

March 30, 2017

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

Re: **Notice of Exempt Modification – Facility Modification
1394 Meriden Waterbury Turnpike, Southington, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) antennas at the 138-foot level of an existing 160-foot tower at 1394 Meriden Waterbury Turnpike in Southington, Connecticut (the “Property”). The tower is owned by Crown Castle (“Crown”). The Council approved Cellco’s use of this tower in 2002. Cellco now intends to remove nine (9) of its existing and install six (6) new antennas (three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 700/2100 MHz antennas), all at the same level on the tower. Cellco also intends to replace three (3) remote radio heads (“RRHs”) and install six (6) new RRHs and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Garry Brumback, Town Manager of the Town of Southington; Robert Phillips, Southington Director of Planning Community Development; Southington Tower Development LLC, the Property owner; and Crown, the tower owner.

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

Robinson+Cole

Melanie A. Bachman, Esq.

March 30, 2017

Page 2

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's replacement antennas and RRHs will be installed on its existing platform at the 138-foot level on the tower.

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

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

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

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

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

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

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Garry Brumback, Southington Town Manager
Robert Phillips, Southington Director of Planning Community Development
Southington Tower Development LLC
Crown Castle
Tim Parks

ATTACHMENT 1



SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

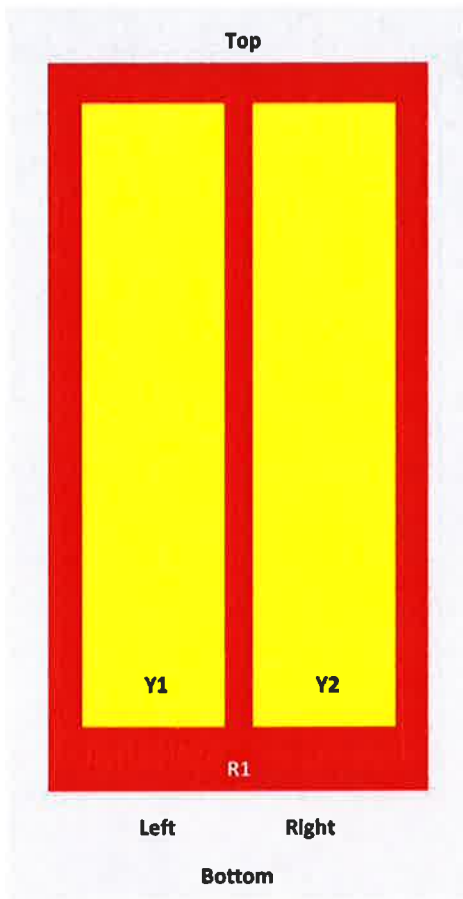
Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0° 14.6	0° 14.5	0° 17.4	0° 17.8	0° 18.1	0° 18.2
Gain by Beam Tilt, average, dBi	7° 14.6	7°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

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

Array Layout

SBNHH-1D65B

SBNHH 65



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

View from the front of the antenna

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

General Specifications

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

Mechanical Specifications

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

SBNHH-1D65B

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

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

Length	2025.0 mm 79.7 in
Width	390.0 mm 15.4 in
Depth	296.0 mm 11.7 in
Shipping Weight	31.0 kg 68.3 lb

Regulatory Compliance/Certifications

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



SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

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

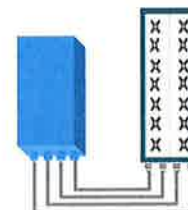


FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

TECHNICAL SPECIFICATIONS

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

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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.

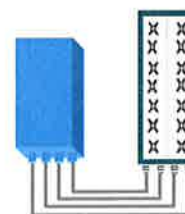


FEATURES

- 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

TECHNICAL SPECIFICATIONS

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)	2.0 dB typ. (<2.5 dB max)
RX Diversity scheme	2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.)	538 x 304 x 182 (21.2" x 12.0" x 7.2")
Volume (w/ solar shield) in L	30
Weight (w/ solar shield) in kg (lb)	24 (53)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	580W typical @100% RF load
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) IP65
Wind load (@150km/h or 93mph)	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

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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.

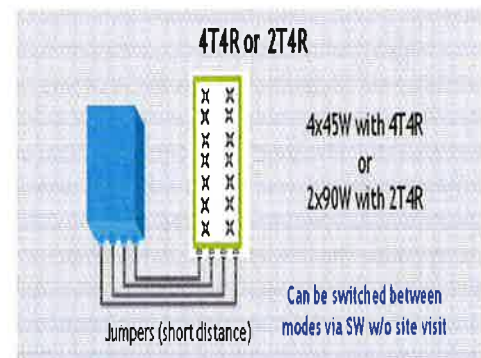
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the 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



TECHNICAL SPECIFICATIONS

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	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity
Receiver Sensivity (FRC A1-3)	-104.5 dBm maximum
Sizes (HxWxD) in mm (in.)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield)
Volume in Liters	35.5 (with solar shield) 29.7 (without solar shield)
Weight in kg (lb) (w/o mounting HW)	25.8kg (56.8lb) (with solar shield)
DC voltage range	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) UL50E Type 4 Enclosure
Wind load (@150km/h or 93mph)	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

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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.

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



Figure 1: HYBRIFLEX Series

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	(mm (in))	46.5 (1.83)
Jacket	Polyethylene, PE	(mm (in))	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		(kg/m (lb/ft))	1.9 (1.30)
Minimum Bending Radius, Single Bending		(mm (in))	200 (8)
Minimum Bending Radius, Repeated Bending		(mm (in))	500 (20)
Recommended/Maximum Clamp Spacing		(m (ft))	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		(μm)	50/125
Primary Coating (Acrylate)		(μm)	245
Buffer Diameter, Nominal		(μm)	900
Secondary Protection, Jacket, Nominal		(mm (in))	2.0 (0.08)
Minimum Bending Radius		(mm (in))	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		(mm (AWG))	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		(mm (AWG))	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		(mm (in))	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

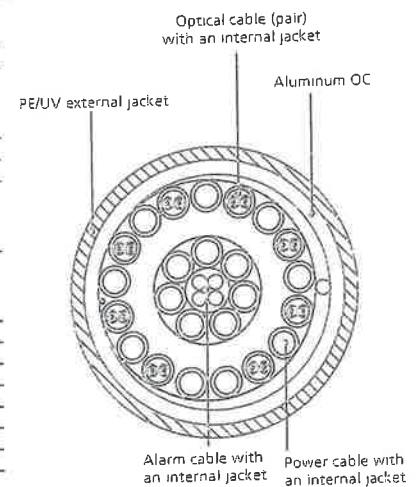


Figure 2: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering.

ATTACHMENT 2

	General		Power		Density				
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total	
*AT&T	2	1077	158	1900	0.0335	1.0000	0.34%		
*AT&T	2	565	158	880	0.0176	0.5867	0.30%		
*AT&T	1	283	158	880	0.0044	0.5867	0.08%		
*AT&T	4	646	158	1900	0.0402	1.0000	0.40%		
*AT&T	1	1313	158	734	0.0204	0.4893	0.42%		
*MetroPCS CDMA	3	727	119	2135	0.0614	1.0000	0.61%		
*MetroPCS LTE	1	1200	119	2130	0.0338	1.0000	0.34%		
*Sprint	5	693	148	1900	0.0618	1.0000	0.62%		
*Sprint	1	390	148	850	0.0070	0.5667	0.12%		
*Sprint	2	693	148	2500	0.0247	1.0000	0.25%		
*T-Mobile	2	2334	129	2100	0.1110	1.0000	1.11%		
*T-Mobile	2	1167	129	1900	0.0555	1.0000	0.55%		
*T-Mobile	2	1167	129	2100	0.0555	1.0000	0.55%		
*T-Mobile	1	865	129	700	0.0206	0.4667	0.44%		
Verizon	1	5000	138	0.0944	1970	1.0000	9.44%		
Verizon	9	393	138	0.0668	869	0.5793	11.53%		
Verizon	1	7400	138	0.1397	2145	1.0000	13.97%		
Verizon	1	2200	138	0.0415	746	0.4973	8.35%		
									49.4%
* Source: Siting Council									

ATTACHMENT 3



Date: February 14, 2017

Steve Tuttle
Crown Castle
8 Parkmeadow Drive
Pittsford, NY 14534
(585) 899-3445

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679
kthorpe@pjfweb.com

Subject: Structural Analysis Report

Carrier Designation:	Verizon Wireless Co-Locate	
	Carrier Site Number:	119644
	Carrier Site Name:	Milldale CT
Crown Castle Designation:	Crown Castle BU Number:	876313
	Crown Castle Site Name:	WEST JOHNSON AVE. BURNT HOUSE
	Crown Castle JDE Job Number:	414771
	Crown Castle Work Order Number:	1359847
	Crown Castle Application Number:	373642 Rev. 0

Engineering Firm Designation: Paul J Ford and Company Project Number: 37517-0193.003.7805

Site Data: 1394 Meriden Waterbury Tpk, SOUTHINGTON, Hartford County, CT
Latitude 41° 33' 51.39", Longitude -72° 53' 30.7"
160 Foot - Monopole Tower

Dear Steve Tuttle,

Paul J Ford and Company is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1000722, in accordance with application 373642, revision 0.

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

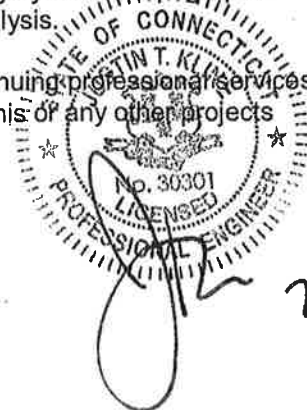
LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in 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. Risk Category II, Exposure Category B and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

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

Respectfully submitted by:


Kyle Thorpe, PE
Project Engineer



2-14-17

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Table 6 – Tower Components vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 160 ft Monopole tower designed by SUMMIT in August of 1998. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in 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. Risk Category II, Exposure Category B and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

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
138.0	138.0	3	alcatel lucent	RRH2X60-PCS	1	1-5/8	1
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	andrew	SBNHH-1D65B w/ Mount Pipe			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			

Notes:

- 1) Proposed Equipment

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
157.0	158.0	1	raycap	DC6-48-60-18-8F	1 2	3/8 3/4	2
		3	cci antennas	HPA-85R-BUU-H8 w/ Mount Pipe			
		3	ericsson	RRUS 32			
		6	ericsson	RRUS-11	2 1 6	3/4 3/8 1-5/8	1
		3	kathrein	800 10121 w/ Mount Pipe			
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	andrew	SBNH-1D6565C w/ Mount Pipe			
	157.0	1	tower mounts	T-Arm Mount [TA 702-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	150.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 103-3]			
148.0	148.0	3	alcatel lucent	TD-RRH8x20-25	4	1-1/4	4
		3	rfs celwave	APXVSP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	rfs celwave	IBC1900BB-1			
		3	rfs celwave	IBC1900HG-2A			
		1	tower mounts	Platform Mount [LP 1201-1]			
139.0	140.0	3	alcatel lucent	RRH2X40-AWS	-	-	3
	139.0	1	tower mounts	Side Arm Mount [SO 102-3]			
138.0	142.0	1	lucent	KS24019-L112A	1 7	1/2 1-5/8	1
	138.0	6	antel	LPA-80063-6CF-EDIN-2 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 1201-1]			
		3	antel	BXA-171063-12BF-EDIN-X w/ Mount Pipe	1 6	1-1/4 1-5/8	3
		3	antel	BXA-70063-6CF-EDIN-2 w/ Mount Pipe			
		3	kathrein	742 213 w/ Mount Pipe			
		1	raycap	RRFDC-3315-PF-48			
	1	rfs celwave	DB-T1-6Z-8AB-0Z				
	6	rfs celwave	FD9R6004/2C-3L				
127.0	129.0	3	commscope	LNx-6515DS-VTM w/ Mount Pipe	1 6	1-1/4 1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
	127.0	1	tower mounts	Platform Mount [LP 1201-1]			
119.0	119.0	3	andrew	HBX-6516DS-VTM w/ Mount Pipe	1 6	3/8 1-5/8	1
		1	tower mounts	T-Arm Mount [TA 602-3]			
48.0	50.0	1	lucent	KS24019-L112A	1	1/2	1
	48.0	1	tower mounts	Side Arm Mount [SO 701-1]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment To Be Removed
 4) SLA Equipment Controlling

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Velocitel, 15CAYC1600, 02/23/2016	5939573	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 128444, 04/12/2013	3846956	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 130340, 10/18/2013	4077468	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25560.9690, 03/13/2014	4600286	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25560, 10/30/2014	5380973	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25560_25075, 03/30/2015	5617077	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 29298-582, 08/27/1998	1633746	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 29298-582, 08/27/1998	2134246	CCISITES

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) For existing modifications: monopole was modified in conformance with the referenced modification drawings.

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	160 - 148.5	Pole	TP10.75x10.75x0.349	1	-2.58	359.22	49.1	Pass
L2	148.5 - 148	Pole	TP23x10.75x0.349	2	-2.58	359.22	49.0	Pass
L3	148 - 111	Pole	TP28.994x23x0.25	3	-17.20	1498.80	71.4	Pass
L4	111 - 105.25	Pole	TP29.4254x27.8865x0.3125	4	-19.08	1980.34	71.3	Pass
L5	105.25 - 76.75	Pole	TP34.042x29.4254x0.4446	5	-24.66	2272.54	95.0	Pass
L6	76.75 - 70.75	Pole	TP34.3889x32.4643x0.4785	6	-28.09	2778.39	89.7	Pass
L7	70.75 - 70	Pole	TP34.5104x34.3889x0.6626	7	-28.35	3444.72	73.8	Pass
L8	70 - 43	Pole	TP38.884x34.5104x0.5356	8	-35.07	3200.82	96.6	Pass
L9	43 - 28	Pole	TP40.5641x37.0028x0.6536	9	-44.04	3930.07	93.1	Pass
L10	28 - 27.25	Pole	TP40.6856x40.5641x0.6528	10	-44.34	4240.93	86.7	Pass
L11	27.25 - 16	Pole	TP42.508x40.6856x0.6551	11	-48.91	4468.34	87.9	Pass
L12	16 - 14.5	Pole	TP42.751x42.508x0.8063	12	-49.65	5023.02	79.4	Pass
L13	14.5 - 12.25	Pole	TP43.1155x42.751x0.6431	13	-50.58	4427.64	90.5	Pass
L14	12.25 - 10	Pole	TP43.48x43.1155x0.8213	14	-51.72	5007.94	81.6	Pass
L15	10 - 0	Pole	TP45.1x43.48x0.661	15	-56.06	5109.46	83.5	Pass
							Summary	
						Pole (L8)	96.6	Pass
						Rating =	96.6	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	76.5	Pass
1	Base Plate	0	65.2	Pass
1	Base Foundation Structural Steel	0	69.2	Pass
1	Base Foundation Soil Interaction	0	98.1	Pass
1	Extension Connection	148	27.5	Pass

Structure Rating (max from all components) =	98.1%
---	--------------

Notes:

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

4.1) Recommendations

The monopole and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Tower is located in Hartford County, Connecticut.

ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).

Basic wind speed of 97.0 mph.

Structure Class II.

