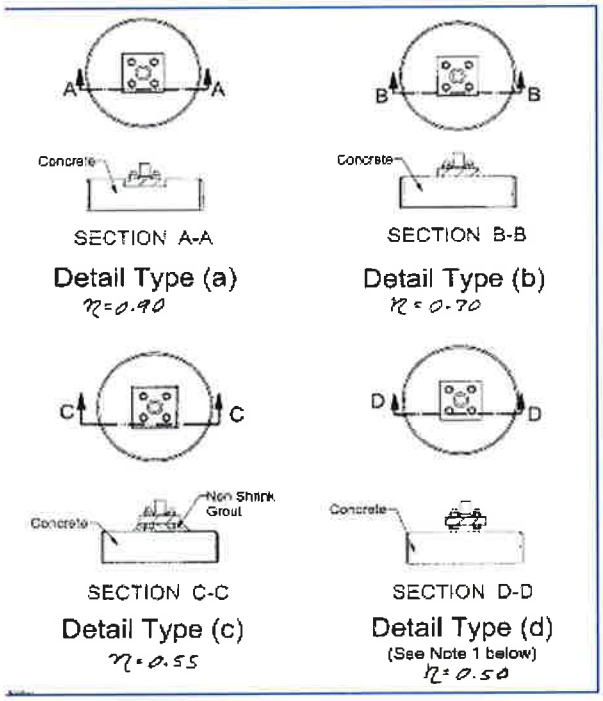


Figure 4-4 of TIA-222-G

Maximum Acceptable Ratio:	105	%
Governing Stress Ratio:	87.1%	Pass

Project:	**806478 - HRT 080 953381, CT**				
Subject	**Individual Pad and Pier Foundation**				
Date:	**08-21-15**	PAGE	**1**	OF	**1**

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

SST Pad & Pier Base Analysis

Rev. Type: F

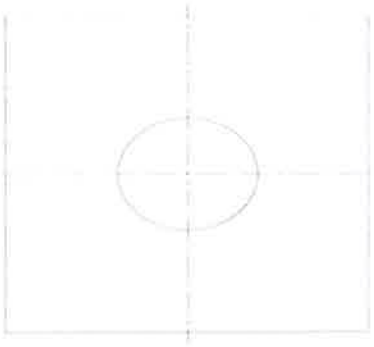
Design Loads:

	Input unfactored loads	
Shear:	46.0	kips
Uplift	225.0	kips
Compression/Leg	273.0	kips
Tower Height:	180.0	ft
Tower Weight:	53.0	kips
Base Width:	22.9	ft

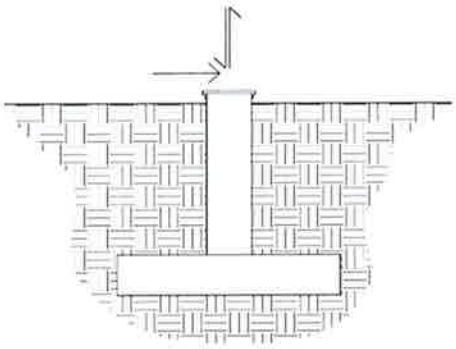
Pad & Pier Dimensions / Properties:

Pier Type:	Square	
Bearing Depth:	9.5	ft
Pad Width:	10.0	ft
Neglected Depth:	3.0	ft
Pad Thickness:	3.5	ft
Pier Width:	5.0	ft
Pier Height Above Grade:	0.5	ft
Clear Cover:	3.0	in
Rebar Yield Strength:	60000	psi
Concrete Strength:	3000	psi
Concrete Unit Weight:	150	pcf

Plan View



Elevation Overview



Soil Data:

	Allowable Values	
Soil Unit Weight:	115.00	pcf
Ult. Bearing Capacity:	6.75	ksf
Angle of Friction:	0.00	deg
Cohesion:	6.00	ksf
Passive Pressure:	0.00	ksf
Base Friction:	0.40	

The steel reinforcement has not been analyzed as a part of this analysis.

