Robinson+Cole

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March 21, 2017

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

Re: **Notice of Exempt Modification – Facility Modification**
161 Pinney Street, Colebrook, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 130-foot level on an existing 148-foot tower at 161 Pinney Street in Colebrook, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 2006. Cellco now intends to replace six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same level on the tower. Cellco also intends to install nine (9) remote radio heads ("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 Thomas D. McKeon, First Selectman of the Town of Colebrook; Michael J. Halloran, Colebrook Zoning Enforcement Officer; Janet E. Fredsall, the Property owner; and Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's replacement antennas and RRHs will be installed on its existing platform at the 130-foot level on the tower.

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

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

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

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

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Thomas D. McKeon, Colebrook First Selectman
Michael J. Halloran, Colebrook Zoning Enforcement Officer
Janet E. Fredsall
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

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

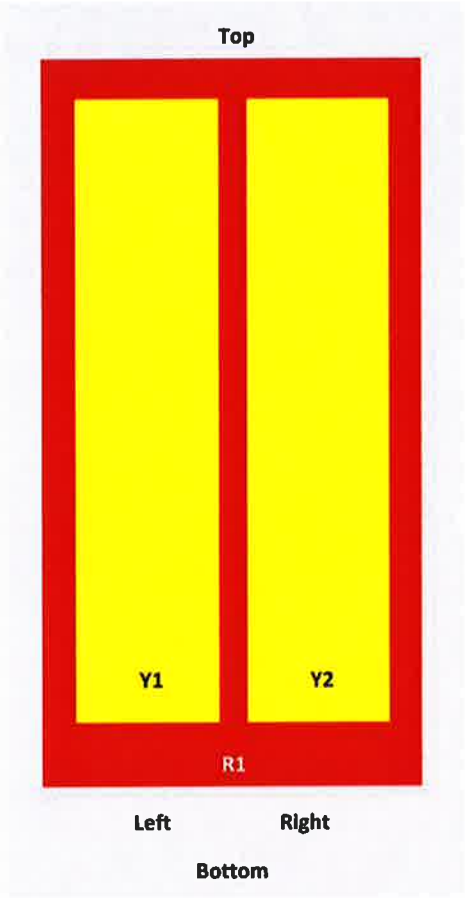
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

SBNHH-1D65B

SBNHH 65



Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	ANxxxxxxxxxxxxxxxx.1
Y1	1695-2360	3-4	2	ANxxxxxxxxxxxxxxxx.2
Y2	1695-2360	5-6		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female

Product Specifications

SBNHH-1D65B

Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Depth	180.0 mm | 7.1 in
Net Weight, without mounting kit	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (1) | Low band (1)
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

Packed Dimensions

Length	2025.0 mm | 79.7 in
Width	390.0 mm | 15.4 in
Depth	296.0 mm | 11.7 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

Product Specifications

SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

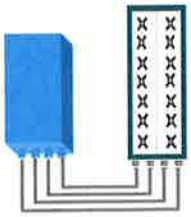
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

TECHNICAL SPECIFICATIONS

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

ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new 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 B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 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, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

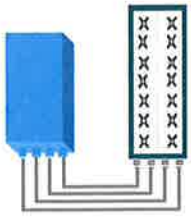
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx 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	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 2) **RX Diversity scheme**	2.0 dB typ. (<2.5 dB max) 2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.) **Volume (w/ solar shield) in L** **Weight (w/ solar shield) in kg (lb)**	538 x 304 x 182 (21.2" x 12.0" x 7.2") 30 24 (53)
DC voltage range **DC power consumption**	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 580W typical @100% RF load
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 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 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

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.

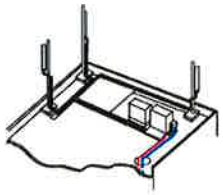
EASY INSTALLATION

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.

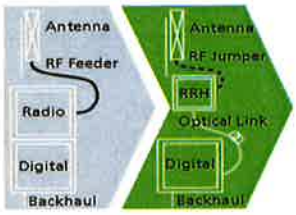
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

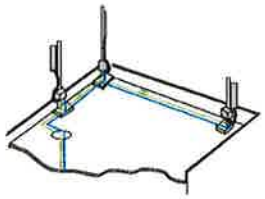
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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.

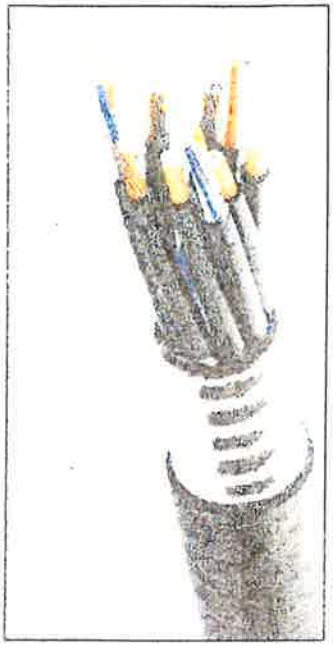


Figure 1: HYBRIFLEX Series

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)

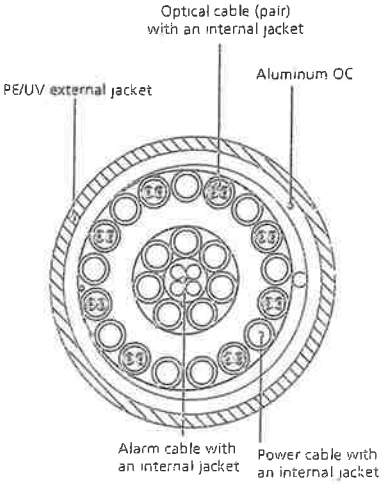


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Colebrook SW								
Tower Height: 148ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T	2	565	140	880	0.0226	0.5867	0.39%	
*AT&T	2	875	140	1900	0.0350	1.0000	0.35%	
*AT&T	1	283	140	880	0.0057	0.5867	0.10%	
*AT&T	4	525	140	1900	0.0421	1.0000	0.42%	
*AT&T	1	1313	140	734	0.0263	0.4893	0.54%	
*Sprint	2	778	147	1900	0.0281	1.0000	0.28%	
*Sprint	1	438	147	850	0.0079	0.5667	0.14%	
Verizon PCS	**1**	**4511**	**130**	**0.0960**	**1970**	**1.0000**	**9.60%**	
Verizon Cellular	**9**	**499**	**130**	**0.0956**	**869**	**0.5793**	**16.49%**	
Verizon AWS	**1**	**4834**	**130**	**0.1028**	**2145**	**1.0000**	**10.28%**	
Verizon 700	**1**	**2062**	**130**	**0.0439**	**746**	**0.4973**	**8.82%**	
								47.41%
* Source: Siting Council								

ATTACHMENT 3

March 07, 2017

Sean Dempsey
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
(704) 405-6565

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

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Colebrook SW
Crown Castle Designation:	**Crown Castle BU Number:**	876377
	Crown Castle Site Name:	Horton 2 / Fredsall Property
	Crown Castle JDE Job Number:	337989
	Crown Castle Work Order Number:	1372042
	Crown Castle Application Number:	300765 Rev. 1
Engineering Firm Designation:	**B+T Group Project Number:**	112179.001.01
Site Data:	**161 Pinney Street, Colebrook, Litchfield County, CT** **Latitude *41° 57' 58.9"*, Longitude *-73° 7' 18.1"*** **148 Foot - Monopole Tower**	

Dear Sean Dempsey,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1008776, in accordance with application 300765, revision 1.

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

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 115 mph converted to a nominal 3-second gust wind speed of 89 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

All 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.

James Lindsey
Project Engineer

Scott S. Vance, P.E.
Engineer of Record
COA: PEC.0001564 Expires: 02/10/2018

3/7/17

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 148 ft. Monopole tower designed by Summit Manufacturer in September of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F. This tower has been modified by PJF in February of 2009, and those modifications are incorporated in this analysis

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 89 mph with no ice, 40 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B with topographic category 1 and crest height of 0 feet.

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
130.0	130.0	3	Alcatel Lucent	RRH2X60-AWS	2	1-5/8	--
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2x60-700			
		6	Commscope	SBNHH-1D65B			
		1	Rfs Celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	150.0	1	--	Miscellaneous [NA 510-1]	3	1-1/4	1
		1	--	Platform Mount [LP 1201-1]			
	148.0	3	Alcatel Lucent	800 EXTERNAL NOTCH FILTER			
		3	Alcatel Lucent	800MHZ RRH			
		3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz			
		9	Rfs Celwave	ACU-A20-N			
		3	Rfs Celwave	APXVSPP18-C-A20			
141.0	143.0	3	Ericsson	RRUS 11 B2	--	--	1
		1	Raycap	DC6-48-60-18-8F			
	141.0	1	--	Side Arm Mount [SO 102-3]			
140.0	140.0	1	Kmw Comm.	AM-X-CD-14-65-00T-RET	12 2 1	1-5/8 7/16 3/8	1
		2	Kmw Comm.	AM-X-CD-16-65-00T-RET			
		6	Powerwave Tech	7770.00			
		6	Powerwave Tech	LGP 17201			
		6	Powerwave Tech	LGP21901			
		1	--	T-Arm Mount [TA 602-3]			
130.0	130.0	**3**	**Antel**	**BXA-171085-12BF-EDIN-2**	--	--	**2**
		1	**Antel**	**BXA-70063/6CFx2**			
		1	**Antel**	**BXA-70080-6CF-EDIN-6**			
		1	**Antel**	**BXA-70080/6CF**			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		6	**Rfs Celwave**	**FD9R6004/2C-3L**			
		2	Antel	LPA-80080-6CF-EDIN-6	12	1-5/8	1
		4	Antel	LPA-80080/6CF			
		1	--	Platform Mount [LP 303-1]			

Notes:
1) Existing Equipment
2) 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)
148	148	12	DAPA	4800 PCS Panel	--	--
		1	Generic	14Ft LP Platform		
140	140	12	DAPA	4800 PCS Panel	--	--
		1	Generic	Clamp-on LP Platform		
130	130	12	DAPA	4800 PCS Panel	--	--
		1	Generic	14' Clamp-on LP Platform		
101	101	1	Generic	GPS Antenna w/ mount	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate, Rev# 1	300765	CCI Sites
Tower Manufacturer Drawing	Summit Manufacturer, Inc. Job No. 11163	1883532	CCI Sites
Tower Modification Drawing	PJF, Job No. 37508-0010_BP-R1	2293404	CCI Sites
Post Modification Inspection	PJF, Job No. 41708-0177_Record	2385953	CCI Sites
Foundation Drawing	Summit Manufacturer, Inc. Job No. 11163	1629428	CCI Sites
Geotech Report	SEA Consultant, Inc. Reference No. 99674.03-A	1532992	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 03/15/2016	CCI Sites

