David Ford, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767
Mobile: (508) 821-6509
dford@clinellc.com

August 2, 2016

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification // Site Number: CT1141
179 Shunpike Road (Site Name: Cromwell US MIL)
N 41.6232231 // W -72.6790381

Dear Ms. Bachman:

New Cingular Wireless, PCS, LLC (ñAT&Tò) currently maintains three (9) antennas at the 115 foot level of the existing 170 foot self-support tower at 179 Shunpike Road, Cromwell, CT 06416. The tower is owned by Cromwell Fire District. The property is also owned by Cromwell Fire District. AT&T now intends to swap three (3) existing antennas with three (3) new larger antennas, adding three (3) RRUS-12+A2 radios, (3) RRUS-32 radios, (1) Raycap surge arrestor, (2) DC power lines and (1) Fiber line. These antennas and equipment would be installed at the 115 foot level of the tower.

The current proposal involves an antenna swap only (three for three); no antennas will be added.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 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 Enzo Faienza, Mayor for the Town of Cromwell, as well as the tower owner and ground owner, Cromwell Fire District. The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

Attached to accommodate this filing are construction drawings dated 8/1/2016 by ComEx Consultants, a structural analysis dated 7/16/2016 by AECOM and an Emissions Analysis Report dated 8/2/2016 by EBI Consulting.

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications 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 emissions at the facility to a level at or above the Federal Communications Commission safety standard.

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

6. The existing structure and its foundation can support the proposed loading as shown in the attached structural analysis by AECOM, dated 7/16/2016.

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

Sincerely,

_____

David Ford, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767
Mobile: (508) 821-6509
dford@clinellc.com

Attachments

cc: Enzo Faienza, Mayor, Town of Cromwell - as elected official
Cromwell Fire District - as tower owner
Cromwell Fire Distruict - as property owner

EBI Consulting
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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

AT&T Existing Facility

Site ID: CT1141

Cromwell US Mil
179 Shunpike Road
Cromwell, CT 06416

August 2, 2016

EBI Project Number: 6616000142

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	15.32 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
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August 2, 2016

AT&T Mobility – New England
Attn: Cameron Syme, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CT1141 – Cromwell US Mil**

EBI Consulting was directed to analyze the proposed AT&T facility located at **179 Shunpike Road, Cromwell, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **179 Shunpike Road, Cromwell, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 LTE channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (WCS Band – 2300 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **CCI HPA-65R-BUU-H6, Quintel QS66512-3, KMW AM-X-CD-16-65-00T-RET and the Powerwave 7770.00** for transmission in the 700 MHz, 850 MHz 1900 MHz (PCS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is **115 feet** above ground level (AGL).

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

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AT&T Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	115 feet	Height (AGL):	115 feet	Height (AGL):	115 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A1 MPE%	**0.84**	Antenna B1 MPE%	**0.84**	Antenna C1 MPE%	**0.84**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Quintel QS66512-3	Make / Model:	Quintel QS66512-3	Make / Model:	Quintel QS66512-3
Gain:	12.0 / 15.6 dBd	Gain:	12.0 / 15.6 dBd	Gain:	12.0 / 15.6 dBd
Height (AGL):	115 feet	Height (AGL):	115 feet	Height (AGL):	115 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	9,664.81	ERP (W):	9,664.81	ERP (W):	9,664.81
Antenna A2 MPE%	**3.14**	Antenna B2 MPE%	**3.14**	Antenna C2 MPE%	**3.14**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	KMW AM-X-CD-16-65-00T-RET	Make / Model:	CCI OPA-65R-BUU-H6	Make / Model:	CCI OPA-65R-BUU-H6
Gain:	13.35 dBd	Gain:	11.95 dBd	Gain:	11.95 dBd
Height (AGL):	115 feet	Height (AGL):	115 feet	Height (AGL):	115 feet
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	240	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,595.26	ERP (W):	1,880.10	ERP (W):	1,880.10
Antenna A3 MPE%	**1.68**	Antenna B3 MPE%	**1.22**	Antenna C3 MPE%	**1.22**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**5.66 %**
T-Mobile	2.85 %
CR Police Dept	0.23 %
CR Fire Dept	0.12 %
CR Fire Dept	0.12 %
CR Fire Alarm	0.40 %
Clearwire	0.11 %
Sprint	0.19 %
Verizon Wireless	5.64 %
Site Total MPE %:	**15.32 %**

AT&T Sector 1 Total:	5.66 %
AT&T Sector 2 Total:	5.20 %
AT&T Sector 3 Total:	5.20 %
Site Total:	15.32 %

AT&T _ Per Sector (Highest Calculated Sector – Sector A)	**# Channels**	**Watts ERP (Per Channel)**	**Height (feet)**	**Total Power Density ($\mu W/cm^2$)**	**Frequency (MHz)**	**Allowable MPE ($\mu W/cm^2$)**	**Calculated % MPE**
AT&T 850 MHz UMTS	2	414.12	115	2.51	850	567	0.44 %
AT&T 1900 MHz (PCS) UMTS	2	656.33	115	3.97	1900	1000	0.40 %
AT&T 850 MHz GSM	2	475.47	115	2.88	850	567	0.51 %
AT&T 1900 MHz (PCS) LTE	2	2178.47	115	13.18	1900	1000	1.32 %
AT&T 2300 MHz (WCS) LTE	2	2178.47	115	13.18	2300	1000	1.32 %
AT&T 700 MHz LTE	2	1297.63	115	7.85	700	467	1.68 %
						Total:	5.66 %

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector 1:	5.66 %
Sector 2:	5.20 %
Sector 3:	5.20 %
AT&T Maximum Total (per sector):	5.66 %
Site Total:	15.32 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **15.32 %** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

AECOM

Submitted to
AT&T Mobility
550 Cochituate Road
Suite 550 13&14
Framingham, MA 01701

Cromwell Fire District
One West Street
Cromwell, CT 06416

Submitted by
AECOM
500 Enterprise Drive,
Suite 3B
Rocky Hill, CT 06067
July 16, 2016

DETAILED STRUCTURAL ANALYSIS AND EXALUATION OF AN EXISTING 170' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

at&t

AT&T Site I.D. #: CT1141 / Cromwell Us MIL
Site Address: 179 Shunpike Road
Cromwell, CT

60512677
CFD-010

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1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 170' self-supporting lattice tower located at 179 Shunpike Road in Cromwell, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 100 mph which converts to an 80 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 85 mph (fastest mile). The wind speed from the TIA/EIA-222-F standard governs the design at 85 mph (fastest mile) and 74 mph (fastest mile) concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

The proposed AT&T antenna modifications are listed below:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(3) Powerwave 7770 Panel Antennas (1 per sector, GSM)**	**AT&T (Remove)**	**@ 115'**
Install: **(3) Quintel QS66512-3 Panel Antennas (1 per sector, LTE/GSM)** **(3) Ericsson RRUS-12 RRH Units** **(3) Ericsson A2 Module Units** **(3) Ericsson RRUS-32 RRH Units** **(1) Surge Suppressor Unit** **(1) Fiber Optic Cable** **(2) DC Cables**	**AT&T (Proposed)**	**@ 115'**

The results of the analysis indicate that the existing tower structure, anchor bolts and foundation have the capacity to support the proposed loading conditions. **The tower structure, anchor bolts and foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

The analysis results presented herewith are based upon the completed construction of previous tower modifications proposed by URS Corporation's tower modification analysis report, project 36931260, signed and sealed on September 23, 2014. If the tower has not been modified to the specifications proposed by URS, please notify the engineer in writing immediately. No installation of new antennas or equipment shall occur until the modifications have been completed.

1. EXECUTIVE SUMMARY (continued)

This analysis is based on:

1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry, structural member sizes, and Foundation information taken from a tower report prepared by PiROD Inc., ENG. File No. A-116398, dated November 18, 1999.
3) Foundation modification drawings prepared by Tectonic, dated May 5, 2004.
4) Structural analysis and reinforcement performed by URS Corp. on behalf of Sprint and T-Mobile, project number 36931250, signed and sealed on September 23, 2014.
5) Structural Analysis and evaluation performed by URS Corporation, on behalf of Verizon Wireless (VZW), signed and sealed on January 7, 2015.
6) Proposed Antenna equipment obtained from Radio Frequency Data Sheet (RFDS), dated September 15, 2015, obtained via e-mail, dated July 7, 2016.
7) Contract Drawings of proposed antenna installation obtained via e-mail, dated July 7, 2016.
8) Proposed additional antenna and mount configuration as specified in Section 2 of this report.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the antenna, cabling and mount configuration used as well as the physical condition of the tower members, connections and foundation. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

AECOM, *contracting as URS Corporation AES,*

STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9057
LICENSED
PROFESSIONAL ENGINEER

Richard A. Sambor, P.E.
Senior Structural Engineer

RAS/mcd

2. INTRODUCTION

The subject tower is located at 179 Shunpike Road in Cromwell, Connecticut. The structure is a 170' self supporting lattice tower designed and manufactured by PiROD Inc.

The current inventory with proposed modification is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) Tx Rx 101-90-08 antenna	Town (existing)	15' Mast pipe on 9 Arm Halo Mount	183'	(1) 7/8"
(1) 8 Bay Dipole (3" dia x 20')	Town (existing)	9 Arm Halo Mount	178'	(1) 7/8"
(1) 2 ½" dia x 20' Whip	Town (existing)	9 Arm Halo Mount	178'	(1) 1 1/2"
(3) 2 ½" dia x 15' Whip	Town (existing)	9 Arm Halo Mount	175'	(3) 7/8"
1 ½" dia x 12' Whip	Town (existing)	9 Arm Halo Mount	174'	(1) 7/8"
(3) RFS APXV9TM14-ALU-I20 Panels (3) TD-RRH8x20-25 RRH Units (3) RFS APXVSPP18-C-A20 Antennas (3) 1900 MHz RRHs (3) 800 MHz RRHs (3) 800 MHz Filters	Sprint (existing)	9 Arm Halo Mount	170'	(27) 8' Jumper Cables (3) 8' AISG Cables (4) RFS HB114-1-0804-MSF Hybrid Cables
(1) Radiowaves HPD2-4.7 w/ Radome (1) Cambium PTP49600 Antenna	CPD (existing)	9 Arm Halo Mount	168'	(1) WB3176A – Copper Clad Outdoor Cable (2) 4' long 1/2" Jumper Cables
(1) SU-RA-HP-2.4 (1' x 1' Antenna)	Town (existing)	9 Arm Halo Mount	168'	(1) 3/8"
(3) APXV18-206517S	Unknown (existing)	Leg Mount	159'-6"	(6) 1 5/8"
(1) Sinclair SC420-HF1LDF Omni	CPD (existing)	Pipe mount	158'-6"	(1) 1 5/8" Low Density Foam Cable
(2) 3" dia x 20' Whip	Town (existing)	20' Platform	144'	(2) 7/8"
(1) 2 ½" x 20' Whip	Town (existing)	20' Platform	144'	(1) 1/2"
2" dia x 15' Whip	Town (existing)	20' Platform	141'	(1) 1/2"
(1) 1.5" dia x 10' Whip	Town (existing)	20' Platform	139'	(1) 1/2"
(1) 3.5" dia x 9' Whip	Town (existing)	20' Platform	138'-6"	---

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(3) Argus LLPX310R antennas (3) Samsung Remote Radio Heads U-RAS (3) Andrew VHLP2.5 dish (2.5' dia.) (1) Andrew VHLP2 dish (2' dia.) (Gamma Sector)	Clearwire (existing)	20' Platform	134'	(6) CAT 5 cable (4) 1/2"
(3) Commscope LNX-6515DS-VTM Panel Antennas (3) Ericsson RRUS_11 RRH Unit (6) Ericsson AIR21 B4A|B2P Antennas (3) Twin PCS TMAs	T-Mobile (existing)	(3) Existing T-Frames	125'	(12) 1 5/8" (1) 1-5/8" Hybrid Cable
(3) QS66512-3 Panel Antennas (3) RRUS-12 RRH Units (3) A2 Module Units (3) RRUS-32 RRH Units (1) Surge Suppressor Unit	**AT&T (Proposed)**	***See Below Mounts***	**115'**	**(1) Fiber Optic Cable (2) DC Cables**
(3) Powerwave 7770 (12) TMA's (3) KMW AM-X-CD-16-65-00T-RET (3) RRU (1) Surge Suppressor	AT&T (existing)	(3) T-Frames	115'	(12) 1 5/8" (3) Fiber Optic & (6) DC Cables (Located within 3" dia Flex Conduit)
(3) LNX-4514DS-A1M Panel Antennas (1) HBX-6517DS-VTM_04DT_2110 Panel Antenna (Alpha Sector) (2) HBX-6517DS-VTM_02DT_2110 Panel Antennas (Beta & Gamma Sectors) (3) AWS RRH Units (1) DB-T1-6Z-8AB-0Z Distribution Box (3) LNX-6514DS-VTM Panel Antennas (3) BXA-171063-12BF_2 antennas (6) FD9R6004/2C-3L Diplexers	Verizon (existing)	(3) T-Frames	101'	(1) 1 5/8" F.O Cable (12) 1 5/8"

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	Pipe Mount	87'	(2) CAT 5
(1) 3' Dish (1) TMA	AT&T (existing)	3' Stand-off	83'	(2) CAT 5
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	3' Stand-off	80'	(2) CAT 5
(1) Camera	Unknown (existing)	Leg Mounted	30'	(2) 1/2" (estimated from photographs)
(1) 3' Yagi	Unknown (existing)	Leg Mounted	24'	(1) 1/2"

This structural analysis of the communications tower was performed by AECOM for the Cromwell Fire District on behalf of AT&T. The purpose of this analysis was to investigate the structural integrity of the previously reinforced tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

The analysis results presented herewith are based upon the completed construction of previous tower modifications proposed by URS Corporation's tower modification analysis report, project 36931260, signed and sealed on September 23, 2014. If the tower has not been modified to the specifications proposed by URS, please notify the engineer in writing immediately. No installation of new antennas or equipment shall occur until the modifications have been completed.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Allowable Stress Design (ASD).