Exposure Category B.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50.0 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60.0 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC 6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	---	---

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	160.00-148.50	11.50	0.00	Round	10.7500	10.7500	0.3490		A53-B-35 (35 ksi)
L2	148.50-148.00	0.50	0.00	Round	10.7500	23.0000	0.3490		A53-B-35 (35 ksi)

160 Ft Monopole Tower Structural Analysis
 Project Number 37517-0193.003.7805, Application 373642, Revision 0

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	148.00-111.00	37.00	3.75	18	23.0000	28.9940	0.2500	1.0000	A607-60 (60 ksi)
L4	111.00-105.25	9.50	0.00	18	27.8865	29.4254	0.3125	1.2500	A607-60 (60 ksi)
L5	105.25-76.75	28.50	4.25	18	29.4254	34.0420	0.4446	1.7785	Reinf 42.81 ksi (43 ksi)
L6	76.75-70.75	10.25	0.00	18	32.4643	34.3889	0.4785	1.9139	Reinf 47.20 ksi (47 ksi)
L7	70.75-70.00	0.75	0.00	18	34.3889	34.5104	0.6625	2.6502	Reinf 42.34 ksi (42 ksi)
L8	70.00-43.00	27.00	5.00	18	34.5104	38.8840	0.5356	2.1425	Reinf 43.88 ksi (44 ksi)
L9	43.00-28.00	20.00	0.00	18	37.0028	40.5641	0.6536	2.6143	Reinf 41.53 ksi (42 ksi)
L10	28.00-27.25	0.75	0.00	18	40.5641	40.6856	0.6528	2.6113	Reinf 44.73 ksi (45 ksi)
L11	27.25-16.00	11.25	0.00	18	40.6856	42.5080	0.6551	2.6205	Reinf 44.92 ksi (45 ksi)
L12	16.00-14.50	1.50	0.00	18	42.5080	42.7510	0.8063	3.2251	Reinf 40.94 ksi (41 ksi)
L13	14.50-12.25	2.25	0.00	18	42.7510	43.1155	0.6431	2.5725	Reinf 44.68 ksi (45 ksi)
L14	12.25-10.00	2.25	0.00	18	43.1155	43.4800	0.8213	3.2852	Reinf 39.40 ksi (39 ksi)
L15	10.00-0.00	10.00		18	43.4800	45.1000	0.6610	2.6438	Reinf 47.95 ksi (48 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	10.7500	11.4038	154.3829	3.6794	5.3750	28.7224	308.7659	5.6985	0.0000	0
	10.7500	11.4038	154.3829	3.6794	5.3750	28.7224	308.7659	5.6985	0.0000	0
L2	10.7500	11.4038	154.3829	3.6794	5.3750	28.7224	308.7659	5.6985	0.0000	0
	23.0000	24.8349	1593.1275	8.0093	11.5000	138.5328	3186.2550	12.4100	0.0000	0
L3	23.3548	18.0521	1180.3983	8.0762	11.6840	101.0269	2362.3498	9.0278	3.6080	14.432
	29.4413	22.8084	2380.8169	10.2041	14.7290	161.6420	4764.7665	11.4063	4.6629	18.652
L4	28.9335	27.3500	2627.2035	9.7888	14.1663	185.4539	5257.8639	13.6776	4.3580	13.946
	29.8793	28.8763	3092.0742	10.3351	14.9481	206.8541	6188.2170	14.4409	4.6289	14.812
L5	29.8793	40.8992	4339.8228	10.2882	14.9481	290.3262	8685.3560	20.4535	4.3963	9.888
	34.5672	47.4145	6761.7480	11.9271	17.2933	391.0031	13532.393	23.7117	5.2088	11.715
L6	33.7754	48.5767	6278.8556	11.3550	16.4919	380.7245	12565.973	24.2930	4.8716	10.181
	34.9194	51.4997	7481.8536	12.0382	17.4696	428.2789	14973.552	25.7547	5.2103	10.889
L7	34.9194	70.9244	10192.309	11.9729	17.4696	583.4318	20398.030	35.4689	4.8864	7.375
	35.0428	71.1798	10302.851	12.0160	17.5313	587.6833	20619.260	35.5967	4.9077	7.407
L8	35.0428	57.7602	8423.2559	12.0611	17.5313	480.4696	16857.595	28.8856	5.1311	9.58
	39.4838	65.1957	12112.951	13.6137	19.7531	613.2186	24241.842	32.6040	5.9009	11.017
L9	38.4777	75.4051	12587.199	12.9040	18.7974	669.6233	25190.961	37.7097	5.3622	8.204
	41.1898	82.7928	16661.111	14.1682	20.6065	808.5350	33344.146	41.4043	5.9890	9.163
L10	41.1898	82.6981	16642.688	14.1685	20.6065	807.6410	33307.276	41.3569	5.9903	9.176
	41.3132	82.9499	16795.145	14.2116	20.6683	812.6055	33612.390	41.4828	6.0117	9.209
L11	41.3132	83.2386	16851.657	14.2108	20.6683	815.3397	33725.489	41.6272	6.0076	9.17
	43.1638	87.0282	19259.656	14.8578	21.5941	891.8952	38544.654	43.5224	6.3284	9.66

160 Ft Monopole Tower Structural Analysis
 Project Number 37517-0193.003.7805, Application 373642, Revision 0

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L12	43.1638	106.7203	23447.314	14.8041	21.5941	1085.8214	46925.480	53.3703	6.0624	7.519
	43.4105	107.3422	23859.596	14.8904	21.7175	1098.6334	47750.587	53.6813	6.1051	7.572
L13	43.4105	85.9546	19254.572	14.9483	21.7175	886.5916	38534.481	42.9855	6.3923	9.939
	43.7807	86.6987	19758.935	15.0777	21.9027	902.1237	39543.870	43.3576	6.4564	10.039
L14	43.7807	110.2529	24916.644	15.0145	21.9027	1137.6067	49866.075	55.1369	6.1428	7.479
	44.1508	111.2030	25566.404	15.1438	22.0879	1157.4872	51166.449	55.6121	6.2070	7.558
L15	44.1508	89.8282	20807.728	15.2008	22.0879	942.0441	41642.836	44.9226	6.4892	9.818
	45.7957	93.2267	23259.869	15.7759	22.9108	1015.2360	46550.345	46.6222	6.7743	10.249

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 160.00-148.50				1	1	1			
L2 148.50-148.00				1	1	1			
L3 148.00-111.00				1	1	1			
L4 111.00-105.25				1	1	1			
L5 105.25-76.75				1	1	1			
L6 76.75-70.75				1	1	1			
L7 70.75-70.00				1	1	1			
L8 70.00-43.00				1	1	1			
L9 43.00-28.00				1	1	1			
L10 28.00-27.25				1	1	1			
L11 27.25-16.00				1	1	1			
L12 16.00-14.50				1	1	1			
L13 14.50-12.25				1	1	1			
L14 12.25-10.00				1	1	1			
L15 10.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C _{AA}	Weight
				ft		ft ² /ft	plf
FB-L98B-002-75000(3/8")	C	No	Inside Pole	157.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	157.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
LDF7-50A(1-5/8")	C	No	Inside Pole	157.00 - 0.00	6	No Ice	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A		Weight
						ft ² /ft	plf	
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
2" (Nominal) Conduit	C	No	Inside Pole	157.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
FB-L98B-034-XXX(3/8")	C	No	Inside Pole	157.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	157.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" (Nominal) Conduit	C	No	Inside Pole	157.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72

HB114-1-08U4-M5J(1-1/4")	C	No	Inside Pole	148.00 - 0.00	4	No Ice	0.00	1.08
						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08

LDF4-50A(1/2")	C	No	Inside Pole	138.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
HB158-1-08U8-S8J18(1-5/8")	C	No	Inside Pole	138.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
AL7-50(1-5/8")	C	No	Inside Pole	138.00 - 0.00	6	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
HB158-1-08U8-S8J18(1-5/8")	C	No	Inside Pole	138.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30

MLE Hybrid 3Power/6Fiber RL 2(1-1/4")	C	No	CaAa (Out Of Face)	127.00 - 0.00	1	No Ice	0.00	0.68
						1/2" Ice	0.00	1.75
						1" Ice	0.00	3.43
LDF7-50A(1-5/8")	C	No	Inside Pole	127.00 - 0.00	1	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.00 - 0.00	4	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.00 - 0.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46

FXL-1873(1-5/8")	C	No	CaAa (Out Of Face)	119.00 - 106.75	1	No Ice	0.20	0.67
						1/2" Ice	0.30	2.18
						1" Ice	0.40	4.31
FXL-1873(1-5/8")	C	No	CaAa (Out Of Face)	106.75 - 0.00	1	No Ice	0.00	0.67
						1/2" Ice	0.00	2.18
						1" Ice	0.00	4.31
FXL-1873(1-5/8")	C	No	CaAa (Out Of Face)	119.00 - 0.00	5	No Ice	0.00	0.67
						1/2" Ice	0.00	2.18
						1" Ice	0.00	4.31
860 10033(3/8")	C	No	CaAa (Out Of Face)	119.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.50
						1" Ice	0.00	1.61

LDF4-50A(1/2")	C	No	Inside Pole	48.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15

Aero MP3-06	C	No	CaAa (Out Of Face)	30.50 - 0.00	1	No Ice	0.43	0.00
						1/2" Ice	0.55	0.00
						1" Ice	0.66	0.00
Aero MP3-05	C	No	CaAa (Out Of Face)	73.00 - 43.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00
Aero MP3-04	C	No	CaAa (Out Of Face)	106.75 - 76.75	1	No Ice	0.27	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A		Weight
						ft ² /ft	plf	
			Face)			1/2" Ice	0.38	0.00
						1" Ice	0.49	0.00

1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	49.50 - 24.50	1	No Ice	0.21	0.00
						1/2" Ice	0.32	0.00
						1" Ice	0.43	0.00

1" Flat Reinforcement	C	No	CaAa (Out Of Face)	18.00 - 8.00	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00

1" Flat Reinforcement	C	No	CaAa (Out Of Face)	82.50 - 67.50	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement ft	C _A A _A Front	C _A A _A Side	Weight
			Horz Lateral	Vert	ft			ft ²	ft ²	K
HPA-85R-BUU-H8 w/ Mount Pipe	A	From Leg	3.00	0.000	157.00	No Ice	12.98	9.32	0.10	
			0.00			1/2"	13.67	10.79	0.20	
			1.00			Ice	14.36	12.24	0.30	
						1" Ice				
HPA-85R-BUU-H8 w/ Mount Pipe	B	From Leg	3.00	0.000	157.00	No Ice	12.98	9.32	0.10	
			0.00			1/2"	13.67	10.79	0.20	
			1.00			Ice	14.36	12.24	0.30	
						1" Ice				
HPA-85R-BUU-H8 w/ Mount Pipe	C	From Leg	3.00	0.000	157.00	No Ice	12.98	9.32	0.10	
			0.00			1/2"	13.67	10.79	0.20	
			1.00			Ice	14.36	12.24	0.30	
						1" Ice				
RRUS 32	A	From Leg	3.00	0.000	157.00	No Ice	2.86	1.78	0.06	
			0.00			1/2"	3.08	1.97	0.08	
			1.00			Ice	3.32	2.17	0.10	
						1" Ice				
RRUS 32	B	From Leg	3.00	0.000	157.00	No Ice	2.86	1.78	0.06	
			0.00			1/2"	3.08	1.97	0.08	
			1.00			Ice	3.32	2.17	0.10	
						1" Ice				
RRUS 32	C	From Leg	3.00	0.000	157.00	No Ice	2.86	1.78	0.06	
			0.00			1/2"	3.08	1.97	0.08	
			1.00			Ice	3.32	2.17	0.10	
						1" Ice				
DC6-48-60-18-8F	A	From Leg	3.00	0.000	157.00	No Ice	0.92	0.92	0.02	
			0.00			1/2"	1.46	1.46	0.04	
			1.00			Ice	1.64	1.64	0.06	
						1" Ice				
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	3.00	0.000	157.00	No Ice	8.26	6.30	0.07	
			0.00			1/2"	8.82	7.48	0.14	
			1.00			Ice	9.35	8.37	0.21	
						1" Ice				
P65-17-XLH-RR w/ Mount Pipe	B	From Leg	3.00	0.000	157.00	No Ice	11.82	9.06	0.09	
			0.00			1/2"	12.59	10.62	0.18	
			1.00			Ice	13.38	12.21	0.28	
						1" Ice				
SBNH-1D6565C w/ Mount Pipe	C	From Leg	3.00	0.000	157.00	No Ice	11.56	9.72	0.10	
			0.00			1/2"	12.22	11.19	0.19	
			1.00			Ice	12.89	12.59	0.28	
						1" Ice				
800 10121 w/ Mount Pipe	A	From Leg	3.00	0.000	157.00	No Ice	5.74	4.95	0.07	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
			0.00			1/2"	6.34	6.02	0.12
			1.00			Ice	6.86	6.81	0.18
800 10121 w/ Mount Pipe	B	From Leg	3.00	0.000	157.00	1" Ice No Ice	5.74	4.95	0.07
			0.00			1/2"	6.34	6.02	0.12
			1.00			Ice	6.86	6.81	0.18
800 10121 w/ Mount Pipe	C	From Leg	3.00	0.000	157.00	1" Ice No Ice	5.74	4.95	0.07
			0.00			1/2"	6.34	6.02	0.12
			1.00			Ice	6.86	6.81	0.18
DC6-48-60-18-8F	A	From Leg	3.00	0.000	157.00	1" Ice No Ice	0.92	0.92	0.02
			0.00			1/2"	1.46	1.46	0.04
			1.00			Ice	1.64	1.64	0.06
(2) LGP21401	A	From Leg	3.00	0.000	157.00	1" Ice No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			1.00			Ice	1.38	0.54	0.03
(2) LGP21401	B	From Leg	3.00	0.000	157.00	1" Ice No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			1.00			Ice	1.38	0.54	0.03
(2) LGP21401	C	From Leg	3.00	0.000	157.00	1" Ice No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			1.00			Ice	1.38	0.54	0.03
(2) RRUS-11	A	From Leg	3.00	0.000	157.00	1" Ice No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			1.00			Ice	3.21	1.50	0.09
(2) RRUS-11	B	From Leg	3.00	0.000	157.00	1" Ice No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			1.00			Ice	3.21	1.50	0.09
(2) RRUS-11	C	From Leg	3.00	0.000	157.00	1" Ice No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			1.00			Ice	3.21	1.50	0.09
T-Arm Mount [TA 702-3]	C	None		0.000	157.00	1" Ice No Ice	5.64	5.64	0.34
						1/2"	6.55	6.55	0.43
						Ice	7.46	7.46	0.52
						1" Ice			

800MHz 2X50W RRH W/FILTER	A	From Leg	2.00	0.000	150.00	1" Ice No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	2.00	0.000	150.00	1" Ice No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	2.00	0.000	150.00	1" Ice No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
PCS 1900MHz 4x45W-65MHz	A	From Leg	2.00	0.000	150.00	1" Ice 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
PCS 1900MHz 4x45W-65MHz	B	From Leg	2.00	0.000	150.00	1" Ice 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
PCS 1900MHz 4x45W-	C	From Leg	2.00	0.000	150.00	1" Ice No Ice	2.32	2.24	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
65MHz			0.00			1/2" 2.53	2.44	0.08
			0.00			Ice 2.74	2.65	0.11
Side Arm Mount [SO 103-3]	C	None		0.000	150.00	1" Ice No Ice	9.50	0.22
						1/2" 11.80	11.80	0.32
						Ice 14.10	14.10	0.41
						1" Ice		

APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	148.00	No Ice 6.58 1/2" 7.03 Ice 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 6.58 1/2" 7.03 Ice 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 6.58 1/2" 7.03 Ice 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVSP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 8.26 1/2" 8.82 Ice 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVSP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 8.26 1/2" 8.82 Ice 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVSP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 8.26 1/2" 8.82 Ice 9.35	6.95 8.13 9.02	0.08 0.15 0.23
IBC1900HG-2A	A	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 0.97 1/2" 1.09 Ice 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900HG-2A	B	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 0.97 1/2" 1.09 Ice 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900HG-2A	C	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 0.97 1/2" 1.09 Ice 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	A	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 0.97 1/2" 1.09 Ice 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	B	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 0.97 1/2" 1.09 Ice 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	C	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 0.97 1/2" 1.09 Ice 1.22	0.46 0.56 0.66	0.02 0.03 0.04
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 4.05 1/2" 4.30 Ice 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.000	148.00	1" Ice No Ice 4.05 1/2" 4.30 Ice 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.00	0.000	148.00	1" Ice No Ice 4.05	1.53	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			0.00			1/2"	4.30	1.71	0.10
			0.00			Ice	4.56	1.90	0.13
						1" Ice			
Platform Mount [LP 1201-1]	C	None		0.000	148.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90
						1" Ice			

(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.000	138.00	No Ice	8.42	7.42	0.08
			0.00			1/2"	8.96	8.45	0.15
			0.00			Ice	9.48	9.35	0.23
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.000	138.00	No Ice	8.42	7.42	0.08
			0.00			1/2"	8.96	8.45	0.15
			0.00			Ice	9.48	9.35	0.23
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.000	138.00	No Ice	8.42	7.42	0.08
			0.00			1/2"	8.96	8.45	0.15
			0.00			Ice	9.48	9.35	0.23
						1" Ice			
RRH4X45-AWS4 B66	A	From Leg	4.00	0.000	138.00	No Ice	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH4X45-AWS4 B66	B	From Leg	4.00	0.000	138.00	No Ice	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH4X45-AWS4 B66	C	From Leg	4.00	0.000	138.00	No Ice	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH2X60-PCS	A	From Leg	4.00	0.000	138.00	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	4.00	0.000	138.00	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	C	From Leg	4.00	0.000	138.00	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			
RRH2x60-700	A	From Leg	4.00	0.000	138.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2x60-700	B	From Leg	4.00	0.000	138.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2x60-700	C	From Leg	4.00	0.000	138.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
(2) DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.000	138.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice			
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00	0.000	138.00	No Ice	9.97	10.25	0.05
			0.00			1/2"	10.54	11.42	0.15
			0.00			Ice	11.08	12.31	0.25
						1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement		C _{AA}	C _{AA}	Weight
			Horz Lateral	Vert				Front	Side	
							ft	ft ²	ft ²	K
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00	0.000	138.00	No Ice	9.97	10.25	0.05	
			0.00			1/2"	10.54	11.42	0.15	
			0.00			Ice	11.08	12.31	0.25	
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00	0.000	138.00	No Ice	9.97	10.25	0.05	
			0.00			1/2"	10.54	11.42	0.15	
			0.00			Ice	11.08	12.31	0.25	
KS24019-L112A	C	From Leg	4.00	0.000	138.00	No Ice	0.14	0.14	0.01	
			0.00			1/2"	0.20	0.20	0.01	
			4.00			Ice	0.26	0.26	0.01	
Platform Mount [LP 1201-1]	C	None		0.000	138.00	No Ice	23.10	23.10	2.10	
						1/2"	26.80	26.80	2.50	
						Ice	30.50	30.50	2.90	

ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00	0.000	127.00	No Ice	6.32	5.63	0.11	
			0.00			1/2"	6.76	6.42	0.17	
			2.00			Ice	7.20	7.12	0.23	
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.000	127.00	No Ice	6.32	5.63	0.11	
			0.00			1/2"	6.76	6.42	0.17	
			2.00			Ice	7.20	7.12	0.23	
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00	0.000	127.00	No Ice	6.32	5.63	0.11	
			0.00			1/2"	6.76	6.42	0.17	
			2.00			Ice	7.20	7.12	0.23	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.000	127.00	No Ice	6.33	5.64	0.11	
			0.00			1/2"	6.78	6.43	0.17	
			2.00			Ice	7.21	7.13	0.23	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.000	127.00	No Ice	6.33	5.64	0.11	
			0.00			1/2"	6.78	6.43	0.17	
			2.00			Ice	7.21	7.13	0.23	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.000	127.00	No Ice	6.33	5.64	0.11	
			0.00			1/2"	6.78	6.43	0.17	
			2.00			Ice	7.21	7.13	0.23	
KRY 112 144/1	A	From Leg	4.00	0.000	127.00	No Ice	0.35	0.17	0.01	
			0.00			1/2"	0.43	0.23	0.01	
			2.00			Ice	0.51	0.30	0.02	
KRY 112 144/1	B	From Leg	4.00	0.000	127.00	No Ice	0.35	0.17	0.01	
			0.00			1/2"	0.43	0.23	0.01	
			2.00			Ice	0.51	0.30	0.02	
KRY 112 144/1	C	From Leg	4.00	0.000	127.00	No Ice	0.35	0.17	0.01	
			0.00			1/2"	0.43	0.23	0.01	
			2.00			Ice	0.51	0.30	0.02	
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.000	127.00	No Ice	11.68	9.84	0.08	
			0.00			1/2"	12.40	11.37	0.17	
			2.00			Ice	13.14	12.91	0.27	
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.000	127.00	No Ice	11.68	9.84	0.08	
			0.00			1/2"	12.40	11.37	0.17	
			2.00			Ice	13.14	12.91	0.27	
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.000	127.00	No Ice	11.68	9.84	0.08	
			0.00			1/2"	12.40	11.37	0.17	
			2.00			Ice	13.14	12.91	0.27	
						No Ice				
						1/2"				
						Ice				
						1"				

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
RRUS 11 B12	A	From Leg	4.00	0.000	127.00	No Ice	2.83	1.18	0.05
			0.00			1/2"	3.04	1.33	0.07
			2.00			Ice	3.26	1.48	0.10
RRUS 11 B12	B	From Leg	4.00	0.000	127.00	No Ice	2.83	1.18	0.05
			0.00			1/2"	3.04	1.33	0.07
			2.00			Ice	3.26	1.48	0.10
RRUS 11 B12	C	From Leg	4.00	0.000	127.00	No Ice	2.83	1.18	0.05
			0.00			1/2"	3.04	1.33	0.07
			2.00			Ice	3.26	1.48	0.10
Platform Mount [LP 1201-1]	C	None		0.000	127.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90

HBX-6516DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.000	119.00	No Ice	3.60	3.24	0.03
			0.00			1/2"	4.00	3.91	0.06
			0.00			Ice	4.39	4.56	0.10
HBX-6516DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.000	119.00	No Ice	3.60	3.24	0.03
			0.00			1/2"	4.00	3.91	0.06
			0.00			Ice	4.39	4.56	0.10
HBX-6516DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.000	119.00	No Ice	3.60	3.24	0.03
			0.00			1/2"	4.00	3.91	0.06
			0.00			Ice	4.39	4.56	0.10
2.375" OD x 5' Mount Pipe	A	From Leg	4.00	0.000	119.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
2.375" OD x 5' Mount Pipe	B	From Leg	4.00	0.000	119.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
2.375" OD x 5' Mount Pipe	C	From Leg	4.00	0.000	119.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
T-Arm Mount [TA 602-3]	C	None		0.000	119.00	No Ice	11.59	11.59	0.77
						1/2"	15.44	15.44	0.99
						Ice	19.29	19.29	1.21

KS24019-L112A	A	From Leg	3.00	0.000	48.00	No Ice	0.14	0.14	0.01
			0.00			1/2"	0.20	0.20	0.01
			2.00			Ice	0.26	0.26	0.01
Side Arm Mount [SO 701-1]	A	None		0.000	48.00	No Ice	0.85	1.67	0.07
						1/2"	1.14	2.34	0.08
						Ice	1.43	3.01	0.09

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K _z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 160.00-148.50	154.25	1.119	26	10.302	A	0.000	10.302	10.302	100.00	0.000	0.000
					B	0.000	10.302		100.00	0.000	0.000
					C	0.000	10.302		100.00	0.000	0.000
L2 148.50-148.00	148.22	1.106	25	0.703	A	0.000	0.703	0.703	100.00	0.000	0.000
					B	0.000	0.703		100.00	0.000	0.000
					C	0.000	0.703		100.00	0.000	0.000
L3 148.00-111.00	128.98	1.063	24	81.394	A	0.000	81.394	81.394	100.00	0.000	0.000
					B	0.000	81.394		100.00	0.000	0.000
					C	0.000	81.394		100.00	0.000	4.752
L4 111.00-105.25	108.11	1.01	23	14.091	A	0.000	14.091	14.091	100.00	0.000	0.000
					B	0.000	14.091		100.00	0.000	0.000
					C	0.000	14.091		100.00	0.000	2.384
L5 105.25-76.75	90.65	0.961	22	76.530	A	0.000	76.530	76.530	100.00	0.000	0.000
					B	0.000	76.530		100.00	0.000	0.000
					C	0.000	76.530		100.00	0.000	14.269
L6 76.75-70.75	73.73	0.906	21	17.174	A	0.000	17.174	17.174	100.00	0.000	0.000
					B	0.000	17.174		100.00	0.000	0.000
					C	0.000	17.174		100.00	0.000	2.971
L7 70.75-70.00	70.37	0.894	20	2.186	A	0.000	2.186	2.186	100.00	0.000	0.000
					B	0.000	2.186		100.00	0.000	0.000
					C	0.000	2.186		100.00	0.000	0.534
L8 70.00-43.00	56.23	0.838	19	83.842	A	0.000	83.842	83.842	100.00	0.000	0.000
					B	0.000	83.842		100.00	0.000	0.000
					C	0.000	83.842		100.00	0.000	16.507
L9 43.00-28.00	35.41	0.735	17	49.792	A	0.000	49.792	49.792	100.00	0.000	0.000
					B	0.000	49.792		100.00	0.000	0.000
					C	0.000	49.792		100.00	0.000	7.181
L10 28.00-27.25	27.62	0.7	16	2.578	A	0.000	2.578	2.578	100.00	0.000	0.000
					B	0.000	2.578		100.00	0.000	0.000
					C	0.000	2.578		100.00	0.000	0.630
L11 27.25-16.00	21.58	0.7	16	39.599	A	0.000	39.599	39.599	100.00	0.000	0.000
					B	0.000	39.599		100.00	0.000	0.000
					C	0.000	39.599		100.00	0.000	8.020
L12 16.00-14.50	15.25	0.7	16	5.411	A	0.000	5.411	5.411	100.00	0.000	0.000
					B	0.000	5.411		100.00	0.000	0.000
					C	0.000	5.411		100.00	0.000	1.198
L13 14.50-12.25	13.37	0.7	16	8.174	A	0.000	8.174	8.174	100.00	0.000	0.000
					B	0.000	8.174		100.00	0.000	0.000
					C	0.000	8.174		100.00	0.000	1.798
L14 12.25-10.00	11.12	0.7	16	8.244	A	0.000	8.244	8.244	100.00	0.000	0.000
					B	0.000	8.244		100.00	0.000	0.000
					C	0.000	8.244		100.00	0.000	1.798
L15 10.00-0.00	4.97	0.7	16	37.478	A	0.000	37.478	37.478	100.00	0.000	0.000
					B	0.000	37.478		100.00	0.000	0.000
					C	0.000	37.478		100.00	0.000	6.657

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K _z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 160.00-148.50	154.25	1.119	7	2.3335	14.775	A	0.000	14.775	14.775	100.00	0.000	0.000
						B	0.000	14.775		100.00	0.000	0.000
						C	0.000	14.775		100.00	0.000	0.000
L2 148.50-148.00	148.22	1.106	7	2.3242	0.897	A	0.000	0.897	0.897	100.00	0.000	0.000
						B	0.000	0.897		100.00	0.000	0.000
						C	0.000	0.897		100.00	0.000	0.000
L3 148.00-111.00	128.98	1.063	6	2.2921	95.528	A	0.000	95.528	95.528	100.00	0.000	0.000
						B	0.000	95.528		100.00	0.000	0.000
						C	0.000	95.528		100.00	0.000	15.754
L4 111.00-105.25	108.11	1.01	6	2.2520	16.287	A	0.000	16.287	16.287	100.00	0.000	0.000
						B	0.000	16.287		100.00	0.000	0.000

Section Elevation ft	z ft	K _z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L5 105.25-76.75	90.65	0.961	6	2.2127	87.040	C	0.000	16.287	87.040	100.00	0.000	7.732
						A	0.000	87.040		100.00	0.000	0.000
						B	0.000	87.040		100.00	0.000	0.000
L6 76.75-70.75	73.73	0.906	6	2.1674	19.386	C	0.000	87.040	19.386	100.00	0.000	43.722
						A	0.000	19.386		100.00	0.000	0.000
						B	0.000	19.386		100.00	0.000	0.000
L7 70.75-70.00	70.37	0.894	5	2.1573	2.456	C	0.000	19.386	2.456	100.00	0.000	9.877
						A	0.000	2.456		100.00	0.000	0.000
						B	0.000	2.456		100.00	0.000	0.000
L8 70.00-43.00	56.23	0.838	5	2.1095	93.335	C	0.000	93.335	93.335	100.00	0.000	1.642
						A	0.000	93.335		100.00	0.000	0.000
						B	0.000	93.335		100.00	0.000	0.000
L9 43.00-28.00	35.41	0.735	4	2.0142	55.066	C	0.000	93.335	55.066	100.00	0.000	47.111
						A	0.000	55.066		100.00	0.000	0.000
						B	0.000	55.066		100.00	0.000	0.000
L10 28.00-27.25	27.62	0.7	4	1.9648	2.824	C	0.000	55.066	2.824	100.00	0.000	21.713
						A	0.000	2.824		100.00	0.000	0.000
						B	0.000	2.824		100.00	0.000	0.000
L11 27.25-16.00	21.58	0.7	4	1.9169	43.193	C	0.000	2.824	43.193	100.00	0.000	1.580
						A	0.000	43.193		100.00	0.000	0.000
						B	0.000	43.193		100.00	0.000	0.000
L12 16.00-14.50	15.25	0.7	4	1.8514	5.874	C	0.000	43.193	5.874	100.00	0.000	19.148
						A	0.000	5.874		100.00	0.000	0.000
						B	0.000	5.874		100.00	0.000	0.000
L13 14.50-12.25	13.37	0.7	4	1.8273	8.859	C	0.000	5.874	8.859	100.00	0.000	2.988
						A	0.000	8.859		100.00	0.000	0.000
						B	0.000	8.859		100.00	0.000	0.000
L14 12.25-10.00	11.12	0.7	4	1.7939	8.916	C	0.000	8.859	8.916	100.00	0.000	4.447
						A	0.000	8.916		100.00	0.000	0.000
						B	0.000	8.916		100.00	0.000	0.000
L15 10.00-0.00	4.97	0.7	4	1.6550	40.236	C	0.000	8.916	40.236	100.00	0.000	4.399
						A	0.000	40.236		100.00	0.000	0.000
						B	0.000	40.236		100.00	0.000	0.000
						C	0.000	40.236		100.00	0.000	14.380

