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Also admitted in Massachusetts

June 14, 2018

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**
82 North Eagleville Road, Mansfield (Storrs), Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 84-foot level of an existing 323-foot tower at 82 North Eagleville Road in Mansfield, Connecticut (the "Property"). The tower and underlying property are owned by the University of Connecticut. The Council approved Cellco's use of this tower in 1997 (Docket No. 179). Cellco now intends to replace nine (8) of its existing antennas with eight (8) new antennas (four (4) model JAHH-45B-R3B, 700/850/2100 MHz antennas and four (4) model JAHH-45B-R3B, 700/850/1900 MHz antennas) all at the same 84-foot level on the tower. Cellco also intends to replace six (6) remote radio heads ("RRHs") and install seven (7) new RRHs and four (4) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Derrik Kennedy, Mansfield's Town Manager; Linda Painter, Mansfield's Director of Planning and Development; and Robert Sitkowski, General Counsel at the University of Connecticut.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's new antennas and RRHs will be attached to its existing antenna mounting system at the 84-foot level of the tower.

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

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

4. The installation of replacement antennas and RRHs will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included in Attachment 2. The Far Field calculations demonstrate that Cellco's modified facility will operate well within the RF emissions limits established by the FCC.

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

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

A copy of the parcel map and property owner information 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:
Derrik Kennedy, Town Manager
Linda Painter, Director of Planning and Development
Robert Sitkowski, General Counsel, University of Connecticut
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

JAHH-45B-R3B

8-port sector antenna, 2x 698–798, 2x 824-894 and 4x 1695–2360 MHz, 45° HPBW, low bands each have a RET and the high bands share a RET. Two internal SBTs.

- 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
- Narrow beamwidth capacity antenna for higher level of densification and enhanced data throughput

Electrical Specifications

Frequency Band, MHz	698–798	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	16.5	17.2	19.4	20.2	20.5	21.1
Beamwidth, Horizontal, degrees	48	43	44	43	41	38
Beamwidth, Vertical, degrees	12.6	11.2	5.8	5.4	5.0	4.5
Beam Tilt, degrees	2–14	2–14	0–8	0–8	0–8	0–8
USLS (First Lobe), dB	16	21	18	18	18	18
Front-to-Back Ratio at 180°, dB	32	36	37	37	38	41
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	28	28	28	28
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	200	200	300	300	300	250
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	698–798	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	16.3	17.0	19.1	19.9	20.2	20.9
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.3	±0.5	±0.4	±0.3	±0.4
	2 ° | 16.3	2 ° | 17.1	0 ° | 19.1	0 ° | 19.8	0 ° | 20.1	0 ° | 20.7
Gain by Beam Tilt, average, dBi	8 ° | 16.3	8 ° | 17.1	4 ° | 19.2	4 ° | 19.9	4 ° | 20.2	4 ° | 21.0
	14 ° | 16.1	14 ° | 16.7	8 ° | 19.0	8 ° | 19.8	8 ° | 20.1	8 ° | 20.7
Beamwidth, Horizontal Tolerance, degrees	±1.1	±2.4	±2	±2.7	±2.9	±1.5
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.6	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	16	21	17	17	17	17
Front-to-Back Total Power at 180° ± 30°, dB	23	24	29	31	33	34
CPR at Boresight, dB	25	26	20	21	20	20
CPR at Sector, dB	16	18	14	15	15	16

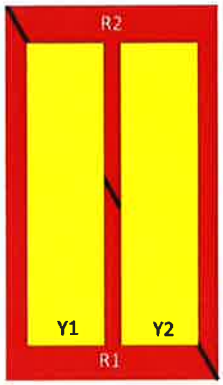
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA,

Product Specifications

JAHH-45B-R3B

download the whitepaper Time to Raise the Bar on BSAs.

Array Layout



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

Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

Port Configuration

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 798 MHz | 824 – 894 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	800 W @ 50 °C

Product Specifications

JAHH-45B-R3B

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
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	1038.0 N @ 150 km/h 233.4 lbf @ 150 km/h
Wind Loading, lateral	234.0 N @ 150 km/h 52.6 lbf @ 150 km/h
Wind Loading, rear	1091.0 N @ 150 km/h 245.3 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1829.0 mm | 72.0 in
Width	457.0 mm | 18.0 in
Depth	178.0 mm | 7.0 in
Net Weight, without mounting kit	41.5 kg | 91.5 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	1 W
Power Consumption, normal conditions, maximum	8 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	1970.0 mm | 77.6 in
Width	608.0 mm | 23.9 in
Depth	346.0 mm | 13.6 in
Shipping Weight	71.5 kg | 157.6 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-45B-R3B

Included Products

BSAMNT-3 — 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.

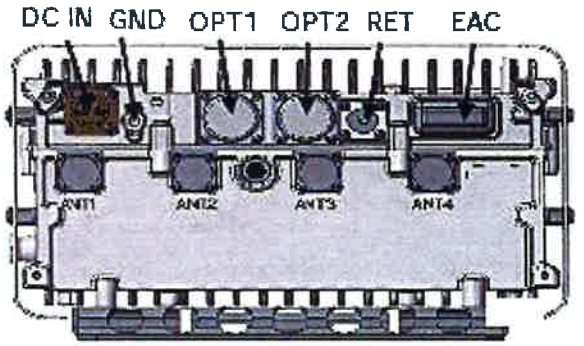
BSAMNT-M — Middle Downtilt Mounting Kit for Long Antennas for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor bracket set.

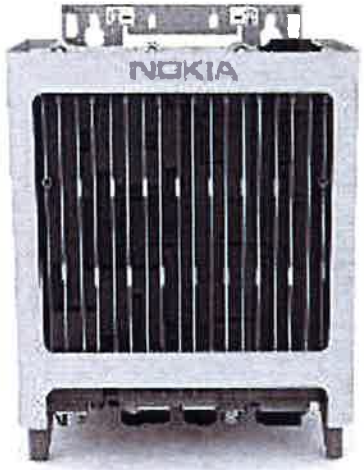
* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

AHCA AirScale RRH 4T4R B5 160W

Supported Frequency bands	3GPP band 5
Frequencies	DL 869-894MHz, UL 824-849MHz
Number of TX/RX paths/pipes	4TX/4RX
Instantaneous Bandwidth IBW	25MHz (Full Band)
Occupied Bandwidth OBW	25MHz (Full Band)
Output Power	4T4R @ 40W / 2T4R @ 60W
RF Sharing	LTE, WCDMA, LTE + NB-IoT supported
256 QAM Back Off	No backoff at 40W and 0.8dB at 60W.
Supply Voltage / Voltage Range	DC-48V / -36V to -60V
Typical Power Consumption	365W [50% ETSI Busy Hour Load at 4TX @ 40W]
	529W [100% RF Load at 4 TX @ 40W]
	574W [100% RF Load at 4 TX @ 40W with SBT and AISG ON]
Antenna Ports	4 Ports, 4.3-10+
Optical Ports	2x CPRI 9.8 Gbps
ALD Control Interfaces	AISG3.0 from ANT1,2, 3, 4 and RET (Power supply ANT1 and ANT3)
Other Interfaces	External Alarm MDR-26 Serial connector (4 inputs, 1 Output) DC Circular Power Connector





Operational Temperature Range	-40°C to 55°C (with solar cover)
Dimensions (mm) **Height x width x depth**	337 x 295 x 165 (radio only) 13.3" x 11.7" x 6.5" 428 x 324 x 208 (with bracket and enclosure) 16.9" x 12.8" x 8.2"
Volume (liters)	16.5
Weight (kg)	16/ 35.3 lb – w/o bracket
Ingress protection class	IP65
Installation options	Pole or Wall, Vertical or Horizontal Book Mount
Surge protection	Class II 5kA

NOKIA

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

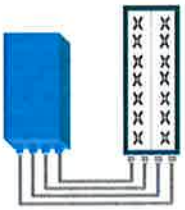
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4Tx mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS-485) 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.

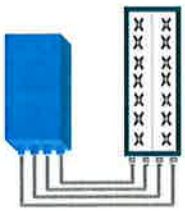
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

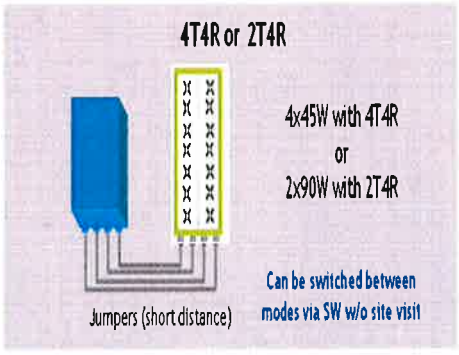
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

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*25V 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

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Structure			
Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optical Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environment			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

* This data is provisional and subject to change

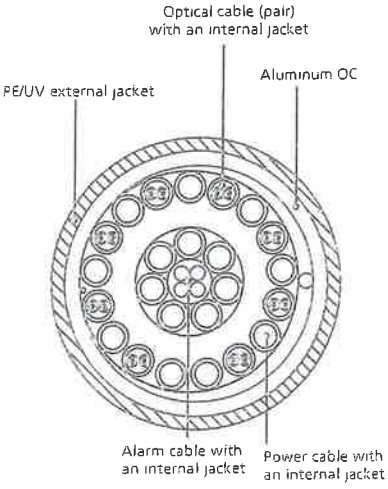


Figure 2: Construction Detail

ATTACHMENT 2

Far Field Approximation
with downtilt variation

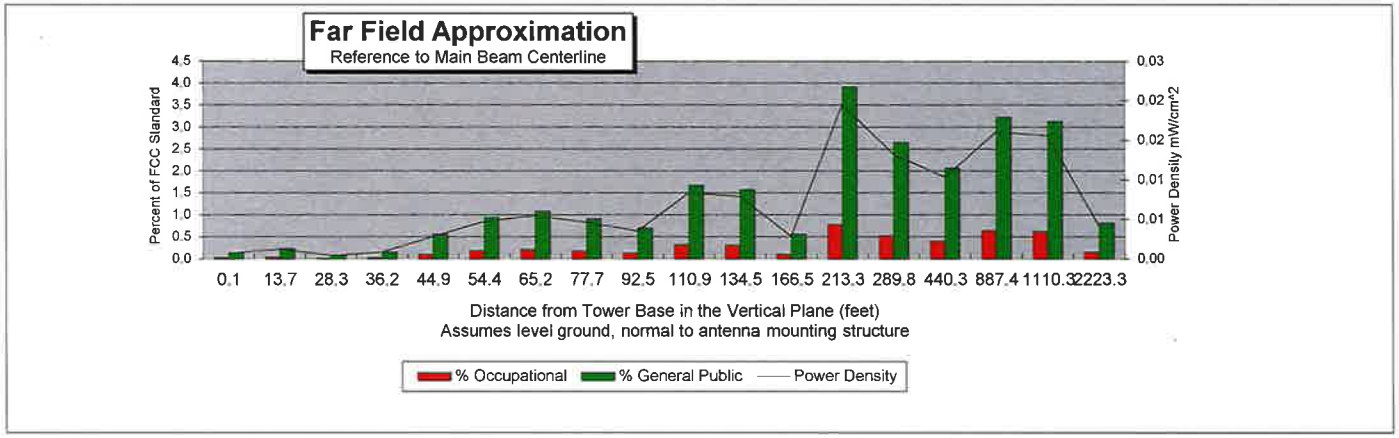
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Storrs, CT
Site #:	64225
Date:	06/12/18
Name:	Kelly Lemay
File Name:	Storrs, CT 700 LTE - FF Power

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**83.6**
Antenna Gain (dBi):	**16.5**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**3269.0**
Number of Channels	**1**



Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.6	78.8	82.6	85.6	89.6	94.8	101.3	109.8	120.8	135.4	155.3	183.7	227.0	300.0	447.1	890.8	1113.0	2224.7	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.7	28.3	36.2	44.9	54.4	65.2	77.7	92.5	110.9	134.5	166.5	213.3	289.8	440.3	887.4	1110.3	2223.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.8	0.5	0.4	0.6	0.6	0.2	
Percent of General Population Standard	0.1	0.2	0.1	0.2	0.6	0.9	1.1	0.9	0.7	1.7	1.6	0.6	3.9	2.7	2.1	3.2	3.1	0.8	

Antenna Type JAHH-45B-R3B
Max% 3.93%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pow
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

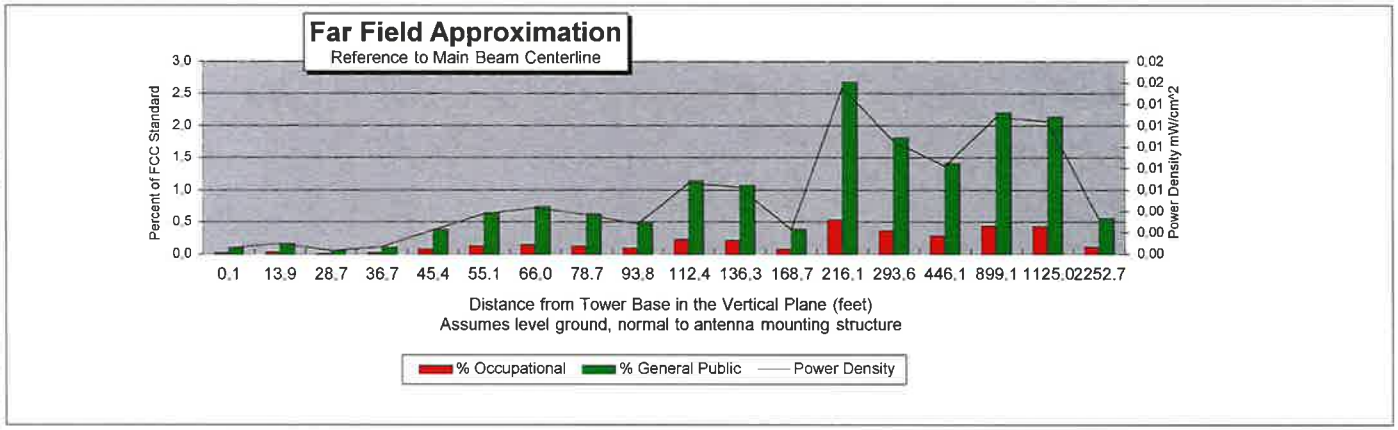
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Storrs, CT
Site #:	64225
Date:	06/12/18
Name:	Kelly Lemay
File Name:	Storrs, CT 850 CDMA - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**81.6**
Antenna Gain (dBi):	**15.2**
Antenna Size (in.):	**47.4**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**3600.0**
Number of Channels	**1**



Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	78.6	79.8	83.7	86.8	90.8	96.0	102.7	111.2	122.4	137.1	157.3	186.1	230.0	303.9	453.0	902.6	1127.7	2254.0	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.9	28.7	36.7	45.4	55.1	66.0	78.7	93.8	112.4	136.3	168.7	216.1	293.6	446.1	899.1	1125.0	2252.7	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.4	0.3	0.4	0.4	0.1	
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.4	0.6	0.7	0.6	0.5	1.1	1.1	0.4	2.7	1.8	1.4	2.2	2.1	0.6	

Antenna Type BXA-80063/4
Max% 2.68%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Power (in watts)
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

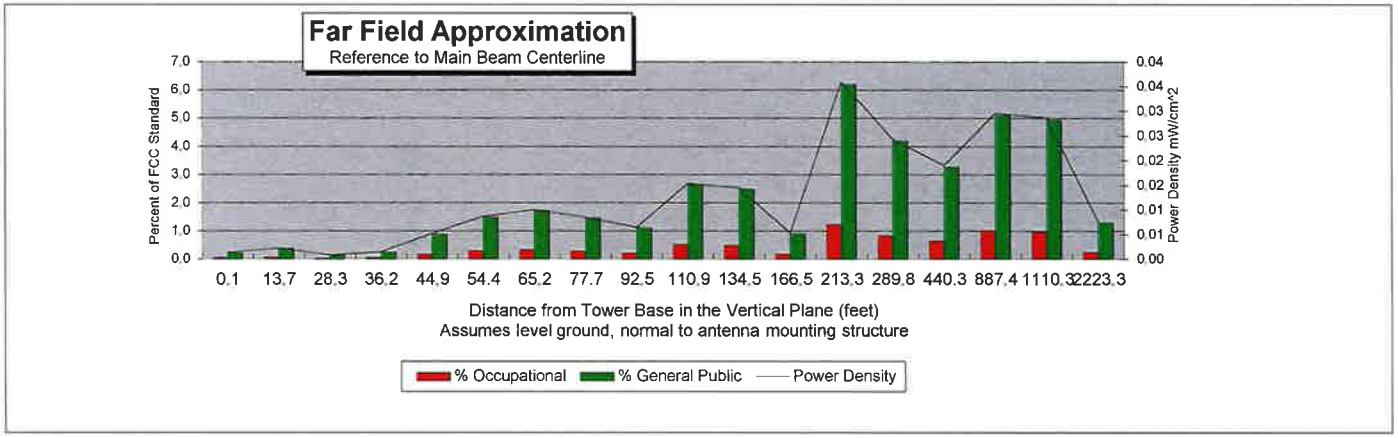
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Storrs, CT
Site #:	64225
Date:	06/12/18
Name:	Kelly Lemay
File Name:	Storrs, CT 850 LTE - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**83.6**
Antenna Gain (dBi):	**17.2**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**5121.0**
Number of Channels	**1**



Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.6	78.8	82.6	85.6	89.6	94.8	101.3	109.8	120.8	135.4	155.3	183.7	227.0	300.0	447.1	890.8	1113.0	2224.7	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.7	28.3	36.2	44.9	54.4	65.2	77.7	92.5	110.9	134.5	166.5	213.3	289.8	440.3	887.4	1110.3	2223.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.04	0.02	0.02	0.03	0.03	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.1	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.2	1.2	0.8	0.7	1.0	1.0	0.3	
Percent of General Population Standard	0.2	0.4	0.1	0.3	0.9	1.5	1.7	1.5	1.1	2.7	2.5	0.9	6.2	4.2	3.3	5.1	5.0	1.3	

Antenna Type JAHH-45B-R3B
Max% 6.20%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Powe
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

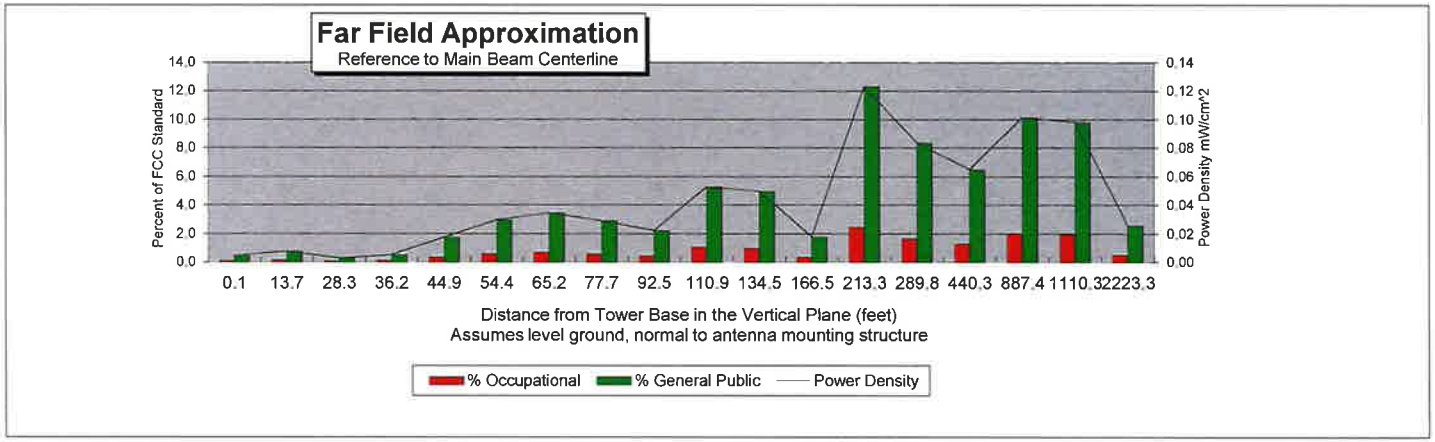
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Storrs, CT
Site #:	64225
Date:	06/12/18
Name:	Kelly Lemay
File Name:	Storrs, PCS CT - FF Power

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**83.6**
Antenna Gain (dBi):	**20.5**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**8210.0**
Number of Channels	**1**



Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.6	78.8	82.6	85.6	89.6	94.8	101.3	109.8	120.8	135.4	155.3	183.7	227.0	300.0	447.1	890.8	1113.0	2224.7	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.7	28.3	36.2	44.9	54.4	65.2	77.7	92.5	110.9	134.5	166.5	213.3	289.8	440.3	887.4	1110.3	2223.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.01	0.00	0.01	0.02	0.03	0.03	0.03	0.02	0.05	0.05	0.02	0.12	0.08	0.06	0.10	0.10	0.03	
Percent of Occupational Standard	0.1	0.2	0.1	0.1	0.4	0.6	0.7	0.6	0.4	1.1	1.0	0.4	2.5	1.7	1.3	2.0	2.0	0.5	
Percent of General Population Standard	0.4	0.8	0.3	0.5	1.8	3.0	3.4	2.9	2.2	5.3	4.9	1.8	12.3	8.3	6.5	10.1	9.8	2.6	

Antenna Type JAHH-45B-R3B
Max% 12.32%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pov
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

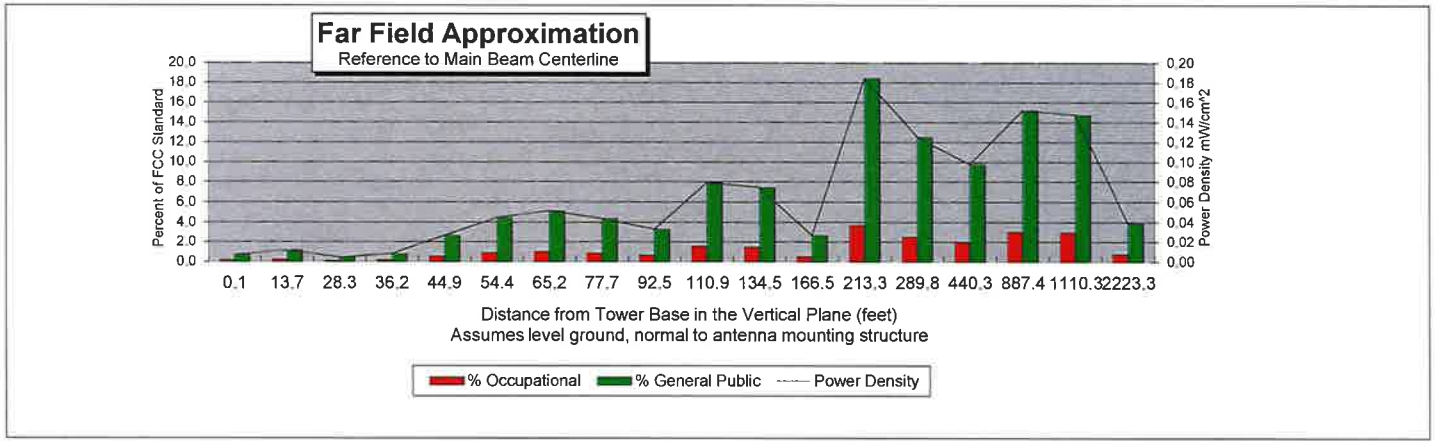
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Storrs, CT
Site #:	64225
Date:	06/12/18
Name:	Kelly Lemay
File Name:	Storrs, CT AWS - FF Power

Operating Freq. (MHz)	**2145.0**
Antenna Height (ft):	**83.6**
Antenna Gain (dBi):	**20.5**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**12315.0**
Number of Channels	**1**



Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.6	78.8	82.6	85.6	89.6	94.8	101.3	109.8	120.8	135.4	155.3	183.7	227.0	300.0	447.1	890.8	1113.0	2224.7	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.7	28.3	36.2	44.9	54.4	65.2	77.7	92.5	110.9	134.5	166.5	213.3	289.8	440.3	887.4	1110.3	2223.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.01	0.01	0.00	0.01	0.03	0.04	0.05	0.04	0.03	0.08	0.07	0.03	0.18	0.13	0.10	0.15	0.15	0.04	
Percent of Occupational Standard	0.1	0.2	0.1	0.2	0.5	0.9	1.0	0.9	0.7	1.6	1.5	0.5	3.7	2.5	1.9	3.0	2.9	0.8	
Percent of General Population Standard	0.7	1.1	0.4	0.8	2.6	4.5	5.1	4.3	3.3	7.9	7.4	2.7	18.5	12.5	9.7	15.2	14.7	3.9	

Antenna Type JAHH-45B-R3B
Max% 18.48%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pov
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 3

PJF PAUL J. FORD & COMPANY

Report Date: January 9, 2018

Client: On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
Attn: David Weinpahl, P.E.
Phone: 201-456-4624

Carrier: Verizon Wireless
Structure: Modified 323-ft Guyed tower
Site Name: Storrs CT
Site Address: 82 North Eagleville Rd. UCONN Campus
City, County, State: Storrs Mansfield, Tolland County CT
Latitude, Longitude: 41° 48' 50.0" N, 72° 15' 33.99" W

PJF Project: 42917-0010.002.8800_R1

Paul J. Ford and Company is pleased to submit this "**Structural Modification Report**" to determine the structural integrity of the above mentioned guyed tower. The purpose of this analysis is to determine the acceptability of the guyed tower stress level.