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Mount areas and weights are assumed based on photographs provided.
5) The existing base plate grout was not considered in this analysis.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	148 - 117.25	Pole	TP27.227x22x0.188	1	-10.580	982.420	39.9	Pass
L2	117.25 - 97	Pole	TP30.294x26.257x0.25	2	-13.794	1570.360	52.5	Pass
L3	97 - 80.75	Pole	TP33.056x30.294x0.444	3	-16.235	2283.640	45.1	Pass
L4	80.75 - 40	Pole	TP39.483x31.834x0.439	4	-26.108	2726.570	59.6	Pass
L5	40 - 0	Pole	TP45.72x38.071x0.443	5	-39.432	3287.320	66.9	Pass
							Summary	
						Pole (L5)	66.9	Pass
						Rating =	66.9	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component		Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods		Base	61.7	Pass
1	Base Plate		Base	50.4	Pass
1	Base Foundation	(Structure)	Base	61.8	Pass
		(Soil Interaction)	Base	56.9	Pass

Structure Rating (max from all components) =	66.9%

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

4.1) Recommendations

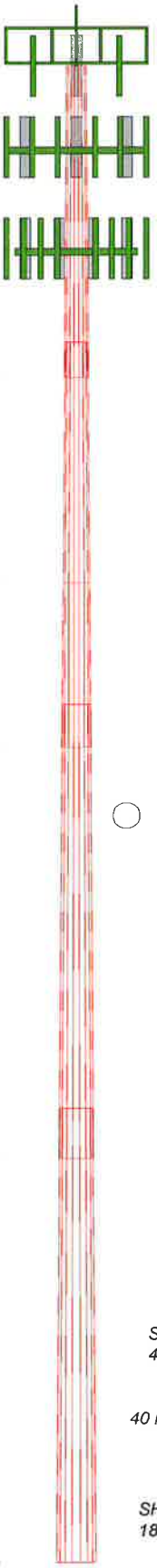
The tower and its foundation have sufficient capacity to carry the final load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5
Length (ft)	30.750	23.750	16.250	45.000	45.000
Number of Sides	18	18	18	18	18
Thickness (in)	0.188	0.250	0.444	0.439	0.443
Socket Length (ft)	3.500		4.250	5.000	
Top Dia (in)	22.000	26.257	30.294	31.834	38.071
Bot Dia (in)	27.227	30.294	33.056	39.483	45.720
Grade	A607-60			44.422141ksi	44.788075ksi / 45.158122ksi
Weight (K)	1.5	1.8	2.3	7.2	8.7

148.0 ft
117.3 ft
97.0 ft
80.8 ft
40.0 ft
0.0 ft
21.5



ALL REACTIONS ARE FACTORED

AXIAL 68 K
SHEAR 4 K
MOMENT 456 kip-ft
TORQUE 0 kip-ft
40 mph WIND - 0.750 in ICE

AXIAL 39 K
SHEAR 18 K
MOMENT 2005 kip-ft
TORQUE 1 kip-ft
REACTIONS - 89 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Pipe Mount [PM 601-3] (E-For TME/Photo)	151	AM-X-CD-14-65-00T-RET w/ Mount Pipe (E)	140
APXVSPP18-C-A20 w/ Mount Pipe (E)	150	AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	140
APXVSPP18-C-A20 w/ Mount Pipe (E)	150	(2) 7770.00 w/ Mount Pipe (E)	140
APXVSPP18-C-A20 w/ Mount Pipe (E)	150	(2) 7770.00 w/ Mount Pipe (E)	140
800 EXTERNAL NOTCH FILTER (E)	150	(2) 7770.00 w/ Mount Pipe (E)	140
800 EXTERNAL NOTCH FILTER (E)	150	(2) LGP 17201 (E)	140
800 EXTERNAL NOTCH FILTER (E)	150	(2) LGP 17201 (E)	140
800MHZ RRH (E)	150	(2) LGP 17201 (E)	140
800MHZ RRH (E)	150	(2) LGP21901 (E)	140
800MHZ RRH (E)	150	(2) LGP21901 (E)	140
PCS 1900MHz 4x45W-65MHz (E)	150	(2) LGP21901 (E)	140
PCS 1900MHz 4x45W-65MHz (E)	150	T-Arm Mount [TA 602-3] (E)	140
PCS 1900MHz 4x45W-65MHz (E)	150	(2) LPA-80080/6CF w/ Mount Pipe (E)	130
(3) ACU-A20-N (E)	150	(2) LPA-80080/6CF w/ Mount Pipe (E)	130
(3) ACU-A20-N (E)	150	(2) LPA-80080-6CF-EDIN-6 w/ Mount Pipe (E)	130
(3) ACU-A20-N (E)	150	(2) SBNHH-1D65B w/ Mount Pipe (P)	130
(2) 6' x 2" Mount Pipe (E-Per Photo)	150	(2) SBNHH-1D65B w/ Mount Pipe (P)	130
(2) 6' x 2" Mount Pipe (E-Per Photo)	150	(2) SBNHH-1D65B w/ Mount Pipe (P)	130
(2) 6' x 2" Mount Pipe (E-Per Photo)	150	RRH2x60-700 (P)	130
Platform Mount [LP 1201-1] (E-Per photo)	150	RRH2x60-700 (P)	130
Miscellaneous [NA 510-1] (E)	150	RRH2x60-700 (P)	130
Top Hat (E)	149	RRH2X60-PCS (P)	130
6' x 2" Mount Pipe (E-Per Photo)	148	RRH2X60-PCS (P)	130
TME-RRUS 11 B2 (E)	141	RRH2X60-PCS (P)	130
TME-RRUS 11 B2 (E)	141	RRH2X60-AWS (P)	130
TME-RRUS 11 B2 (E)	141	RRH2X60-AWS (P)	130
DC6-48-60-18-8F (E)	141	RRH2X60-AWS (P)	130
7' x 2" Pipe Mount (E-Per Photo)	141	DB-T1-6Z-8AB-0Z (P)	130
7' x 2" Pipe Mount (E-Per Photo)	141	Platform Mount [LP 303-1] (E)	130
7' x 2" Pipe Mount (E-Per Photo)	141		
Side Arm Mount [SO 102-3] (E)	141		
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	140		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	44.788075ksi	45 ksi	60 ksi
44.422141ksi	44 ksi	59 ksi	45.158122ksi	45 ksi	60 ksi

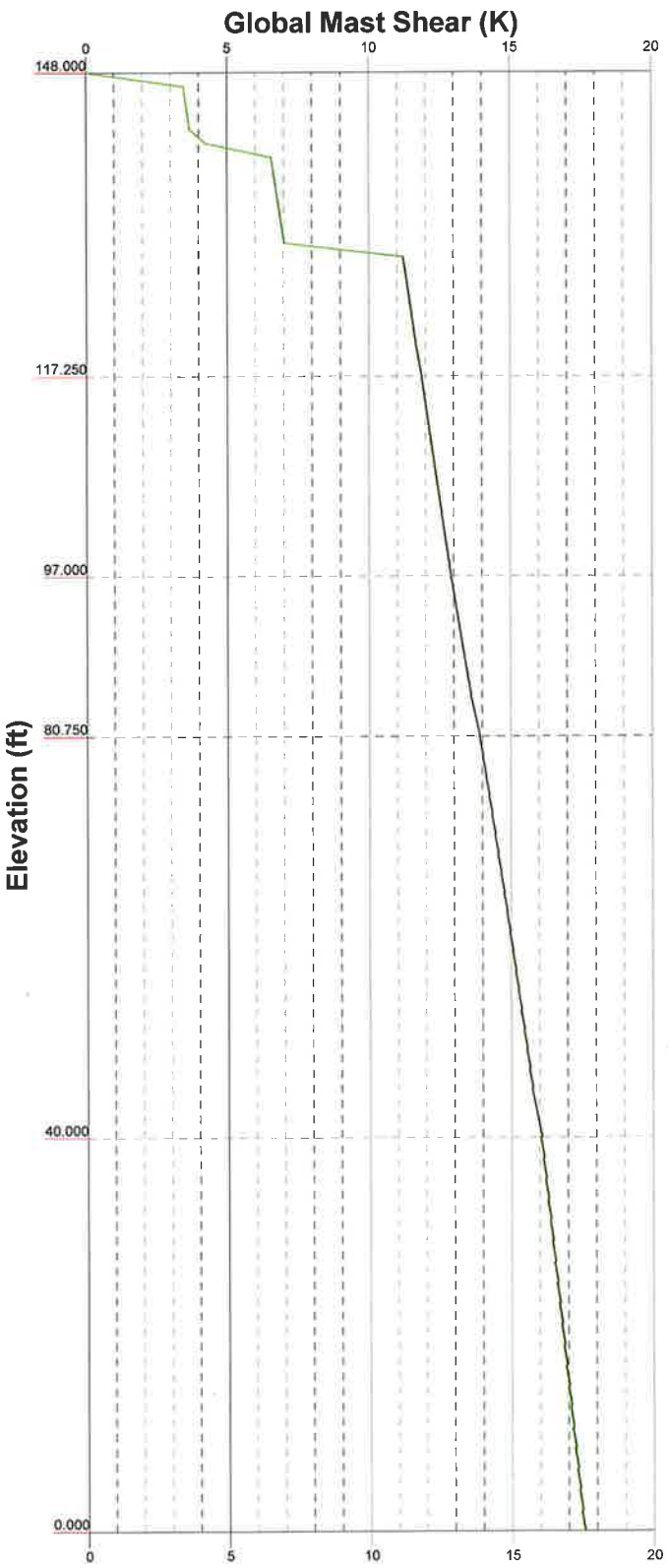
TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 89 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 66.9%

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

Job: 112179.001.01 - HORTON 2 FREDSALL PROPERTY, CT (BU# 876
Project:
Client: Crown Castle | Drawn by: Yathish | App'd:
Code: TIA-222-G | Date: 03/03/17 | Scale: NTS
Path: | Dwg No. E-1

