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December 13, 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**
63 Industrial Park Road, Putnam, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 176-foot level of an existing 196-foot self-supporting lattice tower at 63 Industrial Park Road in Putnam, Connecticut (the "Property"). The tower is owned by SBA Properties, LLC ("SBA"). Cellco's use of the tower was approved by the Council in 2015. Cellco now intends to replace nine (9) of its existing antennas with three (3) model JAHH-65B-R3B, 850 MHz antennas and three (3) model JAHH-65B-R3B, 700/2100 MHz antennas, at the same level on the tower. Cellco also intends to replace three (3) remote radio heads ("RRHs") and install six (6) new RRHs. Included in Attachment 1 are specifications for Cellco's replacement antennas and RRHs.

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 Putnam Mayor, Barney Seney; Fredrick E. Wojick, Putnam's Land Use Agent; DMW Putnam LLC, the owner of the Property; and SBA, 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 RRHs will be installed at the same 176-foot level of the 196-foot tower.

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

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

4. The operation of the 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 behind 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 included in Attachment 3).

A copy of the parcel map and owner information for the Property is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

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:
Barney Seney, Putnam Mayor
Fredrick E. Wojick, Putnam Land Use Agent
DMW Putnam LLC
SBA
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

JAHH-65B-R3B

8-port sector antenna, 2x 698–787, 2x 824-894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB(Port 1) and first HB (Port 5).

- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One RET for 700MHz, one RET for 850MHz, and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO
- Internal filter on low band and interleaved dipole technology providing for attractive, low wind load mechanical package
- Separate RS-485 RET input/output for low and high band

Electrical Specifications

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 14.3	2 ° | 15.0	0 ° | 17.2	0 ° | 17.6	0 ° | 17.7	0 ° | 17.9
	8 ° | 14.3	8 ° | 14.9	5 ° | 17.6	5 ° | 18.2	5 ° | 18.3	5 ° | 18.7
	14 ° | 14.3	14 ° | 15.4	10 ° | 17.6	10 ° | 18.2	10 ° | 18.3	10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

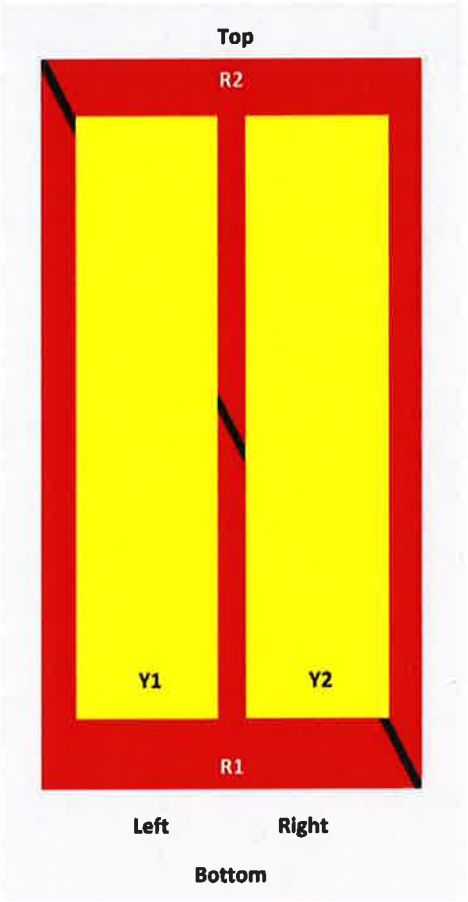
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

JAHH-65B-R3B

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

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 – 787 MHz | 824 – 894 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray

Product Specifications

JAHH-65B-R3B

Grounding Type	RF connector 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	746.0 N @ 150 km/h 167.7 lbf @ 150 km/h
Wind Loading, lateral	243.0 N @ 150 km/h 54.6 lbf @ 150 km/h
Wind Loading, rear	776.0 N @ 150 km/h 174.5 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	350.0 mm | 13.8 in
Depth	208.0 mm | 8.2 in
Net Weight, without mounting kit	28.7 kg | 63.3 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

Packed Dimensions

Length	1975.0 mm | 77.8 in
Width	456.0 mm | 18.0 in
Depth	357.0 mm | 14.1 in
Shipping Weight	42.0 kg | 92.6 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

JAHH-65B-R3B

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.

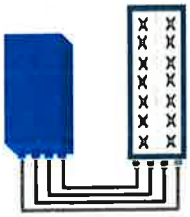
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

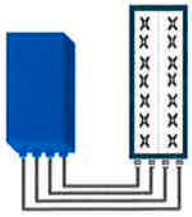
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the 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 B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 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. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

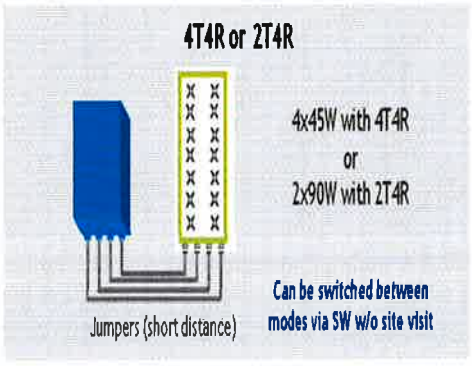
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

The Alcatel-Lucent B66a RRH4x45 is a compact (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 B66a RRH4x45 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 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz 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 AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme Receiver Sensivity (FRC A1-3)	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.) Volume in Liters Weight in kg (lb) (w/o mounting HW)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield) 35.5 (with solar shield) 29.7 (without solar shield) 25.8kg (56.8lb) (with solar shield)
DC voltage range DC power consumption	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) UL50E Type 4 Enclosure 250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

Alcatel·Lucent

ATTACHMENT 2

	General	Power	Density					
Site Name: Putnam S								
Tower Height: 196ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T	6	718	186	700	0.0478	0.4667	1.02%	
*AT&T	4	853	186	700	0.0379	0.4667	0.81%	
*AT&T	4	351	186	850	0.0156	0.5667	0.28%	
Verizon PCS	**0**	**0**	**176**	**0.0000**	**1970**	**1.0000**	**0.00%**	
Verizon Cellular	**0**	**0**	**176**	**0.0000**	**869**	**0.5793**	**0.00%**	
Verizon 850 LTE	**1**	**3710**	**176**	**0.0431**	**869**	**0.5793**	**7.43%**	
Verizon AWS	**1**	**8326**	**176**	**0.0966**	**2145**	**1.0000**	**9.66%**	
Verizon 700	**1**	**2063**	**176**	**0.0239**	**746**	**0.4973**	**4.82%**	
								24.03%
* Source: Siting Council								

ATTACHMENT 3

FDH VELOCITEL

ENGINEERING INNOVATION

Structural Analysis for SBA Network Services, Inc.

196' Self-Support Tower (196.0' AGL)

SBA Site Name: Putnam Freight
SBA Site ID: CT00802-S-03
Verizon Site Number: 306382
Verizon Site ID: Putnam South CT
Site Address: 63 Industrial Park Road, Putnam, CT 06260

FDH Velocitel Project Number: 17QPFS1400

Analysis Results

Tower Components	94.9%	Sufficient
Foundation	83.2%	Sufficient

Prepared By:

Tavares W. Allen, EIT
Project Engineer

Reviewed By:

Dennis D. Abel, PE
Director – New Product Development
CT PE License No. 23247

Velocitel, Inc., d.b.a. FDH Velocitel
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STATE OF CONNECTICUT
DENNIS D. ABEL
No. 23247
LICENSED PROFESSIONAL ENGINEER

10-18-2017

October 18, 2017

Prepared pursuant to TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and 2016 CT State Building Code

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing self-supported tower located in Putnam, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standard for Antenna Supporting Structures and Antennas, ANSI/TIA-222-G* and *2016 CT State Building Code*. Information pertaining to the existing/proposed antenna loading, current tower geometry, the member sizes, and foundation dimensions was obtained from:

Source	Document Type	Reference	Date
Sabre Communications Corporation	Tower & Foundation Drawings	Job No. 99-04060	April 19, 1999
Jaworski Geotech, Inc.	Geotechnical Report	Project No. C98364G	December 18, 1998
SBA Network Services, Inc.	-	-	-

The *ultimate design wind speed* per the *2016 Connecticut Building Code (IBC)* is 130 mph without ice and 50 mph with 1" radial ice. This is converted to a *basic design wind speed* of 101 mph per the *ANSI/TIA-222-G* Standard and the *2012 IBC Section 1609.3.1*. Ice is considered to increase in thickness with height. Furthermore, this structure was analyzed as a Class II structure in Exposure Category C using Topographic Category 1 and Spectral Response Accelerations of S_S= 0.172 and S_1= 0.063.

Note: Per *Section 2.7.3* of the *ANSI/TIA-222-G* Standard, the seismic/earthquake loading effects can be ignored if the spectral response acceleration at short periods (S_S) is less than or equal to 1.00. The tower's location mandates a design S_S of less than 1.00, thus seismic loading was not considered as part of the analysis of this structure.

Conclusions

With the antenna configuration in place per **Table 1** we have determined the tower stress level to be sufficient and the foundation(s) to be sufficient pursuant to the requirements stipulated by *ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2016 CT Building Code* provided the **Recommendations** listed below are satisfied. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Velocitel is accurate (i.e., the structure member information, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the ANSI/*TIA-222-G* standards and *2016 CT State Building Code* are met with the existing and proposed loading in place, we have the following recommendations:

1. Coax lines must be installed as shown in **Figure 1**.
2. The proposed RRUs should be installed directly behind the proposed panel antennas.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Velocitel, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

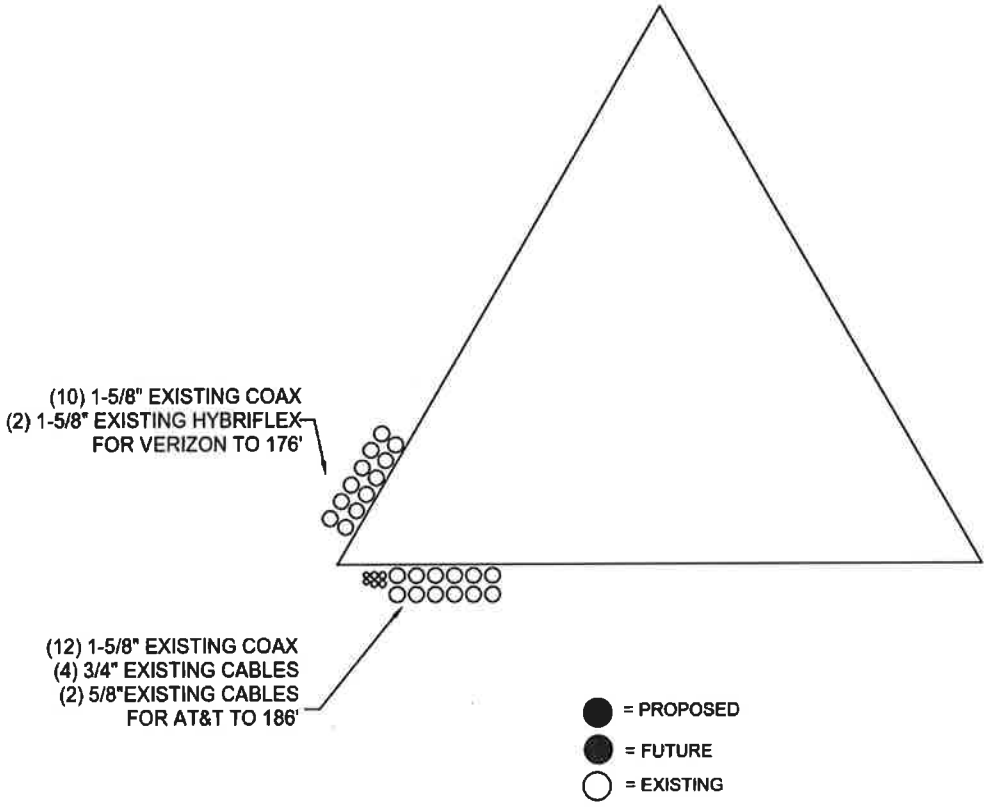
Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
196	-	-	-	196	(3) T-Frames
186	(3) Powerwave 7770.00 (3) CCI HPA-65R-BUU-H8 (3) CCI OPA-65R-LCUU-H6 (6) Powerwave LGP21401 TMAs (6) Powerwave LGP21901850.1900 (6) Ericsson RRUS-11 RRUs (3) Ericsson RRUS 12 RRUs (3) Ericsson RRUS A2 (3) Ericsson RRUS 32 (3) Ericsson RRUS E2 (2) Raycap DC6-48-60-18-8F (3) Polyphaser 1000860	(12) 1-5/8" (4) 3/4" (2) 5/8"	AT&T	186	(3) Commscope MTC3615 T-Frames
176	(6) Commscope HBXX-6517DS-VTM (6) Commscope LNX-6514DS-A1M (3) Alcatel Lucent RRH-2x60-AWS (3) Alcatel Lucent RRH-2x60-PCS (3) Alcatel Lucent RRH-2x40-700U (2) RFS DB-T1-6Z-8AB-0Z	(10) 1-5/8" (2) 1-5/8" Hybriflex	Verizon	176	(3) T-Frames

