

December 27, 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  
128 Mather Street, Wilton, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 166-foot level of the existing 180-foot self-supporting lattice tower at 128 Mather Street in Wilton, Connecticut (the “Property”). The tower is owned by Crown Castle (“Crown”). The Council approved Cellco’s use of the existing tower in 1988 (Docket No. 94). Cellco now intends to remove three (3) of its existing antennas and install six (6) new antennas (three (3) model JAHH-65B-R3B, 700/1900 MHz antennas and three (3) model JAHH-65B-R3B, 2100 MHz antennas), for a total of fifteen (15) antennas, all at the 166-foot level on the tower. Cellco also intends to install nine (9) remote radio heads (“RRHs”) behind its antennas and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Wilton First Selectwoman, Lynne Vanderslice; Robert Nerney, Wilton’s Director of Planning and Land Use Management; and Crown, the tower owner. The Town of Wilton is the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s replacement antennas and RRHs will be installed at the same 166-foot level of the 180-foot tower.

17453333-v1

# Robinson+Cole

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2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Attachment 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report included in Attachment 3).

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

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

Sincerely,



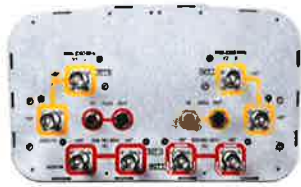
Kenneth C. Baldwin

Enclosures

Copy to:

Lynne Vanderslice, Wilton First Selectwoman  
Robert Nerney, Wilton Director of Planning and Land Use Management  
Crown Castle  
Tim Parks

# ATTACHMENT 1



## JAHH-65B-R3B

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

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

### Electrical Specifications

| Frequency Band, MHz                  | 698–787    | 824–894    | 1695–1880  | 1850–1990  | 1920–2200  | 2300–2360  |
|--------------------------------------|------------|------------|------------|------------|------------|------------|
| Gain, dBi                            | 14.5       | 15.8       | 18.0       | 18.4       | 18.5       | 18.8       |
| Beamwidth, Horizontal, degrees       | 67         | 65         | 63         | 63         | 65         | 68         |
| Beamwidth, Vertical, degrees         | 12.4       | 10.5       | 5.7        | 5.2        | 4.9        | 4.4        |
| Beam Tilt, degrees                   | 2–14       | 2–14       | 0–10       | 0–10       | 0–10       | 0–10       |
| USLS (First Lobe), dB                | 18         | 18         | 20         | 20         | 21         | 23         |
| Front-to-Back Ratio at 180°, dB      | 32         | 34         | 31         | 35         | 36         | 38         |
| Isolation, dB                        | 25         | 25         | 25         | 25         | 25         | 25         |
| Isolation, Intersystem, dB           | 30         | 30         | 30         | 30         | 30         | 30         |
| VSWR   Return Loss, dB               | 1.5   14.0 | 1.5   14.0 | 1.5   14.0 | 1.5   14.0 | 1.5   14.0 | 1.5   14.0 |
| PIM, 3rd Order, 2 x 20 W, dBc        | -153       | -153       | -153       | -153       | -153       | -153       |
| Input Power per Port, maximum, watts | 350        | 350        | 350        | 350        | 350        | 300        |
| Polarization                         | ±45°       | ±45°       | ±45°       | ±45°       | ±45°       | ±45°       |
| Impedance                            | 50 ohm     | 50 ohm     | 50 ohm     | 50 ohm     | 50 ohm     | 50 ohm     |

### Electrical Specifications, BASTA\*

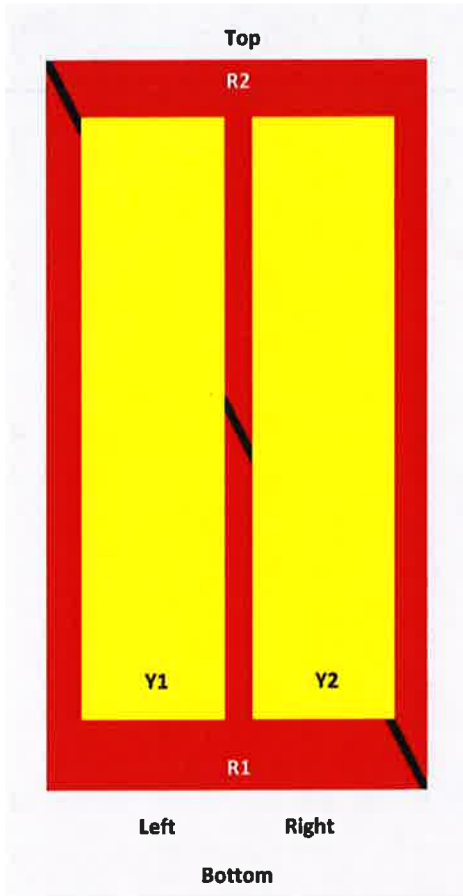
| Frequency Band, MHz                         | 698–787    | 824–894    | 1695–1880  | 1850–1990  | 1920–2200  | 2300–2360  |
|---|------------|------------|------------|------------|------------|------------|
| Gain by all Beam Tilts, average, dBi        | 14.3       | 14.9       | 17.6       | 18.1       | 18.2       | 18.5       |
| Gain by all Beam Tilts Tolerance, dB        | ±0.3       | ±0.5       | ±0.6       | ±0.4       | ±0.5       | ±0.6       |
| Gain by Beam Tilt, average, dBi             | 2°   14.3  | 2°   15.0  | 0°   17.2  | 0°   17.6  | 0°   17.7  | 0°   17.9  |
|   | 8°   14.3  | 8°   14.9  | 5°   17.6  | 5°   18.2  | 5°   18.3  | 5°   18.7  |
|   | 14°   14.3 | 14°   15.4 | 10°   17.6 | 10°   18.2 | 10°   18.3 | 10°   18.7 |
| Beamwidth, Horizontal Tolerance, degrees    | ±1.2       | ±1.4       | ±4         | ±2.4       | ±2.9       | ±2.7       |
| Beamwidth, Vertical Tolerance, degrees      | ±0.9       | ±0.5       | ±0.3       | ±0.2       | ±0.3       | ±0.1       |
| USLS, beampeak to 20° above beampeak, dB    | 18         | 17         | 17         | 18         | 19         | 18         |
| Front-to-Back Total Power at 180° ± 30°, dB | 25         | 24         | 26         | 29         | 27         | 29         |
| CPR at Boresight, dB                        | 22         | 23         | 20         | 21         | 21         | 24         |
| CPR at Sector, dB                           | 11         | 12         | 11         | 11         | 11         | 8          |

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

### Array Layout

JAHH-65B-R3B

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



| Array | Freq (MHz) | Conns | RET (SRET) | AISG RET UID     |
|-------|------------|-------|------------|------------------|
| R1    | 698-798    | 1-2   | 1          | ANXXXXXXXXXXXXX1 |
| R2    | 824-894    | 3-4   | 2          | ANXXXXXXXXXXXXX2 |
| Y1    | 1695-2360  | 5-6   | 3          | ANXXXXXXXXXXXXX3 |
| Y2    | 1695-2360  | 7-8   |            |                  |

View from the front of the antenna

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

## General Specifications

|                          |   |
|--------------------------|---|
| Operating Frequency Band | 1695 – 2360 MHz   698 – 787 MHz   824 – 894 MHz |
| Antenna Type             | Sector  |
| Band                     | Multiband                                       |
| Performance Note         | Outdoor usage                                   |

## Mechanical Specifications

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

JAHH-65B-R3B

|                       |  |
|-----------------------|--|
| Grounding Type        | RF connector body grounded to reflector and mounting bracket |
| Radiator Material     | Aluminum   Low loss circuit board                            |
| Radome Material       | Fiberglass, UV resistant                                     |
| Reflector Material    | Aluminum   |
| RF Connector Location | Bottom   |
| Wind Loading, frontal | 746.0 N @ 150 km/h<br>167.7 lbf @ 150 km/h                   |
| Wind Loading, lateral | 243.0 N @ 150 km/h<br>54.6 lbf @ 150 km/h                    |
| Wind Loading, rear    | 776.0 N @ 150 km/h<br>174.5 lbf @ 150 km/h                   |
| Wind Speed, maximum   | 241 km/h   150 mph   |

## Dimensions

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

## Remote Electrical Tilt (RET) Information

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

## Packed Dimensions

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

## Regulatory Compliance/Certifications

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



JAHH-65B-R3B

## Included Products

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

## \* Footnotes

Performance Note      Severe environmental conditions may degrade optimum performance

# ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

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

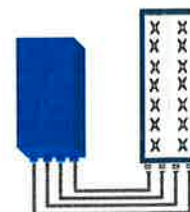


## FEATURES

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

## BENEFITS

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



4x30W with 4T4R  
or  
2x60W with 2T4R  
Can be switched between  
modes via SW w/o site  
visit



## TECHNICAL SPECIFICATIONS

| Features & performance              |   |
|-------------------------------------|---|
| Number of TX/RX paths               | 4 duplexed (either 4T4R or 2T4R by SW)  |
| Frequency band                      | U700 (C) (3GPP bands 13):<br>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)   |
| Wind load (@150km/h or 93mph)       | IP65<br>Frontal:<200N / Lateral :<150N  |
| Antenna ports                       | 4 ports 7/16 DIN female (50 ohms)<br>VSWR < 1.5   |
| CPRI ports                          | 2 CPRI ports (HW ready for Rate7, 9.8 Gbps)<br>SFP single mode dual fiber                   |
| AISG interfaces                     | 1 AISG2.0 output (RS485)<br>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.

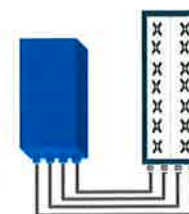


## FEATURES

- 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)<br>DL: 1930 - 1995 MHz<br>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)<br>IP65  |
| Wind load (@150km/h or 93mph)              | Frontal:<200N / Lateral :<150N   |
| Antenna ports                              | 4 ports 7/16 DIN female (50 ohms)<br>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<br>Integrated Smart Bias Tees (x2)                        |
| Misc. Interfaces                           | 1 external alarms connector (4 alarms)<br>4 RF Tx & 4 RF Rx monitor ports<br>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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B25 RRH4x30

ALCATEL-LUCENT DATA SHEET REV1.1 – JANUARY 2015

# 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.

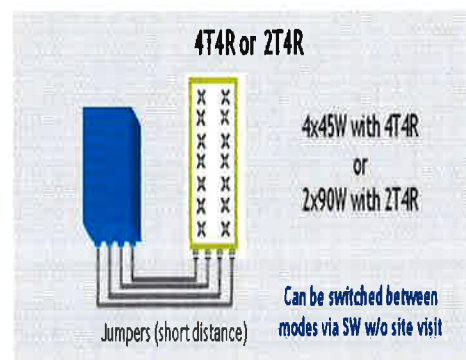
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the 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<br>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<br>Receiver Sensitivity (FRC A1-3) | 2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity<br>-104.5 dBm maximum   |
| Sizes (HxWxD) in mm (in.)   | 655x299x182 (25.8x11.8x7.2) (with solar shield)<br>640x290x160 (25.2x11.4x6.3) (without solar shield)                    |
| Volume in Liters  | 35.5 (with solar shield)<br>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)<br>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)<br>VSWR < 1.5  |
| CPRI ports  | 2 CPRI ports (HW ready for Rate 7, 9.8 Gbps)<br>SFP: SMDF (HW supports also SMSF and MMDF)                               |
| AISG Interfaces   | 1 AISG 2.0 output (RS485)<br>Integrated Smart Bias Tees (x2)   |
| Misc. Interfaces  | 4 external alarms (1 connector)<br>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  |
| <b>Physical Properties</b>                           |                                |                   |  |
| 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)   |
| <b>Electrical Properties</b>                         |                                |                   |  |
| DC-Resistance Outer Conductor Armor                  |                                | (Ω/km (Ω/1000ft)) | 0.68 (0.205)   |
| DC-Resistance Power Cable, 8.4mm <sup>2</sup> (8AWG) |                                | (Ω/km (Ω/1000ft)) | 2.1 (0.307)  |
| <b>Optical Properties</b>                            |                                |                   |  |
| 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<br>RoHS Compliant  |
| <b>Power Properties</b>                              |                                |                   |  |
| 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<br>UL Type XH-HW-2, UL 44<br>UL-LS Limited Smoke, UL VW-1<br>IEEE-383 (1974), IEEE1202/FT4<br>RoHS Compliant |
| <b>Temperature Properties</b>                        |                                |                   |  |
| Installation Temperature                             |                                | (°C (°F))         | -40 to +65 (-40 to 149)  |
| Operation Temperature                                |                                | (°C (°F))         | -40 to +65 (-40 to 149)  |

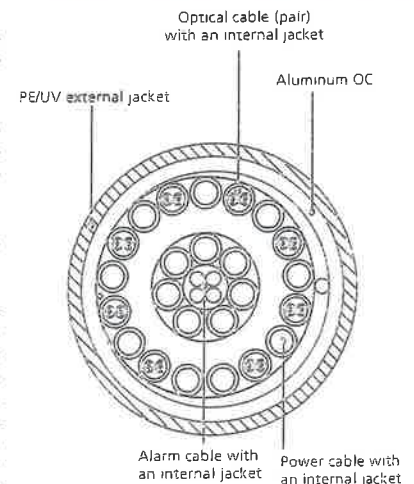


Figure 2: Construction Detail

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

# **ATTACHMENT 2**

| Site Name: Wilton<br>Tower Height: 180ft |            | General   |        | Power            |        | Density            |              |       |  |  |  |  |               |
|--|------------|-----------|--------|------------------|--------|--------------------|--------------|-------|--|--|--|--|---------------|
| CARRIER                                  | # OF CHAN. | WATTS ERP | HEIGHT | CALC. POWER DENS | FREQ.  | MAX. PERMISS. EXP. | FRACTION MPE | Total |  |  |  |  |               |
| *AT&T                                    | 1          | 500       | 153    | 880              | 0.0083 | 0.5867             | 0.14%        |       |  |  |  |  |               |
| *AT&T                                    | 1          | 500       | 153    | 1900             | 0.0083 | 1.0000             | 0.08%        |       |  |  |  |  |               |
| *AT&T                                    | 6          | 296       | 153    | 880              | 0.0296 | 0.5867             | 0.50%        |       |  |  |  |  |               |
| *AT&T                                    | 1          | 500       | 153    | 740              | 0.0083 | 0.4933             | 0.17%        |       |  |  |  |  |               |
| *MetroPCS                                | 3          | 444       | 169    | 2140             | 0.0180 | 1.0000             | 0.18%        |       |  |  |  |  |               |
| *Sprint                                  | 1          | 438       | 143    | 850              | 0.0084 | 0.5667             | 0.15%        |       |  |  |  |  |               |
| *Sprint                                  | 2          | 438       | 143    | 850              | 0.0168 | 0.5667             | 0.30%        |       |  |  |  |  |               |
| *Sprint                                  | 5          | 623       | 143    | 1900             | 0.0597 | 1.0000             | 0.60%        |       |  |  |  |  |               |
| *Sprint                                  | 2          | 1556      | 143    | 1900             | 0.0596 | 1.0000             | 0.60%        |       |  |  |  |  |               |
| *Sprint                                  | 8          | 778       | 143    | 2500             | 0.1193 | 1.0000             | 1.19%        |       |  |  |  |  |               |
| *T-Mobile                                | 2          | 2334      | 93     | 2100             | 0.2218 | 1.0000             | 2.22%        |       |  |  |  |  |               |
| *T-Mobile                                | 4          | 1167      | 93     | 1900/2100        | 0.2218 | 1.0000             | 2.22%        |       |  |  |  |  |               |
| *T-Mobile                                | 1          | 865       | 93     | 700              | 0.0411 | 0.4667             | 0.88%        |       |  |  |  |  |               |
| *Nextel                                  | 9          | 100       | 180    | 851              | 0.0107 | 0.5673             | 0.19%        |       |  |  |  |  |               |
| *Town                                    |            |           |        |                  |        |                    | 4.62%        |       |  |  |  |  |               |
| Verizon PCS                              | 1          | 5062      | 166    | 0.0661           | 1970   | 1.0000             | 6.61%        |       |  |  |  |  |               |
| Verizon Cellular                         | 3          | 252       | 166    | 0.0099           | 869    | 0.5793             | 1.70%        |       |  |  |  |  |               |
| Verizon 850 LTE                          | 0          | 3709      | 166    | 0.0000           | 880    | 0.5793             | 0.00%        |       |  |  |  |  |               |
| Verizon AWS                              | 1          | 7770      | 166    | 0.1014           | 2145   | 1.0000             | 10.14%       |       |  |  |  |  |               |
| Verizon 700                              | 1          | 2062      | 166    | 0.0269           | 746    | 0.4973             | 5.41%        |       |  |  |  |  |               |
|  |            |           |        |                  |        |                    |              |       |  |  |  |  | <b>37.89%</b> |
| * Source: Siting Council                 |            |           |        |                  |        |                    |              |       |  |  |  |  |               |



# **ATTACHMENT 3**



Date: August 21, 2017

Charles McGuirt  
Crown Castle  
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1-704-405-6607

Paul J Ford and Company  
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**Subject: Structural Analysis Report**

|                                      |   |                     |
|--------------------------------------|---|---------------------|
| <b>Carrier Designation:</b>          | <b>Verizon Wireless Co-Locate</b>                         |                     |
|                                      | <b>Carrier Site Number:</b>                               | n/a                 |
|                                      | <b>Carrier Site Name:</b>                                 | Wilton, CT          |
| <b>Crown Castle Designation:</b>     | <b>Crown Castle BU Number:</b>                            | 806353              |
|                                      | <b>Crown Castle Site Name:</b>                            | BRG 124 943066      |
|                                      | <b>Crown Castle JDE Job Number:</b>                       | 450829              |
|                                      | <b>Crown Castle Work Order Number:</b>                    | 1439770             |
|                                      | <b>Crown Castle Application Number:</b>                   | 399456 Rev. 1       |
| <b>Engineering Firm Designation:</b> | <b>Paul J Ford and Company Project Number:</b>            | 37517-2777-001-8700 |
| <b>Site Data:</b>                    | <b>128 MATHER STREET, WILTON, Fairfield County, CT</b>    |                     |
|                                      | <b>Latitude 41° 14' 18.34"; Longitude -73° 25' 26.44"</b> |                     |
|                                      | <b>180 Foot - Self Support Tower</b>                      |                     |

Dear Mr. McGuirt,

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 1067160, in accordance with application 399456, revision 1.

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

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 Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per section 1609.3.1 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a topographic category 1 and crest height of 0 feet, and Risk Category II 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.

Structural analysis prepared by:

Joseph Jacobs, PE, SE  
Project Manager



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## 1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by FWT INC. in May of 1988. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E. The tower has been modified in the past.

## 2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 93 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B with topographic category 1 and crest height of 0 feet.