Summary of Results

Base Sliding	10.9%
Bearing (ksf):	59.5%
Uplift (kips):	81.9%
Pad Shear - 1-way	14.7%
Pad Shear - 2-way	4.6%

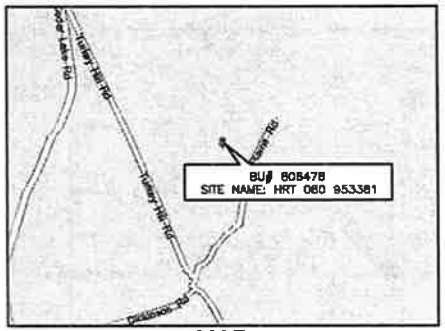
APPENDIX D

TOWER MODIFICATION DRAWINGS

TOWER MODIFICATION DRAWINGS PREPARED FOR: CROWN CASTLE

SITE NAME: HRT 080 953381
BU NUMBER: 806478

SITE ADDRESS:
539 PLAINS RD
HADDAM, CT 06438
MIDDLESEX COUNTY, USA



MAP

DIRECTIONS

RT 95 SOUTH TO EXIT 68 (RT 9). TAKE RT 9 NORTH TO EXIT 8. TAKE JAIL HILL RD. EAST TO A RIGHT ONTO TURKEY HILL RD (1 MILE). FOLLOW TURKEY HILL RD TO A LEFT ONTO PLAINS RD. SITE IS IMMEDIATELY ON LEFT INSIDE MIKE'S AUTO PARTS' JUNKYARD. FOLLOW DRIVEWAY IN FOR A 1/4 MILE AND SITE ACCESS ROAD IS ON YOU LEFT.

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
   HARI ROTITHOR
   (918) 587-4630
   HROTITHOR@BTGRP.COM
   MODDWGS@BTGRP.COM
   1717 S BOULDER AVENUE, SUITE 300
   TULSA, OK 74119

TOWER INFORMATION

TOWER MANUFACTURER / FILE #:	ROHN / 22087JC
TOWER HEIGHT / TYPE:	180' SELF-SUPPORT TOWER
TOWER LOCATION:	LAT. 41° 28' 35.0"
DATUM: (NAD 1983)	LONG. -72° 30' 22.4"
	ELEV. 514 FT AMSL
STRUCTURAL DESIGN DRAWING REPORT:	B+T GROUP / WO. # 1107113
STRUCTURAL ANALYSIS REPORT:	B+T GROUP / WO. # 1100562
STRUCTURAL ANALYSIS DATE:	08/07/15
APPLICATION ID / REVISION #:	305905 / 0
CCISITES DOCUMENT ID:	5837648

CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS PERFORMED 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.

DRAWINGS INCLUDED

SHEET NUMBER	DESCRIPTION
S1	TITLE SHEET
S2	MODIFICATION INSPECTION NOTES AND CHECKLIST
S3	TOWER ELEV., SCHEDULES, TX LINE DIST. DIAGRAM AND GENERAL NOTES
S4	TOWER SECTION (120'–140'), B.O.M. AND DETAILS
S5	TOWER SECTION (140'–160'), B.O.M. AND DETAILS
S6	TOWER SECTION (160'–180'), B.O.M. AND DETAILS
D1	DETAILS

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	08/27/15	ISSUED FOR CONSTRUCTION

PROJECT NO:	100140.002.01
PROJECT ENG:	HARI ROTITHOR
DRAWN BY:	RPA
CHECKED BY:	STS / NGN

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

HRT 080 953381
806478

539 PLAINS RD
HADDAM, CT

EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
TITLE SHEET

SHEET NUMBER: S1
REVISION: 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 APPROVED SHOP DRAWINGS	FABRICATION DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. THE CONTRACTOR SHALL PROVIDE APPROVED SHOP DRAWINGS TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
N/A	ASSEMBLY DRAWINGS	ONCE THE PRE-MODIFICATION MAPPING IS COMPLETE, PRIOR TO FABRICATION, THE CONTRACTOR SHALL PROVIDE DETAILED ASSEMBLY DRAWINGS. 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 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.
N/A	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 SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
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.
N/A	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.
N/A	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.
N/A	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 DUE TO FIELD CONDITIONS.
	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.
N/A	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
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SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

CROWN CASTLE

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PROJECT NO:	100140.002.01
PROJECT ENG:	HARI ROTITHOR
DRAWN BY:	RPA
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B+T ENGINEERING, INC.
PEC.0001564
Expires 02/10/16