Analysis Criteria:

Reference Standard:	2016 Connecticut State Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	130 mph 3-second gust wind speed without ice
Nominal Wind Speed:	101 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 1.0" ice
Service Wind Speed:	60.0 mph (Serviceability) without ice
TIA-222 Criteria:	Structure Class II, Topographic Category I, Exposure Category C

Proposed Appurtenance Loads:
The structure was analyzed with the addition of the proposed appurtenance loads shown in Table 1 combined with the existing loads shown in Table 2 of this report. The structure requires minor reinforcements as detailed in this report.

Summary of Analysis Results:

Modified Structure:	Pass
Existing Foundation:	Pass

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and On Air Engineering, LLC. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Matthew Buske, PE
Project Engineer
mbuske@pjfweb.com

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

JAN 11 2018

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TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 323 ft Guyed tower designed by Sabre in July of 1998. The tower was originally designed for a wind speed of 90 mph per TIA-222-F. The tower was reinforced by modifications designed by URS in March of 2015. The tower modifications designed by PJF, dated 1/9/2018, were considered installed in this analysis.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 101 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category C with topographic category 1 and crest height of 0 feet.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
84.0	84.0	4	nokia	4x40 RRH 850	4	1 1/4 hybrid	-
		4	alu	RRH2x90-AWS			
		4	alu	RRH2X60-700			
		1	alu	RRH2X60-PCS			
		8	commscope	JAHH-45B-R3B			
		2	raycap	RVZDC-6627-PF-48			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
305.0	305.0	1	PD1110	1	7/8	1
		1	Shively 6813-1			
277.0	277.0	1	4' Side Arm Mount	2	1/2	1
		1	PD1110			
267.0	267.0	2	3-ft Side Arm Mount	2	1 5/8	1
		1	DB810K			
		1	OGT9-840			
261.0	261.0	1	3-ft Side Arm Mount	1	1 5/8	1
		1	AP14-850/105			
256.5	256.5	2	OGT9-840	2	1 5/8	1
252.0	252.0	1	3-ft Side Arm Mount	1	1 5/8	1
		1	AP14-850/105			
250.0	250.0	2	BXA-70063/2CF-EDIN-0	5 2	1 5/8 1/2	1
		2	432-83H-01-T			
		3	SC479-HF1LDF			
		2	12-ft Sector Mount			
240.0	240.0	1	432-83H-01-T	2 1	1 5/8 1/2	1
		2	SC479-HF1LDF			
		1	12-ft Sector Mount			
211.0	211.0	1	Shively 6813-1	1	7/8	1
198.0	198.0	1	Shively 6812	1 1	7/8 1/2	1
		1	Shively 6813-1			
190.0	190.0	1	6' Yagi	1	1/2	1
185.0	185.0	3	Commscope MTC 3615 Sector Frame	12 2 1	1 5/8 DC fiber	1
		1	HPA-65R-BUU-H6			
		2	HPA-65R-BUU-H8			
		1	OPA-65R-LCUU-H6			
		2	OPA-65R-LCUU-H8			
		6	TPX-070821			
		6	RRUS 11			
		3	RRUS 32			
		3	RRUS 32 B2			
		3	7770.00			
		2	DC6-48-60-18-8F			
172.0	172.0	1	24 x 12 x 45 Flat Panel	2	7/8	1
		1	8 ft x 3" omni whip			
166.0	166.0	1	16 x 12 x 3 TMA	-	-	1
158.8	158.8	1	24" x 12" x 5" Panel	1	1/2	1
125.0	125.0	1	2-ft Side Arm Mount	-	-	1
124.0	124.0	1	Ice Shield 4.5' x 6.0'	-	-	1
		1	Ice Shield 8.0' x 8.0'			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		2	4' x 4.5" Pipe Mount			
116.0	116.0	2	6 ft standard	2	EW63	1
		2	8' x 2" Sch 40 Pipe Mount			
112.0	112.0	1	2-ft Side Arm Mount	1	7/8	1
		1	PD1110			
104.0	104.0	1	6 ft standard	1	EW63	1
		1	8' x 2" Sch 40 Pipe Mount			
94.0	94.0	1	ASP-962	2	1/2	1
		1	PR-850			
		1	4' x 4.5" Pipe Mount			
84.0	84.0	3	RRH2X40-700	2 6	Hybrid 1 1/4	2
		3	RRH2x60-AWS			
		5	HBXX-6517DS-VTM			
		1	X7C-FRO-440-4			
		2	X7C-FRO-440-6			
		1	XAP-FRO-433-VR0			
		2	RC3DC-3315-PF-48			
		1	12-ft Platform Mount	6	1 1/4	1
		3	RRH2X60-PCS			
		3	BXA-80063/4CF			
70.0	70.0	1	DB212-1	1	7/8	1
18.0	18.0	1	2-ft Side Arm Mount	1	1/2	1
		1	6' Yagi			

Notes:
1) Existing Equipment
2) Equipment To Be Removed, Not Considered In Analysis

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference
Tower Manufacturer Drawings	Sabre, 7/21/1998	#SA1370-G
Foundation Drawings	Sabre, 10/6/1998	#SA1370-G
Foundation Calculations	Sabre, 9/30/1998	#SA1370-G
Modification Drawings	URS Corporation, 3/16/2015	VZ5-188
Structural Analysis	Destek Engineering, 9/16/2016	1629069
Modification Drawings	PJF, 1/9/2018	42917-0010.002.8800

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Foundation analysis was based off of Sabre design foundation calculations.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	323 - 288	Pole	Pipe 10.75" x 0.844" (10 #120)	1	-4.11	1181.96	9.1	Pass
T1	288 - 280	Leg	2" solid	3	-31.04	78.19	39.7	Pass
T2	280 - 260	Leg	2" solid	22	-34.66	90.61	38.3	Pass
T3	260 - 240	Leg	2 1/4" solid	71	-72.59	125.90	57.7	Pass
T4	240 - 220	Leg	2 1/4" solid	119	-72.23	125.90	57.4	Pass
T5	220 - 200	Leg	2 1/2" solid	166	-99.72	166.16	60.0	Pass
T6	200 - 180	Leg	2 1/2" solid	216	-107.14	166.16	64.5	Pass
T7	180 - 160	Leg	2 3/4" solid	263	-128.25	211.24	60.7	Pass
T8	160 - 140	Leg	2 1/2" solid	311	-133.68	166.16	80.5	Pass
T9	140 - 120	Leg	2 3/4" solid	360	-137.40	211.24	65.0	Pass
T10	120 - 100	Leg	2 3/4" solid	406	-159.28	211.24	75.4	Pass
T11	100 - 80	Leg	3" solid	456	-180.56	261.02	69.2	Pass
T12	80 - 60	Leg	3" solid	504	-186.95	261.02	71.6	Pass
T13	60 - 40	Leg	3" solid	552	-197.12	261.02	75.5	Pass
T14	40 - 20	Leg	3" solid	600	-197.82	261.02	75.8	Pass
T15	20 - 6.75	Leg	3" solid	646	-194.31	263.00	73.9	Pass
T16	6.75 - 0	Leg	3" solid	680	-199.67	295.91	67.5	Pass
T1	288 - 280	Diagonal	1 3/8" solid	11	-2.09	21.88	9.6	Pass
T2	280 - 260	Diagonal	1 3/8" solid	33	-1.73	24.19	7.2	Pass
T3	260 - 240	Diagonal	1 3/8" solid	108	-4.44	24.39	18.2	Pass
T4	240 - 220	Diagonal	1 3/8" solid	127	-5.03	24.39	20.6	Pass
T5	220 - 200	Diagonal	1 1/2" solid	205	-5.65	32.57	17.3	Pass
T6	200 - 180	Diagonal	1 1/4" solid	224	-7.74	17.65	43.9	Pass
T7	180 - 160	Diagonal	1 1/2" solid	292	-8.77	32.79	26.7	Pass
T8	160 - 140	Diagonal	1 3/8" solid	356	-5.23	24.59	21.3	Pass
T9	140 - 120	Diagonal	1 1/4" solid	368	-4.97	17.82	27.9	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T10	120 - 100	Diagonal	1 1/2" solid	424	-13.36	32.79	40.8	Pass
T11	100 - 80	Diagonal	1 3/8" solid	499	-12.41	24.98	49.7	Pass
T12	80 - 60	Diagonal	1 1/4" solid	513	-4.50	17.99	25.0	Pass
T13	60 - 40	Diagonal	1 1/4" solid	596	-4.67	17.99	26.0	Pass
T14	40 - 20	Diagonal	1 1/4" solid	609	-5.22	17.99	29.0	Pass
T15	20 - 6.75	Diagonal	1 1/4" solid	657	-6.97	18.23	38.2	Pass
T1	288 - 280	Horizontal	1" solid	15	-2.32	12.83	18.1	Pass
T2	280 - 260	Horizontal	1" solid	37	-0.60	12.83	4.7	Pass
T3	260 - 240	Horizontal	1" solid	112	-3.88	12.98	29.9	Pass
T4	240 - 220	Horizontal	1" solid	131	-1.25	12.98	9.6	Pass
T5	220 - 200	Horizontal	1" solid	207	-6.80	13.14	51.8	Pass
T6	200 - 180	Horizontal	1" solid	235	-1.86	13.14	14.1	Pass
T7	180 - 160	Horizontal	1" solid	282	-10.04	13.30	75.5	Pass
T8	160 - 140	Horizontal	1" solid	323	-2.32	13.14	17.6	Pass
T9	140 - 120	Horizontal	1" solid	373	-2.38	13.30	17.9	Pass
T10	120 - 100	Horizontal	1" solid	419	-2.76	13.30	20.7	Pass
T11	100 - 80	Horizontal	1" solid	468	-3.13	13.46	23.2	Pass
T12	80 - 60	Horizontal	1" solid	516	-3.24	13.46	24.1	Pass
T13	60 - 40	Horizontal	1" solid	591	-4.57	13.46	33.9	Pass
T14	40 - 20	Horizontal	1" solid	619	-3.43	13.46	25.4	Pass
T15	20 - 6.75	Horizontal	1" solid	659	-3.37	13.46	25.0	Pass
T16	6.75 - 0	Horizontal	9 x 3/8	686	0.08	151.88	1.6	Pass
T1	288 - 280	Secondary Horizontal	1" solid	21	-0.00	17.94	0.1	Pass
T2	280 - 260	Secondary Horizontal	1" solid	55	-0.00	17.94	0.1	Pass
T3	260 - 240	Secondary Horizontal	1" solid	103	-0.00	17.97	0.1	Pass
T4	240 - 220	Secondary Horizontal	1" solid	165	-0.00	17.97	0.1	Pass
T5	220 - 200	Secondary Horizontal	1" solid	199	-0.00	17.99	0.1	Pass
T6	200 - 180	Secondary Horizontal	1" solid	261	-0.00	17.99	0.1	Pass
T7	180 - 160	Secondary Horizontal	1" solid	309	-0.00	18.02	0.1	Pass
T8	160 - 140	Secondary Horizontal	1" solid	322	0.00	25.45	0.1	Pass
T9	140 - 120	Secondary Horizontal	1" solid	370	0.00	25.45	0.1	Pass
T10	120 - 100	Secondary Horizontal	1" solid	418	0.00	25.45	0.1	Pass
T11	100 - 80	Secondary Horizontal	1" solid	466	0.00	25.45	0.1	Pass
T12	80 - 60	Secondary Horizontal	1" solid	514	0.00	25.45	0.1	Pass
T13	60 - 40	Secondary Horizontal	1" solid	562	0.00	25.45	0.1	Pass
T14	40 - 20	Secondary Horizontal	1" solid	610	0.00	25.45	0.1	Pass
T15	20 - 6.75	Secondary Horizontal	1" solid	672	-0.00	18.05	0.1	Pass
T1	288 - 280	Top Girt	1" solid	5	3.58	25.45	14.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T2	280 - 260	Top Girt	1" solid	25	1.60	25.45	6.3	Pass
T3	260 - 240	Top Girt	1" solid	74	2.13	25.45	8.4	Pass
T4	240 - 220	Top Girt	1" solid	121	-0.74	12.39	6.0	Pass
T5	220 - 200	Top Girt	1" solid	169	2.24	25.45	8.8	Pass
T6	200 - 180	Top Girt	1" solid	218	-0.35	12.50	2.8	Pass
T7	180 - 160	Top Girt	1" solid	266	-1.56	12.61	12.3	Pass
T8	160 - 140	Top Girt	1" solid	315	-0.86	12.50	6.9	Pass
T9	140 - 120	Top Girt	1" solid	361	0.50	25.45	2.0	Pass
T10	120 - 100	Top Girt	1" solid	410	-0.69	12.61	5.4	Pass
T11	100 - 80	Top Girt	1" solid	458	-1.76	12.72	13.9	Pass
T12	80 - 60	Top Girt	1" solid	505	0.81	25.45	3.2	Pass
T13	60 - 40	Top Girt	1" solid	553	1.14	25.45	4.5	Pass
T14	40 - 20	Top Girt	1" solid	601	0.82	25.45	3.2	Pass
T15	20 - 6.75	Top Girt	1" solid	651	1.26	25.45	4.9	Pass
T16	6.75 - 0	Top Girt	12x3/8	685	29.45	145.80	20.2	Pass
T1	288 - 280	Bottom Girt	1" solid	8	-2.21	12.29	18.0	Pass
T2	280 - 260	Bottom Girt	1" solid	29	-1.31	12.29	10.7	Pass
T3	260 - 240	Bottom Girt	1" solid	77	-0.49	12.39	3.9	Pass
T4	240 - 220	Bottom Girt	1" solid	124	-1.68	12.39	13.5	Pass
T5	220 - 200	Bottom Girt	1" solid	173	0.99	25.45	3.9	Pass
T6	200 - 180	Bottom Girt	1" solid	221	-1.39	12.50	11.1	Pass
T7	180 - 160	Bottom Girt	1" solid	270	-1.04	12.61	8.3	Pass
T8	160 - 140	Bottom Girt	1" solid	318	0.59	25.45	2.3	Pass
T9	140 - 120	Bottom Girt	1" solid	365	1.06	25.45	4.2	Pass
T10	120 - 100	Bottom Girt	1" solid	414	-1.88	12.61	14.9	Pass
T11	100 - 80	Bottom Girt	1" solid	462	0.89	25.45	3.5	Pass
T12	80 - 60	Bottom Girt	1" solid	510	0.92	25.45	3.6	Pass
T13	60 - 40	Bottom Girt	1" solid	558	0.82	25.45	3.2	Pass
T14	40 - 20	Bottom Girt	1" solid	605	1.05	25.45	4.1	Pass
T15	20 - 6.75	Bottom Girt	1" solid	652	4.82	25.45	18.9	Pass
T1	288 - 280	Guy A@284	3/4	704	19.06	34.98	54.5	Pass
T3	260 - 240	Guy A@256.5	3/4	716	18.81	34.98	53.8	Pass
T5	220 - 200	Guy A@216.5	3/4	728	18.57	34.98	53.1	Pass
T7	180 - 160	Guy A@166.75	3/4	739	18.38	34.98	52.5	Pass
T10	120 - 100	Guy A@106.75	3/4	752	18.75	34.98	53.6	Pass
T13	60 - 40	Guy A@56.5	7/16	764	8.67	12.48	69.5	Pass
T1	288 - 280	Guy B@284	3/4	700	19.01	34.98	54.4	Pass
T3	260 - 240	Guy B@256.5	3/4	711	18.83	34.98	53.8	Pass
T5	220 - 200	Guy B@216.5	3/4	723	18.61	34.98	53.2	Pass
T7	180 - 160	Guy B@166.75	3/4	735	18.41	34.98	52.6	Pass
T10	120 - 100	Guy B@106.75	3/4	747	18.42	34.98	52.7	Pass
T13	60 - 40	Guy B@56.5	7/16	760	8.61	12.48	69.0	Pass
T1	288 - 280	Guy C@284	3/4	696	19.04	34.98	54.4	Pass
T3	260 - 240	Guy C@256.5	3/4	708	18.80	34.98	53.7	Pass
T5	220 - 200	Guy C@216.5	3/4	720	18.56	34.98	53.1	Pass
T7	180 - 160	Guy C@166.75	3/4	731	18.35	34.98	52.5	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T10	120 - 100	Guy C@106.75	3/4	743	18.66	34.98	53.4	Pass
T13	60 - 40	Guy C@56.5	7/16	756	8.66	12.48	69.4	Pass
T10	120 - 100	Top Guy Pull-Off@106.75	1" S.R. w/ 1" S.R. crosby clipped	428	-15.08	18.10	83.4	Pass
T1	288 - 280	Torque Arm Top@284	C15x33.9	706	3.79	322.70	55.8	Pass
T3	260 - 240	Torque Arm Top@256.5	C15x33.9	718	3.78	322.70	53.1	Pass
T5	220 - 200	Torque Arm Top@216.5	C15x33.9	725	3.82	322.70	48.8	Pass
T7	180 - 160	Torque Arm Top@166.75	C15x33.9	741	4.18	322.70	42.0	Pass
T10	120 - 100	Torque Arm Top@106.75	C15x33.9	749	-5.28	280.44	31.6	Pass
T13	60 - 40	Torque Arm Top@56.5	C15x33.9	766	3.60	322.70	10.9	Pass
							Summary	
						Pole (L1)	9.1	Pass
						Leg (T8)	80.5	Pass
						Diagonal (T11)	49.7	Pass
						Horizontal (T7)	75.5	Pass
						Secondary Horizontal (T1)	0.1	Pass
						Top Girt (T16)	20.2	Pass
						Bottom Girt (T15)	18.9	Pass
						Guy A (T13)	69.5	Pass
						Guy B (T13)	69.0	Pass
						Guy C (T13)	69.4	Pass
						Top Guy Pull-Off (T10)	83.4	Pass
						Torque Arm Top (T1)	55.8	Pass
						Bolt Checks	39.0	Pass
						Rating =	83.4	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Base Foundation Structural	-	69.3	Pass
1	Base Foundation Soil Interaction	-	95.6	Pass
1	Guy Anchor Foundation Structural	-	40.1	Pass
1	Guy Anchor Foundation Soil Interaction	-	47.4	Pass

Structure Rating (max from all components) =	83.4%

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

4.1) Recommendations

The tower and its base and anchor foundations have sufficient capacity to carry the proposed loading configuration once the proposed modifications are installed.

- Install the proposed modifications per the attached drawings, dated 1/9/2018.

APPENDIX A

TNXTOWER OUTPUT

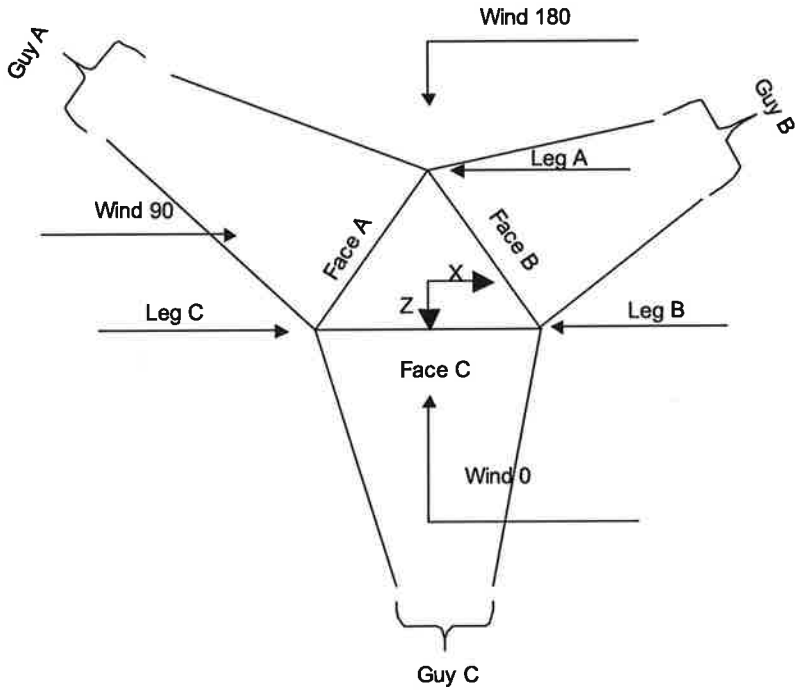
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 323.00 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 3.67 ft at the top and tapered at the base.
An index plate is provided at the 3x guyed -tower connection.
There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Tolland County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 101 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 1.000 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60 mph.
14) Pressures are calculated at each section.
15) Stress ratio used in pole design is 1.
16) Safety factor used in guy design is 1.
17) Stress ratio used in tower member design is 1.
18) 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		



Face Guyed

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	323.00-288.00	35.00	Pipe 10.75" x 0.844" (10 #120)	A618-50 (50 ksi)	

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
L1 323.00-288.00				1	1	1.025			

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	288.00-280.00			3.67	1	8.00

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T2	280.00-260.00			3.67	1	20.00
T3	260.00-240.00			3.67	1	20.00
T4	240.00-220.00			3.67	1	20.00
T5	220.00-200.00			3.67	1	20.00
T6	200.00-180.00			3.67	1	20.00
T7	180.00-160.00			3.67	1	20.00
T8	160.00-140.00			3.67	1	20.00
T9	140.00-120.00			3.67	1	20.00
T10	120.00-100.00			3.67	1	20.00
T11	100.00-80.00			3.67	1	20.00
T12	80.00-60.00			3.67	1	20.00
T13	60.00-40.00			3.67	1	20.00
T14	40.00-20.00			3.67	1	20.00
T15	20.00-6.75			3.67	1	13.25
T16	6.75-0.00			3.67	1	6.75

Tower Section Geometry *(cont'd)*

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
T1	288.00-280.00	3.75	K Brace Left	No	Yes+Steps	3.000	3.000
T2	280.00-260.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T3	260.00-240.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T4	240.00-220.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T5	220.00-200.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T6	200.00-180.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T7	180.00-160.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T8	160.00-140.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T9	140.00-120.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T10	120.00-100.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T11	100.00-80.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T12	80.00-60.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T13	60.00-40.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T14	40.00-20.00	3.25	K Brace Left	No	Yes+Steps	3.000	3.000
T15	20.00-6.75	3.19	K Brace Left	No	Yes+Steps	3.000	3.000
T16	6.75-0.00	1.63	X Brace	No	Yes	0.000	3.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 288.00-280.00	Solid Round	2" solid	A572-50 (50 ksi)	Solid Round	1 3/8" solid	A36 (36 ksi)
T2 280.00-260.00	Solid Round	2" solid	A572-50 (50 ksi)	Solid Round	1 3/8" solid	A36 (36 ksi)
T3 260.00-240.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Solid Round	1 3/8" solid	A36 (36 ksi)
T4 240.00-220.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Solid Round	1 3/8" solid	A36 (36 ksi)
T5 220.00-200.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Solid Round	1 1/2" solid	A36 (36 ksi)
T6 200.00-180.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Solid Round	1 1/4" solid	A36 (36 ksi)
T7 180.00-160.00	Solid Round	2 3/4" solid	A572-50 (50 ksi)	Solid Round	1 1/2" solid	A36 (36 ksi)
T8 160.00-140.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Solid Round	1 3/8" solid	A36 (36 ksi)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T9 140.00-120.00	Solid Round	2 3/4" solid	A572-50 (50 ksi)	Solid Round	1 1/4" solid	A36 (36 ksi)
T10 120.00-100.00	Solid Round	2 3/4" solid	A572-50 (50 ksi)	Solid Round	1 1/2" solid	A36 (36 ksi)
T11 100.00-80.00	Solid Round	3" solid	A572-50 (50 ksi)	Solid Round	1 3/8" solid	A36 (36 ksi)
T12 80.00-60.00	Solid Round	3" solid	A572-50 (50 ksi)	Solid Round	1 1/4" solid	A36 (36 ksi)
T13 60.00-40.00	Solid Round	3" solid	A572-50 (50 ksi)	Solid Round	1 1/4" solid	A36 (36 ksi)
T14 40.00-20.00	Solid Round	3" solid	A572-50 (50 ksi)	Solid Round	1 1/4" solid	A36 (36 ksi)
T15 20.00-6.75	Solid Round	3" solid	A572-50 (50 ksi)	Solid Round	1 1/4" solid	A36 (36 ksi)
T16 6.75-0.00	Solid Round	3" solid	A572-50 (50 ksi)	Solid Round		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 288.00-280.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T2 280.00-260.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T3 260.00-240.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T4 240.00-220.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T5 220.00-200.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T6 200.00-180.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T7 180.00-160.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T8 160.00-140.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T9 140.00-120.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T10 120.00-100.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T11 100.00-80.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T12 80.00-60.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T13 60.00-40.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T14 40.00-20.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T15 20.00-6.75	Solid Round	1" solid	A36 (36 ksi)	Solid Round	1" solid	A36 (36 ksi)
T16 6.75-0.00	Flat Bar	12x3/8	A36 (36 ksi)	Flat Bar	12 x 3/8	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
T1 288.00-280.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T2 280.00-260.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T3 260.00-240.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T4 240.00-220.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T5 220.00-200.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T6 200.00-180.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T7 180.00-160.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T8 160.00-140.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T9 140.00-120.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T10 120.00-100.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T11 100.00-80.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T12 80.00-60.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T13 60.00-40.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T14 40.00-20.00	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T15 20.00-6.75	None	Solid Round		A36 (36 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T16 6.75-0.00	None	Solid Round		A36 (36 ksi)	Flat Bar	9 x 3/8	A572-50 (50 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
T1 288.00-280.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 280.00-260.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 260.00-240.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T4 240.00-220.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T5 220.00-200.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T6 200.00-180.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T7 180.00-160.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T8 160.00-140.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T9 140.00-120.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T10 120.00-100.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T11 100.00-80.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T12 80.00-60.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T13 60.00-40.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T14 40.00-20.00	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T15 20.00-6.75	Solid Round	1" solid	A36 (36 ksi)	Solid Round		A36 (36 ksi)