Vx Vz



Mx Mz

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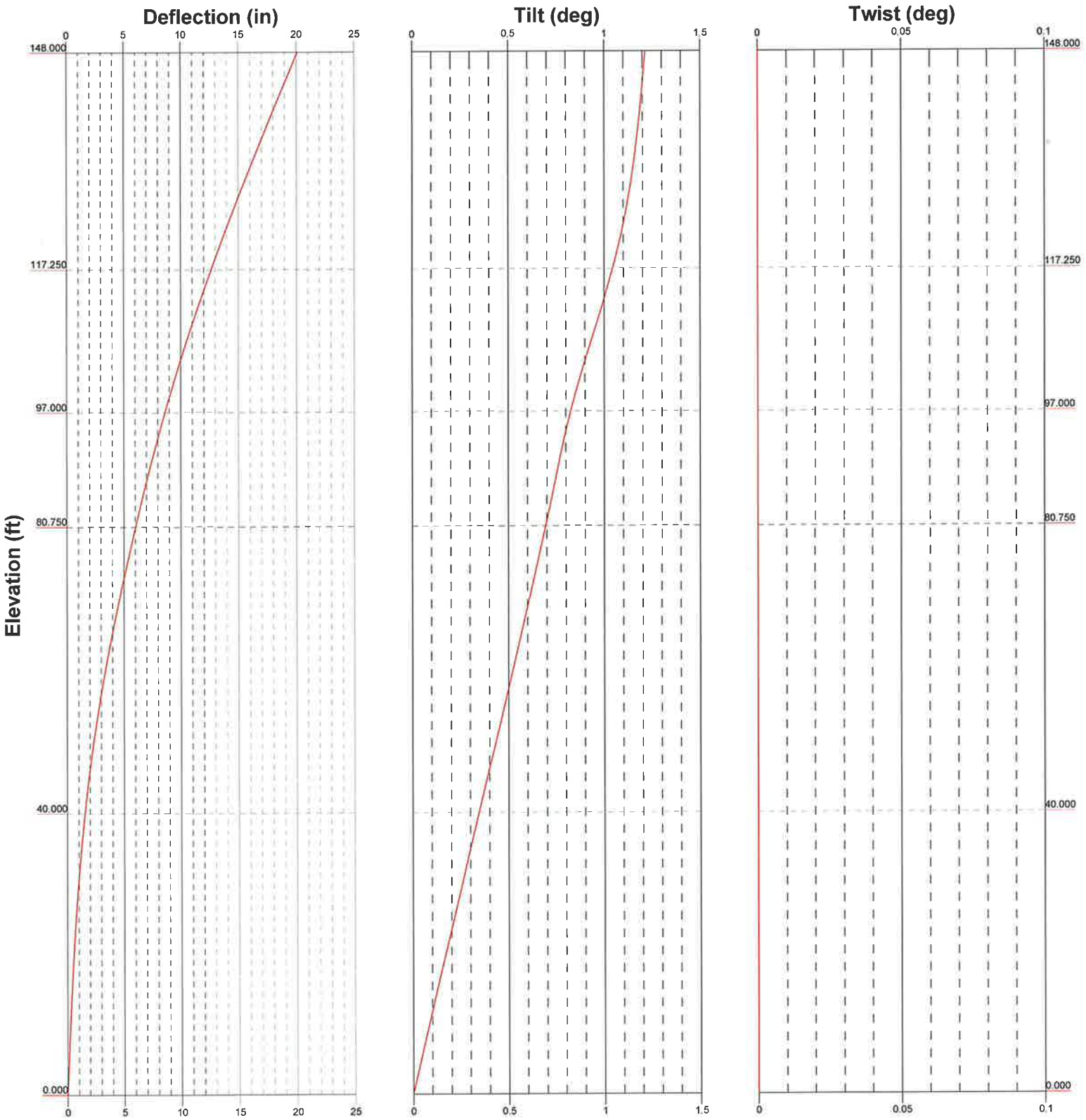
Job: 112179.001.01 - HORTON 2 FREDSALL PROPERTY, CT (BU# 876			
Project:			
Client: Crown Castle	Drawn by: Yathish	App'd:	
Code: TIA-222-G	Date: 03/03/17	Scale: NTS	
Path:		Dwg No. E-4	

TIA-222-G - Service - 60 mph

Maximum Values



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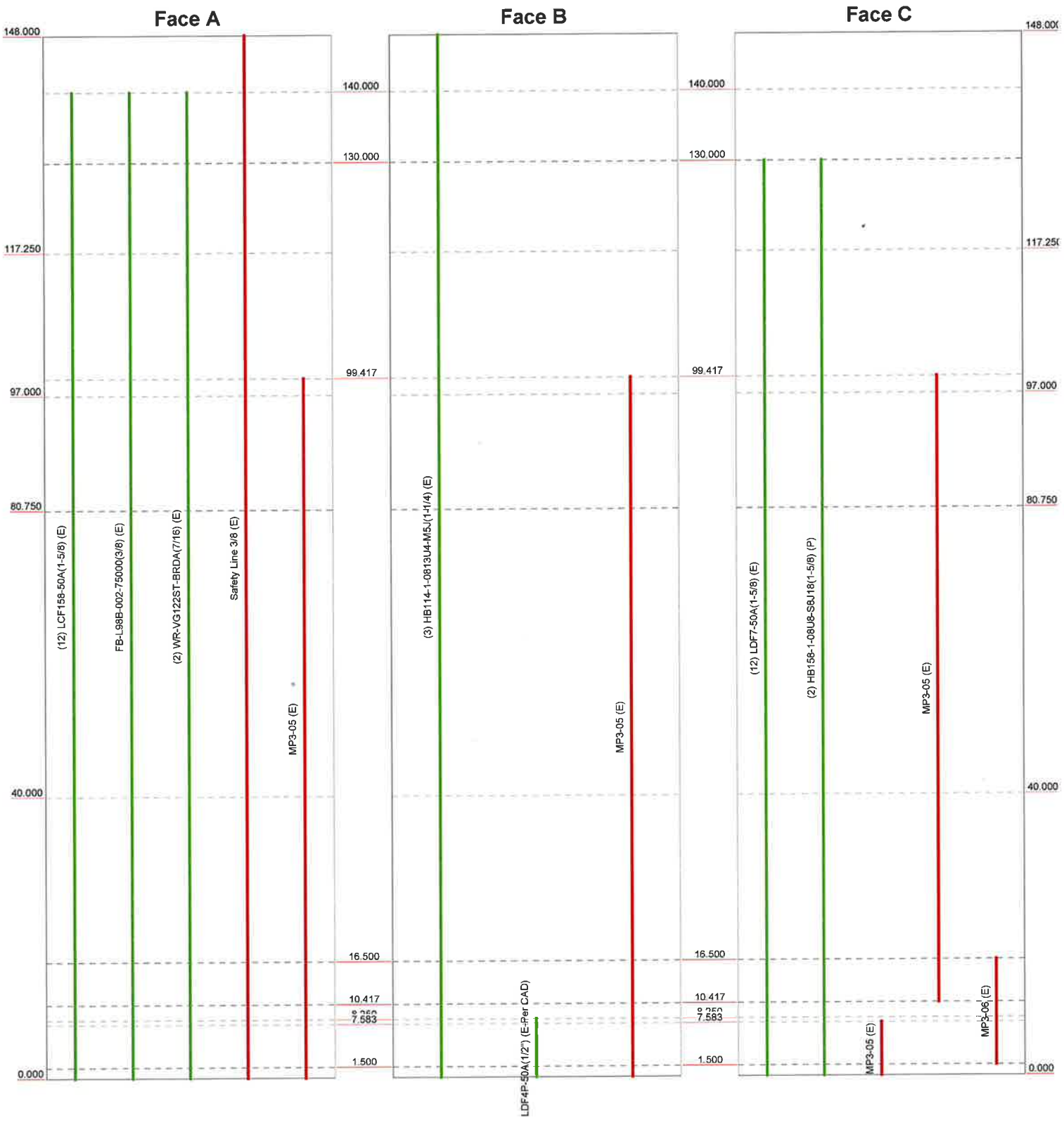
Job: 112179.001.01 - HORTON 2 FREDSALL PROPERTY, CT (BU# 876			
Project:			
Client: Crown Castle	Drawn by: Yathish	App'd:	
Code: TIA-222-G	Date: 03/03/17	Scale: NTS	
Path:		Dwg No. E-5	

0' - 148'

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



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Phone: (918) 587-4630
FAX: (918) 295-0265

Job: 112179.001.01 - HORTON 2 FREDSALL PROPERTY, CT (BU# 876			
Project:			
Client: Crown Castle	Drawn by: Yathish	App'd:	
Code: TIA-222-G	Date: 03/03/17	Scale: NTS	
Path:		Dwg No. E-7	

Tower Input Data

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

Tower is located in Litchfield County, Connecticut.
Basic wind speed of 89 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.000 ft.
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 40 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	148.000-117.250	30.750	3.500	18	22.000	27.227	0.188	0.750	A607-60 (60 ksi)
L2	117.250-97.000	23.750	0.000	18	26.257	30.294	0.250	1.000	A607-60 (60 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	97.000-80.750	16.250	4.250	18	30.294	33.056	0.444	1.777	44.422141ksi (44 ksi)
L4	80.750-40.000	45.000	5.000	18	31.834	39.483	0.439	1.757	44.788075ksi (45 ksi)
L5	40.000-0.000	45.000		18	38.071	45.720	0.443	1.773	45.158122ksi (45 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.339	12.981	780.301	7.743	11.176	69.819	1561.628	6.492	3.542	18.891
	27.647	16.092	1486.420	9.599	13.831	107.468	2974.796	8.047	4.462	23.797
L2	27.266	20.637	1763.429	9.233	13.339	132.205	3529.179	10.320	4.181	16.725
	30.761	23.840	2718.658	10.666	15.389	176.659	5440.893	11.922	4.892	19.567
L3	30.761	42.099	4739.034	10.597	15.389	307.943	9484.303	21.054	4.550	10.239
	33.566	45.995	6180.071	11.577	16.792	368.027	12368.275	23.002	5.036	11.333
L4	33.058	43.779	5451.360	11.145	16.171	337.097	10909.894	21.894	4.829	10.992
	40.092	54.446	10485.890	13.860	20.057	522.795	20985.577	27.228	6.176	14.057
L5	39.521	52.928	9467.469	13.358	19.340	489.532	18947.396	26.469	5.920	13.359
	46.425	63.688	16494.890	16.073	23.226	710.198	33011.484	31.850	7.267	16.397