The analysis was conducted using TNX Tower 6.1.3.1. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Basic Wind Speed:

- Middlesex County; v = **85** mph (fastest mile) [Section 16 of TIA/EIA-222-F-1996]
- Cromwell; v = 100mph (3 second gust) equivalent to 80mph (fastest mile) [Appendix K, 2005 Connecticut State Building Code Supplement]

Loading Cases:

Load Condition 1 = 85 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of the analysis indicates that the existing tower structure, anchor bolts and foundation have enough capacity to support the proposed loading conditions noted herein. able stresses.

The table below summarizes the critical member capacities for each tower component.

TABLE 1: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Percent Capacity	Pass/Fail
Tower Leg (T5)	PiROD Truss Leg	Compression 90'-100'	**93.2 %**	**Pass**
Diagonal (T7)	L3x3x3/8	Compression 60'-80'	**89.9 %**	**Pass**
Top Girt (T1)	7/8" SR	Compression 150'-170'	**9.7 %**	**Pass**
Bottom Girt (T1)	7/8" SR	Compression 150'-170'	**4.5 %**	**Pass**
Mid Girt (T4)	L3x3x3/16	Compression 100'-120'	**34.4 %**	**Pass**
Bolt Checks				
Tower Bolts	(1) 1" A325N Bolt / 140'	Member Bearing on Bolt	**84.1 %**	**Pass**
Anchor Bolts	(6) 1-1/4"	Tension	**77.6 %**	**Pass**

TABLE 2: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Previously Modified Drilled Concrete Caisson	Uplift	90.7 %/2.70	**Pass**	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

The analysis results presented herewith are based upon the completed construction of previous tower modifications proposed by URS Corporation's tower modification analysis report, project 36931260, signed and sealed on September 23, 2014. If the tower has not been modified to the specifications proposed by URS, please notify the engineer in writing immediately. No installation of new antennas or equipment shall occur until the modifications have been completed.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the existing tower structure, anchor bolts and foundation have the capacity to support the proposed loading conditions. **The tower structure, anchor bolts and foundation are considered structurally adequate with the wind load classification specified with the existing and proposed antenna loading noted herein.**

The analysis results presented herewith are based upon the completed construction of previous tower modifications proposed by URS Corporation's tower modification analysis report, project 36931260, signed and sealed on September 23, 2014. If the tower has not been modified to the specifications proposed by URS, please notify the engineer in writing immediately. No installation of new antennas or equipment shall occur until the modifications have been completed.

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations are in good condition without defect and were properly constructed to support original design loads as specified in the original design documents.

AECOM is not responsible for any modifications completed prior to or hereafter in which AECOM is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

AECOM hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact AECOM. AECOM disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Ongoing and Periodic Inspection and Maintenance:

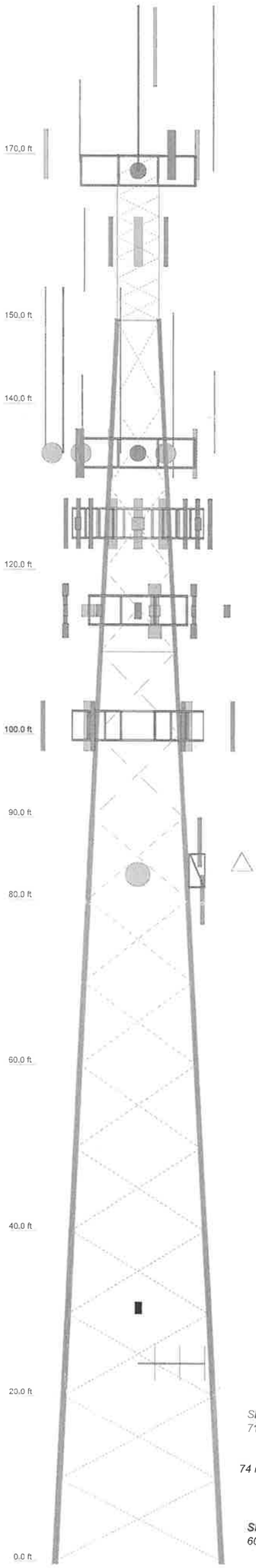
After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

TNX TOWER INPUT/OUTPUT SUMMARY

Section	1	2	3	4	5	6	7	8	9	10	11	12
Legs	Pirod 105220 reinf w/ 1" dia bar	Pirod 105219 reinf w/ 1" dia bar	Pirod 105219	Pirod 105218 reinf w/ 1" dia bar	A	Pirod 105217	Pirod 105216	Pirod 105244	SR 1 3/4			
Leg Grade	A572-50											
Diagonals	L4x4x5/16	L 3 1/2x3 1/2x3/8	L 3 1/2x3 1/2x5/16	L3x3x3/8	L3x3x5/16	L3x3x1/4	L3x3x3/16	L 2 1/2x2 1/2x3/16	SR 7/8			
Diagonal Grade	A36								A572-50			
Top Girts	N.A.							L3x3x3/16	SR 7/8			
Mid Girts	N.A.				L3x3x3/16			N.A.				
Bottom Girts	N.A.								SR 7/8			
Face Width (ft)	20	18	16	14	12	10	8	6	5			
# Panels @ (ft)				15 @ 10					8 @ 2.48958			
Weight (K)	30.7	61	54	49	43	29	21	11	12			



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
101-90-08-0-01 (Municipal)	183	RRUS-11 (T-Mobile)	125.5
15' Mount Pipe (Municipal)	179.75	RRUS-11 (T-Mobile)	125.5
3" Dia 20' Omni (Municipal)	178	RRUS-11 (T-Mobile)	125.5
2.5" x 20'6" Whip (Municipal)	178	(2) TMA (shielded) (ATT)	115
2.5" x 14' Omni (Municipal)	175	(2) TMA (shielded) (ATT)	115
2.5" x 14' Omni (Municipal)	175	(2) TMA (shielded) (ATT)	115
2.5" x 14' Omni (Municipal)	175	PiROD 12' Lightweight T-Frame (ATT)	115
1.5" x 12' Omni (Municipal)	174	PiROD 12' Lightweight T-Frame (ATT)	115
APXVSPP18-C-A20 (Sprint)	170	PiROD 12' Lightweight T-Frame (ATT)	115
APXVSPP18-C-A20 (Sprint)	170	7770 (ATT)	115
APXVSPP18-C-A20 (Sprint)	170	QS66512-3 Quintel Panel (ATT)	115
Panasonic RRH 1900MHZ (Sprint)	170	7770 (ATT)	115
Panasonic RRH 1900MHZ (Sprint)	170	QS66512-3 Quintel Panel (ATT)	115
Panasonic RRH 1900MHZ (Sprint)	170	7770 (ATT)	115
Andrew 800MHz RRH (Sprint)	170	QS66512-3 Quintel Panel (ATT)	115
Andrew 800MHz RRH (Sprint)	170	AM-X-CD-16-65-00T-RET (6') (ATT)	115
Andrew 800MHz RRH (Sprint)	170	AM-X-CD-16-65-00T-RET (6') (ATT)	115
APXV9TM14-120 (Sprint)	170	AM-X-CD-16-65-00T-RET (6') (ATT)	115
APXV9TM14-120 (Sprint)	170	RRUS-11 (ATT)	115
APXV9TM14-120 (Sprint)	170	RRUS-11 (ATT)	115
TD-RRH8x20-25 (Sprint)	170	RRUS-11 (ATT)	115
TD-RRH8x20-25 (Sprint)	170	DC6-48-60-18-8F (Squid) Suppressor (ATT)	115
TD-RRH8x20-25 (Sprint)	170	RRUS-11 (ATT)	115
9 Arm Halo Mount (Municipal)	168	RRUS-11 (ATT)	115
SU-RA-HP-2.4 Antenna (Municipal)	168	RRUS-11 (ATT)	115
PTP49600 (CPD)	168	RRUS-32 (ATT)	115
HPD2-4.7	168	RRUS-32 (ATT)	115
APXV18-206517S-C w/ mounting hardware	159.5	RRUS-32 (ATT)	115
APXV18-206517S-C w/ mounting hardware	159.5	A2 Module Unit (ATT)	115
APXV18-206517S-C w/ mounting hardware	159.5	A2 Module Unit (ATT)	115
SC420-HF1LDF (Municipal)	158.5	A2 Module Unit (ATT)	115
3" Dia 20' Omni (Municipal)	144	DC6-48-60-18-8F (Squid) Suppressor (ATT)	115
3" Dia 20' Omni (Municipal)	144	BXA-171063-12BF (Verizon - PCS)	101
2.5" x 20'6" Whip (Municipal)	144	BXA-171063-12BF (Verizon - PCS)	101
2" Dia 15' Omni (Municipal)	141	BXA-171063-12BF (Verizon - PCS)	101
1.5" x 10' Omni (Municipal)	139	PiROD 12' Lightweight T-Frame (Verizon)	101
9' Whip (Municipal)	138.5	PiROD 12' Lightweight T-Frame (Verizon)	101
Argus LLPX310R (Clearwire)	134	PiROD 12' Lightweight T-Frame (Verizon)	101
Argus LLPX310R (Clearwire)	134	(2) Diplexer (Verizon - 850)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	(2) Diplexer (Verizon - 850)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	(2) Diplexer (Verizon - 850)	101
PiROD 20' Universal Platform (Municipal)	134	HBX-6517DS-VTM (Verizon - AWS)	101
Argus LLPX310R (Clearwire)	134	HBX-6517DS-VTM (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	HBX-6517DS-VTM (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	RH_2X40-AWS (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	RH_2X40-AWS (Verizon - AWS)	101
VHLP2-180 (Clearwire)	134	RH_2X40-AWS (Verizon - AWS)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	DB-T1-6Z-8AB-0Z (Verizon - AWS)	101
PiROD 10' Lightweight T-Frame (T-Mobile)	125.5	LNX-6514DS-T4M (Verizon - 850)	101
PiROD 10' Lightweight T-Frame (T-Mobile)	125.5	LNX-6514DS-T4M (Verizon - 850)	101
PiROD 10' Lightweight T-Frame (T-Mobile)	125.5	LNX-6514DS-T4M (Verizon - 850)	101
AIR B2A/B4P (T-Mobile)	125.5	LNX-4514DS-A1M (Verizon - LTE)	101
AIR B2A/B4P (T-Mobile)	125.5	LNX-4514DS-A1M (Verizon - LTE)	101
AIR B2A/B4P (T-Mobile)	125.5	LNX-4514DS-A1M (Verizon - LTE)	101
AIR B2A/B4P (T-Mobile)	125.5	3'x2'x22" Panel	87
AIR B2A/B4P (T-Mobile)	125.5	TMA	84.5
AIR B2A/B4P (T-Mobile)	125.5	3' Stand-off	83.5
Twin PCS TMA (T-Mobile)	125.5	3' Stand-off	83.5
Twin PCS TMA (T-Mobile)	125.5	3' Dish	83
Twin PCS TMA (T-Mobile)	125.5	TMA	83
LNX-6515DS-VTM w/ 6' 2" sch 40 Pipe Mount (T-Mobile)	125.5	TMA	82.5
LNX-6515DS-VTM w/ 6' 2" sch 40 Pipe Mount (T-Mobile)	125.5	3'x2'x22" Panel	80
LNX-6515DS-VTM w/ 6' 2" sch 40 Pipe Mount (T-Mobile)	125.5	Camera	30
		PC9013N	24

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105217 reinf w/ 1" dia bar		

MATERIAL STRENGTH

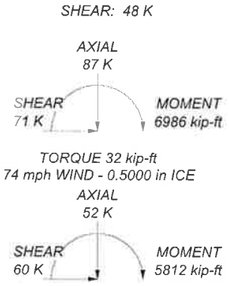
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

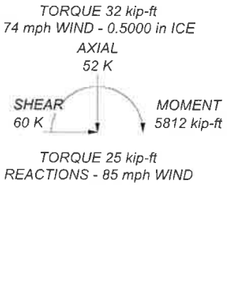
1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 93.2%