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K _z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 160.00-148.50	154.25	1.119	9	10.302	A	0.000	10.302	10.302	100.00	0.000	0.000
					B	0.000	10.302		100.00	0.000	0.000
					C	0.000	10.302		100.00	0.000	0.000
L2 148.50-148.00	148.22	1.106	9	0.703	A	0.000	0.703	0.703	100.00	0.000	0.000
					B	0.000	0.703		100.00	0.000	0.000
					C	0.000	0.703		100.00	0.000	0.000
L3 148.00-111.00	128.98	1.063	8	81.394	A	0.000	81.394	81.394	100.00	0.000	0.000
					B	0.000	81.394		100.00	0.000	0.000
					C	0.000	81.394		100.00	0.000	4.752
L4 111.00-105.25	108.11	1.01	8	14.091	A	0.000	14.091	14.091	100.00	0.000	0.000
					B	0.000	14.091		100.00	0.000	0.000
					C	0.000	14.091		100.00	0.000	2.384
L5 105.25-76.75	90.65	0.961	8	76.530	A	0.000	76.530	76.530	100.00	0.000	0.000
					B	0.000	76.530		100.00	0.000	0.000
					C	0.000	76.530		100.00	0.000	14.269
L6 76.75-70.75	73.73	0.906	7	17.174	A	0.000	17.174	17.174	100.00	0.000	0.000
					B	0.000	17.174		100.00	0.000	0.000
					C	0.000	17.174		100.00	0.000	2.971
L7 70.75-70.00	70.37	0.894	7	2.186	A	0.000	2.186	2.186	100.00	0.000	0.000
					B	0.000	2.186		100.00	0.000	0.000

Section Elevation ft	z ft	K _z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L8 70.00-43.00	56.23	0.838	7	83.842	C	0.000	2.186	83.842	100.00	0.000	0.534
					A	0.000	83.842		100.00	0.000	0.000
					B	0.000	83.842		100.00	0.000	0.000
L9 43.00-28.00	35.41	0.735	6	49.792	C	0.000	83.842	49.792	100.00	0.000	16.507
					A	0.000	49.792		100.00	0.000	0.000
					B	0.000	49.792		100.00	0.000	0.000
L10 28.00-27.25	27.62	0.7	5	2.578	C	0.000	49.792	2.578	100.00	0.000	7.181
					A	0.000	2.578		100.00	0.000	0.000
					B	0.000	2.578		100.00	0.000	0.000
L11 27.25-16.00	21.58	0.7	5	39.599	C	0.000	2.578	39.599	100.00	0.000	0.630
					A	0.000	39.599		100.00	0.000	0.000
					B	0.000	39.599		100.00	0.000	0.000
L12 16.00-14.50	15.25	0.7	5	5.411	C	0.000	39.599	5.411	100.00	0.000	8.020
					A	0.000	5.411		100.00	0.000	0.000
					B	0.000	5.411		100.00	0.000	0.000
L13 14.50-12.25	13.37	0.7	5	8.174	C	0.000	5.411	8.174	100.00	0.000	1.198
					A	0.000	8.174		100.00	0.000	0.000
					B	0.000	8.174		100.00	0.000	0.000
L14 12.25-10.00	11.12	0.7	5	8.244	C	0.000	8.174	8.244	100.00	0.000	1.798
					A	0.000	8.244		100.00	0.000	0.000
					B	0.000	8.244		100.00	0.000	0.000
L15 10.00-0.00	4.97	0.7	5	37.478	C	0.000	8.244	37.478	100.00	0.000	1.798
					A	0.000	37.478		100.00	0.000	0.000
					B	0.000	37.478		100.00	0.000	0.000
					C	0.000	37.478		100.00	0.000	6.657

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	160 - 148.5	Pole	Max Tension	21	0.00	-0.00	0.00
			Max. Compression	26	-11.29	0.09	0.38
			Max. Mx	20	-2.58	47.67	0.25
			Max. My	2	-2.58	0.19	47.58
			Max. Vy	20	-6.02	47.67	0.25
			Max. Vx	2	-6.01	0.19	47.58
			Max. Torque	23			0.19
L2	148.5 - 148	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-11.36	0.10	0.38
			Max. Mx	20	-2.62	50.68	0.26
			Max. My	2	-2.62	0.20	50.59
			Max. Vy	20	-6.04	50.68	0.26
			Max. Vx	2	-6.03	0.20	50.59
			Max. Torque	23			0.19
L3	148 - 111	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-53.58	2.96	1.77
			Max. Mx	20	-17.24	602.92	1.18
			Max. My	2	-17.20	0.98	607.49
			Max. Vy	20	-22.88	602.92	1.18
			Max. Vx	2	-23.08	0.98	607.49
			Max. Torque	19			-0.49
L4	111 - 105.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-57.51	4.53	0.99
			Max. Mx	20	-19.11	823.92	1.32
			Max. My	2	-19.08	1.24	830.23
			Max. Vy	20	-23.66	823.92	1.32
			Max. Vx	2	-23.85	1.24	830.23
			Max. Torque	17			-0.51
L5	105.25 - 76.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-68.48	9.80	-1.81
			Max. Mx	20	-24.68	1424.44	1.60
			Max. My	2	-24.66	1.99	1435.03
			Max. Vy	20	-25.88	1424.44	1.60
			Max. Vx	2	-26.08	1.99	1435.03
			Max. Torque	3			0.93
L6	76.75 - 70.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-74.63	12.07	-3.04
			Max. Mx	20	-28.11	1695.20	1.72
			Max. My	2	-28.09	2.30	1707.59
			Max. Vy	20	-26.87	1695.20	1.72
			Max. Vx	14	27.06	-0.79	-1707.22
			Max. Torque	3			1.16
L7	70.75 - 70	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.05	12.24	-3.13

160 Ft Monopole Tower Structural Analysis
 Project Number 37517-0193.003.7805, Application 373642, Revision 0

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L8	70 - 43	Pole	Max. Mx	20	-28.37	1715.38	1.72
			Max. My	2	-28.35	2.33	1727.90
			Max. Vy	20	-26.97	1715.38	1.72
			Max. Vx	14	27.16	-0.79	-1727.54
			Max. Torque	3			1.19
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-86.44	17.08	-5.80
			Max. Mx	20	-35.09	2328.77	1.94
			Max. My	2	-35.07	3.03	2345.08
			Max. Vy	20	-28.79	2328.77	1.94
L9	43 - 28	Pole	Max. Vx	14	28.99	-0.87	-2345.08
			Max. Torque	24			1.78
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-100.31	21.52	-8.20
			Max. Mx	20	-44.05	2921.82	2.15
			Max. My	14	-44.04	-0.92	-2941.82
			Max. Vy	20	-30.25	2921.82	2.15
			Max. Vx	14	30.44	-0.92	-2941.82
			Max. Torque	24			2.28
			Max Tension	1	0.00	0.00	0.00
L10	28 - 27.25	Pole	Max. Compression	26	-100.75	21.68	-8.28
			Max. Mx	20	-44.35	2944.53	2.16
			Max. My	14	-44.34	-0.92	-2964.67
			Max. Vy	20	-30.33	2944.53	2.16
			Max. Vx	14	30.52	-0.92	-2964.67
			Max. Torque	24			2.31
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-107.49	23.92	-9.56
			Max. Mx	20	-48.92	3289.82	2.25
			Max. My	14	-48.91	-0.94	-3312.02
L11	27.25 - 16	Pole	Max. Vy	20	-31.06	3289.82	2.25
			Max. Vx	14	31.25	-0.94	-3312.02
			Max. Torque	24			2.70
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-108.52	24.20	-9.72
			Max. Mx	20	-49.65	3336.49	2.26
			Max. My	14	-49.65	-0.94	-3358.96
			Max. Vy	20	-31.18	3336.49	2.26
			Max. Vx	14	31.37	-0.94	-3358.96
			Max. Torque	24			2.76
L12	16 - 14.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-109.86	24.60	-9.95
			Max. Mx	20	-50.58	3406.79	2.28
			Max. My	14	-50.58	-0.94	-3429.67
			Max. Vy	20	-31.33	3406.79	2.28
			Max. Vx	14	31.52	-0.94	-3429.67
			Max. Torque	24			2.85
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-111.41	25.01	-10.19
			Max. Mx	20	-51.73	3477.46	2.29
L13	14.5 - 12.25	Pole	Max. My	14	-51.72	-0.94	-3500.74
			Max. Vy	20	-31.50	3477.46	2.29
			Max. Vx	14	31.68	-0.94	-3500.74
			Max. Torque	24			2.94
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-117.38	26.68	-11.15
			Max. Mx	20	-56.06	3795.13	2.36
			Max. My	14	-56.06	-0.95	-3820.20
			Max. Vy	20	-32.05	3795.13	2.36
			Max. Vx	14	32.23	-0.95	-3820.20
L14	12.25 - 10	Pole	Max. Torque	24			3.29
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-117.38	26.68	-11.15
			Max. Mx	20	-56.06	3795.13	2.36
			Max. My	14	-56.06	-0.95	-3820.20
L15	10 - 0	Pole	Max. Vy	20	-32.05	3795.13	2.36
			Max. Vx	14	32.23	-0.95	-3820.20
			Max. Torque	24			3.29
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-117.38	26.68	-11.15

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	117.38	-0.00	0.00
	Max. H _x	20	56.08	32.02	0.02
	Max. H _z	3	42.06	0.02	32.21
	Max. M _x	2	3819.38	0.02	32.21
	Max. M _z	8	3791.46	-32.02	-0.02
	Max. Torsion	24	3.29	16.03	27.90
	Min. Vert	21	42.06	32.02	0.02
	Min. H _x	8	56.08	-32.02	-0.02
	Min. H _z	14	56.08	-0.02	-32.21
	Min. M _x	14	-3820.20	-0.02	-32.21
	Min. M _z	20	-3795.13	32.02	0.02
	Min. Torsion	12	-3.28	-16.03	-27.90

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
Dead Only	46.73	-0.00	-0.00	0.35	1.46	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	56.08	-0.02	-32.21	-3819.38	4.59	-3.09
0.9 Dead+1.6 Wind 0 deg - No Ice	42.06	-0.02	-32.21	-3761.07	4.06	-3.09
1.2 Dead+1.6 Wind 30 deg - No Ice	56.08	16.00	-27.89	-3306.60	-1892.74	-2.07
0.9 Dead+1.6 Wind 30 deg - No Ice	42.06	16.00	-27.89	-3256.02	-1864.19	-2.07
1.2 Dead+1.6 Wind 60 deg - No Ice	56.08	27.73	-16.09	-1907.33	-3282.47	-0.49
0.9 Dead+1.6 Wind 60 deg - No Ice	42.06	27.73	-16.09	-1878.20	-3232.63	-0.49
1.2 Dead+1.6 Wind 90 deg - No Ice	56.08	32.02	0.02	3.17	-3791.46	1.22
0.9 Dead+1.6 Wind 90 deg - No Ice	42.06	32.02	0.02	3.02	-3733.63	1.21
1.2 Dead+1.6 Wind 120 deg - No Ice	56.08	27.75	16.12	1912.92	-3285.22	2.60
0.9 Dead+1.6 Wind 120 deg - No Ice	42.06	27.75	16.12	1883.50	-3235.32	2.60
1.2 Dead+1.6 Wind 150 deg - No Ice	56.08	16.03	27.90	3310.15	-1897.52	3.28
0.9 Dead+1.6 Wind 150 deg - No Ice	42.06	16.03	27.90	3259.32	-1868.88	3.28
1.2 Dead+1.6 Wind 180 deg - No Ice	56.08	0.02	32.21	3820.20	-0.95	3.09
0.9 Dead+1.6 Wind 180 deg - No Ice	42.06	0.02	32.21	3761.46	-1.37	3.09
1.2 Dead+1.6 Wind 210 deg - No Ice	56.08	-16.00	27.89	3307.43	1896.39	2.07
0.9 Dead+1.6 Wind 210 deg - No Ice	42.06	-16.00	27.89	3256.64	1866.89	2.07
1.2 Dead+1.6 Wind 240 deg - No Ice	56.08	-27.73	16.09	1908.15	3286.14	0.49
0.9 Dead+1.6 Wind 240 deg - No Ice	42.06	-27.73	16.09	1878.82	3235.34	0.50
1.2 Dead+1.6 Wind 270 deg - No Ice	56.08	-32.02	-0.02	-2.36	3795.13	-1.22
0.9 Dead+1.6 Wind 270 deg - No Ice	42.06	-32.02	-0.02	-2.41	3736.35	-1.21
1.2 Dead+1.6 Wind 300 deg - No Ice	56.08	-27.75	-16.12	-1912.12	3288.88	-2.60
0.9 Dead+1.6 Wind 300 deg - No Ice	42.06	-27.75	-16.12	-1882.90	3238.03	-2.60
1.2 Dead+1.6 Wind 330 deg - No Ice	56.08	-16.03	-27.90	-3309.35	1901.16	-3.29

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.6 Wind 330 deg - No Ice	42.06	-16.03	-27.90	-3258.72	1871.58	-3.29
1.2 Dead+1.0 Ice+1.0 Temp	117.38	0.00	-0.00	11.15	26.68	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	117.38	-0.00	-10.14	-1320.55	27.35	-1.43
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	117.38	5.04	-8.78	-1141.96	-634.43	-0.92
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	117.38	8.74	-5.07	-654.29	-1119.02	-0.17
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	117.38	10.09	0.00	11.71	-1296.48	0.63
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	117.38	8.74	5.07	677.58	-1119.52	1.26
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	117.38	5.05	8.79	1164.88	-635.30	1.55
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	117.38	0.00	10.14	1342.96	26.34	1.43
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	117.38	-5.04	8.78	1164.37	688.11	0.92
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	117.38	-8.74	5.07	676.70	1172.70	0.17
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	117.38	-10.09	-0.00	10.70	1350.16	-0.63
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	117.38	-8.74	-5.07	-655.15	1173.20	-1.26
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	117.38	-5.05	-8.79	-1142.46	688.99	-1.55
Dead+Wind 0 deg - Service	46.73	-0.00	-6.90	-811.56	2.11	-0.02
Dead+Wind 30 deg - Service	46.73	3.43	-5.97	-702.49	-401.13	-0.07
Dead+Wind 60 deg - Service	46.73	5.94	-3.45	-405.10	-696.47	-0.11
Dead+Wind 90 deg - Service	46.73	6.86	0.00	0.92	-804.79	-0.11
Dead+Wind 120 deg - Service	46.73	5.94	3.45	406.79	-697.06	-0.09
Dead+Wind 150 deg - Service	46.73	3.43	5.97	703.75	-402.14	-0.04
Dead+Wind 180 deg - Service	46.73	0.00	6.90	812.23	0.94	0.02
Dead+Wind 210 deg - Service	46.73	-3.43	5.97	703.16	404.18	0.07
Dead+Wind 240 deg - Service	46.73	-5.94	3.45	405.78	699.52	0.11
Dead+Wind 270 deg - Service	46.73	-6.86	-0.00	-0.25	807.84	0.11
Dead+Wind 300 deg - Service	46.73	-5.94	-3.45	-406.12	700.11	0.09
Dead+Wind 330 deg - Service	46.73	-3.43	-5.97	-703.08	405.19	0.04