STATE OF CONNECTICUT — No. 23924 — LICENSED PROFESSIONAL ENGINEER — 8/27/15

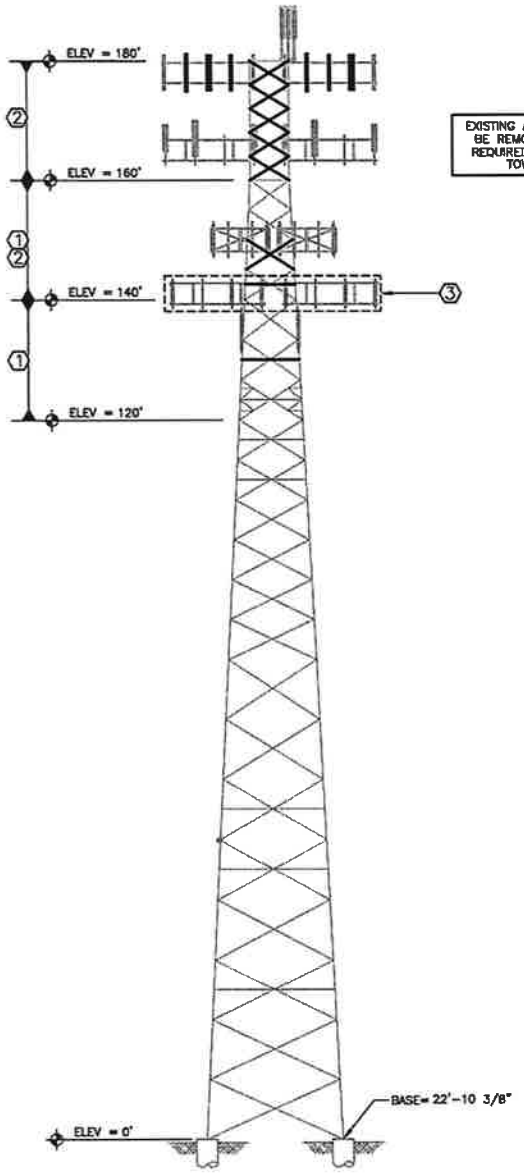
HRT 080 953381
806478

539 PLAINS RD
HADDAM, CT

EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
MODIFICATION INSPECTION NOTES AND CHECKLIST

SHEET NUMBER:	REVISION:
S2	0



1 TOWER ELEVATION
SCALE: N.T.S.

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

EXISTING MEMBER SCHEDULE

"ELEV" (BOTT)	"ELEV" (TOP)	LEGS	DIAGONALS	HORIZONTALS
0'	20'	ROHN 6 XS WITH 2" B7 SOLID ROD (3' SPAN)	L4x4x1/4	N/A
20'	30'	ROHN 6 EHS WITH 2" B7 SOLID ROD (3' SPAN)	(2) L3 1/2x3 1/2x1/4	L3 1/2x3 1/2x1/4
30'	40'	ROHN 6 EHS WITH 2" B7 SOLID ROD (3' SPAN)	(2) L3 1/2x3 1/2x1/4	N/A
40'	60'	ROHN 5 XS WITH 2" B7 SOLID ROD (3' SPAN)	(2) L3x3x1/4	L3x3x1/4
60'	80'	ROHN 5 XS WITH 2" B7 SOLID ROD (3' SPAN)	(2) L3x3x3/16	N/A
80'	100'	ROHN 4 XS WITH 2" B7 SOLID ROD(3' SPAN)	(2) L3x3x3/16	N/A
100'	106.5'	ROHN 3.5 XS WITH 2" B7 SOLID ROD (3' SPAN)	(2) L2 1/2x2 1/2x3/16	N/A
106.5'	120'	ROHN 3.5 XS PIPE	(2) L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x1/4
120'	126.8'	ROHN 3 XS PIPE	(2) L2x2x3/16	L2 1/2x2 1/2x1/4
126.8'	140'	ROHN 3 XS PIPE	(2) L2x2x3/16	N/A
140'	145'	ROHN 2.5 XS PIPE	(2) L1 3/4x1 3/4x3/16	N/A
145'	160'	ROHN 2.5 XS PIPE	L1 3/4x1 3/4x3/16	L2x2x1/8
160'	180'	ROHN 2 STD PIPE	L1 3/4x1 3/4x3/16	L2x2x1/8