MAX. CORNER REACTIONS AT BASE:
DOWN: 432 K
SHEAR: 38 K

UPLIFT: -369 K
SHEAR: 48 K



TORQUE 32 kip-ft
74 mph WIND - 0.5000 in ICE



TORQUE 25 kip-ft
REACTIONS - 85 mph WIND

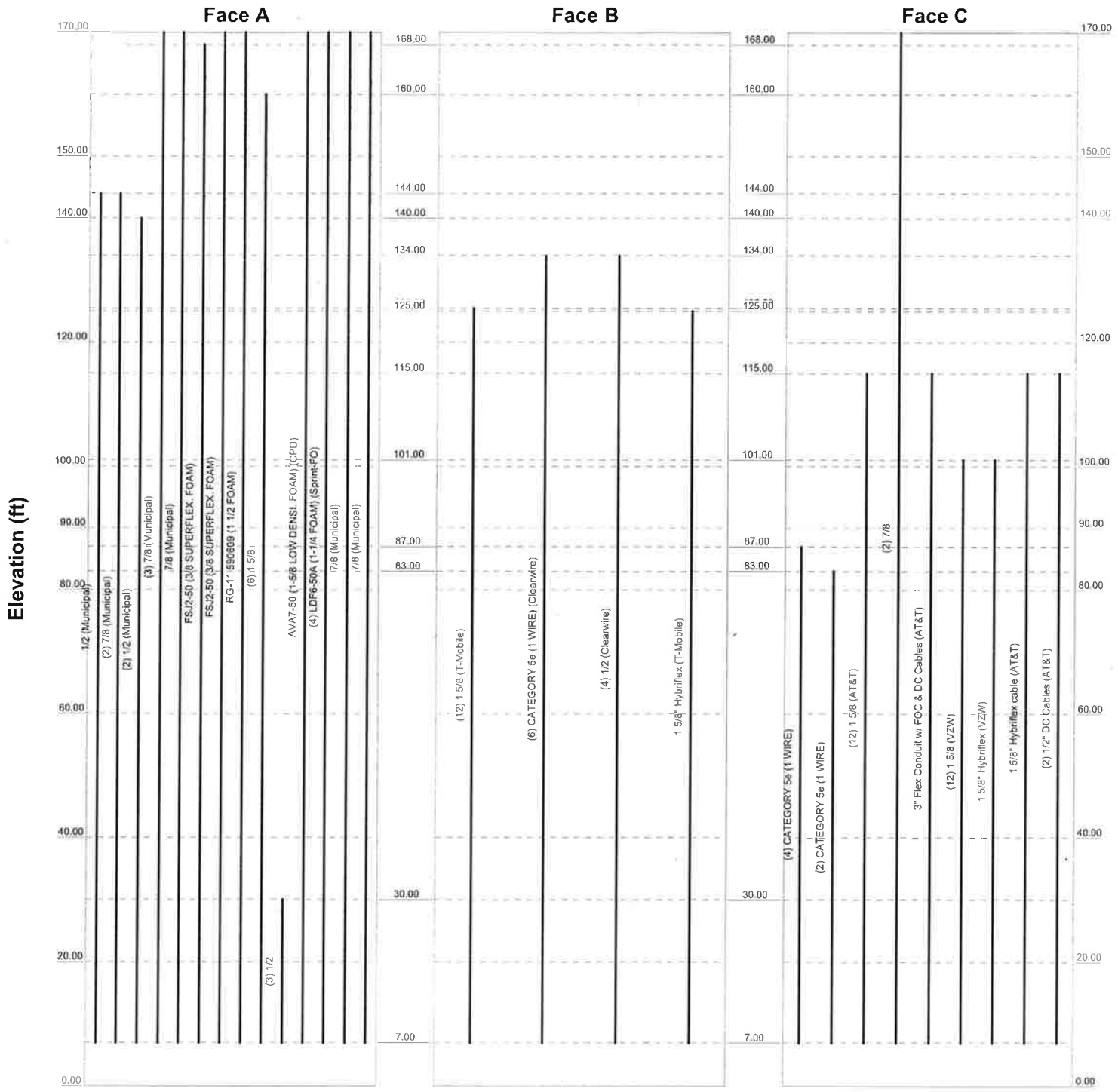
AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

Job:	PiROD U20'-0"x170' Lattice Tower
Project:	CFD-010 / Cromwell, CT Tower
Client:	Structural Analysis - AT&T Assessment
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	07/16/16
Scale:	NTS
Path:	
Dwg No.	E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feed Line Distribution Chart
0' - 170'

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



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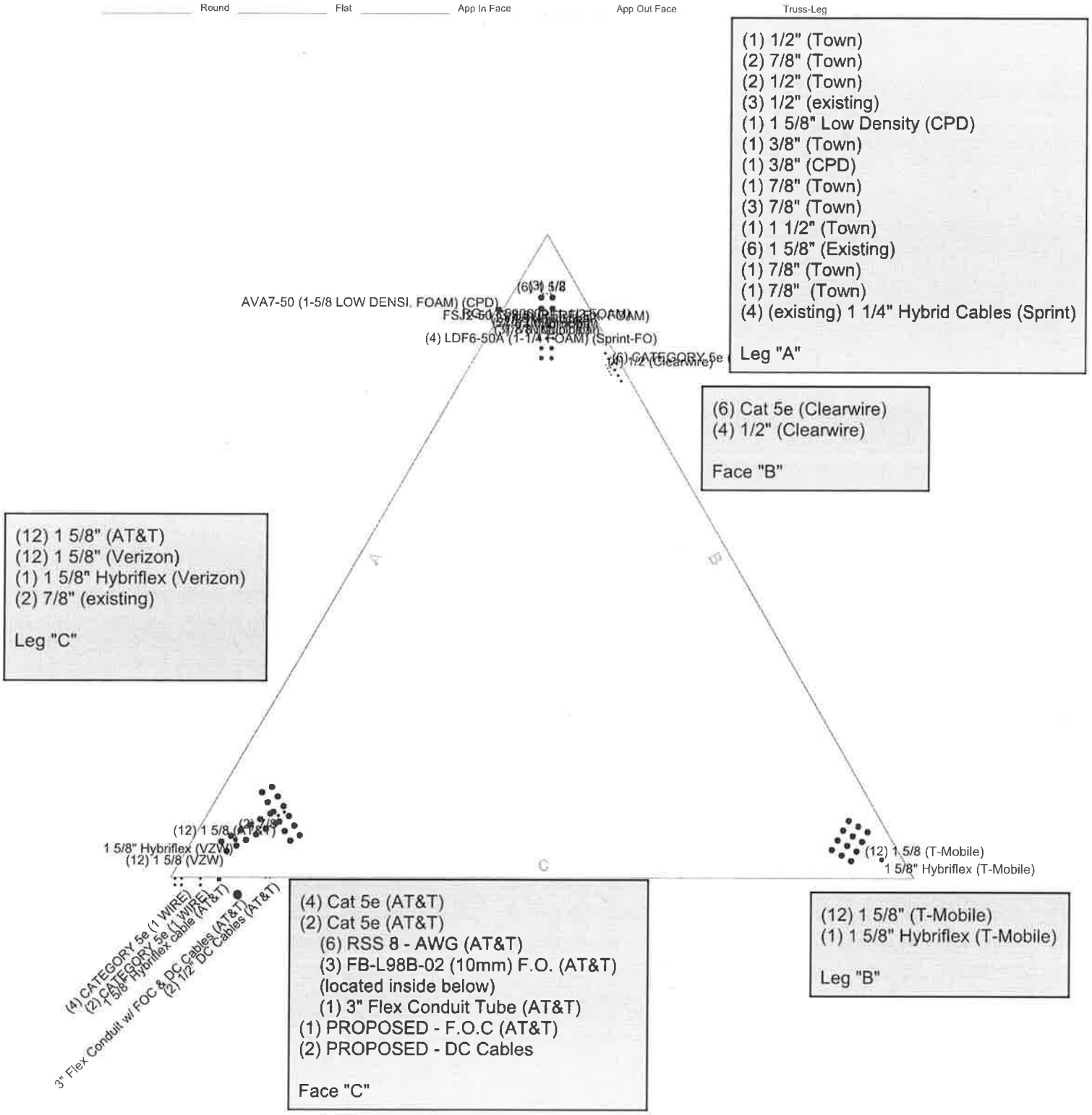
Client:	Structural Analysis - AT&T Assessment
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	07/16/16
Scale:	NTS
Path:	
Dwg No.	E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan



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Project:	***CFD-010 / Cromwell, CT Tower***
Client:	Structural Analysis - AT&T Assessment
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	07/16/16
Scale:	NTS
Path:	
Dwg No.	E-7

TNX TOWER DETAILED OUTPUT

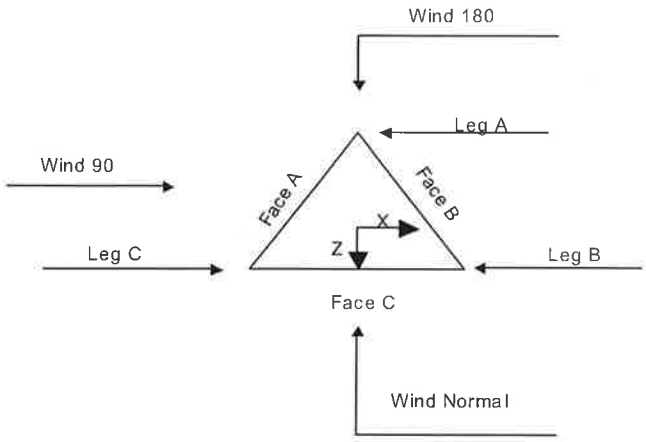
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 170.00 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 5.00 ft at the top and 20.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	170.00-150.00			5.00	1	20.00
T2	150.00-140.00		U6.0 105244	5.00	1	10.00
T3	140.00-120.00		U8.0 105216	6.00	1	20.00
T4	120.00-100.00		U10.0 105217 L3x3/16	8.00	1	20.00
T5	100.00-90.00		U12.0 105216	10.00	1	10.00
T6	90.00-80.00		U12.0 105216	11.00	1	10.00
T7	80.00-60.00		U14.0 105218	12.00	1	20.00
T8	60.00-40.00		U16.0 105219	14.00	1	20.00
T9	40.00-20.00		U18.0 105219	16.00	1	20.00
T10	20.00-0.00		U20.0 105219 L4x1/4	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	170.00-150.00	2.49	X Brace	No	No	0.0000	1.0000
T2	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-90.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	90.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 170.00-150.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 100.00-90.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T6 90.00-80.00	Truss Leg	Pirod 105217 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 80.00-60.00	Truss Leg	Pirod 105218 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x3/8	A36 (36 ksi)
T8 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 40.00-20.00	Truss Leg	Pirod 105219 reinf w /1" dia bar	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T10 20.00-0.00	Truss Leg	Pirod 105220 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 170.00-150.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T4 120.00-100.00	1	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 170.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T2 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T5 100.00-90.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T6 90.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	0.0000	0.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
170.00-150.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
150.00-140.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
100.00-90.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
90.00-80.00				1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T7	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2	1	0.5	0.85	1	0.5	0.85
150.00-140.00						
T3	1	0.5	0.85	1	0.5	0.85
140.00-120.00						
T4	1	0.5	0.85	1	0.5	0.85
120.00-100.00						
T5	1	0.5	0.85	1	0.5	0.85
100.00-90.00						
T6	1	0.5	0.85	1	0.5	0.85
90.00-80.00						
T7	1	0.5	0.85	1	0.5	0.85
80.00-60.00						
T8	1	0.5	0.85	1	0.5	0.85
60.00-40.00						
T9	1	0.5	0.85	1	0.5	0.85
40.00-20.00						
T10	1	0.5	0.85	1	0.5	0.85
20.00-0.00						

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg: Net Width Deduct in	Leg: U	Diagonal: Net Width Deduct in	Diagonal: U	Top Girt: Net Width Deduct in	Top Girt: U	Bottom Girt: Net Width Deduct in	Bottom Girt: U	Mid Girt: Net Width Deduct in	Mid Girt: U	Long Horizontal: Net Width Deduct in	Long Horizontal: U	Short Horizontal: Net Width Deduct in	Short Horizontal: U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
170.00-150.00														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T2 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-90.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 90.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 170.00-150.00	Flange	0.7500 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 150.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-90.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 90.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-0.00	Flange	0.0000 A325N	0	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
CATEGORY	C	Yes	Ar (CfAe)	87.00 - 7.00	0.0000	0.49	4	2	1.0000	1.0000		0.21

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
5e (1 WIRE) CATEGORY	C	Yes	Ar (CfAe)	83.00 - 7.00	0.0000	0.46	2	1	1.0000	1.0000		0.21
5e (1 WIRE) 1/2 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	1	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	2	1	1.0000	1.1100		0.54
1/2 (Municipal)	A	No	Ar (Leg)	140.00 - 7.00	0.0000	0.13	2	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	3	1	1.0000	1.1100		0.54
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	1	1	1.1100	1.1100		0.54
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
RG-11 590609 (1 1/2 FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	1.5000	1.5900		0.94
1 5/8 (T-Mobile)	B	No	Ar (Leg)	125.50 - 7.00	0.0000	0.1	12	3	1.5000	1.9800		1.04
1 5/8 (AT&T)	C	No	Ar (Leg)	115.00 - 7.00	0.0000	0.17	12	2	1.5000	1.9800		1.04
7/8	C	No	Ar (Leg)	170.00 - 7.00	0.0000	0.17	2	2	1.0000	1.1100		0.54
1 5/8	A	No	Ar (Leg)	160.00 - 7.00	0.0000	0.1	6	3	1.5000	1.9800		1.04
CATEGORY 5e (1 WIRE) (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-2.0000	-0.3	6	6	1.0000	1.0000		0.21
1/2 (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-4.0000	-0.3	4	4	0.5800	0.5800		0.25
3" Flex Conduit w/ FOC & DC Cables (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	4.0000	0.41	1	1	0.0000	3.0000		3.00
1/2	A	No	Ar (Leg)	30.00 - 7.00	0.0000	0.08	3	1	0.5800	0.5800		0.25
AVA7-50 (1-5/8 LOW DENSI. FOAM) (CPD)	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.38	1	1	1.5000	1.9800		0.72
1 5/8" Hybriflex (T-Mobile)	B	No	Ar (Leg)	125.00 - 7.00	0.0000	0.05	1	1	1.5750	1.5750		1.07
LDF6-50A (1-1/4 FOAM) (Sprint-FO)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.16	4	2	1.5500	1.5500		0.66
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.132	1	1	1.1100	1.1100		0.54
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.132	1	1	1.1100	1.1100		0.54
1 5/8 (VZW)	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.12	12	6	1.5000	1.9800		1.04
1 5/8" Hybriflex (VZW)	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.1	1	1	1.5000	1.5000		1.07
*** Proposed AT&T 7/2016 ***												

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8" Hybriflex cable (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	0.0000	0.435	1	1	1.5000	1.5000		1.07
1/2" DC Cables (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	0.0000	0.37	2	2	0.5800	0.5800		0.25