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-46.73	0.00	0.00	46.73	0.00	0.000%
2	-0.02	-56.08	-32.21	0.02	56.08	32.21	0.004%
3	-0.02	-42.06	-32.21	0.02	42.06	32.21	0.003%
4	16.00	-56.08	-27.89	-16.00	56.08	27.89	0.000%
5	16.00	-42.06	-27.89	-16.00	42.06	27.89	0.000%
6	27.73	-56.08	-16.09	-27.73	56.08	16.09	0.000%
7	27.73	-42.06	-16.09	-27.73	42.06	16.09	0.000%
8	32.03	-56.08	0.02	-32.02	56.08	-0.02	0.008%
9	32.03	-42.06	0.02	-32.02	42.06	-0.02	0.013%
10	27.75	-56.08	16.12	-27.75	56.08	-16.12	0.000%
11	27.75	-42.06	16.12	-27.75	42.06	-16.12	0.000%
12	16.03	-56.08	27.90	-16.03	56.08	-27.90	0.000%
13	16.03	-42.06	27.90	-16.03	42.06	-27.90	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
14	0.02	-56.08	32.21	-0.02	56.08	-32.21	0.004%
15	0.02	-42.06	32.21	-0.02	42.06	-32.21	0.007%
16	-16.00	-56.08	27.89	16.00	56.08	-27.89	0.000%
17	-16.00	-42.06	27.89	16.00	42.06	-27.89	0.000%
18	-27.73	-56.08	16.09	27.73	56.08	-16.09	0.000%
19	-27.73	-42.06	16.09	27.73	42.06	-16.09	0.000%
20	-32.03	-56.08	-0.02	32.02	56.08	0.02	0.008%
21	-32.03	-42.06	-0.02	32.02	42.06	0.02	0.013%
22	-27.75	-56.08	-16.12	27.75	56.08	16.12	0.000%
23	-27.75	-42.06	-16.12	27.75	42.06	16.12	0.000%
24	-16.03	-56.08	-27.90	16.03	56.08	27.90	0.000%
25	-16.03	-42.06	-27.90	16.03	42.06	27.90	0.000%
26	0.00	-117.38	0.00	-0.00	117.38	0.00	0.000%
27	-0.00	-117.38	-10.14	0.00	117.38	10.14	0.001%
28	5.04	-117.38	-8.78	-5.04	117.38	8.78	0.000%
29	8.74	-117.38	-5.07	-8.74	117.38	5.07	0.000%
30	10.09	-117.38	0.00	-10.09	117.38	-0.00	0.001%
31	8.74	-117.38	5.07	-8.74	117.38	-5.07	0.000%
32	5.05	-117.38	8.79	-5.05	117.38	-8.79	0.000%
33	0.00	-117.38	10.14	-0.00	117.38	-10.14	0.001%
34	-5.04	-117.38	8.78	5.04	117.38	-8.78	0.000%
35	-8.74	-117.38	5.07	8.74	117.38	-5.07	0.000%
36	-10.09	-117.38	-0.00	10.09	117.38	0.00	0.001%
37	-8.74	-117.38	-5.07	8.74	117.38	5.07	0.000%
38	-5.05	-117.38	-8.79	5.05	117.38	8.79	0.000%
39	-0.00	-46.73	-6.90	0.00	46.73	6.90	0.004%
40	3.43	-46.73	-5.97	-3.43	46.73	5.97	0.004%
41	5.94	-46.73	-3.45	-5.94	46.73	3.45	0.004%
42	6.86	-46.73	0.00	-6.86	46.73	-0.00	0.004%
43	5.94	-46.73	3.45	-5.94	46.73	-3.45	0.004%
44	3.43	-46.73	5.98	-3.43	46.73	-5.97	0.004%
45	0.00	-46.73	6.90	-0.00	46.73	-6.90	0.004%
46	-3.43	-46.73	5.97	3.43	46.73	-5.97	0.004%
47	-5.94	-46.73	3.45	5.94	46.73	-3.45	0.004%
48	-6.86	-46.73	-0.00	6.86	46.73	0.00	0.004%
49	-5.94	-46.73	-3.45	5.94	46.73	3.45	0.004%
50	-3.43	-46.73	-5.98	3.43	46.73	5.97	0.004%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	18	0.00004866	0.00010459
3	Yes	18	0.00003098	0.00008197
4	Yes	23	0.00000001	0.00013794
5	Yes	23	0.00000001	0.00009344
6	Yes	23	0.00000001	0.00013982
7	Yes	23	0.00000001	0.00009484
8	Yes	17	0.00009332	0.00008027
9	Yes	16	0.00011670	0.00013032
10	Yes	23	0.00000001	0.00014061
11	Yes	23	0.00000001	0.00009537
12	Yes	23	0.00000001	0.00013841
13	Yes	23	0.00000001	0.00009375
14	Yes	18	0.00004867	0.00009218
15	Yes	17	0.00006046	0.00013709
16	Yes	23	0.00000001	0.00014092
17	Yes	23	0.00000001	0.00009554
18	Yes	23	0.00000001	0.00013852
19	Yes	23	0.00000001	0.00009387
20	Yes	17	0.00009331	0.00007806
21	Yes	16	0.00011669	0.00012758
22	Yes	23	0.00000001	0.00013908
23	Yes	23	0.00000001	0.00009422

24	Yes	23	0.00000001	0.00014180
25	Yes	23	0.00000001	0.00009610
26	Yes	15	0.00000001	0.00003848
27	Yes	21	0.00007785	0.00010790
28	Yes	22	0.00004501	0.00010766
29	Yes	22	0.00004501	0.00010939
30	Yes	21	0.00007786	0.00010467
31	Yes	22	0.00004497	0.00011170
32	Yes	22	0.00004496	0.00010867
33	Yes	21	0.00007774	0.00010881
34	Yes	22	0.00004491	0.00011815
35	Yes	22	0.00004491	0.00011581
36	Yes	21	0.00007775	0.00010870
37	Yes	22	0.00004495	0.00011390
38	Yes	22	0.00004496	0.00011758
39	Yes	16	0.00014679	0.00003497
40	Yes	16	0.00014657	0.00013239
41	Yes	16	0.00014657	0.00013806
42	Yes	16	0.00014678	0.00003517
43	Yes	16	0.00014655	0.00013226
44	Yes	16	0.00014655	0.00013628
45	Yes	16	0.00014676	0.00003490
46	Yes	16	0.00014654	0.00013824
47	Yes	16	0.00014654	0.00013158
48	Yes	16	0.00014677	0.00003540
49	Yes	16	0.00014656	0.00013893
50	Yes	16	0.00014656	0.00013589

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 148.5	29.46	39	1.701	0.001
L2	148.5 - 148	25.42	39	1.616	0.001
L3	148 - 111	25.25	39	1.615	0.001
L4	114.75 - 105.25	14.83	39	1.298	0.001
L5	105.25 - 76.75	12.35	45	1.178	0.000
L6	81 - 70.75	7.14	45	0.868	0.000
L7	70.75 - 70	5.37	45	0.756	0.000
L8	70 - 43	5.26	45	0.749	0.000
L9	48 - 28	2.44	45	0.475	0.000
L10	28 - 27.25	0.81	45	0.282	0.000
L11	27.25 - 16	0.77	45	0.274	0.000
L12	16 - 14.5	0.27	45	0.156	0.000
L13	14.5 - 12.25	0.22	45	0.143	0.000
L14	12.25 - 10	0.16	45	0.119	0.000
L15	10 - 0	0.10	45	0.101	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157.00	HPA-85R-BUU-H8 w/ Mount Pipe	39	28.39	1.671	0.001	8381
150.00	800MHz 2X50W RRRH W/FILTER	39	25.93	1.620	0.001	5354
148.00	APXVTM14-C-120 w/ Mount Pipe	39	25.25	1.615	0.001	6876
138.00	(2) SBNHH-1D65B w/ Mount Pipe	39	21.92	1.563	0.001	8586
127.00	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	39	18.42	1.452	0.001	5478
119.00	HBX-6516DS-VTM w/ Mount	39	16.03	1.352	0.001	4334

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
48.00	Pipe KS24019-L112A	45	2.44	0.475	0.000	5677

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	160 - 148.5	138.46	2	7.995	0.009
L2	148.5 - 148	119.52	2	7.600	0.007
L3	148 - 111	118.73	2	7.595	0.007
L4	114.75 - 105.25	69.82	2	6.112	0.005
L5	105.25 - 76.75	58.15	14	5.551	0.005
L6	81 - 70.75	33.60	14	4.091	0.004
L7	70.75 - 70	25.30	14	3.563	0.004
L8	70 - 43	24.74	14	3.528	0.003
L9	48 - 28	11.47	14	2.235	0.002
L10	28 - 27.25	3.83	14	1.326	0.001
L11	27.25 - 16	3.63	14	1.289	0.001
L12	16 - 14.5	1.25	14	0.732	0.001
L13	14.5 - 12.25	1.03	14	0.672	0.001
L14	12.25 - 10	0.74	14	0.561	0.001
L15	10 - 0	0.49	14	0.473	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
157.00	HPA-85R-BUU-H8 w/ Mount Pipe	2	133.44	7.857	0.008	1878
150.00	800MHz 2X50W RRRH W/FILTER	2	121.92	7.621	0.007	1198
148.00	APXVTM14-C-120 w/ Mount Pipe	2	118.73	7.595	0.007	1537
138.00	(2) SBNHH-1D65B w/ Mount Pipe	2	103.09	7.356	0.007	1897
127.00	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	2	86.65	6.834	0.006	1202
119.00	HBX-6516DS-VTM w/ Mount Pipe	2	75.45	6.367	0.006	947
48.00	KS24019-L112A	14	11.47	2.235	0.002	1208

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	KI/r	A	P _u	φP _n	Ratio P _u /φP _n
	ft		ft	ft		in ²	K	K	
L1	160 - 148.5	TP10.75x10.75x0.349	11.50	0.00	0.0	11.403	-2.58	359.22	0.007
	(1)					8			
L2	148.5 - 148	TP23x10.75x0.349	0.50	0.00	0.0	11.403	-2.58	359.22	0.007
	(2)					8			
L3	148 - 111 (3)	TP28.994x23x0.25	37.00	0.00	0.0	22.326	-17.20	1498.80	0.011

Section No.	Elevation ft	Size	L ft	L _u ft	K/lr	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L4	111 - 105.25 (4)	TP29.4254x27.8865x0.31 25	9.50	0.00	0.0	28.876 3	-19.08	1980.34	0.010
L5	105.25 - 76.75 (5)	TP34.042x29.4254x0.444 6	28.50	0.00	0.0	46.442 9	-24.66	2272.54	0.011
L6	76.75 - 70.75 (6)	TP34.3889x32.4643x0.47 85	10.25	0.00	0.0	51.499 7	-28.09	2778.39	0.010
L7	70.75 - 70 (7)	TP34.5104x34.3889x0.66 26	0.75	0.00	0.0	71.179 8	-28.35	3444.72	0.008
L8	70 - 43 (8)	TP38.884x34.5104x0.535 6	27.00	0.00	0.0	63.818 7	-35.07	3200.82	0.011
L9	43 - 28 (9)	TP40.5641x37.0028x0.65 36	20.00	0.00	0.0	82.792 8	-44.04	3930.07	0.011
L10	28 - 27.25 (10)	TP40.6856x40.5641x0.65 28	0.75	0.00	0.0	82.949 9	-44.34	4240.93	0.010
L11	27.25 - 16 (11)	TP42.508x40.6856x0.655 1	11.25	0.00	0.0	87.028 2	-48.91	4468.34	0.011
L12	16 - 14.5 (12)	TP42.751x42.508x0.8063 1	1.50	0.00	0.0	107.34 20	-49.65	5023.02	0.010
L13	14.5 - 12.25 (13)	TP43.1155x42.751x0.643 1	2.25	0.00	0.0	86.698 7	-50.58	4427.64	0.011
L14	12.25 - 10 (14)	TP43.48x43.1155x0.8213 1	2.25	0.00	0.0	111.20 30	-51.72	5007.94	0.010
L15	10 - 0 (15)	TP45.1x43.48x0.661 1	10.00	0.00	0.0	93.226 7	-56.06	5109.46	0.011

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	160 - 148.5 (1)	TP10.75x10.75x0.349	47.81	99.14	0.482	0.00	99.14	0.000
L2	148.5 - 148 (2)	TP23x10.75x0.349	47.80	99.14	0.482	0.00	99.14	0.000
L3	148 - 111 (3)	TP28.994x23x0.25	607.49	866.29	0.701	0.00	866.29	0.000
L4	111 - 105.25 (4)	TP29.4254x27.8865x0.31 25	830.23	1182.18	0.702	0.00	1182.18	0.000
L5	105.25 - 76.75 (5)	TP34.042x29.4254x0.444 6	1435.03	1529.28	0.938	0.00	1529.28	0.000
L6	76.75 - 70.75 (6)	TP34.3889x32.4643x0.47 85	1707.59	1925.46	0.887	0.00	1925.46	0.000
L7	70.75 - 70 (7)	TP34.5104x34.3889x0.66 26	1727.91	2370.06	0.729	0.00	2370.06	0.000
L8	70 - 43 (8)	TP38.884x34.5104x0.535 6	2345.07	2455.14	0.955	0.00	2455.14	0.000
L9	43 - 28 (9)	TP40.5641x37.0028x0.65 36	2941.82	3198.35	0.920	0.00	3198.35	0.000
L10	28 - 27.25 (10)	TP40.6856x40.5641x0.65 28	2964.68	3462.13	0.856	0.00	3462.13	0.000
L11	27.25 - 16 (11)	TP42.508x40.6856x0.655 1	3312.03	3816.09	0.868	0.00	3816.09	0.000
L12	16 - 14.5 (12)	TP42.751x42.508x0.8063 1	3358.96	4284.16	0.784	0.00	4284.16	0.000
L13	14.5 - 12.25 (13)	TP43.1155x42.751x0.643 1	3429.68	3839.23	0.893	0.00	3839.23	0.000
L14	12.25 - 10 (14)	TP43.48x43.1155x0.8213 1	3500.74	4343.88	0.806	0.00	4343.88	0.000
L15	10 - 0 (15)	TP45.1x43.48x0.661 1	3820.20	4636.82	0.824	0.00	4636.82	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio V_u ϕV_n	Actual T_u kip-ft	ϕT_n kip-ft	Ratio T_u ϕT_n
L1	160 - 148.5 (1)	TP10.75x10.75x0.349	6.03	179.61	0.034	0.19	150.79	0.001
L2	148.5 - 148 (2)	TP23x10.75x0.349	6.09	391.15	0.016	0.19	150.79	0.001
L3	148 - 111 (3)	TP28.994x23x0.25	23.08	749.40	0.031	0.28	1734.71	0.000
L4	111 - 105.25 (4)	TP29.4254x27.8865x0.3125	23.85	990.17	0.024	0.40	2367.23	0.000
L5	105.25 - 76.75 (5)	TP34.042x29.4254x0.4446	26.08	1136.27	0.023	0.93	3062.31	0.000
L6	76.75 - 70.75 (6)	TP34.3889x32.4643x0.4785	27.06	1389.19	0.019	1.16	3855.63	0.000
L7	70.75 - 70 (7)	TP34.5104x34.3889x0.6626	27.16	1722.36	0.016	1.19	4745.92	0.000
L8	70 - 43 (8)	TP38.884x34.5104x0.5356	28.99	1592.41	0.018	1.78	4916.29	0.000
L9	43 - 28 (9)	TP40.5641x37.0028x0.6536	30.44	1965.04	0.015	2.22	6404.52	0.000
L10	28 - 27.25 (10)	TP40.6856x40.5641x0.6528	30.52	2114.03	0.014	2.24	6932.73	0.000
L11	27.25 - 16 (11)	TP42.508x40.6856x0.6551	31.25	2234.17	0.014	2.58	7641.52	0.000
L12	16 - 14.5 (12)	TP42.751x42.508x0.8063	31.37	2511.51	0.012	2.63	8578.83	0.000
L13	14.5 - 12.25 (13)	TP43.1155x42.751x0.6431	31.52	2204.32	0.014	2.71	7687.85	0.000
L14	12.25 - 10 (14)	TP43.48x43.1155x0.8213	31.68	2503.97	0.013	2.79	8698.42	0.000
L15	10 - 0 (15)	TP45.1x43.48x0.661	32.23	2545.42	0.013	3.09	9285.00	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	160 - 148.5 (1)	0.007	0.482	0.000	0.034	0.001	0.491	1.000	4.8.2 ✓
L2	148.5 - 148 (2)	0.007	0.482	0.000	0.016	0.001	0.490	1.000	4.8.2 ✓
L3	148 - 111 (3)	0.011	0.701	0.000	0.031	0.000	0.714	1.000	4.8.2 ✓
L4	111 - 105.25 (4)	0.010	0.702	0.000	0.024	0.000	0.713	1.000	4.8.2 ✓
L5	105.25 - 76.75 (5)	0.011	0.938	0.000	0.023	0.000	0.950	1.000	4.8.2 ✓
L6	76.75 - 70.75 (6)	0.010	0.887	0.000	0.019	0.000	0.897	1.000	4.8.2 ✓
L7	70.75 - 70 (7)	0.008	0.729	0.000	0.016	0.000	0.738	1.000	4.8.2 ✓
L8	70 - 43 (8)	0.011	0.955	0.000	0.018	0.000	0.966	1.000	4.8.2 ✓
L9	43 - 28 (9)	0.011	0.920	0.000	0.015	0.000	0.931	1.000	4.8.2 ✓
L10	28 - 27.25 (10)	0.010	0.856	0.000	0.014	0.000	0.867	1.000	4.8.2 ✓
L11	27.25 - 16 (11)	0.011	0.868	0.000	0.014	0.000	0.879	1.000	4.8.2 ✓
L12	16 - 14.5 (12)	0.010	0.784	0.000	0.012	0.000	0.794	1.000	4.8.2 ✓
L13	14.5 - 12.25 (13)	0.011	0.893	0.000	0.014	0.000	0.905	1.000	4.8.2 ✓