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 288.00-280.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T2 280.00-260.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T3 260.00-240.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T4 240.00-220.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T5 220.00-200.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T6 200.00-180.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T7 180.00-160.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T8 160.00-140.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T9 140.00-120.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T10 120.00-100.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T11 100.00-80.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T12 80.00-60.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T13 60.00-40.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T14 40.00-20.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T15 20.00-6.75	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt
T16 6.75-0.00	0.00	0.000	A36 (36 ksi)	1	1	1.025	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 288.00-280.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 280.00-260.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T3 260.00-240.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 240.00-220.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 220.00-200.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 200.00-180.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 180.00-160.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 160.00-140.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 140.00-120.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 120.00-100.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T11 100.00-80.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T12 80.00-60.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T13 60.00-40.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T14 40.00-20.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T15 20.00-6.75	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T16 6.75-0.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	U	Diagonal Net Width Deduct in	U	Top Girt Net Width Deduct in	U	Bottom Girt Net Width Deduct in	U	Mid Girt Net Width Deduct in	U	Long Horizontal Net Width Deduct in	U	Short Horizontal Net Width Deduct in	U
T1 288.00-280.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T2 280.00-260.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T3 260.00-240.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T4 240.00-220.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T5 220.00-200.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T6 200.00-180.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T7 180.00-160.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T8 160.00-140.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T9 140.00-120.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T10 120.00-100.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1

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
T11 100.00-80.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T12 80.00-60.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T13 60.00-40.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T14 40.00-20.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T15 20.00-6.75	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T16 6.75-0.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1

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 288.00-280.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T2 280.00-260.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T3 260.00-240.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T4 240.00-220.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T5 220.00-200.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T6 200.00-180.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T7 180.00-160.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T8 160.00-140.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T9 140.00-120.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T10 120.00-100.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T11 100.00-80.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T12 80.00-60.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T13 60.00-40.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T14 40.00-20.00	Flange	1.000 A325N	4	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T15 20.00-6.75	Flange	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T16 6.75-0.00	Flange	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
284	EHS	A	3/4	8.16	14%	24000	1.16	366.81	235.00	0.000	0.00	100%
		B	3/4	8.16	14%	24000	1.16	366.81	235.00	0.000	0.00	100%
		C	3/4	8.16	14%	24000	1.16	366.81	235.00	0.000	0.00	100%
256.5	EHS	A	3/4	8.16	14%	24000	1.16	346.00	235.00	0.000	0.00	100%
		B	3/4	8.16	14%	24000	1.16	346.00	235.00	0.000	0.00	100%
		C	3/4	8.16	14%	24000	1.16	346.00	235.00	0.000	0.00	100%
216.5	EHS	A	3/4	8.16	14%	24000	1.16	317.54	235.00	0.000	0.00	100%
		B	3/4	8.16	14%	24000	1.16	317.54	235.00	0.000	0.00	100%
		C	3/4	8.16	14%	24000	1.16	317.54	235.00	0.000	0.00	100%
166.75	EHS	A	3/4	8.16	14%	24000	1.16	286.02	235.00	0.000	0.00	100%
		B	3/4	8.16	14%	24000	1.16	286.02	235.00	0.000	0.00	100%
		C	3/4	8.16	14%	24000	1.16	286.02	235.00	0.000	0.00	100%
106.75	EHS	A	3/4	8.16	14%	24000	1.16	255.79	235.00	0.000	0.00	100%
		B	3/4	8.16	14%	24000	1.16	255.79	235.00	0.000	0.00	100%
		C	3/4	8.16	14%	24000	1.16	255.79	235.00	0.000	0.00	100%
56.5	EHS	A	7/16	2.91	14%	23000	0.40	239.23	235.00	0.000	0.00	100%
		B	7/16	2.91	14%	23000	0.40	239.23	235.00	0.000	0.00	100%
		C	7/16	2.91	14%	23000	0.40	239.23	235.00	0.000	0.00	100%

Guy Data *(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
284	Torque Arm	8.00	0.000	Channel	A36 (36 ksi)	Channel	C15x33.9
256.5	Torque Arm	8.00	0.000	Channel	A36 (36 ksi)	Channel	C15x33.9
216.5	Torque Arm	8.00	0.000	Channel	A36 (36 ksi)	Channel	C15x33.9
166.75	Torque Arm	8.00	0.000	Channel	A36 (36 ksi)	Channel	C15x33.9
106.75	Torque Arm	8.00	0.000	Channel	A36 (36 ksi)	Channel	C15x33.9
56.5	Torque Arm	8.00	0.000	Channel	A36 (36 ksi)	Channel	C15x33.9

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
284.00	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Flat Bar	
256.50	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Flat Bar	
216.50	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Flat Bar	
166.75	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Flat Bar	
106.75	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Arbitrary Shape	1" S.R. w/ 1" S.R. crosby clipped
56.50	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Flat Bar	

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A K	Cable Weight B K	Cable Weight C K	Cable Weight D K	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
284	0.42	0.42	0.42		9.34 5.3 sec/pulse	9.34 5.3 sec/pulse	9.34 5.3 sec/pulse	
256.5	0.40	0.40	0.40		8.33 5.0 sec/pulse	8.33 5.0 sec/pulse	8.33 5.0 sec/pulse	
216.5	0.37	0.37	0.37		7.03 4.6 sec/pulse	7.03 4.6 sec/pulse	7.03 4.6 sec/pulse	
166.75	0.33	0.33	0.33		5.73 4.1 sec/pulse	5.73 4.1 sec/pulse	5.73 4.1 sec/pulse	
106.75	0.30	0.30	0.30		4.60 3.7 sec/pulse	4.60 3.7 sec/pulse	4.60 3.7 sec/pulse	
56.5	0.10	0.10	0.10		3.91 3.4 sec/pulse	3.91 3.4 sec/pulse	3.91 3.4 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
284	No	No	1	1	1	1	1	1
256.5	No	No	1	1	1	1	1	1
216.5	No	No	1	1	1	1	1	1
166.75	No	No	1	1	1	1	1	1
106.75	No	No	1	1	0.7	0.7	1	1
56.5	No	No	1	1	1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
284	0.875 A325N	2	0.000	1	0.000 A325N	0	0.000	0.75	0.000 A325N	0	0.000	0.75
256.5	0.875 A325N	2	0.000	1	0.000 A325N	0	0.000	0.75	0.000 A325N	0	0.000	0.75
216.5	0.875 A325N	2	0.000	1	0.000 A325N	0	0.000	0.75	0.000 A325N	0	0.000	0.75
166.75	0.875 A325N	2	0.000	1	0.000 A325N	0	0.000	0.75	0.000 A325N	0	0.000	0.75
106.75	0.875 A325N	2	0.000	1	0.000 A325N	0	0.000	0.75	0.000 A325N	0	0.000	0.75
56.5	0.875 A325N	2	0.000	1	0.000 A325N	0	0.000	0.75	0.000 A325N	0	0.000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
284	A	142.00	30.25	7.41	2.314
	B	142.00	30.25	7.41	2.314
	C	142.00	30.25	7.41	2.314
256.5	A	128.25	29.60	7.26	2.291
	B	128.25	29.60	7.26	2.291
	C	128.25	29.60	7.26	2.291
216.5	A	108.25	28.57	7.00	2.252
	B	108.25	28.57	7.00	2.252
	C	108.25	28.57	7.00	2.252
166.75	A	83.38	27.04	6.63	2.194
	B	83.38	27.04	6.63	2.194
	C	83.38	27.04	6.63	2.194
106.75	A	53.38	24.62	6.03	2.099
	B	53.38	24.62	6.03	2.099
	C	53.38	24.62	6.03	2.099
56.5	A	28.25	21.53	5.28	1.969
	B	28.25	21.53	5.28	1.969
	C	28.25	21.53	5.28	1.969

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
LDF7-50A (1 5/8" foam)	A	No	Ar (CaAa)	250.00 - 240.00	0.000	-0.37	5	5	0.500	1.980		0.92
LDF7-50A (1 5/8" foam)	A	No	Ar (CaAa)	240.00 - 0.00	0.000	-0.37	7	7	0.500	1.980		0.92
LDF4-50A (1/2" foam)	A	No	Ar (CaAa)	250.00 - 240.00	0.000	-0.19	2	2	0.500 0.630	0.630		0.15
LDF4-50A (1/2" foam) ****	A	No	Ar (CaAa)	240.00 - 0.00	0.000	-0.19	3	3	0.500 0.630	0.630		0.15
LDF5-50A (7/8" foam)	A	No	Ar (CaAa)	70.00 - 0.00	0.000	-0.145	1	1	0.500 1.090	1.090		0.33
EW63(ELLIPTICAL)	A	No	Ar (CaAa)	104.00 - 0.00	0.000	-0.105	1	1	0.500 2.010	2.010		0.51
LDF5-50A (7/8" foam)	A	No	Ar (CaAa)	112.00 - 0.00	0.000	-0.08	1	1	0.500 1.090	1.090		0.33
EW63(ELLIPTICAL)	A	No	Ar (CaAa)	116.00 - 0.00	0.000	-0.105	2	2	0.500 2.010	2.010		0.51
LDF5-50A (7/8" foam)	A	No	Ar (CaAa)	172.00 - 0.00	0.000	0.075	2	2	0.500 1.090	1.090		0.33
LDF5-50A (7/8" foam)	A	No	Ar (CaAa)	198.00 - 0.00	0.000	0.125	1	1	0.500 1.090	1.090		0.33
LDF5-50A (7/8" foam) ***	A	No	Ar (CaAa)	211.00 - 0.00	0.000	0.21	1	1	0.500 1.090	1.090		0.33
LDF7-50A (1 5/8" foam)	A	No	Ar (CaAa)	256.50 - 0.00	0.000	0.31	4	4	0.500	1.980		0.92
LDF7-50A (1 5/8" foam)	A	No	Ar (CaAa)	267.00 - 0.00	0.000	0.41	2	2	0.500 1.980	1.980		0.92
LDF5-50A (7/8" foam) ***	A	No	Ar (CaAa)	288.00 - 0.00	0.000	0	1	1	1.090	1.090		0.33
LDF4-50A (1/2" foam)	B	No	Ar (CaAa)	277.00 - 197.00	0.000	0.3	2	2	0.500 0.630	0.630		0.15
LDF4-50A (1/2" foam)	B	No	Ar (CaAa)	198.00 - 190.00	0.000	0.3	3	3	0.500 0.630	0.630		0.15
LDF4-50A (1/2" foam)	B	No	Ar (CaAa)	190.00 - 159.00	0.000	0.3	4	4	0.500 0.630	0.630		0.15

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
LDF4-50A (1/2" foam)	B	No	Ar (CaAa)	159.00 - 94.00	0.000	0.3	5	5	0.500 0.630	0.630		0.15
LDF4-50A (1/2" foam)	B	No	Ar (CaAa)	94.00 - 18.00	0.000	0.3	7	7	0.500 0.630	0.630		0.15
LDF4-50A (1/2" foam)	B	No	Ar (CaAa)	18.00 - 0.00	0.000	0.3	9	9	0.500 0.630	0.630		0.15
LDF5-50A (7/8" foam)	B	No	Ar (CaAa)	288.00 - 0.00	0.000	0.45	1	1	1.090	1.090		0.33
LDF4-50A (1/2" foam) *******	B	No	Ar (CaAa)	288.00 - 0.00	0.000	0.3	1	1	0.630	0.630		0.15
LDF7-50A (1 5/8" foam)	C	No	Ar (CaAa)	185.00 - 0.00	0.000	0	12	11	0.500	1.980		0.92
LDF2-50 (3/8" foam)	C	No	Ar (CaAa)	185.00 - 0.00	0.000	0	1	1	0.440	0.440		0.08
DC Cable	C	No	Ar (CaAa)	185.00 - 0.00	0.000	0	2	2	1.090	1.090		0.33
LDF6-50 (1 1/4" foam)	C	No	Ar (CaAa)	84.00 - 0.00	0.000	0	4	4	0.500	1.550		0.66
LDF6-50 (1 1/4" foam) *******	C	No	Ar (CaAa)	84.00 - 0.00	0.000	-0.14	6	6	0.500	1.550		0.66

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF5-50A (7/8" foam)	A	No	Inside Pole	305.00 - 288.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
*******								

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Beacon	B	None			0.000	323.00	No Ice	3.60	3.60	0.10
							1/2" Ice	4.00	4.00	0.15
							1" Ice	4.40	4.40	0.20
3/4" x 4 ft lightning rod	C	None			0.000	323.00	No Ice	0.30	0.30	0.01
							1/2" Ice	0.71	0.71	0.01
							1" Ice	1.00	1.00	0.02
****										
Obstruction light	A	From Leg	1.00	0.00	0.000	157.00	No Ice	0.50	0.50	0.01
			0.00	0.00			1/2" Ice	0.83	0.83	0.02
							1" Ice	0.96	0.96	0.03
Obstruction light	B	From Leg	1.00	0.00	0.000	157.00	No Ice	0.50	0.50	0.01
			0.00	0.00			1/2" Ice	0.83	0.83	0.02
							1" Ice	0.96	0.96	0.03
Obstruction light	C	From Leg	1.00	0.00	0.000	157.00	No Ice	0.50	0.50	0.01
			0.00	0.00			1/2" Ice	0.83	0.83	0.02
								0.96	0.96	0.03

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
						1" Ice			
****									
Shively 6813-1 no Radome Full Wave	C	None		0.000	305.00	No Ice 1/2" Ice 1" Ice	2.40 3.50 4.60	2.40 3.50 4.60	0.08 0.12 0.16
PD1110	C	None		0.000	305.00	No Ice 1/2" Ice 1" Ice	3.06 5.10 7.14	3.06 5.10 7.14	0.03 0.06 0.10
****									
****									
PD1110	C	From Leg	4.00 0.00 0.00	0.000	277.00	No Ice 1/2" Ice 1" Ice	3.06 5.10 7.14	3.06 5.10 7.14	0.03 0.06 0.10
4' Side Arm Mount	C	From Leg	2.00 0.00 0.00	0.000	277.00	No Ice 1/2" Ice 1" Ice	0.98 1.70 2.42	2.18 3.80 5.42	0.04 0.06 0.08
****									
DB810K	A	From Leg	3.00 0.00 0.00	0.000	267.00	No Ice 1/2" Ice 1" Ice	4.08 5.73 7.41	4.08 5.73 7.41	0.04 0.07 0.11
OGT9-840	C	From Leg	3.00 0.00 0.00	0.000	267.00	No Ice 1/2" Ice 1" Ice	2.27 3.44 4.61	2.27 3.44 4.61	0.02 0.04 0.06
3-ft Side Arm Mount	A	From Leg	1.50 0.00 0.00	0.000	267.00	No Ice 1/2" Ice 1" Ice	0.94 1.48 2.02	1.41 2.17 2.93	0.03 0.04 0.06
3-ft Side Arm Mount	C	From Leg	1.50 0.00 0.00	0.000	267.00	No Ice 1/2" Ice 1" Ice	0.94 1.48 2.02	1.41 2.17 2.93	0.03 0.04 0.06
****									
AP14-850/105	B	From Leg	3.00 0.00 0.00	0.000	261.00	No Ice 1/2" Ice 1" Ice	10.61 11.25 11.89	5.64 6.28 6.89	0.03 0.08 0.14
3-ft Side Arm Mount	B	From Leg	1.50 0.00 0.00	0.000	261.00	No Ice 1/2" Ice 1" Ice	0.94 1.48 2.02	1.41 2.17 2.93	0.03 0.04 0.06
****									
OGT9-840	C	From Leg	3.00 0.00 0.00	0.000	256.50	No Ice 1/2" Ice 1" Ice	2.27 3.44 4.61	2.27 3.44 4.61	0.02 0.04 0.06
OGT9-840	B	From Leg	3.00 0.00 0.00	0.000	256.50	No Ice 1/2" Ice 1" Ice	2.27 3.44 4.61	2.27 3.44 4.61	0.02 0.04 0.06
****									
AP14-850/105	B	From Leg	3.00 0.00 0.00	0.000	252.00	No Ice 1/2" Ice 1" Ice	10.61 11.25 11.89	5.64 6.28 6.89	0.03 0.08 0.14
3-ft Side Arm Mount	B	From Leg	1.50 0.00 0.00	0.000	252.00	No Ice 1/2" Ice 1" Ice	0.94 1.48 2.02	1.41 2.17 2.93	0.03 0.04 0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
****									
Shively 6813-1 no Radome Full Wave	C	From Leg	2.00 0.00 0.00	0.000	211.00	No Ice 1/2" Ice 1" Ice	2.40 3.50 4.60	2.40 3.50 4.60	0.08 0.12 0.16
Shively 6813-1 no Radome Full Wave	B	From Leg	2.00 0.00 0.00	0.000	198.00	No Ice 1/2" Ice 1" Ice	2.40 3.50 4.60	2.40 3.50 4.60	0.08 0.12 0.16
Shively 6812	A	From Leg	3.00 0.00 0.00	0.000	198.00	No Ice 1/2" Ice 1" Ice	2.40 3.50 4.60	2.40 3.50 4.60	0.08 0.12 0.16
****									
6' Yagi	B	From Leg	3.00 0.00 0.00	0.000	190.00	No Ice 1/2" Ice 1" Ice	3.00 6.02 9.05	3.00 6.02 9.05	0.04 0.07 0.11
****									
OPA-65R-LCUU-H8 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	12.98 13.67 14.36	9.32 10.79 12.24	0.12 0.21 0.32
OPA-65R-LCUU-H6 w/Mount Pipe	B	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	8.11 9.30 10.21	0.09 0.17 0.26
OPA-65R-LCUU-H8 w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	12.98 13.67 14.36	9.32 10.79 12.24	0.12 0.21 0.32
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	13.21 13.90 14.59	9.58 11.05 12.50	0.10 0.20 0.30
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	8.11 9.30 10.21	0.08 0.16 0.25
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	13.21 13.90 14.59	9.58 11.05 12.50	0.10 0.20 0.30
RRUS 32 B2	A	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	2.73 2.95 3.18	1.67 1.86 2.05	0.05 0.07 0.10
RRUS 32 B2	B	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	2.73 2.95 3.18	1.67 1.86 2.05	0.05 0.07 0.10
RRUS 32 B2	C	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	2.73 2.95 3.18	1.67 1.86 2.05	0.05 0.07 0.10
RRUS 32	A	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	2.86 3.08 3.32	1.78 1.97 2.17	0.06 0.08 0.10
RRUS 32	B	From Leg	3.00 0.00 0.00	0.000	185.00	No Ice 1/2" Ice 1" Ice	2.86 3.08 3.32	1.78 1.97 2.17	0.06 0.08 0.10
RRUS 32	C	From Leg	3.00	0.000	185.00	No Ice	2.86	1.78	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	3.08	1.97	0.08
			0.00			Ice	3.32	2.17	0.10
						1" Ice			
(2) RRUS 11	A	From Leg	3.00	0.000	185.00	No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			0.00			Ice	3.21	1.50	0.10
						1" Ice			
(2) RRUS 11	B	From Leg	3.00	0.000	185.00	No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			0.00			Ice	3.21	1.50	0.10
						1" Ice			
(2) RRUS 11	C	From Leg	3.00	0.000	185.00	No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			0.00			Ice	3.21	1.50	0.10
						1" Ice			
(2) DC6-48-60-18-8F	A	From Leg	3.00	0.000	185.00	No Ice	0.92	0.92	0.02
			0.00			1/2"	1.46	1.46	0.04
			0.00			Ice	1.64	1.64	0.06
						1" Ice			
(2) TPX-070821	A	From Leg	3.00	0.000	185.00	No Ice	0.47	0.10	0.01
			0.00			1/2"	0.56	0.15	0.01
			0.00			Ice	0.66	0.20	0.02
						1" Ice			
(2) TPX-070821	B	From Leg	3.00	0.000	185.00	No Ice	0.47	0.10	0.01
			0.00			1/2"	0.56	0.15	0.01
			0.00			Ice	0.66	0.20	0.02
						1" Ice			
(2) TPX-070821	C	From Leg	3.00	0.000	185.00	No Ice	0.47	0.10	0.01
			0.00			1/2"	0.56	0.15	0.01
			0.00			Ice	0.66	0.20	0.02
						1" Ice			
7770.00 w/ Mount Pipe	A	From Leg	3.00	0.000	185.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice			
7770.00 w/ Mount Pipe	B	From Leg	3.00	0.000	185.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice			
7770.00 w/ Mount Pipe	C	From Leg	3.00	0.000	185.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice			
Commscope MTC 3615 Sector Frame	C	None		0.000	185.00	No Ice	49.30	49.30	2.29
						1/2"	52.20	52.20	2.68
						Ice	55.10	55.10	3.07
						1" Ice			
****									
24 x 12 x 45 Flat Panel	B	From Leg	1.00	0.000	172.00	No Ice	2.40	9.00	0.05
			0.00			1/2"	2.60	9.39	0.11
			0.00			Ice	2.81	9.78	0.18
						1" Ice			
8 ft x 3" omni whip	C	From Leg	0.00	0.000	172.00	No Ice	2.40	2.40	0.05
			0.00			1/2"	3.19	3.19	0.07
			0.00			Ice	3.67	3.67	0.09
						1" Ice			
****									
16 x 12 x 3 TMA	A	From Leg	0.00	0.000	166.00	No Ice	1.60	0.44	0.02
			0.00			1/2"	1.76	0.55	0.03
			0.00			Ice	1.93	0.66	0.04
						1" Ice			
24" x 12" x 5" Panel	C	From Leg	0.00	0.000	158.80	No Ice	2.40	0.99	0.02
			0.00			1/2"	2.60	1.15	0.04
			0.00			Ice	2.81	1.32	0.05