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 148.000-117.250				1	1	1			
L2 117.250-97.000				1	1	1			
L3 97.000-80.750				1	1	0.943672			
L4 80.750-40.000				1	1	0.961803			
L5 40.000-0.000				1	1	0.974068			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
--*-*									
Safety Line 3/8 (E)	A	Surface Ar (CaAa)	148.000 - 0.000	1	1	-0.200 -0.200	0.375		0.000
--*-*									
MP3-05 (E)	A	Surface Af (CaAa)	99.417 - 0.000	1	1	0.000 0.000	5.330	14.840	0.000
MP3-05	B	Surface Af	99.417 - 0.000	1	1	0.000	5.330	14.840	0.000

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
(E)		(CaAa)				0.000			
MP3-05	C	Surface Af	7.583 - 0.000	1	1	0.000	5.330	14.840	0.000
(E)		(CaAa)				0.000			
MP3-05	C	Surface Af	99.417 - 10.417	1	1	0.000	5.330	14.840	0.000
(E)		(CaAa)				0.000			
MP3-06	C	Surface Af	16.500 - 1.500	1	1	0.000	6.890	18.992	0.000
(E)		(CaAa)				0.000			
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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
HB114-1-0813U4-M5J(1-1/4)	B	No	Inside Pole	148.000 - 0.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
(E)						1" Ice	0.000	0.001
LDF4P-50A(1/2")	B	No	Inside Pole	8.250 - 0.000	1	No Ice	0.000	0.000
(E-Per CAD)						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
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LCF158-50A(1-5/8)	A	No	Inside Pole	140.000 - 0.000	12	No Ice	0.000	0.001
(E)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
FB-L98B-002-75000(3/8)	A	No	Inside Pole	140.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
(E)						1" Ice	0.000	0.000
WR-VG122ST-BRDA(7/16)	A	No	Inside Pole	140.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
(E)						1" Ice	0.000	0.000
--*-*								
LDF7-50A(1-5/8)	C	No	Inside Pole	130.000 - 0.000	12	No Ice	0.000	0.001
(E)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	130.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
(P)						1" Ice	0.000	0.001
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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	148.000-117.250	A	0.000	0.000	1.153	0.000	0.233
		B	0.000	0.000	0.000	0.000	0.111
		C	0.000	0.000	0.000	0.000	0.159
L2	117.250-97.000	A	0.000	0.000	2.906	0.000	0.206
		B	0.000	0.000	2.147	0.000	0.073
		C	0.000	0.000	2.147	0.000	0.252
L3	97.000-80.750	A	0.000	0.000	15.045	0.000	0.165
		B	0.000	0.000	14.435	0.000	0.059
		C	0.000	0.000	14.435	0.000	0.202
L4	80.750-40.000	A	0.000	0.000	37.728	0.000	0.414
		B	0.000	0.000	36.200	0.000	0.147

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
		C	0.000	0.000	36.200	0.000	0.507
L5	40.000-0.000	A	0.000	0.000	37.033	0.000	0.406
		B	0.000	0.000	35.533	0.000	0.145
		C	0.000	0.000	50.241	0.000	0.498

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	148.000-117.250	A	1.723	0.000	0.000	11.752	0.000	0.369
		B		0.000	0.000	0.000	0.000	0.111
		C		0.000	0.000	0.000	0.000	0.159
L2	117.250-97.000	A	1.687	0.000	0.000	10.719	0.000	0.330
		B		0.000	0.000	2.980	0.000	0.108
		C		0.000	0.000	2.980	0.000	0.287
L3	97.000-80.750	A	1.656	0.000	0.000	25.809	0.000	0.453
		B		0.000	0.000	19.817	0.000	0.279
		C		0.000	0.000	19.817	0.000	0.423
L4	80.750-40.000	A	1.593	0.000	0.000	64.720	0.000	1.135
		B		0.000	0.000	49.696	0.000	0.701
		C		0.000	0.000	49.696	0.000	1.061
L5	40.000-0.000	A	1.423	0.000	0.000	62.521	0.000	1.077
		B		0.000	0.000	48.277	0.000	0.662
		C		0.000	0.000	63.108	0.000	1.211

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	148.000-117.250	-0.055	-0.006	-0.431	-0.045
L2	117.250-97.000	-0.049	-0.005	-0.390	-0.041
L3	97.000-80.750	-0.028	-0.003	-0.210	-0.022
L4	80.750-40.000	-0.030	-0.003	-0.227	-0.024
L5	40.000-0.000	-0.030	0.321	-0.231	0.241

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	11	Safety Line 3/8	117.25 - 148.00	1.0000	1.0000
L1	13	MP3-05	117.25 - 99.42	1.0000	1.0000
L1	14	MP3-05	117.25 - 99.42	1.0000	1.0000
L1	16	MP3-05	117.25 - 99.42	1.0000	1.0000
L3	11	Safety Line 3/8	80.75 - 97.00	1.0000	1.0000
L3	13	MP3-05	80.75 - 97.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L3	14	MP3-05	80.75 - 97.00	1.0000	1.0000
L3	16	MP3-05	80.75 - 97.00	1.0000	1.0000
L4	11	Safety Line 3/8	40.00 - 80.75	1.0000	1.0000
L4	13	MP3-05	40.00 - 80.75	1.0000	1.0000
L4	14	MP3-05	40.00 - 80.75	1.0000	1.0000
L4	15	MP3-05	40.00 - 7.58	1.0000	1.0000
L4	16	MP3-05	40.00 - 80.75	1.0000	1.0000
L4	17	MP3-06	40.00 - 16.50	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Top Hat (E)	C	None			0.000	149.000	No Ice	3.000	3.000	0.081
							1/2" Ice	3.480	3.480	0.111
							1" Ice	3.960	3.960	0.141
6' x 2" Mount Pipe (E-Per Photo)	C	From Leg	0.000	0.000	0.000	148.000	No Ice	1.425	1.425	0.022
			0.000				1/2" Ice	1.925	1.925	0.033
			3.000				1" Ice	2.294	2.294	0.048
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APXVSPP18-C-A20 w/ Mount Pipe (E)	A	From Leg	4.000	0.000	0.000	150.000	No Ice	8.262	6.946	0.083
			0.000				1/2" Ice	8.822	8.127	0.151
			-2.000				1" Ice	9.346	9.021	0.227
APXVSPP18-C-A20 w/ Mount Pipe (E)	B	From Leg	4.000	0.000	0.000	150.000	No Ice	8.262	6.946	0.083
			0.000				1/2" Ice	8.822	8.127	0.151
			-2.000				1" Ice	9.346	9.021	0.227
APXVSPP18-C-A20 w/ Mount Pipe (E)	C	From Leg	4.000	0.000	0.000	150.000	No Ice	8.262	6.946	0.083
			0.000				1/2" Ice	8.822	8.127	0.151
			-2.000				1" Ice	9.346	9.021	0.227
800 EXTERNAL NOTCH FILTER (E)	A	From Leg	4.000	0.000	0.000	150.000	No Ice	0.660	0.321	0.011
			0.000				1/2" Ice	0.763	0.398	0.017
			-2.000				1" Ice	0.873	0.483	0.024
800 EXTERNAL NOTCH FILTER (E)	B	From Leg	4.000	0.000	0.000	150.000	No Ice	0.660	0.321	0.011
			0.000				1/2" Ice	0.763	0.398	0.017
			-2.000				1" Ice	0.873	0.483	0.024
800 EXTERNAL NOTCH FILTER (E)	C	From Leg	4.000	0.000	0.000	150.000	No Ice	0.660	0.321	0.011
			0.000				1/2" Ice	0.763	0.398	0.017
			-2.000				1" Ice	0.873	0.483	0.024
800MHZ RRH (E)	A	From Leg	4.000	0.000	0.000	150.000	No Ice	2.134	1.773	0.053
			0.000				1/2" Ice	2.320	1.946	0.074
			-2.000				1" Ice	2.512	2.127	0.098
800MHZ RRH (E)	B	From Leg	4.000	0.000	0.000	150.000	No Ice	2.134	1.773	0.053
			0.000				1/2" Ice	2.320	1.946	0.074
			-2.000				1" Ice	2.512	2.127	0.098
800MHZ RRH (E)	C	From Leg	4.000	0.000	0.000	150.000	No Ice	2.134	1.773	0.053
			0.000				1/2" Ice	2.320	1.946	0.074
			-2.000				1" Ice	2.512	2.127	0.098
PCS 1900MHz 4x45W-65MHz (E)	A	From Leg	4.000	0.000	0.000	150.000	No Ice	2.322	2.238	0.060
			0.000				1/2" Ice	2.527	2.441	0.083
			-2.000				1" Ice	2.739	2.651	0.110

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
PCS 1900MHz 4x45W-65MHz (E)	B	From Leg	4.000 0.000 -2.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.322 2.527 2.739	2.238 2.441 2.651	0.060 0.083 0.110
PCS 1900MHz 4x45W-65MHz (E)	C	From Leg	4.000 0.000 -2.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.322 2.527 2.739	2.238 2.441 2.651	0.060 0.083 0.110
(3) ACU-A20-N (E)	A	From Leg	4.000 0.000 -2.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.067 0.104 0.148	0.117 0.162 0.215	0.001 0.002 0.004
(3) ACU-A20-N (E)	B	From Leg	4.000 0.000 -2.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.067 0.104 0.148	0.117 0.162 0.215	0.001 0.002 0.004
(3) ACU-A20-N (E)	C	From Leg	4.000 0.000 -2.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.067 0.104 0.148	0.117 0.162 0.215	0.001 0.002 0.004
(2) 6' x 2" Mount Pipe (E-Per Photo)	A	From Leg	4.000 0.000 -1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
(2) 6' x 2" Mount Pipe (E-Per Photo)	B	From Leg	4.000 0.000 -1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
(2) 6' x 2" Mount Pipe (E-Per Photo)	C	From Leg	4.000 0.000 -1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
Pipe Mount [PM 601-3] (E-For TME/Photo)	C	None		0.000	151.000	No Ice 1/2" Ice 1" Ice	4.390 5.480 6.570	4.390 5.480 6.570	0.195 0.237 0.280
Platform Mount [LP 1201-1] (E-Per photo)	C	None		0.000	150.000	No Ice 1/2" Ice 1" Ice	23.100 26.800 30.500	23.100 26.800 30.500	2.100 2.500 2.900
Miscellaneous [NA 510-1] (E)	C	None		0.000	150.000	No Ice 1/2" Ice 1" Ice	6.000 8.500 11.000	6.000 8.500 11.000	0.256 0.340 0.423
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TME-RRUS 11 B2 (E)	A	From Leg	2.000 0.000 2.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
TME-RRUS 11 B2 (E)	B	From Leg	2.000 0.000 2.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
TME-RRUS 11 B2 (E)	C	From Leg	2.000 0.000 2.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
DC6-48-60-18-8F (E)	A	From Leg	2.000 0.000 2.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	0.917 1.458 1.643	0.917 1.458 1.643	0.019 0.037 0.057
7' x 2" Pipe Mount (E-Per Photo)	A	From Leg	2.000 0.000 1.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	1.663 2.391 2.825	1.663 2.391 2.825	0.026 0.038 0.055
7' x 2" Pipe Mount (E-Per Photo)	B	From Leg	2.000 0.000 1.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	1.663 2.391 2.825	1.663 2.391 2.825	0.026 0.038 0.055
7' x 2" Pipe Mount (E-Per Photo)	C	From Leg	2.000 0.000 1.000	0.000	141.000	No Ice 1/2" Ice 1" Ice	1.663 2.391 2.825	1.663 2.391 2.825	0.026 0.038 0.055
Side Arm Mount [SO 102-3] (E)	C	None		0.000	141.000	No Ice 1/2" Ice	3.000 3.480	3.000 3.480	0.081 0.111