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
176	(6) Commscope JAHH-65B-R3B (3) Andrew LNX-6514DS-A1M (3) Alcatel Lucent RRH-2x90 AWS (3) Alcatel Lucent RRH-4x40 850 (3) Alcatel Lucent RRH-2x60 700 (2) RFS DB-T1-6Z-8AB-0Z	(10) 1-5/8" (2) 1-5/8" Hybrid	Verizon	176	(3) T-Frames

Figure 1 – Feedline Layout



RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Legs	50 ksi
Bracing	36 ksi

Table 3 and **Table 4** display the summary of capacities for the analyzed structure and its additional components. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 105% are considered acceptable (except foundation soil interaction, up to 110% is considered acceptable).*

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
T1	196 - 180	Leg	P3.5x.318 (4.00 OD)	8.3	Pass
		Diagonal	L2x2x3/16	56.2 60.0 (b)	Pass
		Top Girt	L2x2x3/16	15.4	Pass
T2	180 - 160	Leg	P4x.438 (4.50 OD)	23.5	Pass
		Diagonal	L2 1/2x2 1/2x3/16	71.3 92.4 (b)	Pass
T3	160 - 140	Leg	P5x.375 (5.563 OD)	35.4	Pass
		Diagonal	L2 1/2x2 1/2x1/4	77.4	Pass
T4	140 - 120	Leg	P6x.432 (6.625 OD)	35.7	Pass
		Diagonal	L3 1/2x3 1/2x1/4	38.5 74.4 (b)	Pass
T5	120 - 100	Leg	P6x.432 (6.625 OD)	51.7	Pass
		Diagonal	L3 1/2x3 1/2x1/4	67.8 88.1 (b)	Pass
T6	100 - 80	Leg	P8x.322 (8.625 OD)	58.0	Pass
		Diagonal	L3 1/2x3 1/2x1/4	86.0 94.9 (b)	Pass
T7	80 - 60	Leg	P8x.5 (8.625 OD)	45.8	Pass
		Diagonal	L3 1/2x3 1/2x3/8	77.5	Pass
T8	60 - 40	Leg	P8x.5 (8.625 OD)	53.3	Pass
		Diagonal	L4x4x3/8	66.0 74.8 (b)	Pass
T9	40 - 20	Leg	P8x.5 (8.625 OD)	53.4	Pass
		Diagonal	L3 1/2x3 1/2x3/8	68.9	Pass
		Horizontal	L4x4x3/8	50.1	Pass
		Redund Horz 1 Bracing	L3x3x3/16	30.2	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	48.2	Pass
		Inner Bracing	L4x4x1/4	0.8	Pass
T10	20 - 0	Leg	P10x.365 (10.75 OD)	63.7	Pass
		Diagonal	L3 1/2x3 1/2x3/8	77.2	Pass

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
		Horizontal	L4x4x3/8	62.5	Pass
		Redund Horz 1 Bracing	L3x3x3/16	36.2	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	57.0	Pass
		Inner Bracing	L4x4x1/4	0.8	Pass

Table 4 – Additional Structure Component Capacities

Elevation (ft.)	Component	%Capacity	Pass/Fail	Notes
0	Base Foundation (Structural)	26.5	Pass	-
0	Base Foundation (Soil Interaction)	66.3	Pass	-
0	Anchor Rods	81.2	Pass	-

GENERAL COMMENTS

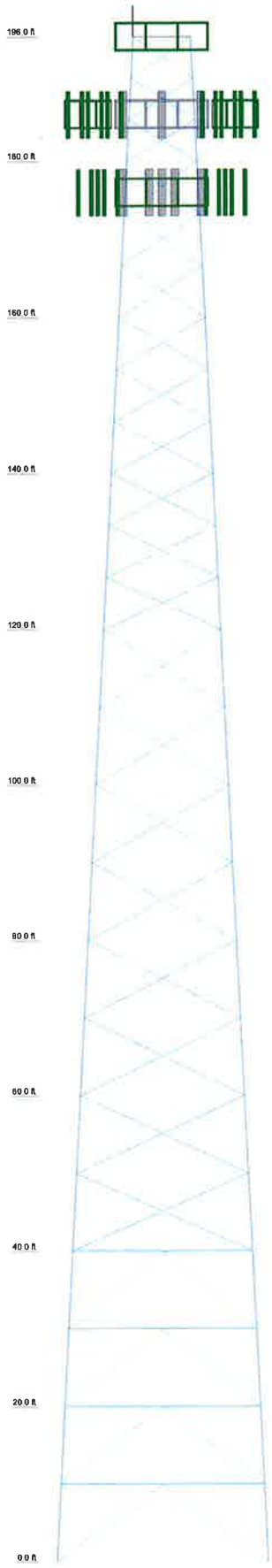
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Velocitel, Inc. should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Velocitel, Inc.

APPENDIX

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	P10x.365 (10.75 OD)		P8x.5 (8.625 OD)		P8x.322 (8.625 OD)		P8x.432 (8.625 OD)	P8x.375 (8.563 OD)	P4x.438 (4.50 OD)	P3.5x.319 (4.00 OD)
Leg Grade	A572-50									
Diagonals	L3 1/2x3 1/2x3/8		L4x4x3/8		L3 1/2x3 1/2x3/8		L3 1/2x3 1/2x1/4	L3 1/2x3 1/2x1/4	L2 1/2x2 1/2x3/16	L2x2x3/16
Diagonal Grade	A36									
Top Girts	N.A.									L2x2x3/16
Horizontals	L4x4x3/8						N.A.			
Red. Horizontals	L3x3x3/16						N.A.			
Red. Diagonals	L2 1/2x2 1/2x3/16						N.A.			
Inner Bracing	L4x4x1/4						N.A.			
Face Width (ft)	27	25	23	21	19	17	15	13	11	9
# Panels @ (ft)			12 @ 10					9 @ 6.66667		3 @ 5.33333
Weight (K)	38.2	47	44	44	44	44	33	33	44	11



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	196	RRUS 12	186
(3) T-Frames MNT	196	RRUS A2	186
(4) 7'x2" Mount Pipe	196	RRUS A2	186
(4) 7'x2" Mount Pipe	196	RRUS A2	186
(4) 7'x2" Mount Pipe	196	DC6-48-60-18-8F Surge Arrestor	186
7770.00 w/Mount Pipe	186	DC6-48-60-18-8F Surge Arrestor	186
7770.00 w/Mount Pipe	186	100860	186
7770.00 w/Mount Pipe	186	100860	186
HPA-65R-BUU-H8 w/ Mount Pipe	186	100860	186
HPA-65R-BUU-H8 w/ Mount Pipe	186	(3) T-Frames (Commscope MTC3615)	186
HPA-65R-BUU-H8 w/ Mount Pipe	186	7'x2" Mount Pipe	186
OPA-65R-LCUU-H6 w/ Mount Pipe	186	7'x2" Mount Pipe	186
OPA-65R-LCUU-H6 w/ Mount Pipe	186	7'x2" Mount Pipe	186
OPA-65R-LCUU-H6 w/ Mount Pipe	186	(2) JAHH-65B-R3B w/ Mount Pipe	176
(2) LGP21401 TMA	186	(2) JAHH-65B-R3B w/ Mount Pipe	176
(2) LGP21401 TMA	186	(2) JAHH-65B-R3B w/ Mount Pipe	176
(2) LGP21401 TMA	186	LNX-6514DS-A1M w/ Mount Pipe	176
(2) LGP21901 Diplexer	186	LNX-6514DS-A1M w/ Mount Pipe	176
(2) LGP21901 Diplexer	186	LNX-6514DS-A1M w/ Mount Pipe	176
(2) LGP21901 Diplexer	186	DB-T1-6Z-8AB-0Z	176
(2) RRUS-11	186	DB-T1-6Z-8AB-0Z	176
(2) RRUS-11	186	RRH-2x90 AWS	176
(2) RRUS-11	186	RRH-2x90 AWS	176
RRUS E2	186	RRH-2x90 AWS	176
RRUS E2	186	RRH4x40 850	176
RRUS E2	186	RRH4x40 850	176
RRUS 32	186	RRH4x40 850	176
RRUS 32	186	RRH2x60-700	176
RRUS 32	186	RRH2x60-700	176
RRUS 12	186	RRH2x60-700	176
RRUS 12	186	(3) T-Frames MNT	176

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 Windham County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in Ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 94.9%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 341 K
SHEAR: 40 K

UPLIFT: -282 K
SHEAR: 34 K

AXIAL 192 K
SHEAR 18 K *MOMENT 2314 kip-ft*
TORQUE 9 kip-ft
50 mph WIND - 1.0000 in ICE
AXIAL 68 K
SHEAR 66 K *MOMENT 7444 kip-ft*
TORQUE 55 kip-ft
REACTIONS - 101 mph WIND

FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031
Tower Analysis

Job: Putnam Freight, CT00802-S
Project: 17QPFS1400
Client: SBA Network Services, Inc. Drawn by: tallen App'd:
Code: TIA-222-G Date: 10/18/17 Scale: NTS
Path: Dwg No. E-1

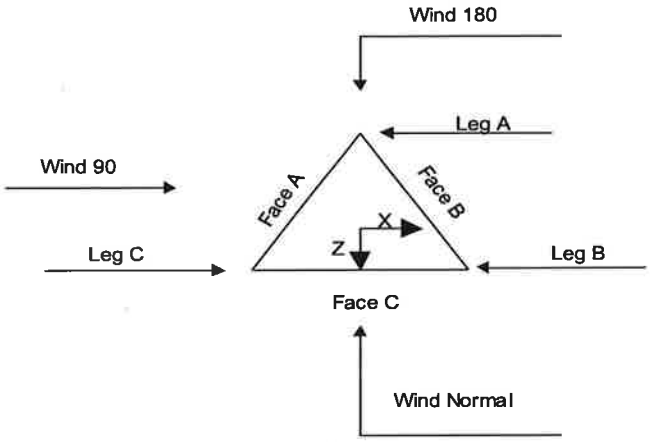
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 196.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 7.40 ft at the top and 27.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Windham County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 101 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in tower member 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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	196.00-180.00			7.40	1	16.00
T2	180.00-160.00			9.00	1	20.00
T3	160.00-140.00			11.00	1	20.00
T4	140.00-120.00			13.00	1	20.00
T5	120.00-100.00			15.00	1	20.00
T6	100.00-80.00			17.00	1	20.00
T7	80.00-60.00			19.00	1	20.00
T8	60.00-40.00			21.00	1	20.00
T9	40.00-20.00			23.00	1	20.00
T10	20.00-0.00			25.00	1	20.00

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	196.00-180.00	5.33	X Brace	No	No	0.0000	0.0000
T2	180.00-160.00	6.67	X Brace	No	No	0.0000	0.0000
T3	160.00-140.00	6.67	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T5	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000

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
T6	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	K1 Down	No	Yes	0.0000	0.0000
T10	20.00-0.00	10.00	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 196.00-180.00	Pipe	P3.5x.318 (4.00 OD)	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T2 180.00-160.00	Pipe	P4x.438 (4.50 OD)	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 160.00-140.00	Pipe	P5x.375 (5.563 OD)	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T4 140.00-120.00	Pipe	P6x.432 (6.625 OD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T5 120.00-100.00	Pipe	P6x.432 (6.625 OD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T6 100.00-80.00	Pipe	P8x.322 (8.625 OD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T7 80.00-60.00	Pipe	P8x.5 (8.625 OD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T8 60.00-40.00	Pipe	P8x.5 (8.625 OD)	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T9 40.00-20.00	Pipe	P8x.5 (8.625 OD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T10 20.00-0.00	Pipe	P10x.365 (10.75 OD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x3/8	A36 (36 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 196.00-180.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		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
T9 40.00-20.00	None	Flat Bar		A36	Equal Angle	L4x4x3/8	A36