**Table 1 - Proposed Antenna and Cable Information**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model              | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|----------------------|----------------------------|----------------------|---------------------|
| 164.0               | 166.0                      | 3                  | alcatel lucent       | AWS4 (B66) 4x45 RRH        | 8                    | 1 5/8               |
|                     |                            | 1                  | alcatel lucent       | B13 RRH 4X30               |                      |                     |
|                     |                            | 2                  | alcatel lucent       | B13 RRH 4X30               |                      |                     |
|                     |                            | 1                  | alcatel lucent       | B25 RRH2x60 PCS            |                      |                     |
|                     |                            | 2                  | alcatel lucent       | B25 RRH2x60 PCS            |                      |                     |
|                     |                            | 6                  | commscope            | JAHH-65B-R3B w/ Mount Pipe |                      |                     |
|                     |                            | 1                  | rfs celwave          | DB-T1-6Z-8AB-0Z            |                      |                     |
|                     | 163.0                      | 1                  | rfs celwave          | DB-T1-6Z-8AB-0Z            |                      |                     |

**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 |
|---------------------|----------------------------|--------------------|------------------------|--------------------------------|----------------------|---------------------|------|
| 178.0               | 184.0                      | 1                  | rfs celwave            | PD10017<br>CO 301-1 (Mount)    | 2                    | 7/8                 | 1    |
| 170.0               | 171.0                      | 3                  | kathrein               | 800 10504 w/ Mount Pipe        | 6<br>1               | 1 5/8<br>1/4        | 1    |
|                     | 170.0                      | 3                  | kathrein               | 860 10025                      |                      |                     |      |
|                     |                            | 1                  | tower mounts           | Side Arm Mount [SO 103-3]      |                      |                     |      |
| 164.0               | 166.0                      | 6                  | rfs celwave            | APL868013-42T0 w/ Mount Pipe   | 6                    | 1 1/4               | 1    |
|                     |                            | 3                  | rfs celwave            | APX75-866512-CT2 w/ Mount Pipe |                      |                     | 3    |
|                     |                            | 6                  | rfs celwave            | FD9R6004/2C-3L                 |                      |                     | 1    |
|                     |                            | 3                  | rymsa wireless         | MG D3-800Tx w/ Mount Pipe      |                      |                     |      |
|                     | 164.0                      | 1                  | tower mounts           | Sector Mount [SM 702-3]        |                      |                     | 6    |
| 154.0               | 158.0                      | 6                  | ericsson               | RRUS-11                        | 12                   | 1 5/8               | 1    |
|                     |                            | 6                  | powerwave technologies | 7770.00 w/ Mount Pipe          | 1<br>2               | 3/8<br>5/8          |      |

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer   | Antenna Model                         | Number of Feed Lines | Feed Line Size (in) | Note |       |   |
|---------------------|----------------------------|--------------------|------------------------|---------------------------------------|----------------------|---------------------|------|-------|---|
|                     | 154.0                      | 6                  | powerwave technologies | LGP21401                              |                      |                     |      |       |   |
|                     |                            | 6                  | powerwave technologies | LGP21901                              |                      |                     |      |       |   |
|                     |                            | 3                  | powerwave technologies | P65-16-XLH-RR w/ Mount Pipe           |                      |                     |      |       |   |
|                     |                            | 1                  | raycap                 | DC6-48-60-18-8F                       |                      |                     |      |       |   |
|                     |                            | 1                  | tower mounts           | Sector Mount [SM 602-3]               |                      |                     |      |       |   |
| 146.0               | 146.0                      | 3                  | alcatel lucent         | 800 EXTERNAL NOTCH FILTER             | -                    | -                   | 1    |       |   |
|                     |                            | 3                  | alcatel lucent         | TME-800MHZ 2X50W RRH                  |                      |                     |      |       |   |
|                     |                            | 3                  | alcatel lucent         | TME-PCS 1900 MHz 4x45W-65MHz          |                      |                     |      |       |   |
| 143.0               | 143.0                      | 3                  | alcatel lucent         | TD-RRH8x20-25                         |                      |                     | 2    |       |   |
|                     |                            | 9                  | rfs celwave            | ACU-A20-N                             |                      |                     | 1    |       |   |
|                     |                            | 3                  | rfs celwave            | APXVSP18-C-A20                        |                      |                     |      |       |   |
|                     |                            | 3                  | rfs celwave            | APXVTM14-C-120 w/ Mount Pipe          |                      |                     | 1    | 1 1/4 | 2 |
|                     |                            | 1                  | tower mounts           | Sector Mount [SM 701-3]               |                      |                     | 3    | 1 1/4 | 1 |
| 124.0               | 131.0                      | 2                  | rfs celwave            | 1142-2C                               | 2                    | 1/2                 | 1    |       |   |
|                     | 124.0                      | 2                  | tower mounts           | Side Arm Mount [SO 306-1]             |                      |                     |      |       |   |
| 104.0               | 111.0                      | 1                  | rfs celwave            | 1142-2C                               | 1                    | 7/8                 | 1    |       |   |
|                     | 108.0                      | 1                  | rfs celwave            | 220-3BN                               |                      |                     |      |       |   |
|                     | 104.0                      | 2                  | tower mounts           | Side Arm Mount [SO 306-1]             |                      |                     |      |       |   |
| 93.0                | 93.0                       | 3                  | commscope              | LNX-6515DS-VTM w/ Mount Pipe          | 13                   | 1 1/4               | 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                           |                      |                     |      |       |   |
|                     |                            | 3                  | tower mounts           | MTC 3615]                             |                      |                     |      |       |   |
| 62.0                | 62.0                       | 1                  | gps                    | GPS_A                                 | 1                    | 1/2                 | 1    |       |   |
|                     |                            | 1                  | tower mounts           | Side Arm Mount [SO 301-1]             |                      |                     |      |       |   |
| 42.0                | 44.0                       | 1                  | gps                    | GPS_A                                 | 1                    | 1/2                 | 1    |       |   |
|                     | 42.0                       | 1                  | tower mounts           | Side Arm Mount [SO 301-1]             |                      |                     |      |       |   |
| 31.0                | 32.0                       | 1                  | gps                    | GPS_A                                 | 1                    | 1/2                 | 1    |       |   |
|                     | 31.0                       | 1                  | tower mounts           | Side Arm Mount [SO 301-1]             |                      |                     |      |       |   |

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment
- 3) Equipment To Be Removed

**Table 3 – Design Load**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model        | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|----------------------|----------------------|----------------------|---------------------|
| Top                 | Top                        | 2                  | rfs celwave          | PD10017              | 2                    | 7/8                 |
| 165                 | 165                        | 3                  | rfs celwave          | PD1132D              | 3                    | 7/8                 |
| 160                 | 160                        | 2                  |                      | 8' dish w/ no radome | 2                    | 7/8                 |
| 140                 | 140                        | 2                  | rfs celwave          | PD10017              | 2                    | 7/8                 |
| 125                 | 125                        | 3                  | rfs celwave          | PD1132D              | 3                    | 7/8                 |

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

| Document                                 | Remarks                                    | Reference | Source   |
|--|--|-----------|----------|
| GEOTECHNICAL REPORTS                     | FDH, 09-04219E G1 - 4/29/2009              | 262283    | CCISITES |
| POST-MODIFICATION INSPECTION             | Paul J. Ford, 37509-0801 - 1/11/2010       | 2575710   | CCISITES |
| TOWER FOUNDATION DRAWINGS/DESIGN/SPECS   | FWT, 18888-81 - 5/31/1988                  | 262285    | CCISITES |
| TOWER MANUFACTURER DRAWINGS              | FWT, 18888-81 - 5/6/1988                   | 217757    | CCISITES |
| TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA | Paul J. Ford, 37509-0801 - 12/8/2009       | 2434484   | CCISITES |
| TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA | HEB, 98124A - 1/7/2000<br>Rock anchor Mod. | 3290324   | CCISITES |
| TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA | APT, CT105271 - 1/17/2003                  | 801524    | CCISITES |
| FOUNDATION MAPPING                       | FDH, 09-11077 E N1 - 8/7/2012              | 3290324   | CCISITES |
| PMI                                      | SGS Oct 21, 2016                           | 6515894   | 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) The existing base plate grout was considered in this analysis. Grout must be maintained and inspected periodically, and must be replaced if damaged or cracked. Refer to crown document PRC-10012, Base Plate Grout Inspection & Classification.
- 5) The Knife plates at 40' and 20' splices have not been analyzed since the existing flange bolts do pass in this analysis.

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 5 - Section Capacity (Summary)

| <b>Section Capacity Table</b> |              |                      |                              |                  |         |                    |                           |             |             |
|-------------------------------|--------------|----------------------|------------------------------|------------------|---------|--------------------|---------------------------|-------------|-------------|
| Section No.                   | Elevation ft | Component Type       | Size                         | Critical Element | P K     | $\phi P_{allow}$ K | % Capacity                | Pass        | Fail        |
| T1                            | 180 - 168    | Leg                  | Pipe 2.375" x 0.154" (2 STD) | 3                | -2.32   | 27.98              | 8.3                       | Pass        |             |
| T2                            | 168 - 160    | Leg                  | Pipe 2.375" x 0.154" (2 STD) | 25               | -11.92  | 38.43              | 31.0                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T3                            | 160 - 140    | Leg                  | Pipe 3.5" x 0.216" (3 STD)   | 40               | 43.40   | 70.20              | 61.8                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T4                            | 140 - 120    | Leg                  | Pipe 4" x 0.318" (3.5 XS)    | 67               | -89.13  | 122.13             | 73.0                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T5                            | 120 - 100    | Leg                  | Pipe 4.5" x 0.337" (4 XS)    | 88               | -122.42 | 157.19             | 77.9                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T6                            | 100 - 80     | Leg                  | Pipe 5.563" x 0.375" (5 XS)  | 109              | 136.41  | 192.53             | 70.9                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T7                            | 80 - 60      | Leg                  | Pipe 6.625" x 0.432" (6 XS)  | 130              | 164.26  | 264.76             | 62.0                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T8                            | 60 - 40      | Leg                  | Pipe 6.625" x 0.432" (6 XS)  | 145              | 192.96  | 264.76             | 72.9                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T9                            | 40 - 20      | Leg                  | Pipe 6.625" x 0.432" (6 XS)  | 160              | 219.61  | 264.76             | 82.9                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T10                           | 20 - 0       | Leg                  | Pipe 8.625" x 0.500" (8 XS)  | 181              | 245.52  | 402.03             | 61.1                      | Pass        |             |
|                               |              |                      | (GR)                         |                  |         |                    |                           |             |             |
| T1                            | 180 - 168    | Diagonal             | L 2 x 1.5 x 3/16 LLV         | 11               | -0.66   | 12.98              | 5.1                       | Pass        |             |
| T2                            | 168 - 160    | Diagonal             | L 2 x 1.5 x 3/16 LLV         | 28               | -3.28   | 12.98              | 25.3                      | Pass        |             |
| T3                            | 160 - 140    | Diagonal             | L 2 x 1.5 x 3/16 LLV         | 44               | -4.46   | 9.17               | 48.7                      | Pass        |             |
| T4                            | 140 - 120    | Diagonal             | L 2 x 2 x 3/16               | 71               | -5.02   | 8.21               | 61.2                      | Pass        |             |
| T5                            | 120 - 100    | Diagonal             | L 2.5 x 2 x 3/16 LLV         | 92               | -5.22   | 7.98               | 65.5                      | Pass        |             |
| T6                            | 100 - 80     | Diagonal             | L 2.5 x 2.5 x 3/16           | 112              | -6.56   | 8.94               | 73.4                      | Pass        |             |
| T7                            | 80 - 60      | Diagonal             | L 3 x 3 x 3/16               | 133              | -7.85   | 9.69               | 81.0                      | Pass        |             |
| T8                            | 60 - 40      | Diagonal             | L 3.5 x 3 x 1/4 LLV          | 148              | -8.38   | 12.78              | 65.6                      | Pass        |             |
| T9                            | 40 - 20      | Diagonal             | L 3.5 x 3 x 1/4 LLV          | 163              | -9.20   | 10.29              | 89.4                      | Pass        |             |
| T10                           | 20 - 0       | Diagonal             | L 3.5 x 3.5 x 1/4            | 184              | -9.57   | 11.85              | 80.8                      | Pass        |             |
| T9                            | 40 - 20      | Secondary Horizontal | L 3.5 x 3.5 x 1/4            | 171              | -4.45   | 17.81              | 25.0                      | Pass        |             |
| T1                            | 180 - 168    | Top Girt             | L 2 x 1.5 x 3/16 LLH         | 5                | -0.15   | 8.00               | 1.9                       | Pass        |             |
|                               |              |                      |                              |                  |         |                    | <b>Summary</b>            |             |             |
|                               |              |                      |                              |                  |         |                    | Leg (T9)                  | 82.9        | Pass        |
|                               |              |                      |                              |                  |         |                    | Diagonal (T9)             | 89.4        | Pass        |
|                               |              |                      |                              |                  |         |                    | Secondary Horizontal (T9) | 25.0        | Pass        |
|                               |              |                      |                              |                  |         |                    | Top Girt (T1)             | 1.9         | Pass        |
|                               |              |                      |                              |                  |         |                    | Bolt                      | 91          | Pass        |
|                               |              |                      |                              |                  |         |                    | Checks                    |             |             |
|                               |              |                      |                              |                  |         |                    | <b>RATING =</b>           | <b>91.0</b> | <b>Pass</b> |

**Table 6 - Tower Component Stresses vs. Capacity – LC7**

| Notes                       | Component                           | % Capacity | Pass / Fail |
|-----------------------------|-------------------------------------|------------|-------------|
|                             | Anchor Rods                         | 78.9       | Pass        |
| 1                           | Base Foundation                     | 56         | Pass        |
| 1, Considering rock anchors | Base Foundation<br>Soil Interaction | 79         | Pass        |

|   |              |
|---|--------------|
| <b>Structure Rating (max from all components) =</b> | <b>91.0%</b> |
|---|--------------|

Notes:

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



**APPENDIX A**  
**TNXTOWER OUTPUT**

## Tower Input Data

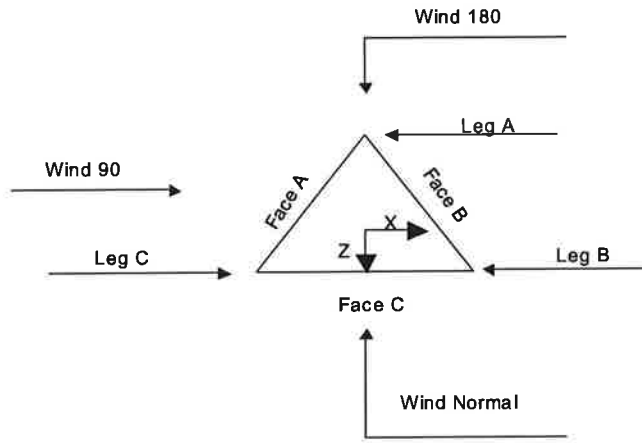
The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.  
 The base of the tower is set at an elevation of 0.00 ft above the ground line.  
 The face width of the tower is 4.00 ft at the top and 20.00 ft at the base.  
 This tower is designed using the TIA-222-G standard.

The following design criteria apply:

- 1) Tower is located in Fairfield County, Connecticut.
- 2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- 3) Basic wind speed of 93 mph.
- 4) Structure Class II.
- 5) Exposure Category B.
- 6) Topographic Category 1.
- 7) Crest Height 0.00 ft.
- 8) Nominal ice thickness of 0.75 in.
- 9) Ice thickness is considered to increase with height.
- 10) Ice density of 56 pcf.
- 11) A wind speed of 50 mph is used in combination with ice.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) Grouted pipe  $f_c$  is 7 ksi.
- 14) Pressures are calculated at each section.
- 15) Stress ratio used in tower member design is 1.

## Options

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



**Triangular Tower**

**Tower Section Geometry**

| Tower Section | Tower Elevation | Assembly Database | Description | Section Width | Number of Sections | Section Length |
|---------------|-----------------|-------------------|-------------|---------------|--------------------|----------------|
|               | ft              |                   |             | ft            |                    | ft             |
| T1            | 180.00-168.00   |                   |             | 4.00          | 1                  | 12.00          |
| T2            | 168.00-160.00   |                   |             | 4.00          | 1                  | 8.00           |
| T3            | 160.00-140.00   |                   |             | 4.00          | 1                  | 20.00          |
| T4            | 140.00-120.00   |                   |             | 6.00          | 1                  | 20.00          |
| T5            | 120.00-100.00   |                   |             | 8.00          | 1                  | 20.00          |
| T6            | 100.00-80.00    |                   |             | 10.00         | 1                  | 20.00          |
| T7            | 80.00-60.00     |                   |             | 12.00         | 1                  | 20.00          |
| T8            | 60.00-40.00     |                   |             | 14.00         | 1                  | 20.00          |
| T9            | 40.00-20.00     |                   |             | 16.00         | 1                  | 20.00          |
| T10           | 20.00-0.00      |                   |             | 18.00         | 1                  | 20.00          |

**Tower Section Geometry (cont'd)**

| Tower Section | Tower Elevation | Diagonal Spacing | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset | Bottom Girt Offset |
|---------------|-----------------|------------------|--------------|------------------------|-----------------|-----------------|--------------------|
|               | ft              | ft               |              |                        |                 | in              | in                 |
| T1            | 180.00-168.00   | 4.00             | X Brace      | No                     | No              | 0.00            | 0.00               |
| T2            | 168.00-160.00   | 4.00             | X Brace      | No                     | No              | 0.00            | 0.00               |
| T3            | 160.00-140.00   | 5.00             | X Brace      | No                     | No              | 0.00            | 0.00               |
| T4            | 140.00-120.00   | 6.67             | X Brace      | No                     | No              | 0.00            | 0.00               |
| T5            | 120.00-100.00   | 6.67             | X Brace      | No                     | No              | 0.00            | 0.00               |
| T6            | 100.00-80.00    | 6.67             | X Brace      | No                     | No              | 0.00            | 0.00               |
| T7            | 80.00-60.00     | 10.00            | X Brace      | No                     | No              | 0.00            | 0.00               |
| T8            | 60.00-40.00     | 10.00            | X Brace      | No                     | No              | 0.00            | 0.00               |
| T9            | 40.00-20.00     | 10.00            | X Brace      | No                     | Yes             | 0.00            | 0.00               |
| T10           | 20.00-0.00      | 10.00            | X Brace      | No                     | No              | 0.00            | 0.00               |