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-150.00	A	40.136	0.000	0.000	0.000	0.22
		B	33.136	0.000	0.000	0.000	0.00
		C	3.700	0.000	0.000	0.000	0.02
T2	150.00-140.00	A	25.105	0.000	0.000	0.000	0.14
		B	21.605	0.000	0.000	0.000	0.00
		C	1.850	0.000	0.000	0.000	0.01
T3	140.00-120.00	A	54.943	0.000	0.000	0.000	0.32
		B	64.964	0.000	0.000	0.000	0.11
		C	11.015	0.000	0.000	0.000	0.02
T4	120.00-100.00	A	81.367	0.000	0.000	0.000	0.32
		B	88.646	0.000	0.000	0.000	0.32
		C	64.037	0.000	0.000	0.000	0.29
T5	100.00-90.00	A	61.596	0.000	0.000	0.000	0.16
		B	44.323	0.000	0.000	0.000	0.16
		C	54.110	0.000	0.000	0.000	0.32
T6	90.00-80.00	A	61.596	0.000	0.000	0.000	0.16
		B	44.323	0.000	0.000	0.000	0.16
		C	56.843	0.000	0.000	0.000	0.32
T7	80.00-60.00	A	123.191	0.000	0.000	0.000	0.32
		B	88.646	0.000	0.000	0.000	0.32
		C	117.933	0.000	0.000	0.000	0.66
T8	60.00-40.00	A	123.191	0.000	0.000	0.000	0.32
		B	88.646	0.000	0.000	0.000	0.32
		C	117.933	0.000	0.000	0.000	0.66
T9	40.00-20.00	A	124.641	0.000	0.000	0.000	0.32
		B	90.096	0.000	0.000	0.000	0.32
		C	117.933	0.000	0.000	0.000	0.66
T10	20.00-0.00	A	81.959	0.000	0.000	0.000	0.21
		B	59.505	0.000	0.000	0.000	0.21
		C	76.657	0.000	0.000	0.000	0.43

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-150.00	A	0.500	58.953	3.517	0.000	0.000	0.60
		B		50.470	0.000	0.000	0.000	0.00
		C		3.517	3.517	0.000	0.000	0.07
T2	150.00-140.00	A	0.500	36.013	1.758	0.000	0.000	0.39
		B		31.771	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		1.758	1.758	0.000	0.000	0.03
T3	140.00-120.00	A	0.500	82.393	3.517	0.000	0.000	0.87
		B		86.276	15.727	0.000	0.000	0.35
		C		11.706	3.517	0.000	0.000	0.07
T4	120.00-100.00	A	0.500	110.234	3.517	0.000	0.000	0.87
		B		110.046	22.467	0.000	0.000	0.90
		C		71.628	4.967	0.000	0.000	0.70
T5	100.00-90.00	A	0.500	77.821	1.758	0.000	0.000	0.44
		B		55.023	11.233	0.000	0.000	0.45
		C		60.201	2.725	0.000	0.000	0.76
T6	90.00-80.00	A	0.500	77.821	1.758	0.000	0.000	0.44
		B		55.023	11.233	0.000	0.000	0.45
		C		62.368	4.375	0.000	0.000	0.81
T7	80.00-60.00	A	0.500	155.641	3.517	0.000	0.000	0.87
		B		110.046	22.467	0.000	0.000	0.90
		C		130.402	10.164	0.000	0.000	1.67
T8	60.00-40.00	A	0.500	155.641	3.517	0.000	0.000	0.87
		B		110.046	22.467	0.000	0.000	0.90
		C		130.402	10.164	0.000	0.000	1.67
T9	40.00-20.00	A	0.500	158.891	3.517	0.000	0.000	0.90
		B		113.296	22.467	0.000	0.000	0.90
		C		130.402	10.164	0.000	0.000	1.67
T10	20.00-0.00	A	0.500	105.392	2.286	0.000	0.000	0.60
		B		75.755	14.603	0.000	0.000	0.58
		C		84.762	6.607	0.000	0.000	1.09

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	170.00-150.00	A	0.239	0.771	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	150.00-140.00	A	0.000	0.106	0.184	0.277
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	140.00-120.00	A	0.000	0.145	0.289	0.435
		B	0.000	0.580	0.849	1.741
		C	0.000	0.000	0.000	0.000
T4	120.00-100.00	A	0.000	0.145	0.288	0.434
		B	0.000	0.828	1.212	2.484
		C	0.000	0.336	0.618	1.009
T5	100.00-90.00	A	0.000	0.057	0.114	0.171
		B	0.000	0.327	0.479	0.981
		C	0.000	0.177	0.326	0.532
T6	90.00-80.00	A	0.000	0.055	0.109	0.165
		B	0.000	0.314	0.459	0.942
		C	0.000	0.233	0.406	0.698
T7	80.00-60.00	A	0.000	0.105	0.208	0.314
		B	0.000	0.598	0.875	1.795
		C	0.000	0.534	0.911	1.603
T8	60.00-40.00	A	0.000	0.100	0.231	0.348
		B	0.000	0.570	0.973	1.994
		C	0.000	0.509	1.012	1.781
T9	40.00-20.00	A	0.000	0.096	0.223	0.336
		B	0.000	0.550	0.939	1.925

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
		C	0.000	0.491	0.977	1.719
T10	20.00-0.00	A	0.000	0.061	0.162	0.243
		B	0.000	0.348	0.679	1.393
		C	0.000	0.311	0.707	1.244

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	170.00-150.00	-0.7973	-8.0376	-0.4853	-7.4212
T2	150.00-140.00	-0.4988	-6.6293	-0.3283	-6.3594
T3	140.00-120.00	0.9113	-8.7179	0.7562	-8.8599
T4	120.00-100.00	-0.5486	-4.0538	-0.2522	-5.7032
T5	100.00-90.00	-5.4043	-0.9809	-4.1954	-3.3564
T6	90.00-80.00	-6.5423	-0.5574	-4.9887	-3.2522
T7	80.00-60.00	-7.8366	-0.2220	-6.1271	-3.1725
T8	60.00-40.00	-8.7514	-0.2611	-6.8645	-3.5781
T9	40.00-20.00	-9.6366	-0.6192	-7.5330	-4.4637
T10	20.00-0.00	-8.4850	-0.8082	-6.5824	-4.3369

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
101-90-08-0-01 (Municipal)	A	From Leg	9.00 2.00 0.00	0.0000	183.00	No Ice 1/2" Ice	3.33 4.31	3.33 4.31	0.04 0.06
15' Mount Pipe (Municipal)	A	From Leg	9.00 2.00 0.00	0.0000	179.75	No Ice 1/2" Ice	4.50 6.03	4.50 6.03	0.09 0.12
3" Dia 20' Omni (Municipal)	B	From Face	9.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	0.06 0.10
2.5" x 20'6" Whip (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
1.5" x 12' Omni	A	From Face	9.00	0.0000	174.00	No Ice	1.50	1.50	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Municipal)			4.00 0.00			1/2" Ice	2.52	2.52	0.07
9 Arm Halo Mount (Municipal)	C	None		0.0000	168.00	No Ice 1/2" Ice	62.60 80.40	62.60 80.40	3.60 4.80
SU-RA-HP-2.4 Antenna (Municipal)	B	From Face	9.00 2.50 0.00	0.0000	168.00	No Ice 1/2" Ice	0.80 0.93	0.37 0.47	0.00 0.01
PTP49600 (CPD)	C	From Leg	9.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.04 2.24	0.53 0.65	0.01 0.02
APXV18-206517S-C w/ mounting hardware	A	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	B	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	C	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
SC420-HF1LDF (Municipal)	A	From Face	6.00 0.00 0.00	0.0000	158.50	No Ice 1/2" Ice	2.14 3.02	2.14 3.02	0.02 0.03
3" Dia 20' Omni (Municipal)	C	From Face	6.00 9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	0.06 0.10
3" Dia 20' Omni (Municipal)	A	From Face	6.00 -9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	0.06 0.10
2.5" x 20'6" Whip (Municipal)	A	From Face	6.00 9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
2" Dia 15' Omni (Municipal)	B	From Face	6.00 -5.00 0.00	0.0000	141.00	No Ice 1/2" Ice	3.20 4.83	3.20 4.83	0.04 0.06
1.5" x 10' Omni (Municipal)	B	From Face	6.00 5.00 0.00	0.0000	139.00	No Ice 1/2" Ice	1.50 2.52	1.50 2.52	0.06 0.07
9' Whip (Municipal)	A	From Face	6.00 0.00 0.00	0.0000	138.50	No Ice 1/2" Ice	5.85 7.66	5.85 7.66	0.12 0.17
PiROD 20' Universal Platform (Municipal)	C	None		0.0000	134.00	No Ice 1/2" Ice	33.10 47.10	33.10 47.10	2.27 2.70
Argus LLPX310R (Clearwire)	A	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	B	From Face	6.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	C	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
REMOTE RADIO HEAD (RRH) (Clearwire)	A	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH)	B	From Face	6.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Clearwire)			0.00						
REMOTE RADIO HEAD	C	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			7.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
3"x2"x22" Panel	B	From Leg	2.00	0.0000	87.00	No Ice	0.65	0.47	0.05
			0.00			1/2" Ice	0.81	0.61	0.05
			0.00						
TMA	B	From Leg	2.00	0.0000	84.50	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
3' Stand-off	B	From Leg	1.50	0.0000	83.50	No Ice	1.00	2.00	0.05
			0.00			1/2" Ice	1.20	2.70	0.07
			0.00						
3' Stand-off	A	From Leg	1.50	0.0000	83.50	No Ice	1.00	2.00	0.05
			0.00			1/2" Ice	1.20	2.70	0.07
			0.00						
TMA	A	From Leg	2.00	0.0000	83.00	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
TMA	B	From Leg	2.00	0.0000	82.50	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
3"x2"x22" Panel	B	From Leg	2.00	0.0000	80.00	No Ice	0.65	0.47	0.05
			0.00			1/2" Ice	0.81	0.61	0.05
			0.00						
Camera	A	From Leg	0.00	0.0000	30.00	No Ice	0.50	0.50	0.01
			0.00			1/2" Ice	0.60	0.60	0.02
			0.00						
PC9013N	A	From Leg	1.00	0.0000	24.00	No Ice	0.46	0.46	0.00
			0.00			1/2" Ice	0.52	0.52	0.00
			0.00						
APXVSPP18-C-A20	A	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
APXVSPP18-C-A20	B	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
APXVSPP18-C-A20	C	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
Panasonic RRH 1900MHZ	A	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Panasonic RRH 1900MHZ	B	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Panasonic RRH 1900MHZ	C	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Andrew 800MHz RRH	A	From Face	8.00	0.0000	170.00	No Ice	2.36	1.97	0.06
(Sprint)			0.00			1/2" Ice	2.57	2.17	0.08
			0.00						
Andrew 800MHz RRH	B	From Face	8.00	0.0000	170.00	No Ice	2.36	1.97	0.06
(Sprint)			0.00			1/2" Ice	2.57	2.17	0.08
			0.00						
Andrew 800MHz RRH	C	From Face	8.00	0.0000	170.00	No Ice	2.36	1.97	0.06
(Sprint)			0.00			1/2" Ice	2.57	2.17	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
APXV9TM14-120	A	From Face	9.00	0.0000	170.00	No Ice	7.27	5.33	0.10
(Sprint)			-4.00			1/2" Ice	7.80	6.05	0.16
			0.00						
APXV9TM14-120	B	From Face	9.00	0.0000	170.00	No Ice	7.27	5.33	0.10
(Sprint)			-4.00			1/2" Ice	7.80	6.05	0.16
			0.00						
APXV9TM14-120	C	From Face	9.00	0.0000	170.00	No Ice	7.27	5.33	0.10
(Sprint)			-4.00			1/2" Ice	7.80	6.05	0.16
			0.00						
TD-RRH8x20-25	A	From Face	9.00	0.0000	170.00	No Ice	4.32	1.41	0.07
(Sprint)			-4.00			1/2" Ice	4.60	1.61	0.09
			0.00						
TD-RRH8x20-25	B	From Face	9.00	0.0000	170.00	No Ice	4.32	1.41	0.07
(Sprint)			-4.00			1/2" Ice	4.60	1.61	0.09
			0.00						
TD-RRH8x20-25	C	From Face	9.00	0.0000	170.00	No Ice	4.32	1.41	0.07
(Sprint)			-4.00			1/2" Ice	4.60	1.61	0.09
			0.00						
PiROD 10' Lightweight	A	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
PiROD 10' Lightweight	B	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
PiROD 10' Lightweight	C	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
AIR B2A/B4P	A	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	B	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	C	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	A	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	B	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	C	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
Twin PCS TMA	A	From Leg	4.00	0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00			1/2" Ice	0.96	0.52	0.02
			0.00						
Twin PCS TMA	B	From Leg	4.00	0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00			1/2" Ice	0.96	0.52	0.02
			0.00						
Twin PCS TMA	C	From Leg	4.00	0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00			1/2" Ice	0.96	0.52	0.02
			0.00						
LNX-6515DS-VTM w/ 6' 2"	A	From Leg	4.00	0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00			1/2" Ice	12.06	10.21	0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(T-Mobile)			0.00						
LNX-6515DS-VTM w/ 6' 2"	B	From Leg	4.00	0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00			1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00						
LNX-6515DS-VTM w/ 6' 2"	C	From Leg	4.00	0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00			1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00						
RRUS-11	A	From Leg	4.00	0.0000	125.50	No Ice	2.99	1.25	0.05
(T-Mobile)			0.00			1/2" Ice	3.23	1.41	0.07
			0.00						
RRUS-11	B	From Leg	4.00	0.0000	125.50	No Ice	2.99	1.25	0.05
(T-Mobile)			0.00			1/2" Ice	3.23	1.41	0.07
			0.00						
RRUS-11	C	From Leg	4.00	0.0000	125.50	No Ice	2.99	1.25	0.05
(T-Mobile)			0.00			1/2" Ice	3.23	1.41	0.07
			0.00						
BXA-171063-12BF	A	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon - PCS)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
BXA-171063-12BF	B	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon - PCS)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
BXA-171063-12BF	C	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon - PCS)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
PiROD 12' Lightweight	A	From Leg	0.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
PiROD 12' Lightweight	B	From Leg	0.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
PiROD 12' Lightweight	C	From Leg	0.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
(2) Diplexer	A	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon - 850)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
(2) Diplexer	B	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon - 850)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
(2) Diplexer	C	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon - 850)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
HBX-6517DS-VTM	A	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
HBX-6517DS-VTM	B	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
HBX-6517DS-VTM	C	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
RH_2X40-AWS	A	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	B	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
RH_2X40-AWS	C	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06
			0.00						
DB-T1-6Z-8AB-0Z	C	None		0.0000	101.00	No Ice	5.35	2.40	0.04
(Verizon - AWS)						1/2" Ice	5.75	2.72	0.07
LNX-6514DS-T4M	A	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-6514DS-T4M	B	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-6514DS-T4M	C	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-4514DS-A1M	A	From Leg	4.00	0.0000	101.00	No Ice	8.93	5.27	0.06
(Verizon - LTE)			-4.00			1/2" Ice	9.42	5.96	0.12
			0.00						
LNX-4514DS-A1M	B	From Leg	4.00	0.0000	101.00	No Ice	8.93	5.27	0.06
(Verizon - LTE)			-4.00			1/2" Ice	9.42	5.96	0.12
			0.00						
LNX-4514DS-A1M	C	From Leg	4.00	0.0000	101.00	No Ice	8.93	5.27	0.06
(Verizon - LTE)			-4.00			1/2" Ice	9.42	5.96	0.12
			0.00						
*** ATT New Inventory 7/9/2016***									
(2) TMA (shielded)	A	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	B	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	C	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
PiROD 12' Lightweight T-Frame (AT&T)	A	None		0.0000	115.00	No Ice	10.20	10.20	0.25
						1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T-Frame (AT&T)	B	None		0.0000	115.00	No Ice	10.20	10.20	0.25
						1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T-Frame (AT&T)	C	None		0.0000	115.00	No Ice	10.20	10.20	0.25
						1/2" Ice	16.20	16.20	0.35
7770	A	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
QS66512-3 Quintel Panel	A	From Leg	4.00	0.0000	115.00	No Ice	8.40	8.22	0.07
(AT&T)			2.00			1/2" Ice	8.95	9.19	0.14
			0.00						
7770	B	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
QS66512-3 Quintel Panel	B	From Leg	4.00	0.0000	115.00	No Ice	8.40	8.22	0.07
(AT&T)			2.00			1/2" Ice	8.95	9.19	0.14
			0.00						
7770	C	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)			6.00 0.00			1/2" Ice	10.61	6.15	0.07
QS66512-3 Quintel Panel	C	From Leg	4.00	0.0000	115.00	No Ice	8.40	8.22	0.07
(AT&T)			2.00 0.00			1/2" Ice	8.95	9.19	0.14
AM-X-CD-16-65-00T-RET	A	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			-6.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
AM-X-CD-16-65-00T-RET	B	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			-6.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
AM-X-CD-16-65-00T-RET	C	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			-6.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
RRUS-11	A	From Leg	4.00	0.0000	115.00	No Ice	2.99	1.25	0.05
(AT&T)			-6.00 0.00			1/2" Ice	3.23	1.41	0.07
RRUS-11	B	From Leg	4.00	0.0000	115.00	No Ice	2.99	1.25	0.05
(AT&T)			-6.00 0.00			1/2" Ice	3.23	1.41	0.07
RRUS-11	C	From Leg	4.00	0.0000	115.00	No Ice	2.99	1.25	0.05
(AT&T)			-6.00 0.00			1/2" Ice	3.23	1.41	0.07
DC6-48-60-18-8F (Squid)	C	None		0.0000	115.00	No Ice	1.27	1.27	0.02
Suppressor						1/2" Ice	1.46	1.46	0.04
(AT&T)									
RRUS-11	A	From Leg	4.00	0.0000	115.00	No Ice	2.99	1.25	0.05
(AT&T)			2.00 2.50			1/2" Ice	3.23	1.41	0.07
RRUS-11	B	From Leg	4.00	0.0000	115.00	No Ice	2.99	1.25	0.05
(AT&T)			2.00 2.50			1/2" Ice	3.23	1.41	0.07
RRUS-11	C	From Leg	4.00	0.0000	115.00	No Ice	2.99	1.25	0.05
(AT&T)			2.00 2.50			1/2" Ice	3.23	1.41	0.07
RRUS-32	A	From Leg	4.00	0.0000	115.00	No Ice	3.88	2.76	0.08
(AT&T)			2.00 -2.50			1/2" Ice	4.14	2.98	0.11
RRUS-32	B	From Leg	4.00	0.0000	115.00	No Ice	3.88	2.76	0.08
(AT&T)			2.00 -2.50			1/2" Ice	4.14	2.98	0.11
RRUS-32	C	From Leg	4.00	0.0000	115.00	No Ice	3.88	2.76	0.08
(AT&T)			2.00 -2.50			1/2" Ice	4.14	2.98	0.11
A2 Module Unit	A	From Leg	4.00	0.0000	115.00	No Ice	2.42	0.54	0.02
(AT&T)			2.00 0.00			1/2" Ice	2.63	0.67	0.03
A2 Module Unit	B	From Leg	4.00	0.0000	115.00	No Ice	2.42	0.54	0.02
(AT&T)			2.00 0.00			1/2" Ice	2.63	0.67	0.03
A2 Module Unit	C	From Leg	4.00	0.0000	115.00	No Ice	2.42	0.54	0.02
(AT&T)			2.00 0.00			1/2" Ice	2.63	0.67	0.03
DC6-48-60-18-8F (Squid)	C	None		0.0000	115.00	No Ice	1.27	1.27	0.02
Suppressor						1/2" Ice	1.46	1.46	0.04
(AT&T)									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
3' Dish	A	Paraboloid w/o Radome	From Leg	2.00 0.00 0.00	0.0000		83.00	3.00	No Ice 1/2" Ice	7.07 7.47	0.23 0.27
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	6.00 0.00 0.00	0.0000		134.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	6.00 -7.00 0.00	0.0000		134.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	B	Paraboloid w/o Radome	From Face	6.00 -7.00 0.00	0.0000		134.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2-180 (Clearwire)	C	Paraboloid w/o Radome	From Face	6.00 0.00 0.00	0.0000		134.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.03 0.04
HPD2-4.7	C	Paraboloid w/Radome	From Face	9.00 0.00 0.00	0.0000		168.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.03 0.04