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T10 20.00-0.00	None	Flat Bar		(36 ksi) A36 (36 ksi)	Equal Angle	L4x4x3/8	(36 ksi) 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
T9 40.00-20.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T10 20.00-0.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T9 40.00-20.00	A36 (36 ksi)	Horizontal (1)	Equal Angle	L3x3x3/16	1
		Diagonal (1)	Equal Angle	L2 1/2x2 1/2x3/16	1
T10 20.00-0.00	A36 (36 ksi)	Horizontal (1)	Equal Angle	L3x3x3/16	1
		Diagonal (1)	Equal Angle	L2 1/2x2 1/2x3/16	1

Tower Section Geometry *(cont'd)*

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
T1 196.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	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
T9 40.00-20.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	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
T1	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
196.00-180.00				1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
20.00-0.00				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	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
196.00-180.00														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
180.00-160.00														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T3 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 196.00-180.00	Flange	1.0000 A325N	4	0.6250 A325X	1	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 180.00-160.00	Flange	1.2500 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 160.00-140.00	Flange	1.2500 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 140.00-120.00	Flange	1.2500 A325N	4	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-100.00	Flange	1.2500 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 100.00-80.00	Flange	1.2500 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.3750 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.3750 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.3750 A325N	6	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A490X	2	0.6250 A325N	0
T10 20.00-0.00	Flange	0.0000 A449	0	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A490X	2	0.6250 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 plf
***												
Climbing	B	No	Ar (CaAa)	196.00 - 0.00	0.0000	0	1	1	2.5000	2.5000		7.90

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 plf
Ladder												
Safety Line 3/8	B	No	Ar (CaAa)	196.00 - 10.00	0.0000	0	1	1	0.3750	0.3750		0.22
***												
Feedline Ladder (Af)	B	No	Ar (CaAa)	196.00 - 0.00	0.0000	0.1	1	1	3.0000	3.0000		8.40
***												
1-5/8"	C	No	Ar (CaAa)	186.00 - 10.00	0.0000	0.45	12	6	0.5000	1.9800		0.82
3/4"	A	No	Ar (CaAa)	186.00 - 10.00	0.0000	-0.48	4	2	0.9950	0.9950		0.47
Feedline Ladder (Af)	A	No	Ar (CaAa)	186.00 - 0.00	0.0000	-0.48	1	1	3.0000	3.0000		8.40
Feedline Ladder (Af)	C	No	Ar (CaAa)	186.00 - 0.00	0.0000	0.425	1	1	3.0000	3.0000		8.40
***												
1-5/8"	A	No	Ar (CaAa)	176.00 - 10.00	0.0000	-0.43	12	6	0.5000	1.9800		0.82
***												
5/8"	C	No	Ar (CaAa)	186.00 - 10.00	0.0000	0.49	2	1	0.8800	0.8800		0.40

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft²/ft	Weight plf
***							
**							

Feed Line/Linear Appurtenances Section Areas

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
T1	196.00-180.00	A	0.000	0.000	4.188	0.000	0.06
		B	0.000	0.000	9.400	0.000	0.26
		C	0.000	0.000	17.112	0.000	0.11
T2	180.00-160.00	A	0.000	0.000	51.976	0.000	0.36
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T3	160.00-140.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T4	140.00-120.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T5	120.00-100.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T6	100.00-80.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T7	80.00-60.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T8	60.00-40.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33

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
		C	0.000	0.000	57.040	0.000	0.38
T9	40.00-20.00	A	0.000	0.000	61.480	0.000	0.40
		B	0.000	0.000	11.750	0.000	0.33
		C	0.000	0.000	57.040	0.000	0.38
T10	20.00-0.00	A	0.000	0.000	33.740	0.000	0.29
		B	0.000	0.000	11.375	0.000	0.33
		C	0.000	0.000	31.520	0.000	0.27

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	196.00-180.00	A	2.380	0.000	0.000	12.871	0.000	0.27
		B		0.000	0.000	32.249	0.000	0.87
		C		0.000	0.000	27.568	0.000	0.62
T2	180.00-160.00	A	2.356	0.000	0.000	85.003	0.000	1.85
		B		0.000	0.000	40.025	0.000	1.08
		C		0.000	0.000	91.473	0.000	2.06
T3	160.00-140.00	A	2.327	0.000	0.000	95.074	0.000	2.07
		B		0.000	0.000	39.673	0.000	1.06
		C		0.000	0.000	90.955	0.000	2.04
T4	140.00-120.00	A	2.294	0.000	0.000	94.487	0.000	2.04
		B		0.000	0.000	39.277	0.000	1.05
		C		0.000	0.000	90.371	0.000	2.01
T5	120.00-100.00	A	2.256	0.000	0.000	93.813	0.000	2.01
		B		0.000	0.000	38.821	0.000	1.03
		C		0.000	0.000	89.700	0.000	1.98
T6	100.00-80.00	A	2.211	0.000	0.000	93.019	0.000	1.98
		B		0.000	0.000	38.283	0.000	1.01
		C		0.000	0.000	88.908	0.000	1.94
T7	80.00-60.00	A	2.156	0.000	0.000	92.046	0.000	1.94
		B		0.000	0.000	37.624	0.000	0.98
		C		0.000	0.000	87.939	0.000	1.89
T8	60.00-40.00	A	2.085	0.000	0.000	90.782	0.000	1.89
		B		0.000	0.000	36.768	0.000	0.95
		C		0.000	0.000	86.681	0.000	1.84
T9	40.00-20.00	A	1.981	0.000	0.000	88.944	0.000	1.81
		B		0.000	0.000	35.522	0.000	0.90
		C		0.000	0.000	84.851	0.000	1.75
T10	20.00-0.00	A	1.775	0.000	0.000	49.199	0.000	1.02
		B		0.000	0.000	29.124	0.000	0.77
		C		0.000	0.000	47.161	0.000	0.99

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	196.00-180.00	-2.7946	2.1397	-0.7074	0.7759
T2	180.00-160.00	-8.4212	5.0223	-4.4080	2.7945
T3	160.00-140.00	-9.8988	5.7953	-5.2629	3.2732
T4	140.00-120.00	-10.4064	6.0944	-5.7619	3.5799
T5	120.00-100.00	-12.3192	7.2164	-6.9097	4.2887

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T6	100.00-80.00	-12.9912	7.6115	-7.4857	4.6412
T7	80.00-60.00	-14.2145	8.3294	-8.2294	5.0961
T8	60.00-40.00	-14.9840	8.7814	-8.8433	5.4680
T9	40.00-20.00	-14.9770	8.7782	-8.6366	5.3290
T10	20.00-0.00	-9.9442	6.0308	-6.2087	4.0475

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	Climbing Ladder	180.00 - 196.00	0.6000	0.5863
T1	3	Safety Line 3/8	180.00 - 196.00	0.6000	0.5863
T1	5	Feedline Ladder (Af)	180.00 - 196.00	0.6000	0.5863
T1	10	1-5/8"	180.00 - 186.00	0.6000	0.5863
T1	11	3/4"	180.00 - 186.00	0.6000	0.5863
T1	12	Feedline Ladder (Af)	180.00 - 186.00	0.6000	0.5863
T1	16	Feedline Ladder (Af)	180.00 - 186.00	0.6000	0.5863
T1	20	5/8"	180.00 - 186.00	0.6000	0.5863
T2	2	Climbing Ladder	160.00 - 180.00	0.6000	0.6000
T2	3	Safety Line 3/8	160.00 - 180.00	0.6000	0.6000
T2	5	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.6000
T2	10	1-5/8"	160.00 - 180.00	0.6000	0.6000
T2	11	3/4"	160.00 - 180.00	0.6000	0.6000
T2	12	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.6000
T2	16	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.6000
T2	18	1-5/8"	160.00 - 176.00	0.6000	0.6000
T2	20	5/8"	160.00 - 180.00	0.6000	0.6000
T3	2	Climbing Ladder	140.00 - 160.00	0.6000	0.6000
T3	3	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T3	5	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	10	1-5/8"	140.00 - 160.00	0.6000	0.6000
T3	11	3/4"	140.00 - 160.00	0.6000	0.6000
T3	12	Feedline Ladder (Af)	140.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	16	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	18	1-5/8"	140.00 - 160.00	0.6000	0.6000
T3	20	5/8"	140.00 - 160.00	0.6000	0.6000
T4	2	Climbing Ladder	120.00 - 140.00	0.6000	0.6000
T4	3	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T4	5	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T4	10	1-5/8"	120.00 - 140.00	0.6000	0.6000
T4	11	3/4"	120.00 - 140.00	0.6000	0.6000
T4	12	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T4	16	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T4	18	1-5/8"	120.00 - 140.00	0.6000	0.6000
T4	20	5/8"	120.00 - 140.00	0.6000	0.6000
T5	2	Climbing Ladder	100.00 - 120.00	0.6000	0.6000
T5	3	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T5	5	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T5	10	1-5/8"	100.00 - 120.00	0.6000	0.6000
T5	11	3/4"	100.00 - 120.00	0.6000	0.6000
T5	12	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T5	16	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T5	18	1-5/8"	100.00 - 120.00	0.6000	0.6000
T5	20	5/8"	100.00 - 120.00	0.6000	0.6000
T6	2	Climbing Ladder	80.00 - 100.00	0.6000	0.6000
T6	3	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T6	5	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	10	1-5/8"	80.00 - 100.00	0.6000	0.6000
T6	11	3/4"	80.00 - 100.00	0.6000	0.6000
T6	12	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	16	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	18	1-5/8"	80.00 - 100.00	0.6000	0.6000
T6	20	5/8"	80.00 - 100.00	0.6000	0.6000
T7	2	Climbing Ladder	60.00 - 80.00	0.6000	0.6000
T7	3	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T7	5	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	10	1-5/8"	60.00 - 80.00	0.6000	0.6000
T7	11	3/4"	60.00 - 80.00	0.6000	0.6000
T7	12	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	16	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	18	1-5/8"	60.00 - 80.00	0.6000	0.6000
T7	20	5/8"	60.00 - 80.00	0.6000	0.6000
T8	2	Climbing Ladder	40.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	3	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T8	5	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	10	1-5/8"	40.00 - 60.00	0.6000	0.6000
T8	11	3/4"	40.00 - 60.00	0.6000	0.6000
T8	12	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	16	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	18	1-5/8"	40.00 - 60.00	0.6000	0.6000
T8	20	5/8"	40.00 - 60.00	0.6000	0.6000
T9	2	Climbing Ladder	20.00 - 40.00	0.6000	0.6000
T9	3	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T9	5	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	10	1-5/8"	20.00 - 40.00	0.6000	0.6000
T9	11	3/4"	20.00 - 40.00	0.6000	0.6000
T9	12	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	16	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	18	1-5/8"	20.00 - 40.00	0.6000	0.6000
T9	20	5/8"	20.00 - 40.00	0.6000	0.6000
T10	2	Climbing Ladder	0.00 - 20.00	0.6000	0.6000
T10	3	Safety Line 3/8	10.00 - 20.00	0.6000	0.6000
T10	5	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	10	1-5/8"	10.00 - 20.00	0.6000	0.6000
T10	11	3/4"	10.00 - 20.00	0.6000	0.6000
T10	12	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	16	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	18	1-5/8"	10.00 - 20.00	0.6000	0.6000
T10	20	5/8"	10.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