### Tower Section Geometry (cont'd)

| Tower Elevation<br>ft | Leg Type     | Leg Size                     | Leg Grade         | Diagonal Type | Diagonal Size        | Diagonal Grade |
|-----------------------|--------------|------------------------------|-------------------|---------------|----------------------|----------------|
| T1 180.00-168.00      | Pipe         | Pipe 2.375" x 0.154" (2 STD) | A53-B-35 (35 ksi) | Single Angle  | L 2 x 1.5 x 3/16 LLV | A36 (36 ksi)   |
| T2 168.00-160.00      | Grouted Pipe | Pipe 2.375" x 0.154" (2 STD) | A53-B-35 (35 ksi) | Single Angle  | L 2 x 1.5 x 3/16 LLV | A36 (36 ksi)   |
| T3 160.00-140.00      | Grouted Pipe | Pipe 3.5" x 0.216" (3 STD)   | A53-B-35 (35 ksi) | Single Angle  | L 2 x 1.5 x 3/16 LLV | A36 (36 ksi)   |
| T4 140.00-120.00      | Grouted Pipe | Pipe 4" x 0.318" (3.5 XS)    | A53-B-35 (35 ksi) | Single Angle  | L 2 x 2 x 3/16       | A36 (36 ksi)   |
| T5 120.00-100.00      | Grouted Pipe | Pipe 4.5" x 0.337" (4 XS)    | A53-B-35 (35 ksi) | Single Angle  | L 2.5 x 2 x 3/16 LLV | A36 (36 ksi)   |
| T6 100.00-80.00       | Grouted Pipe | Pipe 5.563" x 0.375" (5 XS)  | A53-B-35 (35 ksi) | Single Angle  | L 2.5 x 2.5 x 3/16   | A36 (36 ksi)   |
| T7 80.00-60.00        | Grouted Pipe | Pipe 6.625" x 0.432" (6 XS)  | A53-B-35 (35 ksi) | Single Angle  | L 3 x 3 x 3/16       | A36 (36 ksi)   |
| T8 60.00-40.00        | Grouted Pipe | Pipe 6.625" x 0.432" (6 XS)  | A53-B-35 (35 ksi) | Single Angle  | L 3.5 x 3 x 1/4 LLV  | A36 (36 ksi)   |
| T9 40.00-20.00        | Grouted Pipe | Pipe 6.625" x 0.432" (6 XS)  | A53-B-35 (35 ksi) | Single Angle  | L 3.5 x 3 x 1/4 LLV  | A36 (36 ksi)   |
| T10 20.00-0.00        | Grouted Pipe | Pipe 8.625" x 0.500" (8 XS)  | A53-B-35 (35 ksi) | Single Angle  | L 3.5 x 3.5 x 1/4    | A36 (36 ksi)   |

### Tower Section Geometry (cont'd)

| Tower Elevation<br>ft | Top Girt Type | Top Girt Size        | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|-----------------------|---------------|----------------------|----------------|------------------|------------------|-------------------|
| T1 180.00-168.00      | Single Angle  | L 2 x 1.5 x 3/16 LLH | A36 (36 ksi)   | Single Angle     |                  | A36 (36 ksi)      |

### Tower Section Geometry (cont'd)

| Tower Elevation<br>ft | Secondary Horizontal Type | Secondary Horizontal Size | Secondary Horizontal Grade | Inner Bracing Type | Inner Bracing Size | Inner Bracing Grade |
|-----------------------|---------------------------|---------------------------|----------------------------|--------------------|--------------------|---------------------|
| T9 40.00-20.00        | Single Angle              | L 3.5 x 3.5 x 1/4         | A36 (36 ksi)               | Single Angle       |                    | A36 (36 ksi)        |

### Tower Section Geometry (cont'd)

| Tower Elevation<br>ft | Gusset Area<br>(per face)<br>ft <sup>2</sup> | Gusset Thickness<br>in | Gusset Grade | Adjust. Factor<br>A <sub>r</sub> | Adjust. Factor<br>A <sub>r</sub> | Weight Mult. | Double Angle<br>Stitch Bolt<br>Spacing<br>Diagonals<br>in | Double Angle<br>Stitch Bolt<br>Spacing<br>Horizontal<br>in | Double Angle<br>Stitch Bolt<br>Spacing<br>Redundants<br>in |
|-----------------------|--|------------------------|--------------|----------------------------------|----------------------------------|--------------|---|--|--|
| T1 180.00-168.00      | 0.00   | 0.38                   | A36 (36 ksi) | 1.03                             | 1                                | 1.15         | 0.00  | 0.00   | 36.00  |
| T2 168.00-160.00      | 0.00   | 0.38                   | A36 (36 ksi) | 1.03                             | 1                                | 1.15         | 0.00  | 0.00   | 36.00  |
| T3 160.00-140.00      | 0.00   | 0.38                   | A36 (36 ksi) | 1.03                             | 1                                | 1.15         | 0.00  | 0.00   | 36.00  |
| T4 140.00-            | 0.00   | 0.38                   | A36          | 1.03                             | 1                                | 1.15         | 0.00  | 0.00   | 36.00  |

| 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 <sup>2</sup>        | in               |              |                      |                      |              | in   | in   | in  |
| 120.00           |                        |                  | (36 ksi)     |                      |                      |              |  |  |   |
| T5 120.00-100.00 | 0.00                   | 0.38             | A36          | 1.03                 | 1                    | 1.15         | 0.00                                       | 0.00   | 36.00                                       |
| T6 100.00-80.00  | 0.00                   | 0.38             | A36          | 1.03                 | 1                    | 1.15         | 0.00                                       | 0.00   | 36.00                                       |
| T7 80.00-60.00   | 0.00                   | 0.38             | A36          | 1.03                 | 1                    | 1.15         | 0.00                                       | 0.00   | 36.00                                       |
| T8 60.00-40.00   | 0.00                   | 0.38             | A36          | 1.03                 | 1                    | 1.15         | 0.00                                       | 0.00   | 36.00                                       |
| T9 40.00-20.00   | 0.00                   | 0.38             | A36          | 1.03                 | 1                    | 1.15         | 0.00                                       | 0.00   | 36.00                                       |
| T10 20.00-0.00   | 0.00                   | 0.38             | A36          | 1.03                 | 1                    | 1.15         | 0.00                                       | 0.00   | 36.00                                       |

### Tower Section Geometry (cont'd)

| Tower Elevation  | Calc K Single Angles | Calc K Solid Rounds | Legs | K Factors <sup>1</sup> |               |              |       |        |             |             |        |        |
|------------------|----------------------|---------------------|------|------------------------|---------------|--------------|-------|--------|-------------|-------------|--------|--------|
|                  |                      |                     |      | X Brace Diags          | K Brace Diags | Single Diags | Girts | Horiz. | Sec. Horiz. | Inner Brace |        |        |
|                  |                      |                     |      |                        |               |              |       |        |             |             | X<br>Y | X<br>Y |
| T1 180.00-168.00 | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T2 168.00-160.00 | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T3 160.00-140.00 | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T4 140.00-120.00 | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T5 120.00-100.00 | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T6 100.00-80.00  | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T7 80.00-60.00   | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T8 60.00-40.00   | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |
| T9 40.00-20.00   | No                   | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 0.5         | 1      | 1      |
| T10 20.00-0.00   | Yes                  | No                  | 1    | 1                      | 1             | 1            | 1     | 1      | 1           | 1           | 1      | 1      |

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

### Tower Section Geometry (cont'd)

| Tower Elevation ft | Leg                 |   | Diagonal            |      | Top Girt            |      | Bottom Girt         |      | Mid Girt            |      | Long Horizontal     |      | Short Horizontal    |      |
|--------------------|---------------------|---|---------------------|------|---------------------|------|---------------------|------|---------------------|------|---------------------|------|---------------------|------|
|                    | Net Width Deduct in | U | Net Width Deduct in | U    | Net Width Deduct in | U    | Net Width Deduct in | U    | Net Width Deduct in | U    | Net Width Deduct in | U    | Net Width Deduct in | U    |
| T1 180.00-168.00   | 0.00                | 1 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 |
| T2 168.00-160.00   | 0.00                | 1 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 |
| T3 160.00-140.00   | 0.00                | 1 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 | 0.00                | 0.75 |

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

### Tower Section Geometry (cont'd)

| Tower Elevation ft | Leg Connection Type | Leg Bolt Size in | Leg No. | Diagonal     |     | Top Girt     |     | Bottom Girt  |     | Mid Girt     |     | Long Horizontal |     | Short Horizontal |     |
|--------------------|---------------------|------------------|---------|--------------|-----|--------------|-----|--------------|-----|--------------|-----|-----------------|-----|------------------|-----|
|                    |                     |                  |         | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in    | No. | Bolt Size in     | No. |
| T1 180.00-168.00   | Flange              | 0.00             | 0       | A325N        | 0   | 0.63         | 1   | A325N        | 1   | 0.63         | 1   | 0.00            | 0   | A325N            | 0   |
| T2 168.00-160.00   | Flange              | 0.63             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T3 160.00-140.00   | Flange              | 0.63             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T4 140.00-120.00   | Flange              | 0.75             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T5 120.00-100.00   | Flange              | 0.75             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T6 100.00-80.00    | Flange              | 0.88             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T7 80.00-60.00     | Flange              | 0.88             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T8 60.00-40.00     | Flange              | 1.00             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |
| T9 40.00-20.00     | Flange              | 1.00             | 4       | A325N        | 4   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 1   |
| T10 20.00-0.00     | Flange              | 1.50             | 6       | F1554-36     | 6   | 0.63         | 1   | 0.00         | 0   | 0.00         | 0   | 0.63            | 0   | 0.00             | 0   |

### Grouted Pipe Properties

| Size                              | F <sub>y</sub> ksi | A <sub>s</sub> in <sup>2</sup> | A <sub>g</sub> in <sup>2</sup> | Wt plf | E <sub>c</sub> ksi | E <sub>m</sub> ksi | F <sub>ym</sub> ksi |
|-----------------------------------|--------------------|--------------------------------|--------------------------------|--------|--------------------|--------------------|---------------------|
| Pipe 2.375" x 0.154" (2 STD) (GR) | 35                 | 1.07                           | 3.36                           | 10.65  | 4769               | 40914              | 54                  |
| Pipe 3.5" x 0.216" (3 STD) (GR)   | 35                 | 2.23                           | 7.39                           | 22.98  | 4769               | 41656              | 55                  |
| Pipe 4" x 0.318" (3.5 XS) (GR)    | 35                 | 3.68                           | 8.89                           | 31.03  | 4769               | 38218              | 49                  |
| Pipe 4.5" x 0.337"                | 35                 | 4.41                           | 11.50                          | 38.95  | 4769               | 38952              | 51                  |

180 Ft Self Support Tower Structural Analysis  
Project Number 37517-2777-001-8700, Application 399456, Revision 1

| Size  | F <sub>y</sub><br>ksi | A <sub>s</sub><br>in <sup>2</sup> | A <sub>c</sub><br>in <sup>2</sup> | Wt<br>plf | E <sub>c</sub><br>ksi | E <sub>m</sub><br>ksi | F <sub>ym</sub><br>ksi |
|---|-----------------------|-----------------------------------|-----------------------------------|-----------|-----------------------|-----------------------|------------------------|
| (4 XS) (GR)<br>Pipe 5.563" x<br>0.375" (5 XS)<br>(GR) | 35                    | 6.11                              | 18.19                             | 58.70     | 4769                  | 40357                 | 53                     |
| Pipe 6.625" x<br>0.432" (6 XS) (GR)                   | 35                    | 8.40                              | 26.07                             | 82.91     | 4769                  | 40832                 | 53                     |
| Pipe 8.625" x<br>0.500" (8 XS) (GR)                   | 35                    | 12.76                             | 45.66                             | 138.56    | 4769                  | 42650                 | 56                     |

**Feed Line/Linear Appurtenances - Entered As Round Or Flat**

| Description                              | Face<br>or<br>Shield<br>Leg | Allow<br>Shield | Component<br>Type | Placement<br>ft | Face<br>Offset<br>in | Lateral<br>Offset<br>(Frac FW) | #  | #<br>Per<br>Row | Clear<br>Spacing<br>in | Width or<br>Diameter<br>in | Perimete<br>r<br>in | Weight<br>plf |
|--|-----------------------------|-----------------|-------------------|-----------------|----------------------|--------------------------------|----|-----------------|------------------------|----------------------------|---------------------|---------------|
| 1.5" flat<br>Climb Ladder<br>Rail        | C                           | No              | Af (CaAa)         | 180.00 - 0.00   | 0.00                 | 0                              | 2  | 2               | 12.00<br>1.50          | 1.50                       |                     | 1.80          |
| 5/8" ladder<br>rung (12"<br>long 12" oc) | C                           | No              | Ar (CaAa)         | 180.00 - 0.00   | 0.00                 | 0                              | 1  | 1               | 0.63                   | 0.63                       |                     | 1.04          |
| Safety Line<br>3/8<br>***                | C                           | No              | Ar (CaAa)         | 180.00 - 0.00   | 3.00                 | 0                              | 1  | 1               | 0.38                   | 0.38                       |                     | 0.22          |
| FSJ4-<br>50B(1/2")                       | A                           | No              | Ar (CaAa)         | 42.00 - 0.00    | 0.00                 | -0.1                           | 4  | 4               | 0.52                   | 0.52                       |                     | 0.14          |
| LDF4-<br>50A(1/2")                       | A                           | No              | Ar (CaAa)         | 62.00 - 42.00   | 0.00                 | -0.1                           | 3  | 3               | 0.63                   | 0.63                       |                     | 0.15          |
| LDF4-<br>50A(1/2")                       | A                           | No              | Ar (CaAa)         | 124.00 - 62.00  | 0.00                 | -0.1                           | 2  | 2               | 0.63                   | 0.63                       |                     | 0.15          |
| HB114-1-<br>0813U4-<br>M5J( 1 1/4")      | A                           | No              | Ar (CaAa)         | 143.00 - 0.00   | 0.00                 | -0.1                           | 4  | 4               | 1.50<br>0.50           | 1.54                       |                     | 1.20          |
| LDF5-<br>50A(7/8")                       | A                           | No              | Ar (CaAa)         | 178.00 - 0.00   | 3.00                 | 0                              | 2  | 2               | 1.09                   | 1.09                       |                     | 0.33          |
| 561(1-5/8")<br>***                       | A                           | No              | Ar (CaAa)         | 164.00 - 0.00   | 0.00                 | 0.02                           | 6  | 4               | 1.00<br>0.50           | 1.63                       |                     | 1.35          |
| 1.5" flat<br>Cable Ladder<br>Rail        | B                           | No              | Af (CaAa)         | 160.00 - 0.00   | 0.00                 | 0.35                           | 2  | 2               | 36.00<br>1.50          | 1.50                       |                     | 1.80          |
| 1.5" flat<br>Cable Ladder<br>Rail        | B                           | No              | Af (CaAa)         | 100.00 - 0.00   | 0.00                 | 0.15                           | 2  | 2               | 36.00<br>1.50          | 1.50                       |                     | 1.80          |
| LDF6-50A(1-<br>1/4")                     | B                           | No              | Ar (CaAa)         | 93.00 - 0.00    | 0.00                 | 0.15                           | 13 | 13              | 1.55<br>0.50           | 1.55                       |                     | 0.66          |
| LCF158-<br>50JA-A0(1<br>5/8")            | B                           | No              | Ar (CaAa)         | 154.00 - 0.00   | 0.00                 | 0.35                           | 12 | 6               | 1.00<br>0.50           | 1.98                       |                     | 0.08          |
| LDF4-<br>50A(1/2")                       | B                           | No              | Ar (CaAa)         | 104.00 - 0.00   | 0.00                 | 0.4                            | 1  | 1               | 0.63                   | 0.63                       |                     | 0.15          |
| LDF5-<br>50A(7/8")                       | B                           | No              | Ar (CaAa)         | 104.00 - 0.00   | 0.00                 | 0.41                           | 1  | 1               | 1.09                   | 1.09                       |                     | 0.33          |
| 2" Conduit (1<br>1/2" EMT)               | B                           | No              | Ar (CaAa)         | 154.00 - 0.00   | 0.00                 | 0.43                           | 1  | 1               | 1.74                   | 1.74                       |                     | 1.16          |
| FB-L98B-<br>002-75000(<br>3/8")          | B                           | No              | Ar (CaAa)         | 154.00 - 0.00   | 0.00                 | 0.43                           | 1  | 1               | 0.39                   | 0.38                       |                     | 0.06          |
| WR-<br>VG82ST-<br>BRDA( 5/8")<br>***     | B                           | No              | Ar (CaAa)         | 154.00 - 0.00   | 0.00                 | 0.43                           | 2  | 2               | 0.65                   | 0.63                       |                     | 0.31          |
| 1.5" flat<br>Cable Ladder<br>Rail        | C                           | No              | Af (CaAa)         | 170.00 - 0.00   | -1.00                | -0.35                          | 4  | 2               | 36.00<br>1.50          | 1.50                       |                     | 1.80          |
| CR 50                                    | C                           | No              | Ar (CaAa)         | 170.00 - 0.00   | 0.00                 | -0.35                          | 6  | 4               | 1.00                   | 1.98                       |                     | 0.83          |

| Description            | Face or Leg | Allow Shield | Component Type | Placement<br>ft | Face Offset<br>in | Lateral Offset<br>(Frac FW) | # | # Per Row | Clear Spacing<br>in | Width or Diameter<br>in | Perimeter<br>in | Weight<br>plf |
|------------------------|-------------|--------------|----------------|-----------------|-------------------|-----------------------------|---|-----------|---------------------|-------------------------|-----------------|---------------|
| 1873PE(1-5/8")         |             |              |                |                 |                   |                             |   |           | 0.50                |                         |                 |               |
| LDF4-50A(1/2")         | C           | No           | Ar (CaAa)      | 31.00 - 0.00    | -1.00             | -0.32                       | 1 | 1         | 0.63                | 0.63                    |                 | 0.15          |
| LDF1-50A(1/4")         | C           | No           | Ar (CaAa)      | 170.00 - 0.00   | 0.00              | -0.325                      | 1 | 1         | 0.34                | 0.34                    |                 | 0.06          |
| HB158-1-08U8-          | A           | No           | Ar (CaAa)      | 164.00 - 0.00   | 0.00              | 0.1                         | 8 | 4         | 1.00                | 1.98                    |                 | 1.30          |
| S8J18(1-5/8) 1.5" flat | A           | No           | Af (CaAa)      | 180.00 - 0.00   | 0.00              | 0                           | 2 | 2         | 48.00               | 1.50                    |                 | 1.80          |
| Cable Ladder Rail      |             |              |                |                 |                   |                             |   | 1.50      |                     |                         |                 |               |