Truss-Leg Properties

Section Designation	Area in²	Area Ice in²	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in²
Pirod 105244	1026.8606	1727.9786	0.56	0.21	7.1310	11.9999	3.6816
Pirod 105216	1998.0891	3357.4497	0.51	0.43	6.9378	11.6578	3.6816
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217 reinf w/ 1" dia bar	2291.5652	3727.7657	0.79	0.46	7.9568	12.9436	7.6570
Pirod 105218 reinf w/ 1" dia bar	2425.8928	3907.6826	0.95	0.48	8.4232	13.5683	9.9280
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105219 reinf w /1" dia bar	2571.0468	4121.6676	1.11	0.50	8.9272	14.3113	11.7803
Pirod 105220 reinf w/ 1" dia bar	2697.7688	4300.8949	1.29	0.51	9.3673	14.9337	14.2843

Tower Pressures - No Ice

$G_H = 1.125$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	160.00	1.57	29	102.917	A	0.000	52.765	5.833	11.06	0.000	0.000
170.00-150.00					B	0.000	46.004		12.68	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	28	66.055	A	5.292	37.009	11.905	28.14	0.000	0.000
150.00-140.00					B	5.476	33.509		30.54	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	27	162.111	A	10.178	78.107	23.165	26.24	0.000	0.000
140.00-120.00					B	9.618	88.128		23.70	0.000	0.000
					C	10.467	34.179		51.88	0.000	0.000
T4	110.00	1.411	26	202.528	A	13.676	106.070	24.703	20.63	0.000	0.000
120.00-100.00					B	12.753	113.349		19.59	0.000	0.000
					C	13.346	88.739		24.20	0.000	0.000
T5	95.00	1.353	25	116.264	A	6.447	73.947	12.351	15.36	0.000	0.000
100.00-90.00					B	6.082	56.674		19.68	0.000	0.000
					C	6.235	66.461		16.99	0.000	0.000
T6 90.00-80.00	85.00	1.31	24	126.517	A	6.849	74.879	13.283	16.25	0.000	0.000
					B	6.499	57.607		20.72	0.000	0.000
					C	6.552	70.126		17.32	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	283.450	A	14.936	151.315	28.124	16.92	0.000	0.000
					B	14.269	116.771		21.46	0.000	0.000
					C	14.233	146.057		17.55	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	323.362	A	19.403	151.501	28.309	16.56	0.000	0.000
					B	18.662	116.956		20.87	0.000	0.000
					C	18.623	146.243		17.17	0.000	0.000
T9 40.00-20.00	30.00	1	18	363.756	A	21.437	154.448	29.807	16.95	0.000	0.000
					B	20.722	119.904		21.20	0.000	0.000
					C	20.684	147.740		17.70	0.000	0.000
T10 20.00-0.00	10.00	1	18	404.134	A	26.964	113.235	31.276	22.31	0.000	0.000
					B	26.446	90.781		26.68	0.000	0.000
					C	26.418	107.933		23.28	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.125$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	160.00	1.57	22	0.5000	104.583	A	3.517	82.422	9.167	10.67	0.000	0.000
170.00-150.00						B	0.000	74.710		12.27	0.000	0.000
						C	3.517	27.757		29.31	0.000	0.000
T2	145.00	1.526	21	0.5000	66.890	A	6.957	58.049	20.033	30.82	0.000	0.000
150.00-140.00						B	5.476	53.914		33.73	0.000	0.000
						C	7.234	23.901		64.34	0.000	0.000
T3	130.00	1.48	21	0.5000	163.780	A	13.549	124.661	38.924	28.16	0.000	0.000
140.00-120.00						B	24.452	128.108		25.51	0.000	0.000
						C	13.984	54.119		57.15	0.000	0.000
T4	110.00	1.411	20	0.5000	204.197	A	17.047	155.558	40.814	23.65	0.000	0.000
120.00-100.00						B	33.947	154.687		21.64	0.000	0.000
						C	17.922	116.761		30.30	0.000	0.000
T5 100.00-90.00	95.00	1.353	19	0.5000	117.098	A	8.148	100.357	20.407	18.81	0.000	0.000
						B	16.813	77.290		21.69	0.000	0.000
						C	8.755	82.618		22.33	0.000	0.000
T6 90.00-80.00	85.00	1.31	18	0.5000	127.351	A	8.553	101.694	21.609	19.60	0.000	0.000
						B	17.250	78.638		22.54	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	10.636	86.064		22.35	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	285.119	A	18.347	205.888	45.303	20.20	0.000	0.000
						B	35.816	159.799		23.16	0.000	0.000
						C	23.705	180.219		22.22	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	325.031	A	22.803	206.856	45.704	19.90	0.000	0.000
						B	40.107	160.791		22.75	0.000	0.000
						C	28.017	181.208		21.84	0.000	0.000
T9 40.00-20.00	30.00	1	14	0.5000	365.425	A	24.841	212.768	47.784	20.11	0.000	0.000
						B	42.203	166.719		22.87	0.000	0.000
						C	30.105	183.884		22.33	0.000	0.000
T10 20.00-0.00	10.00	1	14	0.5000	405.803	A	29.168	161.974	49.862	26.09	0.000	0.000
						B	40.336	132.050		28.92	0.000	0.000
						C	32.488	141.094		28.73	0.000	0.000