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
***									
Lightning Rod	C	From Leg	0.00	0.0000	196.00	No Ice	0.25	0.25	0.03
			0.00			1/2" Ice	0.66	0.66	0.03
			2.00			1" Ice	0.97	0.97	0.04
(3) T-Frames MNT	C	None		0.0000	196.00	No Ice	30.02	30.02	0.95
						1/2" Ice	40.48	40.48	1.40
						1" Ice	50.94	50.94	1.86
(4) 7'x2" Mount Pipe	A	From Leg	4.00	0.0000	196.00	No Ice	1.66	1.66	0.03
			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
(4) 7'x2" Mount Pipe	B	From Leg	4.00	0.0000	196.00	No Ice	1.66	1.66	0.03
			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
(4) 7'x2" Mount Pipe	C	From Leg	4.00	0.0000	196.00	No Ice	1.66	1.66	0.03
			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
**									
7770.00 w/Mount Pipe	A	From Leg	4.00	0.0000	186.00	No Ice	6.08	4.59	0.05
			0.00			1/2" Ice	6.69	5.66	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	7.21	6.45	0.16
7770.00 w/Mount Pipe	B	From Leg	4.00	0.0000	186.00	No Ice	6.08	4.59	0.05
			0.00			1/2" Ice	6.69	5.66	0.10
			0.00			1" Ice	7.21	6.45	0.16
7770.00 w/Mount Pipe	C	From Leg	4.00	0.0000	186.00	No Ice	6.08	4.59	0.05
			0.00			1/2" Ice	6.69	5.66	0.10
			0.00			1" Ice	7.21	6.45	0.16
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	4.00	0.0000	186.00	No Ice	12.98	9.18	0.09
			0.00			1/2" Ice	13.56	10.48	0.19
			0.00			1" Ice	14.15	11.49	0.29
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Leg	4.00	0.0000	186.00	No Ice	12.98	9.18	0.09
			0.00			1/2" Ice	13.56	10.48	0.19
			0.00			1" Ice	14.15	11.49	0.29
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	4.00	0.0000	186.00	No Ice	12.98	9.18	0.09
			0.00			1/2" Ice	13.56	10.48	0.19
			0.00			1" Ice	14.15	11.49	0.29
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00	0.0000	186.00	No Ice	9.90	7.18	0.11
			0.00			1/2" Ice	10.47	8.36	0.18
			0.00			1" Ice	11.01	9.26	0.27
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00	0.0000	186.00	No Ice	9.90	7.18	0.11
			0.00			1/2" Ice	10.47	8.36	0.18
			0.00			1" Ice	11.01	9.26	0.27
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00	0.0000	186.00	No Ice	9.90	7.18	0.11
			0.00			1/2" Ice	10.47	8.36	0.18
			0.00			1" Ice	11.01	9.26	0.27
(2) LGP21401 TMA	A	From Leg	4.00	0.0000	186.00	No Ice	0.82	0.35	0.02
			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	B	From Leg	4.00	0.0000	186.00	No Ice	0.82	0.35	0.02
			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	C	From Leg	4.00	0.0000	186.00	No Ice	0.82	0.35	0.02
			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21901 Diplexer	A	From Leg	4.00	0.0000	186.00	No Ice	1.95	0.50	0.03
			0.00			1/2" Ice	2.13	0.62	0.04
			0.00			1" Ice	2.33	0.75	0.06
(2) LGP21901 Diplexer	B	From Leg	4.00	0.0000	186.00	No Ice	1.95	0.50	0.03
			0.00			1/2" Ice	2.13	0.62	0.04
			0.00			1" Ice	2.33	0.75	0.06
(2) LGP21901 Diplexer	C	From Leg	4.00	0.0000	186.00	No Ice	1.95	0.50	0.03
			0.00			1/2" Ice	2.13	0.62	0.04
			0.00			1" Ice	2.33	0.75	0.06
(2) RRUS-11	A	From Leg	4.00	0.0000	186.00	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.00			1" Ice	2.92	1.36	0.10
(2) RRUS-11	B	From Leg	4.00	0.0000	186.00	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.00			1" Ice	2.92	1.36	0.10
(2) RRUS-11	C	From Leg	4.00	0.0000	186.00	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.00			1" Ice	2.92	1.36	0.10
RRUS E2	A	From Leg	4.00	0.0000	186.00	No Ice	1.60	0.39	0.05
			0.00			1/2" Ice	1.76	0.48	0.06
			0.00			1" Ice	1.92	0.58	0.07
RRUS E2	B	From Leg	4.00	0.0000	186.00	No Ice	1.60	0.39	0.05
			0.00			1/2" Ice	1.76	0.48	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	1.92	0.58	0.07
RRUS E2	C	From Leg	4.00	0.0000	186.00	No Ice	1.60	0.39	0.05
			0.00			1/2" Ice	1.76	0.48	0.06
			0.00			1" Ice	1.92	0.58	0.07
RRUS 32	A	From Leg	4.00	0.0000	186.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			0.00			1" Ice	3.32	2.17	0.10
RRUS 32	B	From Leg	4.00	0.0000	186.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			0.00			1" Ice	3.32	2.17	0.10
RRUS 32	C	From Leg	4.00	0.0000	186.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			0.00			1" Ice	3.32	2.17	0.10
RRUS 12	A	From Leg	4.00	0.0000	186.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS 12	B	From Leg	4.00	0.0000	186.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS 12	C	From Leg	4.00	0.0000	186.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS A2	A	From Leg	4.00	0.0000	186.00	No Ice	2.07	0.50	0.02
			0.00			1/2" Ice	2.25	0.61	0.03
			0.00			1" Ice	2.43	0.72	0.05
RRUS A2	B	From Leg	4.00	0.0000	186.00	No Ice	2.07	0.50	0.02
			0.00			1/2" Ice	2.25	0.61	0.03
			0.00			1" Ice	2.43	0.72	0.05
RRUS A2	C	From Leg	4.00	0.0000	186.00	No Ice	2.07	0.50	0.02
			0.00			1/2" Ice	2.25	0.61	0.03
			0.00			1" Ice	2.43	0.72	0.05
DC6-48-60-18-8F Surge Arrestor	A	From Leg	0.00	0.0000	186.00	No Ice	2.20	3.70	0.02
			0.00			1/2" Ice	2.40	3.94	0.05
			0.00			1" Ice	2.60	4.19	0.09
DC6-48-60-18-8F Surge Arrestor	B	From Leg	0.00	0.0000	186.00	No Ice	2.20	3.70	0.02
			0.00			1/2" Ice	2.40	3.94	0.05
			0.00			1" Ice	2.60	4.19	0.09
100860	A	From Leg	4.00	0.0000	186.00	No Ice	1.87	0.50	0.02
			0.00			1/2" Ice	2.05	0.62	0.03
			0.00			1" Ice	2.24	0.75	0.04
100860	B	From Leg	4.00	0.0000	186.00	No Ice	1.87	0.50	0.02
			0.00			1/2" Ice	2.05	0.62	0.03
			0.00			1" Ice	2.24	0.75	0.04
100860	C	From Leg	4.00	0.0000	186.00	No Ice	1.87	0.50	0.02
			0.00			1/2" Ice	2.05	0.62	0.03
			0.00			1" Ice	2.24	0.75	0.04
(3) T-Frames (Commscope MTC3615)	C	None		0.0000	186.00	No Ice	49.30	49.30	2.29
						1/2" Ice	52.20	52.20	2.68
						1" Ice	55.10	55.10	3.07
7'x2" Mount Pipe	A	From Leg	4.00	0.0000	186.00	No Ice	1.66	1.66	0.03
			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
7'x2" Mount Pipe	B	From Leg	4.00	0.0000	186.00	No Ice	1.66	1.66	0.03
			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
7'x2" Mount Pipe	C	From Leg	4.00	0.0000	186.00	No Ice	1.66	1.66	0.03
			0.00			1/2" Ice	2.39	2.39	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	2.83	2.83	0.06
***									
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00	0.0000	176.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			0.00			1" Ice	10.46	9.73	0.25
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00	0.0000	176.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			0.00			1" Ice	10.46	9.73	0.25
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00	0.0000	176.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			0.00			1" Ice	10.46	9.73	0.25
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	176.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			0.00			1" Ice	9.50	9.18	0.21
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	176.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			0.00			1" Ice	9.50	9.18	0.21
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	176.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			0.00			1" Ice	9.50	9.18	0.21
DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.0000	176.00	No Ice	4.80	2.00	0.04
			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	B	From Leg	4.00	0.0000	176.00	No Ice	4.80	2.00	0.04
			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
RRH-2x90 AWS	A	From Leg	4.00	0.0000	176.00	No Ice	2.58	0.76	0.06
			0.00			1/2" Ice	2.79	0.87	0.08
			0.00			1" Ice	3.01	0.99	0.11
RRH-2x90 AWS	B	From Leg	4.00	0.0000	176.00	No Ice	2.58	0.76	0.06
			0.00			1/2" Ice	2.79	0.87	0.08
			0.00			1" Ice	3.01	0.99	0.11
RRH-2x90 AWS	C	From Leg	4.00	0.0000	176.00	No Ice	2.58	0.76	0.06
			0.00			1/2" Ice	2.79	0.87	0.08
			0.00			1" Ice	3.01	0.99	0.11
RRH4x40 850	A	From Leg	4.00	0.0000	176.00	No Ice	2.45	3.29	0.06
			0.00			1/2" Ice	2.65	3.51	0.09
			0.00			1" Ice	2.86	3.75	0.13
RRH4x40 850	B	From Leg	4.00	0.0000	176.00	No Ice	2.45	3.29	0.06
			0.00			1/2" Ice	2.65	3.51	0.09
			0.00			1" Ice	2.86	3.75	0.13
RRH4x40 850	C	From Leg	4.00	0.0000	176.00	No Ice	2.45	3.29	0.06
			0.00			1/2" Ice	2.65	3.51	0.09
			0.00			1" Ice	2.86	3.75	0.13
RRH2x60-700	A	From Leg	4.00	0.0000	176.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
RRH2x60-700	B	From Leg	4.00	0.0000	176.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
RRH2x60-700	C	From Leg	4.00	0.0000	176.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
(3) T-Frames MNT	C	None		0.0000	176.00	No Ice	30.02	30.02	0.95
						1/2" Ice	40.48	40.48	1.40
						1" Ice	50.94	50.94	1.86

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
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
T1	196 - 180	Leg	Max Tension	15	6.06	-0.51	0.00
			Max. Compression	35	-11.54	-0.02	0.00
			Max. Mx	6	0.46	0.92	-0.00
			Max. My	8	-0.76	-0.03	-1.24
			Max. Vy	6	2.16	-0.51	-0.00
			Max. Vx	4	1.95	-0.00	-0.06
		Diagonal	Max Tension	9	3.92	0.00	0.00
			Max. Compression	20	-3.98	0.00	0.00
			Max. Mx	31	-0.06	0.05	0.01
			Max. My	32	-1.09	0.05	0.01
			Max. Vy	31	0.05	0.05	0.01
			Max. Vx	32	-0.00	0.00	0.00
		Top Girt	Max Tension	19	0.52	0.00	0.00
			Max. Compression	6	-0.58	0.00	0.00
			Max. Mx	26	-0.14	-0.12	0.00
			Max. My	26	-0.14	0.00	0.00
			Max. Vy	26	-0.07	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
T2	180 - 160	Leg	Max Tension	15	37.34	0.23	-0.03
			Max. Compression	18	-47.00	0.45	0.00
			Max. Mx	22	12.83	1.91	0.00
			Max. My	4	-3.08	-0.04	1.94
			Max. Vy	22	1.19	-1.20	0.00
			Max. Vx	12	1.02	-0.02	-0.69
		Diagonal	Max Tension	9	6.64	0.00	0.00
			Max. Compression	8	-6.71	0.00	0.00
			Max. Mx	32	1.72	0.09	-0.01
			Max. My	38	1.73	0.09	0.01
			Max. Vy	32	0.07	0.09	-0.01
			Max. Vx	38	-0.00	0.00	0.00
T3	160 - 140	Leg	Max Tension	15	70.44	-0.24	-0.03
			Max. Compression	18	-83.67	0.58	0.00
			Max. Mx	2	-82.57	0.58	0.05
			Max. My	12	-6.92	0.01	-0.53
			Max. Vy	2	-0.14	0.58	0.05
			Max. Vx	24	-0.15	0.01	0.53
		Diagonal	Max Tension	8	7.11	0.00	0.00
			Max. Compression	8	-7.19	0.00	0.00
			Max. Mx	33	1.39	0.13	0.02
			Max. My	32	1.64	0.13	-0.02
			Max. Vy	33	0.09	0.13	0.02
			Max. Vx	32	0.00	0.00	0.00
T4	140 - 120	Leg	Max Tension	15	102.11	-0.45	-0.02
			Max. Compression	18	-120.12	0.71	0.00
			Max. Mx	3	-116.73	0.72	0.06
			Max. My	12	-9.03	-0.02	-0.66
			Max. Vy	6	0.13	-0.70	-0.00
			Max. Vx	12	0.18	-0.02	-0.66
		Diagonal	Max Tension	8	8.10	0.00	0.00
			Max. Compression	8	-8.07	0.00	0.00
			Max. Mx	33	1.59	0.21	-0.03
			Max. My	37	-2.02	0.19	0.03
			Max. Vy	33	0.13	0.21	-0.03
			Max. Vx	37	-0.01	0.00	0.00
T5	120 - 100	Leg	Max Tension	15	130.48	-0.53	-0.07
			Max. Compression	18	-153.08	1.03	0.00
			Max. Mx	2	-151.08	1.03	0.07
			Max. My	12	-10.34	-0.06	-0.93