EXISTING TOWER HAS BEEN PREVIOUSLY MODIFIED

REFERENCE DRAWINGS BY:	DATE
ALL-POINTS TECHNOLOGY CORPORATION, P.C.	11/06/02
VERTICAL STRUCTURES, INC.	09/17/08
VERTICAL STRUCTURES, INC.	07/28/08

TOWER MODIFICATIONS:

1. INSTALL NEW SINGLE ANGLE SECONDARY HORIZONTALS
   RE: SHEET S4 AND S5.
2. REMOVE AND REPLACE EXISTING SINGLE ANGLE DIAGONALS WITH NEW SINGLE ANGLE
   RE: SHEET S5 AND S6.
3. REMOVE ABANDONED ANTENNAS, MOUNTS AND FEED LINES AT 141 FT LEVEL.

* CONTRACTOR SHALL BUDGET A SITE VISIT TO CHECK CRITICAL DIMENSIONS AND VERIFY UNKNOWN CONDITIONS PRIOR TO STEEL FABRICATION.
** THE NEW AND EXISTING TRANSMISSION MUST BE DISTRIBUTED AS SHOWN IN THE TX LINE DIST. DIAGRAM RE: DETAIL 2/S3.
*** CONTRACTOR SHALL PROVIDE TEMPORARY BRACING FOR ALL REMOVE AND REPLACE PROCEDURES.
**** MODIFICATIONS SHALL BE COMPLETED PRIOR TO ADDING THE PROPOSED APPURTENANCES.

GENERAL NOTES

1.1 ALL WORK SHALL COMPLY WITH THE TIA/EIA-222-F STANDARD, TIA-1019-A 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 ALL FIELD CONNECTIONS SHALL BE MADE WITH A325X BOLTS, U.N.O.
1.6 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.
1.7 ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CCUSA POLICY "CUTTING AND WELDING PLAN" (DOC #ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT.
1.8 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

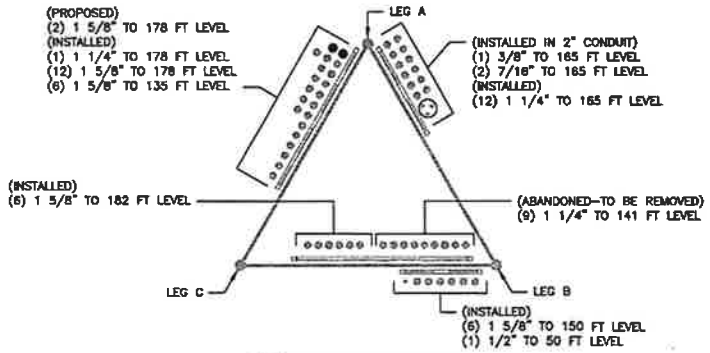
2.1 ALL WORK SHALL BE DONE IN ACCORDANCE WITH A.I.S.C. "SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."
2.2 STRUCTURAL STEEL SHALL MEET THE FOLLOWING SPECIFICATIONS:

	YIELD	ASTM SPECS
A. STEEL SHAPES AND PLATES, U.N.O.	36ksi	A36
B. STEEL ANGLES	50ksi	A572

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 E70 SERIES.
2.5 CONTRACTOR SHALL PROVIDE SHOP FABRICATION DRAWINGS TO B+T GROUP 5 DAYS PRIOR TO FABRICATION.

KEY NOTES

(1) TOWER MODIFICATION I.D.