Tower Pressure - Service

$G_H = 1.125$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	160.00	1.57	10	102.917	A	0.000	52.765	5.833	11.06	0.000	0.000
170.00-150.00					B	0.000	46.004		12.68	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	10	66.055	A	5.292	37.009	11.905	28.14	0.000	0.000
150.00-140.00					B	5.476	33.509		30.54	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	9	162.111	A	10.178	78.107	23.165	26.24	0.000	0.000
140.00-120.00					B	9.618	88.128		23.70	0.000	0.000
					C	10.467	34.179		51.88	0.000	0.000
T4	110.00	1.411	9	202.528	A	13.676	106.070	24.703	20.63	0.000	0.000
120.00-100.00					B	12.753	113.349		19.59	0.000	0.000
					C	13.346	88.739		24.20	0.000	0.000
T5	95.00	1.353	9	116.264	A	6.447	73.947	12.351	15.36	0.000	0.000
100.00-90.00					B	6.082	56.674		19.68	0.000	0.000
					C	6.235	66.461		16.99	0.000	0.000
T6 90.00-80.00	85.00	1.31	8	126.517	A	6.849	74.879	13.283	16.25	0.000	0.000
					B	6.499	57.607		20.72	0.000	0.000
					C	6.552	70.126		17.32	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	283.450	A	14.936	151.315	28.124	16.92	0.000	0.000
					B	14.269	116.771		21.46	0.000	0.000
					C	14.233	146.057		17.55	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	323.362	A	19.403	151.501	28.309	16.56	0.000	0.000
					B	18.662	116.956		20.87	0.000	0.000
					C	18.623	146.243		17.17	0.000	0.000
T9 40.00-20.00	30.00	1	6	363.756	A	21.437	154.448	29.807	16.95	0.000	0.000
					B	20.722	119.904		21.20	0.000	0.000
					C	20.684	147.740		17.70	0.000	0.000
T10 20.00-0.00	10.00	1	6	404.134	A	26.964	113.235	31.276	22.31	0.000	0.000
					B	26.446	90.781		26.68	0.000	0.000
					C	26.418	107.933		23.28	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	1	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	1	1	30.910			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	1	1	34.128	1.93	193.38	A
150.00-140.00			B	0.59	1.81	0.748	1	1	30.529			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.44	2.09	A	0.545	1.849	0.721	1	1	66.514	4.23	211.31	B
140.00-120.00			B	0.603	1.802	0.755	1	1	76.191			
			C	0.275	2.363	0.609	1	1	31.271			
T4	0.92	2.80	A	0.591	1.81	0.748	1	1	93.046	5.25	262.28	B
120.00-100.00			B	0.623	1.792	0.768	1	1	99.772			
			C	0.504	1.895	0.7	1	1	75.426			
T5	0.63	1.48	A	0.691	1.776	0.814	1	1	66.629	3.33	332.94	A
100.00-90.00			B	0.54	1.854	0.719	1	1	46.808			
			C	0.625	1.791	0.769	1	1	57.370			
T6	0.64	1.76	A	0.646	1.783	0.783	1	1	65.467	3.18	318.14	A
90.00-80.00			B	0.507	1.891	0.701	1	1	46.878			
			C	0.606	1.8	0.757	1	1	59.662			
T7	1.29	4.33	A	0.587	1.813	0.745	1	1	127.734	5.97	298.61	A
80.00-60.00			B	0.462	1.954	0.679	1	1	93.556			
			C	0.565	1.829	0.733	1	1	121.307			
T8	1.29	4.45	A	0.529	1.866	0.712	1	1	127.342	5.57	278.27	A
60.00-40.00			B	0.419	2.027	0.66	1	1	95.819			
			C	0.51	1.888	0.703	1	1	121.368			
T9	1.30	5.44	A	0.484	1.922	0.689	1	1	127.889	5.11	255.72	A
40.00-20.00			B	0.387	2.091	0.646	1	1	98.206			
			C	0.463	1.953	0.679	1	1	121.049			
T10	0.85	6.08	A	0.347	2.179	0.631	1	1	98.458	4.46	223.12	A
20.00-0.00			B	0.29	2.323	0.613	1	1	82.087			
			C	0.332	2.213	0.626	1	1	94.023			
Sum Weight:	7.76	30.71						OTM	3253.68 kip-ft	41.32		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.825	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.825	1	30.910			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.825	1	33.202	1.88	188.14	A
150.00-140.00			B	0.59	1.81	0.748	0.825	1	29.570			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.44	2.09	A	0.545	1.849	0.721	0.825	1	64.733	4.13	206.65	B
140.00-120.00			B	0.603	1.802	0.755	0.825	1	74.508			
			C	0.275	2.363	0.609	0.825	1	29.440			
T4	0.92	2.80	A	0.591	1.81	0.748	0.825	1	90.653	5.13	256.41	B
120.00-100.00			B	0.623	1.792	0.768	0.825	1	97.541			
			C	0.504	1.895	0.7	0.825	1	73.090			
T5	0.63	1.48	A	0.691	1.776	0.814	0.825	1	65.501	3.27	327.31	A
100.00-90.00			B	0.54	1.854	0.719	0.825	1	45.744			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.625	1.791	0.769	0.825	1	56.279			
T6	0.64	1.76	A	0.646	1.783	0.783	0.825	1	64.268	3.12	312.32	A
90.00-80.00			B	0.507	1.891	0.701	0.825	1	45.741			
			C	0.606	1.8	0.757	0.825	1	58.515			
T7	1.29	4.33	A	0.587	1.813	0.745	0.825	1	125.120	5.85	292.50	A
80.00-60.00			B	0.462	1.954	0.679	0.825	1	91.059			
			C	0.565	1.829	0.733	0.825	1	118.816			
T8	1.29	4.45	A	0.529	1.866	0.712	0.825	1	123.946	5.42	270.85	A
60.00-40.00			B	0.419	2.027	0.66	0.825	1	92.553			
			C	0.51	1.888	0.703	0.825	1	118.109			
T9	1.30	5.44	A	0.484	1.922	0.689	0.825	1	124.137	4.96	248.21	A
40.00-20.00			B	0.387	2.091	0.646	0.825	1	94.580			
			C	0.463	1.953	0.679	0.825	1	117.429			
T10	0.85	6.08	A	0.347	2.179	0.631	0.825	1	93.739	4.25	212.43	A
20.00-0.00			B	0.29	2.323	0.613	0.825	1	77.459			
			C	0.332	2.213	0.626	0.825	1	89.400			
Sum Weight:	7.76	30.71						OTM	3188.10 kip-ft	40.30		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.8	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.8	1	30.910			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.8	1	33.069	1.87	187.39	A
150.00-140.00			B	0.59	1.81	0.748	0.8	1	29.433			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.44	2.09	A	0.545	1.849	0.721	0.8	1	64.478	4.12	205.98	B
140.00-120.00			B	0.603	1.802	0.755	0.8	1	74.268			
			C	0.275	2.363	0.609	0.8	1	29.178			
T4	0.92	2.80	A	0.591	1.81	0.748	0.8	1	90.311	5.11	255.58	B
120.00-100.00			B	0.623	1.792	0.768	0.8	1	97.222			
			C	0.504	1.895	0.7	0.8	1	72.757			
T5	0.63	1.48	A	0.691	1.776	0.814	0.8	1	65.340	3.27	326.50	A
100.00-90.00			B	0.54	1.854	0.719	0.8	1	45.592			
			C	0.625	1.791	0.769	0.8	1	56.123			
T6	0.64	1.76	A	0.646	1.783	0.783	0.8	1	64.097	3.11	311.48	A
90.00-80.00			B	0.507	1.891	0.701	0.8	1	45.578			
			C	0.606	1.8	0.757	0.8	1	58.351			
T7	1.29	4.33	A	0.587	1.813	0.745	0.8	1	124.746	5.83	291.62	A
80.00-60.00			B	0.462	1.954	0.679	0.8	1	90.702			
			C	0.565	1.829	0.733	0.8	1	118.460			
T8	1.29	4.45	A	0.529	1.866	0.712	0.8	1	123.461	5.40	269.79	A
60.00-40.00			B	0.419	2.027	0.66	0.8	1	92.086			
			C	0.51	1.888	0.703	0.8	1	117.644			
T9	1.30	5.44	A	0.484	1.922	0.689	0.8	1	123.601	4.94	247.14	A
40.00-20.00			B	0.387	2.091	0.646	0.8	1	94.062			
			C	0.463	1.953	0.679	0.8	1	116.912			
T10	0.85	6.08	A	0.347	2.179	0.631	0.8	1	93.065	4.22	210.90	A
20.00-0.00			B	0.29	2.323	0.613	0.8	1	76.798			
			C	0.332	2.213	0.626	0.8	1	88.740			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	7.76	30.71						OTM	3178.73 kip-ft	40.16		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.85	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.85	1	30.910			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.85	1	33.334	1.89	188.89	A
150.00-140.00			B	0.59	1.81	0.748	0.85	1	29.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.44	2.09	A	0.545	1.849	0.721	0.85	1	64.987	4.15	207.31	B
140.00-120.00			B	0.603	1.802	0.755	0.85	1	74.749			
			C	0.275	2.363	0.609	0.85	1	29.701			
T4	0.92	2.80	A	0.591	1.81	0.748	0.85	1	90.995	5.15	257.25	B
120.00-100.00			B	0.623	1.792	0.768	0.85	1	97.860			
			C	0.504	1.895	0.7	0.85	1	73.424			
T5	0.63	1.48	A	0.691	1.776	0.814	0.85	1	65.662	3.28	328.11	A
100.00-90.00			B	0.54	1.854	0.719	0.85	1	45.896			
			C	0.625	1.791	0.769	0.85	1	56.434			
T6	0.64	1.76	A	0.646	1.783	0.783	0.85	1	64.439	3.13	313.15	A
90.00-80.00			B	0.507	1.891	0.701	0.85	1	45.903			
			C	0.606	1.8	0.757	0.85	1	58.679			
T7	1.29	4.33	A	0.587	1.813	0.745	0.85	1	125.493	5.87	293.37	A
80.00-60.00			B	0.462	1.954	0.679	0.85	1	91.416			
			C	0.565	1.829	0.733	0.85	1	119.172			
T8	1.29	4.45	A	0.529	1.866	0.712	0.85	1	124.431	5.44	271.91	A
60.00-40.00			B	0.419	2.027	0.66	0.85	1	93.020			
			C	0.51	1.888	0.703	0.85	1	118.575			
T9	1.30	5.44	A	0.484	1.922	0.689	0.85	1	124.673	4.99	249.29	A
40.00-20.00			B	0.387	2.091	0.646	0.85	1	95.098			
			C	0.463	1.953	0.679	0.85	1	117.946			
T10	0.85	6.08	A	0.347	2.179	0.631	0.85	1	94.413	4.28	213.96	A
20.00-0.00			B	0.29	2.323	0.613	0.85	1	78.120			
			C	0.332	2.213	0.626	0.85	1	90.061			
Sum Weight:	7.76	30.71						OTM	3197.47 kip-ft	40.45		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	1	1	78.881	3.54	177.15	A
170.00-150.00			B	0.714	1.778	0.83	1	1	62.028			
			C	0.299	2.299	0.616	1	1	20.604			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2	0.43	1.64	A	0.972	2.044	1	1	1	65.006	3.16	316.37	A
150.00-140.00			B	0.888	1.907	0.972	1	1	57.882			
			C	0.465	1.949	0.68	1	1	23.498			
T3	1.29	3.77	A	0.844	1.855	0.933	1	1	129.881	6.95	347.26	B
140.00-120.00			B	0.931	1.972	1	1	1	152.561			
			C	0.416	2.034	0.658	1	1	49.604			
T4	2.47	4.64	A	0.845	1.856	0.934	1	1	162.400	8.14	406.78	B
120.00-100.00			B	0.924	1.96	1	1	1	188.634			
			C	0.66	1.779	0.792	1	1	110.381			
T5	1.65	2.39	A	0.927	1.964	1	1	1	108.505	4.50	449.81	A
100.00-90.00			B	0.804	1.819	0.899	1	1	86.325			
			C	0.78	1.803	0.881	1	1	81.502			
T6	1.69	2.70	A	0.866	1.879	0.952	1	1	105.386	4.05	404.92	A
90.00-80.00			B	0.753	1.789	0.859	1	1	84.810			
			C	0.759	1.792	0.864	1	1	84.998			
T7	3.44	6.30	A	0.786	1.807	0.885	1	1	200.650	7.01	350.57	A
80.00-60.00			B	0.686	1.776	0.81	1	1	165.264			
			C	0.715	1.778	0.831	1	1	173.447			
T8	3.44	6.58	A	0.707	1.777	0.825	1	1	193.380	6.04	301.79	A
60.00-40.00			B	0.618	1.794	0.765	1	1	163.086			
			C	0.644	1.783	0.781	1	1	169.599			
T9	3.47	7.67	A	0.65	1.781	0.786	1	1	191.997	5.34	266.82	A
40.00-20.00			B	0.572	1.824	0.737	1	1	165.025			
			C	0.586	1.814	0.745	1	1	167.078			
T10	2.27	8.52	A	0.471	1.941	0.683	1	1	139.820	4.23	211.66	A
20.00-0.00			B	0.425	2.017	0.662	1	1	127.757			
			C	0.428	2.012	0.663	1	1	126.077			
Sum Weight:	20.83	45.71						OTM	4589.91 kip-ft	52.95		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.825	1	78.265	3.52	175.77	A
170.00-150.00			B	0.714	1.778	0.83	0.825	1	62.028			
			C	0.299	2.299	0.616	0.825	1	19.988			
T2	0.43	1.64	A	0.972	2.044	1	0.825	1	63.789	3.10	310.45	A
150.00-140.00			B	0.888	1.907	0.972	0.825	1	56.923			
			C	0.465	1.949	0.68	0.825	1	22.232			
T3	1.29	3.77	A	0.844	1.855	0.933	0.825	1	127.510	6.75	337.52	B
140.00-120.00			B	0.931	1.972	1	0.825	1	148.282			
			C	0.416	2.034	0.658	0.825	1	47.157			
T4	2.47	4.64	A	0.845	1.856	0.934	0.825	1	159.417	7.88	393.97	B
120.00-100.00			B	0.924	1.96	1	0.825	1	182.693			
			C	0.66	1.779	0.792	0.825	1	107.244			
T5	1.65	2.39	A	0.927	1.964	1	0.825	1	107.080	4.44	443.90	A
100.00-90.00			B	0.804	1.819	0.899	0.825	1	83.383			
			C	0.78	1.803	0.881	0.825	1	79.970			
T6	1.69	2.70	A	0.866	1.879	0.952	0.825	1	103.889	3.99	399.16	A
90.00-80.00			B	0.753	1.789	0.859	0.825	1	81.791			
			C	0.759	1.792	0.864	0.825	1	83.137			
T7	3.44	6.30	A	0.786	1.807	0.885	0.825	1	197.439	6.90	344.96	A
80.00-60.00			B	0.686	1.776	0.81	0.825	1	158.996			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.715	1.778	0.831	0.825	1	169.299			
T8	3.44	6.58	A	0.707	1.777	0.825	0.825	1	189.390	5.91	295.56	A
60.00-40.00			B	0.618	1.794	0.765	0.825	1	156.067			
			C	0.644	1.783	0.781	0.825	1	164.696			
T9	3.47	7.67	A	0.65	1.781	0.786	0.825	1	187.650	5.22	260.78	A
40.00-20.00			B	0.572	1.824	0.737	0.825	1	157.640			
			C	0.586	1.814	0.745	0.825	1	161.810			
T10	2.27	8.52	A	0.471	1.941	0.683	0.825	1	134.716	4.08	203.94	A
20.00-0.00			B	0.425	2.017	0.662	0.825	1	120.699			
			C	0.428	2.012	0.663	0.825	1	120.392			
Sum Weight:	20.83	45.71						OTM	4493.64 kip-ft	51.78		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.8	1	78.177	3.51	175.57	A
170.00-150.00			B	0.714	1.778	0.83	0.8	1	62.028			
			C	0.299	2.299	0.616	0.8	1	19.901			
T2	0.43	1.64	A	0.972	2.044	1	0.8	1	63.615	3.10	309.60	A
150.00-140.00			B	0.888	1.907	0.972	0.8	1	56.786			
			C	0.465	1.949	0.68	0.8	1	22.051			
T3	1.29	3.77	A	0.844	1.855	0.933	0.8	1	127.171	6.72	336.13	B
140.00-120.00			B	0.931	1.972	1	0.8	1	147.670			
			C	0.416	2.034	0.658	0.8	1	46.807			
T4	2.47	4.64	A	0.845	1.856	0.934	0.8	1	158.991	7.84	392.14	B
120.00-100.00			B	0.924	1.96	1	0.8	1	181.844			
			C	0.66	1.779	0.792	0.8	1	106.796			
T5	1.65	2.39	A	0.927	1.964	1	0.8	1	106.876	4.43	443.05	A
100.00-90.00			B	0.804	1.819	0.899	0.8	1	82.962			
			C	0.78	1.803	0.881	0.8	1	79.751			
T6	1.69	2.70	A	0.866	1.879	0.952	0.8	1	103.676	3.98	398.34	A
90.00-80.00			B	0.753	1.789	0.859	0.8	1	81.360			
			C	0.759	1.792	0.864	0.8	1	82.871			
T7	3.44	6.30	A	0.786	1.807	0.885	0.8	1	196.981	6.88	344.15	A
80.00-60.00			B	0.686	1.776	0.81	0.8	1	158.100			
			C	0.715	1.778	0.831	0.8	1	168.706			
T8	3.44	6.58	A	0.707	1.777	0.825	0.8	1	188.819	5.89	294.67	A
60.00-40.00			B	0.618	1.794	0.765	0.8	1	155.065			
			C	0.644	1.783	0.781	0.8	1	163.996			
T9	3.47	7.67	A	0.65	1.781	0.786	0.8	1	187.029	5.20	259.92	A
40.00-20.00			B	0.572	1.824	0.737	0.8	1	156.585			
			C	0.586	1.814	0.745	0.8	1	161.057			
T10	2.27	8.52	A	0.471	1.941	0.683	0.8	1	133.987	4.06	202.83	A
20.00-0.00			B	0.425	2.017	0.662	0.8	1	119.690			
			C	0.428	2.012	0.663	0.8	1	119.580			
Sum Weight:	20.83	45.71						OTM	4479.88 kip-ft	51.62		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.85	1	78.353	3.52	175.96	A
170.00-150.00			B	0.714	1.778	0.83	0.85	1	62.028			
			C	0.299	2.299	0.616	0.85	1	20.076			
T2	0.43	1.64	A	0.972	2.044	1	0.85	1	63.963	3.11	311.30	A
150.00-140.00			B	0.888	1.907	0.972	0.85	1	57.060			
			C	0.465	1.949	0.68	0.85	1	22.413			
T3	1.29	3.77	A	0.844	1.855	0.933	0.85	1	127.849	6.78	338.91	B
140.00-120.00			B	0.931	1.972	1	0.85	1	148.893			
			C	0.416	2.034	0.658	0.85	1	47.507			
T4	2.47	4.64	A	0.845	1.856	0.934	0.85	1	159.843	7.92	395.80	B
120.00-100.00			B	0.924	1.96	1	0.85	1	183.542			
			C	0.66	1.779	0.792	0.85	1	107.692			
T5	1.65	2.39	A	0.927	1.964	1	0.85	1	107.283	4.45	444.74	A
100.00-90.00			B	0.804	1.819	0.899	0.85	1	83.803			
			C	0.78	1.803	0.881	0.85	1	80.189			
T6	1.69	2.70	A	0.866	1.879	0.952	0.85	1	104.103	4.00	399.99	A
90.00-80.00			B	0.753	1.789	0.859	0.85	1	82.222			
			C	0.759	1.792	0.864	0.85	1	83.403			
T7	3.44	6.30	A	0.786	1.807	0.885	0.85	1	197.898	6.92	345.76	A
80.00-60.00			B	0.686	1.776	0.81	0.85	1	159.891			
			C	0.715	1.778	0.831	0.85	1	169.891			
T8	3.44	6.58	A	0.707	1.777	0.825	0.85	1	189.960	5.93	296.45	A
60.00-40.00			B	0.618	1.794	0.765	0.85	1	157.070			
			C	0.644	1.783	0.781	0.85	1	165.397			
T9	3.47	7.67	A	0.65	1.781	0.786	0.85	1	188.271	5.23	261.64	A
40.00-20.00			B	0.572	1.824	0.737	0.85	1	158.695			
			C	0.586	1.814	0.745	0.85	1	162.562			
T10	2.27	8.52	A	0.471	1.941	0.683	0.85	1	135.445	4.10	205.04	A
20.00-0.00			B	0.425	2.017	0.662	0.85	1	121.707			
			C	0.428	2.012	0.663	0.85	1	121.204			
Sum Weight:	20.83	45.71						OTM	4507.39 kip-ft	51.95		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	1	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	1	1	30.910			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	1	1	34.128	0.67	66.92	A
150.00-140.00			B	0.59	1.81	0.748	1	1	30.529			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.44	2.09	A	0.545	1.849	0.721	1	1	66.514	1.46	73.12	B
140.00-120.00			B	0.603	1.802	0.755	1	1	76.191			
			C	0.275	2.363	0.609	1	1	31.271			
T4	0.92	2.80	A	0.591	1.81	0.748	1	1	93.046	1.82	90.75	B
120.00-100.00			B	0.623	1.792	0.768	1	1	99.772			
			C	0.504	1.895	0.7	1	1	75.426			
T5	0.63	1.48	A	0.691	1.776	0.814	1	1	66.629	1.15	115.21	A
100.00-90.00			B	0.54	1.854	0.719	1	1	46.808			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.625	1.791	0.769	1	1	57.370			
T6	0.64	1.76	A	0.646	1.783	0.783	1	1	65.467	1.10	110.08	A
90.00-80.00			B	0.507	1.891	0.701	1	1	46.878			
			C	0.606	1.8	0.757	1	1	59.662			
T7	1.29	4.33	A	0.587	1.813	0.745	1	1	127.734	2.07	103.32	A
80.00-60.00			B	0.462	1.954	0.679	1	1	93.556			
			C	0.565	1.829	0.733	1	1	121.307			
T8	1.29	4.45	A	0.529	1.866	0.712	1	1	127.342	1.93	96.29	A
60.00-40.00			B	0.419	2.027	0.66	1	1	95.819			
			C	0.51	1.888	0.703	1	1	121.368			
T9	1.30	5.44	A	0.484	1.922	0.689	1	1	127.889	1.77	88.48	A
40.00-20.00			B	0.387	2.091	0.646	1	1	98.206			
			C	0.463	1.953	0.679	1	1	121.049			
T10	0.85	6.08	A	0.347	2.179	0.631	1	1	98.458	1.54	77.20	A
20.00-0.00			B	0.29	2.323	0.613	1	1	82.087			
			C	0.332	2.213	0.626	1	1	94.023			
Sum Weight:	7.76	30.71						OTM	1125.84 kip-ft	14.30		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.825	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.825	1	30.910			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.825	1	33.202	0.65	65.10	A
150.00-140.00			B	0.59	1.81	0.748	0.825	1	29.570			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.44	2.09	A	0.545	1.849	0.721	0.825	1	64.733	1.43	71.50	B
140.00-120.00			B	0.603	1.802	0.755	0.825	1	74.508			
			C	0.275	2.363	0.609	0.825	1	29.440			
T4	0.92	2.80	A	0.591	1.81	0.748	0.825	1	90.653	1.77	88.72	B
120.00-100.00			B	0.623	1.792	0.768	0.825	1	97.541			
			C	0.504	1.895	0.7	0.825	1	73.090			
T5	0.63	1.48	A	0.691	1.776	0.814	0.825	1	65.501	1.13	113.25	A
100.00-90.00			B	0.54	1.854	0.719	0.825	1	45.744			
			C	0.625	1.791	0.769	0.825	1	56.279			
T6	0.64	1.76	A	0.646	1.783	0.783	0.825	1	64.268	1.08	108.07	A
90.00-80.00			B	0.507	1.891	0.701	0.825	1	45.741			
			C	0.606	1.8	0.757	0.825	1	58.515			
T7	1.29	4.33	A	0.587	1.813	0.745	0.825	1	125.120	2.02	101.21	A
80.00-60.00			B	0.462	1.954	0.679	0.825	1	91.059			
			C	0.565	1.829	0.733	0.825	1	118.816			
T8	1.29	4.45	A	0.529	1.866	0.712	0.825	1	123.946	1.87	93.72	A
60.00-40.00			B	0.419	2.027	0.66	0.825	1	92.553			
			C	0.51	1.888	0.703	0.825	1	118.109			
T9	1.30	5.44	A	0.484	1.922	0.689	0.825	1	124.137	1.72	85.89	A
40.00-20.00			B	0.387	2.091	0.646	0.825	1	94.580			
			C	0.463	1.953	0.679	0.825	1	117.429			
T10	0.85	6.08	A	0.347	2.179	0.631	0.825	1	93.739	1.47	73.50	A
20.00-0.00			B	0.29	2.323	0.613	0.825	1	77.459			
			C	0.332	2.213	0.626	0.825	1	89.400			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	7.76	30.71						OTM	1103.15 kip-ft	13.95		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.8	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.8	1	30.910			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.8	1	33.069	0.65	64.84	A
150.00-140.00			B	0.59	1.81	0.748	0.8	1	29.433			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.44	2.09	A	0.545	1.849	0.721	0.8	1	64.478	1.43	71.27	B
140.00-120.00			B	0.603	1.802	0.755	0.8	1	74.268			
			C	0.275	2.363	0.609	0.8	1	29.178			
T4	0.92	2.80	A	0.591	1.81	0.748	0.8	1	90.311	1.77	88.43	B
120.00-100.00			B	0.623	1.792	0.768	0.8	1	97.222			
			C	0.504	1.895	0.7	0.8	1	72.757			
T5	0.63	1.48	A	0.691	1.776	0.814	0.8	1	65.340	1.13	112.98	A
100.00-90.00			B	0.54	1.854	0.719	0.8	1	45.592			
			C	0.625	1.791	0.769	0.8	1	56.123			
T6	0.64	1.76	A	0.646	1.783	0.783	0.8	1	64.097	1.08	107.78	A
90.00-80.00			B	0.507	1.891	0.701	0.8	1	45.578			
			C	0.606	1.8	0.757	0.8	1	58.351			
T7	1.29	4.33	A	0.587	1.813	0.745	0.8	1	124.746	2.02	100.91	A
80.00-60.00			B	0.462	1.954	0.679	0.8	1	90.702			
			C	0.565	1.829	0.733	0.8	1	118.460			
T8	1.29	4.45	A	0.529	1.866	0.712	0.8	1	123.461	1.87	93.35	A
60.00-40.00			B	0.419	2.027	0.66	0.8	1	92.086			
			C	0.51	1.888	0.703	0.8	1	117.644			
T9	1.30	5.44	A	0.484	1.922	0.689	0.8	1	123.601	1.71	85.52	A
40.00-20.00			B	0.387	2.091	0.646	0.8	1	94.062			
			C	0.463	1.953	0.679	0.8	1	116.912			
T10	0.85	6.08	A	0.347	2.179	0.631	0.8	1	93.065	1.46	72.98	A
20.00-0.00			B	0.29	2.323	0.613	0.8	1	76.798			
			C	0.332	2.213	0.626	0.8	1	88.740			
Sum Weight:	7.76	30.71						OTM	1099.91 kip-ft	13.90		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.85	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.85	1	30.910			
			C	0.161	2.732	0.583	0.85	1	9.663			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2	0.16	1.12	A	0.64	1.785	0.779	0.85	1	33.334	0.65	65.36	A
150.00-140.00			B	0.59	1.81	0.748	0.85	1	29.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.44	2.09	A	0.545	1.849	0.721	0.85	1	64.987	1.43	71.73	B
140.00-120.00			B	0.603	1.802	0.755	0.85	1	74.749			
			C	0.275	2.363	0.609	0.85	1	29.701			
T4	0.92	2.80	A	0.591	1.81	0.748	0.85	1	90.995	1.78	89.01	B
120.00-100.00			B	0.623	1.792	0.768	0.85	1	97.860			
			C	0.504	1.895	0.7	0.85	1	73.424			
T5	0.63	1.48	A	0.691	1.776	0.814	0.85	1	65.662	1.14	113.53	A
100.00-90.00			B	0.54	1.854	0.719	0.85	1	45.896			
			C	0.625	1.791	0.769	0.85	1	56.434			
T6	0.64	1.76	A	0.646	1.783	0.783	0.85	1	64.439	1.08	108.36	A
90.00-80.00			B	0.507	1.891	0.701	0.85	1	45.903			
			C	0.606	1.8	0.757	0.85	1	58.679			
T7	1.29	4.33	A	0.587	1.813	0.745	0.85	1	125.493	2.03	101.51	A
80.00-60.00			B	0.462	1.954	0.679	0.85	1	91.416			
			C	0.565	1.829	0.733	0.85	1	119.172			
T8	1.29	4.45	A	0.529	1.866	0.712	0.85	1	124.431	1.88	94.09	A
60.00-40.00			B	0.419	2.027	0.66	0.85	1	93.020			
			C	0.51	1.888	0.703	0.85	1	118.575			
T9	1.30	5.44	A	0.484	1.922	0.689	0.85	1	124.673	1.73	86.26	A
40.00-20.00			B	0.387	2.091	0.646	0.85	1	95.098			
			C	0.463	1.953	0.679	0.85	1	117.946			
T10	0.85	6.08	A	0.347	2.179	0.631	0.85	1	94.413	1.48	74.03	A
20.00-0.00			B	0.29	2.323	0.613	0.85	1	78.120			
			C	0.332	2.213	0.626	0.85	1	90.061			
Sum Weight:	7.76	30.71						OTM	1106.39 kip-ft	14.00		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	19.74					
Bracing Weight	10.97					
Total Member Self-Weight	30.71			-2.60	10.23	
Total Weight	52.43			-2.60	10.23	
Wind 0 deg - No Ice		-0.00	-60.21	-5776.89	9.54	-22.51
Wind 30 deg - No Ice		29.59	-51.35	-4951.53	-2839.93	-24.82
Wind 45 deg - No Ice		41.99	-41.73	-4024.64	-4047.10	-23.05
Wind 60 deg - No Ice		51.34	-29.37	-2832.49	-4956.36	-19.67
Wind 90 deg - No Ice		59.34	0.20	22.75	-5713.46	-10.45
Wind 120 deg - No Ice		52.18	30.36	2905.90	-4999.60	1.81
Wind 135 deg - No Ice		41.95	41.97	4038.53	-4043.97	7.89
Wind 150 deg - No Ice		29.82	51.45	4949.59	-2872.21	14.02
Wind 180 deg - No Ice		0.18	59.27	5720.20	-12.29	24.11
Wind 210 deg - No Ice		-29.67	51.40	4944.35	2875.74	25.15
Wind 225 deg - No Ice		-41.86	41.91	4032.11	4054.19	23.81
Wind 240 deg - No Ice		-52.09	30.30	2900.62	5009.53	22.05
Wind 270 deg - No Ice		-59.27	0.11	13.58	5724.44	12.68
Wind 300 deg - No Ice		-51.22	-29.50	-2848.65	4959.77	0.33
Wind 315 deg - No Ice		-41.89	-41.82	-4035.40	4052.48	-6.29
Wind 330 deg - No Ice		-29.60	-51.40	-4956.02	2859.66	-13.31