### Discrete Tower Loads

| Description               | Face or Leg | Offset Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>t<br>° | Placement<br>ft | CAAA Front<br>ft <sup>2</sup>                     | CAAA Side<br>ft <sup>2</sup> | Weight<br>K          |
|---------------------------|-------------|-------------|---|------------------------------|-----------------|---|------------------------------|----------------------|
| PD10017                   | A           | From Leg    | 0.50<br>0<br>6  | 0.000                        | 178.00          | No Ice 4.11<br>1/2" 5.64<br>Ice 7.19<br>1" Ice    | 4.11<br>5.64<br>7.19         | 0.03<br>0.06<br>0.09 |
| ***                       |             |             |   |                              |                 |   |                              |                      |
| 800 10504 w/ Mount Pipe   | A           | From Leg    | 2.00<br>0<br>1  | 0.000                        | 170.00          | No Ice 3.59<br>1/2" 4.01<br>Ice 4.42<br>1" Ice    | 3.18<br>3.91<br>4.58         | 0.04<br>0.07<br>0.11 |
| 800 10504 w/ Mount Pipe   | B           | From Leg    | 2.00<br>0<br>1  | 0.000                        | 170.00          | No Ice 3.59<br>1/2" 4.01<br>Ice 4.42<br>1" Ice    | 3.18<br>3.91<br>4.58         | 0.04<br>0.07<br>0.11 |
| 800 10504 w/ Mount Pipe   | C           | From Leg    | 2.00<br>0<br>1  | 0.000                        | 170.00          | No Ice 3.59<br>1/2" 4.01<br>Ice 4.42<br>1" Ice    | 3.18<br>3.91<br>4.58         | 0.04<br>0.07<br>0.11 |
| 860 10025                 | A           | From Leg    | 2.00<br>0<br>0  | 0.000                        | 170.00          | No Ice 0.14<br>1/2" 0.19<br>Ice 0.25<br>1" Ice    | 0.12<br>0.17<br>0.23         | 0.00<br>0.00<br>0.01 |
| 860 10025                 | B           | From Leg    | 2.00<br>0<br>0  | 0.000                        | 170.00          | No Ice 0.14<br>1/2" 0.19<br>Ice 0.25<br>1" Ice    | 0.12<br>0.17<br>0.23         | 0.00<br>0.00<br>0.01 |
| 860 10025                 | C           | From Leg    | 2.00<br>0<br>0  | 0.000                        | 170.00          | No Ice 0.14<br>1/2" 0.19<br>Ice 0.25<br>1" Ice    | 0.12<br>0.17<br>0.23         | 0.00<br>0.00<br>0.01 |
| Side Arm Mount [SO 103-3] | A           | None        |   | 0.000                        | 170.00          | No Ice 9.50<br>1/2" 11.80<br>Ice 14.10<br>1" Ice  | 9.50<br>11.80<br>14.10       | 0.22<br>0.32<br>0.41 |
| ***                       |             |             |   |                              |                 |   |                              |                      |
| Sector Mount [SM 702-3]   | C           | None        |   | 0.000                        | 164.00          | No Ice 37.40<br>1/2" 54.20<br>Ice 71.00<br>1" Ice | 37.40<br>54.20<br>71.00      | 1.55<br>2.35<br>3.15 |
| Pipe Mount [PM 601-3]     | C           | None        |   | 0.000                        | 154.00          | No Ice 4.39<br>1/2" 5.48<br>Ice 6.57              | 4.39<br>5.48<br>6.57         | 0.20<br>0.24<br>0.28 |



180 Ft Self Support Tower Structural Analysis  
 Project Number 37517-2777-001-8700, Application 399456, Revision 1

| Description                 | Face or Leg | Offset Type | Offsets: |      | Azimuth Adjustment | Placement |                 | C <sub>A</sub> A <sub>A</sub> | C <sub>A</sub> A <sub>A</sub> | Weight |
|-----------------------------|-------------|-------------|----------|------|--------------------|-----------|-----------------|-------------------------------|-------------------------------|--------|
|                             |             |             | Horz     | Vert |                    |           |                 | Front                         | Side                          |        |
|                             |             |             | Lateral  | ft   |                    | ft        | ft <sup>2</sup> | ft <sup>2</sup>               | K                             |        |
| (2) 7770.00 w/ Mount Pipe   | A           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 5.75                          | 4.25                          | 0.06   |
|                             |             |             |          |      |                    |           | 1/2"            | 6.18                          | 5.01                          | 0.10   |
| (2) 7770.00 w/ Mount Pipe   | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | Ice             | 6.61                          | 5.71                          | 0.16   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 5.75                          | 4.25                          | 0.06   |
| (2) 7770.00 w/ Mount Pipe   | C           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1/2"            | 6.18                          | 5.01                          | 0.10   |
|                             |             |             |          |      |                    |           | Ice             | 6.61                          | 5.71                          | 0.16   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
| P65-16-XLH-RR w/ Mount Pipe | A           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | No Ice          | 8.37                          | 6.36                          | 0.08   |
|                             |             |             |          |      |                    |           | 1/2"            | 8.93                          | 7.54                          | 0.14   |
|                             |             |             |          |      |                    |           | Ice             | 9.46                          | 8.43                          | 0.22   |
| P65-16-XLH-RR w/ Mount Pipe | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 8.37                          | 6.36                          | 0.08   |
|                             |             |             |          |      |                    |           | 1/2"            | 8.93                          | 7.54                          | 0.14   |
| P65-16-XLH-RR w/ Mount Pipe | C           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | Ice             | 9.46                          | 8.43                          | 0.22   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 8.37                          | 6.36                          | 0.08   |
| (2) LGP21901                | A           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1/2"            | 8.93                          | 7.54                          | 0.14   |
|                             |             |             |          |      |                    |           | Ice             | 9.46                          | 8.43                          | 0.22   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
| (2) LGP21901                | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | No Ice          | 0.23                          | 0.16                          | 0.01   |
|                             |             |             |          |      |                    |           | 1/2"            | 0.29                          | 0.21                          | 0.01   |
|                             |             |             |          |      |                    |           | Ice             | 0.36                          | 0.28                          | 0.01   |
| (2) LGP21901                | C           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 0.23                          | 0.16                          | 0.01   |
|                             |             |             |          |      |                    |           | 1/2"            | 0.29                          | 0.21                          | 0.01   |
| (2) RRUS-11                 | A           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | Ice             | 0.36                          | 0.28                          | 0.01   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 0.23                          | 0.16                          | 0.01   |
| (2) RRUS-11                 | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1/2"            | 0.29                          | 0.21                          | 0.01   |
|                             |             |             |          |      |                    |           | Ice             | 0.36                          | 0.28                          | 0.01   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
| (2) RRUS-11                 | C           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | No Ice          | 0.23                          | 0.16                          | 0.01   |
|                             |             |             |          |      |                    |           | 1/2"            | 0.29                          | 0.21                          | 0.01   |
|                             |             |             |          |      |                    |           | Ice             | 0.36                          | 0.28                          | 0.01   |
| (2) LGP21401                | A           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 2.79                          | 1.19                          | 0.05   |
|                             |             |             |          |      |                    |           | 1/2"            | 3.00                          | 1.34                          | 0.07   |
| (2) LGP21401                | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | Ice             | 3.21                          | 1.50                          | 0.09   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 2.79                          | 1.19                          | 0.05   |
| (2) LGP21401                | C           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1/2"            | 3.00                          | 1.34                          | 0.07   |
|                             |             |             |          |      |                    |           | Ice             | 3.21                          | 1.50                          | 0.09   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
| (2) LGP21401                | A           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | No Ice          | 2.79                          | 1.19                          | 0.05   |
|                             |             |             |          |      |                    |           | 1/2"            | 3.00                          | 1.34                          | 0.07   |
|                             |             |             |          |      |                    |           | Ice             | 3.21                          | 1.50                          | 0.09   |
| (2) LGP21401                | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 1.10                          | 0.35                          | 0.01   |
|                             |             |             |          |      |                    |           | 1/2"            | 1.24                          | 0.44                          | 0.02   |
| (2) LGP21401                | C           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | Ice             | 1.38                          | 0.54                          | 0.03   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
|                             |             |             |          |      |                    |           | No Ice          | 1.10                          | 0.35                          | 0.01   |
| DC6-48-60-18-8F             | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | 1/2"            | 1.24                          | 0.44                          | 0.02   |
|                             |             |             |          |      |                    |           | Ice             | 1.38                          | 0.54                          | 0.03   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |
| DC6-48-60-18-8F             | B           | From Leg    | 4.00     | 0    | 0.000              | 154.00    | No Ice          | 0.92                          | 0.92                          | 0.02   |
|                             |             |             |          |      |                    |           | 1/2"            | 1.46                          | 1.46                          | 0.04   |
|                             |             |             |          |      |                    |           | Ice             | 1.64                          | 1.64                          | 0.06   |
|                             |             |             |          |      |                    |           | 1" Ice          |                               |                               |        |

| Description                  | Face or Leg | Offset Type | Offsets:     |      | Azimuth Adjustment | Placement | C <sub>AA</sub> <sub>Front</sub> | C <sub>AA</sub> <sub>Side</sub> | Weight |      |
|------------------------------|-------------|-------------|--------------|------|--------------------|-----------|----------------------------------|---------------------------------|--------|------|
|                              |             |             | Horz Lateral | Vert |                    |           |                                  |                                 |        | ft   |
| Sector Mount [SM 602-3]      | A           | None        |              |      | 0.000              | 154.00    | No Ice                           | 33.11                           | 33.11  | 1.54 |
|                              |             |             |              |      |                    |           | 1/2"                             | 44.90                           | 44.90  | 2.16 |
|                              |             |             |              |      |                    |           | Ice                              | 56.69                           | 56.69  | 2.78 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| ***                          |             |             |              |      |                    |           |                                  |                                 |        |      |
| 800 EXTERNAL NOTCH FILTER    | A           | From Leg    | 1.00         | 0    | 0.000              | 146.00    | No Ice                           | 0.66                            | 0.32   | 0.01 |
|                              |             |             |              |      |                    |           | 1/2"                             | 0.76                            | 0.40   | 0.02 |
|                              |             |             |              |      |                    |           | Ice                              | 0.87                            | 0.48   | 0.02 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| 800 EXTERNAL NOTCH FILTER    | B           | From Leg    | 1.00         | 0    | 0.000              | 146.00    | No Ice                           | 0.66                            | 0.32   | 0.01 |
|                              |             |             |              |      |                    |           | 1/2"                             | 0.76                            | 0.40   | 0.02 |
|                              |             |             |              |      |                    |           | Ice                              | 0.87                            | 0.48   | 0.02 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| 800 EXTERNAL NOTCH FILTER    | C           | From Leg    | 1.00         | 0    | 0.000              | 146.00    | No Ice                           | 0.66                            | 0.32   | 0.01 |
|                              |             |             |              |      |                    |           | 1/2"                             | 0.76                            | 0.40   | 0.02 |
|                              |             |             |              |      |                    |           | Ice                              | 0.87                            | 0.48   | 0.02 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| TME-800MHZ 2X50W RRH         | A           | From Leg    | 1.00         | 0    | 0.000              | 146.00    | No Ice                           | 2.13                            | 1.77   | 0.05 |
|                              |             |             |              |      |                    |           | 1/2"                             | 2.32                            | 1.95   | 0.07 |
|                              |             |             |              |      |                    |           | Ice                              | 2.51                            | 2.13   | 0.10 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| TME-800MHZ 2X50W RRH         | B           | From Leg    | 1.00         | 0    | 0.000              | 146.00    | No Ice                           | 2.13                            | 1.77   | 0.05 |
|                              |             |             |              |      |                    |           | 1/2"                             | 2.32                            | 1.95   | 0.07 |
|                              |             |             |              |      |                    |           | Ice                              | 2.51                            | 2.13   | 0.10 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| TME-800MHZ 2X50W RRH         | C           | From Leg    | 1.00         | 0    | 0.000              | 146.00    | No Ice                           | 2.13                            | 1.77   | 0.05 |
|                              |             |             |              |      |                    |           | 1/2"                             | 2.32                            | 1.95   | 0.07 |
|                              |             |             |              |      |                    |           | Ice                              | 2.51                            | 2.13   | 0.10 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| TME-PCS 1900 MHz 4x45W-65MHz | A           | From Leg    | 2.00         | 0    | 0.000              | 146.00    | No Ice                           | 2.32                            | 2.24   | 0.06 |
|                              |             |             |              |      |                    |           | 1/2"                             | 2.53                            | 2.44   | 0.08 |
|                              |             |             |              |      |                    |           | Ice                              | 2.74                            | 2.65   | 0.11 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| TME-PCS 1900 MHz 4x45W-65MHz | B           | From Leg    | 2.00         | 0    | 0.000              | 146.00    | No Ice                           | 2.32                            | 2.24   | 0.06 |
|                              |             |             |              |      |                    |           | 1/2"                             | 2.53                            | 2.44   | 0.08 |
|                              |             |             |              |      |                    |           | Ice                              | 2.74                            | 2.65   | 0.11 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| TME-PCS 1900 MHz 4x45W-65MHz | C           | From Leg    | 2.00         | 0    | 0.000              | 146.00    | No Ice                           | 2.32                            | 2.24   | 0.06 |
|                              |             |             |              |      |                    |           | 1/2"                             | 2.53                            | 2.44   | 0.08 |
|                              |             |             |              |      |                    |           | Ice                              | 2.74                            | 2.65   | 0.11 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| ***                          |             |             |              |      |                    |           |                                  |                                 |        |      |
| APXVSP18-C-A20               | A           | From Leg    | 2.00         | 0    | 0.000              | 143.00    | No Ice                           | 8.02                            | 5.28   | 0.06 |
|                              |             |             |              |      |                    |           | 1/2"                             | 8.48                            | 5.74   | 0.11 |
|                              |             |             |              |      |                    |           | Ice                              | 8.94                            | 6.20   | 0.16 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| APXVSP18-C-A20               | B           | From Leg    | 2.00         | 0    | 0.000              | 143.00    | No Ice                           | 8.02                            | 5.28   | 0.06 |
|                              |             |             |              |      |                    |           | 1/2"                             | 8.48                            | 5.74   | 0.11 |
|                              |             |             |              |      |                    |           | Ice                              | 8.94                            | 6.20   | 0.16 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| APXVSP18-C-A20               | C           | From Leg    | 2.00         | 0    | 0.000              | 143.00    | No Ice                           | 8.02                            | 5.28   | 0.06 |
|                              |             |             |              |      |                    |           | 1/2"                             | 8.48                            | 5.74   | 0.11 |
|                              |             |             |              |      |                    |           | Ice                              | 8.94                            | 6.20   | 0.16 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| (3) ACU-A20-N                | A           | From Leg    | 2.00         | 0    | 0.000              | 143.00    | No Ice                           | 0.07                            | 0.12   | 0.00 |
|                              |             |             |              |      |                    |           | 1/2"                             | 0.10                            | 0.16   | 0.00 |
|                              |             |             |              |      |                    |           | Ice                              | 0.15                            | 0.21   | 0.00 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| (3) ACU-A20-N                | B           | From Leg    | 2.00         | 0    | 0.000              | 143.00    | No Ice                           | 0.07                            | 0.12   | 0.00 |
|                              |             |             |              |      |                    |           | 1/2"                             | 0.10                            | 0.16   | 0.00 |
|                              |             |             |              |      |                    |           | Ice                              | 0.15                            | 0.21   | 0.00 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |
| (3) ACU-A20-N                | C           | From Leg    | 2.00         | 0    | 0.000              | 143.00    | No Ice                           | 0.07                            | 0.12   | 0.00 |
|                              |             |             |              |      |                    |           | 1/2"                             | 0.10                            | 0.16   | 0.00 |
|                              |             |             |              |      |                    |           | Ice                              | 0.15                            | 0.21   | 0.00 |
|                              |             |             |              |      |                    |           | 1" Ice                           |                                 |        |      |

| Description                  | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft ft ft | Azimuth Adjustment ° | Placement ft | C <sub>AA</sub> Front ft <sup>2</sup>     | C <sub>AA</sub> Side ft <sup>2</sup>      | Weight K                                  |                                      |
|------------------------------|-------------|-------------|--|----------------------|--------------|---|---|---|--------------------------------------|
| Sector Mount [SM 701-3]      | A           | None        |  | 0.000                | 143.00       | 1" Ice<br>No Ice<br>1/2"<br>Ice<br>1" Ice | 19.73<br>27.41<br>27.41<br>35.09<br>35.09 | 19.73<br>27.41<br>27.41<br>35.09<br>35.09 | 0.82<br>1.17<br>1.17<br>1.51<br>1.51 |
| ***                          |             |             |  |                      |              |   |   |   |                                      |
| 1142-2C                      | B           | From Leg    | 4.00<br>0<br>7                         | 0.000                | 124.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 2.09<br>3.37<br>4.67<br>2.09              | 2.09<br>3.37<br>4.67<br>2.09              | 0.02<br>0.04<br>0.07<br>0.02         |
| 1142-2C                      | C           | From Leg    | 4.00<br>0<br>7                         | 0.000                | 124.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 2.09<br>3.37<br>4.67<br>2.09              | 2.09<br>3.37<br>4.67<br>2.09              | 0.02<br>0.04<br>0.07<br>0.02         |
| Side Arm Mount [SO 306-1]    | B           | From Leg    | 2.00<br>0<br>0                         | 0.000                | 124.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 0.98<br>1.70<br>2.42<br>0.98              | 2.18<br>3.80<br>5.42<br>2.18              | 0.04<br>0.06<br>0.08<br>0.04         |
| Side Arm Mount [SO 306-1]    | C           | From Leg    | 2.00<br>0<br>0                         | 0.000                | 124.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 0.98<br>1.70<br>2.42<br>0.98              | 2.18<br>3.80<br>5.42<br>2.18              | 0.04<br>0.06<br>0.08<br>0.04         |
| ***                          |             |             |  |                      |              |   |   |   |                                      |
| 220-3BN                      | B           | From Leg    | 4.00<br>0<br>4                         | 0.000                | 104.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 5.72<br>7.83<br>9.96<br>2.09              | 5.72<br>7.83<br>9.96<br>2.09              | 0.02<br>0.07<br>0.12<br>0.02         |
| 1142-2C                      | C           | From Leg    | 4.00<br>0<br>7                         | 0.000                | 104.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 2.09<br>3.37<br>4.67<br>2.09              | 2.09<br>3.37<br>4.67<br>2.09              | 0.02<br>0.04<br>0.07<br>0.02         |
| Side Arm Mount [SO 306-1]    | B           | From Leg    | 2.00<br>0<br>0                         | 0.000                | 104.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 0.98<br>1.70<br>2.42<br>0.98              | 2.18<br>3.80<br>5.42<br>2.18              | 0.04<br>0.06<br>0.08<br>0.04         |
| Side Arm Mount [SO 306-1]    | C           | From Leg    | 2.00<br>0<br>0                         | 0.000                | 104.00       | No Ice<br>1/2"<br>Ice<br>1" Ice           | 0.98<br>1.70<br>2.42<br>0.98              | 2.18<br>3.80<br>5.42<br>2.18              | 0.04<br>0.06<br>0.08<br>0.04         |
| ***                          |             |             |  |                      |              |   |   |   |                                      |
| LNX-6515DS-VTM w/ Mount Pipe | A           | From Leg    | 4.00<br>0<br>0                         | 0.000                | 93.00        | No Ice<br>1/2"<br>Ice<br>1" Ice           | 11.68<br>12.40<br>13.14<br>11.68          | 9.84<br>11.37<br>12.91<br>9.84            | 0.08<br>0.17<br>0.27<br>0.08         |
| LNX-6515DS-VTM w/ Mount Pipe | B           | From Leg    | 4.00<br>0<br>0                         | 0.000                | 93.00        | No Ice<br>1/2"<br>Ice<br>1" Ice           | 11.68<br>12.40<br>13.14<br>11.68          | 9.84<br>11.37<br>12.91<br>9.84            | 0.08<br>0.17<br>0.27<br>0.08         |
| LNX-6515DS-VTM w/ Mount Pipe | C           | From Leg    | 4.00<br>0<br>0                         | 0.000                | 93.00        | No Ice<br>1/2"<br>Ice<br>1" Ice           | 11.68<br>12.40<br>13.14<br>11.68          | 9.84<br>11.37<br>12.91<br>9.84            | 0.08<br>0.17<br>0.27<br>0.08         |
| RRUS 11 B12                  | A           | From Leg    | 4.00<br>0<br>0                         | 0.000                | 93.00        | No Ice<br>1/2"<br>Ice<br>1" Ice           | 2.83<br>3.04<br>3.26<br>2.83              | 1.18<br>1.33<br>1.48<br>1.18              | 0.05<br>0.07<br>0.10<br>0.05         |
| RRUS 11 B12                  | B           | From Leg    | 4.00<br>0<br>0                         | 0.000                | 93.00        | No Ice<br>1/2"<br>Ice<br>1" Ice           | 2.83<br>3.04<br>3.26<br>2.83              | 1.18<br>1.33<br>1.48<br>1.18              | 0.05<br>0.07<br>0.10<br>0.05         |
| RRUS 11 B12                  | C           | From Leg    | 4.00<br>0<br>0                         | 0.000                | 93.00        | No Ice<br>1/2"<br>Ice<br>1" Ice           | 2.83<br>3.04<br>3.26<br>2.83              | 1.18<br>1.33<br>1.48<br>1.18              | 0.05<br>0.07<br>0.10<br>0.05         |
| ERICSSON AIR 21 B2A          | A           | From Leg    | 4.00                                   | 0.000                | 93.00        | No Ice                                    | 6.33                                      | 5.64                                      | 0.11                                 |