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

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

CROWN CASTLE

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

STATE OF OKLAHOMA ★ No. 23924 LICENSED ★ PROFESSIONAL ENGINEER ★ 8/27/15

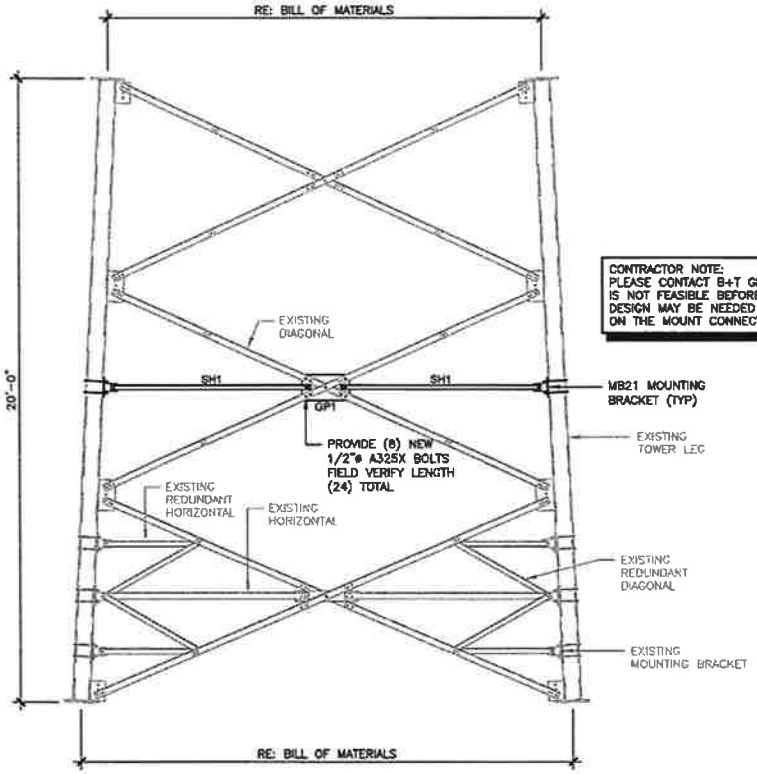
HRT 080 953381
806478

539 PLAINS RD
HADDAM, CT

EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
TOWER ELEV., SCHEDULES, TX LINE DIST. DIAGRAM AND GENERAL NOTES

SHEET NUMBER:	REVISION:
S3	0



1 TOWER SECTION (120'-140')
SCALE: N.T.S.

CONTRACTOR NOTE:
PLEASE CONTACT B+T GROUP IF MB21 INSTALLATION IS NOT FEASIBLE BEFORE FABRICATION. ALTERNATE DESIGN MAY BE NEEDED AFTER ACTUAL DIMENSIONS ON THE MOUNT CONNECTIONS ARE KNOWN.

CONTRACTOR NOTE:

1. WE RECOMMEND CUTTING MEMBERS TO THE CUT LENGTH SHOWN, SHOP PUNCHING THE HOLES IN ONE END AND THEN PUNCHING THE OTHER END AND PERFORMING THE FINAL CUT IN THE FIELD.
2. THE CONTRACTOR MAY ALSO CHOOSE TO SHOP FABRICATE ALL MEMBERS, BUT WE WOULD RECOMMEND VERIFYING DIMENSIONS IN THE FIELD PRIOR TO FABRICATION.

2 ANGLE DETAIL
SCALE: N.T.S

BILL OF MATERIALS

ELEVATION	BOTTOM	TOP	PC MARK	QTY	DESCRIPTION	CUT LENGTH	DETAIL	MATERIAL	HARDWARE
120'-140'	10'-7 5/8"	8'-7 1/4"	SH1	6	SECONDARY HORIZONTAL	4'-9"	2/S4	L2x2x1/4	(3) 5/8"ø A325X BOLTS
			GP1	3	GUSSET PLATE	13"x1'-5"	2/D1	PLATE, RE: NOTE 7	(1) 1/2"ø A325X BOLT
			MB21	3	MOUNTING BRACKET	---	1/D1	1/2" PLATE	(2) 1/2"ø U-BOLTS

1. PROVIDE NUT AND LOCK WASHERS WITH ALL HARDWARE, U.N.O.
2. ALL MATERIAL TO BE HOT DIPPED GALVANIZED.
3. ALL CUT LENGTHS ARE FOR BIDDING PURPOSES ONLY.
4. ALL MATERIAL LENGTHS, DIMENSIONS AND QUANTITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO STEEL FABRICATION.
5. QUANTITY SHOWN INDICATES THE NUMBER OF ASSEMBLIES REF. THE MATERIAL & HARDWARE FOR ADDITIONAL QUANTITIES.
6. SEE CONTRACTOR NOTE ON DETAIL 2 OF THIS SHEET.
7. THICKNESS OF NEW GUSSET PLATE AND RINGFILL TO MATCH EXISTING END GUSSET PLATES. CONTACT B+T GROUP IF THE EXISTING END GUSSET IS THINNER THAN A 3/8".