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Member Ice	15.00					
Total Weight Ice	86.52			-8.69	25.48	
Wind 0 deg - Ice		-0.00	-70.39	-6928.81	24.67	-19.50
Wind 30 deg - Ice		34.63	-60.07	-5927.95	-3386.45	-28.84
Wind 45 deg - Ice		49.06	-48.85	-4822.44	-4816.52	-30.31
Wind 60 deg - Ice		59.97	-34.40	-3398.24	-5897.16	-29.65
Wind 90 deg - Ice		69.40	0.16	11.35	-6816.72	-23.63
Wind 120 deg - Ice		60.99	35.40	3467.99	-5974.86	-11.30
Wind 135 deg - Ice		49.02	49.03	4819.60	-4813.73	-3.33
Wind 150 deg - Ice		34.81	60.14	5912.61	-3412.00	4.94
Wind 180 deg - Ice		0.14	69.23	6820.00	7.67	20.88
Wind 210 deg - Ice		-34.70	60.10	5908.67	3449.82	29.11
Wind 225 deg - Ice		-48.96	48.99	4814.81	4856.84	30.92
Wind 240 deg - Ice		-60.92	35.36	3464.20	6017.63	31.89
Wind 270 deg - Ice		-69.34	0.09	4.51	6860.08	25.41
Wind 300 deg - Ice		-59.87	-34.51	-3410.75	5934.19	12.60
Wind 315 deg - Ice		-48.97	-48.92	-4830.71	4855.01	4.61
Wind 330 deg - Ice		-34.63	-60.10	-5931.29	3436.38	-4.38
Total Weight	52.43			-2.60	10.23	
Wind 0 deg - Service		-0.00	-20.83	-2002.32	0.90	-7.79
Wind 30 deg - Service		10.24	-17.77	-1716.73	-985.07	-8.59
Wind 45 deg - Service		14.53	-14.44	-1396.01	-1402.78	-7.98
Wind 60 deg - Service		17.76	-10.16	-983.50	-1717.40	-6.80
Wind 90 deg - Service		20.53	0.07	4.47	-1979.37	-3.62
Wind 120 deg - Service		18.05	10.51	1002.10	-1732.36	0.63
Wind 135 deg - Service		14.52	14.52	1394.02	-1401.69	2.73
Wind 150 deg - Service		10.32	17.80	1709.26	-996.24	4.85
Wind 180 deg - Service		0.06	20.51	1975.91	-6.65	8.34
Wind 210 deg - Service		-10.27	17.79	1707.45	992.67	8.70
Wind 225 deg - Service		-14.49	14.50	1391.79	1400.44	8.24
Wind 240 deg - Service		-18.02	10.49	1000.27	1731.00	7.63
Wind 270 deg - Service		-20.51	0.04	1.30	1978.38	4.39
Wind 300 deg - Service		-17.72	-10.21	-989.09	1713.79	0.12
Wind 315 deg - Service		-14.49	-14.47	-1399.73	1399.84	-2.18
Wind 330 deg - Service		-10.24	-17.78	-1718.28	987.11	-4.61