| Description                           | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft ft ft | Azimuth Adjustment | Placement<br>ft | C <sub>AA</sub><br>Front<br>ft <sup>2</sup>                    | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K          |
|---------------------------------------|-------------|-------------|--|--------------------|-----------------|--|--|----------------------|
| B4P w/ Mount Pipe                     |             |             | 0<br>0                                 |                    |                 | 1/2" Ice<br>6.78<br>7.21                                       | 6.43<br>7.13                               | 0.17<br>0.23         |
| ERICSSON AIR 21 B2A B4P w/ Mount Pipe | B           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>6.78<br>7.21                             | 5.64<br>6.43<br>7.13                       | 0.11<br>0.17<br>0.23 |
| ERICSSON AIR 21 B2A B4P w/ Mount Pipe | C           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>6.78<br>7.21                             | 5.64<br>6.43<br>7.13                       | 0.11<br>0.17<br>0.23 |
| ERICSSON AIR 21 B4A B2P w/ Mount Pipe | A           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>6.76<br>7.20                             | 5.63<br>6.42<br>7.12                       | 0.11<br>0.17<br>0.23 |
| ERICSSON AIR 21 B4A B2P w/ Mount Pipe | B           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>6.76<br>7.20                             | 5.63<br>6.42<br>7.12                       | 0.11<br>0.17<br>0.23 |
| ERICSSON AIR 21 B4A B2P w/ Mount Pipe | C           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>6.76<br>7.20                             | 5.63<br>6.42<br>7.12                       | 0.11<br>0.17<br>0.23 |
| KRY 112 144/1                         | A           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>0.43<br>0.51                             | 0.17<br>0.23<br>0.30                       | 0.01<br>0.01<br>0.02 |
| KRY 112 144/1                         | B           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>0.43<br>0.51                             | 0.17<br>0.23<br>0.30                       | 0.01<br>0.01<br>0.02 |
| KRY 112 144/1                         | C           | From Leg    | 4.00<br>0<br>0                         | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>0.43<br>0.51                             | 0.17<br>0.23<br>0.30                       | 0.01<br>0.01<br>0.02 |
| Sector Mount [SM 1306-3]              | C           | None        |  | 0.000              | 93.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>49.30<br>52.20<br>55.10 | 49.30<br>52.20<br>55.10                    | 2.29<br>2.68<br>3.07 |
| ***<br>GPS_A                          | A           | From Leg    | 2.00<br>0<br>0                         | 0.000              | 62.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>0.26<br>0.32<br>0.39    | 0.26<br>0.32<br>0.39                       | 0.00<br>0.00<br>0.01 |
| Side Arm Mount [SO 301-1]             | A           | From Leg    | 1.00<br>0<br>0                         | 0.000              | 62.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>1.00<br>1.39<br>1.78    | 0.90<br>1.42<br>1.94                       | 0.02<br>0.03<br>0.04 |
| ***<br>GPS_A                          | C           | From Leg    | 2.00<br>0<br>2                         | 0.000              | 42.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>0.26<br>0.32<br>0.39    | 0.26<br>0.32<br>0.39                       | 0.00<br>0.00<br>0.01 |
| Side Arm Mount [SO 301-1]             | C           | From Leg    | 1.00<br>0<br>0                         | 0.000              | 42.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>1.00<br>1.39<br>1.78    | 0.90<br>1.42<br>1.94                       | 0.02<br>0.03<br>0.04 |
| ***<br>GPS_A                          | C           | From Leg    | 2.00<br>0<br>1                         | 0.000              | 31.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>0.26<br>0.32<br>0.39    | 0.26<br>0.32<br>0.39                       | 0.00<br>0.00<br>0.01 |
| Side Arm Mount [SO 301-1]             | C           | From Leg    | 1.00<br>0<br>0                         | 0.000              | 31.00           | No Ice<br>1/2" Ice<br>Ice<br>1" Ice<br>1.00<br>1.39<br>1.78    | 0.90<br>1.42<br>1.94                       | 0.02<br>0.03<br>0.04 |

180 Ft Self Support Tower Structural Analysis  
 Project Number 37517-2777-001-8700, Application 399456, Revision 1

| Description                       | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft ft ft | Azimuth Adjustment<br>° | Placement<br>ft |                                 | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K          |
|-----------------------------------|-------------|-------------|--|-------------------------|-----------------|---------------------------------|---|--|----------------------|
|                                   |             |             |  |                         |                 | 1" Ice                          |   |  |                      |
| ***                               |             |             |  |                         |                 |                                 |   |  |                      |
| (2) 3'x8" Knife Plate             | A           | From Leg    | 0.00<br>0<br>0                         | 0.000                   | 20.00           | No Ice<br>1/2"<br>Ice           | 2.33<br>2.63<br>2.92                        | 0.25<br>0.50<br>0.75                       | 0.05<br>0.05<br>0.06 |
| (2) 3'x8" Knife Plate             | B           | From Leg    | 0.00<br>0<br>0                         | 0.000                   | 20.00           | 1" Ice<br>No Ice<br>1/2"<br>Ice | 2.33<br>2.63<br>2.92                        | 0.25<br>0.50<br>0.75                       | 0.05<br>0.05<br>0.06 |
| (2) 3'x8" Knife Plate             | C           | From Leg    | 0.00<br>0<br>0                         | 0.000                   | 20.00           | 1" Ice<br>No Ice<br>1/2"<br>Ice | 2.33<br>2.63<br>2.92                        | 0.25<br>0.50<br>0.75                       | 0.05<br>0.05<br>0.06 |
| (2) 3'x8" Knife Plate             | A           | From Leg    | 0.00<br>0<br>0                         | 0.000                   | 60.00           | 1" Ice<br>No Ice<br>1/2"<br>Ice | 2.33<br>2.63<br>2.92                        | 0.25<br>0.50<br>0.75                       | 0.05<br>0.05<br>0.06 |
| (2) 3'x8" Knife Plate             | B           | From Leg    | 0.00<br>0<br>0                         | 0.000                   | 60.00           | 1" Ice<br>No Ice<br>1/2"<br>Ice | 2.33<br>2.63<br>2.92                        | 0.25<br>0.50<br>0.75                       | 0.05<br>0.05<br>0.06 |
| (2) 3'x8" Knife Plate             | C           | From Leg    | 0.00<br>0<br>0                         | 0.000                   | 60.00           | 1" Ice<br>No Ice<br>1/2"<br>Ice | 2.33<br>2.63<br>2.92                        | 0.25<br>0.50<br>0.75                       | 0.05<br>0.05<br>0.06 |
| **                                |             |             |  |                         |                 |                                 |   |  |                      |
| APXVTM14-C-120 w/<br>Mount Pipe   | A           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 6.58<br>7.03<br>7.47                        | 4.96<br>5.75<br>6.47                       | 0.08<br>0.13<br>0.19 |
| APXVTM14-C-120 w/<br>Mount Pipe   | B           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 6.58<br>7.03<br>7.47                        | 4.96<br>5.75<br>6.47                       | 0.08<br>0.13<br>0.19 |
| APXVTM14-C-120 w/<br>Mount Pipe   | C           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 6.58<br>7.03<br>7.47                        | 4.96<br>5.75<br>6.47                       | 0.08<br>0.13<br>0.19 |
| TD-RRH8x20-25                     | A           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 4.05<br>4.30<br>4.56                        | 1.53<br>1.71<br>1.90                       | 0.07<br>0.10<br>0.13 |
| TD-RRH8x20-25                     | B           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 4.05<br>4.30<br>4.56                        | 1.53<br>1.71<br>1.90                       | 0.07<br>0.10<br>0.13 |
| TD-RRH8x20-25                     | C           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 4.05<br>4.30<br>4.56                        | 1.53<br>1.71<br>1.90                       | 0.07<br>0.10<br>0.13 |
| 12' horizontal x 2" Pipe<br>Mount | A           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 1.00<br>2.11<br>2.84                        | 1.00<br>2.11<br>2.84                       | 0.10<br>0.65<br>1.21 |
| 12' horizontal x 2" Pipe<br>Mount | B           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 1.00<br>2.11<br>2.84                        | 1.00<br>2.11<br>2.84                       | 0.10<br>0.65<br>1.21 |
| 12' horizontal x 2" Pipe<br>Mount | C           | From Leg    | 4.00<br>0<br>0                         | 0.000                   | 143.00          | 1" Ice<br>No Ice<br>1/2"<br>Ice | 1.00<br>2.11<br>2.84                        | 1.00<br>2.11<br>2.84                       | 0.10<br>0.65<br>1.21 |
| (2) 5' x 2" Pipe Mount            | A           | From Leg    | 4.00<br>0                              | 0.000                   | 154.00          | 1" Ice<br>No Ice<br>1/2"        | 1.00<br>1.39                                | 1.00<br>1.39                               | 0.03<br>0.04         |

| Description                         | Face or Leg | Offset Type | Offsets: Horz Lateral<br>Vert<br>ft<br>ft | Azimuth Adjustment | Placement<br>ft | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K          |
|-------------------------------------|-------------|-------------|---|--------------------|-----------------|---|--|----------------------|
|                                     |             |             | 0   |                    |                 | Ice<br>1" Ice<br>1.70                       | 1.70                                       | 0.05                 |
| (2) 5' x 2" Pipe Mount              | B           | From Leg    | 4.00<br>0<br>0                            | 0.000              | 154.00          | No Ice<br>1/2"<br>Ice<br>1.70               | 1.00<br>1.39<br>1.70                       | 0.03<br>0.04<br>0.05 |
| (2) 5' x 2" Pipe Mount              | C           | From Leg    | 4.00<br>0<br>0                            | 0.000              | 154.00          | No Ice<br>1/2"<br>Ice<br>1.70               | 1.00<br>1.39<br>1.70                       | 0.03<br>0.04<br>0.05 |
| 6' x 2" Mount Pipe                  | A           | From Leg    | 2.00<br>0<br>0                            | 0.000              | 170.00          | No Ice<br>1/2"<br>Ice<br>2.29               | 1.43<br>1.92<br>2.29                       | 0.02<br>0.03<br>0.05 |
| 6' x 2" Mount Pipe                  | B           | From Leg    | 2.00<br>0<br>0                            | 0.000              | 170.00          | No Ice<br>1/2"<br>Ice<br>2.29               | 1.43<br>1.92<br>2.29                       | 0.02<br>0.03<br>0.05 |
| 6' x 2" Mount Pipe                  | C           | From Leg    | 2.00<br>0<br>0                            | 0.000              | 170.00          | No Ice<br>1/2"<br>Ice<br>2.29               | 1.43<br>1.92<br>2.29                       | 0.02<br>0.03<br>0.05 |
| ****                                |             |             |   |                    |                 | 1" Ice                                      |  |                      |
| APL868013-42T0 w/<br>Mount Pipe     | From Leg    | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>3.49               | 2.87<br>3.18<br>4.23                       | 3.61<br>0.05<br>0.07 |
| (2) FD9R6004/2C-3L                  | A           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>0.47               | 0.31<br>0.12<br>0.17                       | 0.00<br>0.01<br>0.01 |
| MG D3-800Tx w/ Mount<br>Pipe        | A           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>4.39               | 3.42<br>4.12<br>4.78                       | 0.03<br>0.07<br>0.11 |
| AWS4 (B66) 4x45 RRH                 | A           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>3.10               | 1.59<br>1.77<br>1.96                       | 0.06<br>0.08<br>0.11 |
| B13 RRH 4X30                        | A           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>2.43               | 1.32<br>1.48<br>1.64                       | 0.06<br>0.07<br>0.09 |
| B25 RRH2x60 PCS                     | A           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>2.53               | 1.31<br>1.46<br>1.63                       | 0.05<br>0.07<br>0.09 |
| (2) JAHH-65B-R3B w/<br>Mount Pipe   | A           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>13.79              | 11.82<br>13.09<br>14.14                    | 0.09<br>0.20<br>0.32 |
| DB-T1-6Z-8AB-0Z                     | C           | From Leg    | 4.00<br>0<br>-1                           | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>5.35               | 2.00<br>2.19<br>2.39                       | 0.04<br>0.08<br>0.12 |
| DB-T1-6Z-8AB-0Z                     | C           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>5.35               | 2.00<br>2.19<br>2.39                       | 0.04<br>0.08<br>0.12 |
| (2) APL868013-42T0 w/<br>Mount Pipe | B           | From Leg    | 4.00<br>0<br>2                            | 0.000              | 164.00          | No Ice<br>1/2"<br>Ice<br>3.49               | 3.61<br>3.92<br>4.23                       | 0.02<br>0.05<br>0.07 |
| (2) FD9R6004/2C-3L                  | B           | From Leg    | 4.00<br>0                                 | 0.000              | 164.00          | No Ice<br>1/2"                              | 0.31<br>0.12                               | 0.00<br>0.01         |

| Description                      | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | C <sub>AA</sub> A <sub>Front</sub><br>ft <sup>2</sup> | C <sub>AA</sub> A <sub>Side</sub><br>ft <sup>2</sup> | Weight<br>K |      |
|----------------------------------|-------------|-------------|--|-------------------------|-----------------|---|--|-------------|------|
|                                  |             |             | 2  |                         |                 | Ice<br>0.47   | 0.17   | 0.01        |      |
| MG D3-800Tx w/ Mount Pipe        | B           | From Leg    | 4.00   | 0.000                   | 164.00          | 1" Ice  |  |             |      |
|                                  |             |             | 0  |                         |                 | No Ice  | 3.57   | 3.42        | 0.03 |
|                                  |             |             | 2  |                         |                 | 1/2"  | 3.98   | 4.12        | 0.07 |
| AWS4 (B66) 4x45 RRH              | B           | From Leg    | 4.00   | 0.000                   | 164.00          | Ice   | 4.39   | 4.78        | 0.11 |
|                                  |             |             | 0  |                         |                 | 1" Ice  |  |             |      |
|                                  |             |             | 2  |                         |                 | No Ice  | 2.66   | 1.59        | 0.06 |
| B13 RRH 4X30                     | B           | From Leg    | 4.00   | 0.000                   | 164.00          | 1/2"  | 2.88   | 1.77        | 0.08 |
|                                  |             |             | 0  |                         |                 | Ice   | 3.10   | 1.96        | 0.11 |
|                                  |             |             | 2  |                         |                 | 1" Ice  |  |             |      |
| B25 RRH2x60 PCS                  | B           | From Leg    | 4.00   | 0.000                   | 164.00          | No Ice  | 2.06   | 1.32        | 0.06 |
|                                  |             |             | 0  |                         |                 | 1/2"  | 2.24   | 1.48        | 0.07 |
|                                  |             |             | 2  |                         |                 | Ice   | 2.43   | 1.64        | 0.09 |
| (2) JAHH-65B-R3B w/ Mount Pipe   | B           | From Leg    | 4.00   | 0.000                   | 164.00          | 1" Ice  |  |             |      |
|                                  |             |             | 0  |                         |                 | No Ice  | 2.14   | 1.31        | 0.05 |
|                                  |             |             | 2  |                         |                 | 1/2"  | 2.33   | 1.46        | 0.07 |
| (3) APL868013-42T0 w/ Mount Pipe | C           | From Leg    | 4.00   | 0.000                   | 164.00          | Ice   | 2.53   | 1.63        | 0.09 |
|                                  |             |             | 0  |                         |                 | 1" Ice  |  |             |      |
|                                  |             |             | 2  |                         |                 | No Ice  | 12.57  | 11.82       | 0.09 |
| (2) FD9R6004/2C-3L               | C           | From Leg    | 4.00   | 0.000                   | 164.00          | 1/2"  | 13.19  | 13.09       | 0.20 |
|                                  |             |             | 0  |                         |                 | Ice   | 13.79  | 14.14       | 0.32 |
|                                  |             |             | 2  |                         |                 | 1" Ice  |  |             |      |
| MG D3-800Tx w/ Mount Pipe        | C           | From Leg    | 4.00   | 0.000                   | 164.00          | No Ice  | 2.87   | 3.61        | 0.02 |
|                                  |             |             | 0  |                         |                 | 1/2"  | 3.18   | 3.92        | 0.05 |
|                                  |             |             | 2  |                         |                 | Ice   | 3.49   | 4.23        | 0.07 |
| AWS4 (B66) 4x45 RRH              | C           | From Leg    | 4.00   | 0.000                   | 164.00          | 1" Ice  |  |             |      |
|                                  |             |             | 0  |                         |                 | No Ice  | 0.31   | 0.08        | 0.00 |
|                                  |             |             | 2  |                         |                 | 1/2"  | 0.39   | 0.12        | 0.01 |
| B13 RRH 4X30                     | C           | From Leg    | 4.00   | 0.000                   | 164.00          | Ice   | 0.47   | 0.17        | 0.01 |
|                                  |             |             | 0  |                         |                 | 1" Ice  |  |             |      |
|                                  |             |             | 2  |                         |                 | No Ice  | 3.57   | 3.42        | 0.03 |
| B25 RRH2x60 PCS                  | C           | From Leg    | 4.00   | 0.000                   | 164.00          | 1/2"  | 3.98   | 4.12        | 0.07 |
|                                  |             |             | 0  |                         |                 | Ice   | 4.39   | 4.78        | 0.11 |
|                                  |             |             | 2  |                         |                 | 1" Ice  |  |             |      |
| (2) JAHH-65B-R3B w/ Mount Pipe   | C           | From Leg    | 4.00   | 0.000                   | 164.00          | No Ice  | 2.66   | 1.59        | 0.06 |
|                                  |             |             | 0  |                         |                 | 1/2"  | 2.88   | 1.77        | 0.08 |
|                                  |             |             | 2  |                         |                 | Ice   | 3.10   | 1.96        | 0.11 |
| MG D3-800Tx w/ Mount Pipe        | C           | From Leg    | 4.00   | 0.000                   | 164.00          | 1" Ice  |  |             |      |
|                                  |             |             | 0  |                         |                 | No Ice  | 2.06   | 1.32        | 0.06 |
|                                  |             |             | 2  |                         |                 | 1/2"  | 2.24   | 1.48        | 0.07 |
| AWS4 (B66) 4x45 RRH              | C           | From Leg    | 4.00   | 0.000                   | 164.00          | Ice   | 2.43   | 1.64        | 0.09 |
|                                  |             |             | 0  |                         |                 | 1" Ice  |  |             |      |
|                                  |             |             | 2  |                         |                 | No Ice  | 2.14   | 1.31        | 0.05 |
| B13 RRH 4X30                     | C           | From Leg    | 4.00   | 0.000                   | 164.00          | 1/2"  | 2.33   | 1.46        | 0.07 |
|                                  |             |             | 0  |                         |                 | Ice   | 2.53   | 1.63        | 0.09 |
|                                  |             |             | 2  |                         |                 | 1" Ice  |  |             |      |
| B25 RRH2x60 PCS                  | C           | From Leg    | 4.00   | 0.000                   | 164.00          | No Ice  | 2.14   | 1.31        | 0.05 |
|                                  |             |             | 0  |                         |                 | 1/2"  | 2.33   | 1.46        | 0.07 |
|                                  |             |             | 2  |                         |                 | Ice   | 2.53   | 1.63        | 0.09 |
| (2) JAHH-65B-R3B w/ Mount Pipe   | C           | From Leg    | 4.00   | 0.000                   | 164.00          | 1" Ice  |  |             |      |
|                                  |             |             | 0  |                         |                 | No Ice  | 12.57  | 11.82       | 0.09 |
|                                  |             |             | 2  |                         |                 | 1/2"  | 13.19  | 13.09       | 0.20 |
|                                  |             |             |  |                         |                 | Ice   | 13.79  | 14.14       | 0.32 |
|                                  |             |             |  |                         |                 | 1" Ice  |  |             |      |