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	2	-0.19	1.03	0.07
			Max. Vx	12	-0.22	-0.06	-0.93
		Diagonal	Max Tension	8	9.58	0.00	0.00
			Max. Compression	8	-9.63	0.00	0.00
			Max. Mx	33	1.85	0.29	0.04
			Max. My	32	2.18	0.29	-0.04
			Max. Vy	33	0.14	0.29	0.04
			Max. Vx	32	0.01	0.00	0.00
T6	100 - 80	Leg	Max Tension	15	160.68	-0.99	-0.05
			Max. Compression	18	-188.43	1.78	0.00
			Max. Mx	2	-186.01	1.79	0.13
			Max. My	12	-12.29	-0.10	-1.55
			Max. Vy	2	-0.25	1.79	0.13
			Max. Vx	12	0.30	-0.10	-1.55
		Diagonal	Max Tension	8	10.32	0.00	0.00
			Max. Compression	8	-10.44	0.00	0.00
			Max. Mx	33	1.89	0.34	0.04
			Max. My	32	2.22	0.34	-0.04
			Max. Vy	33	0.16	0.34	0.04
			Max. Vx	32	0.01	0.00	0.00
T7	80 - 60	Leg	Max Tension	15	190.39	-0.96	-0.04
			Max. Compression	18	-224.43	1.68	0.00
			Max. Mx	2	-203.63	1.79	0.13
			Max. My	12	-13.39	0.06	-1.37
			Max. Vy	2	0.25	1.79	0.13
			Max. Vx	12	-0.25	-0.12	-1.35
		Diagonal	Max Tension	8	11.22	0.00	0.00
			Max. Compression	8	-11.35	0.00	0.00
			Max. Mx	33	1.90	0.45	0.05
			Max. My	38	2.27	0.45	0.05
			Max. Vy	33	0.19	0.45	0.05
			Max. Vx	38	-0.01	0.00	0.00
T8	60 - 40	Leg	Max Tension	15	219.39	-1.16	-0.06
			Max. Compression	18	-260.43	-0.07	-0.00
			Max. Mx	2	-239.43	1.68	0.09
			Max. My	12	-16.88	-0.10	-2.03
			Max. Vy	3	0.26	1.09	0.05
			Max. Vx	12	0.32	-0.10	-2.03
		Diagonal	Max Tension	8	12.20	0.00	0.00
			Max. Compression	8	-12.36	0.00	0.00
			Max. Mx	34	2.24	0.58	0.07
			Max. My	32	2.32	0.58	-0.07
			Max. Vy	34	0.23	0.58	0.07
			Max. Vx	32	0.01	0.00	0.00
T9	40 - 20	Leg	Max Tension	15	239.14	2.91	-0.27
			Max. Compression	18	-286.40	-4.45	0.00
			Max. Mx	18	-286.02	6.25	-0.00
			Max. My	12	-21.10	-0.78	-4.14
			Max. Vy	18	2.20	6.25	-0.00
			Max. Vx	12	1.22	-0.78	-4.14
		Diagonal	Max Tension	9	15.34	0.06	0.01
			Max. Compression	10	-16.36	0.00	0.00
			Max. Mx	32	0.85	0.17	0.04
			Max. My	33	-1.40	0.14	-0.04
			Max. Vy	32	0.10	0.17	0.04
			Max. Vx	27	-0.01	0.00	0.00
		Horizontal	Max Tension	20	12.16	0.22	-0.01
			Max. Compression	8	-12.16	0.00	0.00
			Max. Mx	33	1.77	0.58	-0.01
			Max. My	2	-0.58	0.15	-0.04
			Max. Vy	33	0.23	0.58	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	27	-0.01	0.54	-0.02
		Redund Horz 1 Bracing	Max Tension	18	4.97	0.00	0.00
			Max. Compression	18	-4.97	0.00	0.00
			Max. Mx	26	0.85	-0.09	0.00
			Max. My	26	1.16	0.00	0.00
			Max. Vy	26	0.06	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	18	3.21	0.00	0.00
			Max. Compression	18	-3.21	0.00	0.00
			Max. Mx	26	0.51	-0.09	0.00
			Max. My	26	0.52	0.00	0.00
			Max. Vy	26	0.05	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
		Inner Bracing	Max Tension	3	0.00	0.00	0.00
			Max. Compression	29	-0.02	0.00	0.00
			Max. Mx	26	-0.02	-0.48	0.00
			Max. Vy	26	-0.16	0.00	0.00
T10	20 - 0	Leg	Max Tension	15	267.01	3.65	-0.29
			Max. Compression	18	-322.33	0.00	0.00
			Max. Mx	18	-303.43	8.60	-0.00
			Max. My	12	-22.61	-1.00	-5.14
			Max. Vy	18	2.87	8.60	-0.00
			Max. Vx	12	-1.48	-1.00	-5.14
		Diagonal	Max Tension	9	16.25	0.07	0.01
			Max. Compression	8	-17.30	0.00	0.00
			Max. Mx	32	1.23	0.17	0.04
			Max. My	29	-0.87	0.14	-0.04
			Max. Vy	32	-0.10	0.17	0.04
			Max. Vx	27	0.01	0.00	0.00
		Horizontal	Max Tension	20	13.16	0.25	-0.01
			Max. Compression	10	-13.17	0.00	0.00
			Max. Mx	33	1.98	0.58	-0.01
			Max. My	2	2.68	0.19	-0.04
			Max. Vy	33	0.22	0.54	-0.01
			Max. Vx	27	0.01	0.50	-0.02
		Redund Horz 1 Bracing	Max Tension	18	5.59	0.00	0.00
			Max. Compression	18	-5.59	0.00	0.00
			Max. Mx	26	0.97	-0.09	0.00
			Max. My	26	1.28	0.00	0.00
			Max. Vy	26	0.06	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	18	3.50	0.00	0.00
			Max. Compression	18	-3.50	0.00	0.00
			Max. Mx	26	0.89	-0.10	0.00
			Max. My	26	1.09	0.00	-0.00
			Max. Vy	26	-0.05	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	29	-0.02	0.00	0.00
			Max. Mx	26	-0.02	-0.51	0.00
			Max. Vy	26	0.16	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	340.95	34.46	-19.88
	Max. H_x	18	340.95	34.46	-19.88
	Max. H_z	5	-246.63	-24.22	18.09
	Min. Vert	7	-278.90	-29.12	16.80
	Min. H_x	7	-278.90	-29.12	16.80
	Min. H_z	18	340.95	34.46	-19.88
Leg B	Max. Vert	10	337.60	-34.98	-18.91
	Max. H_x	23	-281.87	29.64	16.02
	Max. H_z	25	-249.64	25.12	16.66
	Min. Vert	23	-281.87	29.64	16.02
	Min. H_x	10	337.60	-34.98	-18.91
	Min. H_z	10	337.60	-34.98	-18.91
Leg A	Max. Vert	2	337.31	-1.09	39.75
	Max. H_x	19	-142.02	5.47	-17.50
	Max. H_z	2	337.31	-1.09	39.75
	Min. Vert	15	-282.09	0.93	-33.68
	Min. H_x	8	21.05	-5.51	1.88
	Min. H_z	15	-282.09	0.93	-33.68

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	56.50	0.00	0.00	27.25	40.65	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	67.80	-0.02	-66.32	-7358.73	52.31	-49.65
0.9 Dead+1.6 Wind 0 deg - No Ice	50.85	-0.02	-66.32	-7366.91	40.12	-49.65
1.2 Dead+1.6 Wind 30 deg - No Ice	67.80	31.78	-55.08	-6178.00	-3532.89	-25.03
0.9 Dead+1.6 Wind 30 deg - No Ice	50.85	31.78	-55.08	-6186.17	-3545.08	-25.03
1.2 Dead+1.6 Wind 60 deg - No Ice	67.80	53.07	-30.64	-3448.11	-5980.16	0.49
0.9 Dead+1.6 Wind 60 deg - No Ice	50.85	53.07	-30.64	-3456.29	-5992.36	0.49
1.2 Dead+1.6 Wind 90 deg - No Ice	67.80	63.59	0.02	36.23	-7120.67	25.88
0.9 Dead+1.6 Wind 90 deg - No Ice	50.85	63.59	0.02	28.06	-7132.87	25.88
1.2 Dead+1.6 Wind 120 deg - No Ice	67.80	57.43	33.18	3731.48	-6350.62	50.37
0.9 Dead+1.6 Wind 120 deg - No Ice	50.85	57.43	33.18	3723.30	-6362.82	50.37
1.2 Dead+1.6 Wind 150 deg - No Ice	67.80	31.82	55.11	6246.93	-3539.00	54.89
0.9 Dead+1.6 Wind 150 deg - No Ice	50.85	31.82	55.11	6238.75	-3551.20	54.89
1.2 Dead+1.6 Wind 180 deg - No Ice	67.80	0.02	61.32	7000.44	45.25	44.72
0.9 Dead+1.6 Wind 180 deg - No Ice	50.85	0.02	61.32	6992.27	33.06	44.72
1.2 Dead+1.6 Wind 210 deg - No Ice	67.80	-31.78	55.08	6243.40	3630.45	25.03
0.9 Dead+1.6 Wind 210 deg -	50.85	-31.78	55.08	6235.22	3618.26	25.03

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
No Ice 1.2 Dead+1.6 Wind 240 deg - No Ice	67.80	-57.41	33.14	3725.36	6444.66	-0.55
0.9 Dead+1.6 Wind 240 deg - No Ice	50.85	-57.41	33.14	3717.19	6432.46	-0.55
1.2 Dead+1.6 Wind 270 deg - No Ice	67.80	-63.59	-0.02	29.17	7218.24	-25.88
0.9 Dead+1.6 Wind 270 deg - No Ice	50.85	-63.59	-0.02	21.00	7206.04	-25.88
1.2 Dead+1.6 Wind 300 deg - No Ice	67.80	-53.09	-30.68	-3454.23	6081.26	-45.39
0.9 Dead+1.6 Wind 300 deg - No Ice	50.85	-53.09	-30.68	-3462.40	6069.06	-45.39
1.2 Dead+1.6 Wind 330 deg - No Ice	67.80	-31.82	-55.11	-6181.53	3636.57	-54.89
0.9 Dead+1.6 Wind 330 deg - No Ice	50.85	-31.82	-55.11	-6189.70	3624.37	-54.89
1.2 Dead+1.0 Ice+1.0 Temp	191.55	0.00	0.00	143.94	233.03	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	191.55	-0.00	-17.81	-1897.59	233.64	-7.40
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	191.55	8.71	-15.10	-1598.60	-772.32	-3.84
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	191.55	14.86	-8.58	-849.63	-1487.87	0.30
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	191.55	17.44	0.00	144.55	-1778.73	4.39
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	191.55	15.43	8.91	1165.23	-1534.68	7.77
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	191.55	8.72	15.11	1887.09	-773.38	8.54
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	191.55	0.00	17.17	2132.13	232.42	7.04
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	191.55	-8.71	15.10	1886.48	1238.38	3.84
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	191.55	-15.42	8.90	1164.18	2000.13	-0.31
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	191.55	-17.44	-0.00	143.33	2244.79	-4.39
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	191.55	-14.87	-8.59	-850.69	1954.55	-7.39
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	191.55	-8.72	-15.11	-1599.22	1239.44	-8.54
Dead+Wind 0 deg - Service	56.50	-0.00	-14.63	-1603.05	41.43	-10.95
Dead+Wind 30 deg - Service	56.50	7.01	-12.15	-1342.62	-749.34	-5.52
Dead+Wind 60 deg - Service	56.50	11.71	-6.76	-740.50	-1289.13	0.11
Dead+Wind 90 deg - Service	56.50	14.03	0.00	28.03	-1540.69	5.71
Dead+Wind 120 deg - Service	56.50	12.67	7.32	843.08	-1370.84	11.11
Dead+Wind 150 deg - Service	56.50	7.02	12.15	1397.90	-750.69	12.11
Dead+Wind 180 deg - Service	56.50	0.00	13.52	1564.10	39.87	9.86
Dead+Wind 210 deg - Service	56.50	-7.01	12.15	1397.12	830.65	5.52
Dead+Wind 240 deg - Service	56.50	-12.66	7.31	841.73	1451.37	-0.12
Dead+Wind 270 deg - Service	56.50	-14.03	-0.00	26.47	1622.00	-5.71
Dead+Wind 300 deg - Service	56.50	-11.71	-6.77	-741.85	1371.22	-10.01
Dead+Wind 330 deg - Service	56.50	-7.02	-12.15	-1343.40	832.00	-12.11