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	3.960	3.960	0.141
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AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	8.262 8.822 9.346	6.304 7.479 8.368	0.074 0.139 0.212
AM-X-CD-14-65-00T-RET w/ Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	5.232 5.618 6.012	4.015 4.633 5.257	0.035 0.080 0.131
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	8.262 8.822 9.346	6.304 7.479 8.368	0.074 0.139 0.212
(2) 7770.00 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	5.746 6.179 6.607	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	5.746 6.179 6.607	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	5.746 6.179 6.607	4.254 5.014 5.711	0.055 0.103 0.157
(2) LGP 17201 (E)	A	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	1.668 1.829 1.997	0.467 0.568 0.675	0.031 0.042 0.055
(2) LGP 17201 (E)	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	1.668 1.829 1.997	0.467 0.568 0.675	0.031 0.042 0.055
(2) LGP 17201 (E)	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	1.668 1.829 1.997	0.467 0.568 0.675	0.031 0.042 0.055
(2) LGP21901 (E)	A	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	0.231 0.294 0.365	0.158 0.213 0.276	0.006 0.008 0.011
(2) LGP21901 (E)	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	0.231 0.294 0.365	0.158 0.213 0.276	0.006 0.008 0.011
(2) LGP21901 (E)	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice	0.231 0.294 0.365	0.158 0.213 0.276	0.006 0.008 0.011
T-Arm Mount [TA 602-3] (E)	C	None		0.000	140.000	No Ice 1/2" Ice 1" Ice	11.590 15.440 19.290	11.590 15.440 19.290	0.774 0.990 1.206
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(2) LPA-80080/6CF w/ Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	4.564 5.105 5.612	10.259 11.427 12.312	0.046 0.113 0.187
(2) LPA-80080/6CF w/ Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	4.564 5.105 5.612	10.259 11.427 12.312	0.046 0.113 0.187
(2) LPA-80080-6CF-EDIN-6 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	4.560 5.102 5.608	10.269 11.439 12.323	0.046 0.113 0.187
(2) SBNHH-1D65B w/ Mount Pipe (P)	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	8.397 8.960 9.490	7.071 8.260 9.170	0.066 0.135 0.212
(2) SBNHH-1D65B w/ Mount Pipe (P)	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	8.397 8.960 9.490	7.071 8.260 9.170	0.066 0.135 0.212

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) SBNHH-1D65B w/ Mount Pipe (P)	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	8.397 8.960 9.490	7.071 8.260 9.170	0.066 0.135 0.212
RRH2x60-700 (P)	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
RRH2x60-700 (P)	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
RRH2x60-700 (P)	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
RRH2X60-PCS (P)	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	2.200 2.393 2.593	1.723 1.901 2.087	0.055 0.075 0.099
RRH2X60-PCS (P)	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	2.200 2.393 2.593	1.723 1.901 2.087	0.055 0.075 0.099
RRH2X60-PCS (P)	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	2.200 2.393 2.593	1.723 1.901 2.087	0.055 0.075 0.099
RRH2X60-AWS (P)	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
RRH2X60-AWS (P)	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
RRH2X60-AWS (P)	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
DB-T1-6Z-8AB-0Z (P)	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	4.800 5.070 5.348	2.000 2.193 2.393	0.044 0.080 0.120
Platform Mount [LP 303-1] (E)	C	None		0.000	130.000	No Ice 1/2" Ice 1" Ice	14.660 18.870 23.080	14.660 18.870 23.080	1.250 1.481 1.713
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Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice

Comb. No.	Description
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	148 - 117.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-25.666	1.717	0.087
			Max. Mx	20	-10.584	207.031	-0.518
			Max. My	2	-10.589	-0.110	206.416
			Max. Vy	20	-11.664	207.031	-0.518
			Max. Vx	2	-11.633	-0.110	206.416
			Max. Torque	3			0.576
L2	117.25 - 97	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-30.657	1.958	0.105
			Max. Mx	20	-13.798	499.212	-1.628
			Max. My	2	-13.801	-1.193	497.857
			Max. Vy	20	-12.925	499.212	-1.628

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	2	-12.893	-1.193	497.857
			Max. Torque	3			0.576
L3	97 - 80.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-34.404	2.063	0.114
			Max. Mx	20	-16.238	658.398	-2.189
			Max. My	2	-16.241	-1.742	656.670
			Max. Vy	20	-13.622	658.398	-2.189
			Max. Vx	2	-13.589	-1.742	656.670
			Max. Torque	3			0.575
L4	80.75 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-49.072	2.323	0.141
			Max. Mx	20	-26.110	1248.368	-4.059
			Max. My	2	-26.112	-3.580	1245.393
			Max. Vy	20	-15.784	1248.368	-4.059
			Max. Vx	2	-15.753	-3.580	1245.393
			Max. Torque	3			0.575
L5	40 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-67.934	2.646	-0.207
			Max. Mx	20	-39.432	2001.086	-6.105
			Max. My	2	-39.432	-5.602	1996.744
			Max. Vy	20	-17.589	2001.086	-6.105
			Max. Vx	2	-17.559	-5.602	1996.744
			Max. Torque	3			0.574

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	67.934	3.904	-0.005
	Max. H_x	20	39.443	17.563	-0.044
	Max. H_z	2	39.443	-0.044	17.534
	Max. M_x	2	1996.744	-0.044	17.534
	Max. M_z	8	1999.999	-17.563	0.044
	Max. Torsion	3	0.573	-0.044	17.534
	Min. Vert	25	29.582	8.743	15.163
	Min. H_x	9	29.582	-17.563	0.044
	Min. H_z	14	39.443	0.044	-17.534
	Min. M_x	14	-1996.645	0.044	-17.534
	Min. M_z	20	-2001.086	17.563	-0.044
	Min. Torsion	15	-0.572	0.044	-17.534

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	32.869	0.000	0.000	-0.037	0.424	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	39.443	0.044	-17.534	-1996.744	-5.602	-0.569
0.9 Dead+1.6 Wind 0 deg - No Ice	29.582	0.044	-17.534	-1970.417	-5.665	-0.573
1.2 Dead+1.6 Wind 30 deg - No	39.443	8.820	-15.207	-1732.301	-1005.052	-0.532

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
0.9 Dead+1.6 Wind 30 deg - No Ice	29.582	8.820	-15.207	-1709.458	-991.944	-0.535
1.2 Dead+1.6 Wind 60 deg - No Ice	39.443	15.232	-8.805	-1003.715	-1735.046	-0.351
0.9 Dead+1.6 Wind 60 deg - No Ice	29.582	15.232	-8.805	-990.472	-1712.320	-0.353
1.2 Dead+1.6 Wind 90 deg - No Ice	39.443	17.563	-0.044	-6.202	-1999.999	-0.077
0.9 Dead+1.6 Wind 90 deg - No Ice	29.582	17.563	-0.044	-6.104	-1973.777	-0.077
1.2 Dead+1.6 Wind 120 deg - No Ice	39.443	15.188	8.729	992.972	-1728.913	0.217
0.9 Dead+1.6 Wind 120 deg - No Ice	29.582	15.188	8.729	979.902	-1706.270	0.220
1.2 Dead+1.6 Wind 150 deg - No Ice	39.443	8.743	15.163	1726.071	-994.405	0.453
0.9 Dead+1.6 Wind 150 deg - No Ice	29.582	8.743	15.163	1703.338	-981.444	0.457
1.2 Dead+1.6 Wind 180 deg - No Ice	39.443	-0.044	17.534	1996.645	6.704	0.568
0.9 Dead+1.6 Wind 180 deg - No Ice	29.582	-0.044	17.534	1970.346	6.472	0.572
1.2 Dead+1.6 Wind 210 deg - No Ice	39.443	-8.820	15.207	1732.206	1006.155	0.530
0.9 Dead+1.6 Wind 210 deg - No Ice	29.582	-8.820	15.207	1709.389	992.751	0.534
1.2 Dead+1.6 Wind 240 deg - No Ice	39.443	-15.232	8.805	1003.620	1736.152	0.352
0.9 Dead+1.6 Wind 240 deg - No Ice	29.582	-15.232	8.805	990.403	1713.130	0.353
1.2 Dead+1.6 Wind 270 deg - No Ice	39.443	-17.563	0.044	6.105	2001.086	0.079
0.9 Dead+1.6 Wind 270 deg - No Ice	29.582	-17.563	0.044	6.033	1974.589	0.078
1.2 Dead+1.6 Wind 300 deg - No Ice	39.443	-15.188	-8.729	-993.072	1730.020	-0.216
0.9 Dead+1.6 Wind 300 deg - No Ice	29.582	-15.188	-8.729	-979.975	1707.081	-0.219
1.2 Dead+1.6 Wind 330 deg - No Ice	39.443	-8.743	-15.163	-1726.172	995.510	-0.454
0.9 Dead+1.6 Wind 330 deg - No Ice	29.582	-8.743	-15.163	-1703.411	982.252	-0.457
1.2 Dead+1.0 Ice+1.0 Temp	67.934	-0.000	-0.000	0.207	2.646	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	67.934	0.005	-3.899	-451.914	2.131	-0.099
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	67.934	1.956	-3.379	-391.693	-224.235	-0.099
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	67.934	3.383	-1.953	-226.463	-389.758	-0.072
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	67.934	3.904	-0.005	-0.496	-450.086	-0.025
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	67.934	3.379	1.945	225.658	-389.055	0.027
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	67.934	1.948	3.374	391.403	-223.018	0.073
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	67.934	-0.005	3.899	452.326	3.536	0.099
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	67.934	-1.956	3.379	392.105	229.902	0.099
1.2 Dead+1.0 Wind 240	67.934	-3.383	1.953	226.875	395.425	0.072