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
						1" Ice			
****									
2-ft Side Arm Mount	B	From Leg	0.00 0.00 0.00	0.000	125.00	No Ice 1/2" Ice 1" Ice	2.97 4.40 5.83	2.99 4.58 6.17	0.06 0.08 0.11
Ice Shield 4.5' x 6.0'	C	From Leg	0.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	0.90 1.21 1.54	1.20 1.61 2.04	0.09 0.23 0.38
4' x 4.5" Pipe Mount	C	From Leg	0.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	1.11 1.58 1.84	1.11 1.58 1.84	0.04 0.06 0.07
Ice Shield 8.0' x 8.0'	A	From Leg	0.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	2.40 2.95 3.51	2.40 2.95 3.51	0.35 0.68 1.01
4' x 4.5" Pipe Mount	A	From Leg	0.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	1.11 1.58 1.84	1.11 1.58 1.84	0.04 0.06 0.07
*****									
PD1110	B	From Leg	0.00 0.00 0.00	0.000	112.00	No Ice 1/2" Ice 1" Ice	3.06 5.10 7.14	3.06 5.10 7.14	0.03 0.06 0.10
2-ft Side Arm Mount	B	From Leg	0.00 0.00 0.00	0.000	112.00	No Ice 1/2" Ice 1" Ice	2.97 4.40 5.83	2.99 4.58 6.17	0.06 0.08 0.11
****									
8' x 2" Sch 40 Pipe Mount	C	From Leg	0.50 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
8' x 2" Sch 40 Pipe Mount	A	From Leg	0.50 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
8' x 2" Sch 40 Pipe Mount	C	From Leg	0.50 0.00 0.00	0.000	104.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
****									
ASP-962	B	From Leg	0.00 0.00 0.00	0.000	94.00	No Ice 1/2" Ice 1" Ice	0.16 0.29 0.42	0.16 0.29 0.42	0.00 0.00 0.00
4' x 4.5" Pipe Mount	C	From Leg	0.00 0.00 0.00	0.000	94.00	No Ice 1/2" Ice 1" Ice	1.13 1.58 1.84	1.13 1.58 1.84	0.04 0.06 0.07
****									
RRH2x60-700	A	From Leg	3.00 0.00 0.00	0.000	84.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2x60-700	B	From Leg	3.00 0.00 0.00	0.000	84.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
(2) RRH2x60-700	C	From Leg	3.00 0.00	0.000	84.00	No Ice 1/2"	3.50 3.76	1.82 2.05	0.06 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
4x40 RRH 850	A	From Leg	3.00	0.000	84.00	No Ice	2.32	2.24	0.06
			0.00			1/2"	2.53	2.44	0.08
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
(2) 4x40 RRH 850	B	From Leg	3.00	0.000	84.00	No Ice	2.32	2.24	0.06
			0.00			1/2"	2.53	2.44	0.08
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
4x40 RRH 850	C	From Leg	3.00	0.000	84.00	No Ice	2.32	2.24	0.06
			0.00			1/2"	2.53	2.44	0.08
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
RRH2X60-PCS	A	From Leg	3.00	0.000	84.00	No Ice	2.20	1.72	0.06
			0.00			1/2"	2.39	1.90	0.08
			0.00			Ice	2.59	2.09	0.10
						1" Ice			
(2) RVZDC-6627-PF-48	A	From Leg	3.00	0.000	84.00	No Ice	3.79	2.51	0.03
			0.00			1/2"	4.04	2.73	0.06
			0.00			Ice	4.30	2.95	0.10
						1" Ice			
(2) RRH2x90-AWS	A	From Leg	3.00	0.000	84.00	No Ice	1.88	1.24	0.04
			0.00			1/2"	2.06	1.39	0.06
			0.00			Ice	2.24	1.54	0.08
						1" Ice			
RRH2x90-AWS	B	From Leg	3.00	0.000	84.00	No Ice	1.88	1.24	0.04
			0.00			1/2"	2.06	1.39	0.06
			0.00			Ice	2.24	1.54	0.08
						1" Ice			
RRH2x90-AWS	C	From Leg	3.00	0.000	84.00	No Ice	1.88	1.24	0.04
			0.00			1/2"	2.06	1.39	0.06
			0.00			Ice	2.24	1.54	0.08
						1" Ice			
(3) JAHH-45B-R3B w/ Mount Pipe	A	From Leg	3.00	0.000	84.00	No Ice	11.64	6.95	0.11
			0.00			1/2"	12.23	8.13	0.19
			0.00			Ice	12.78	9.02	0.29
						1" Ice			
(3) JAHH-45B-R3B w/ Mount Pipe	B	From Leg	3.00	0.000	84.00	No Ice	11.64	6.95	0.11
			0.00			1/2"	12.23	8.13	0.19
			0.00			Ice	12.78	9.02	0.29
						1" Ice			
(2) JAHH-45B-R3B w/ Mount Pipe	C	From Leg	3.00	0.000	84.00	No Ice	11.64	6.95	0.11
			0.00			1/2"	12.23	8.13	0.19
			0.00			Ice	12.78	9.02	0.29
						1" Ice			
BXA-80063/4CF w/ Mount Pipe	A	From Leg	3.00	0.000	84.00	No Ice	4.95	3.42	0.03
			0.00			1/2"	5.32	4.02	0.07
			0.00			Ice	5.71	4.64	0.12
						1" Ice			
BXA-80063/4CF w/ Mount Pipe	B	From Leg	3.00	0.000	84.00	No Ice	4.95	3.42	0.03
			0.00			1/2"	5.32	4.02	0.07
			0.00			Ice	5.71	4.64	0.12
						1" Ice			
BXA-80063/4CF w/ Mount Pipe	C	From Leg	3.00	0.000	84.00	No Ice	4.95	3.42	0.03
			0.00			1/2"	5.32	4.02	0.07
			0.00			Ice	5.71	4.64	0.12
						1" Ice			
RRH2X60-PCS	A	From Leg	3.00	0.000	84.00	No Ice	2.20	1.72	0.06
			0.00			1/2"	2.39	1.90	0.08
			0.00			Ice	2.59	2.09	0.10
						1" Ice			
RRH2X60-PCS	B	From Leg	3.00	0.000	84.00	No Ice	2.20	1.72	0.06
			0.00			1/2"	2.39	1.90	0.08

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					Ice	2.59	2.09	0.10
								1" Ice			
RRH2X60-PCS	C	From Leg	3.00			0.000	84.00	No Ice	2.20	1.72	0.06
			0.00					1/2"	2.39	1.90	0.08
			0.00					Ice	2.59	2.09	0.10
								1" Ice			
12-ft Platform Mount	C	None				0.000	84.00	No Ice	32.03	32.03	1.34
								1/2"	38.71	38.71	1.80
								Ice	45.39	45.39	2.26
								1" Ice			
****											
DB212-1	C	From Leg	0.00			0.000	70.00	No Ice	4.50	4.50	0.03
			0.00					1/2"	8.10	8.10	0.04
			0.00					Ice	11.70	11.70	0.05
								1" Ice			
****											
6' Yagi	C	From Leg	2.00			0.000	18.00	No Ice	3.00	3.00	0.04
			0.00					1/2"	6.02	6.02	0.07
			0.00					Ice	9.05	9.05	0.11
								1" Ice			
2-ft Side Arm Mount	C	From Leg	0.00			0.000	18.00	No Ice	2.97	2.99	0.06
			0.00					1/2"	4.40	4.58	0.08
			0.00					Ice	5.83	6.17	0.11
								1" Ice			
****											
BXA-70063/2CF-EDIN-0	A	From Leg	4.00			0.000	250.00	No Ice	2.22	1.11	0.00
			0.00					1/2"	2.42	1.27	0.02
			0.00					Ice	2.63	1.44	0.04
								1" Ice			
BXA-70063/2CF-EDIN-0	B	From Leg	4.00			0.000	250.00	No Ice	2.22	1.11	0.00
			0.00					1/2"	2.42	1.27	0.02
			0.00					Ice	2.63	1.44	0.04
								1" Ice			
SC479-HF1LDF	A	From Leg	4.00			4.750	250.00	No Ice	4.42	4.42	0.03
			0.00					1/2"	6.51	6.51	0.07
			0.00					Ice	8.00	8.00	0.11
								1" Ice			
SC479-HF1LDF	B	From Leg	4.00			-4.750	250.00	No Ice	4.42	4.42	0.03
			0.00					1/2"	6.51	6.51	0.07
			0.00					Ice	8.00	8.00	0.11
								1" Ice			
SC479-HF1LDF	B	From Leg	4.00			-4.750	250.00	No Ice	4.42	4.42	0.03
			0.00					1/2"	6.51	6.51	0.07
			0.00					Ice	8.00	8.00	0.11
								1" Ice			
432-83H-01-T	A	From Leg	4.00			0.000	250.00	No Ice	1.40	0.82	0.03
			0.00					1/2"	1.55	0.94	0.04
			0.00					Ice	1.70	1.06	0.05
								1" Ice			
432-83H-01-T	B	From Leg	4.00			0.000	250.00	No Ice	1.40	0.82	0.03
			0.00					1/2"	1.55	0.94	0.04
			0.00					Ice	1.70	1.06	0.05
								1" Ice			
Sector Mount [SM 602-1]	A	From Leg	0.00			0.000	250.00	No Ice	18.81	10.62	0.51
			0.00					1/2"	24.75	15.16	0.72
			0.00					Ice	30.69	19.70	0.93
								1" Ice			
Sector Mount [SM 602-1]	B	From Leg	0.00			0.000	250.00	No Ice	18.81	10.62	0.51
			0.00					1/2"	24.75	15.16	0.72
			0.00					Ice	30.69	19.70	0.93
								1" Ice			
SC479-HF1LDF	C	From Leg	4.00			4.500	240.00	No Ice	4.44	4.44	0.03
			0.00					1/2"	6.51	6.51	0.07
			0.00					Ice	8.00	8.00	0.11

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
						1" Ice			
SC479-HF1LDF	C	From Leg	4.00	-4.750	240.00	No Ice	4.44	4.44	0.03
			0.00			1/2"	6.51	6.51	0.07
			0.00			Ice	8.00	8.00	0.11
						1" Ice			
432-83H-01-T	C	From Leg	4.00	0.000	240.00	No Ice	1.40	0.82	0.03
			0.00			1/2"	1.55	0.94	0.04
			0.00			Ice	1.70	1.06	0.05
						1" Ice			
Sector Mount [SM 602-1]	C	From Leg	0.00	0.000	240.00	No Ice	18.81	10.62	0.51
			0.00			1/2"	24.75	15.16	0.72
			0.00			Ice	30.69	19.70	0.93
						1" Ice			

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
****											
6 ft standard	C	Paraboloid w/Shroud (HP)	From Leg	1.00	0.000		116.00	6.00	No Ice	28.27	0.14
				0.00					1/2" Ice	29.07	0.29
				0.00					1" Ice	29.86	0.45
6 ft standard	A	Paraboloid w/o Radome	From Leg	1.00	0.000		116.00	6.00	No Ice	28.27	0.14
				0.00					1/2" Ice	29.07	0.29
				0.00					1" Ice	29.86	0.45
6 ft standard	C	Paraboloid w/Shroud (HP)	From Leg	1.00	0.000		104.00	6.00	No Ice	28.27	0.14
				0.00					1/2" Ice	29.07	0.29
				0.00					1" Ice	29.86	0.45
****											
PR-850	C	Grid	From Leg	0.00	0.000		94.00	5.67	No Ice	25.22	0.04
				0.00					1/2" Ice	25.97	0.17
				0.00					1" Ice	26.71	0.31

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy

Comb. No.	Description
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	323 - 288	0.70	33	0.048	0.034
T1	288 - 280	0.48	37	0.026	0.034
T2	280 - 260	0.52	37	0.029	0.029
T3	260 - 240	0.62	37	0.032	0.034
T4	240 - 220	0.71	37	0.024	0.044
T5	220 - 200	0.76	37	0.021	0.037
T6	200 - 180	0.82	29	0.018	0.043
T7	180 - 160	0.84	34	0.005	0.032
T8	160 - 140	0.85	34	0.008	0.028
T9	140 - 120	0.89	34	0.006	0.032
T10	120 - 100	0.89	34	0.004	0.033
T11	100 - 80	0.92	34	0.014	0.033
T12	80 - 60	0.97	34	0.005	0.035
T13	60 - 40	0.89	34	0.032	0.040
T14	40 - 20	0.70	34	0.058	0.039
T15	20 - 6.75	0.40	34	0.084	0.035
T16	6.75 - 0	0.14	34	0.095	0.025

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
323.00	Beacon	33	0.70	0.048	0.034	111541
305.00	Shively 6813-1 no Radome Full Wave	37	0.53	0.029	0.057	30983
284.00	Guy	37	0.50	0.027	0.021	34272
277.00	PD1110	37	0.53	0.030	0.033	313205
267.00	DB810K	37	0.58	0.032	0.035	401053
261.00	AP14-850/105	37	0.62	0.032	0.034	234257
256.50	Guy	37	0.64	0.031	0.034	780944
252.00	AP14-850/105	37	0.66	0.029	0.036	168174
250.00	BXA-70063/2CF-EDIN-0	37	0.67	0.028	0.038	122612

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
240.00	SC479-HF1LDF	37	0.71	0.024	0.044	58998
216.50	Guy	37	0.77	0.021	0.037	113807
211.00	Shively 6813-1 no Radome Full Wave	33	0.78	0.021	0.039	921352
198.00	Shively 6813-1 no Radome Full Wave	29	0.82	0.017	0.043	61136
190.00	6' Yagi	33	0.84	0.010	0.039	76747
185.00	OPA-65R-LCUU-H8 w/ Mount Pipe	34	0.84	0.006	0.035	93204
172.00	24 x 12 x 45 Flat Panel	34	0.85	0.004	0.028	762427
166.75	Guy	34	0.85	0.006	0.028	138830
166.00	16 x 12 x 3 TMA	34	0.85	0.006	0.028	124306
158.80	24" x 12" x 5" Panel	34	0.85	0.008	0.028	81314
157.00	Obstruction light	34	0.86	0.009	0.028	93607
125.00	2-ft Side Arm Mount	34	0.89	0.003	0.033	217384
124.00	Ice Shield 4.5' x 6.0'	34	0.89	0.003	0.033	176132
116.00	6 ft standard	34	0.89	0.006	0.033	92870
112.00	PD1110	34	0.90	0.009	0.033	85838
106.75	Guy	34	0.91	0.013	0.033	77588
104.00	6 ft standard	34	0.91	0.014	0.033	73975
94.00	PR-850	34	0.94	0.011	0.034	331623
84.00	RRH2x60-700	34	0.97	0.005	0.035	34219
70.00	DB212-1	34	0.94	0.015	0.038	36581
56.50	Guy	34	0.86	0.037	0.040	56767
18.00	6' Yagi	34	0.36	0.086	0.033	49347

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	323 - 288	5.62	12	0.267	0.124
T1	288 - 280	4.29	12	0.160	0.124
T2	280 - 260	4.37	12	0.163	0.116
T3	260 - 240	4.62	12	0.157	0.143
T4	240 - 220	4.83	12	0.124	0.142
T5	220 - 200	4.83	12	0.098	0.131
T6	200 - 180	4.93	8	0.081	0.135
T7	180 - 160	4.84	8	0.061	0.123
T8	160 - 140	4.71	9	0.081	0.126
T9	140 - 120	4.89	9	0.088	0.159
T10	120 - 100	4.93	9	0.070	0.197
T11	100 - 80	5.06	9	0.091	0.186
T12	80 - 60	5.23	9	0.037	0.160
T13	60 - 40	4.76	9	0.180	0.152
T14	40 - 20	3.74	9	0.315	0.152
T15	20 - 6.75	2.10	9	0.448	0.143
T16	6.75 - 0	0.73	9	0.498	0.123

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
323.00	Beacon	12	5.62	0.267	0.124	24688
305.00	Shively 6813-1 no Radome Full Wave	12	4.67	0.126	0.187	6858
284.00	Guy	12	4.31	0.162	0.098	7590
277.00	PD1110	12	4.41	0.164	0.130	17394
267.00	DB810K	12	4.53	0.163	0.146	15390

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
261.00	AP14-850/105	12	4.61	0.158	0.143	14800
256.50	Guy	12	4.66	0.152	0.141	15638
252.00	AP14-850/105	12	4.72	0.145	0.138	8389
250.00	BXA-70063/2CF-EDIN-0	12	4.74	0.141	0.137	6950
240.00	SC479-HF1LDF	12	4.83	0.124	0.142	3773
216.50	Guy	8	4.84	0.096	0.129	14757
211.00	Shively 6813-1 no Radome Full Wave	8	4.87	0.092	0.130	19911
198.00	Shively 6813-1 no Radome Full Wave	8	4.94	0.078	0.134	14488
190.00	6' Yagi	8	4.92	0.063	0.130	18853
185.00	OPA-65R-LCUU-H8 w/ Mount Pipe	8	4.89	0.055	0.126	23717
172.00	24 x 12 x 45 Flat Panel	8	4.75	0.055	0.121	32583
166.75	Guy	8	4.70	0.061	0.122	17703
166.00	16 x 12 x 3 TMA	8	4.69	0.064	0.122	16619
158.80	24" x 12" x 5" Panel	9	4.71	0.084	0.128	13038
157.00	Obstruction light	9	4.73	0.087	0.129	14784
125.00	2-ft Side Arm Mount	9	4.92	0.068	0.191	35387
124.00	Ice Shield 4.5' x 6.0'	9	4.93	0.068	0.193	30200
116.00	6 ft standard	9	4.94	0.076	0.199	18247
112.00	PD1110	9	4.96	0.086	0.198	17544
106.75	Guy	9	4.99	0.096	0.193	16711
104.00	6 ft standard	9	5.02	0.097	0.191	16328
94.00	PR-850	9	5.14	0.065	0.178	25110
84.00	RRH2x60-700	9	5.24	0.031	0.165	6571
70.00	DB212-1	9	5.08	0.096	0.152	6909
56.50	Guy	9	4.62	0.207	0.152	9886
18.00	6' Yagi	9	1.90	0.457	0.140	10105

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	288	Leg	A325N	1.000	4	2.62	53.01	0.049 ✔	1	Bolt Tension
		Torque Arm Top@284	A325N	0.875	2	3.52	24.35	0.144 ✔	1	Bolt Shear
T2	280	Leg	A325N	1.000	4	2.85	53.01	0.054 ✔	1	Bolt Tension
T3	260	Leg	A325N	1.000	4	6.07	53.01	0.115 ✔	1	Bolt Tension
		Torque Arm Top@256.5	A325N	0.875	2	4.01	24.35	0.165 ✔	1	Bolt Shear
T4	240	Leg	A325N	1.000	4	5.74	53.01	0.108 ✔	1	Bolt Tension
T5	220	Leg	A325N	1.000	4	8.41	53.01	0.159 ✔	1	Bolt Tension
		Torque Arm Top@216.5	A325N	0.875	2	5.24	24.35	0.215 ✔	1	Bolt Shear
T6	200	Leg	A325N	1.000	4	8.83	53.01	0.167 ✔	1	Bolt Tension
T7	180	Leg	A325N	1.000	4	10.76	53.01	0.203 ✔	1	Bolt Tension
		Torque Arm Top@166.75	A325N	0.875	2	7.07	24.35	0.290 ✔	1	Bolt Shear
T8	160	Leg	A325N	1.000	4	11.23	53.01	0.212 ✔	1	Bolt Tension
T9	140	Leg	A325N	1.000	4	11.50	53.01	0.217 ✔	1	Bolt Tension
T10	120	Leg	A325N	1.000	4	13.38	53.01	0.252 ✔	1	Bolt Tension
		Torque Arm Top@106.75	A325N	0.875	2	9.51	24.35	0.390 ✔	1	Bolt Shear
T11	100	Leg	A325N	1.000	4	15.23	53.01	0.287 ✔	1	Bolt Tension
T12	80	Leg	A325N	1.000	4	15.68	53.01	0.296 ✔	1	Bolt Tension

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
T13	60	Leg	A325N	1.000	4	16.57	53.01	0.312 ✔	1	Bolt Tension
		Torque Arm Top@56.5	A325N	0.875	2	3.56	24.35	0.146 ✔	1	Bolt Shear
T14	40	Leg	A325N	1.000	4	16.33	53.01	0.308 ✔	1	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T1	284.00 (A) (703)	3/4 EHS	8.16	58.30	19.00	34.98	1.000	1.841 ✔
	284.00 (A) (704)	3/4 EHS	8.16	58.30	19.06	34.98	1.000	1.835 ✔
	284.00 (B) (699)	3/4 EHS	8.16	58.30	19.00	34.98	1.000	1.841 ✔
	284.00 (B) (700)	3/4 EHS	8.16	58.30	19.01	34.98	1.000	1.840 ✔
	284.00 (C) (695)	3/4 EHS	8.16	58.30	18.98	34.98	1.000	1.843 ✔
	284.00 (C) (696)	3/4 EHS	8.16	58.30	19.04	34.98	1.000	1.838 ✔
T3	256.50 (A) (715)	3/4 EHS	8.16	58.30	18.79	34.98	1.000	1.861 ✔
	256.50 (A) (716)	3/4 EHS	8.16	58.30	18.81	34.98	1.000	1.860 ✔
	256.50 (B) (711)	3/4 EHS	8.16	58.30	18.83	34.98	1.000	1.858 ✔
	256.50 (B) (712)	3/4 EHS	8.16	58.30	18.80	34.98	1.000	1.860 ✔
	256.50 (C) (707)	3/4 EHS	8.16	58.30	18.76	34.98	1.000	1.864 ✔
	256.50 (C) (708)	3/4 EHS	8.16	58.30	18.80	34.98	1.000	1.861 ✔
T5	216.50 (A) (727)	3/4 EHS	8.16	58.30	18.55	34.98	1.000	1.886 ✔
	216.50 (A) (728)	3/4 EHS	8.16	58.30	18.57	34.98	1.000	1.883 ✔
	216.50 (B) (723)	3/4 EHS	8.16	58.30	18.61	34.98	1.000	1.879 ✔
	216.50 (B) (724)	3/4 EHS	8.16	58.30	18.60	34.98	1.000	1.881 ✔
	216.50 (C) (719)	3/4 EHS	8.16	58.30	18.52	34.98	1.000	1.888 ✔
	216.50 (C) (720)	3/4 EHS	8.16	58.30	18.56	34.98	1.000	1.884 ✔
T7	166.75 (A) (739)	3/4 EHS	8.16	58.30	18.38	34.98	1.000	1.903 ✔
	166.75 (A) (740)	3/4 EHS	8.16	58.30	18.34	34.98	1.000	1.908 ✔
	166.75 (B) (735)	3/4 EHS	8.16	58.30	18.41	34.98	1.000	1.900 ✔
	166.75 (B) (736)	3/4 EHS	8.16	58.30	18.33	34.98	1.000	1.909 ✔
	166.75 (C) (731)	3/4 EHS	8.16	58.30	18.35	34.98	1.000	1.906 ✔
	166.75 (C) (732)	3/4 EHS	8.16	58.30	18.32	34.98	1.000	1.909 ✔
T10	106.75 (A) (751)	3/4 EHS	8.16	58.30	18.47	34.98	1.000	1.894 ✔

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
	106.75 (A) (752)	3/4 EHS	8.16	58.30	18.75	34.98	1.000	1.865 ✔
	106.75 (B) (747)	3/4 EHS	8.16	58.30	18.42	34.98	1.000	1.899 ✔
	106.75 (B) (748)	3/4 EHS	8.16	58.30	18.33	34.98	1.000	1.908 ✔
	106.75 (C) (743)	3/4 EHS	8.16	58.30	18.66	34.98	1.000	1.874 ✔
	106.75 (C) (744)	3/4 EHS	8.16	58.30	18.47	34.98	1.000	1.894 ✔
T13	56.50 (A) (763)	7/16 EHS	2.91	20.80	8.60	12.48	1.000	1.451 ✔
	56.50 (A) (764)	7/16 EHS	2.91	20.80	8.67	12.48	1.000	1.439 ✔
	56.50 (B) (759)	7/16 EHS	2.91	20.80	8.58	12.48	1.000	1.454 ✔
	56.50 (B) (760)	7/16 EHS	2.91	20.80	8.61	12.48	1.000	1.449 ✔
	56.50 (C) (755)	7/16 EHS	2.91	20.80	8.61	12.48	1.000	1.449 ✔
	56.50 (C) (756)	7/16 EHS	2.91	20.80	8.66	12.48	1.000	1.441 ✔

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	323 - 288 (1)	Pipe 10.75" x 0.844" (10 #120)	35.00	0.00	0.0	26.266	-4.11	1181.96	0.003

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	323 - 288 (1)	Pipe 10.75" x 0.844" (10 #120)	27	311	0.088	0	311	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	323 - 288 (1)	Pipe 10.75" x 0.844" (10 #120)	1.36	590.98	0.002	0	453	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P_u / \phi P_n$	Ratio $M_{ux} / \phi M_{nx}$	Ratio $M_{uy} / \phi M_{ny}$	Ratio $V_u / \phi V_n$	Ratio $T_u / \phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	323 - 288 (1)	0.003	0.088	0.000	0.002	0.000	0.091 ✔	1.000	4.8.2 ✔

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 $P_u / \phi P_n$
T1	288 - 280	2" solid	8.00	3.75	90.0 K=1.00	3.142	-31.04	78.19	0.397 [1]
T2	280 - 260	2" solid	20.00	3.25	78.0 K=1.00	3.142	-34.66	90.61	0.383 [1]
T3	260 - 240	2 1/4" solid	20.00	3.25	69.3 K=1.00	3.976	-72.59	125.90	0.577 [1]
T4	240 - 220	2 1/4" solid	20.00	3.25	69.3 K=1.00	3.976	-72.23	125.90	0.574 [1]
T5	220 - 200	2 1/2" solid	20.00	3.25	62.4 K=1.00	4.909	-99.72	166.16	0.600 [1]
T6	200 - 180	2 1/2" solid	20.00	3.25	62.4 K=1.00	4.909	-107.14	166.16	0.645 [1]
T7	180 - 160	2 3/4" solid	20.00	3.25	56.7 K=1.00	5.940	-128.25	211.24	0.607 [1]
T8	160 - 140	2 1/2" solid	20.00	3.25	62.4 K=1.00	4.909	-133.68	166.16	0.805 [1]
T9	140 - 120	2 3/4" solid	20.00	3.25	56.7 K=1.00	5.940	-137.40	211.24	0.650 [1]
T10	120 - 100	2 3/4" solid	20.00	3.25	56.7 K=1.00	5.940	-159.28	211.24	0.754 [1]
T11	100 - 80	3" solid	20.00	3.25	52.0 K=1.00	7.069	-180.56	261.02	0.692 [1]
T12	80 - 60	3" solid	20.00	3.25	52.0 K=1.00	7.069	-186.95	261.02	0.716 [1]
T13	60 - 40	3" solid	20.00	3.25	52.0 K=1.00	7.069	-197.12	261.02	0.755 [1]
T14	40 - 20	3" solid	20.00	3.25	52.0 K=1.00	7.069	-197.82	261.02	0.758 [1]
T15	20 - 6.75	3" solid	13.25	3.19	51.0 K=1.00	7.069	-194.31	263.00	0.739 [1]
T16	6.75 - 0	3" solid	7.07	1.97	31.4 K=1.00	7.069	-199.67	295.91	0.675 [1]