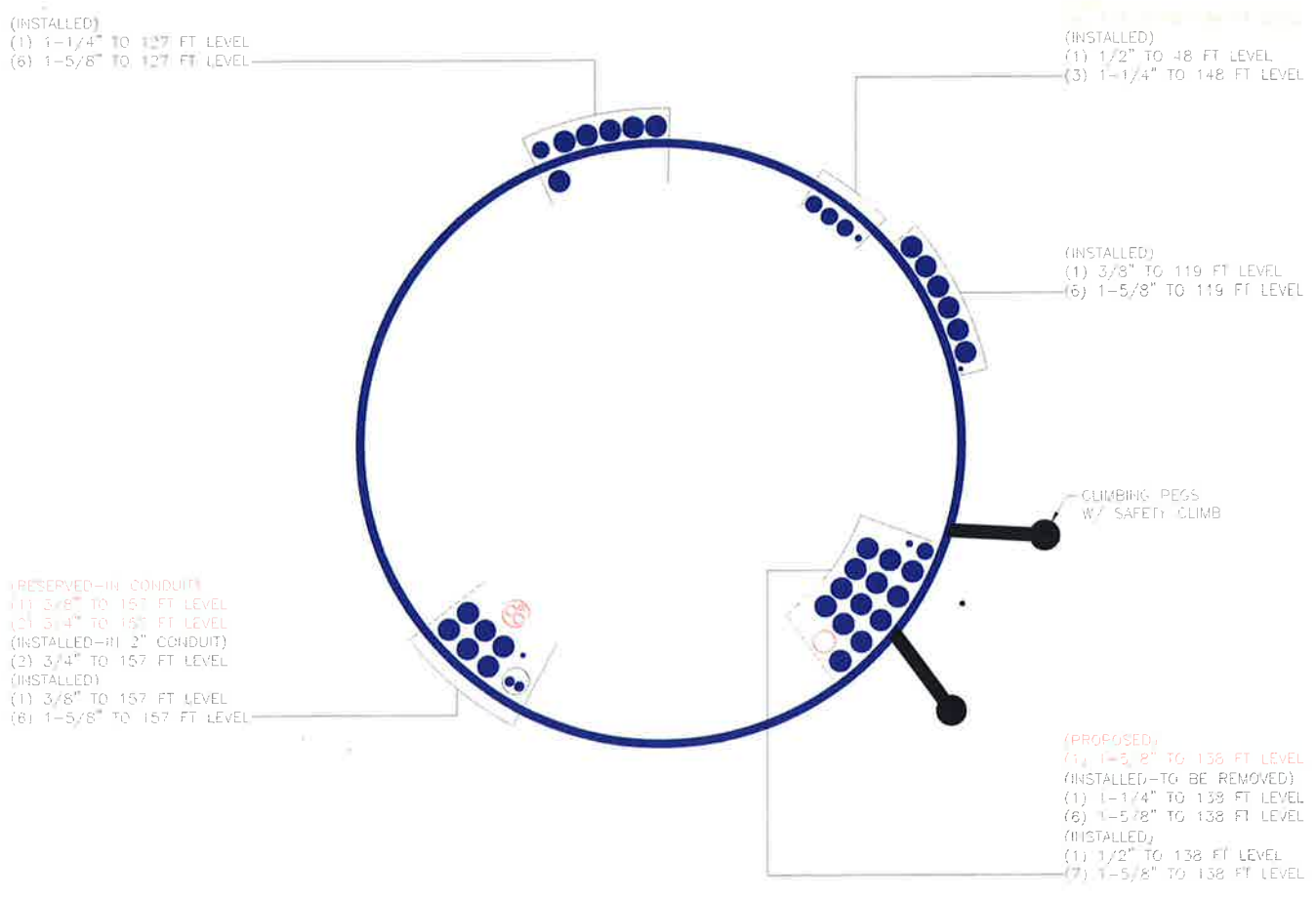
160 Ft Monopole Tower Structural Analysis
 Project Number 37517-0193.003.7805, Application 373642, Revision 0

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L14	12.25 - 10 (14)	0.010	0.806	0.000	0.013	0.000	0.816	1.000	4.8.2 ✓
L15	10 - 0 (15)	0.011	0.824	0.000	0.013	0.000	0.835	1.000	4.8.2 ✓

Section Capacity Table

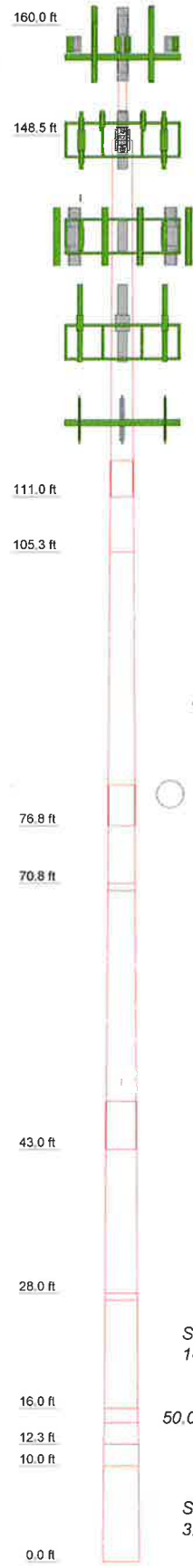
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	160 - 148.5	Pole	TP10.75x10.75x0.349	1	-2.58	359.22	49.1	Pass
L2	148.5 - 148	Pole	TP23x10.75x0.349	2	-2.58	359.22	49.0	Pass
L3	148 - 111	Pole	TP28.994x23x0.25	3	-17.20	1498.80	71.4	Pass
L4	111 - 105.25	Pole	TP29.4254x27.8865x0.3125	4	-19.08	1980.34	71.3	Pass
L5	105.25 - 76.75	Pole	TP34.042x29.4254x0.4446	5	-24.66	2272.54	95.0	Pass
L6	76.75 - 70.75	Pole	TP34.3889x32.4643x0.4785	6	-28.09	2778.39	89.7	Pass
L7	70.75 - 70	Pole	TP34.5104x34.3889x0.6626	7	-28.35	3444.72	73.8	Pass
L8	70 - 43	Pole	TP38.884x34.5104x0.5356	8	-35.07	3200.82	96.6	Pass
L9	43 - 28	Pole	TP40.5641x37.0028x0.6536	9	-44.04	3930.07	93.1	Pass
L10	28 - 27.25	Pole	TP40.6856x40.5641x0.6528	10	-44.34	4240.93	86.7	Pass
L11	27.25 - 16	Pole	TP42.508x40.6856x0.6551	11	-48.91	4468.34	87.9	Pass
L12	16 - 14.5	Pole	TP42.751x42.508x0.8063	12	-49.65	5023.02	79.4	Pass
L13	14.5 - 12.25	Pole	TP43.1155x42.751x0.6431	13	-50.58	4427.64	90.5	Pass
L14	12.25 - 10	Pole	TP43.48x43.1155x0.8213	14	-51.72	5007.94	81.6	Pass
L15	10 - 0	Pole	TP45.1x43.48x0.661	15	-56.06	5109.46	83.5	Pass
						Summary		
						Pole (L8)	96.6	Pass
						RATING =	96.6	Pass

APPENDIX B BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Length (ft)	11.50	0.50	37.00	9.50	28.50	10.25	0.75	27.00	20.00	0.75	11.25	2.50	2.50	10.00	10.00
Number of Sides	1	1	18	18	18	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.3490	0.3490	0.2500	0.3125	0.4446	0.6620	0.6620	0.5356	0.6536	0.6551	0.6551	0.6551	0.6551	0.6610	0.6610
Socket Length (ft)			3.75		4.25		5.00								
Top Dia (in)	10.7500	10.7500	23.0000	27.8865	29.4254	34.3889	34.5104	34.5104	37.0028	40.6856	40.6856	40.6856	40.6856	43.4800	43.4800
Bot Dia (in)	23.0000	23.0000	28.9940	29.4254	34.0420	34.5104	38.8640	38.8640	40.5641	42.5080	42.5080	42.5080	42.5080	45.1000	45.1000
Grade	A53-B-35	A53-B-35	A607-60	A607-60	Reinf 42.34 ksi	Reinf 42.81 ksi	Reinf 43.88 ksi	Reinf 44.73 ksi	Reinf 41.53 ksi	Reinf 44.73 ksi	Reinf 44.73 ksi	Reinf 44.73 ksi	Reinf 44.73 ksi	Reinf 44.73 ksi	Reinf 44.73 ksi
Weight (K)	0.0	0.0	2.6	0.9	4.3	1.7	5.6	5.4	0.2	3.3	0.2	0.8	0.7	3.1	29.8



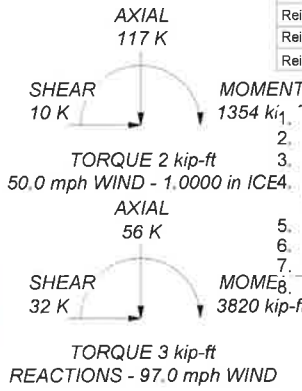
DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
HPA-85R-BUU-H8 w/ Mount Pipe	157	RRH4X45-AWS4 B66	138
HPA-85R-BUU-H8 w/ Mount Pipe	157	RRH4X45-AWS4 B66	138
HPA-85R-BUU-H8 w/ Mount Pipe	157	RRH2X60-PCS	138
RRUS 32	157	RRH2X60-PCS	138
RRUS 32	157	RRH2X60-PCS	138
RRUS 32	157	RRH2x60-700	138
DC6-48-60-18-8F	157	RRH2x60-700	138
AM-X-CD-16-65-00T-RET w/ Mount Pipe	157	RRH2x60-700	138
		(2) DB-T1-6Z-8AB-0Z	138
P65-17-XLH-RR w/ Mount Pipe	157	(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	138
SBNH-1D6565C w/ Mount Pipe	157		
800 10121 w/ Mount Pipe	157	(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	138
800 10121 w/ Mount Pipe	157		
800 10121 w/ Mount Pipe	157	(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	138
DC6-48-60-18-8F	157		
(2) LGP21401	157	KS24019-L112A	138
(2) LGP21401	157	Platform Mount [LP 1201-1]	138
(2) LGP21401	157	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
(2) RRUS-11	157	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
(2) RRUS-11	157	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
(2) RRUS-11	157	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
T-Arm Mount [TA 702-3]	157	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
800MHz 2X50W RRH W/FILTER	150	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
800MHz 2X50W RRH W/FILTER	150		
800MHz 2X50W RRH W/FILTER	150	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
PCS 1900MHz 4x45W-65MHz	150	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
PCS 1900MHz 4x45W-65MHz	150		
PCS 1900MHz 4x45W-65MHz	150	KRY 112 144/1	127
Side Arm Mount [SO 103-3]	150	KRY 112 144/1	127
APXVTM14-C-120 w/ Mount Pipe	148	KRY 112 144/1	127
APXVTM14-C-120 w/ Mount Pipe	148	LNx-6515DS-VTM w/ Mount Pipe	127
APXVTM14-C-120 w/ Mount Pipe	148	LNx-6515DS-VTM w/ Mount Pipe	127
APXVSP18-C-A20 w/ Mount Pipe	148	LNx-6515DS-VTM w/ Mount Pipe	127
APXVSP18-C-A20 w/ Mount Pipe	148	RRUS 11 B12	127
APXVSP18-C-A20 w/ Mount Pipe	148	RRUS 11 B12	127
IBC1900HG-2A	148	Platform Mount [LP 1201-1]	127
IBC1900HG-2A	148	HBX-6516DS-VTM w/ Mount Pipe	119
IBC1900BB-1	148	HBX-6516DS-VTM w/ Mount Pipe	119
IBC1900BB-1	148	HBX-6516DS-VTM w/ Mount Pipe	119
IBC1900BB-1	148	2.375" OD x 5' Mount Pipe	119
TD-RRH8x20-25	148	2.375" OD x 5' Mount Pipe	119
TD-RRH8x20-25	148	2.375" OD x 5' Mount Pipe	119
TD-RRH8x20-25	148	T-Arm Mount [TA 602-3]	119
Platform Mount [LP 1201-1]	148	KS24019-L112A	48
(2) SBNHH-1D65B w/ Mount Pipe	138	Side Arm Mount [SO 701-1]	48
(2) SBNHH-1D65B w/ Mount Pipe	138		
(2) SBNHH-1D65B w/ Mount Pipe	138		
RRH4X45-AWS4 B66	138		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	60 ksi	Reinf 44.73 ksi	45 ksi	56 ksi
A607-60	60 ksi	75 ksi	Reinf 44.92 ksi	45 ksi	57 ksi
Reinf 42.81 ksi	43 ksi	54 ksi	Reinf 40.94 ksi	41 ksi	52 ksi
Reinf 47.20 ksi	47 ksi	59 ksi	Reinf 44.68 ksi	45 ksi	56 ksi
Reinf 42.34 ksi	42 ksi	53 ksi	Reinf 39.40 ksi	39 ksi	50 ksi
Reinf 43.88 ksi	44 ksi	55 ksi	Reinf 47.95 ksi	48 ksi	60 ksi
Reinf 41.53 ksi	42 ksi	52 ksi			