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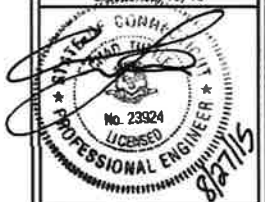


IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

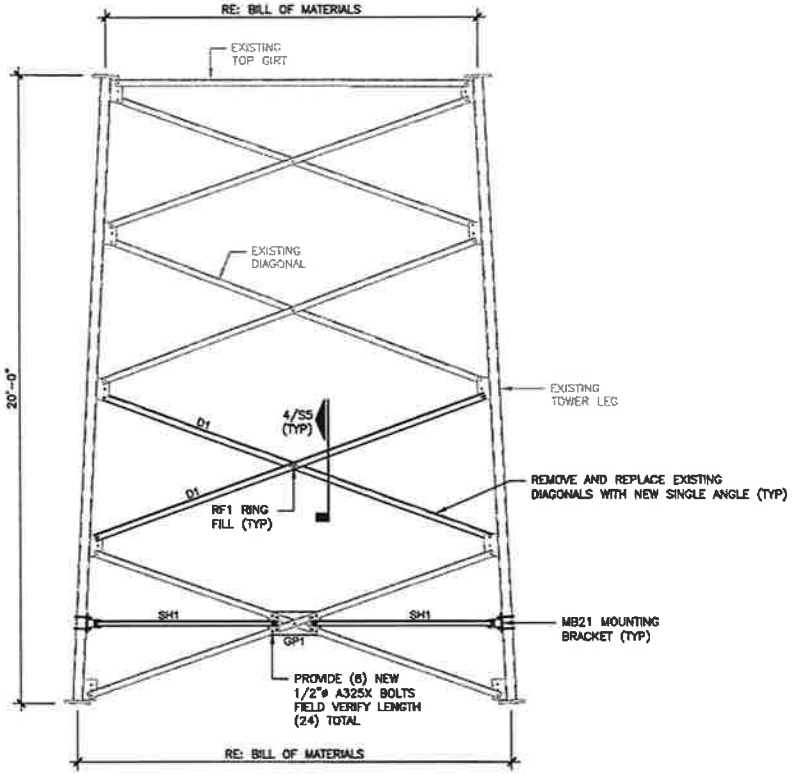
HRT 080 953381
806478

539 PLAINS RD
HADDAM, CT

EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
TOWER SECTION
120'-140'

SHEET NUMBER:	REVISION:
S4	0

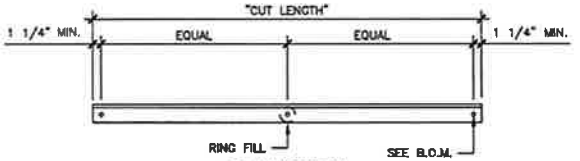


1 TOWER SECTION (140'-160')
SCALE: N.T.S.

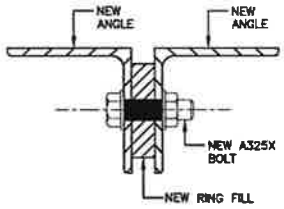
CONTRACTOR NOTE:

1. WE RECOMMEND CUTTING MEMBERS TO THE CUT LENGTH SHOWN, SHOP PUNCHING THE HOLES IN ONE END AND THEN PUNCHING THE OTHER END AND PERFORMING THE FINAL CUT IN THE FIELD.
2. THE CONTRACTOR MAY ALSO CHOOSE TO SHOP FABRICATE ALL MEMBERS, BUT WE WOULD RECOMMEND VERIFYING DIMENSIONS IN THE FIELD PRIOR TO FABRICATION.