[1] $P_u / \phi P_n$ controls

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $M_{ux} / \phi M_{nx}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $M_{uy} / \phi M_{ny}$
T1	288 - 280	2" solid	0	5	0.000	0	5	0.000
T2	280 - 260	2" solid	0	5	0.000	0	5	0.000
T3	260 - 240	2 1/4" solid	0	7	0.000	0	7	0.000
T4	240 - 220	2 1/4" solid	0	7	0.000	0	7	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T5	220 - 200	2 1/2" solid	0	10	0.000	0	10	0.000
T6	200 - 180	2 1/2" solid	0	10	0.000	0	10	0.000
T7	180 - 160	2 3/4" solid	0	13	0.000	0	13	0.000
T8	160 - 140	2 1/2" solid	0	10	0.000	0	10	0.000
T9	140 - 120	2 3/4" solid	0	13	0.000	0	13	0.000
T10	120 - 100	2 3/4" solid	0	13	0.000	0	13	0.000
T11	100 - 80	3" solid	0	17	0.000	0	17	0.000
T12	80 - 60	3" solid	0	17	0.000	0	17	0.000
T13	60 - 40	3" solid	0	17	0.000	0	17	0.000
T14	40 - 20	3" solid	0	17	0.000	0	17	0.000
T15	20 - 6.75	3" solid	0	17	0.000	0	17	0.000
T16	6.75 - 0	3" solid	0	17	0.000	0	17	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	288 - 280	2" solid	0.397	0.000	0.000	0.397 [1] ✔	1.000	4.8.1 ✔
T2	280 - 260	2" solid	0.383	0.000	0.000	0.383 [1] ✔	1.000	4.8.1 ✔
T3	260 - 240	2 1/4" solid	0.577	0.000	0.000	0.577 [1] ✔	1.000	4.8.1 ✔
T4	240 - 220	2 1/4" solid	0.574	0.000	0.000	0.574 [1] ✔	1.000	4.8.1 ✔
T5	220 - 200	2 1/2" solid	0.600	0.000	0.000	0.600 [1] ✔	1.000	4.8.1 ✔
T6	200 - 180	2 1/2" solid	0.645	0.000	0.000	0.645 [1] ✔	1.000	4.8.1 ✔
T7	180 - 160	2 3/4" solid	0.607	0.000	0.000	0.607 [1] ✔	1.000	4.8.1 ✔
T8	160 - 140	2 1/2" solid	0.805	0.000	0.000	0.805 [1] ✔	1.000	4.8.1 ✔
T9	140 - 120	2 3/4" solid	0.650	0.000	0.000	0.650 [1] ✔	1.000	4.8.1 ✔
T10	120 - 100	2 3/4" solid	0.754	0.000	0.000	0.754 [1] ✔	1.000	4.8.1 ✔
T11	100 - 80	3" solid	0.692	0.000	0.000	0.692 [1] ✔	1.000	4.8.1 ✔
T12	80 - 60	3" solid	0.716	0.000	0.000	0.716 [1] ✔	1.000	4.8.1 ✔
T13	60 - 40	3" solid	0.755	0.000	0.000	0.755 [1] ✔	1.000	4.8.1 ✔
T14	40 - 20	3" solid	0.758	0.000	0.000	0.758 [1] ✔	1.000	4.8.1 ✔
T15	20 - 6.75	3" solid	0.739	0.000	0.000	0.739 [1] ✔	1.000	4.8.1 ✔
T16	6.75 - 0	3" solid	0.675	0.000	0.000	0.675 [1] ✔	1.000	4.8.1 ✔

[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	288 - 280	1 3/8" solid	5.24	5.01	122.3 K=0.70	1.485	-2.09	21.88	0.096 [1] ✔
T2	280 - 260	1 3/8" solid	4.90	4.68	114.3 K=0.70	1.485	-1.73	24.19	0.072 [1] ✔
T3	260 - 240	1 3/8" solid	4.90	4.65	113.6 K=0.70	1.485	-4.44	24.39	0.182 [1] ✔
T4	240 - 220	1 3/8" solid	4.90	4.65	113.6 K=0.70	1.485	-5.03	24.39	0.206 [1] ✔
T5	220 - 200	1 1/2" solid	4.90	4.62	103.5 K=0.70	1.767	-5.65	32.57	0.173 [1] ✔
T6	200 - 180	1 1/4" solid	4.90	4.62	124.2 K=0.70	1.227	-7.74	17.65	0.439 [1] ✔
T7	180 - 160	1 1/2" solid	4.90	4.59	102.9 K=0.70	1.767	-8.77	32.79	0.267 [1] ✔
T8	160 - 140	1 3/8" solid	4.90	4.62	112.9 K=0.70	1.485	-5.23	24.59	0.213 [1] ✔
T9	140 - 120	1 1/4" solid	4.90	4.59	123.5 K=0.70	1.227	-4.97	17.82	0.279 [1] ✔
T10	120 - 100	1 1/2" solid	4.90	4.59	102.9 K=0.70	1.767	-13.36	32.79	0.408 [1] ✔
T11	100 - 80	1 3/8" solid	4.90	4.57	111.6 K=0.70	1.485	-12.41	24.98	0.497 [1] ✔
T12	80 - 60	1 1/4" solid	4.90	4.57	122.7 K=0.70	1.227	-4.50	17.99	0.250 [1] ✔
T13	60 - 40	1 1/4" solid	4.90	4.57	122.7 K=0.70	1.227	-4.67	17.99	0.260 [1] ✔
T14	40 - 20	1 1/4" solid	4.90	4.57	122.7 K=0.70	1.227	-5.22	17.99	0.290 [1] ✔
T15	20 - 6.75	1 1/4" solid	4.86	4.53	121.7 K=0.70	1.227	-6.97	18.23	0.382 [1] ✔

[1] $P_u / \phi P_n$ controls

Horizontal 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	288 - 280	1" solid	3.67	3.50	117.6 K=0.70	0.785	-2.32	12.83	0.181 [1] ✔
T2	280 - 260	1" solid	3.67	3.50	117.6 K=0.70	0.785	-0.60	12.83	0.047 [1] ✔
T3	260 - 240	1" solid	3.67	3.48	116.9 K=0.70	0.785	-3.88	12.98	0.299 [1] ✔
T4	240 - 220	1" solid	3.67	3.48	116.9 K=0.70	0.785	-1.25	12.98	0.096 [1] ✔
T5	220 - 200	1" solid	3.67	3.46	116.2 K=0.70	0.785	-6.80	13.14	0.518 [1] ✔
T6	200 - 180	1" solid	3.67	3.46	116.2 K=0.70	0.785	-1.86	13.14	0.141 [1] ✔
T7	180 - 160	1" solid	3.67	3.44	115.5 K=0.70	0.785	-10.04	13.30	0.755 [1] ✔
T8	160 - 140	1" solid	3.67	3.46	116.2 K=0.70	0.785	-2.32	13.14	0.176 [1] ✔
T9	140 - 120	1" solid	3.67	3.44	115.5 K=0.70	0.785	-2.38	13.30	0.179 [1] ✔

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	
T10	120 - 100	1" solid	3.67	3.44	115.5 K=0.70	0.785	-2.76	13.30	0.207 [1] ✔
T11	100 - 80	1" solid	3.67	3.42	114.8 K=0.70	0.785	-3.13	13.46	0.232 [1] ✔
T12	80 - 60	1" solid	3.67	3.42	114.8 K=0.70	0.785	-3.24	13.46	0.241 [1] ✔
T13	60 - 40	1" solid	3.67	3.42	114.8 K=0.70	0.785	-4.57	13.46	0.339 [1] ✔
T14	40 - 20	1" solid	3.67	3.42	114.8 K=0.70	0.785	-3.43	13.46	0.254 [1] ✔
T15	20 - 6.75	1" solid	3.67	3.42	114.8 K=0.70	0.785	-3.37	13.46	0.250 [1] ✔
T16	6.75 - 0	9 x 3/8	1.90	1.65	183.0 K=1.00	3.375	-0.16	22.76	0.007 [1] ✔

[1] $P_u / \phi P_n$ controls

Secondary 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	
T1	288 - 280	1" solid	1.83	1.75	81.5 K=0.97	0.785	-0.00	17.94	0.000 [1] ✔
T2	280 - 260	1" solid	1.83	1.75	81.5 K=0.97	0.785	-0.00	17.94	0.000 [1] ✔
T3	260 - 240	1" solid	1.83	1.74	81.3 K=0.97	0.785	-0.00	17.97	0.000 [1] ✔
T4	240 - 220	1" solid	1.83	1.74	81.3 K=0.97	0.785	-0.00	17.97	0.000 [1] ✔
T5	220 - 200	1" solid	1.83	1.73	81.1 K=0.98	0.785	-0.00	17.99	0.000 [1] ✔
T6	200 - 180	1" solid	1.83	1.73	81.1 K=0.98	0.785	-0.00	17.99	0.000 [1] ✔
T7	180 - 160	1" solid	1.83	1.72	81.0 K=0.98	0.785	-0.00	18.02	0.000 [1] ✔
T8	160 - 140	1" solid	1.83	1.73	81.1 K=0.98	0.785	-0.00	17.99	0.000 [1] ✔
T9	140 - 120	1" solid	1.83	1.72	81.0 K=0.98	0.785	-0.00	18.02	0.000 [1] ✔
T10	120 - 100	1" solid	1.83	1.72	81.0 K=0.98	0.785	-0.00	18.02	0.000 [1] ✔
T11	100 - 80	1" solid	1.83	1.71	80.8 K=0.98	0.785	-0.00	18.05	0.000 [1] ✔
T12	80 - 60	1" solid	1.83	1.71	80.8 K=0.98	0.785	-0.00	18.05	0.000 [1] ✔
T13	60 - 40	1" solid	1.83	1.71	80.8 K=0.98	0.785	-0.00	18.05	0.000 [1] ✔
T14	40 - 20	1" solid	1.83	1.71	80.8 K=0.98	0.785	-0.00	18.05	0.000 [1] ✔
T15	20 - 6.75	1" solid	1.83	1.71	80.8 K=0.98	0.785	-0.00	18.05	0.000 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt 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 $\frac{P_u}{\phi P_n}$
T4	240 - 220	1" solid	3.67	3.48	116.9 K=0.70	0.785	-0.74	12.39	0.060 [1] ✔
T5	220 - 200	1" solid	3.67	3.46	116.2 K=0.70	0.785	-0.33	12.50	0.026 [1] ✔
T6	200 - 180	1" solid	3.67	3.46	116.2 K=0.70	0.785	-0.35	12.50	0.028 [1] ✔
T7	180 - 160	1" solid	3.67	3.44	115.5 K=0.70	0.785	-1.56	12.61	0.123 [1] ✔
T8	160 - 140	1" solid	3.67	3.46	116.2 K=0.70	0.785	-0.86	12.50	0.069 [1] ✔
T10	120 - 100	1" solid	3.67	3.44	115.5 K=0.70	0.785	-0.69	12.61	0.054 [1] ✔
T11	100 - 80	1" solid	3.67	3.42	114.8 K=0.70	0.785	-1.76	12.72	0.139 [1] ✔
T13	60 - 40	1" solid	3.67	3.42	114.8 K=0.70	0.785	-0.21	12.72	0.016 [1] ✔
T15	20 - 6.75	1" solid	3.67	3.42	114.8 K=0.70	0.785	-0.56	12.72	0.044 [1] ✔

[1] $P_u / \phi P_n$ controls

Bottom Girt 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	288 - 280	1" solid	3.67	3.50	117.6 K=0.70	0.785	-2.21	12.29	0.180 [1] ✔
T2	280 - 260	1" solid	3.67	3.50	117.6 K=0.70	0.785	-1.31	12.29	0.107 [1] ✔
T3	260 - 240	1" solid	3.67	3.48	116.9 K=0.70	0.785	-0.49	12.39	0.039 [1] ✔
T4	240 - 220	1" solid	3.67	3.48	116.9 K=0.70	0.785	-1.68	12.39	0.135 [1] ✔
T5	220 - 200	1" solid	3.67	3.46	116.2 K=0.70	0.785	-0.44	12.50	0.035 [1] ✔
T6	200 - 180	1" solid	3.67	3.46	116.2 K=0.70	0.785	-1.39	12.50	0.111 [1] ✔
T7	180 - 160	1" solid	3.67	3.44	115.5 K=0.70	0.785	-1.04	12.61	0.083 [1] ✔
T8	160 - 140	1" solid	3.67	3.46	116.2 K=0.70	0.785	-0.21	12.50	0.017 [1] ✔
T9	140 - 120	1" solid	3.67	3.44	115.5 K=0.70	0.785	-0.44	12.61	0.035 [1] ✔
T10	120 - 100	1" solid	3.67	3.44	115.5 K=0.70	0.785	-1.88	12.61	0.149 [1] ✔
T11	100 - 80	1" solid	3.67	3.42	114.8 K=0.70	0.785	-0.05	12.72	0.004 [1] ✔
T12	80 - 60	1" solid	3.67	3.42	114.8 K=0.70	0.785	-0.31	12.72	0.024 [1] ✔
T14	40 - 20	1" solid	3.67	3.42	114.8 K=0.70	0.785	-0.17	12.72	0.014 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] P_u / ϕP_n controls

Top Guy Pull-Off 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 $\frac{P_u}{\phi P_n}$
T10	120 - 100	1" S.R. w/ 1" S.R. crosby clipped	3.67	3.44	81.2 K=0.70	0.790	-15.08	18.10	0.834 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T10	120 - 100	1" S.R. w/ 1" S.R. crosby clipped	0	0	0.000	0	1	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T10	120 - 100	1" S.R. w/ 1" S.R. crosby clipped	0.834	0.000	0.000	0.834 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	260 - 240 (709)	C15x33.9	4.00	3.91	51.9 K=1.00	9.960	-0.39	280.02	0.001
T3	260 - 240 (710)	C15x33.9	4.00	3.91	51.9 K=1.00	9.960	-0.39	280.02	0.001
T3	260 - 240 (713)	C15x33.9	4.00	3.91	51.9 K=1.00	9.960	-0.59	280.02	0.002
T3	260 - 240 (714)	C15x33.9	4.00	3.91	51.9 K=1.00	9.960	-0.60	280.02	0.002
T3	260 - 240 (717)	C15x33.9	4.00	3.91	51.9 K=1.00	9.960	-0.55	280.02	0.002
T3	260 - 240 (718)	C15x33.9	4.00	3.91	51.9 K=1.00	9.960	-0.54	280.02	0.002
T5	220 - 200 (721)	C15x33.9	4.00	3.90	51.8 K=1.00	9.960	-1.16	280.23	0.004

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	220 - 200 (722)	C15x33.9	4.00	3.90	51.8 K=1.00	9.960	-1.07	280.23	0.004
T5	220 - 200 (725)	C15x33.9	4.00	3.90	51.8 K=1.00	9.960	-1.16	280.23	0.004
T5	220 - 200 (726)	C15x33.9	4.00	3.90	51.8 K=1.00	9.960	-1.13	280.23	0.004
T5	220 - 200 (729)	C15x33.9	4.00	3.90	51.8 K=1.00	9.960	-1.04	280.23	0.004
T5	220 - 200 (730)	C15x33.9	4.00	3.90	51.8 K=1.00	9.960	-1.04	280.23	0.004
T7	180 - 160 (733)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-2.98	280.44	0.011
T7	180 - 160 (734)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-3.07	280.44	0.011
T7	180 - 160 (737)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-2.82	280.44	0.010
T7	180 - 160 (738)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-2.89	280.44	0.010
T7	180 - 160 (741)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-2.54	280.44	0.009
T7	180 - 160 (742)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-2.72	280.44	0.010
T10	120 - 100 (745)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-8.99	280.44	0.032
T10	120 - 100 (746)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-5.96	280.44	0.021
T10	120 - 100 (749)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-5.28	280.44	0.019
T10	120 - 100 (750)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-5.47	280.44	0.019
T10	120 - 100 (753)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-4.70	280.44	0.017
T10	120 - 100 (754)	C15x33.9	4.00	3.89	51.6 K=1.00	9.960	-4.90	280.44	0.017
T13	60 - 40 (757)	C15x33.9	4.00	3.88	51.5 K=1.00	9.960	-3.29	280.65	0.012
T13	60 - 40 (758)	C15x33.9	4.00	3.88	51.5 K=1.00	9.960	-3.25	280.65	0.012
T13	60 - 40 (761)	C15x33.9	4.00	3.88	51.5 K=1.00	9.960	-3.16	280.65	0.011
T13	60 - 40 (762)	C15x33.9	4.00	3.88	51.5 K=1.00	9.960	-3.22	280.65	0.011
T13	60 - 40 (765)	C15x33.9	4.00	3.88	51.5 K=1.00	9.960	-3.06	280.65	0.011
T13	60 - 40 (766)	C15x33.9	4.00	3.88	51.5 K=1.00	9.960	-3.03	280.65	0.011

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T3	260 - 240 (709)	C15x33.9	-41	113	0.365	0	17	0.000
T3	260 - 240 (710)	C15x33.9	-41	113	0.366	0	17	0.000
T3	260 - 240 (713)	C15x33.9	-42	113	0.369	0	17	0.000
T3	260 - 240 (714)	C15x33.9	-41	113	0.366	0	17	0.000
T3	260 - 240 (717)	C15x33.9	-42	113	0.368	0	17	0.000
T3	260 - 240 (718)	C15x33.9	-42	113	0.368	0	17	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T5	220 - 200 (721)	C15x33.9	-43	113	0.381	0	17	0.000
T5	220 - 200 (722)	C15x33.9	-43	113	0.382	0	17	0.000
T5	220 - 200 (725)	C15x33.9	-43	113	0.382	0	17	0.000
T5	220 - 200 (726)	C15x33.9	-43	113	0.381	0	17	0.000
T5	220 - 200 (729)	C15x33.9	-43	113	0.381	0	17	0.000
T5	220 - 200 (730)	C15x33.9	-43	113	0.382	0	17	0.000
T7	180 - 160 (733)	C15x33.9	-39	113	0.347	0	17	0.000
T7	180 - 160 (734)	C15x33.9	-40	113	0.349	0	17	0.000
T7	180 - 160 (737)	C15x33.9	-39	113	0.348	0	17	0.000
T7	180 - 160 (738)	C15x33.9	-39	113	0.343	0	17	0.000
T7	180 - 160 (741)	C15x33.9	-39	113	0.344	0	17	0.000
T7	180 - 160 (742)	C15x33.9	-39	113	0.347	0	17	0.000
T10	120 - 100 (745)	C15x33.9	-30	113	0.267	0	17	0.000
T10	120 - 100 (746)	C15x33.9	-31	113	0.274	0	17	0.000
T10	120 - 100 (749)	C15x33.9	-31	113	0.275	0	17	0.000
T10	120 - 100 (750)	C15x33.9	-30	113	0.267	0	17	0.000
T10	120 - 100 (753)	C15x33.9	-30	113	0.267	0	17	0.000
T10	120 - 100 (754)	C15x33.9	-31	113	0.272	0	17	0.000
T13	60 - 40 (757)	C15x33.9	-7	113	0.058	0	17	0.000
T13	60 - 40 (758)	C15x33.9	-7	113	0.058	0	17	0.000
T13	60 - 40 (761)	C15x33.9	-6	113	0.057	0	17	0.000
T13	60 - 40 (762)	C15x33.9	-6	113	0.057	0	17	0.000
T13	60 - 40 (765)	C15x33.9	-6	113	0.056	0	17	0.000
T13	60 - 40 (766)	C15x33.9	-6	113	0.057	0	17	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T3	260 - 240 (709)	C15x33.9	0.001	0.365	0.000	0.366 ✔	1.000	4.8.1 ✔
T3	260 - 240 (710)	C15x33.9	0.001	0.366	0.000	0.366 ✔	1.000	4.8.1 ✔
T3	260 - 240 (713)	C15x33.9	0.002	0.369	0.000	0.370 ✔	1.000	4.8.1 ✔
T3	260 - 240 (714)	C15x33.9	0.002	0.366	0.000	0.367 ✔	1.000	4.8.1 ✔
T3	260 - 240 (717)	C15x33.9	0.002	0.368	0.000	0.369 ✔	1.000	4.8.1 ✔
T3	260 - 240 (718)	C15x33.9	0.002	0.368	0.000	0.369 ✔	1.000	4.8.1 ✔
T5	220 - 200 (721)	C15x33.9	0.004	0.381	0.000	0.383 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $P_u / \phi P_n$	Ratio $M_{ux} / \phi M_{nx}$	Ratio $M_{uy} / \phi M_{ny}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	220 - 200 (722)	C15x33.9	0.004	0.382	0.000	0.384 ✔	1.000	4.8.1 ✔
T5	220 - 200 (725)	C15x33.9	0.004	0.382	0.000	0.385 ✔	1.000	4.8.1 ✔
T5	220 - 200 (726)	C15x33.9	0.004	0.381	0.000	0.383 ✔	1.000	4.8.1 ✔
T5	220 - 200 (729)	C15x33.9	0.004	0.381	0.000	0.383 ✔	1.000	4.8.1 ✔
T5	220 - 200 (730)	C15x33.9	0.004	0.382	0.000	0.384 ✔	1.000	4.8.1 ✔
T7	180 - 160 (733)	C15x33.9	0.011	0.347	0.000	0.352 ✔	1.000	4.8.1 ✔
T7	180 - 160 (734)	C15x33.9	0.011	0.349	0.000	0.354 ✔	1.000	4.8.1 ✔
T7	180 - 160 (737)	C15x33.9	0.010	0.348	0.000	0.353 ✔	1.000	4.8.1 ✔
T7	180 - 160 (738)	C15x33.9	0.010	0.343	0.000	0.348 ✔	1.000	4.8.1 ✔
T7	180 - 160 (741)	C15x33.9	0.009	0.344	0.000	0.349 ✔	1.000	4.8.1 ✔
T7	180 - 160 (742)	C15x33.9	0.010	0.347	0.000	0.352 ✔	1.000	4.8.1 ✔
T10	120 - 100 (745)	C15x33.9	0.032	0.267	0.000	0.283 ✔	1.000	4.8.1 ✔
T10	120 - 100 (746)	C15x33.9	0.021	0.274	0.000	0.285 ✔	1.000	4.8.1 ✔
T10	120 - 100 (749)	C15x33.9	0.019	0.275	0.000	0.284 ✔	1.000	4.8.1 ✔
T10	120 - 100 (750)	C15x33.9	0.019	0.267	0.000	0.277 ✔	1.000	4.8.1 ✔
T10	120 - 100 (753)	C15x33.9	0.017	0.267	0.000	0.276 ✔	1.000	4.8.1 ✔
T10	120 - 100 (754)	C15x33.9	0.017	0.272	0.000	0.280 ✔	1.000	4.8.1 ✔
T13	60 - 40 (757)	C15x33.9	0.012	0.058	0.000	0.063 ✔	1.000	4.8.1 ✔
T13	60 - 40 (758)	C15x33.9	0.012	0.058	0.000	0.064 ✔	1.000	4.8.1 ✔
T13	60 - 40 (761)	C15x33.9	0.011	0.057	0.000	0.063 ✔	1.000	4.8.1 ✔
T13	60 - 40 (762)	C15x33.9	0.011	0.057	0.000	0.063 ✔	1.000	4.8.1 ✔
T13	60 - 40 (765)	C15x33.9	0.011	0.056	0.000	0.062 ✔	1.000	4.8.1 ✔
T13	60 - 40 (766)	C15x33.9	0.011	0.057	0.000	0.062 ✔	1.000	4.8.1 ✔

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 $P_u / \phi P_n$
T1	288 - 280	2" solid	8.00	3.75	90.0	3.142	8.00	141.37	0.057 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] $P_u / \phi P_n$ controls

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	288 - 280	2" solid	0	5	0.000	0	5	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	288 - 280	2" solid	0.057	0.000	0.000	0.057 [1] ✔	1.000	4.8.1 ✔