### Maximum Tower Deflections - Design Wind

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|------------------------|-----------------|-----------|------------|
| T1          | 180 - 168       | 17.10                  | 18              | 0.936     | 0.051      |
| T2          | 168 - 160       | 14.75                  | 18              | 0.927     | 0.054      |

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|------------------------|-----------------|-----------|------------|
| T3          | 160 - 140       | 13.20                  | 18              | 0.890     | 0.052      |
| T4          | 140 - 120       | 9.66                   | 18              | 0.736     | 0.044      |
| T5          | 120 - 100       | 6.79                   | 19              | 0.580     | 0.037      |
| T6          | 100 - 80        | 4.58                   | 19              | 0.431     | 0.029      |
| T7          | 80 - 60         | 2.89                   | 19              | 0.319     | 0.020      |
| T8          | 60 - 40         | 1.62                   | 19              | 0.235     | 0.013      |
| T9          | 40 - 20         | 0.74                   | 19              | 0.147     | 0.008      |
| T10         | 20 - 0          | 0.22                   | 19              | 0.057     | 0.004      |

### Critical Deflections and Radius of Curvature - Design Wind

| Elevation<br>ft | Appurtenance                 | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|-----------------|------------------------------|-----------------|------------------|-----------|------------|---------------------------|
| 178.00          | PD10017                      | 18              | 16.71            | 0.936     | 0.052      | 303125                    |
| 170.00          | 800 10504 w/ Mount Pipe      | 18              | 15.14            | 0.931     | 0.054      | 119077                    |
| 164.00          | Sector Mount [SM 702-3]      | 18              | 13.97            | 0.912     | 0.053      | 19077                     |
| 154.00          | Pipe Mount [PM 601-3]        | 18              | 12.08            | 0.850     | 0.049      | 8860                      |
| 146.00          | 800 EXTERNAL NOTCH FILTER    | 18              | 10.66            | 0.786     | 0.046      | 7503                      |
| 143.00          | APXVSP18-C-A20               | 18              | 10.15            | 0.761     | 0.045      | 7104                      |
| 124.00          | 1142-2C                      | 19              | 7.31             | 0.611     | 0.038      | 7030                      |
| 104.00          | 220-3BN                      | 19              | 4.97             | 0.458     | 0.031      | 8607                      |
| 93.00           | LNx-6515DS-VTM w/ Mount Pipe | 19              | 3.94             | 0.387     | 0.026      | 10008                     |
| 62.00           | GPS_A                        | 19              | 1.73             | 0.243     | 0.013      | 12226                     |
| 60.00           | (2) 3'x8" Knife Plate        | 19              | 1.62             | 0.235     | 0.013      | 12258                     |
| 42.00           | GPS_A                        | 19              | 0.81             | 0.156     | 0.009      | 13405                     |
| 31.00           | GPS_A                        | 19              | 0.46             | 0.104     | 0.006      | 13268                     |
| 20.00           | (2) 3'x8" Knife Plate        | 19              | 0.22             | 0.057     | 0.004      | 13500                     |

### Design Data

| Section No. | Elevation<br>ft | Component Type | Bolt Grade | Bolt Size<br>in | Number Of Bolts | Maximum Load per Bolt<br>K | Allowable Load<br>K | Ratio Load Allowable | Allowable Ratio | Criteria           |
|-------------|-----------------|----------------|------------|-----------------|-----------------|----------------------------|---------------------|----------------------|-----------------|--------------------|
| T1          | 180             | Diagonal       | A325N      | 0.63            | 1               | 0.62                       | 7.12                | 0.087 ✓              | 1               | Member Block Shear |
|             |                 | Top Girt       | A325N      | 0.63            | 1               | 0.17                       | 5.08                | 0.033 ✓              | 1               | Member Block Shear |
| T2          | 168             | Leg            | A325N      | 0.63            | 4               | 2.14                       | 20.71               | 0.103 ✓              | 1               | Bolt Tension       |
|             |                 | Diagonal       | A325N      | 0.63            | 1               | 3.18                       | 7.12                | 0.447 ✓              | 1               | Member Block Shear |
| T3          | 160             | Leg            | A325N      | 0.63            | 4               | 10.85                      | 20.71               | 0.524 ✓              | 1               | Bolt Tension       |
|             |                 | Diagonal       | A325N      | 0.63            | 1               | 4.40                       | 7.12                | 0.619 ✓              | 1               | Member Block Shear |
| T4          | 140             | Leg            | A325N      | 0.75            | 4               | 19.28                      | 29.82               | 0.647 ✓              | 1               | Bolt Tension       |
|             |                 | Diagonal       | A325N      | 0.63            | 1               | 5.26                       | 7.12                | 0.739 ✓              | 1               | Member Block Shear |
| T5          | 120             | Leg            | A325N      | 0.75            | 4               | 26.79                      | 29.82               | 0.898 ✓              | 1               | Bolt Tension       |
|             |                 | Diagonal       | A325N      | 0.63            | 1               | 5.19                       | 9.91                | 0.523 ✓              | 1               | Member Block Shear |
| T6          | 100             | Leg            | A325N      | 0.88            | 4               | 34.10                      | 40.59               | 0.840 ✓              | 1               | Bolt Tension       |
|             |                 | Diagonal       | A325N      | 0.63            | 1               | 6.59                       | 9.91                | 0.665 ✓              | 1               | Member Block Shear |
| T7          | 80              | Diagonal       | A325N      | 0.63            | 1               | 7.78                       | 10.93               | 0.712 ✓              | 1               | Member Block Shear |
| T8          | 60              | Leg            | A325N      | 1.00            | 4               | 48.24                      | 53.01               | 0.910 ✓              | 1               | Bolt Tension       |
|             |                 | Diagonal       | A325N      | 0.63            | 1               | 8.38                       | 12.43               | 0.675 ✓              | 1               | Bolt Shear         |



| Section No. | Elevation<br>ft | Component Type       | Bolt Grade | Bolt Size<br>in | Number Of Bolts | Maximum Load per Bolt<br>K | Allowable Load<br>K | Ratio Load<br>Allowable | Allowable Ratio | Criteria     |
|-------------|-----------------|----------------------|------------|-----------------|-----------------|----------------------------|---------------------|-------------------------|-----------------|--------------|
| T9          | 40              | Diagonal             | A325N      | 0.63            | 1               | 9.20                       | 12.43               | 0.740 ✓                 | 1               | Bolt Shear   |
|             |                 | Secondary Horizontal | A325N      | 0.50            | 1               | 4.45                       | 7.95                | 0.560 ✓                 | 1               | Bolt Shear   |
| T10         | 20              | Leg                  | F1554-36   | 1.50            | 6               | 40.92                      | 57.65               | 0.710 ✓                 | 1               | Bolt Tension |
|             |                 | Diagonal             | A325N      | 0.63            | 1               | 9.57                       | 12.43               | 0.770 ✓                 | 1               | Bolt Shear   |

### Compression Checks

### Leg Design Data (Compression)

| Section No. | Elevation<br>ft | Size                              | L<br>ft | L <sub>u</sub><br>ft | Kl/r           | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>P <sub>u</sub> / φP <sub>n</sub> |
|-------------|-----------------|-----------------------------------|---------|----------------------|----------------|----------------------|---------------------|----------------------|---|
| T1          | 180 - 168       | Pipe 2.375" x 0.154" (2 STD)      | 12.00   | 4.00                 | 61.0<br>K=1.00 | 1.07                 | -2.32               | 27.98                | 0.083 <sup>1</sup> ✓                      |
| T2          | 168 - 160       | Pipe 2.375" x 0.154" (2 STD) (GR) | 8.00    | 4.00                 | 61.0<br>K=1.00 | 1.07                 | -11.92              | 38.43                | 0.310 <sup>1</sup> ✓                      |
| T3          | 160 - 140       | Pipe 3.5" x 0.216" (3 STD) (GR)   | 20.03   | 5.01                 | 51.7<br>K=1.00 | 2.23                 | -52.12              | 87.01                | 0.599 <sup>1</sup> ✓                      |
| T4          | 140 - 120       | Pipe 4" x 0.318" (3.5 XS) (GR)    | 20.03   | 6.68                 | 61.3<br>K=1.00 | 3.68                 | -89.13              | 122.13               | 0.730 <sup>1</sup> ✓                      |
| T5          | 120 - 100       | Pipe 4.5" x 0.337" (4 XS) (GR)    | 20.03   | 6.68                 | 54.3<br>K=1.00 | 4.41                 | -122.42             | 157.19               | 0.779 <sup>1</sup> ✓                      |
| T6          | 100 - 80        | Pipe 5.563" x 0.375" (5 XS) (GR)  | 20.03   | 6.68                 | 43.6<br>K=1.00 | 6.11                 | -157.94             | 242.30               | 0.652 <sup>1</sup> ✓                      |
| T7          | 80 - 60         | Pipe 6.625" x 0.432" (6 XS) (GR)  | 20.03   | 10.02                | 54.8<br>K=1.00 | 8.40                 | -190.13             | 314.32               | 0.605 <sup>1</sup> ✓                      |
| T8          | 60 - 40         | Pipe 6.625" x 0.432" (6 XS) (GR)  | 20.03   | 10.02                | 54.8<br>K=1.00 | 8.40                 | -224.33             | 314.32               | 0.714 <sup>1</sup> ✓                      |
| T9          | 40 - 20         | Pipe 6.625" x 0.432" (6 XS) (GR)  | 20.03   | 5.15                 | 28.2<br>K=1.00 | 8.40                 | -256.68             | 362.71               | 0.708 <sup>1</sup> ✓                      |
| T10         | 20 - 0          | Pipe 8.625" x 0.500" (8 XS) (GR)  | 20.03   | 10.02                | 41.8<br>K=1.00 | 12.76                | -290.16             | 543.63               | 0.534 <sup>1</sup> ✓                      |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Diagonal Design Data (Compression)

| Section No. | Elevation<br>ft | Size                 | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>P <sub>u</sub> / φP <sub>n</sub> |
|-------------|-----------------|----------------------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---|
| T1          | 180 - 168       | L 2 x 1.5 x 3/16 LLV | 4.63    | 2.19                 | 91.3<br>K=1.12  | 0.62                 | -0.66               | 12.98                | 0.051 <sup>1</sup> ✓                      |
| T2          | 168 - 160       | L 2 x 1.5 x 3/16 LLV | 4.63    | 2.19                 | 91.3<br>K=1.12  | 0.62                 | -3.28               | 12.98                | 0.253 <sup>1</sup> ✓                      |
| T3          | 160 - 140       | L 2 x 1.5 x 3/16 LLV | 6.52    | 3.28                 | 122.1<br>K=1.00 | 0.62                 | -4.46               | 9.17                 | 0.487 <sup>1</sup> ✓                      |
| T4          | 140 - 120       | L 2 x 2 x 3/16       | 9.07    | 4.61                 | 140.3<br>K=1.00 | 0.71                 | -5.02               | 8.21                 | 0.612 <sup>1</sup> ✓                      |
| T5          | 120 - 100       | L 2.5 x 2 x 3/16 LLV | 10.69   | 5.38                 | 151.3<br>K=1.00 | 0.81                 | -5.22               | 7.98                 | 0.655 <sup>1</sup> ✓                      |
| T6          | 100 - 80        | L 2.5 x 2.5 x 3/16   | 12.40   | 6.23                 | 151.0           | 0.90                 | -6.56               | 8.94                 | 0.734 <sup>1</sup> ✓                      |

| Section No. | Elevation<br>ft | Size                | L<br>ft | L <sub>u</sub><br>ft | KI/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|---------------------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T7          | 80 - 60         | L 3 x 3 x 3/16      | 15.56   | 7.92                 | K=1.00<br>159.4 | 1.09                 | -7.85               | 9.69                 | 0.810 <sup>1</sup> ✓            |
| T8          | 60 - 40         | L 3.5 x 3 x 1/4 LLV | 17.20   | 8.73                 | K=1.00<br>166.1 | 1.56                 | -8.38               | 12.78                | 0.656 <sup>1</sup> ✓            |
| T9          | 40 - 20         | L 3.5 x 3 x 1/4 LLV | 18.92   | 9.73                 | K=1.00<br>185.1 | 1.56                 | -9.20               | 10.29                | 0.894 <sup>1</sup> ✓            |
| T10         | 20 - 0          | L 3.5 x 3.5 x 1/4   | 20.53   | 10.38                | K=1.00<br>179.5 | 1.69                 | -9.57               | 11.85                | 0.808 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Secondary Horizontal Design Data (Compression)

| Section No. | Elevation<br>ft | Size              | L<br>ft | L <sub>u</sub><br>ft | KI/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-------------------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T9          | 40 - 20         | L 3.5 x 3.5 x 1/4 | 17.49   | 8.47                 | K=1.00<br>146.4 | 1.69                 | -4.45               | 17.81                | 0.250 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Compression)

| Section No. | Elevation<br>ft | Size                 | L<br>ft | L <sub>u</sub><br>ft | KI/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|----------------------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T1          | 180 - 168       | L 2 x 1.5 x 3/16 LLH | 4.00    | 3.55                 | K=1.00<br>132.4 | 0.62                 | -0.15               | 8.00                 | 0.019 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Tension Checks