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 270	67.934	-3.904	0.005	0.909	455.754	0.026
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 300	67.934	-3.379	-1.945	-225.246	394.723	-0.027
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 330	67.934	-1.948	-3.374	-390.991	228.685	-0.073
deg+1.0 Ice+1.0 Temp Dead+Wind 0 deg - Service	32.869	0.011	-4.456	-503.513	-1.093	-0.146
Dead+Wind 30 deg - Service	32.869	2.242	-3.865	-436.838	-253.110	-0.137
Dead+Wind 60 deg - Service	32.869	3.871	-2.238	-253.121	-437.184	-0.090
Dead+Wind 90 deg - Service	32.869	4.464	-0.011	-1.591	-503.989	-0.020
Dead+Wind 120 deg - Service	32.869	3.860	2.218	250.354	-435.633	0.056
Dead+Wind 150 deg - Service	32.869	2.222	3.854	435.206	-250.424	0.117
Dead+Wind 180 deg - Service	32.869	-0.011	4.456	503.432	2.009	0.146
Dead+Wind 210 deg - Service	32.869	-2.242	3.865	436.757	254.026	0.137
Dead+Wind 240 deg - Service	32.869	-3.871	2.238	253.040	438.100	0.090
Dead+Wind 270 deg - Service	32.869	-4.464	0.011	1.511	504.906	0.020
Dead+Wind 300 deg - Service	32.869	-3.860	-2.218	-250.435	436.550	-0.056
Dead+Wind 330 deg - Service	32.869	-2.222	-3.854	-435.288	251.340	-0.117

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-32.869	0.000	0.000	32.869	0.000	0.000%
2	0.044	-39.443	-17.534	-0.044	39.443	17.534	0.000%
3	0.044	-29.582	-17.534	-0.044	29.582	17.534	0.000%
4	8.820	-39.443	-15.207	-8.820	39.443	15.207	0.000%
5	8.820	-29.582	-15.207	-8.820	29.582	15.207	0.000%
6	15.232	-39.443	-8.805	-15.232	39.443	8.805	0.000%
7	15.232	-29.582	-8.805	-15.232	29.582	8.805	0.000%
8	17.563	-39.443	-0.044	-17.563	39.443	0.044	0.000%
9	17.563	-29.582	-0.044	-17.563	29.582	0.044	0.000%
10	15.188	-39.443	8.729	-15.188	39.443	-8.729	0.000%
11	15.188	-29.582	8.729	-15.188	29.582	-8.729	0.000%
12	8.743	-39.443	15.163	-8.743	39.443	-15.163	0.000%
13	8.743	-29.582	15.163	-8.743	29.582	-15.163	0.000%
14	-0.044	-39.443	17.534	0.044	39.443	-17.534	0.000%
15	-0.044	-29.582	17.534	0.044	29.582	-17.534	0.000%
16	-8.820	-39.443	15.207	8.820	39.443	-15.207	0.000%
17	-8.820	-29.582	15.207	8.820	29.582	-15.207	0.000%
18	-15.232	-39.443	8.805	15.232	39.443	-8.805	0.000%
19	-15.232	-29.582	8.805	15.232	29.582	-8.805	0.000%
20	-17.563	-39.443	0.044	17.563	39.443	-0.044	0.000%
21	-17.563	-29.582	0.044	17.563	29.582	-0.044	0.000%
22	-15.188	-39.443	-8.729	15.188	39.443	8.729	0.000%
23	-15.188	-29.582	-8.729	15.188	29.582	8.729	0.000%
24	-8.743	-39.443	-15.163	8.743	39.443	15.163	0.000%
25	-8.743	-29.582	-15.163	8.743	29.582	15.163	0.000%
26	0.000	-67.934	0.000	0.000	67.934	0.000	0.000%
27	0.005	-67.934	-3.899	-0.005	67.934	3.899	0.000%
28	1.956	-67.934	-3.379	-1.956	67.934	3.379	0.000%
29	3.383	-67.934	-1.953	-3.383	67.934	1.953	0.000%
30	3.904	-67.934	-0.005	-3.904	67.934	0.005	0.000%
31	3.379	-67.934	1.945	-3.379	67.934	-1.945	0.000%
32	1.948	-67.934	3.374	-1.948	67.934	-3.374	0.000%
33	-0.005	-67.934	3.899	0.005	67.934	-3.899	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
34	-1.956	-67.934	3.379	1.956	67.934	-3.379	0.000%
35	-3.383	-67.934	1.953	3.383	67.934	-1.953	0.000%
36	-3.904	-67.934	0.005	3.904	67.934	-0.005	0.000%
37	-3.379	-67.934	-1.945	3.379	67.934	1.945	0.000%
38	-1.948	-67.934	-3.374	1.948	67.934	3.374	0.000%
39	-0.011	-32.869	-4.456	-0.011	32.869	4.456	0.000%
40	2.242	-32.869	-3.865	-2.242	32.869	3.865	0.000%
41	3.871	-32.869	-2.238	-3.871	32.869	2.238	0.000%
42	4.464	-32.869	-0.011	-4.464	32.869	0.011	0.000%
43	3.860	-32.869	2.218	-3.860	32.869	-2.218	0.000%
44	2.222	-32.869	3.854	-2.222	32.869	-3.854	0.000%
45	-0.011	-32.869	4.456	0.011	32.869	-4.456	0.000%
46	-2.242	-32.869	3.865	2.242	32.869	-3.865	0.000%
47	-3.871	-32.869	2.238	3.871	32.869	-2.238	0.000%
48	-4.464	-32.869	0.011	4.464	32.869	-0.011	0.000%
49	-3.860	-32.869	-2.218	3.860	32.869	2.218	0.000%
50	-2.222	-32.869	-3.854	2.222	32.869	3.854	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00009531
3	Yes	5	0.00000001	0.00004701
4	Yes	6	0.00000001	0.00021992
5	Yes	6	0.00000001	0.00007665
6	Yes	6	0.00000001	0.00022578
7	Yes	6	0.00000001	0.00007888
8	Yes	5	0.00000001	0.00005577
9	Yes	4	0.00000001	0.00059457
10	Yes	6	0.00000001	0.00022132
11	Yes	6	0.00000001	0.00007743
12	Yes	6	0.00000001	0.00021686
13	Yes	6	0.00000001	0.00007574
14	Yes	5	0.00000001	0.00014955
15	Yes	5	0.00000001	0.00007379
16	Yes	6	0.00000001	0.00022722
17	Yes	6	0.00000001	0.00007939
18	Yes	6	0.00000001	0.00022149
19	Yes	6	0.00000001	0.00007718
20	Yes	4	0.00000001	0.00085914
21	Yes	4	0.00000001	0.00036741
22	Yes	6	0.00000001	0.00021891
23	Yes	6	0.00000001	0.00007643
24	Yes	6	0.00000001	0.00022324
25	Yes	6	0.00000001	0.00007812
26	Yes	4	0.00000001	0.00008266
27	Yes	6	0.00000001	0.00015018
28	Yes	6	0.00000001	0.00017600
29	Yes	6	0.00000001	0.00017649
30	Yes	6	0.00000001	0.00014863
31	Yes	6	0.00000001	0.00017543
32	Yes	6	0.00000001	0.00017514
33	Yes	6	0.00000001	0.00015004
34	Yes	6	0.00000001	0.00018003

35	Yes	6	0.00000001	0.00017973
36	Yes	6	0.00000001	0.00015199
37	Yes	6	0.00000001	0.00017927
38	Yes	6	0.00000001	0.00017937
39	Yes	4	0.00000001	0.00017168
40	Yes	5	0.00000001	0.00005830
41	Yes	5	0.00000001	0.00006291
42	Yes	4	0.00000001	0.00012604
43	Yes	5	0.00000001	0.00006091
44	Yes	5	0.00000001	0.00005744
45	Yes	4	0.00000001	0.00018244
46	Yes	5	0.00000001	0.00006435
47	Yes	5	0.00000001	0.00005955
48	Yes	4	0.00000001	0.00012440
49	Yes	5	0.00000001	0.00005909
50	Yes	5	0.00000001	0.00006275

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 117.25	20.101	47	1.214	0.002
L2	120.75 - 97	13.428	47	1.077	0.001
L3	97 - 80.75	8.622	47	0.825	0.001
L4	85 - 40	6.666	47	0.730	0.000
L5	45 - 0	1.900	47	0.387	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
151.000	Pipe Mount [PM 601-3]	47	20.101	1.214	0.002	33819
150.000	APXVSPP18-C-A20 w/ Mount Pipe	47	20.101	1.214	0.002	33819
149.000	Top Hat	47	20.101	1.214	0.002	33819
148.000	6' x 2" Mount Pipe	47	20.101	1.214	0.002	33819
141.000	TME-RRUS 11 B2	47	18.329	1.191	0.002	24156
140.000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	47	18.078	1.187	0.002	21136
130.000	(2) LPA-80080/6CF w/ Mount Pipe	47	15.604	1.143	0.001	9394

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 117.25	79.694	18	4.816	0.007
L2	120.75 - 97	53.256	18	4.275	0.004
L3	97 - 80.75	34.202	18	3.276	0.002
L4	85 - 40	26.443	18	2.899	0.002

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L5	45 - 0	7.537	18	1.537	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
151.000	Pipe Mount [PM 601-3]	18	79.694	4.816	0.007	8653
150.000	APXVSPP18-C-A20 w/ Mount Pipe	18	79.694	4.816	0.007	8653
149.000	Top Hat	18	79.694	4.816	0.007	8653
148.000	6' x 2" Mount Pipe	18	79.694	4.816	0.007	8653
141.000	TME-RRUS 11 B2	18	72.676	4.727	0.006	6180
140.000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	18	71.679	4.713	0.006	5408
130.000	(2) LPA-80080/6CF w/ Mount Pipe	18	61.879	4.536	0.005	2402