[1] $P_u / \phi P_n$ controls

Diagonal 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	288 - 280	1 3/8" solid	5.24	5.01	174.8	1.485	1.58	48.11	0.033 [1] ✔
T2	280 - 260	1 3/8" solid	4.90	4.68	163.3	1.485	1.22	48.11	0.025 [1] ✔
T3	260 - 240	1 3/8" solid	4.90	4.65	162.3	1.485	3.46	48.11	0.072 [1] ✔
T4	240 - 220	1 3/8" solid	4.90	4.65	162.3	1.485	4.15	48.11	0.086 [1] ✔
T5	220 - 200	1 1/2" solid	4.90	4.62	147.9	1.767	4.26	57.26	0.074 [1] ✔
T6	200 - 180	1 1/4" solid	4.90	4.62	177.5	1.227	6.21	39.76	0.156 [1] ✔
T7	180 - 160	1 1/2" solid	4.90	4.59	147.0	1.767	7.77	57.26	0.136 [1] ✔
T8	160 - 140	1 3/8" solid	4.90	4.62	161.3	1.485	3.90	48.11	0.081 [1] ✔
T9	140 - 120	1 1/4" solid	4.90	4.59	176.4	1.227	3.17	39.76	0.080 [1] ✔
T10	120 - 100	1 1/2" solid	4.90	4.59	147.0	1.767	11.45	57.26	0.200 [1] ✔
T11	100 - 80	1 3/8" solid	4.90	4.57	159.4	1.485	10.50	48.11	0.218 [1] ✔
T12	80 - 60	1 1/4" solid	4.90	4.57	175.3	1.227	2.51	39.76	0.063 [1] ✔
T13	60 - 40	1 1/4" solid	4.90	4.57	175.3	1.227	2.79	39.76	0.070 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T14	40 - 20	1 1/4" solid	4.90	4.57	175.3	1.227	2.90	39.76	0.073 [1]
T15	20 - 6.75	1 1/4" solid	4.86	4.53	173.8	1.227	5.15	39.76	0.130 [1]

[1] P_u / ϕP_n controls

Horizontal 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	288 - 280	1" solid	3.67	3.50	168.0	0.785	2.92	35.34	0.083 [1]
T2	280 - 260	1" solid	3.67	3.50	168.0	0.785	0.60	35.34	0.017 [1]
T3	260 - 240	1" solid	3.67	3.48	167.0	0.785	4.52	35.34	0.128 [1]
T4	240 - 220	1" solid	3.67	3.48	167.0	0.785	1.25	35.34	0.035 [1]
T5	220 - 200	1" solid	3.67	3.46	166.0	0.785	7.84	35.34	0.222 [1]
T6	200 - 180	1" solid	3.67	3.46	166.0	0.785	2.45	35.34	0.069 [1]
T7	180 - 160	1" solid	3.67	3.44	165.0	0.785	11.81	35.34	0.334 [1]
T8	160 - 140	1" solid	3.67	3.46	166.0	0.785	2.32	35.34	0.066 [1]
T9	140 - 120	1" solid	3.67	3.44	165.0	0.785	2.38	35.34	0.067 [1]
T10	120 - 100	1" solid	3.67	3.44	165.0	0.785	2.76	35.34	0.078 [1]
T11	100 - 80	1" solid	3.67	3.42	164.0	0.785	3.13	35.34	0.088 [1]
T12	80 - 60	1" solid	3.67	3.42	164.0	0.785	3.24	35.34	0.092 [1]
T13	60 - 40	1" solid	3.67	3.42	164.0	0.785	6.56	35.34	0.186 [1]
T14	40 - 20	1" solid	3.67	3.42	164.0	0.785	3.43	35.34	0.097 [1]
T15	20 - 6.75	1" solid	3.67	3.42	164.0	0.785	3.37	35.34	0.095 [1]
T16	6.75 - 0	9 x 3/8	2.78	2.53	280.9	3.375	0.74	151.88	0.005 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal 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 $\frac{P_u}{\phi P_n}$

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	288 - 280	1" solid	1.83	1.75	84.0	0.785	0.00	25.45	0.000 [1] ✔
T2	280 - 260	1" solid	1.83	1.75	84.0	0.785	0.00	25.45	0.000 [1] ✔
T3	260 - 240	1" solid	1.83	1.74	83.5	0.785	0.00	25.45	0.000 [1] ✔
T4	240 - 220	1" solid	1.83	1.74	83.5	0.785	0.00	25.45	0.000 [1] ✔
T5	220 - 200	1" solid	1.83	1.73	83.0	0.785	0.00	25.45	0.000 [1] ✔
T6	200 - 180	1" solid	1.83	1.73	83.0	0.785	0.00	25.45	0.000 [1] ✔
T7	180 - 160	1" solid	1.83	1.72	82.5	0.785	0.00	25.45	0.000 [1] ✔
T8	160 - 140	1" solid	1.83	1.73	83.0	0.785	0.00	25.45	0.000 [1] ✔
T9	140 - 120	1" solid	1.83	1.72	82.5	0.785	0.00	25.45	0.000 [1] ✔
T10	120 - 100	1" solid	1.83	1.72	82.5	0.785	0.00	25.45	0.000 [1] ✔
T11	100 - 80	1" solid	1.83	1.71	82.0	0.785	0.00	25.45	0.000 [1] ✔
T12	80 - 60	1" solid	1.83	1.71	82.0	0.785	0.00	25.45	0.000 [1] ✔
T13	60 - 40	1" solid	1.83	1.71	82.0	0.785	0.00	25.45	0.000 [1] ✔
T14	40 - 20	1" solid	1.83	1.71	82.0	0.785	0.00	25.45	0.000 [1] ✔
T15	20 - 6.75	1" solid	1.83	1.71	82.0	0.785	0.00	25.45	0.000 [1] ✔

[1] $P_u / \phi P_n$ 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	288 - 280	1" solid	3.67	3.50	168.0	0.785	3.58	25.45	0.140 [1] ✔
T2	280 - 260	1" solid	3.67	3.50	168.0	0.785	1.60	25.45	0.063 [1] ✔
T3	260 - 240	1" solid	3.67	3.48	167.0	0.785	2.13	25.45	0.084 [1] ✔
T4	240 - 220	1" solid	3.67	3.48	167.0	0.785	0.84	25.45	0.033 [1] ✔
T5	220 - 200	1" solid	3.67	3.46	166.0	0.785	2.24	25.45	0.088 [1] ✔
T6	200 - 180	1" solid	3.67	3.46	166.0	0.785	0.60	25.45	0.024 [1] ✔
T7	180 - 160	1" solid	3.67	3.44	165.0	0.785	1.80	25.45	0.071 [1] ✔
T8	160 - 140	1" solid	3.67	3.46	166.0	0.785	1.24	25.45	0.049 [1] ✔
T9	140 - 120	1" solid	3.67	3.44	165.0	0.785	0.50	25.45	0.020 [1] ✔

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	
T10	120 - 100	1" solid	3.67	3.44	165.0	0.785	1.20	25.45	0.047 [1] ✔
T11	100 - 80	1" solid	3.67	3.42	164.0	0.785	2.29	25.45	0.090 [1] ✔
T12	80 - 60	1" solid	3.67	3.42	164.0	0.785	0.81	25.45	0.032 [1] ✔
T13	60 - 40	1" solid	3.67	3.42	164.0	0.785	1.14	25.45	0.045 [1] ✔
T14	40 - 20	1" solid	3.67	3.42	164.0	0.785	0.82	25.45	0.032 [1] ✔
T15	20 - 6.75	1" solid	3.67	3.42	164.0	0.785	1.26	25.45	0.049 [1] ✔
T16	6.75 - 0	12x3/8	3.67	3.42	378.7	4.500	29.45	145.80	0.202 [1] ✔

[1] $P_u / \phi P_n$ controls

Bottom 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	
T3	260 - 240	1" solid	3.67	3.48	167.0	0.785	0.77	25.45	0.030 [1] ✔
T4	240 - 220	1" solid	3.67	3.48	167.0	0.785	0.92	25.45	0.036 [1] ✔
T5	220 - 200	1" solid	3.67	3.46	166.0	0.785	0.99	25.45	0.039 [1] ✔
T6	200 - 180	1" solid	3.67	3.46	166.0	0.785	1.96	25.45	0.077 [1] ✔
T7	180 - 160	1" solid	3.67	3.44	165.0	0.785	1.84	25.45	0.072 [1] ✔
T8	160 - 140	1" solid	3.67	3.46	166.0	0.785	0.59	25.45	0.023 [1] ✔
T9	140 - 120	1" solid	3.67	3.44	165.0	0.785	1.06	25.45	0.042 [1] ✔
T10	120 - 100	1" solid	3.67	3.44	165.0	0.785	2.84	25.45	0.112 [1] ✔
T11	100 - 80	1" solid	3.67	3.42	164.0	0.785	0.89	25.45	0.035 [1] ✔
T12	80 - 60	1" solid	3.67	3.42	164.0	0.785	0.92	25.45	0.036 [1] ✔
T13	60 - 40	1" solid	3.67	3.42	164.0	0.785	0.82	25.45	0.032 [1] ✔
T14	40 - 20	1" solid	3.67	3.42	164.0	0.785	1.05	25.45	0.041 [1] ✔
T15	20 - 6.75	1" solid	3.67	3.42	164.0	0.785	4.82	25.45	0.189 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Guy Pull-Off 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 $\frac{P_u}{\phi P_n}$
T10	120 - 100	1" S.R. w/ 1" S.R. crosby clipped	3.67	3.44	115.9	0.790	16.74	25.60	0.654 [1]

[1] $P_u / \phi P_n$ controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T10	120 - 100	1" S.R. w/ 1" S.R. crosby clipped	0	0	0.000	0	1	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T10	120 - 100	1" S.R. w/ 1" S.R. crosby clipped	0.654	0.000	0.000	0.654 [1] ✔	1.000	4.8.1 ✔

[1] $P_u / \phi P_n$ controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	288 - 280 (697)	C15x33.9	4.00	3.92	52.1	9.960	3.74	322.70	0.012
T1	288 - 280 (698)	C15x33.9	4.00	3.92	52.1	9.960	3.84	322.70	0.012
T1	288 - 280 (701)	C15x33.9	4.00	3.92	52.1	9.960	3.79	322.70	0.012
T1	288 - 280 (702)	C15x33.9	4.00	3.92	52.1	9.960	3.72	322.70	0.012
T1	288 - 280 (705)	C15x33.9	4.00	3.92	52.1	9.960	3.76	322.70	0.012
T1	288 - 280 (706)	C15x33.9	4.00	3.92	52.1	9.960	3.79	322.70	0.012
T3	260 - 240 (709)	C15x33.9	4.00	3.91	51.9	9.960	3.77	322.70	0.012
T3	260 - 240 (710)	C15x33.9	4.00	3.91	51.9	9.960	3.83	322.70	0.012
T3	260 - 240 (713)	C15x33.9	4.00	3.91	51.9	9.960	3.74	322.70	0.012
T3	260 - 240 (714)	C15x33.9	4.00	3.91	51.9	9.960	3.76	322.70	0.012
T3	260 - 240 (717)	C15x33.9	4.00	3.91	51.9	9.960	3.78	322.70	0.012
T3	260 - 240 (718)	C15x33.9	4.00	3.91	51.9	9.960	3.78	322.70	0.012
T5	220 - 200 (721)	C15x33.9	4.00	3.90	51.8	9.960	3.83	322.70	0.012

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	220 - 200 (722)	C15x33.9	4.00	3.90	51.8	9.960	3.91	322.70	0.012
T5	220 - 200 (725)	C15x33.9	4.00	3.90	51.8	9.960	3.82	322.70	0.012
T5	220 - 200 (726)	C15x33.9	4.00	3.90	51.8	9.960	3.88	322.70	0.012
T5	220 - 200 (729)	C15x33.9	4.00	3.90	51.8	9.960	3.85	322.70	0.012
T5	220 - 200 (730)	C15x33.9	4.00	3.90	51.8	9.960	3.92	322.70	0.012
T7	180 - 160 (733)	C15x33.9	4.00	3.89	51.6	9.960	4.06	322.70	0.013
T7	180 - 160 (734)	C15x33.9	4.00	3.89	51.6	9.960	4.09	322.70	0.013
T7	180 - 160 (737)	C15x33.9	4.00	3.89	51.6	9.960	4.17	322.70	0.013
T7	180 - 160 (738)	C15x33.9	4.00	3.89	51.6	9.960	4.01	322.70	0.012
T7	180 - 160 (741)	C15x33.9	4.00	3.89	51.6	9.960	4.18	322.70	0.013
T7	180 - 160 (742)	C15x33.9	4.00	3.89	51.6	9.960	4.11	322.70	0.013
T10	120 - 100 (745)	C15x33.9	4.00	3.89	51.6	9.960	4.12	322.70	0.013
T10	120 - 100 (746)	C15x33.9	4.00	3.89	51.6	9.960	4.09	322.70	0.013
T10	120 - 100 (749)	C15x33.9	4.00	3.89	51.6	9.960	5.76	322.70	0.018
T10	120 - 100 (750)	C15x33.9	4.00	3.89	51.6	9.960	4.14	322.70	0.013
T10	120 - 100 (753)	C15x33.9	4.00	3.89	51.6	9.960	6.04	322.70	0.019
T10	120 - 100 (754)	C15x33.9	4.00	3.89	51.6	9.960	5.79	322.70	0.018
T13	60 - 40 (757)	C15x33.9	4.00	3.88	51.5	9.960	3.46	322.70	0.011
T13	60 - 40 (758)	C15x33.9	4.00	3.88	51.5	9.960	3.61	322.70	0.011
T13	60 - 40 (761)	C15x33.9	4.00	3.88	51.5	9.960	3.61	322.70	0.011
T13	60 - 40 (762)	C15x33.9	4.00	3.88	51.5	9.960	3.47	322.70	0.011
T13	60 - 40 (765)	C15x33.9	4.00	3.88	51.5	9.960	3.57	322.70	0.011
T13	60 - 40 (766)	C15x33.9	4.00	3.88	51.5	9.960	3.60	322.70	0.011

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	288 - 280 (697)	C15x33.9	-62	113	0.550	0	17	0.000
T1	288 - 280 (698)	C15x33.9	-63	113	0.551	0	17	0.000
T1	288 - 280 (701)	C15x33.9	-62	113	0.551	0	17	0.000
T1	288 - 280 (702)	C15x33.9	-62	113	0.550	0	17	0.000
T1	288 - 280 (705)	C15x33.9	-62	113	0.549	0	17	0.000
T1	288 - 280 (706)	C15x33.9	-63	113	0.552	0	17	0.000
T3	260 - 240 (709)	C15x33.9	-59	113	0.523	0	17	0.000
T3	260 - 240 (710)	C15x33.9	-59	113	0.524	0	17	0.000
T3	260 - 240 (713)	C15x33.9	-59	113	0.525	0	17	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T3	260 - 240 (714)	C15x33.9	-59	113	0.522	0	17	0.000
T3	260 - 240 (717)	C15x33.9	-59	113	0.522	0	17	0.000
T3	260 - 240 (718)	C15x33.9	-60	113	0.525	0	17	0.000
T5	220 - 200 (721)	C15x33.9	-54	113	0.479	0	17	0.000
T5	220 - 200 (722)	C15x33.9	-55	113	0.481	0	17	0.000
T5	220 - 200 (725)	C15x33.9	-55	113	0.482	0	17	0.000
T5	220 - 200 (726)	C15x33.9	-54	113	0.479	0	17	0.000
T5	220 - 200 (729)	C15x33.9	-54	113	0.480	0	17	0.000
T5	220 - 200 (730)	C15x33.9	-55	113	0.481	0	17	0.000
T7	180 - 160 (733)	C15x33.9	-47	113	0.411	0	17	0.000
T7	180 - 160 (734)	C15x33.9	-47	113	0.413	0	17	0.000
T7	180 - 160 (737)	C15x33.9	-47	113	0.413	0	17	0.000
T7	180 - 160 (738)	C15x33.9	-47	113	0.411	0	17	0.000
T7	180 - 160 (741)	C15x33.9	-47	113	0.413	0	17	0.000
T7	180 - 160 (742)	C15x33.9	-47	113	0.411	0	17	0.000
T10	120 - 100 (745)	C15x33.9	-35	113	0.307	0	17	0.000
T10	120 - 100 (746)	C15x33.9	-35	113	0.309	0	17	0.000
T10	120 - 100 (749)	C15x33.9	-35	113	0.307	0	17	0.000
T10	120 - 100 (750)	C15x33.9	-35	113	0.305	0	17	0.000
T10	120 - 100 (753)	C15x33.9	-35	113	0.304	0	17	0.000
T10	120 - 100 (754)	C15x33.9	-35	113	0.304	0	17	0.000
T13	60 - 40 (757)	C15x33.9	-12	113	0.103	0	17	0.000
T13	60 - 40 (758)	C15x33.9	-12	113	0.103	0	17	0.000
T13	60 - 40 (761)	C15x33.9	-12	113	0.103	0	17	0.000
T13	60 - 40 (762)	C15x33.9	-12	113	0.102	0	17	0.000
T13	60 - 40 (765)	C15x33.9	-12	113	0.102	0	17	0.000
T13	60 - 40 (766)	C15x33.9	-12	113	0.104	0	17	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	288 - 280 (697)	C15x33.9	0.012	0.550	0.000	0.556 ✔	1.000	4.8.1 ✔
T1	288 - 280 (698)	C15x33.9	0.012	0.551	0.000	0.557 ✔	1.000	4.8.1 ✔
T1	288 - 280 (701)	C15x33.9	0.012	0.551	0.000	0.557 ✔	1.000	4.8.1 ✔
T1	288 - 280 (702)	C15x33.9	0.012	0.550	0.000	0.555 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	288 - 280 (705)	C15x33.9	0.012	0.549	0.000	0.555 ✔	1.000	4.8.1 ✔
T1	288 - 280 (706)	C15x33.9	0.012	0.552	0.000	0.558 ✔	1.000	4.8.1 ✔
T3	260 - 240 (709)	C15x33.9	0.012	0.523	0.000	0.528 ✔	1.000	4.8.1 ✔
T3	260 - 240 (710)	C15x33.9	0.012	0.524	0.000	0.530 ✔	1.000	4.8.1 ✔
T3	260 - 240 (713)	C15x33.9	0.012	0.525	0.000	0.530 ✔	1.000	4.8.1 ✔
T3	260 - 240 (714)	C15x33.9	0.012	0.522	0.000	0.528 ✔	1.000	4.8.1 ✔
T3	260 - 240 (717)	C15x33.9	0.012	0.522	0.000	0.528 ✔	1.000	4.8.1 ✔
T3	260 - 240 (718)	C15x33.9	0.012	0.525	0.000	0.531 ✔	1.000	4.8.1 ✔
T5	220 - 200 (721)	C15x33.9	0.012	0.479	0.000	0.485 ✔	1.000	4.8.1 ✔
T5	220 - 200 (722)	C15x33.9	0.012	0.481	0.000	0.487 ✔	1.000	4.8.1 ✔
T5	220 - 200 (725)	C15x33.9	0.012	0.482	0.000	0.488 ✔	1.000	4.8.1 ✔
T5	220 - 200 (726)	C15x33.9	0.012	0.479	0.000	0.485 ✔	1.000	4.8.1 ✔
T5	220 - 200 (729)	C15x33.9	0.012	0.480	0.000	0.486 ✔	1.000	4.8.1 ✔
T5	220 - 200 (730)	C15x33.9	0.012	0.481	0.000	0.488 ✔	1.000	4.8.1 ✔
T7	180 - 160 (733)	C15x33.9	0.013	0.411	0.000	0.417 ✔	1.000	4.8.1 ✔
T7	180 - 160 (734)	C15x33.9	0.013	0.413	0.000	0.420 ✔	1.000	4.8.1 ✔
T7	180 - 160 (737)	C15x33.9	0.013	0.413	0.000	0.419 ✔	1.000	4.8.1 ✔
T7	180 - 160 (738)	C15x33.9	0.012	0.411	0.000	0.417 ✔	1.000	4.8.1 ✔
T7	180 - 160 (741)	C15x33.9	0.013	0.413	0.000	0.420 ✔	1.000	4.8.1 ✔
T7	180 - 160 (742)	C15x33.9	0.013	0.411	0.000	0.418 ✔	1.000	4.8.1 ✔
T10	120 - 100 (745)	C15x33.9	0.013	0.307	0.000	0.313 ✔	1.000	4.8.1 ✔
T10	120 - 100 (746)	C15x33.9	0.013	0.309	0.000	0.315 ✔	1.000	4.8.1 ✔
T10	120 - 100 (749)	C15x33.9	0.018	0.307	0.000	0.316 ✔	1.000	4.8.1 ✔
T10	120 - 100 (750)	C15x33.9	0.013	0.305	0.000	0.312 ✔	1.000	4.8.1 ✔
T10	120 - 100 (753)	C15x33.9	0.019	0.304	0.000	0.314 ✔	1.000	4.8.1 ✔
T10	120 - 100 (754)	C15x33.9	0.018	0.304	0.000	0.313 ✔	1.000	4.8.1 ✔
T13	60 - 40 (757)	C15x33.9	0.011	0.103	0.000	0.108 ✔	1.000	4.8.1 ✔
T13	60 - 40 (758)	C15x33.9	0.011	0.103	0.000	0.109 ✔	1.000	4.8.1 ✔
T13	60 - 40 (761)	C15x33.9	0.011	0.103	0.000	0.109 ✔	1.000	4.8.1 ✔
T13	60 - 40 (762)	C15x33.9	0.011	0.102	0.000	0.108 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $P_u / \phi P_n$	Ratio $M_{ux} / \phi M_{nx}$	Ratio $M_{uy} / \phi M_{ny}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T13	60 - 40 (765)	C15x33.9	0.011	0.102	0.000	0.108 ✔	1.000	4.8.1 ✔
T13	60 - 40 (766)	C15x33.9	0.011	0.104	0.000	0.109 ✔	1.000	4.8.1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	323 - 288	Pole	Pipe 10.75" x 0.844" (10 #120)	1	-4.11	1181.96	9.1	Pass
T1	288 - 280	Leg	2" solid	3	-31.04	78.19	39.7	Pass
T2	280 - 260	Leg	2" solid	22	-34.66	90.61	38.3	Pass
T3	260 - 240	Leg	2 1/4" solid	71	-72.59	125.90	57.7	Pass
T4	240 - 220	Leg	2 1/4" solid	119	-72.23	125.90	57.4	Pass
T5	220 - 200	Leg	2 1/2" solid	166	-99.72	166.16	60.0	Pass
T6	200 - 180	Leg	2 1/2" solid	216	-107.14	166.16	64.5	Pass
T7	180 - 160	Leg	2 3/4" solid	263	-128.25	211.24	60.7	Pass
T8	160 - 140	Leg	2 1/2" solid	311	-133.68	166.16	80.5	Pass
T9	140 - 120	Leg	2 3/4" solid	360	-137.40	211.24	65.0	Pass
T10	120 - 100	Leg	2 3/4" solid	406	-159.28	211.24	75.4	Pass
T11	100 - 80	Leg	3" solid	456	-180.56	261.02	69.2	Pass
T12	80 - 60	Leg	3" solid	504	-186.95	261.02	71.6	Pass
T13	60 - 40	Leg	3" solid	552	-197.12	261.02	75.5	Pass
T14	40 - 20	Leg	3" solid	600	-197.82	261.02	75.8	Pass
T15	20 - 6.75	Leg	3" solid	646	-194.31	263.00	73.9	Pass
T16	6.75 - 0	Leg	3" solid	680	-199.67	295.91	67.5	Pass
T1	288 - 280	Diagonal	1 3/8" solid	11	-2.09	21.88	9.6	Pass
T2	280 - 260	Diagonal	1 3/8" solid	33	-1.73	24.19	7.2	Pass
T3	260 - 240	Diagonal	1 3/8" solid	108	-4.44	24.39	18.2	Pass
T4	240 - 220	Diagonal	1 3/8" solid	127	-5.03	24.39	20.6	Pass
T5	220 - 200	Diagonal	1 1/2" solid	205	-5.65	32.57	17.3	Pass
T6	200 - 180	Diagonal	1 1/4" solid	224	-7.74	17.65	43.9	Pass
T7	180 - 160	Diagonal	1 1/2" solid	292	-8.77	32.79	26.7	Pass
T8	160 - 140	Diagonal	1 3/8" solid	356	-5.23	24.59	21.3	Pass
T9	140 - 120	Diagonal	1 1/4" solid	368	-4.97	17.82	27.9	Pass
T10	120 - 100	Diagonal	1 1/2" solid	424	-13.36	32.79	40.8	Pass
T11	100 - 80	Diagonal	1 3/8" solid	499	-12.41	24.98	49.7	Pass
T12	80 - 60	Diagonal	1 1/4" solid	513	-4.50	17.99	25.0	Pass
T13	60 - 40	Diagonal	1 1/4" solid	596	-4.67	17.99	26.0	Pass
T14	40 - 20	Diagonal	1 1/4" solid	609	-5.22	17.99	29.0	Pass
T15	20 - 6.75	Diagonal	1 1/4" solid	657	-6.97	18.23	38.2	Pass
T1	288 - 280	Horizontal	1" solid	15	-2.32	12.83	18.1	Pass
T2	280 - 260	Horizontal	1" solid	37	-0.60	12.83	4.7	Pass
T3	260 - 240	Horizontal	1" solid	112	-3.88	12.98	29.9	Pass
T4	240 - 220	Horizontal	1" solid	131	-1.25	12.98	9.6	Pass
T5	220 - 200	Horizontal	1" solid	207	-6.80	13.14	51.8	Pass
T6	200 - 180	Horizontal	1" solid	235	-1.86	13.14	14.1	Pass
T7	180 - 160	Horizontal	1" solid	282	-10.04	13.30	75.5	Pass
T8	160 - 140	Horizontal	1" solid	323	-2.32	13.14	17.6	Pass
T9	140 - 120	Horizontal	1" solid	373	-2.38	13.30	17.9	Pass
T10	120 - 100	Horizontal	1" solid	419	-2.76	13.30	20.7	Pass
T11	100 - 80	Horizontal	1" solid	468	-3.13	13.46	23.2	Pass
T12	80 - 60	Horizontal	1" solid	516	-3.24	13.46	24.1	Pass
T13	60 - 40	Horizontal	1" solid	591	-4.57	13.46	33.9	Pass
T14	40 - 20	Horizontal	1" solid	619	-3.43	13.46	25.4	Pass
T15	20 - 6.75	Horizontal	1" solid	659	-3.37	13.46	25.0	Pass
T16	6.75 - 0	Horizontal	9 x 3/8	686	0.08	151.88	1.6	Pass
T1	288 - 280	Secondary Horizontal	1" solid	21	-0.00	17.94	0.1	Pass
T2	280 - 260	Secondary Horizontal	1" solid	55	-0.00	17.94	0.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T3	260 - 240	Secondary Horizontal	1" solid	103	-0.00	17.97	0.1	Pass
T4	240 - 220	Secondary Horizontal	1" solid	165	-0.00	17.97	0.1	Pass
T5	220 - 200	Secondary Horizontal	1" solid	199	-0.00	17.99	0.1	Pass
T6	200 - 180	Secondary Horizontal	1" solid	261	-0.00	17.99	0.1	Pass
T7	180 - 160	Secondary Horizontal	1" solid	309	-0.00	18.02	0.1	Pass
T8	160 - 140	Secondary Horizontal	1" solid	322	0.00	25.45	0.1	Pass
T9	140 - 120	Secondary Horizontal	1" solid	370	0.00	25.45	0.1	Pass
T10	120 - 100	Secondary Horizontal	1" solid	418	0.00	25.45	0.1	Pass
T11	100 - 80	Secondary Horizontal	1" solid	466	0.00	25.45	0.1	Pass
T12	80 - 60	Secondary Horizontal	1" solid	514	0.00	25.45	0.1	Pass
T13	60 - 40	Secondary Horizontal	1" solid	562	0.00	25.45	0.1	Pass
T14	40 - 20	Secondary Horizontal	1" solid	610	0.00	25.45	0.1	Pass
T15	20 - 6.75	Secondary Horizontal	1" solid	672	-0.00	18.05	0.1	Pass
T1	288 - 280	Top Girt	1" solid	5	3.58	25.45	14.0	Pass
T2	280 - 260	Top Girt	1" solid	25	1.60	25.45	6.3	Pass
T3	260 - 240	Top Girt	1" solid	74	2.13	25.45	8.4	Pass
T4	240 - 220	Top Girt	1" solid	121	-0.74	12.39	6.0	Pass
T5	220 - 200	Top Girt	1" solid	169	2.24	25.45	8.8	Pass
T6	200 - 180	Top Girt	1" solid	218	-0.35	12.50	2.8	Pass
T7	180 - 160	Top Girt	1" solid	266	-1.56	12.61	12.3	Pass
T8	160 - 140	Top Girt	1" solid	315	-0.86	12.50	6.9	Pass
T9	140 - 120	Top Girt	1" solid	361	0.50	25.45	2.0	Pass
T10	120 - 100	Top Girt	1" solid	410	-0.69	12.61	5.4	Pass
T11	100 - 80	Top Girt	1" solid	458	-1.76	12.72	13.9	Pass
T12	80 - 60	Top Girt	1" solid	505	0.81	25.45	3.2	Pass
T13	60 - 40	Top Girt	1" solid	553	1.14	25.45	4.5	Pass
T14	40 - 20	Top Girt	1" solid	601	0.82	25.45	3.2	Pass
T15	20 - 6.75	Top Girt	1" solid	651	1.26	25.45	4.9	Pass
T16	6.75 - 0	Top Girt	12x3/8	685	29.45	145.80	20.2	Pass
T1	288 - 280	Bottom Girt	1" solid	8	-2.21	12.29	18.0	Pass
T2	280 - 260	Bottom Girt	1" solid	29	-1.31	12.29	10.7	Pass
T3	260 - 240	Bottom Girt	1" solid	77	-0.49	12.39	3.9	Pass
T4	240 - 220	Bottom Girt	1" solid	124	-1.68	12.39	13.5	Pass
T5	220 - 200	Bottom Girt	1" solid	173	0.99	25.45	3.9	Pass
T6	200 - 180	Bottom Girt	1" solid	221	-1.39	12.50	11.1	Pass
T7	180 - 160	Bottom Girt	1" solid	270	-1.04	12.61	8.3	Pass
T8	160 - 140	Bottom Girt	1" solid	318	0.59	25.45	2.3	Pass
T9	140 - 120	Bottom Girt	1" solid	365	1.06	25.45	4.2	Pass
T10	120 - 100	Bottom Girt	1" solid	414	-1.88	12.61	14.9	Pass
T11	100 - 80	Bottom Girt	1" solid	462	0.89	25.45	3.5	Pass
T12	80 - 60	Bottom Girt	1" solid	510	0.92	25.45	3.6	Pass
T13	60 - 40	Bottom Girt	1" solid	558	0.82	25.45	3.2	Pass
T14	40 - 20	Bottom Girt	1" solid	605	1.05	25.45	4.1	Pass
T15	20 - 6.75	Bottom Girt	1" solid	652	4.82	25.45	18.9	Pass
T1	288 - 280	Guy A@284	3/4	704	19.06	34.98	54.5	Pass
T3	260 - 240	Guy A@256.5	3/4	716	18.81	34.98	53.8	Pass
T5	220 - 200	Guy A@216.5	3/4	728	18.57	34.98	53.1	Pass
T7	180 - 160	Guy A@166.75	3/4	739	18.38	34.98	52.5	Pass
T10	120 - 100	Guy A@106.75	3/4	752	18.75	34.98	53.6	Pass
T13	60 - 40	Guy A@56.5	7/16	764	8.67	12.48	69.5	Pass
T1	288 - 280	Guy B@284	3/4	700	19.01	34.98	54.4	Pass
T3	260 - 240	Guy B@256.5	3/4	711	18.83	34.98	53.8	Pass
T5	220 - 200	Guy B@216.5	3/4	723	18.61	34.98	53.2	Pass
T7	180 - 160	Guy B@166.75	3/4	735	18.41	34.98	52.6	Pass
T10	120 - 100	Guy B@106.75	3/4	747	18.42	34.98	52.7	Pass
T13	60 - 40	Guy B@56.5	7/16	760	8.61	12.48	69.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	288 - 280	Guy C@284	3/4	696	19.04	34.98	54.4	Pass
T3	260 - 240	Guy C@256.5	3/4	708	18.80	34.98	53.7	Pass
T5	220 - 200	Guy C@216.5	3/4	720	18.56	34.98	53.1	Pass
T7	180 - 160	Guy C@166.75	3/4	731	18.35	34.98	52.5	Pass
T10	120 - 100	Guy C@106.75	3/4	743	18.66	34.98	53.4	Pass
T13	60 - 40	Guy C@56.5	7/16	756	8.66	12.48	69.4	Pass
T10	120 - 100	Top Guy Pull-Off@106.75	1" S.R. w/ 1" S.R. crosby clipped	428	-15.08	18.10	83.4	Pass
T1	288 - 280	Torque Arm Top@284	C15x33.9	706	3.79	322.70	55.8	Pass
T3	260 - 240	Torque Arm Top@256.5	C15x33.9	718	3.78	322.70	53.1	Pass
T5	220 - 200	Torque Arm Top@216.5	C15x33.9	725	3.82	322.70	48.8	Pass
T7	180 - 160	Torque Arm Top@166.75	C15x33.9	741	4.18	322.70	42.0	Pass
T10	120 - 100	Torque Arm Top@106.75	C15x33.9	749	-5.28	280.44	31.6	Pass
T13	60 - 40	Torque Arm Top@56.5	C15x33.9	766	3.60	322.70	10.9	Pass
							Summary	
						Pole (L1)	9.1	Pass
						Leg (T8)	80.5	Pass
						Diagonal (T11)	49.7	Pass
						Horizontal (T7)	75.5	Pass
						Secondary Horizontal (T1)	0.1	Pass
						Top Girt (T16)	20.2	Pass
						Bottom Girt (T15)	18.9	Pass
						Guy A (T13)	69.5	Pass
						Guy B (T13)	69.0	Pass
						Guy C (T13)	69.4	Pass
						Top Guy Pull-Off (T10)	83.4	Pass
						Torque Arm Top (T1)	55.8	Pass
						Bolt Checks	39.0	Pass
						RATING =	**83.4**	**Pass**