### Leg Design Data (Tension)

| Section No. | Elevation<br>ft | Size                              | L<br>ft | L <sub>u</sub><br>ft | KI/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------------------------------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T1          | 180 - 168       | Pipe 2.375" x 0.154" (2 STD)      | 12.00   | 4.00                 | 61.0 | 1.07                 | 1.74                | 33.85                | 0.052 <sup>1</sup> ✓            |
| T2          | 168 - 160       | Pipe 2.375" x 0.154" (2 STD) (GR) | 8.00    | 4.00                 | 61.0 | 1.07                 | 8.55                | 33.85                | 0.252 <sup>1</sup> ✓            |
| T3          | 160 - 140       | Pipe 3.5" x 0.216" (3 STD) (GR)   | 20.03   | 5.01                 | 51.7 | 2.23                 | 43.40               | 70.20                | 0.618 <sup>1</sup> ✓            |
| T4          | 140 - 120       | Pipe 4" x 0.318" (3.5 XS) (GR)    | 20.03   | 6.68                 | 61.3 | 3.68                 | 77.14               | 115.87               | 0.666 <sup>1</sup> ✓            |
| T5          | 120 - 100       | Pipe 4.5" x 0.337" (4 XS) (GR)    | 20.03   | 6.68                 | 54.3 | 4.41                 | 107.17              | 138.83               | 0.772 <sup>1</sup> ✓            |

| Section No. | Elevation<br>ft | Size                             | L<br>ft | L <sub>u</sub><br>ft | KI/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>P <sub>u</sub> / φP <sub>n</sub> |
|-------------|-----------------|----------------------------------|---------|----------------------|------|----------------------|---------------------|----------------------|---|
| T6          | 100 - 80        | Pipe 5.563" x 0.375" (5 XS) (GR) | 20.03   | 6.68                 | 43.6 | 6.11                 | 136.41              | 192.53               | 0.709 <sup>1</sup> ✓                      |
| T7          | 80 - 60         | Pipe 6.625" x 0.432" (6 XS) (GR) | 20.03   | 10.02                | 54.8 | 8.40                 | 164.26              | 264.76               | 0.620 <sup>1</sup> ✓                      |
| T8          | 60 - 40         | Pipe 6.625" x 0.432" (6 XS) (GR) | 20.03   | 10.02                | 54.8 | 8.40                 | 192.96              | 264.76               | 0.729 <sup>1</sup> ✓                      |
| T9          | 40 - 20         | Pipe 6.625" x 0.432" (6 XS) (GR) | 20.03   | 4.87                 | 26.6 | 8.40                 | 219.61              | 264.76               | 0.829 <sup>1</sup> ✓                      |
| T10         | 20 - 0          | Pipe 8.625" x 0.500" (8 XS) (GR) | 20.03   | 10.02                | 41.8 | 12.76                | 245.52              | 402.03               | 0.611 <sup>1</sup> ✓                      |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Diagonal Design Data (Tension)

| Section No. | Elevation<br>ft | Size                 | L<br>ft | L <sub>u</sub><br>ft | KI/r  | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>P <sub>u</sub> / φP <sub>n</sub> |
|-------------|-----------------|----------------------|---------|----------------------|-------|----------------------|---------------------|----------------------|---|
| T1          | 180 - 168       | L 2 x 1.5 x 3/16 LLV | 4.63    | 2.19                 | 63.2  | 0.36                 | 0.62                | 15.68                | 0.039 <sup>1</sup> ✓                      |
| T2          | 168 - 160       | L 2 x 1.5 x 3/16 LLV | 4.63    | 2.19                 | 63.2  | 0.36                 | 3.18                | 15.68                | 0.203 <sup>1</sup> ✓                      |
| T3          | 160 - 140       | L 2 x 1.5 x 3/16 LLV | 6.52    | 3.28                 | 92.9  | 0.36                 | 4.40                | 15.68                | 0.281 <sup>1</sup> ✓                      |
| T4          | 140 - 120       | L 2 x 2 x 3/16       | 8.11    | 4.14                 | 83.0  | 0.43                 | 5.26                | 18.74                | 0.281 <sup>1</sup> ✓                      |
| T5          | 120 - 100       | L 2.5 x 2 x 3/16 LLV | 10.69   | 5.38                 | 110.7 | 0.50                 | 5.19                | 21.81                | 0.238 <sup>1</sup> ✓                      |
| T6          | 100 - 80        | L 2.5 x 2.5 x 3/16   | 12.40   | 6.23                 | 98.2  | 0.57                 | 6.59                | 24.84                | 0.265 <sup>1</sup> ✓                      |
| T7          | 80 - 60         | L 3 x 3 x 3/16       | 15.56   | 7.92                 | 103.1 | 0.71                 | 7.78                | 30.97                | 0.251 <sup>1</sup> ✓                      |
| T8          | 60 - 40         | L 3.5 x 3 x 1/4 LLV  | 17.20   | 8.73                 | 116.7 | 1.03                 | 8.30                | 44.78                | 0.185 <sup>1</sup> ✓                      |
| T9          | 40 - 20         | L 3.5 x 3 x 1/4 LLV  | 18.92   | 9.73                 | 127.9 | 1.03                 | 8.74                | 44.78                | 0.195 <sup>1</sup> ✓                      |
| T10         | 20 - 0          | L 3.5 x 3.5 x 1/4    | 20.53   | 10.38                | 115.8 | 1.13                 | 9.29                | 49.02                | 0.189 <sup>1</sup> ✓                      |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Secondary Horizontal Design Data (Tension)

| Section No. | Elevation<br>ft | Size              | L<br>ft | L <sub>u</sub><br>ft | KI/r  | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>P <sub>u</sub> / φP <sub>n</sub> |
|-------------|-----------------|-------------------|---------|----------------------|-------|----------------------|---------------------|----------------------|---|
| T9          | 40 - 20         | L 3.5 x 3.5 x 1/4 | 17.49   | 8.47                 | 186.3 | 1.15                 | 4.45                | 50.04                | 0.089 <sup>1</sup> ✓                      |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Tension)

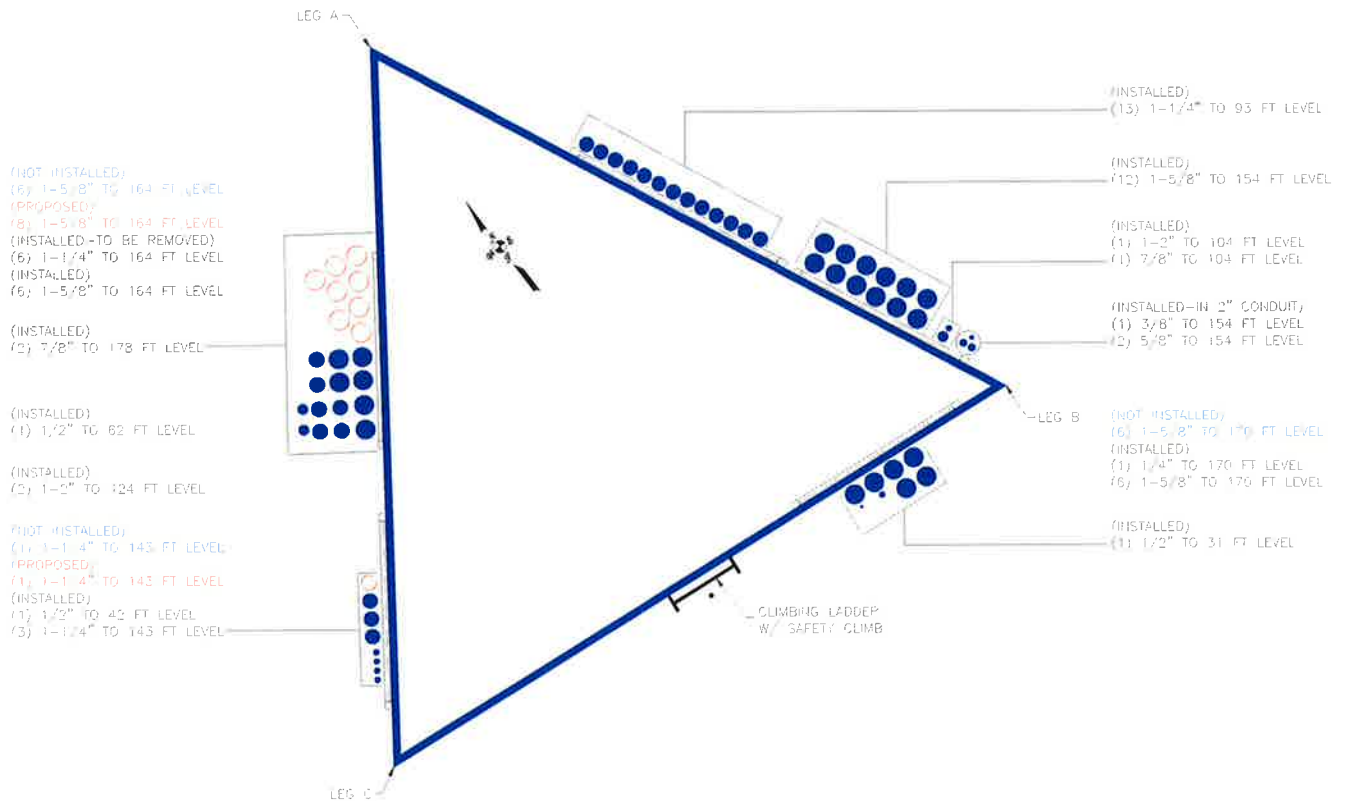
| Section No. | Elevation<br>ft | Size                 | L<br>ft | L <sub>u</sub><br>ft | Kl/r  | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ <sup>1</sup> |
|-------------|-----------------|----------------------|---------|----------------------|-------|----------------------|---------------------|----------------------|--|
| T1          | 180 - 168       | L 2 x 1.5 x 3/16 LLH | 4.00    | 3.55                 | 103.8 | 0.36                 | 0.17                | 15.68                | 0.011 <sup>1</sup><br>✓                      |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Section Capacity Table

| Section No. | Elevation<br>ft | Component<br>Type       | Size                                 | Critical<br>Element | P<br>K  | φP <sub>allow</sub><br>K | %<br>Capacity                   | Pass<br>Fail |             |
|-------------|-----------------|-------------------------|--------------------------------------|---------------------|---------|--------------------------|---------------------------------|--------------|-------------|
| T1          | 180 - 168       | Leg                     | Pipe 2.375" x 0.154" (2 STD)         | 3                   | -2.32   | 27.98                    | 8.3                             | Pass         |             |
| T2          | 168 - 160       | Leg                     | Pipe 2.375" x 0.154" (2 STD)<br>(GR) | 25                  | -11.92  | 38.43                    | 31.0                            | Pass         |             |
| T3          | 160 - 140       | Leg                     | Pipe 3.5" x 0.216" (3 STD)<br>(GR)   | 40                  | 43.40   | 70.20                    | 61.8                            | Pass         |             |
| T4          | 140 - 120       | Leg                     | Pipe 4" x 0.318" (3.5 XS)<br>(GR)    | 67                  | -89.13  | 122.13                   | 73.0                            | Pass         |             |
| T5          | 120 - 100       | Leg                     | Pipe 4.5" x 0.337" (4 XS)<br>(GR)    | 88                  | -122.42 | 157.19                   | 77.9                            | Pass         |             |
| T6          | 100 - 80        | Leg                     | Pipe 5.563" x 0.375" (5 XS)<br>(GR)  | 109                 | 136.41  | 192.53                   | 70.9                            | Pass         |             |
| T7          | 80 - 60         | Leg                     | Pipe 6.625" x 0.432" (6 XS)<br>(GR)  | 130                 | 164.26  | 264.76                   | 62.0                            | Pass         |             |
| T8          | 60 - 40         | Leg                     | Pipe 6.625" x 0.432" (6 XS)<br>(GR)  | 145                 | 192.96  | 264.76                   | 72.9                            | Pass         |             |
| T9          | 40 - 20         | Leg                     | Pipe 6.625" x 0.432" (6 XS)<br>(GR)  | 160                 | 219.61  | 264.76                   | 82.9                            | Pass         |             |
| T10         | 20 - 0          | Leg                     | Pipe 8.625" x 0.500" (8 XS)<br>(GR)  | 181                 | 245.52  | 402.03                   | 61.1                            | Pass         |             |
| T1          | 180 - 168       | Diagonal                | L 2 x 1.5 x 3/16 LLV                 | 11                  | -0.66   | 12.98                    | 5.1                             | Pass         |             |
| T2          | 168 - 160       | Diagonal                | L 2 x 1.5 x 3/16 LLV                 | 28                  | -3.28   | 12.98                    | 25.3                            | Pass         |             |
| T3          | 160 - 140       | Diagonal                | L 2 x 1.5 x 3/16 LLV                 | 44                  | -4.46   | 9.17                     | 48.7                            | Pass         |             |
| T4          | 140 - 120       | Diagonal                | L 2 x 2 x 3/16                       | 71                  | -5.02   | 8.21                     | 61.2                            | Pass         |             |
| T5          | 120 - 100       | Diagonal                | L 2.5 x 2 x 3/16 LLV                 | 92                  | -5.22   | 7.98                     | 65.5                            | Pass         |             |
| T6          | 100 - 80        | Diagonal                | L 2.5 x 2.5 x 3/16                   | 112                 | -6.56   | 8.94                     | 73.4                            | Pass         |             |
| T7          | 80 - 60         | Diagonal                | L 3 x 3 x 3/16                       | 133                 | -7.85   | 9.69                     | 81.0                            | Pass         |             |
| T8          | 60 - 40         | Diagonal                | L 3.5 x 3 x 1/4 LLV                  | 148                 | -8.38   | 12.78                    | 65.6                            | Pass         |             |
| T9          | 40 - 20         | Diagonal                | L 3.5 x 3 x 1/4 LLV                  | 163                 | -9.20   | 10.29                    | 89.4                            | Pass         |             |
| T10         | 20 - 0          | Diagonal                | L 3.5 x 3.5 x 1/4                    | 184                 | -9.57   | 11.85                    | 80.8                            | Pass         |             |
| T9          | 40 - 20         | Secondary<br>Horizontal | L 3.5 x 3.5 x 1/4                    | 171                 | -4.45   | 17.81                    | 25.0                            | Pass         |             |
| T1          | 180 - 168       | Top Girt                | L 2 x 1.5 x 3/16 LLH                 | 5                   | -0.15   | 8.00                     | 1.9                             | Pass         |             |
|             |                 |                         |                                      |                     |         |                          | <b>Summary</b>                  |              |             |
|             |                 |                         |                                      |                     |         |                          | Leg (T9)                        | 82.9         | Pass        |
|             |                 |                         |                                      |                     |         |                          | Diagonal<br>(T9)                | 89.4         | Pass        |
|             |                 |                         |                                      |                     |         |                          | Secondary<br>Horizontal<br>(T9) | 25.0         | Pass        |
|             |                 |                         |                                      |                     |         |                          | Top Girt<br>(T1)                | 1.9          | Pass        |
|             |                 |                         |                                      |                     |         |                          | Bolt                            | 91           | Pass        |
|             |                 |                         |                                      |                     |         |                          | Checks                          |              |             |
|             |                 |                         |                                      |                     |         |                          | <b>RATING =</b>                 | <b>91.0</b>  | <b>Pass</b> |

### APPENDIX B BASE LEVEL DRAWING



**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

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

**Factored Base Reactions from RISA**

|                  | Comp. (+) | Tension (-) |               |
|------------------|-----------|-------------|---------------|
| Moment, Mu =     |           |             | k-ft          |
| Shear, Vu =      | 31.0      | 30.0        | kips          |
| Axial Load, Pu = | 300.0     | -255.0      | kips          |
| OTMu =           | 7.8       | 7.5         | k-ft @ Ground |

**Safety Factors / Load Factors / Φ Factors**

|                           |                |
|---------------------------|----------------|
| Tower Type =              | Self-Supported |
| ACI Code =                | ACI 318-08     |
| Seismic Design Category = | D              |
| Reference Standard =      | TIA-222-G      |
| Use 1.3 Load Factor?      | No             |
| Load Factor =             | 1.00           |

**Drilled Pier Parameters**

|                       |             |
|-----------------------|-------------|
| Diameter =            | 2.5 ft      |
| Height Above Grade =  | 0.25 ft     |
| Depth Below Grade =   | 10.5 ft     |
| fc' =                 | 3 ksi       |
| εc =                  | 0.003 in/in |
| L / D Ratio =         | 4.30        |
| Mat Fdn. Cap Width =  | 3.5 ft      |
| Mat Fdn. Cap Length = | 6.5 ft      |
| Depth Below Grade =   | 5 ft        |

|                              | Safety Factor | Φ Factor |
|------------------------------|---------------|----------|
| Soil Lateral Resistance =    | 2.00          | 0.75     |
| Soil 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

**Steel Parameters**

|                            |           |
|----------------------------|-----------|
| Number of Bars =           | 14        |
| Rebar Size =               | #8        |
| Rebar Fy =                 | 60 ksi    |
| Rebar MOE =                | 29000 ksi |
| Tie Size =                 | #4        |
| Side Clear Cover to Ties = | 3 in      |

**Soil Parameters**

|                           |          |
|---------------------------|----------|
| Water Table Depth =       | 99.00 ft |
| Depth to Ignore Soil =    | 5.00 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)

**Direct Embed Pole Shaft Parameters**

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

**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 BCD 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.

**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     | 5            | 110             | 0            | 30                     | Sand      | 56030                    | 0                            | 0                              | 5        |
| 2     | 1            | 110             | 0            | 30                     | Sand      | 56030                    | 772                          | 772                            | 6        |
| 3     | 7.5          | 140             | 8000         | 0                      | Clay      | 56030                    | 4402                         | 4402                           | 13.5     |
| 4     |              |                 |              |                        |           |                          |                              |                                |          |
| 5     |              |                 |              |                        |           |                          |                              |                                |          |
| 6     |              |                 |              |                        |           |                          |                              |                                |          |
| 7     |              |                 |              |                        |           |                          |                              |                                |          |
| 8     |              |                 |              |                        |           |                          |                              |                                |          |
| 9     |              |                 |              |                        |           |                          |                              |                                |          |
| 10    |              |                 |              |                        |           |                          |                              |                                |          |
| 11    |              |                 |              |                        |           |                          |                              |                                |          |
| 12    |              |                 |              |                        |           |                          |                              |                                |          |

**Soil Results: Overturning**

|                         |                       |
|-------------------------|-----------------------|
| Depth to COR =          | 8.51 ft, from Grade   |
| Bending Moment, Mu =    | 271.71 k-ft, from COR |
| Resisting Moment, ΦMn = | 646.54 k-ft, from COR |

**MOMENT RATIO = 42.0% OK**

|                        |            |
|------------------------|------------|
| Shear, Vu =            | 31.00 kips |
| Resisting Shear, ΦVn = | 73.77 kips |

**Shear Ratio = 42.0% OK**

**Soil Results: Uplift**

|                        |             |
|------------------------|-------------|
| Uplift, Tu =           | 255.00 kips |
| Uplift Capacity, ΦTn = | 141.00 kips |

**UPLIFT RATIO = OK**

**Soil Results: Compression**

|                       |              |
|-----------------------|--------------|
| Compression, Cu =     | 300.00 kips  |
| Comp. Capacity, ΦCn = | 1070.26 kips |

**COMPRESSION RATIO = 28.0% OK**

Rock anchor capacity = .75 x 60 x 4 = 180 kips 180 + 141 = 321 kips

Uplift ratio = 79 %

**Steel Results (ACI 318-08):**

|                      |             |
|----------------------|-------------|
| Minimum Steel Area = | 2.36 sq in  |
| Actual Steel Area =  | 11.06 sq in |

|                  |                                    |
|------------------|------------------------------------|
| Axial Load, Pu = | -229.39 kips @ 6.00 ft Below Grade |
| Moment, Mu =     | 185.49 k-ft @ 6.00 ft Below Grade  |
| Moment, ΦMn =    | 331.77 k-ft                        |

**MOMENT RATIO = 55.9% OK**

|                    |                                  |
|--------------------|----------------------------------|
| Axial, ΦPn (min) = | -597.24 kips, Where ΦMn = 0 k-ft |
| Axial, ΦPn (max) = | 1267.70 kips, Where ΦMn = 0 k-ft |

# Anchor Rod Check for Self Supporting Towers

TIA-222-G, Section 4.9.9

| Site Data  |        |
|------------|--------|
| BU#:       | 806353 |
| Site Name: |        |
| App #:     |        |

| Anchor Rod Data |     |     |
|-----------------|-----|-----|
| Qty:            | 6   |     |
| Diam:           | 1.5 | in  |
| Rod Material:   | A36 |     |
| Strength (Fu):  | 58  | ksi |
| Yield (Fy):     | 36  | ksi |

|               |  |        |
|---------------|--|--------|
| * Rod Circle: |  | in     |
| * e:          |  | in     |
| * # of Rods   |  | 1 or 2 |

|              |  |         |
|--------------|--|---------|
| Mu = Pu x e: |  | ft-kips |
|--------------|--|---------|

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

| Reactions          |      |             |
|--------------------|------|-------------|
| Eta Factor, $\eta$ | 0.55 | Detail Type |
| Uplift, Pu:        | 255  | kips        |
| Shear, Vu:         | 30   | kips        |

|                             |   |         |
|-----------------------------|---|---------|
| $I_{ar}$ :                  | 0 | in      |
| $M_u = 0.65 * I_{ar} * V_u$ |   | ft-kips |