2 ANGLE DETAIL
SCALE: N.T.S



3 ANGLE DETAIL
SCALE: N.T.S



4 RING FILL DETAIL
SCALE: N.T.S.

BILL OF MATERIALS

ELEVATION	BOTTOM	TOP	PC MARK	QTY	DESCRIPTION	CUT LENGTH	DETAIL	MATERIAL	HARDWARE
140'-160'	8'-7 1/4"	5'-6 3/4"	SH1	6	SECONDARY HORIZONTAL	4'-3"	2/S5	L2x2x1/4	(3) 5/8"ø A325X BOLTS
			MB21	3	MOUNTING BRACKET	----	1/D1	1/2" PLATE	(2) 1/2"ø U-BOLTS
			GP1	3	GUSSET PLATE	12"x1'-5"	2/D1	PLATE, RE: NOTE 7	(1) 1/2"ø A325X BOLT
			D1	6	DIAGONAL	9'-4"	3/S5	L2x2x1/4	(2) 1/2"ø A325X BOLTS
			RF1	3	RING FILL	----	4/S5	PLATE, RE: NOTE 7	(1) 1/2"ø A325X BOLT

1. PROVIDE NUT AND LOCK WASHERS WITH ALL HARDWARE, U.N.O.
2. ALL MATERIAL TO BE HOT DIPPED GALVANIZED.
3. ALL CUT LENGTHS ARE FOR BIDDING PURPOSES ONLY.
4. ALL MATERIAL LENGTHS, DIMENSIONS AND QUANTITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO STEEL FABRICATION.
5. QUANTITY SHOWN INDICATES THE NUMBER OF ASSEMBLIES REF. THE MATERIAL & HARDWARE FOR ADDITIONAL QUANTITIES.
6. SEE CONTRACTOR NOTE ON DETAIL 2 OF THIS SHEET.
7. THICKNESS OF NEW GUSSET PLATE AND RINGFILL TO MATCH EXISTING END GUSSET PLATES. CONTACT B+T GROUP IF THE EXISTING END GUSSET IS THINNER THAN A 3/8".

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	08/27/15	ISSUED FOR CONSTRUCTION

PROJECT NO:	100140.002.01
PROJECT ENG:	HARI ROTITHOR
DRAWN BY:	RPA
CHECKED BY:	STS / NGN

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

STATE OF OKLAHOMA
CHAD TODD CUT
No. 23924
LICENSED
PROFESSIONAL ENGINEER
8/27/15

HRT 080 953381
806478

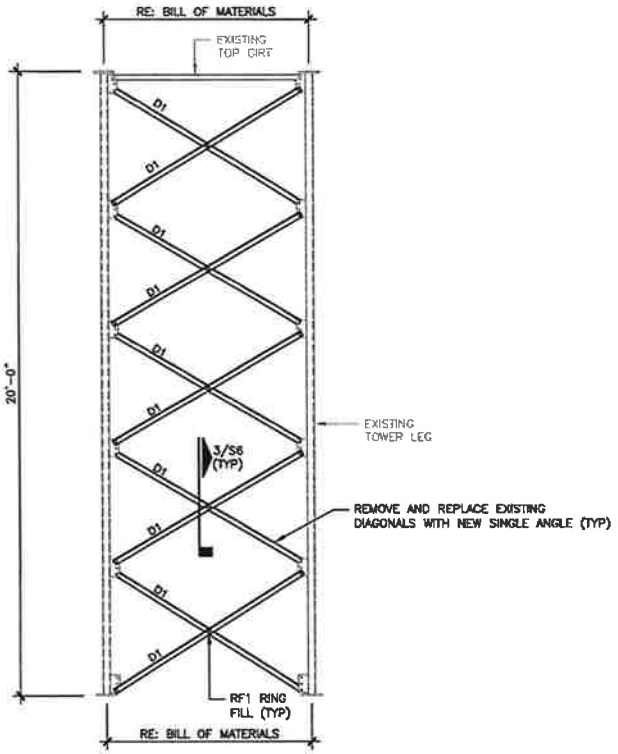
539 PLAINS RD
HADDAM, CT

EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
TOWER SECTION
140'-160'

SHEET NUMBER: S5

REVISION: 0



1 TOWER SECTION (160'-180')
SCALE: N.T.S.

CONTRACTOR NOTE:

1. WE RECOMMEND CUTTING MEMBERS TO THE CUT LENGTH SHOWN, SHOP PUNCHING THE HOLES IN ONE END AND THEN PUNCHING THE OTHER END AND PERFORMING THE FINAL CUT IN THE FIELD.
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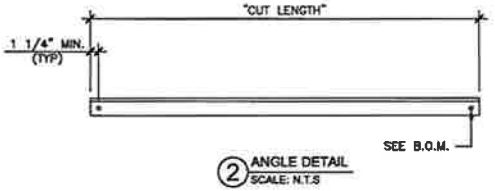
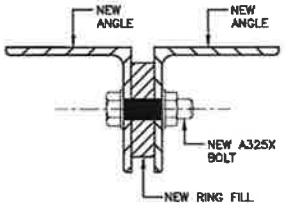