APPENDIX B

ADDITIONAL CALCULATIONS

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1) Paul J. Ford and Company has not performed a site visit to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

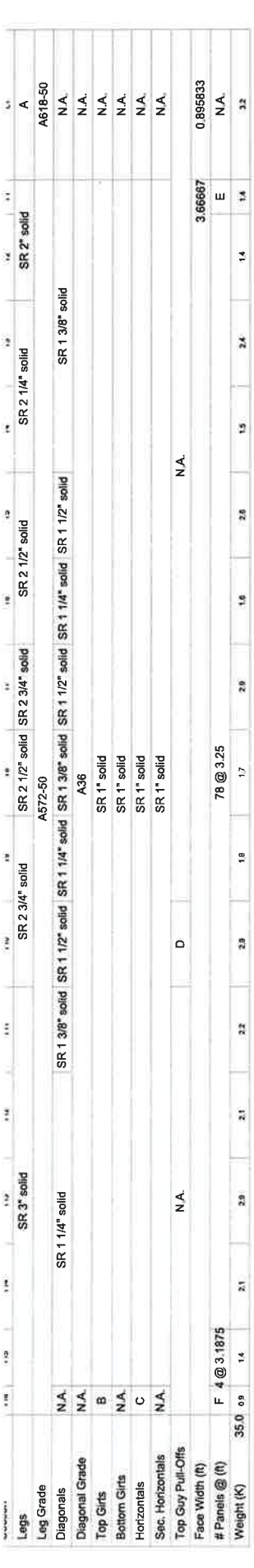
2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

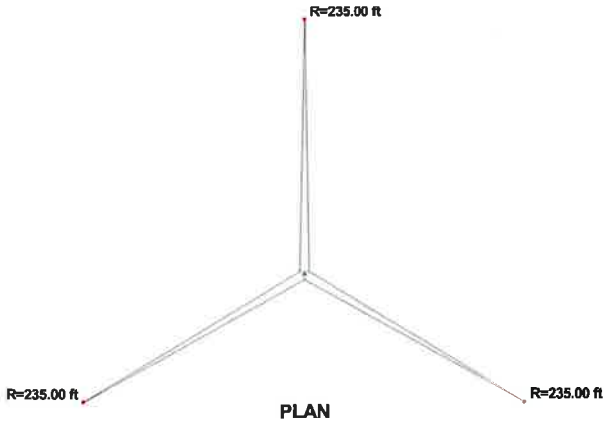
3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

4) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

5) The attached sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

6) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon	323	OPA-65R-LCUU-H8 w/ Mount Pipe	185
3/4" x 4 ft lightning rod	323	HPA-65R-BUU-H8 w/ Mount Pipe	185
Shively 6813-1 no Radome Full Wave	305	HPA-65R-BUU-H6 w/ Mount Pipe	185
PD1110	305	HPA-65R-BUU-H8 w/ Mount Pipe	185
PD1110	277	24 x 12 x 45 Flat Panel	172
4' Side Arm Mount	277	8 ft x 3" omni whip	172
DB810K	267	16 x 12 x 3 TMA	166
OGT9-840	267	24" x 12" x 5" Panel	158.8
3-ft Side Arm Mount	267	Obstruction light	157
3-ft Side Arm Mount	267	Obstruction light	157
AP14-850/105	261	Obstruction light	157
3-ft Side Arm Mount	261	2-ft Side Arm Mount	125
OGT9-840	256.5	Ice Shield 4.5' x 6.0'	124
OGT9-840	256.5	4' x 4.5" Pipe Mount	124
AP14-850/105	252	Ice Shield 8.0' x 8.0'	124
3-ft Side Arm Mount	252	4' x 4.5" Pipe Mount	124
BXA-70063/2CF-EDIN-0	250	8' x 2" Sch 40 Pipe Mount	116
BXA-70063/2CF-EDIN-0	250	8' x 2" Sch 40 Pipe Mount	116
SC479-HF1LDF	250	6 ft standard	116
SC479-HF1LDF	250	6 ft standard	116
SC479-HF1LDF	250	2-ft Side Arm Mount	112
432-83H-01-T	250	PD1110	112
432-83H-01-T	250	8' x 2" Sch 40 Pipe Mount	104
Sector Mount [SM 602-1]	250	6 ft standard	104
Sector Mount [SM 602-1]	250	ASP-962	94
SC479-HF1LDF	240	4' x 4.5" Pipe Mount	94
SC479-HF1LDF	240	PR-850	94
432-83H-01-T	240	RRH2X60-PCS	84
Sector Mount [SM 602-1]	240	RRH2X60-PCS	84
Shively 6813-1 no Radome Full Wave	211	RRH2X60-PCS	84
Shively 6813-1 no Radome Full Wave	198	12-ft Platform Mount	84
Shively 6812	198	BXA-80063/4CF w/ Mount Pipe	84
6' Yagi	190	BXA-80063/4CF w/ Mount Pipe	84
RRUS 32	185	RRH2x60-700	84
RRUS 32	185	RRH2x90-AWS	84
(2) RRUS 11	185	RRH2X60-PCS	84
(2) RRUS 11	185	(2) RVZDC-6627-PF-48	84
(2) RRUS 11	185	(3) JAHH-45B-R3B w/ Mount Pipe	84
(2) DC6-48-60-18-8F	185	RRH2x60-700	84
(2) TPX-070821	185	(2) RRH2x60-700	84
(2) TPX-070821	185	4x40 RRH 850	84
(2) TPX-070821	185	(2) 4x40 RRH 850	84
7770.00 w/ Mount Pipe	185	4x40 RRH 850	84
7770.00 w/ Mount Pipe	185	(3) JAHH-45B-R3B w/ Mount Pipe	84
7770.00 w/ Mount Pipe	185	(2) RRH2x90-AWS	84
Commscope MTC 3615 Sector Frame	185	RRH2x90-AWS	84
RRUS 32 B2	185	(2) JAHH-45B-R3B w/ Mount Pipe	84
RRUS 32 B2	185	BXA-80063/4CF w/ Mount Pipe	84
RRUS 32 B2	185	DB212-1	70
RRUS 32	185	2-ft Side Arm Mount	18
OPA-65R-LCUU-H8 w/ Mount Pipe	185	6' Yagi	18
OPA-65R-LCUU-H6 w/Mount Pipe	185		

SYMBOL LIST

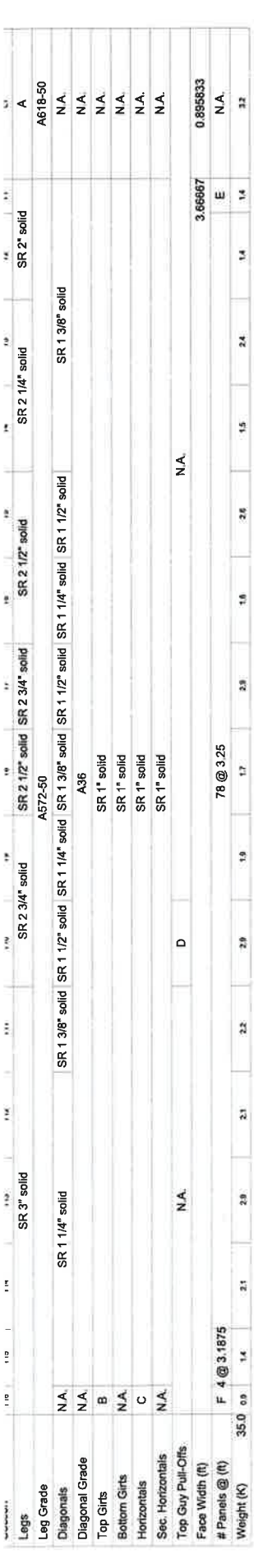
MARK	SIZE	MARK	SIZE
A	Pipe 10.75" x 0.844" (10 #120)	D	1" S.R. w/ 1" S.R. crosby clipped
B	12x3/8	E	2 @ 3.75
C	9 x 3/8	F	4 @ 1.625

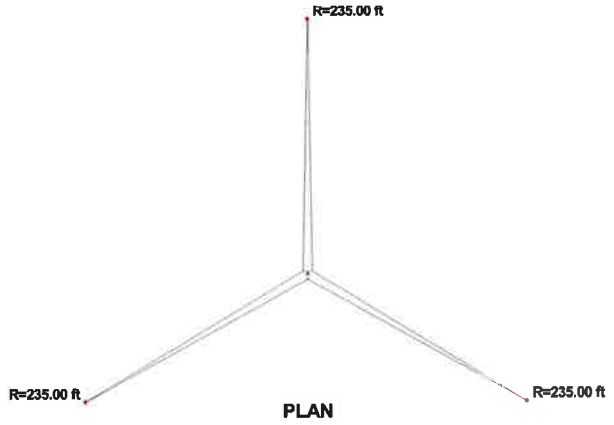
MATERIAL STRENGTH

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

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH
Phone: 43215
FAX: 614.448.4105

Job: [illegible] Storrs, CT
TOWER DESIGN NOTES
Project: 42917-0010
Client: On Air Engineering, LLC Drawn by: Matthew R Buske App'd:
Code: TIA-222-G Date: 01/09/18 Scale: N
Path: Dwg No.





SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 10.75" x 0.844" (10 #120)	D	1" S.R. w/ 1" S.R. crosby clipped
B	12x3/8	E	2 @ 3.75
C	9 x 3/8	F	4 @ 1.625

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 Tolland 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: 83.4%

ALL REACTIONS ARE FACTORED

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH
Phone: 43215
FAX: 614.448.4105

Job:	***323-ft Guyed Tower Storrs, CT***		
Project:	***42917-0010***		
Client:	On Air Engineering, LLC	Drawn by: Matthew R Buske	App'd:
Code:	TIA-222-G	Date: 01/09/18	Scale: N
Path:			Dwg No.

PJF Job No. **42917-0010** Project Name: **323-ft Guyed Tower Storrs, CT** Engineer: MRB

Factored Foundation Loads:

	LC1	
Factored Axial Load (+Comp, -Ten) =	561	kips
Factored Horiz. Load at Top of Pier =	6	kips
Factored OTM at Top of Pier =	0	k-ft

LRFD Resistance and Load Factors:

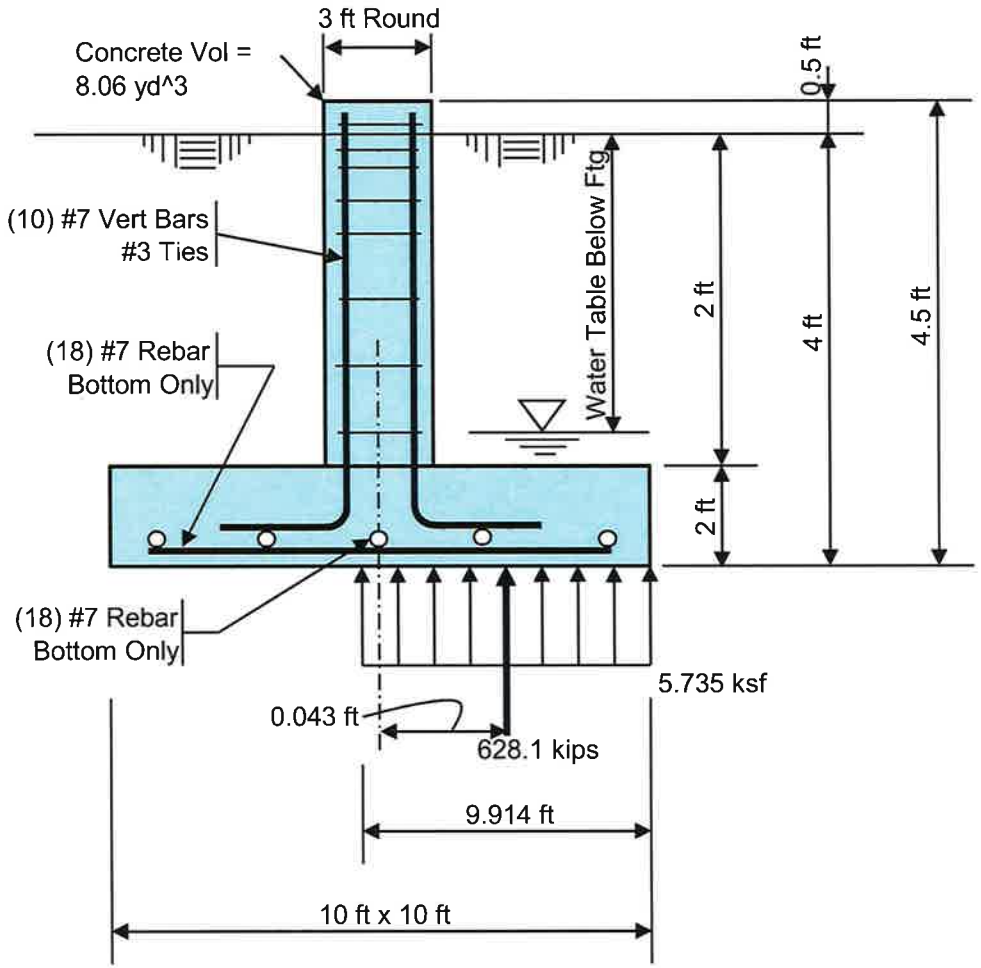
	Φ	Dead Load Factors
Soil Bearing =	0.6	
Soil Weight =	0.75	1.2
Concrete Weight =	0.75	1.2

Soil Properties:

Depth to Water Table = **99** ft

Uplift Cone from **Top** of footing

Layer Thk ft	Soil Density pcf	Cohesion ksf	Friction Angle degrees	Ult Bearing ksf	Depth ft
4	125	0	34	10	4.00



Dimensions:

Pier Shape =	Round	
Pier Width =	3	ft Diameter
Pier Height above Grade =	0.5	ft
Depth to Bottom of Footing =	4	ft
Footing Thickness =	2	ft
Footing Width, B =	10	ft
Footing Length, L =	10	ft

Concrete:

Concrete Strength =	3	ksi
Rebar Strength =	60	ksi

Total Pad Reinf Stl =	10.80	in^2 >= 5.18 in^2 = Min Stl, OK
Total Pier Reinf Stl =	6.00	in^2 >= 5.09 in^2 = Min Stl, OK
Footing Thickness =	2.00	ft >= 1.37 ft = Min Ftg Thk, OK

Summary Results:

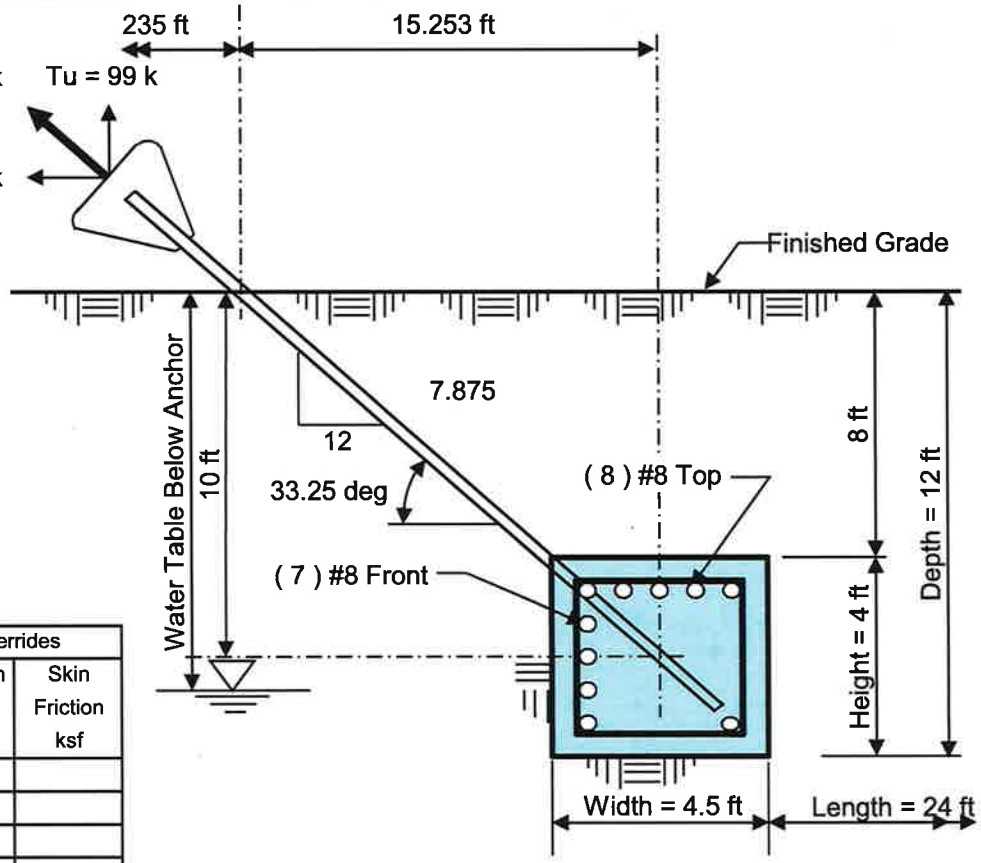
	Required		Available			
Maximum Net Soil Bearing =	5.735	ksf	6.000	ksf	Stress Ratio =	95.6% in Soil Bearing
Uplift =	0.0	kips	47.4	kips	Stress Ratio =	0.0% in Uplift
Punching Shear Stress =	0.114	ksi	0.164	ksi	Stress Ratio =	69.3% in Punching Shear
Bending Shear Stress =	107.0	kips	194.1	kips	Stress Ratio =	55.1% in Bending Shear
Bending Moment =	351.87	k-ft	905.4	k-ft	Stress Ratio =	38.9% in Bending Moment
Conc Pier Reinforcing Steel =	564.2	kips	1528.9	kips	Stress Ratio =	36.9% in Pier Rebar