### Anchor Rod Results:

|   |       |      |
|---|-------|------|
| Max Rod (Cu + Vu/ $\eta$ ):               | 51.6  | Kips |
| Allowable Axial, $\Phi * F_u * A_{net}$ : | 65.4  | Kips |
| Anchor Rod Stress Ratio:                  | 78.9% |      |

### If Applicable;

### Anchor Rod Results with Bending Considered:

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

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

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

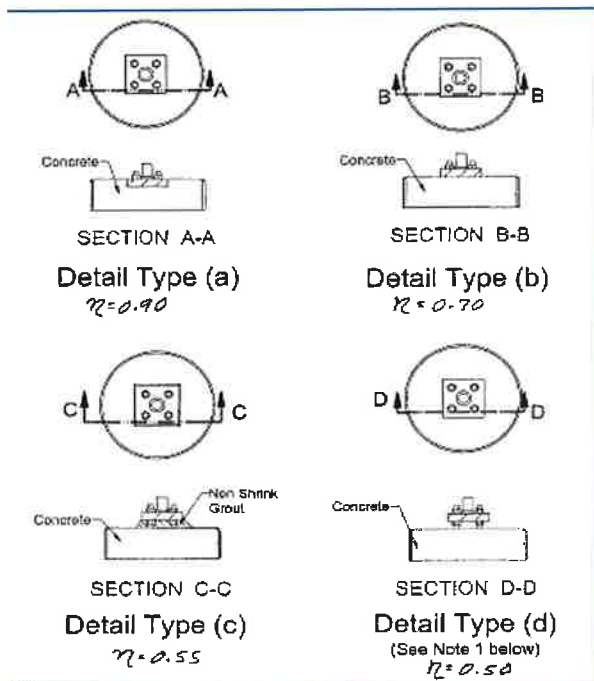


Figure 4-4 of TIA-222-G

Maximum Acceptable Ratio: **105** %

Governing Stress Ratio: **78.9%** **Pass**



37517-2777-001-8700

Capacity of the flange bolts at 20' =  $53.01 \times 4 = 212.04$

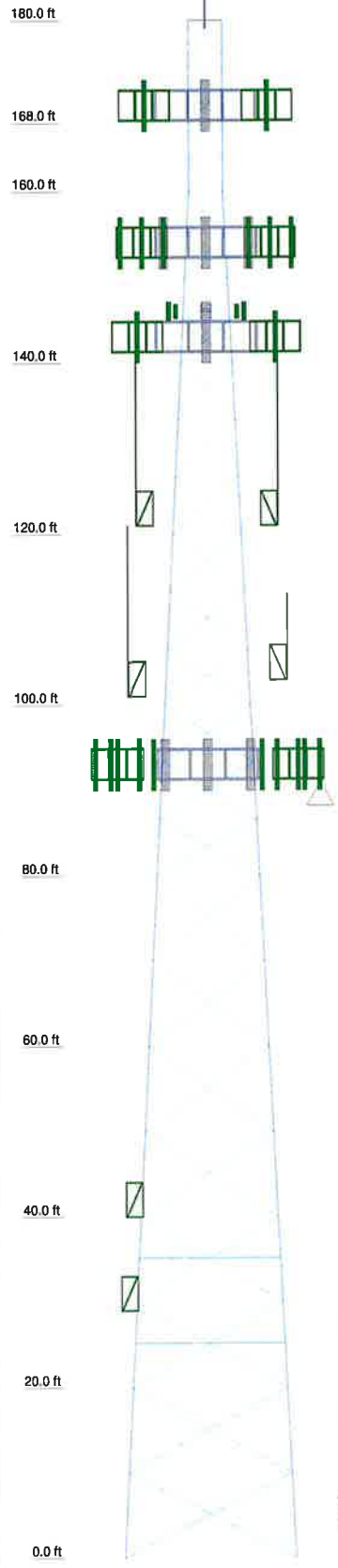
Capacity of the existing weld at the jump plate = 33 kips

Total capacity at the flange at 20' = 245 kips

Actual tensile force at 20' = 219.24 kips

% ratio =  $219.01/245 = 89\%$

| Section          | T1    | T2  | T3    | T4  | T5          | T6  | T7  | T8  | T9     | T10 | T11  |
|------------------|-------|-----|-------|-----|-------------|-----|-----|-----|--------|-----|------|
| Legs             | A     | B   | C     | D   | E           | F   |     |     |        |     |      |
| Leg Grade        |       |     |       |     |             |     |     |     |        |     |      |
| Diagonals        |       |     |       |     |             |     |     |     |        |     |      |
| Diagonal Grade   |       |     |       |     |             |     |     |     |        |     |      |
| Top Girts        |       |     |       |     |             |     |     |     |        |     |      |
| Sec. Horizontals |       |     |       |     |             |     |     |     |        |     |      |
| Face Width (ft)  | 4     | 0.3 | 1.4   | 6   | 8           | 10  | 12  | 14  | 16     | 18  | 20   |
| # Panels @ (ft)  | 5 @ 4 | 0.3 | 4 @ 5 | 6   | 9 @ 6.66667 | 10  | 12  | 14  | 8 @ 10 | 16  | 18   |
| Weight (K)       | 0.4   | 0.3 | 1.4   | 1.9 | 2.4         | 3.5 | 4.6 | 5.1 | 5.9    | 7.9 | 33.5 |



**SYMBOL LIST**

| MARK | SIZE                              | MARK | SIZE                             |
|------|-----------------------------------|------|----------------------------------|
| A    | Pipe 2.375" x 0.154" (2 STD)      | E    | Pipe 4.5" x 0.337" (4 XS) (GR)   |
| B    | Pipe 2.375" x 0.154" (2 STD) (GR) | F    | Pipe 5.563" x 0.375" (5 XS) (GR) |
| C    | Pipe 3.5" x 0.216" (3 STD) (GR)   | G    | Pipe 8.625" x 0.500" (8 XS) (GR) |
| D    | Pipe 4" x 0.318" (3.5 XS) (GR)    | H    | L 2 x 1.5 x 3/16 LLH             |

**MATERIAL STRENGTH**

| GRADE    | Fy     | Fu     | GRADE | Fy     | Fu     |
|----------|--------|--------|-------|--------|--------|
| A53-B-35 | 35 ksi | 60 ksi | A36   | 36 ksi | 58 ksi |

**TOWER DESIGN NOTES**

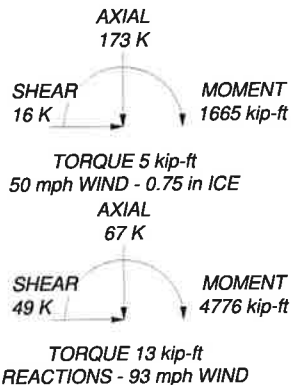
1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. Grouted pipe f'c is 7 ksi
9. see additional calcs for flange capacity at 60' and 20', considering the weakest link weld in the jump plate design
10. TOWER RATING: 91%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:

DOWN: 298 K  
SHEAR: 31 K

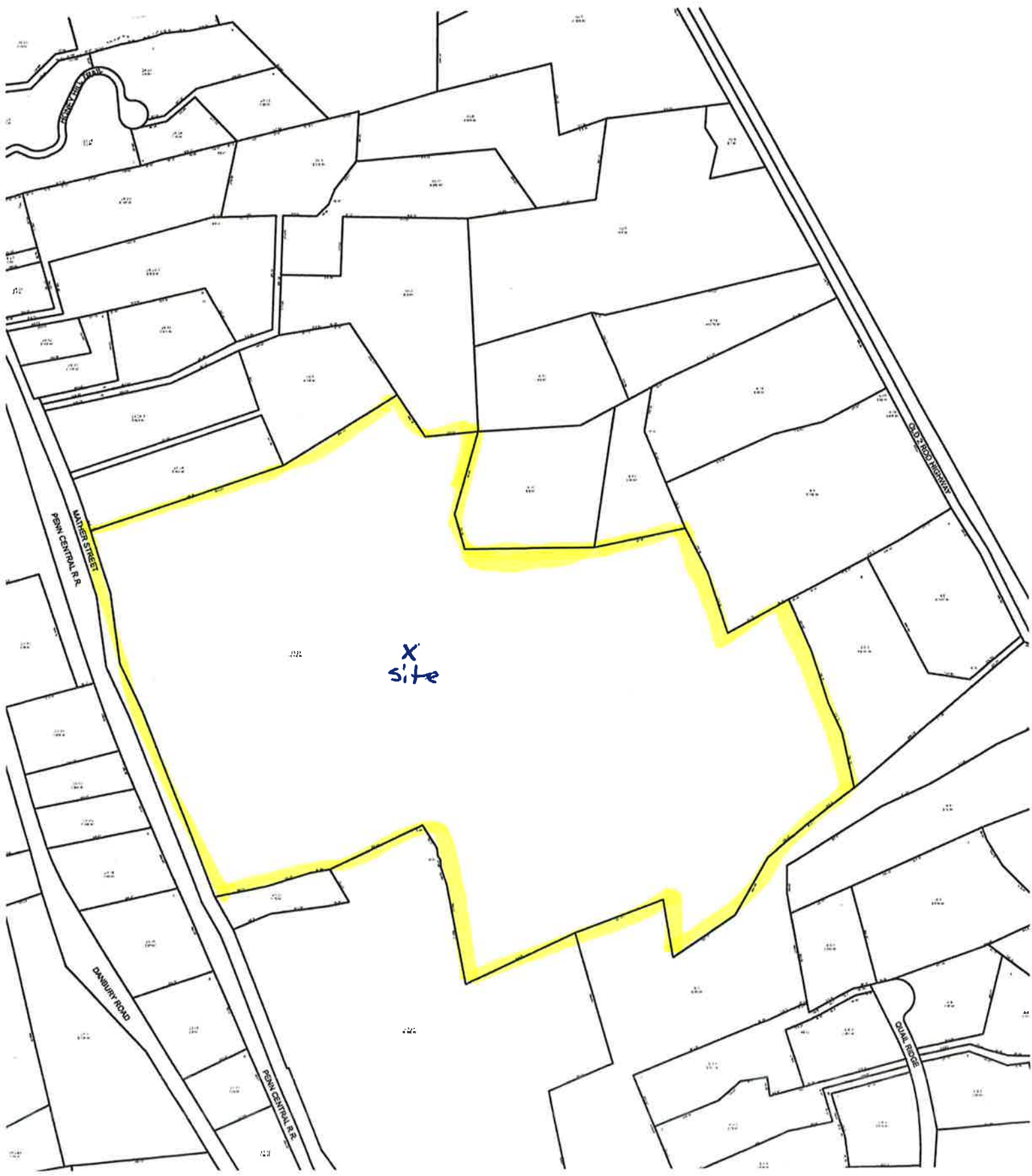
UPLIFT: -251 K  
SHEAR: 27 K



|  |   |          |  |
|--|---|----------|--|
|  <b>Paul J Ford and Company</b><br>250 E Broad St Suite 600<br>Columbus, OH 43215<br>Phone: Software\TNX\Settings<br>FAX: | <b>Job: 180-ft S/S Tower - Wilton, CT</b>             |          |  |
|  | Project: <b>PJF# 37517-2777-001-8700 (BU# 806353)</b> |          |  |
| Client: Crown Castle   | Drawn by: Joseph Jacobs                               | App'd:   |  |
| Code: TIA-222-G  | Date: 08/21/17  | Scale: N |  |
| Path:  | Dwg No.:  |          |  |



# **ATTACHMENT 4**



X  
site

# MATHER ST

**Location** MATHER ST

**Mblu** 23 / 23 /

**Acct#** 5165,3335

**Owner** WILTON TOWN OF

**Assessment** \$6,999,790

**Appraisal** \$9,999,700

**PID** 1065

**Building Count** 2

## Current Value

| Appraisal      |              |             |             |
|----------------|--------------|-------------|-------------|
| Valuation Year | Improvements | Land        | Total       |
| 2016           | \$45,500     | \$9,954,200 | \$9,999,700 |
| Assessment     |              |             |             |
| Valuation Year | Improvements | Land        | Total       |
| 2016           | \$31,850     | \$6,967,940 | \$6,999,790 |

## Owner of Record

**Owner** WILTON TOWN OF  
**Co-Owner**  
**Address** 238 DANBURY RD  
 WILTON, CT 06897

**Sale Price** \$0  
**Certificate**  
**Book & Page** 1151/0195  
**Sale Date** 02/02/1999  
**Instrument** 00

## Ownership History

| Ownership History |            |             |             |            |            |
|-------------------|------------|-------------|-------------|------------|------------|
| Owner             | Sale Price | Certificate | Book & Page | Instrument | Sale Date  |
| WILTON TOWN OF    | \$0        |             | 1151/0195   | 00         | 02/02/1999 |
|                   | \$0        |             | 0112/0179   | 00         | 05/01/1965 |

## Building Information

### Building 1 : Section 1

**Year Built:**  
**Living Area:** 0  
**Replacement Cost:** \$0  
**Building Percent Good:**  
**Replacement Cost Less Depreciation:** \$0

| Building Attributes |             |
|---------------------|-------------|
| Field               | Description |
| Style               | Vacant Land |

|                   |  |
|-------------------|--|
| Model             |  |
| Occupancy         |  |
| Exterior Wall 1   |  |
| Exterior Wall 2   |  |
| Roof Structure:   |  |
| Roof Cover        |  |
| Interior Wall 1   |  |
| Interior Wall 2   |  |
| Interior Flr 1    |  |
| Interior Flr 2    |  |
| Heat Fuel         |  |
| Heat Type:        |  |
| AC Type:          |  |
| Total Bedrooms:   |  |
| Total Bthrms:     |  |
| Total Half Baths: |  |
| Total Rooms:      |  |
| Bath Style:       |  |
| Kitchen Style:    |  |
| Elevator          |  |
| Fireplaces        |  |
| Sauna             |  |
| Spa/Jet Tub       |  |
| Whirlpool Tub     |  |
| Cath. Ceil        |  |

**Building 2 : Section 1**

**Year Built:** 1988  
**Living Area:** 1,200  
**Replacement Cost:** \$62,291  
**Building Percent Good:** 73  
**Replacement Cost Less Depreciation:** \$45,500

| Building Attributes : Bldg 2 of 2 |                 |
|-----------------------------------|-----------------|
| Field                             | Description     |
| STYLE                             | Service Shop    |
| MODEL                             | Commercial      |
| Grade                             | Below Average   |
| Occupancy                         | 1               |
| Exterior Wall 1                   | Pre-finish Metl |
| Exterior Wall 2                   |                 |
| Roof Structure                    | Gable/Hip       |
| Roof Cover                        | Enam Mtl Shing  |
| Interior Wall 1                   | Drywall         |

**Building Photo**



(<http://images.vgsi.com/photos/WiltonCTPhotos//default.jpg>)

**Building Layout**

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

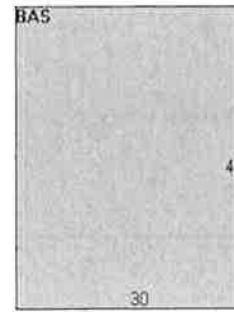
**Building Photo**



(<http://images.vgsi.com/photos/WiltonCTPhotos//00\00\78\11>)

|                  |                |
|------------------|----------------|
| Interior Wall 2  |                |
| Interior Floor 1 | Dirt/None      |
| Interior Floor 2 |                |
| Heating Fuel     | None           |
| Heating Type     | None           |
| AC Type          | None           |
| Bldg Use         | Ex Com MDL-96  |
| Fireplace        |                |
| Elevator         |                |
| Cath Ceil        |                |
| Sauna            |                |
| 1st Floor Use:   | 21I            |
| Heat/AC          | None           |
| Frame Type       | Steel          |
| Baths/Plumbing   | None           |
| Ceiling/Wall     | Sus Ceil Min W |
| Rooms/Prtns      | Average        |
| Wall Height      | 11             |
| % Comn Wall      | 0              |

### Building Layout



| Building Sub-Areas (sq ft) |             |            | <u>Legend</u> |
|----------------------------|-------------|------------|---------------|
| Code                       | Description | Gross Area | Living Area   |
| BAS                        | First Floor | 1,200      | 1,200         |
|                            |             | 1,200      | 1,200         |

### Extra Features

| Extra Features             |  | <u>Legend</u> |
|----------------------------|--|---------------|
| No Data for Extra Features |  |               |

### Land

#### Land Use

**Use Code** 21V  
**Description** Ex Com MDL-00  
**Zone** R-2  
**Neighborhood** 4000  
**Alt Land Appr** No  
**Category**

#### Land Line Valuation

**Size (Acres)** 74.12  
**Frontage**  
**Depth**  
**Assessed Value** \$6,967,940  
**Appraised Value** \$9,954,200

### Outbuildings

| Outbuildings             |  | <u>Legend</u> |
|--------------------------|--|---------------|
| No Data for Outbuildings |  |               |

### Valuation History

| Appraisal      |              |             |             |
|----------------|--------------|-------------|-------------|
| Valuation Year | Improvements | Land        | Total       |
| 2015           | \$45,500     | \$9,954,200 | \$9,999,700 |



|      |          |             |             |
|------|----------|-------------|-------------|
| 2014 | \$45,500 | \$9,954,200 | \$9,999,700 |
| 2013 | \$45,500 | \$9,954,200 | \$9,999,700 |

| <b>Assessment</b>     |                     |                    |                    |
|-----------------------|---------------------|--------------------|--------------------|
| <b>Valuation Year</b> | <b>Improvements</b> | <b>Land</b>        | <b>Total</b>       |
| 2015                  | \$31,850            | \$6,967,940        | \$6,999,790        |
| 2014                  | \$31,850            | \$6,967,940        | <b>\$6,999,790</b> |
| 2013                  | \$31,850            | <b>\$6,967,940</b> | <b>\$6,999,790</b> |

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# **ATTACHMENT 5**



**Certificate of Mailing — Firm**

Name and Address of Sender

Kenneth C. Baldwin, Esq.  
Robinson & Cole LLP  
280 Trumbull Street  
Hartford, CT 06103

Affix Stamp Here  
Postmark with Date of Receipt.

TOTAL NO.  
of Pieces Listed by Sender

2

TOTAL NO.  
of Pieces Received at Post Office™

2

Postmaster, per (name of receiving employee)

06103

DEC 27 2017

USPS

neopost

12/27/2017

**US POSTAGE \$002.38**



ZIP 06103

041L12203680

USPS® Tracking Number  
Firm-specific Identifier

Address  
(Name, Street, City, State, and ZIP Code™)

1. Lynne Vanderslice, First Selectwoman  
Town of Wilton  
238 Danbury Road  
Wilton, CT 06897

2. Robert Nemej, Director of Planning and Land  
Use Management  
Town of Wilton  
238 Danbury Road  
Wilton, CT 06897

3.

4.

5.

6.

Parcel Airlift

Special Handling

Fee

Postage