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-56.50	0.00	0.00	56.50	0.00	0.000%
2	-0.02	-67.80	-66.32	0.02	67.80	66.32	0.000%
3	-0.02	-50.85	-66.32	0.02	50.85	66.32	0.000%
4	31.78	-67.80	-55.08	-31.78	67.80	55.08	0.000%
5	31.78	-50.85	-55.08	-31.78	50.85	55.08	0.000%
6	53.07	-67.80	-30.64	-53.07	67.80	30.64	0.000%
7	53.07	-50.85	-30.64	-53.07	50.85	30.64	0.000%
8	63.59	-67.80	0.02	-63.59	67.80	-0.02	0.000%
9	63.59	-50.85	0.02	-63.59	50.85	-0.02	0.000%
10	57.43	-67.80	33.18	-57.43	67.80	-33.18	0.000%
11	57.43	-50.85	33.18	-57.43	50.85	-33.18	0.000%
12	31.82	-67.80	55.11	-31.82	67.80	-55.11	0.000%
13	31.82	-50.85	55.11	-31.82	50.85	-55.11	0.000%
14	0.02	-67.80	61.32	-0.02	67.80	-61.32	0.000%
15	0.02	-50.85	61.32	-0.02	50.85	-61.32	0.000%
16	-31.78	-67.80	55.08	31.78	67.80	-55.08	0.000%
17	-31.78	-50.85	55.08	31.78	50.85	-55.08	0.000%
18	-57.41	-67.80	33.14	57.41	67.80	-33.14	0.000%
19	-57.41	-50.85	33.14	57.41	50.85	-33.14	0.000%
20	-63.59	-67.80	-0.02	63.59	67.80	0.02	0.000%
21	-63.59	-50.85	-0.02	63.59	50.85	0.02	0.000%
22	-53.09	-67.80	-30.68	53.09	67.80	30.68	0.000%
23	-53.09	-50.85	-30.68	53.09	50.85	30.68	0.000%
24	-31.82	-67.80	-55.11	31.82	67.80	55.11	0.000%
25	-31.82	-50.85	-55.11	31.82	50.85	55.11	0.000%
26	0.00	-191.55	0.00	0.00	191.55	0.00	0.000%
27	-0.00	-191.55	-17.81	0.00	191.55	17.81	0.000%
28	8.71	-191.55	-15.10	-8.71	191.55	15.10	0.000%
29	14.86	-191.55	-8.58	-14.86	191.55	8.58	0.000%
30	17.44	-191.55	0.00	-17.44	191.55	-0.00	0.000%
31	15.43	-191.55	8.91	-15.43	191.55	-8.91	0.000%
32	8.72	-191.55	15.11	-8.72	191.55	-15.11	0.000%
33	0.00	-191.55	17.17	-0.00	191.55	-17.17	0.000%
34	-8.71	-191.55	15.10	8.71	191.55	-15.10	0.000%
35	-15.42	-191.55	8.90	15.42	191.55	-8.90	0.000%
36	-17.44	-191.55	-0.00	17.44	191.55	0.00	0.000%
37	-14.87	-191.55	-8.59	14.87	191.55	8.59	0.000%
38	-8.72	-191.55	-15.11	8.72	191.55	15.11	0.000%
39	-0.00	-56.50	-14.63	0.00	56.50	14.63	0.000%
40	7.01	-56.50	-12.15	-7.01	56.50	12.15	0.000%
41	11.71	-56.50	-6.76	-11.71	56.50	6.76	0.000%
42	14.03	-56.50	0.00	-14.03	56.50	-0.00	0.000%
43	12.67	-56.50	7.32	-12.67	56.50	-7.32	0.000%
44	7.02	-56.50	12.15	-7.02	56.50	-12.15	0.000%
45	0.00	-56.50	13.52	-0.00	56.50	-13.52	0.000%
46	-7.01	-56.50	12.15	7.01	56.50	-12.15	0.000%
47	-12.66	-56.50	7.31	12.66	56.50	-7.31	0.000%
48	-14.03	-56.50	-0.00	14.03	56.50	0.00	0.000%
49	-11.71	-56.50	-6.77	11.71	56.50	6.77	0.000%
50	-7.02	-56.50	-12.15	7.02	56.50	12.15	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	196 - 180	2.884	47	0.1163	0.0145
T2	180 - 160	2.484	47	0.1152	0.0144
T3	160 - 140	1.987	47	0.1085	0.0138
T4	140 - 120	1.533	47	0.0956	0.0123
T5	120 - 100	1.137	47	0.0831	0.0107
T6	100 - 80	0.797	47	0.0682	0.0090
T7	80 - 60	0.522	47	0.0515	0.0070
T8	60 - 40	0.312	47	0.0397	0.0055
T9	40 - 20	0.153	47	0.0271	0.0041
T10	20 - 0	0.050	39	0.0143	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
196.00	Lightning Rod	47	2.884	0.1163	0.0145	Inf
186.00	7770.00 w/Mount Pipe	47	2.635	0.1159	0.0144	580066
176.00	(2) JAHH-65B-R3B w/ Mount Pipe	47	2.384	0.1144	0.0143	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	196 - 180	12.783	18	0.5141	0.0656
T2	180 - 160	11.017	18	0.5090	0.0652
T3	160 - 140	8.815	18	0.4793	0.0625
T4	140 - 120	6.806	18	0.4225	0.0559
T5	120 - 100	5.051	18	0.3672	0.0486
T6	100 - 80	3.548	18	0.3013	0.0407
T7	80 - 60	2.326	18	0.2277	0.0317
T8	60 - 40	1.393	18	0.1754	0.0250
T9	40 - 20	0.690	18	0.1197	0.0186
T10	20 - 0	0.225	2	0.0631	0.0094

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
196.00	Lightning Rod	18	12.783	0.5141	0.0656	260149
186.00	7770.00 w/Mount Pipe	18	11.682	0.5121	0.0654	130075
176.00	(2) JAHH-65B-R3B w/ Mount Pipe	18	10.572	0.5057	0.0649	542299

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	196	Leg	A325N	1.0000	4	1.52	53.01	0.029 ✔	1	Bolt Tension
		Diagonal	A325X	0.6250	1	3.92	6.53	0.600 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	1	0.52	6.53	0.079 ✔	1	Member Block Shear
T2	180	Leg	A325N	1.2500	4	9.33	82.83	0.113 ✔	1	Bolt Tension
		Diagonal	A325X	0.6250	1	6.64	7.18	0.924 ✔	1	Member Bearing
T3	160	Leg	A325N	1.2500	4	17.61	82.83	0.213 ✔	1	Bolt Tension
		Diagonal	A325X	0.6250	1	7.11	9.57	0.743 ✔	1	Member Bearing
T4	140	Leg	A325N	1.2500	4	25.53	82.83	0.308 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	8.10	10.88	0.744 ✔	1	Member Bearing
T5	120	Leg	A325N	1.2500	6	21.75	82.83	0.263 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	9.58	10.88	0.881 ✔	1	Member Bearing
T6	100	Leg	A325N	1.2500	6	26.78	82.83	0.323 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	10.32	10.88	0.949 ✔	1	Member Bearing
T7	80	Leg	A325N	1.3750	6	31.73	100.23	0.317 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	11.22	16.31	0.688 ✔	1	Member Bearing
T8	60	Leg	A325N	1.3750	6	36.56	100.23	0.365 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	12.20	16.31	0.748 ✔	1	Member Bearing
T9	40	Leg	A325N	1.3750	6	39.80	100.23	0.397 ✔	1	Bolt Tension
		Diagonal	A325X	0.6250	2	8.18	15.19	0.539 ✔	1	Bolt Shear
		Horizontal	A490X	0.6250	2	6.08	17.13	0.355 ✔	1	Member Block Shear
T10	20	Diagonal	A325X	0.6250	2	8.65	15.19	0.570 ✔	1	Bolt Shear
		Horizontal	A490X	0.6250	2	6.58	17.13	0.384 ✔	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	196 - 180	P3.5x.318 (4.00 OD)	16.03	5.34	49.1 K=1.00	3.6784	-11.54	138.82	0.083 [1] ✔
T2	180 - 160	P4x.438 (4.50 OD)	20.03	6.68	55.5 K=1.00	5.5894	-47.00	200.84	0.234 [1] ✔
T3	160 - 140	P5x.375 (5.563 OD)	20.03	6.68	43.6	6.1114	-83.67	239.36	0.350 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				✔
T4	140 - 120	P6x.432 (6.625 OD)	20.03	6.68	36.5 K=1.00	8.4049	-120.12	343.10	0.350 [1] ✔
T5	120 - 100	P6x.432 (6.625 OD)	20.03	10.02	54.8 K=1.00	8.4049	-153.09	303.75	0.504 [1] ✔
T6	100 - 80	P8x.322 (8.625 OD)	20.03	10.02	40.9 K=1.00	8.3993	-188.43	334.42	0.563 [1] ✔
T7	80 - 60	P8x.5 (8.625 OD)	20.03	10.02	41.8 K=1.00	12.7627	-224.43	505.56	0.444 [1] ✔
T8	60 - 40	P8x.5 (8.625 OD)	20.03	10.02	41.8 K=1.00	12.7627	-260.43	505.56	0.515 [1] ✔
T9	40 - 20	P8x.5 (8.625 OD)	20.03	5.01	20.9 K=1.00	12.7627	-286.40	556.30	0.515 [1] ✔
T10	20 - 0	P10x.365 (10.75 OD)	20.03	5.01	16.4 K=1.00	11.9083	-322.33	525.49	0.613 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	196 - 180	L2x2x3/16	10.23	4.96	151.0 K=1.00	0.7150	-3.98	7.08	0.562 [1] ✔
T2	180 - 160	L2 1/2x2 1/2x3/16	12.58	6.15	149.0 K=1.00	0.9020	-6.55	9.18	0.713 [1] ✔
T3	160 - 140	L2 1/2x2 1/2x1/4	14.32	6.96	170.2 K=1.00	1.1900	-7.19	9.28	0.774 [1] ✔
T4	140 - 120	L3 1/2x3 1/2x1/4	16.11	7.80	134.9 K=1.00	1.6900	-8.07	20.99	0.385 [1] ✔
T5	120 - 100	L3 1/2x3 1/2x1/4	19.30	9.48	164.0 K=1.00	1.6900	-9.63	14.20	0.678 [1] ✔
T6	100 - 80	L3 1/2x3 1/2x1/4	21.03	10.26	177.3 K=1.00	1.6900	-10.44	12.14	0.860 [1] ✔
T7	80 - 60	L3 1/2x3 1/2x3/8	22.81	11.15	194.7 K=1.00	2.4800	-11.35	14.77	0.768 [1] ✔
T8	60 - 40	L4x4x3/8	24.62	12.06	183.6 K=1.00	2.8600	-12.36	19.17	0.645 [1] ✔
T9	40 - 20	L3 1/2x3 1/2x3/8	16.01	15.15	150.7 K=0.89	2.4800	-16.36	24.66	0.663 [1] ✔
T10	20 - 0	L3 1/2x3 1/2x3/8	16.80	15.85	155.5 K=0.87	2.4800	-17.30	23.16	0.747 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T9	40 - 20	L4x4x3/8	24.00	11.44	161.4 K=0.93	2.8600	-12.16	24.81	0.490 [1] ✔
T10	20 - 0	L4x4x3/8	26.00	12.35	172.0 K=0.91	2.8600	-13.17	21.85	0.603 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	196 - 180	L2x2x3/16	7.40	6.83	207.9 K=1.00	0.7150	-0.58	3.74	0.154 [1] ✔
		KL/R > 200 (C) - 5							