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	148 - 117.25 (1)	TP27.227x22x0.188	30.750	0.000	0.0	15.738	-10.580	982.420	0.011
L2	117.25 - 97 (2)	TP30.294x26.257x0.25	23.750	0.000	0.0	23.840	-13.794	1570.360	0.009
L3	97 - 80.75 (3)	TP33.056x30.294x0.444	16.250	0.000	0.0	44.976	-16.235	2283.640	0.007
L4	80.75 - 40 (4)	TP39.483x31.834x0.439	45.000	0.000	0.0	53.261	-26.108	2726.570	0.010
L5	40 - 0 (5)	TP45.72x38.071x0.443	45.000	0.000	0.0	63.688	-39.432	3287.320	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	148 - 117.25 (1)	TP27.227x22x0.188	207.381	534.636	0.388	0.000	534.636	0.000
L2	117.25 - 97 (2)	TP30.294x26.257x0.25	500.342	969.725	0.516	0.000	969.725	0.000
L3	97 - 80.75 (3)	TP33.056x30.294x0.444	659.923	1488.525	0.443	0.000	1488.525	0.000
L4	80.75 - 40 (4)	TP39.483x31.834x0.439	1251.208	2133.708	0.586	0.000	2133.708	0.000
L5	40 - 0 (5)	TP45.72x38.071x0.443	2005.367	3054.783	0.656	0.000	3054.783	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	148 - 117.25 (1)	TP27.227x22x0.188	11.697	491.210	0.024	0.353	1070.575	0.000
L2	117.25 - 97 (2)	TP30.294x26.257x0.25	12.957	785.179	0.017	0.353	1941.825	0.000
L3	97 - 80.75 (3)	TP33.056x30.294x0.444	13.653	1141.820	0.012	0.353	2980.683	0.000
L4	80.75 - 40 (4)	TP39.483x31.834x0.439	15.816	1363.290	0.012	0.352	4272.625	0.000
L5	40 - 0 (5)	TP45.72x38.071x0.443	17.620	1643.660	0.011	0.352	6117.033	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	148 - 117.25 (1)	0.011	0.388	0.000	0.024	0.000	0.399 ✔	1.000	4.8.2 ✔
L2	117.25 - 97 (2)	0.009	0.516	0.000	0.017	0.000	0.525 ✔	1.000	4.8.2 ✔
L3	97 - 80.75 (3)	0.007	0.443	0.000	0.012	0.000	0.451 ✔	1.000	4.8.2 ✔
L4	80.75 - 40 (4)	0.010	0.586	0.000	0.012	0.000	0.596 ✔	1.000	4.8.2 ✔
L5	40 - 0 (5)	0.012	0.656	0.000	0.011	0.000	0.669 ✔	1.000	4.8.2 ✔

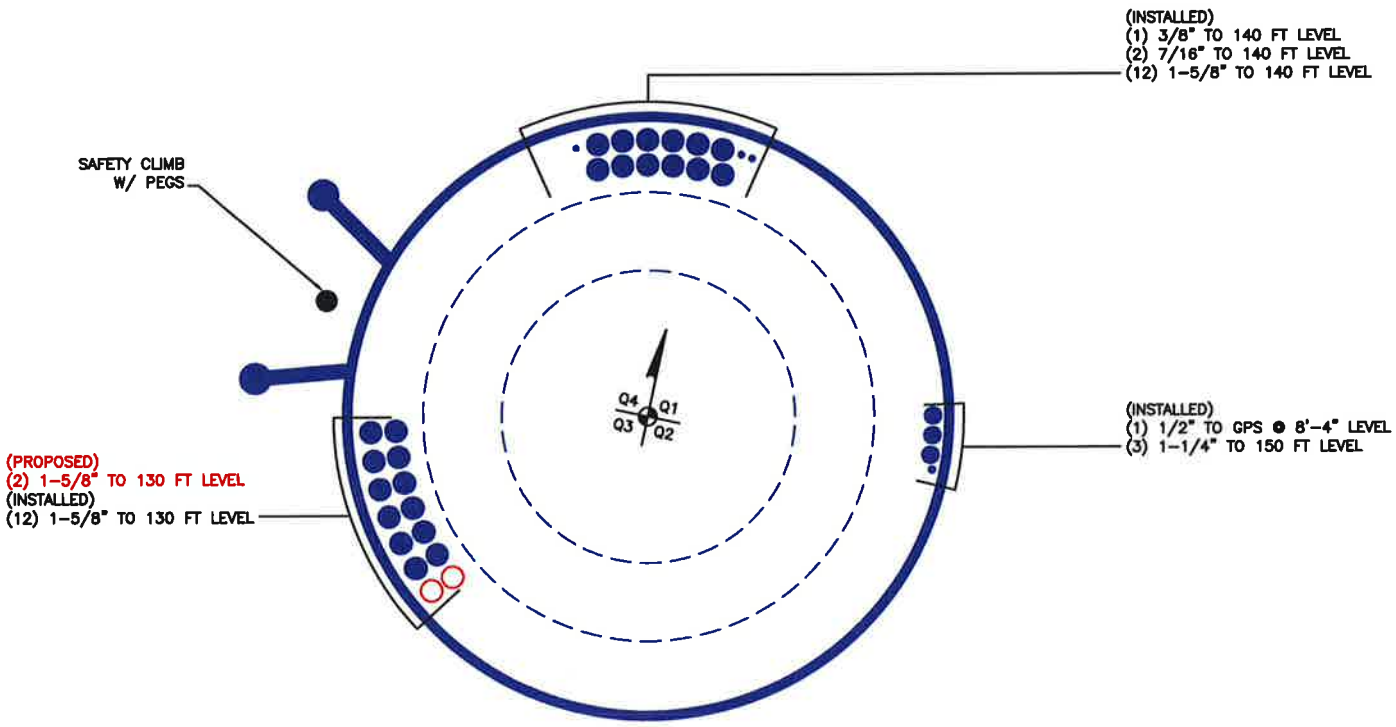
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	148 - 117.25	Pole	TP27.227x22x0.188	1	-10.580	982.420	**	**
L2	117.25 - 97	Pole	TP30.294x26.257x0.25	2	-13.794	1570.360	**	**
L3	97 - 80.75	Pole	TP33.056x30.294x0.444	3	-16.235	2283.640	**	**
L4	80.75 - 40	Pole	TP39.483x31.834x0.439	4	-26.108	2726.570	**	**
L5	40 - 0	Pole	TP45.72x38.071x0.443	5	-39.432	3287.320	**	**
							Summary	
						Pole (L5)	**	**
						RATING =	**	**

** See Additional Calculations

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876377

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforcement 1						
Bottom	Top	QTY	Type	Position	Gap	Ten/Comp
0	97	3	MP305	F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C

Reinforcement 2						
Bottom	Top	QTY	Type	Position	Gap	Ten/Comp
0				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C

Reinforcement 3						
Bottom	Top	QTY	Type	Position	Gap	Ten/Comp
0				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C

	Bottom Elevation	Top Elevation	Original Thickness	Original Yield Stress	Original Ultimate Stress	Reinforced Shaft Capacity	Reinf. 1 QTY	Reinf. 1 Type	Rein. 1 Capacity	Reinf. 2 QTY	Reinf. 2 Type	Rein. 2 Capacity	Reinf. 3 QTY	Reinf. 3 Type	Rein. 3 Capacity	Control Stress Ratio	Top Height	Section Length	Lap Splice	# of Sides	Top Diameter	Bottom Diameter	Equivalent Shaft Thickness	Equivalent Shaft Fy	Equivalent Weight Mult.
1	117.2500	148.0000	0.1875	60	75	39.9%										39.9%	148.0000	30.7500	3.5000	18	22.0000	27.2270	0.1875	60.0	1.00
2	97.0000	120.7500	0.2500	60	75	52.5%										52.5%	120.7500	23.7500	0.0000	18	26.2571	30.2939	0.2500	60.0	1.00
3	80.7500	97.0000	0.2500	60	75	42.2%	3	MP305	45.1%							45.1%	97.0000	16.2500	4.2500	18	30.2939	33.0560	0.4444	43.1	0.94
4	40.0000	85.0000	0.2813	65	80	51.8%	3	MP305	59.6%							59.6%	85.0000	45.0000	5.0000	18	31.8336	39.4830	0.4393	43.4	0.96
5	0.0000	45.0000	0.3125	65	80	58.5%	3	MP305	66.9%							66.9%	45.0000	45.0000	0.0000	18	38.0706	45.7200	0.4432	43.7	0.97
6																								
7																								
8																								
9																								
10																								
11																								
12																								
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28																								
29																								
30																								

	Bottom Elevation Failure	Top Elevation Failure	Section Failure %
1			
2			
3			
4			
5			
6			
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11			
12			
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29			
30			

AeroSolutions LLC

[illegible]

[illegible] Boulder, CO [illegible]

[illegible]

Section	Loads					Pole		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Rein1

Bottom	Top	Qty		Model	Position	T or T&C
	0	97	3	MP305		F T&C
						F T&C
						F T&C
						F T&C
						F T&C
						F T&C
						F T&C
						F T&C
						F T&C

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

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

Rein2

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

Rein3

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

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

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
MP305	19.2	5.65	2.15	20.79	0.79	0	0.5	5.33	2.09	0.91	1.21875	65	80	0.80	18	1.00	18	194.5	259.3	Rupture	**291.8**	Rupture
MP306	28.8	8.47	4.95	52.50	0.93	0	0.64	6.89	2.61	1.01	1.21875	65	80	0.80	24	1.00	24	298.7	398.3	Rupture	**448.1**	Rupture

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

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

Site Data

BU#: *876377*
Site Name: *HORTON 2 - FREDSALL F*
App #: *300765 Revision # 1*

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	52	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	51	in
Thick:	2.75	in
Grade:	55	ksi
Clip Distance:	6	in

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

Pole Data		
Diam:	45.72	in
Thick:	0.3125	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	2005.36263	ft-kips
Factored Axial, Pu:	39.4319	kips
Factored Shear, Vu:	17.619527	kips

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	160.5 Kips
Axial Design Strength, Φ*Fu*Anet:	260.0 Kips
Anchor Rod Stress Ratio:	61.7% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	25.0 ksi
PL Design Bending Strength, Φ*Fy:	49.5 ksi
Base Plate Stress Ratio:	50.4% **Pass**

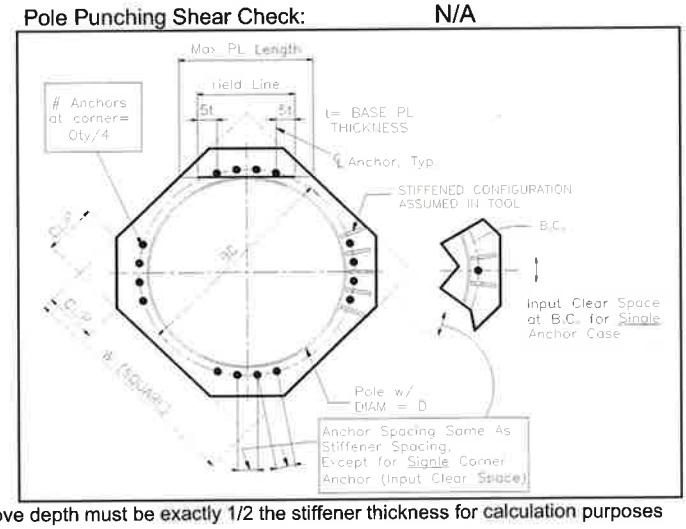
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 03-03-17