Deadman Guy Anchor Analysis (LRFD)

Guy Anchor

PJF Job No. **42917-0010** Project Name: **323-ft Guyed Tower Storrs, CT** Engineer: **MRB**

Uplift Force =	99	k
Horizontal Force =	151	k
Load Factor, Concrete Weight =	0.9	
Φ, Soil Weight =	0.75	
Depth to Water Table =	99	ft
Toe Width (If Any) =	0	in
Toe Height (If Any) =	0	in
Depth to Bottom of Deadman =	12	ft
Deadman Block Height =	4	ft
Deadman Block Width =	4.5	ft
Deadman Block Length =	24	ft
Guy Rod Steel Strength, Fy =	50	ksi
Guy Rod Cross-Sectional Area =	0.000	in^2
Concrete Strength, f'c =	3	ksi
Rebar Strength, Fy =	60	ksi
Minimum Cover Over Rebar =	3	in
Horiz. Ult. Passive Press. Override =	0.442	ksf/ft



			Uplift		Horizontal		Overrides	
Layer Thk ft	Dry Soil Density pcf	Sat Soil Density pcf	Cohesion ksf	Friction Angle degrees	Cohesion ksf	Friction Angle degrees	Adhesion ksf	Skin Friction ksf
12	125	125		34		34		

Uplift Based on: **Soil Cone**

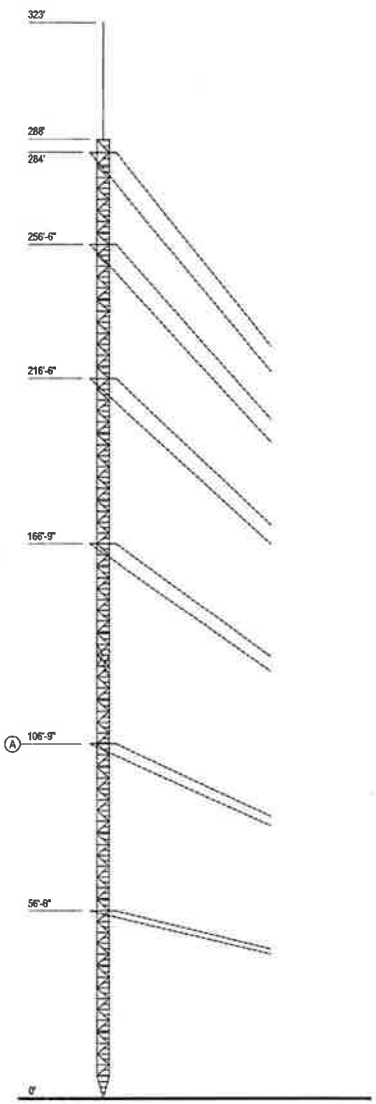
Inverted pyramid of soil in uplift will be taken from the top of the anchor.

Concrete Volume per Anchor =	16.00 yd^3
Concrete Volume for (3) Anchors =	48.00 yd^3

Summary Results:

	Required		Available				
Guy Rod Tensile Force =		k		k	Capacity Ratio =		in Tensile Force
Soil, Horizontal Resistance =	151.0	k	318.2	k	Capacity Ratio =	47.4%	in Horiz Resistance
Soil, Uplift Resistance =	99.0	k	380.4	k	Capacity Ratio =	26.0%	in Uplift Resistance
Steel, Uplift Bending Moment =	338.3	k-ft	1142.1	k-ft	Capacity Ratio =	29.6%	in Bending Moment
Steel, Horizontal Bending Moment =	453.0	k-ft	1129.2	k-ft	Capacity Ratio =	40.1%	in Bending Moment
Toe Shear =		k/ft		k/ft	Capacity Ratio =		in Shear

Guy Anchor Rod Unknown



TOWER ELEVATION 1 / S-1

TOWER MODIFICATION SCHEDULE			
	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
Ⓐ	106'-9"±	WIRE ROPE CLIP NEW SOLID ROD TO EXISTING SOLID ROD HORIZONTAL	S-2

GENERAL NOTES:

1. THIS TOWER MODIFICATION DRAWING IS BASED UPON A STRUCTURAL ANALYSIS PERFORMED BY PAUL J. FORD AND COMPANY DATED 1-9-2018.
2. PAUL J. FORD AND COMPANY HAS NOT PERFORMED A FIELD VISIT TO VERIFY THE EXISTING TOWER MEMBER SIZES AND DIMENSIONS. THE MODIFICATIONS SHOWN ON THESE PAGES WERE DEVELOPED USING INFORMATION PROVIDED TO US BY ON AIR ENGINEERING, LLC.
3. THE CONTRACTOR IS ENCOURAGED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL. IF THE CONTRACTOR DISCOVERS ANY EXISTING CONDITIONS THAT ARE NOT AS REPRESENTED ON THESE DRAWINGS, PAUL J. FORD AND COMPANY SHALL BE CONTACTED IMMEDIATELY TO EVALUATE THE STRUCTURAL SIGNIFICANCE OF THE DEVIATION.
4. PAUL J. FORD AND COMPANY WAS NOT PROVIDED WITH THE EXACT LOCATION OF EVERY EXISTING APPURTENANCE THAT COULD POTENTIALLY INTERFERE WITH THE MODIFICATIONS AS INDICATED ON THESE DRAWINGS. IT IS IMPORTANT THAT THE MODIFICATION MATERIAL BE PLACED IN THE PROPER LOCATION TO BE EFFECTIVE. THIS MAY REQUIRE THE REPOSITIONING OF SOME EXISTING NON-STRUCTURAL ITEMS CURRENTLY ATTACHED TO THE TOWER.
5. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED ON THESE DRAWINGS. BY ACCEPTANCE OF THIS PROJECT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED AND THAT HE IS PROPERLY LICENSED TO DO THIS WORK IN THE JURISDICTION IN WHICH THE WORK IS TO BE PERFORMED.
6. THIS DRAWING DOES NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES.
7. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PROGRAMS AND PRECAUTIONS IN CONNECTION WITH THE WORK.
8. INSPECTIONS SHALL BE COMPLETED IN ACCORDANCE WITH LOCAL BUILDING CODES.

CONSTRUCTION NOTES:

1. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION).

STATE OF CONNECTICUT
JOSEPH PACHICARAN JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER

JAN 1 1 2018

REV	DATE	DESCRIPTION
1	1-10-2018	NO CHANGE

PJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 - Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

ON AIR ENGINEERING, LLC
88 FOUNDRY POND ROAD COLD SPRING, NY 10516
PH: (201) 456-4824

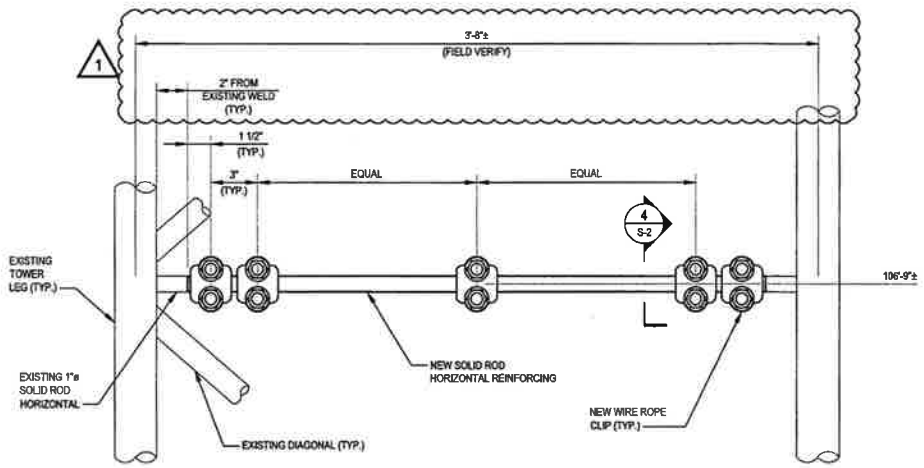
SITE NAME: STORRS, CT
STORRS, CONNECTICUT
MODIFIED 323' GUYED TOWER

PROJECT No:	42917-0010.002.8806
DRAWN BY:	T.A.N.
DESIGNED BY:	M.R.B.
CHECKED BY:	J.P.J.
DATE:	1-9-2018

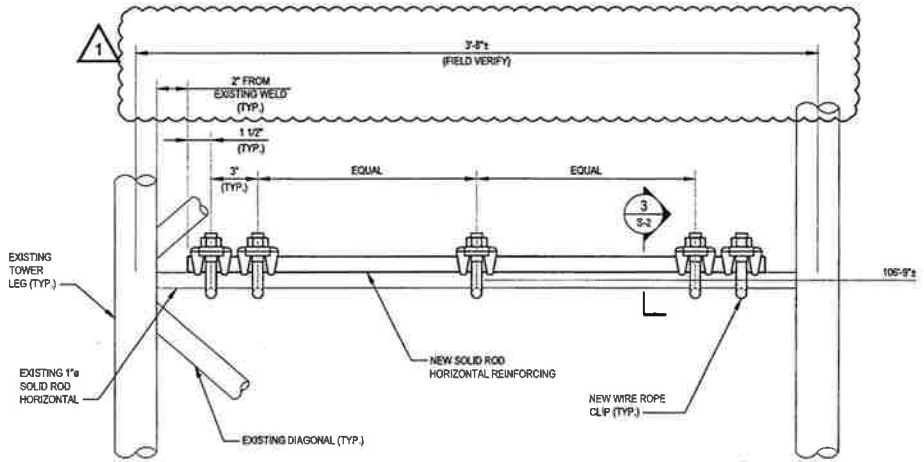
TOWER ELEVATION

S-1

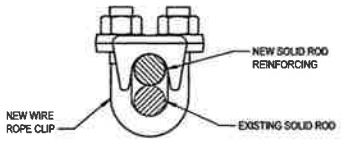
42917-0010.002.R1.DWG



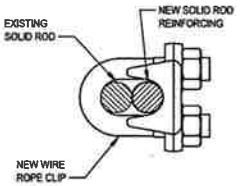
A SOLID ROD HORIZONTAL REINFORCING 2 / S-2
OPTION 2



A SOLID ROD HORIZONTAL REINFORCING 1 / S-2
OPTION 1



SECTION 3 / S-2
OPTION 1



SECTION 4 / S-2
OPTION 2

NOTES:

1. IF EXISTING SOLID ROD MEMBERS ARE BENT, THEY WILL NEED STRAIGHTENING PRIOR TO ATTACHMENT OF NEW MEMBERS. USE PROPER TOOLS & AVOID STRESSING OTHER TOWER MEMBERS & WELDS OF BENT MEMBERS.
2. NEW SOLID ROD SHALL BE INSTALLED PARALLEL & STRAIGHT AGAINST EXISTING SOLID ROD MEMBER.
3. SOLID ROD CONNECTION: OPTION 1 IS THE DEFAULT OPTION.

MATERIAL LIST

ELEVATION	QTY	MATERIAL	LENGTH
106'-9"±	3	1"ø SOLID ROD	3'-2"±
	15	1" WIRE ROPE CLIP	

MATERIAL NOTES:

1. THE ABOVE MATERIAL LIST IS PROVIDED TO CLEARLY IDENTIFY MEMBER SIZES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROPER FIT AND CLEARANCE OF THE REINFORCING MATERIAL IN THE FIELD. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL.
2. NEW SOLID ROUND STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A572 GRADE 50 (50 KSI YIELD POINT MATERIAL).
3. ALL NEW STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE "SPECIFICATION FOR ZINC (HOT GALVANIZED) COATING ON PRODUCTS FABRICATED FROM ROLLED, PRESSED AND FORGED STEEL SHAPES, PLATES BAR, AND STRIP" ASTM A123.
4. WIRE ROPE CLIPS SHALL BE TIGHTENED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
5. ALL NEW STEEL SHALL BE PAINTED TO MATCH THE EXISTING TOWER COLOR SCHEME.

PAUL J. FORD & COMPANY
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Phone 614.221.6679 www.pauljford.com
ON AIR ENGINEERING, LLC
68 FOUNDRY POND ROAD COLD SPRING, NY 10516
PH: (201) 456-4624

SITE NAME: STORRS, CT
STORRS, CONNECTICUT
MODIFIED 323' GUYED TOWER

PROJECT No:	42917-0010 002.8800
DRAWN BY:	T.A.N
DESIGNED BY:	M.R.B
CHECKED BY:	J.P.J
DATE:	1-9-2018

SOLID ROD HORIZONTAL REINFORCING

S-2

STATE OF CONNECTICUT
JOSEPH PACHICARAM JACOB
No. PEN 26731
LICENSED PROFESSIONAL ENGINEER

JAN 11 2018

REV	DATE	DESCRIPTION
1	1-10-2018	ADDED DIMENSIONS TO ELEVATION DRAWINGS, REVISED MATERIAL LIST

42917-0010.002 R1 DWG

POST-MODIFICATION CHECKLIST

REQUIRED	REPORT ITEM	BRIEF DESCRIPTION
		PRE-CONSTRUCTION
X	MI CHECKLIST DRAWING	THIS CHECKLIST SHALL BE INCLUDED IN THE MI REPORT
NA	EOR APPROVED SHOP DRAWINGS	FABRICATION DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. THE CONTRACTOR SHALL PROVIDE THE APPROVED SHOP DRAWINGS TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. SEE SHOP DRAWING NOTES.
NA	FABRICATION INSPECTION	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR CERTIFIED WELD INSPECTION	CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED WELD INSPECTOR SHALL PERFORM NON-DESTRUCTIVE TESTING AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	MATERIAL TEST REPORT (MTR)	MILL CERTIFICATION SHALL BE PROVIDED FOR ALL STEEL WITH A YIELD STRENGTH GREATER THAN 36 KSI AND THIS DOCUMENTATION SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR NDE INSPECTION	A VISUAL OBSERVATION OF A PORTION OF THE EXISTING STRUCTURE (AS NOTED ON THESE DRAWINGS) IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)	A VISUAL OBSERVATION OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	THE MATERIAL SHIPPING LIST SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
		CONSTRUCTION
X	CONSTRUCTION INSPECTIONS	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FOUNDATION INSPECTIONS	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	CONCRETE COMP., STRENGTH AND SLUMP TESTS	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	POST INSTALLED ANCHOR ROD VERIFICATION	ANCHOR ROD INSTALLATION SHALL INCLUDE VERIFICATION BY LETTER AND PHOTOGRAPHIC DOCUMENTATION.
NA	BASE PLATE GROUT VERIFICATION	A LETTER FROM THE GENERAL CONTRACTOR SHALL BE PROVIDED TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS INSTALLED IN ACCORDANCE WITH INDUSTRY STANDARD FOR INCLUSION IN THE MI REPORT.
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION	A CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST AS NECESSARY ALL FIELD WELDS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. PRE, DURING AND POST WELD INSPECTION IS REQUIRED.
NA	EARTHWORK: LIFT AND DENSITY	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	ON SITE COLD GALVANIZING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED FOR FIELD PUNCHED/DRILLED HOLES.
NA	GUY WIRE TENSION REPORT	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT TO THE MI INSPECTOR INDICATING THE TEMPERATURE AND TENSION IN EVERY GUY CABLE FOR INCLUSION IN THE MI REPORT.
X	GC AS-BUILT DOCUMENTS	THE GENERAL CONTRACTOR SHALL SUBMIT A COPY OF THE CONTRACT DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD DUE TO FIELD CONDITIONS.
NA	MAGNI 565 COATING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY MAGNI 565 COATING WAS APPLIED IN ACCORDANCE PER ASTM F1136.
NA	MICROPILE / ROCK ANCHOR	THE GENERAL CONTRACTOR SHALL PROVIDE INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTATION TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
		POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTORS REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
NA	POST INSTALLED ANCHOR ROD PULL TESTING	POST INSTALLED ANCHOR RODS SHALL BE TESTED IN ACCORDANCE WITH INDUSTRY STANDARD AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PHOTOGRAPHS	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI WHICH DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
NA	POST INSTALLED MICROPILE / ROCK ANCHOR TESTING	POST INSTALLED ANCHORS SHALL BE TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION STATED ON MICROPILE/ROCK ANCHOR NOTES.

NOTE: X DENOTES A DOCUMENT NEEDED FROM THE CONTRACTOR FOR THE MI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT

MODIFICATION INSPECTION NOTES:

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

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

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY.

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

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

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

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

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

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH INDUSTRY STANDARD.

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

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

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

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

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

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

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

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

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE COORDINATE WITH THE MI.

SHOP DRAWINGS
EOR APPROVED SHOP DRAWINGS CAN BE PROVIDED AS AN ADDITIONAL SCOPE OF SERVICE. IF REQUIRED, PLEASE CONTACT PJF FOR ADDITIONAL INFORMATION.

STATE OF CONNECTICUT
JOSEPH PACHICARAI JACOBS
No. PEN 22730
LICENSED PROFESSIONAL ENGINEER

JAN 1 1 2018

REV	DATE	DESCRIPTION
1	1-10-2018	NO CHANGE

PJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

ON AIR ENGINEERING, LLC
88 FOUNDRY POND ROAD COLD SPRING, NY 10516
PH: (201) 456-4624

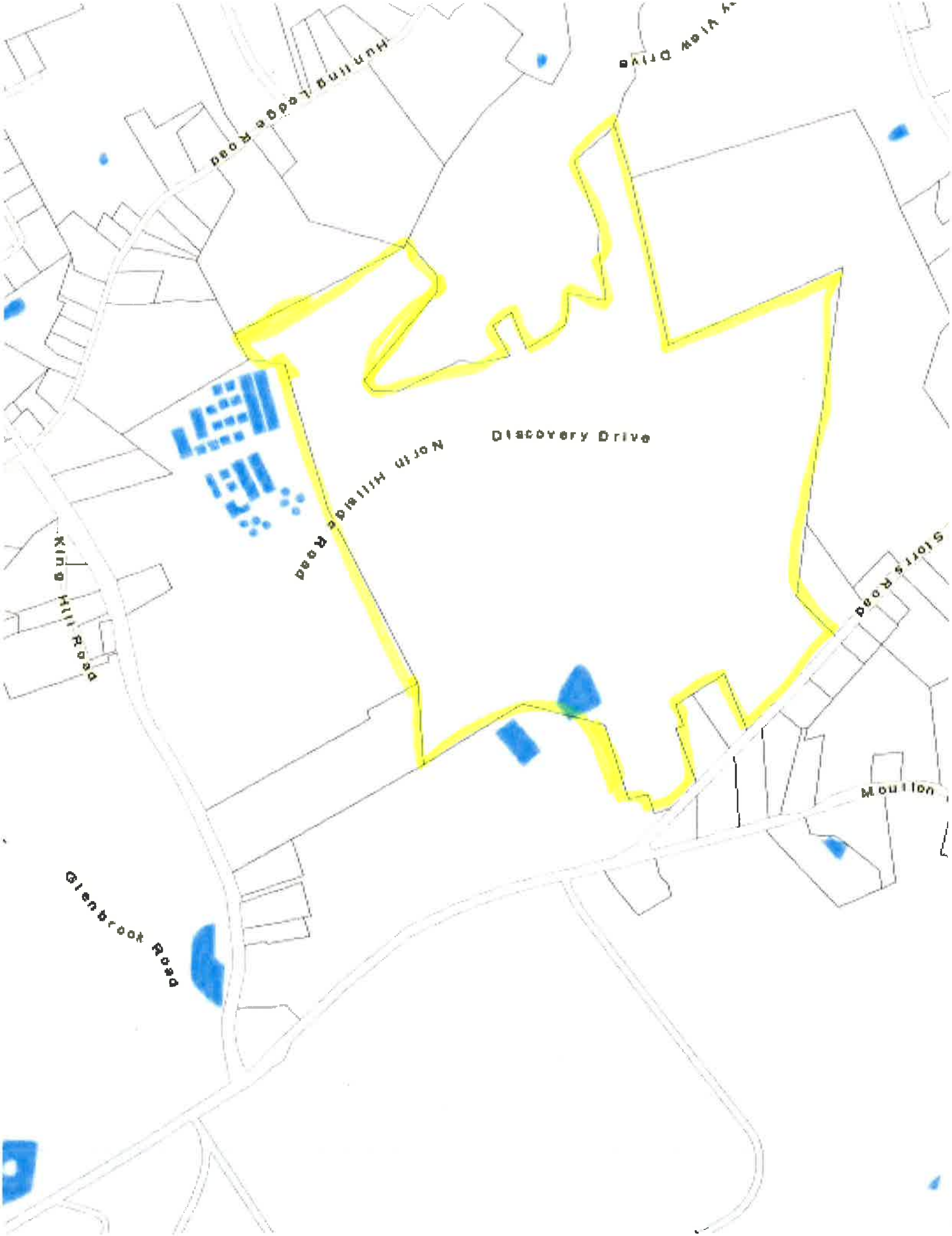
SITE NAME: STORRS, CT
STORRS, CONNECTICUT
MODIFIED 323' GUYED TOWER

PROJECT No:	42917-0010.002.8800
DRAWN BY:	T.A.N.
DESIGNED BY:	M.R.B.
CHECKED BY:	J.P.J.
DATE:	1-9-2018

MI CHECKLIST AND NOTES

S-3

ATTACHMENT 4


Hunting Lodge Road
View Drive
Discovery Drive
North Hillside Road
King Hill Road
Storrs Road
Moulton
Glenbrook Road

Town of Mansfield, Connecticut

Property Record Card Card 1 of 1

82 NO EAGLEVILLE RD

ID: **9.23.UC159** Account #: **9 23 UC159**

Owner: UNIVERSITY OF CONNECTICUT
Co-Owner: NORTH CAMPUS RESIDENCES
Address: U BOX 3038 FACILITIES MGMT
STORRS CT 06269

Assessment: Total: 6059200, Assessed Value:
Building: 5867300 Land: 191900 Yard: 0

Sales History

Grantor	Book / Page	Sale Date	Sale Price
UNIVERSITY OF CONNECTICUT	51/ 518	1919-09-27	

MainStreetGIS, LLC
www.mainstreetgis.com

Land Information
Land Area: 1 AC Zoning: (See Official Zoning Map)
Land Use: 902 - State Com
Neighborhood: C200

Building Information
Style:
Year Built: 1950
Stories:
Rooms: Bedrooms:
Baths: Half Baths:
Living Area:
Finished Basement:

Heat Fuel:
Heat Type:
AC Type:
Roof Structure:
Roof Covering:
Exterior Wall 1:
Exterior Wall 2:
Interior Floor 1:
Interior Floor 2:

Extra Features

Description	Area / Units	Assessment
Covered Loading Platform	240	2900

Sub Areas

Description	Living Area	Gross Area
FUS - Finished Upper Story	49389	49389
BAS - First Floor	25463	25463
BSM - Basement	0	24439
SLB - Slab	0	1024
OLP - Loading Platform	0	240

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

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 06/14/2016 US POSTAGE $002.38 ZIP 06103 041L12203380
	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.		Derrik Kennedy, Town Manager Town of Mansfield Audrey P. Beck Memorial Building 4 South Eagleville Road Mansfield, CT 06268				
2.		Linda Painter, Director of Planning and Development Town of Mansfield Audrey P. Beck Memorial Building 4 South Eagleville Road Mansfield, CT 06268				
3.		Robert Sitkowski, General Counsel University of Connecticut 352 Mansfield Road Box U-72 Storrs, CT 06269				
4.						
5.						
6.						

OLD STATE HOUSE STA 06106 JUN 14 2016 USPS