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T9	40 - 20	L3x3x3/16	6.00	5.64	116.8 K=1.03	1.0900	-4.97	17.05	0.292 [1] ✔
T10	20 - 0	L3x3x3/16	6.50	6.05	121.9 K=1.00	1.0900	-5.59	16.03	0.349 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T9	40 - 20	L2 1/2x2 1/2x3/16	7.62	7.15	173.2 K=1.00	0.9020	-3.16	6.79	0.465 [1] ✔
T10	20 - 0	L2 1/2x2 1/2x3/16	8.01	7.43	180.2 K=1.00	0.9020	-3.44	6.28	0.549 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	40 - 20	L4x4x1/4	12.00	12.00	181.1 K=1.00	1.9400	-0.02	13.36	0.002 [1] ✔
T10	20 - 0	L4x4x1/4	13.00	13.00	196.2 K=1.00	1.9400	-0.02	11.38	0.002 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	196 - 180	P3.5x.318 (4.00 OD)	16.03	5.34	49.1	3.6784	6.06	165.53	0.037 [1] ✔
T2	180 - 160	P4x.438 (4.50 OD)	20.03	6.68	55.5	5.5894	37.34	251.52	0.148 [1] ✔
T3	160 - 140	P5x.375 (5.563 OD)	20.03	6.68	43.6	6.1114	70.44	275.01	0.256 [1] ✔
T4	140 - 120	P6x.432 (6.625 OD)	20.03	6.68	36.5	8.4049	102.11	378.22	0.270 [1] ✔
T5	120 - 100	P6x.432 (6.625 OD)	20.03	10.02	54.8	8.4049	130.48	378.22	0.345 [1] ✔
T6	100 - 80	P8x.322 (8.625 OD)	20.03	10.02	40.9	8.3993	160.68	377.97	0.425 [1] ✔
T7	80 - 60	P8x.5 (8.625 OD)	20.03	10.02	41.8	12.7627	190.40	574.32	0.332 [1] ✔
T8	60 - 40	P8x.5 (8.625 OD)	20.03	10.02	41.8	12.7627	219.39	574.32	0.382 [1] ✔
T9	40 - 20	P8x.5 (8.625 OD)	20.03	5.01	20.9	12.7627	239.14	574.32	0.416 [1] ✔
T10	20 - 0	P10x.365 (10.75 OD)	20.03	5.01	16.4	11.9083	267.01	535.87	0.498 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	196 - 180	L2x2x3/16	10.23	4.96	98.8	0.4308	3.92	18.74	0.209 [1] ✔
T2	180 - 160	L2 1/2x2 1/2x3/16	12.02	5.87	92.4	0.5710	6.64	24.84	0.267 [1] ✔
T3	160 - 140	L2 1/2x2 1/2x1/4	14.32	6.96	110.5	0.7519	7.11	32.71	0.217 [1] ✔
T4	140 - 120	L3 1/2x3 1/2x1/4	16.11	7.80	87.4	1.1034	8.10	48.00	0.169 [1] ✔
T5	120 - 100	L3 1/2x3 1/2x1/4	19.30	9.48	105.9	1.1034	9.58	48.00	0.199 [1] ✔
T6	100 - 80	L3 1/2x3 1/2x1/4	21.03	10.26	114.4	1.1034	10.32	48.00	0.215 [1] ✔
T7	80 - 60	L3 1/2x3 1/2x3/8	22.81	11.15	126.5	1.6139	11.22	70.20	0.160 [1] ✔
T8	60 - 40	L4x4x3/8	24.62	12.06	118.9	1.8989	12.20	82.60	0.148 [1] ✔
T9	40 - 20	L3 1/2x3 1/2x3/8	16.01	15.15	174.4	1.6491	15.34	71.73	0.214 [1] ✔
T10	20 - 0	L3 1/2x3 1/2x3/8	16.80	15.85	182.2	1.6491	16.25	71.73	0.226 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T9	40 - 20	L4x4x3/8	24.00	11.44	113.6	1.9341	12.16	84.13	0.145 [1] ✔
T10	20 - 0	L4x4x3/8	26.00	12.35	122.5	1.9341	13.16	84.13	0.156 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	196 - 180	L2x2x3/16	7.40	6.83	137.4	0.4308	0.52	18.74	0.028 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	40 - 20	L3x3x3/16	6.00	5.64	72.1	1.0900	4.97	35.32	0.141 [1] ✔
T10	20 - 0	L3x3x3/16	6.50	6.05	77.3	1.0900	5.59	35.32	0.158 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	40 - 20	L2 1/2x2 1/2x3/16	7.43	6.96	107.3	0.9020	3.21	29.22	0.110 [1] ✔
T10	20 - 0	L2 1/2x2 1/2x3/16	7.81	7.24	111.6	0.9020	3.50	29.22	0.120 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	40 - 20	L4x4x1/4	12.00	12.00	115.2	1.9400	0.00	62.86	0.000 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	196 - 180	Leg	P3.5x.318 (4.00 OD)	1	-11.54	138.82	8.3	Pass
		Diagonal	L2x2x3/16	7	-3.98	7.08	56.2 60.0 (b)	Pass
		Top Girt	L2x2x3/16	5	-0.58	3.74	15.4	Pass
T2	180 - 160	Leg	P4x.438 (4.50 OD)	25	-47.00	200.84	23.4	Pass
		Diagonal	L2 1/2x2 1/2x3/16	29	-6.55	9.18	71.3 92.4 (b)	Pass
T3	160 - 140	Leg	P5x.375 (5.563 OD)	46	-83.67	239.36	35.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Diagonal	L2 1/2x2 1/2x1/4	50	-7.19	9.28	77.4	Pass
T4	140 - 120	Leg	P6x.432 (6.625 OD)	67	-120.12	343.10	35.0	Pass
		Diagonal	L3 1/2x3 1/2x1/4	71	-8.07	20.99	38.5	Pass
							74.4 (b)	
T5	120 - 100	Leg	P6x.432 (6.625 OD)	88	-153.09	303.75	50.4	Pass
		Diagonal	L3 1/2x3 1/2x1/4	92	-9.63	14.20	67.8	Pass
							88.1 (b)	
T6	100 - 80	Leg	P8x.322 (8.625 OD)	103	-188.43	334.42	56.3	Pass
		Diagonal	L3 1/2x3 1/2x1/4	107	-10.44	12.14	86.0	Pass
							94.9 (b)	
T7	80 - 60	Leg	P8x.5 (8.625 OD)	118	-224.43	505.56	44.4	Pass
		Diagonal	L3 1/2x3 1/2x3/8	122	-11.35	14.77	76.8	Pass
T8	60 - 40	Leg	P8x.5 (8.625 OD)	133	-260.43	505.56	51.5	Pass
		Diagonal	L4x4x3/8	137	-12.36	19.17	64.5	Pass
							74.8 (b)	
T9	40 - 20	Leg	P8x.5 (8.625 OD)	148	-286.40	556.30	51.5	Pass
		Diagonal	L3 1/2x3 1/2x3/8	155	-16.36	24.66	66.3	Pass
		Horizontal	L4x4x3/8	151	-12.16	24.81	49.0	Pass
		Redund Horz 1 Bracing	L3x3x3/16	153	-4.97	17.05	29.2	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	171	-3.16	6.79	46.5	Pass
		Inner Bracing	L4x4x1/4	172	-0.02	13.36	0.8	Pass
T10	20 - 0	Leg	P10x.365 (10.75 OD)	199	-322.33	525.49	61.3	Pass
		Diagonal	L3 1/2x3 1/2x3/8	206	-17.30	23.16	74.7	Pass
		Horizontal	L4x4x3/8	202	-13.17	21.85	60.3	Pass
		Redund Horz 1 Bracing	L3x3x3/16	204	-5.59	16.03	34.9	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	205	-3.44	6.28	54.9	Pass
		Inner Bracing	L4x4x1/4	223	-0.02	11.38	0.8	Pass
							Summary	
						Leg (T10)	61.3	Pass
						Diagonal (T6)	94.9	Pass
						Horizontal (T10)	60.3	Pass
						Top Girt (T1)	15.4	Pass
						Redund Horz 1 Bracing (T10)	34.9	Pass
						Redund Diag 1 Bracing (T10)	54.9	Pass
						Inner Bracing (T9)	0.8	Pass
						Bolt Checks	94.9	Pass
						RATING =	**94.9**	**Pass**

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SST - Anchor Rod Interaction Check per 4.9.9 TIA-222-G

Project No.	17QPFS1400
Site Name	Putnam Freight
Site ID	CT00802-S-03

RISA Reactions per Leg		
Pu	341	kips
Vu	42	kips

Anchor Rod Properties:			
F_{yb}, Anchor Rod Ult. Yield Stress	36	ksi	
F_{ub}, Anchor Rod Ult. Tensile Stress	58	ksi	
number of anchor rods per leg	8	-	
diameter of anchor rod	1 1/2	in	
A_{net}, anchor rods	1.41	in^2	*(use Table 7-18 AISC, Net Tensile Area)*
η, detail type factor	0.5	-	*(see Fig. 4-4 Anchor Rod Detail Type)*
L_{ar}, unbraced length		in	

Capacity:			
ϕR_{nt}, design tensile strength	65.42	kips	
ϕR_{nv}, design shear strength	34.59	kips	
ϕR_{nm}, design flexural strength	12.16	kip-in	
Interaction Equation	81.2%	OK	*(TIA-222-G section 4.9.9)*
Interaction Equation	N/A	OK	*(TIA-222-G section 4.9.9)*

Equations:

$\phi R_{nt} = 0.8 * F_{ub} * A_{net}$

$\phi R_{nt} = 0.75 * 0.45 * F_{ub} * A_b$

$\phi R_{nt} = 0.9 * Fy_b * d\text{^}3/6$

Interaction Equation = [Pu/leg+(Vu/leg)/η]/øRnt

Interaction Equation = [(Vu/øRnv)^2+(Pu/øRnt+Mu/øRnm)^2]

Self Support Tower Caisson Foundation Analysis

Code (F or G)	G

Reactions	
Uplift (Per Leg) (k)	282
Comp. (Per Leg) (k)	341

Legend	
	Input
	Output
	Input Error
	Notes

Caisson Properties	
Diameter (ft)	4.0
Overall Length (ft)	32.5
Height Above Grade (ft)	0.5
γ Unit Weight of Conc. (kcf)	0.150
Foundation Modified?	No

Soil Properties	
Type of Soil Parameter Input	Individual Soil Layer Parameters
Frost Depth (ft)	3.33
Water Table Level (ft)	99
Number of Soil Layers Below Grade	5
Ult. Tip Bearing Pressure (ksf)	40.00
Net or Gross Bearing?	Net

Normal Soils Inputs
Normal Soils
Determine Per County
100
0
8 ksf (F)/7ksf (G)
Net

FDH Geo Inputs
Caisson Capacities Per FDH Geo
Determine Per County
Per FDH Geo
0
Per FDH Geo
Net

FDH Geo Skin Friction Resistance	
Ult. Uplift Resistance (k)	
Ult. Comp. Skin Friction Resistance (k)	
γ Recommended Unit Weight of Soil (kcf)	

Soil Profile

Soil Layers	Clay or Sand (C or S)	Depth to Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Friction Angle (Φ)	Cohesion (ksf)	Ult. Comp. Skin Friction (ksf)	Ult. Uplift Skin Friction (ksf)
Grade	—	0	115	32	0.00	0.00	0.00
Layer 1	S	2	115	32	0.00	0.00	0.00
Layer 2	S	4	115	32	0.00	0.00	0.00
Layer 3	S	20	115	32	0.00	0.00	0.00
Layer 4	S	25.8	135	36	0.00	0.00	0.00
Layer 5	S	32	160	38	0.00	0.00	0.00

Input Parameter Checks	
Last Soil Layer Depth @ Caisson Tip	OK
Moist Soil Unit Weights Used	OK
Only Φ/Cu Input or Skin Friction Input	OK

Uplift Resistance		
Weight of Conc. (k)	61.3	
Soil Type in Neglected Layer	S	
Top Soil Neglected (ft)	3.33	
Ult. Skin Friction Resistance (k)	493.8	
Ult. Modification Resistance (k)		
Total Allowable Uplift Resistance (k)	425.5	
Capacity (%)	66.3%	Sufficient

Compression Resistance		
Weight of Conc. (k)	9.3	
Soil Type Neglected at Top (C or S)	S	
Top Soil Neglected (ft)	3.33	
Soil Type Neglected at Bottom (C or S)	Do Not Neglect	
Bottom Soil Neglected (ft)	0	
Ult. Skin Friction Resistance (k)	617.2	
Ult. Tip Bearing Resistance (k)	502.7	
Ult. Modification Resistance (k)		
Total Allow. Compressive Resistance (k)	839.9	
Capacity (%)	41.9%	Sufficient

Notes

1. The depth of the last soil layer entered must be the depth at which the caisson is bearing.

2. The soil unit weight should be the moist unit weight and is a necessary input to account for net bearing. All buoyant unit weights will be accounted for as necessary.

3. If the water table falls in between soil layers, break the soil layer up into two layers.

4. If the geotechnical report provides a skin friction value for each soil layer, make sure the friction angle and cohesion inputs are zero.

FDH VELOCITEL
ENGINEERING INNOVATION

FDH Velocitel – 6521 Meridien Drive, Raleigh, NC 27616 -- Ph. 919.755.1012 -- Fax 919.755.1031

LPILE 2016 Foundation Inputs

*File was last imported on 10-18-2017 at 13:15:14

Project & Site Details	
Project Number:	17QPFS1400
Site Name:	Putnam Freight
Site ID:	CT00802-S
Code	ANSI/TIA-222-G
Water Table Depth (ft)	Not Encountered
Caisson Diameter (ft)	4
Caisson Length (ft)	32.5
Ext. Above Grade (ft)	0.5
Frost Depth (ft)	3.33
Neglected Depth (ft)	3.33
Total # of Soil Layers	5
Boring Log	B-1
Foundation Type	Self-Support Caisson
Must check both Uplift and Compression Scenarios.	