BU:	876377
Site Name:	HORTON 2 / FREDSALL PROPERTY, CT
App Number:	300765 Revision # 1
Work Order:	1372042

CROWN CASTLE

Monopole Drilled Pier

Input

Criteria

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

Forces

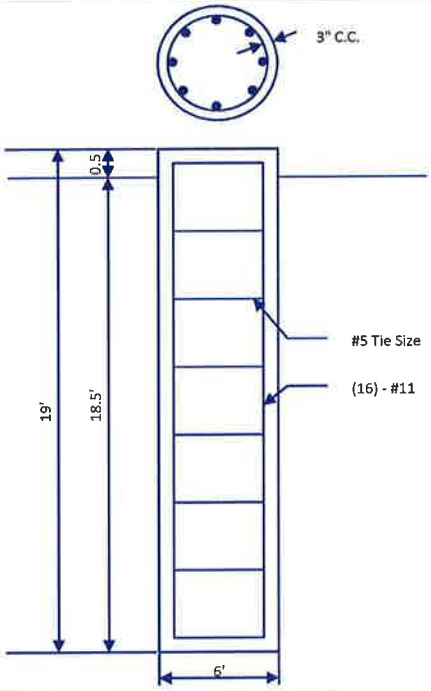
Compression	39 kips
Shear	18 kips
Moment	2005 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	6 ft
Ext. above grade:	0.5 ft
Depth below grade:	18.5 ft

Material Properties

Number of Rebar:	16
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	3000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	3 in



Soil Profile: Soil Properties

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3	0	3	100	0	0	0	0	0	
2	8	3	11	140	0	38			0	
3	3	11	14	77.6	0	38			0	
4	4	14	18	97.6	0	40			0	
5	0.5	18	18.5	97.6	0	40			12	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	4.40 ft
Max Moment, Mu:	2084.24 k-ft
Soil Safety Factor:	2.34
Safety Factor Req'd:	1.33
RATING:	56.9%

Soil Axial Capacity

Skin Friction (k):	158.80 kips
End Bearing (k):	254.47 kips
Comp. Capacity (k), ϕCn:	413.26 kips
Comp. (k), Cu:	39.00 kips
RATING:	9.4%

Concrete/Steel Check

Mu (from soil analysis)	2084.24 k-ft
ϕMn	3374.74 k-ft
RATING:	61.8%

rho provided	0.61
rho required	0.33 OK
Rebar Spacing	11.03
Spacing required	22.56 OK
Dev. Length required	13.85
Dev. Length provided	61.78 OK

Overall Foundation Rating: 61.8%

ATC Applied Technology Council

WINDSPEED BY LOCATION

Search Results

Query Date: Fri Mar 03 2017
Latitude: 41.9664
Longitude: -73.1217

ASCE 7-10 Windspeeds (3-sec peak gust in mph*):

Risk Category I: 105
Risk Category II: 115
Risk Category III-IV: 122
MRI 10-Year:** 76
MRI 25-Year:** 84
MRI 50-Year:** 90
MRI 100-Year:** 96

ASCE 7-05 Windspeed:
93 (3-sec peak gust in mph)
ASCE 7-93 Windspeed:
75 (fastest mile in mph)

*Miles per hour
**Mean Recurrence Interval

Users should consult with local building officials to determine if there are community-specific wind speed requirements that govern.

Print your results

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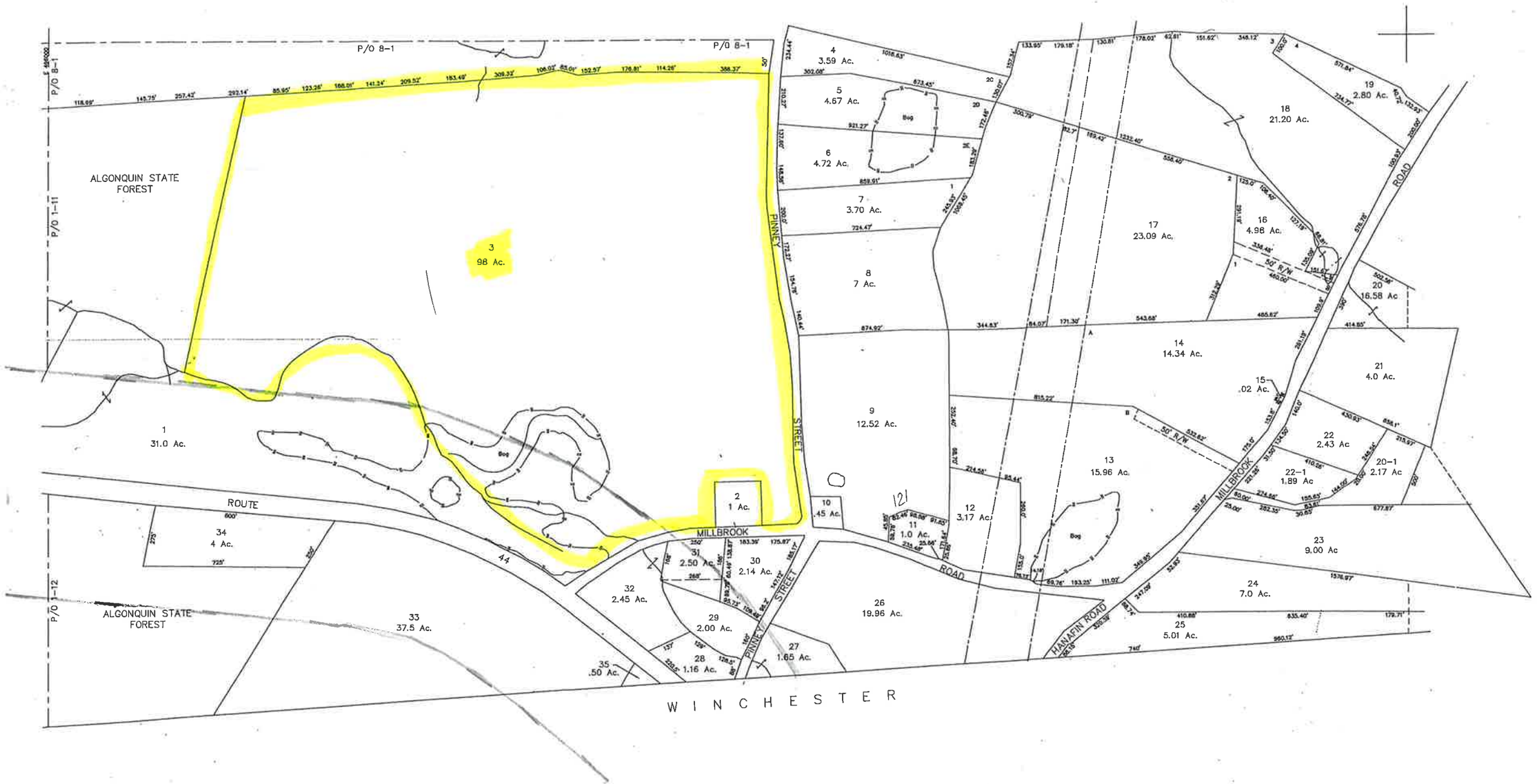
ATTACHMENT 4



GB

DATE OF AERIAL PHOTOGRAPHY 4-10-1987
DATE OF COMPLETION
DATE OF REVISIONS UPDATED 10/92

TAX MAP
TOWN OF COLEBROOK

8
MAP NUMBER

N 410000

161 PINNEY STREET

Location	161 PINNEY STREET	**Mblu**	02/ / 03/ /
Acct#	100273	**Owner**	FREDSALL JANET E SUCC TRUSTEE
Assessment	$421,520	**Appraisal**	$754,100
PID	27	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$473,300	$280,800	$754,100
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$331,400	$90,120	$421,520

Owner of Record

Owner	FREDSALL JANET E SUCC TRUSTEE
Co-Owner	REV TRUST AGMT FBO ELLEN C FREDSALL
Address	158 PINNEY STREET COLEBROOK, CT 06021

Sale Price	$0
Certificate	
Book & Page	86/ 55
Sale Date	10/07/2014
Instrument	04

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
FREDSALL JANET E SUCC TRUSTEE	$0		86/ 55	04	10/07/2014
FREDSALL ELLEN C TRUSTEE	$0		77/ 768		01/17/2008
FREDSALL ELLEN C	$0		59/ 804		03/21/1997

Building Information

Building 1 : Section 1

Year Built:	1979
Replacement Cost:	$0
Building Percent Good:	77

Building Attributes	
Field	**Description**
STYLE	Tower Accsry Bldg
MODEL	Commercial
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Concrete Block
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Minimum/Plywd
Interior Floor 2	
Heating Fuel	Electric
Heating Type	None
AC Type	None
Bldg Use	Comm Bldg.
Total Rooms	1
Total Bedrms	0
Total Baths	0
1st Floor Use:	
Heat/AC	None
Frame Type	None
Baths/Plumbing	None
Ceiling/Wall	None
Rooms/Prtns	Light
Wall Height	
% Comn Wall	

Building Photo

(http://images.vgsi.com/photos/ColebrookCTPhotos//\00\00\00

Building Layout

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Land Line Valuation

Zone	R2	**Depth**	0
Neighborhood	R05	**Assessed Value**	$90,120
Alt Land Appr	No	**Appraised Value**	$280,800
Category			

Special Land			
Land Use Code	**Land Use Description**	**Units**	**Unit Type**
6-2	Forest	93	AC

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
BRN4	BARN W/LFT&BSMT			1408 S.F.	$21,100	1
FCP	CARPORT			300 S.F.	$2,400	1
BRN4	BARN W/LFT&BSMT			240 S.F.	$3,600	1
MAS	MASONRY OUTB			240 S.F.	$16,800	1
MAS	MASONRY OUTB			420 S.F.	$29,400	1
CTW	CELL TOWER			1 UNITS	$400,000	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$473,300	$280,800	$754,100
2013	$169,800	$357,053	$526,853
2012	$169,800	$357,053	$526,853

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$331,400	$90,120	$421,520
2013	$118,900	$63,160	$182,060
2012	$118,900	$63,160	$182,060