ALL REACTIONS ARE FACTORED



TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
 2. Tower designed for Exposure B to the TIA-222-G Standard.
 3. Tower designed for a 97.0 mph basic wind in accordance with the TIA-222-G Standard.
 4. Tower is also designed for a 50.0 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
 5. Deflections are based upon a 60.0 mph wind.
 6. Tower Structure Class II.
 7. Topographic Category 1 with Crest Height of 0.00 ft
- TOWER RATING: 96.6%**

Paul J Ford and Company
 250 E. Broad Street Suite 600
 Columbus, OH 43215
 Phone: 614.221.6679
 FAX: 614.448.4105

Job: **160 ft Monopole / West Johnson Ave. Burnt Ho**
 Project: **PJF 37517-0193 / BU 876313**
 Client: Crown Castle Drawn by: Kyle Thorpe App'd:
 Code: TIA-222-G Date: 02/14/17 Scale: NTS
 Path: Dwg No. E-1

Tube Bypass Analysis

Revision= **LRFD** Passing= **105%**

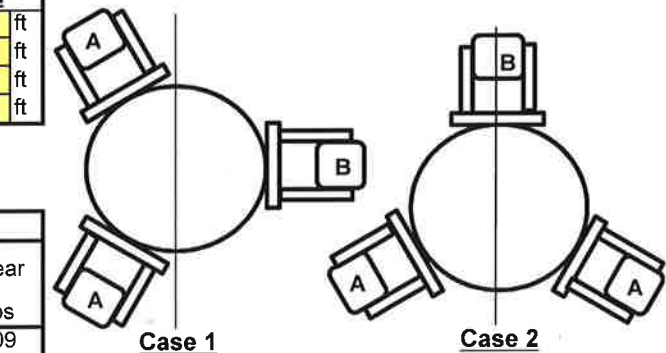
Design/Analysis = **Analysis** @ **148** ft - **0** in elevation

TNX Tower Output @ Connection:	
Moment	= 47.80 k-ft
Axial	= 2.58 kips
Shear	= 6.09 kips
Design Capacity	= 100.0%
Extension Geometry:	
Diameter	= 10.75 in
Thickness	= 15/43 in
Height	= 12 ft
Steel Grade	= A53 Gr. B
Extension Offset	= in
Gap Height	= in
Pole Offset	= in
Pole Geometry:	
Diameter	= 23 in
Thickness	= 1/4 in
Steel Grade	= A572 Gr. 60
Flange/Mount Diam.	= in
Tube Bypass Information:	
Number of Legs	= 3
Unbraced Length	= 94 in
Tube Circle	= 39.5 in
K	= 2.10
Type	HSS 6x6x1/2
	Extension Pole
Blind Bolt	EXISTING AJAX EXISTING AJAX
Method	Case 2 Case 2
Bolt Qty.	16 16
Spacing (in)	3 3
End Dist. (in)	3 3

New Port Information	
Elevation #1=	ft
Elevation #2=	ft
Elevation #3=	ft
Elevation #4=	ft

Analysis Reactions		
Moment	Axial	Shear
k-ft	kips	kips
47.80	2.58	6.09

Load Distribution	
Moment of Inertia, I	Axial / Leg
in ²	kips
585.09	0.860



Member Forces						
Case	d	Tension (kips)	Comp. (kips)	Mx (k-in)	My (k-in)	M (k-in)
1a	9.88	8.82	10.54	165.25	95.41	190.82
1b	19.75	18.50	20.22	0.00	190.82	190.82
2a	17.10	15.91	17.63	95.41	165.25	190.82
2b	0.00	0.86	0.86	190.82	0.00	190.82

Compression Strength							
Case	4.71* √(E/F _y)	KL/r	F _e ksi	F _{cr} ksi	φcP _{nc} kips	P _{rc} kips	Capacity
1a	118.26	88.52	36.53	27.15	238.04	10.54	4.4%
1b	118.26	88.52	36.53	27.15	238.04	20.22	8.5%
2a	118.26	88.52	36.53	27.15	238.04	17.63	7.4%
2b	118.26	88.52	36.53	27.15	238.04	0.86	0.4%

Flexural Strength						
Case	ø	I ₃ in ⁴	∑I in ⁴	M k-in	øbM _n k-in	Capacity
1a	60.00	48.20	144.60	190.82	819.72	23.3%
1b	0.00	48.20	144.60	190.82	819.72	23.3%
2a	30.00	48.20	144.60	190.82	819.72	23.3%
2b	90.00	48.20	144.60	190.82	819.72	23.3%

Tensile Strength					
Case	P _{n1} kips	P _{n2} kips	øtP _{nt} kips	P _{rt} kips	Capacity
1a	448.04	499.67	374.75	8.82	2.4%
1b	448.04	499.67	374.75	18.50	4.9%
2a	448.04	499.67	374.75	15.91	4.2%
2b	448.04	499.67	374.75	0.86	0.2%

Combined Strength			
Case	Flexure + Tension (H1)		
	Prt / Pnt	Mr / Mn	Capacity
1a	0.012	0.233	24.5%
1b	0.025	0.233	25.7%
2a	0.021	0.233	25.4%
2b	0.001	0.233	23.4%
Case	Flexure + Compression (H1)		
	Prc / Pnc	Mr / Mn	Capacity
1a	0.022	0.233	25.5%
1b	0.042	0.233	27.5%
2a	0.037	0.233	27.0%
2b	0.002	0.233	23.5%

Bolt Check									
Case	Location	Tube Comp. kips	e in	Shear on Bolt kips	Bearing Capacity kips	Shear Capacity kips	Tension on Bolt kips	Tension Capacity kips	Limit Capacity
1a	Ext	10.54	14.375	0.67	42.17	37.00	0.85	30.00	0.1%
	Pole	10.54	8.25	1.48	37.76	37.00	1.01	30.00	0.3%
1b	Ext	20.22	14.375	1.26	42.17	37.00	1.64	30.00	0.4%
	Pole	20.22	8.25	1.26	37.76	37.00	1.99	30.00	0.6%
2a	Ext	17.63	14.375	1.10	42.17	37.00	1.43	30.00	0.3%
	Pole	17.63	8.25	1.34	37.76	37.00	1.73	30.00	0.5%
2b	Ext	0.86	14.375	0.14	42.17	37.00	0.06	30.00	0.0%
	Pole	0.86	8.25	1.53	37.76	37.00	0.04	30.00	0.2%

- All equations based on AISC 13th Edition

v4.4 - Effective 7-12-13

Asymmetric Anchor Rod Analysis

Moment =	3820	k-ft	TIA Ref.	G	Location =	Base Plate
Axial =	56.0	kips	ASIF =	1.0000	η =	0.50 for BP, Rev. G Sect. 4.9.9
Shear =	32.0	kips	Max Ratio =	105.0%	Threads =	N/A for FP, Rev. G
Anchor Qty =	19					

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in ²	Area, in ²	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	25.0	52.00	0.00	3.98	195.37	189.15	198.93	0.00	260.00	76.5%
2	2.250	#18J A615 Gr 75	75	100	38.0	52.00	0.00	3.98	192.99	186.77	196.54	0.00	260.00	75.6%
3	2.250	#18J A615 Gr 75	75	100	52.0	52.00	0.00	3.98	189.07	182.85	192.63	0.00	260.00	74.1%
4	2.250	#18J A615 Gr 75	75	100	65.0	52.00	0.00	3.98	185.02	178.80	188.58	0.00	260.00	72.5%
5	2.250	#18J A615 Gr 75	75	100	115.0	52.00	0.00	3.98	180.56	174.34	184.12	0.00	260.00	70.8%
6	2.250	#18J A615 Gr 75	75	100	128.0	52.00	0.00	3.98	183.74	177.52	187.29	0.00	260.00	72.0%
7	2.250	#18J A615 Gr 75	75	100	142.0	52.00	0.00	3.98	188.21	181.99	191.76	0.00	260.00	73.8%
8	2.250	#18J A615 Gr 75	75	100	155.0	52.00	0.00	3.98	192.35	186.13	195.91	0.00	260.00	75.3%
9	2.250	#18J A615 Gr 75	75	100	205.0	52.00	0.00	3.98	195.12	188.90	198.68	0.00	260.00	76.4%
10	2.250	#18J A615 Gr 75	75	100	218.0	52.00	0.00	3.98	191.31	185.09	194.87	0.00	260.00	74.9%
11	2.250	#18J A615 Gr 75	75	100	232.0	52.00	0.00	3.98	185.87	179.65	189.43	0.00	260.00	72.9%
12	2.250	#18J A615 Gr 75	75	100	245.0	52.00	0.00	3.98	180.51	174.29	184.06	0.00	260.00	70.8%
13	2.250	#18J A615 Gr 75	75	100	295.0	52.00	0.00	3.98	173.63	167.42	177.19	0.00	260.00	68.1%
14	2.250	#18J A615 Gr 75	75	100	308.0	52.00	0.00	3.98	177.18	170.96	180.73	0.00	260.00	69.5%
15	2.250	#18J A615 Gr 75	75	100	322.0	52.00	0.00	3.98	182.43	176.21	185.99	0.00	260.00	71.5%
16	2.250	#18J A615 Gr 75	75	100	335.0	52.00	0.00	3.98	187.58	181.36	191.13	0.00	260.00	73.5%
17	1.750	Williams R71	127.7	150	100.0	67.10	0.00	2.66	153.29	149.13	155.67	0.00	312.00	49.9%
18	1.750	Williams R71	127.7	150	238.0	67.10	0.00	2.66	158.08	153.92	160.46	0.00	312.00	51.4%
19	1.750	Williams R71	127.7	150	328.0	67.10	0.00	2.66	159.50	155.34	161.88	0.00	312.00	51.9%

71.67

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

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

Site Data

BU#: 876313

Site Name: West Johnson Ave. Burnt House

App #:

Anchor Rod Data

Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, F_y :	75	ksi
Strength, F_u :	100	ksi
Bolt Circle:	52	in
Anchor Spacing:	6	in

Plate Data

W=Side:	53	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	16	in

Stiffener Data (Welding at both sides)

Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	45.1	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions

TIA Revision:	G	
Factored Moment, M_u :	3332.5	ft-kips
Factored Axial, P_u :	49.8	kips
Factored Shear, V_u :	28.4	kips

Reactions adjusted to account for additional anchor rods.

Anchor Rod Results

TIA G --> Max Rod ($C_u + V_u/\eta$): 198.9 Kips
 Axial Design Strength, $\Phi \cdot F_u \cdot A_{net}$: 260.0 Kips
 Anchor Rod Stress Ratio: 76.5% **Pass**

Base Plate Results

Base Plate Stress: 29.3 ksi
 PL Design Bending Strength, $\Phi \cdot F_y$: 45.0 ksi
 Base Plate Stress Ratio: 65.2% **Pass**

Flexural Check

PL Ref. Data

Yield Line (in):	29.85
Max PL Length:	29.85

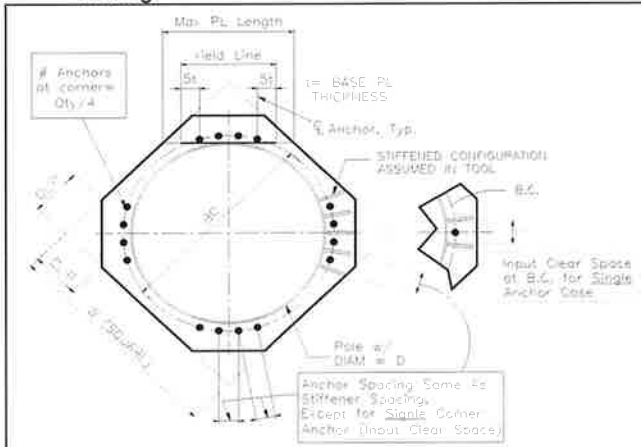
N/A - Unstiffened

Stiffener Results

Horizontal Weld : N/A
 Vertical Weld: N/A
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: N/A
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: N/A
 Plate Comp. (AISC Bracket): N/A

Pole Results

Pole Punching Shear Check: N/A



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

foundation loads

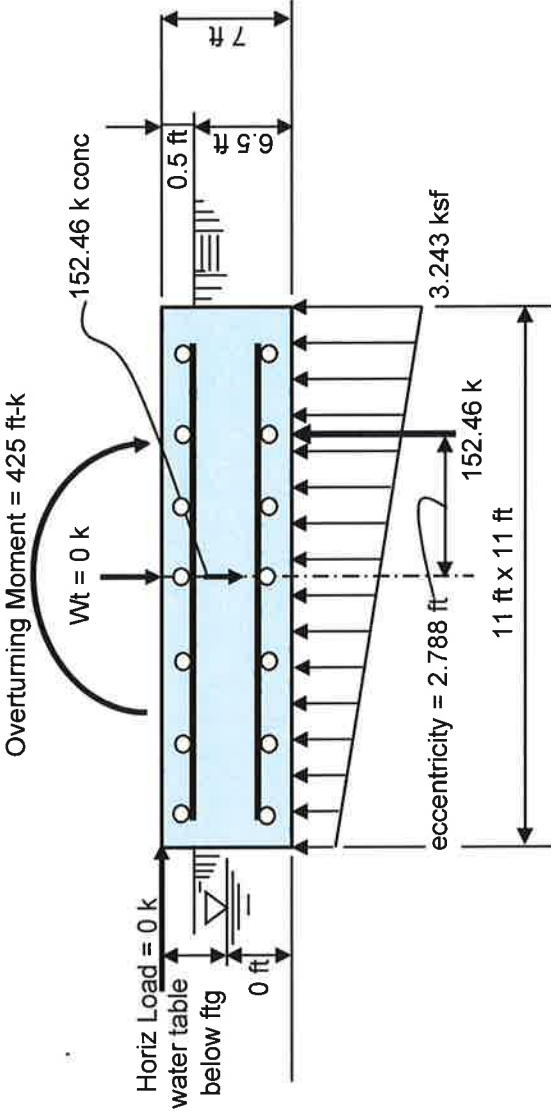
Limit states Tower or Pole Weight = 0 kips
 limit states total horizontal force = 0 kips
 limit states overturning moment = 425 ft-kips

soil properties

Safety factor against overturning = 1
 Soil Density = 110 pcf
 Ultimate soil bearing = 3.4 ksf
 Depth to water table = 10 ft

mat dimensions

depth to bottom of footing = 6.5 ft
 Footing thickness = 7 ft
 Footing Width = 11 ft
 Footing Length = 11 ft
 Tower/Pole Center Offset = 0 ft



Volume of concrete = 31.37 yd^3 Concrete strength = $f_c = 4$ (ksi)
 Rebar = (44) #9 bars by 10.5 ft long
 reinforcing steel = (11) #9 @ 12.6 in o.c. ea way top and bottom

Summary of analysis results

Overturning Moment: (Stress Ratio = 0.676)

Calculated Ultimate Overturning Moment = 425 ft-kips
 Resisting Moment = 628.9 ft-kips

Factor of Safety against overturning = 1.480 > 1 okay

See Next page for soil bearing analysis

Bending Moment

(Stress Ratio = 0.053)

Ultimate Bending Moment Resistance = 3889 ft-kips
 Calculated Ultimate Bending Moment = 207 ft-kips < 3889 ft-kips okay

Bending Shear

(Stress Ratio = 0.058)

Ultimate Bending Shear Resistance = 1126 kips
 Calculated Ultimate Bending Shear = 65 kips < 1126 kips okay

Rebar strength = $F_v = 60$ (ksi)
 minimum cover over rebar = 3 inches

Structure Type:

Type = **Pole**

Factored Foundation Loads:

Load Combination = LC1 = **1.2 D + 1.0 Dg + 1.6 Wo**

Load Combination = LC2 = **0.9 D + 1.0 Dg + 1.6 Wo**

Global Factored Axial Load =

Global Factored Horiz. Load =

Factored OTM =

	LC1	LC2
	0	0
	0	0
	425	425

0 kips (+Comp)

0 kips

425 k-ft

Soil Properties:

Depth to Water Table = **10** ft

Use? (Cohesion or Friction Angle)

Include Passive Press.? (Yes or No) **F** **N** (On Pad Only)

Layer Thk ft	Soil Density pcf	Cohesion ksf	Friction Angle degrees	Ult Bearing ksf	Depth ft
4	110		20	4.2	4.00
3	117	0	20	3.4	7.00

Dimensions:

Depth to Bottom of Footing = **6.5** ft

Footing Thickness = **7** ft

Footing Width, B = **11** ft

Footing Length, L = **11** ft

Pier Shape (Round or Square)

Pier Width =

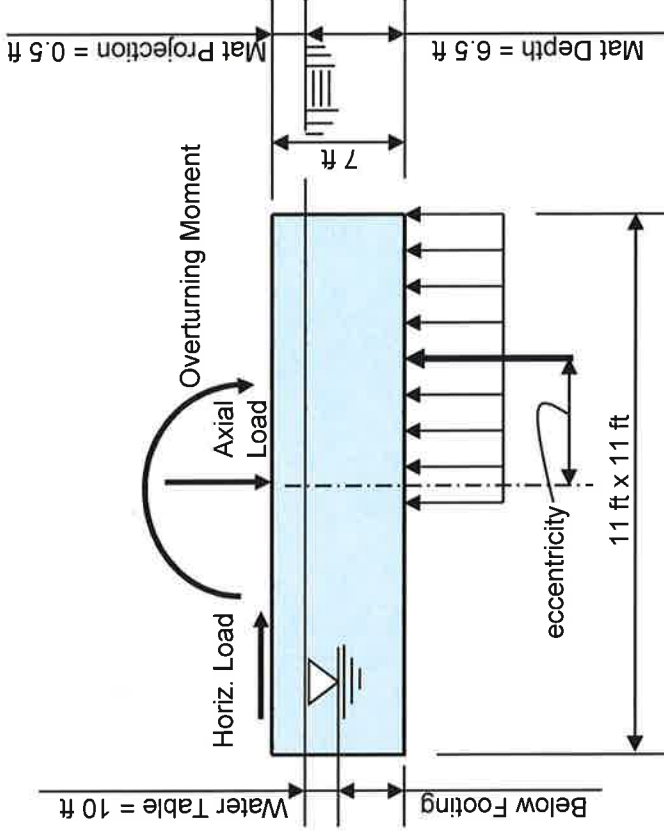
Pier Height above Grade =

Number of Piers = **0**

Structure Offset from Fdn Centroid = **0** ft, Along Width

Tower (Square or Triangular)

Tower Base Width =



Summary Results:

	Required	Available
Max Net Soil Bearing =	1.68 ksf	2.55 ksf
Max Net Soil Bearing =	2.26 ksf	2.55 ksf
Max Net Soil Bearing =	1.68 ksf	2.55 ksf
Max Net Soil Bearing =	2.26 ksf	2.55 ksf
Max Net Soil Bearing =	1.84 ksf	2.55 ksf
Max Net Soil Bearing =	2.42 ksf	2.55 ksf
		LC1, Width
		LC2, Width
		LC1, Length
		LC2, Length
		LC1, Diagonal
		LC2, Diagonal

Stress Ratio =	65.7%	in Soil Bearing
Stress Ratio =	88.5%	in Soil Bearing
Stress Ratio =	65.7%	in Soil Bearing
Stress Ratio =	88.5%	in Soil Bearing
Stress Ratio =	72.2%	in Soil Bearing
Stress Ratio =	95.0%	in Soil Bearing

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA-222-G

Factored Base Reactions from RISAs

	Comp. (+)	Tension (-)	
Moment, Mu =	3395.0		k-ft
Shear, Vu =	32.0		kips
Axial Load, Pu1 =	56.0		kips (from 1.2D + 1.6W)*
Axial Load, Pu2 =	42.0	0.0	kips (from 0.9D + 1.6W)**
OTMu =	3411.0	0.0	k-ft @ Ground

*Axial Load, Pu1 will be used for Soil Compression Analysis.

**Axial Load, Pu2 will be used for Steel Analysis.

Drilled Pier Parameters

Diameter =	7	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	25.5	ft
fc' =	3	ksi
εc =	0.003	in/in
L / D Ratio =	3.71	
Mat Fdn. Cap Width =	11	ft
Mat Fdn. Cap Length =	11	ft
Depth Below Grade =	6.5	ft

Steel Parameters

Number of Bars =	20	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Define Soil Layers

Note: Cohesion = Undrained Shear Strength = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	4	110	0	29	Sand				4
2	2	117	0	31	Sand				6
3	4	120	1000	0	Clay		720		10
4	5	112	550	0	Clay		550		15
5	5	115	700	0	Clay		660		20
6	10	110	600	0	Clay	1700	600		30
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	13.31	ft, from Grade
Bending Moment, Mu =	3836.88	k-ft, from COR
Resisting Moment, ΦMn =	3910.92	k-ft, from COR

MOMENT RATIO = 98.1% OK

Shear, Vu =	32.00	kips
Resisting Shear, ΦVn =	32.62	kips

SHEAR RATIO = 98.1% OK

Soil Results: Uplift

Uplift, Tu =	0.00	kips
Uplift Capacity, ΦTn =	179.56	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, Cu =	56.00	kips
Comp. Capacity, ΦCn =	167.10	kips

COMPRESSION RATIO = 33.5% OK

Steel Results (ACI 318-05):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	31.20	sq in

Axial, ΦPn (min) =	-1684.80	kips, Where ΦMn = 0 k-ft
Axial, ΦPn (max) =	8280.46	kips, Where ΦMn = 0 k-ft

Axial Load, Pu =	111.42	kips @ 3.75 ft Below Grade
Moment, Mu =	3530.14	k-ft @ 3.75 ft Below Grade
Moment, ΦMn =	5098.23	k-ft

MOMENT RATIO = 69.2% OK

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-05
Seismic Design Category =	D
Reference Standard =	TIA-222-G
Use 1.3 Load Factor?	No
Load Factor =	1.00

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA-222-G

- (0.75) Ult. Skin Friction + (0.75) Ult. End Bearing + (1.2) Effective Soil Wt. - (1.2) Buoyant Conc. Wt. ≥ Comp.
- (0.75) Ult. Skin Friction + (0.9) Buoyant Conc. Wt. ≥ Uplift

Soil Parameters

Water Table Depth =	10.00	ft
Depth to Ignore Soil =	3.50	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?*	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)

Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

*Note: The drilled pier foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the drilled pier is based on the recommendations of the site specific geotechnical report. In the absence of any recommendations, the frost depth at the site or one half of the drilled pier diameter (whichever is greater) shall be ignored.

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

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

Site Data

BU#: 876313
 Site Name: West Johnson Ave. Burnt House
 App #:

Maximum Shaft Superimposed Forces		
TIA Revision:	G	
Max. Factored Shaft Mu:	3530.14	ft-kips (* Note)
Max. Factored Shaft Pu:	111.42	kips
Max Axial Force Type:	Comp.	

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

Loads Already Factored		
For M (WL)	1	<----Disregard
For P (DL)	1	<----Disregard

Load Factor	Shaft Factored Loads	
1.00	Mu:	3530.14 ft-kips
1.00	Pu:	111.42 kips

Pier Properties		
Concrete:		
Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in ²
Reinforcement:		
Clear Cover to Tie=	4.00	in
Horiz. Tie Bar Size=	5	
Vert. Cage Diameter =	6.11	ft
Vert. Cage Diameter =	73.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in ²
Number of Bars =	20	
As Total=	31.2	in ²
A s/ Aconc, Rho:	0.0056	0.56%

Material Properties		
Concrete Comp. strength, f _c =	3000	psi
Reinforcement yield strength, F _y =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	
ACI 318 Code		
Select Analysis ACI Code=	2005	
Seismic Properties		
Seismic Design Category =	D	
Seismic Risk =	High	

Solve (Run) ← Press Upon Completing All Input

ACI 10.5, ACI 21.10.4, and IBC 1810.

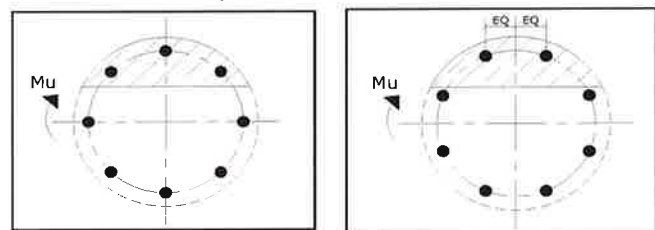
Min As for Flexural, Tension Controlled, Shafts:

$$(3) \cdot (\sqrt{f_c}) / F_y = 0.0027$$

$$200 / F_y = 0.0033$$

Results:

Governing Orientation Case: 1



Case 1

Case 2

Dist. From Edge to Neutral Axis: 14.02 in

Extreme Steel Strain, ϵ_t : 0.0138

$\epsilon_t > 0.0050$, Tension Controlled

Reduction Factor, ϕ : 0.90

Minimum Rho Check:

Actual Req'd Min. Rho: 0.33% Flexural
 Provided Rho: 0.56% **OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = ($\phi=0.65$) Pn.		
Pn per ACI 318 (10-2)	8280.46	kips
at Mu=($\phi=0.65$)Mn=	5016.69	ft-kips
Max Tu, ($\phi=0.9$) Tn =	1684.8	kips
at Mu= $\phi=(0.90)$ Mn=	0.00	ft-kips

Output Note: Negative Pu=Tension
 For Axial Compression, ϕ Pn = Pu: 111.42 kips
 Drilled Shaft Moment Capacity, ϕ Mn: 5098.22 ft-kips
 Drilled Shaft Superimposed Mu: 3530.14 ft-kips

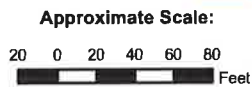
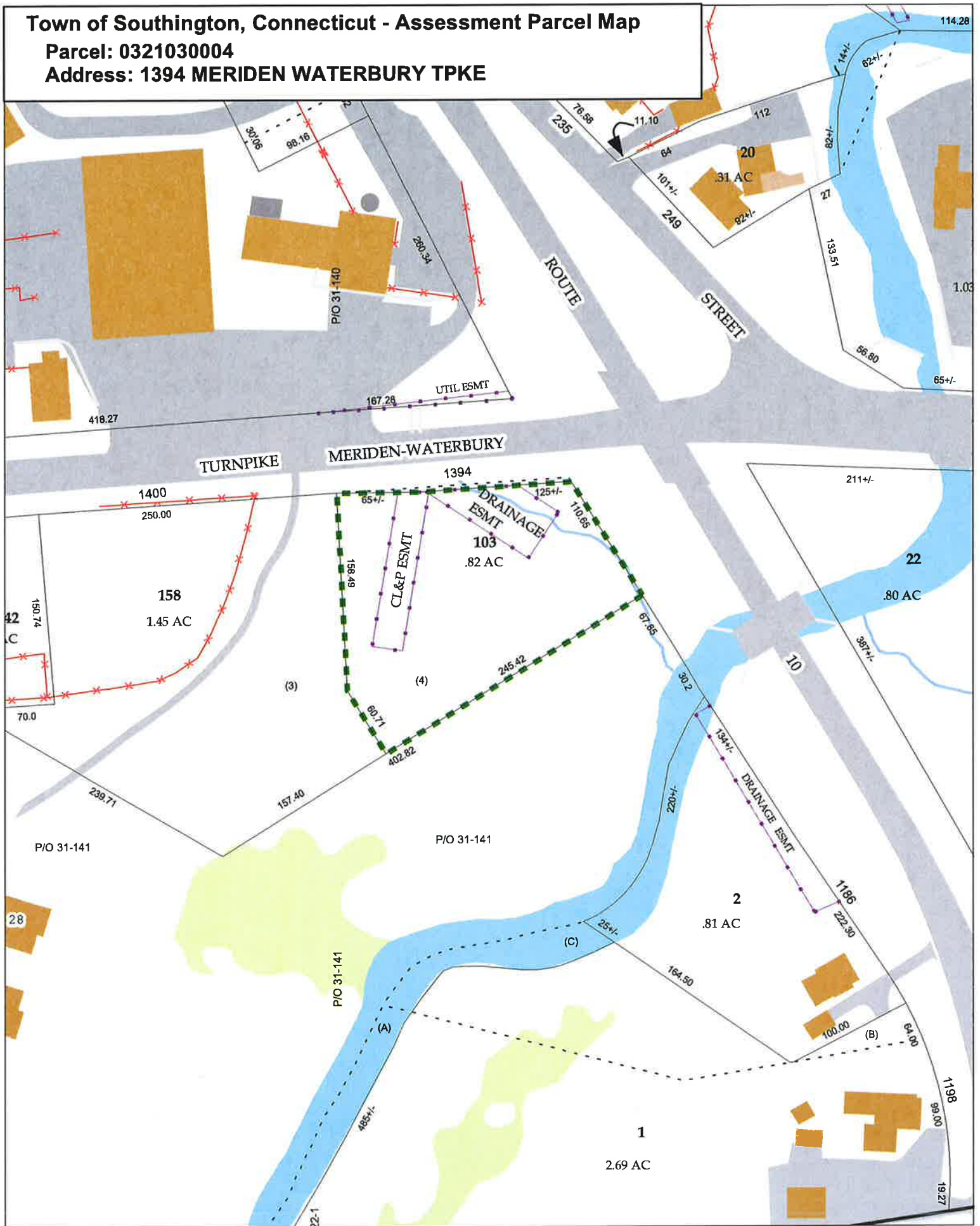
(Mu/ ϕ Mn, Drilled Shaft Flexure CSR): 69.2%

ATTACHMENT 4

Town of Southington, Connecticut - Assessment Parcel Map

Parcel: 0321030004

Address: 1394 MERIDEN WATERBURY TPKE



Disclaimer: This map is for informational purposes only. All information is subject to verification by any user. The Town of Southington and its mapping contractors assume no legal responsibility for the information contained herein.

Map Produced November 2016



Property Information

Property Location	1394 MERIDEN WATERBURY TPKE
Owner	SOUTHINGTON TOWER DEVELOPMENT LLC
Co-Owner	%GLOBAL SIGNAL
Mailing Address	PMB331 CANONSBURG PA 15317-252
Land Use	391 Vac Com Lnd wAcc
Land Class	C
Water Service	

Sewer Service	
Census Tract	4303
Neighborhood	1135
Zoning Code	B
Acreage	0.83
Book / Page	997/1112
Lot Setting/Desc	Level
Trash Day	

Photo

No Photo Available

Sketch

Primary Construction Details

Year Built	
Stories	
Building Style	
Building Use	
Building Condition	
Floors	
Total Rooms	

Bedrooms	0
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	
Roof Cover	

Exterior Walls	
Interior Walls	
Heating Type	
Heating Fuel	
AC Type	
Gross Bldg Area	0
Total Living Area	0



Valuation Summary (Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings		0
Outbuildings	0	0
Improvements	0	0
Extras	0	0
Land	204320	143020
Total	204320	143020

Outbuilding and Extra Items

Type	Description

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	0	0

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
SOUTHINGTON TOWER DEVELOPMENT LLC	997/1112	2005-01-18	90000