TNX Reactions Full Wind		
Compression	341	k
Shear (comp.)	40	k
Uplift	282	k
Shear (uplift)	34	k

LPILE Input Reactions Full Wind		
Vertical Load Down	341,000	lbs
Horizontal Load (comp.)	40,000	lbs
Vertical Load Up	-282,000	lbs
Horizontal Load (uplift)	34,000	lbs

LPILE Output				
Reaction	Maximum Reaction*	Unit	Allowable Deflection (in)	Pass/Fail
Moment	2,539,133	lb-in		
Axial	341	k		
Tensile	282	k		
Full Wind Deflection	0.16	in	1.5	PASS

DSMC Inputs		
$Moment_{comp.}$	296.76	k-ft
Compression	341	k
$Moment_{tension}$	211.59	k-ft
Tension	282	k

Soil Parameters per Geotechnical Investigation					Soil Parameters for LPILE INPUT					
Layer	Thickness (ft)	Unit Weight, g (pcf)	Phi Angle (°)	Cohesion (psf)	Soil Type	Top of Layer (ft)	Bottom of Layer (ft)	Phi Angle (°)	Cohesion (psf)	Effective Unit Weight, g_{eff} (pcf)
1	2	115	0	0	Sand (Reese)	0.5	2.5	-	-	115
2	2	115	32	0	Sand (Reese)	2.5	4.5	32	0	115
3	16	115	32	0	Sand (Reese)	4.5	20.5	32	0	115
4	5.8	135	36	0	Sand (Reese)	20.5	26.3	36	0	135
5	6.2	160	38	0	Sand (Reese)	26.3	32.5	38	0	160

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

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

Site Data

BU#: *CT00802-S*
Site Name: *Putnam Freight*
App #: *62851*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	4	ft
Concrete Area =	1809.6	in^2

Reinforcement:

Clear Cover to **Tie**=	3	in
Horiz. **Tie** Bar Size=	3	
Vert. Cage Diameter =	3.35	ft
Vert. Cage Diameter =	40.25	in
Vertical Bar Size =	8	
Bar Diameter =	1.00	in
Bar Area =	0.79	in^2
Number of Bars =	18	
As Total=	14.22	in^2
A s/ Aconc, Rho:	0.0079	0.79%

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

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.79%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	2824.28	kips
at Mu=(ϕ=0.65)Mn=	961.82	ft-kips
Max Tu, (φ=0.9) Tn =	767.88	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	296.76	ft-kips **(* Note)**
Max. Factored Shaft Pu:	341	kips
Max Axial Force Type:	Comp.	

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

Load Factor	Shaft Factored Loads		
1.00	Mu:	296.76	ft-kips
1.00	Pu:	341	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2008	

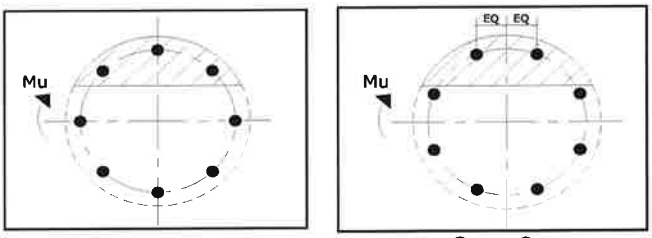
Seismic Properties

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

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

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**12.33**	in
Extreme Steel Strain, εt:	**0.0077**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	341.00	kips
Drilled Shaft Moment Capacity, φMn:	**1594.28**	ft-kips
Drilled Shaft Superimposed Mu:	**296.76**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**18.6%**

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

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

Site Data

BU#: *CT00802-S*
Site Name: *Putnam Freight*
App #: *62851*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	4	ft
Concrete Area =	1809.6	in^2

Reinforcement:

Clear Cover to **Tie**=	3	in
Horiz. **Tie** Bar Size=	3	
Vert. Cage Diameter =	3.35	ft
Vert. Cage Diameter =	40.25	in
Vertical Bar Size =	8	
Bar Diameter =	1.00	in
Bar Area =	0.79	in^2
Number of Bars =	18	
As Total=	14.22	in^2
A s/ Aconc, Rho:	0.0079	0.79%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

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

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.79%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	2824.28	kips
at Mu=(ϕ=0.65)Mn=	961.82	ft-kips
Max Tu, (φ=0.9) Tn =	767.88	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	211.59	ft-kips **(* Note)**
Max. Factored Shaft Pu:	282	kips
Max Axial Force Type:	Tension	

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

Load Factor	Shaft Factored Loads		
1.00	Mu:	211.59	ft-kips
1.00	Pu:	282	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2008

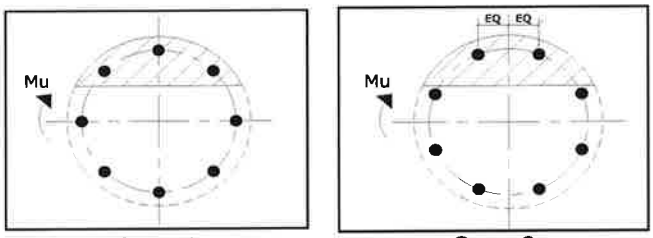
Seismic Properties

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

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

Results:

Governing Orientation Case: **1**



Case 1 Case 2

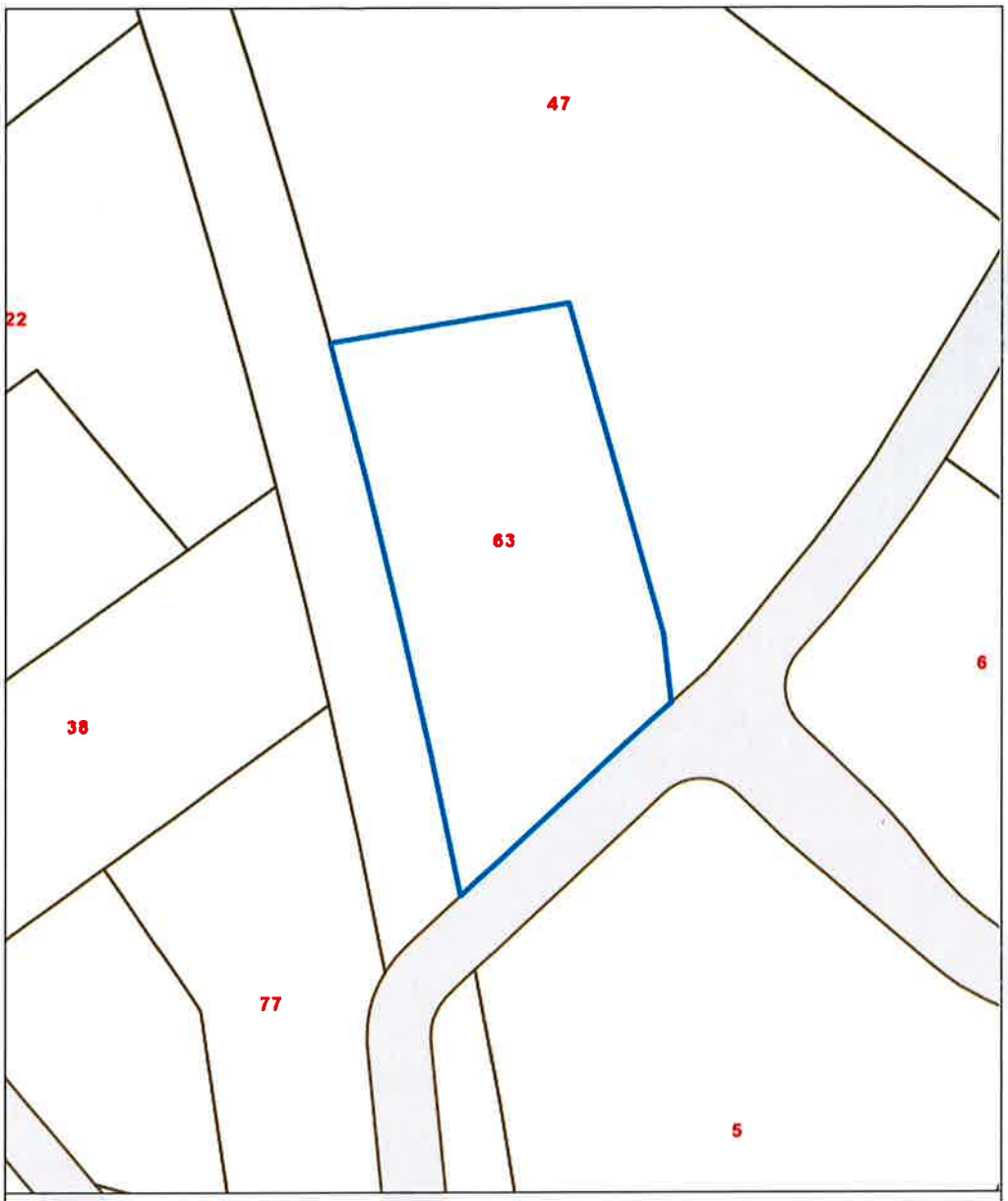
Dist. From Edge to Neutral Axis:	**6.50**	in
Extreme Steel Strain, εt:	**0.0174**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	-282.00	kips
Drilled Shaft Moment Capacity, φMn:	**798.84**	ft-kips
Drilled Shaft Superimposed Mu:	**211.59**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**26.5%**

ATTACHMENT 4



Town of Putnam, Connecticut

20 m
100 ft

N

MainStreetGIS
MainStreetGIS, LLC
www.mainstreetgis.com

Selected Parcel: 63 INDUSTRIAL PARK RD ID: 038-087

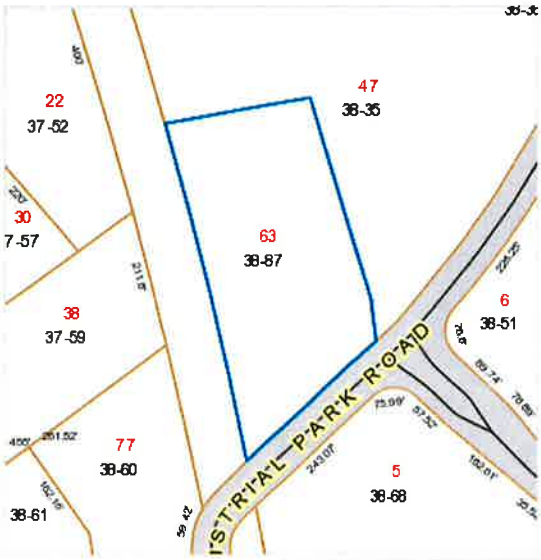
Printed 12/13/2017 from http://www.mainstreetmaps.com/ct/putnam/public.asp

Property Record Card

Card 1 of 1

63 INDUSTRIAL PARK RD

ID: **038-087** Account #: **000013**



Owner: DMW PUTNAM LLC
Co-Owner:
Address: 643 MANLEY STREET
WEST BRIDGEWATER MA 02379

Assessment: Total: 252600
Building: 34200 Land: 118200 Yard: 100200

Sales History

Grantor	Book / Page	Sale Date	Sale Price
DMW PUTNAM LLC	791/ 090	2016-10-19	200000
PUTNAM FINANCIAL ASSOCIATES LLC	738/ 012	2014-04-09	0
PUTNAM PARK ASSOCIATES LLC	0310/0159	1997-07-17	170000

MainStreetGIS, LLC
www.mainstreetgis.com

Land Information
Land Area: 2.39 AC Zoning: SZD
Land Use: 3-1 - Industrial MDL-96
Neighborhood: 2

Building Information
Style:
Year Built: 1956
Rooms: Bedrooms:
Baths: Half Baths:
Living Area:
Gross Area:
Stories:
Heat Fuel:
Heat Type:
AC Type:
Roof Structure:
Roof Covering:

Extra Features

Description	Area / Units	Assessment
Paving Cement	10000	31500
Cell Tower	186000	65100
Overhead Door	456	600
Fence 6'	360	3600

Sub Areas

Description	Living Area	Gross Area
First Floor	9904	9904
Loading Platform Covered	0	720

Printed from: http://www.mainstreetmaps.com/ct/putnam/

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 12/13/2017 US POSTAGE $002.38 ZIP 06103 041L122033
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Barney Seney, Mayor Town of Putnam 126 Church Street Putnam, CT 06260				
2.	Fredrick E. Wojick, Land Use Agent Town of Putnam 126 Church Street Putnam, CT 06260				
3.	DMW Putnam LLC 643 Manley Street West Bridgewater, MA 02379				
4.					
5.					
6.					

OLD STATE HOUSE STA 06103 DEC 13 2017 USPS

See Reverse for Instructions