2 ANGLE DETAIL
SCALE: N.T.S



3 RING FILL DETAIL
SCALE: N.T.S.

BILL OF MATERIALS

ELEVATION	BOTTOM	TOP	PC MARK	QTY	DESCRIPTION	CUT LENGTH	DETAIL	MATERIAL	HARDWARE
160'-180'	6'-6 3/4"	6'-6 1/4"	D1	30	DIAGONAL	7'-9"	2/S6	L2x2x1/4	(2) 1/2"ø A325X BOLTS
			RF1	15	RING FILL	---	3/S6	PLATE, RE: NOTE 7	(1) 1/2"ø A325X BOLT

1. PROVIDE NUT AND LOCK WASHERS WITH ALL HARDWARE, U.N.O.
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3. ALL CUT LENGTHS ARE FOR BIDDING PURPOSES ONLY.
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6. SEE CONTRACTOR NOTE ON DETAIL 2 OF THIS SHEET.
7. THICKNESS OF NEW GUSSET PLATE AND RINGFILL TO MATCH EXISTING END GUSSET PLATES. CONTACT B+T GROUP IF THE EXISTING END GUSSET IS THINNER THAN A 3/8".

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SUITE 200
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CROWN CASTLE

ISSUED FOR:

REV	DATE	DESCRIPTION
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PROJECT NO:	100140.002.01
PROJECT ENG:	HARI ROTITHOR
DRAWN BY:	RPA
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B+T ENGINEERING, INC.
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Expires 02/10/16

STATE OF CONNECTICUT
CHAD TUTTLE
No. 23924
LICENSED PROFESSIONAL ENGINEER
8/27/15

HRT 080 953381
806478

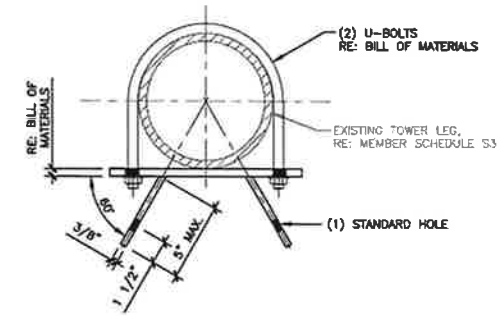
539 PLAINS RD
HADDAM, CT

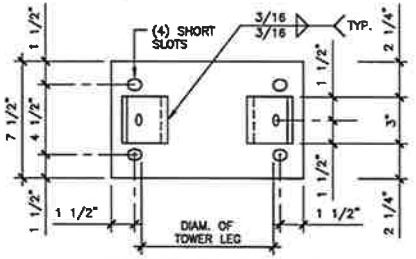
EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
TOWER SECTION
160'-180'

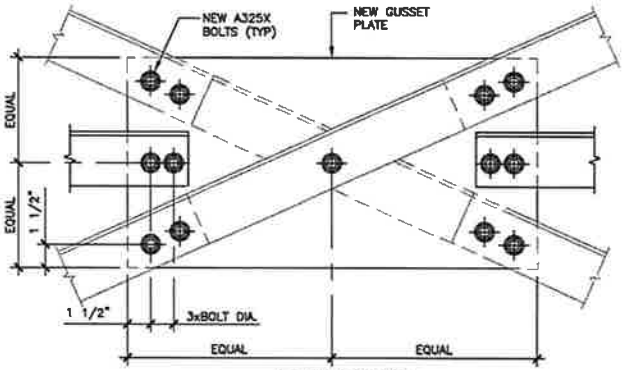
SHEET NUMBER: S6

REVISION: 0





1 MOUNTING BRACKET-MB21
SCALE: N.T.S.



2 GUSSET PLATE
SCALE: N.T.S.

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CROWN CASTLE

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538 PLAINS RD
HADDAM, CT

EXISTING 180' SELF-SUPPORT TOWER

SHEET TITLE
DETAILS

SHEET NUMBER:	REVISION:
D1	0