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice

Comb. No.	Description
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	170 - 150	Leg	Max Tension	22	29.84	-0.04	0.05
			Max. Compression	19	-36.17	-0.00	0.45
			Max. Mx	24	-35.92	-0.38	-0.24
			Max. My	19	-36.17	-0.00	0.45
			Max. Vy	30	-3.93	0.05	-0.06
			Max. Vx	19	-4.55	-0.00	0.45
		Diagonal	Max Tension	26	3.35	0.00	0.00
			Max. Compression	26	-3.41	0.00	0.00
			Max. Mx	19	2.84	-0.00	0.00
			Max. My	22	-2.10	-0.00	0.00
			Max. Vy	19	0.01	-0.00	0.00
			Max. Vx	22	0.00	0.00	0.00
		Top Girt	Max Tension	7	0.30	0.00	0.00
			Max. Compression	15	-0.33	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	31	0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	0.15	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	13	-0.15	0.00	0.00
			Max. Mx	18	-0.00	0.01	0.00
			Max. My	31	-0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
T2	150 - 140	Leg	Max Tension	22	35.11	-0.42	0.02
			Max. Compression	19	-42.04	2.78	0.24
			Max. Mx	22	34.47	-3.29	0.23
			Max. My	31	-4.10	-0.26	-4.01
			Max. Vy	27	0.61	-3.27	-0.32
			Max. Vx	31	0.87	-0.26	-4.01
		Diagonal	Max Tension	22	4.91	0.00	0.00
			Max. Compression	30	-5.45	0.00	0.00
			Max. Mx	22	4.32	0.05	0.00
			Max. My	21	-4.25	-0.02	0.02
			Max. Vy	22	0.02	0.05	0.00
			Max. Vx	21	-0.00	0.00	0.00
		Top Girt	Max Tension	5	0.42	0.00	0.00
			Max. Compression	13	-0.37	0.00	0.00
			Max. Mx	18	0.04	-0.02	0.00
			Max. My	31	0.03	0.00	0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	32	70.41	-3.67	-0.17
			Max. Compression	19	-84.49	3.77	0.02
			Max. Mx	32	69.28	-4.63	-0.19
			Max. My	31	-8.58	-0.43	-6.71
			Max. Vy	27	0.70	-4.58	-0.05
			Max. Vx	23	-1.00	-0.42	6.66
		Diagonal	Max Tension	28	9.05	0.00	0.00
			Max. Compression	29	-9.43	0.00	0.00
			Max. Mx	19	5.83	0.11	0.01
			Max. My	29	-7.58	-0.06	-0.02
			Max. Vy	19	-0.03	0.11	0.01
			Max. Vx	21	-0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	32	117.39	-5.26	-0.04
			Max. Compression	19	-139.26	3.38	0.04
			Max. Mx	19	-110.20	6.27	0.00
			Max. My	31	-11.87	-0.48	-7.41
			Max. Vy	27	0.99	-4.25	-0.07
			Max. Vx	31	1.73	-0.48	-7.41
		Diagonal	Max Tension	21	11.85	0.00	0.00
			Max. Compression	29	-12.90	0.00	0.00
			Max. Mx	19	7.15	0.13	0.01
			Max. My	29	-12.85	-0.06	-0.05
			Max. Vy	32	0.04	0.12	-0.00
			Max. Vx	29	0.01	0.00	0.00
		Mid Girt	Max Tension	32	3.90	0.00	0.00
			Max. Compression	19	-3.13	0.00	0.00
			Max. Mx	18	0.45	-0.07	0.00
			Max. My	31	0.36	0.00	0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
T5	100 - 90	Leg	Max Tension	32	145.63	-4.28	-0.13
			Max. Compression	19	-172.07	4.65	0.02
			Max. Mx	19	-172.07	4.65	0.02
			Max. My	31	-13.08	-0.48	-7.41
			Max. Vy	24	-0.26	4.61	0.01
			Max. Vx	31	-0.51	-0.48	-7.41
		Diagonal	Max Tension	28	13.76	0.00	0.00
			Max. Compression	28	-13.99	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	19	10.57	0.18	0.01
			Max. My	30	-0.71	0.09	-0.02
			Max. Vy	19	-0.05	0.18	0.01
			Max. Vx	30	-0.00	0.00	0.00
T6	90 - 80	Leg	Max Tension	32	174.33	-4.36	-0.01
			Max. Compression	19	-204.07	5.83	0.05
			Max. Mx	19	-204.07	5.83	0.05
			Max. My	31	-15.10	-0.00	-4.76
			Max. Vy	27	0.40	-5.76	-0.06
			Max. Vx	31	0.30	-0.00	-4.76
		Diagonal	Max Tension	28	13.63	0.00	0.00
			Max. Compression	28	-14.01	0.00	0.00
			Max. Mx	19	10.46	0.15	0.01
			Max. My	30	-0.89	0.08	-0.02
			Max. Vy	19	-0.05	0.15	0.01
			Max. Vx	30	0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	32	227.26	-5.06	0.01
			Max. Compression	19	-264.25	5.61	0.01
			Max. Mx	19	-233.84	5.83	0.05
			Max. My	34	-15.78	-0.09	5.23
			Max. Vy	22	-0.21	-5.74	0.14
			Max. Vx	34	-0.20	-0.09	5.23
		Diagonal	Max Tension	28	14.03	0.00	0.00
			Max. Compression	28	-14.40	0.00	0.00
			Max. Mx	19	10.67	0.15	0.01
			Max. My	21	-13.79	0.02	0.02
			Max. Vy	32	0.05	0.15	-0.01
			Max. Vx	22	-0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	32	275.55	-5.07	0.01
			Max. Compression	30	-320.04	5.51	-0.11
			Max. Mx	32	275.00	-6.95	-0.03
			Max. My	34	-20.40	0.06	6.05
			Max. Vy	22	0.31	-6.94	0.10
			Max. Vx	34	-0.21	0.06	6.05
		Diagonal	Max Tension	28	14.09	0.00	0.00
			Max. Compression	28	-14.47	0.00	0.00
			Max. Mx	30	10.05	0.21	-0.01
			Max. My	21	-13.89	0.00	0.03
			Max. Vy	30	-0.06	0.21	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	32	318.52	-3.10	0.02
			Max. Compression	30	-373.39	-0.20	0.02
			Max. Mx	32	317.89	-11.63	0.02
			Max. My	31	-21.75	-0.75	-5.89
			Max. Vy	22	0.97	-11.61	-0.01
			Max. Vx	31	-0.26	2.48	-5.77
		Diagonal	Max Tension	28	15.33	0.00	0.00
			Max. Compression	28	-14.97	0.00	0.00
			Max. Mx	30	10.10	0.23	-0.02
			Max. My	21	-12.88	0.05	0.03
			Max. Vy	32	0.07	0.21	-0.02
			Max. Vx	21	-0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	32	355.09	3.71	0.02
			Max. Compression	30	-423.48	-0.00	0.00
			Max. Mx	30	-395.30	15.51	0.01
			Max. My	31	-30.88	9.54	-9.94
			Max. Vy	22	-1.65	-11.61	-0.01
			Max. Vx	31	-1.09	9.54	-9.94
		Diagonal	Max Tension	21	19.04	0.00	0.00
			Max. Compression	28	-16.85	0.00	0.00
			Max. Mx	32	7.39	0.30	-0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	21	-16.57	0.13	0.04
			Max. Vy	32	0.08	0.30	-0.02
			Max. Vx	21	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	432.20	32.75	-20.00
	Max. H_x	13	353.06	32.83	-19.71
	Max. H_z	21	-353.56	-39.42	24.81
	Min. Vert	22	-366.56	-41.09	24.71
	Min. H_x	22	-366.56	-41.09	24.71
	Min. H_z	30	432.20	32.75	-20.00
Leg B	Max. Vert	24	430.16	-33.06	-19.46
	Max. H_x	32	-368.78	41.35	24.31
	Max. H_z	32	-368.78	41.35	24.31
	Min. Vert	32	-368.78	41.35	24.31
	Min. H_x	7	352.71	-33.21	-19.13
	Min. H_z	24	430.16	-33.06	-19.46
Leg A	Max. Vert	19	431.35	-0.58	38.32
	Max. H_x	31	28.59	4.05	-5.10
	Max. H_z	19	431.35	-0.58	38.32
	Min. Vert	27	-367.35	0.59	-48.00
	Min. H_x	23	28.19	-4.06	-5.14
	Min. H_z	27	-367.35	0.59	-48.00

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	52.43	0.00	0.00	-2.60	10.24	-0.00
Dead+Wind 0 deg - No Ice	52.43	-0.00	-60.21	-5800.64	9.63	-22.57
Dead+Wind 30 deg - No Ice	52.43	29.59	-51.35	-4972.01	-2851.59	-24.87
Dead+Wind 45 deg - No Ice	52.43	41.99	-41.73	-4041.32	-4063.76	-23.12
Dead+Wind 60 deg - No Ice	52.43	51.34	-29.37	-2844.27	-4976.80	-19.74
Dead+Wind 90 deg - No Ice	52.43	59.34	0.20	22.74	-5737.01	-10.52
Dead+Wind 120 deg - No Ice	52.43	52.18	30.36	2917.74	-5020.15	1.80
Dead+Wind 135 deg - No Ice	52.43	41.95	41.97	4055.10	-4060.63	7.90
Dead+Wind 150 deg - No Ice	52.43	29.82	51.45	4969.93	-2884.02	14.06
Dead+Wind 180 deg - No Ice	52.43	0.18	59.27	5743.76	-12.26	24.16
Dead+Wind 210 deg - No Ice	52.43	-29.67	51.40	4964.63	2887.68	25.21
Dead+Wind 225 deg - No Ice	52.43	-41.86	41.91	4048.60	4070.97	23.87
Dead+Wind 240 deg - No Ice	52.43	-52.09	30.30	2912.40	5030.16	22.13
Dead+Wind 270 deg - No Ice	52.43	-59.27	0.11	13.55	5748.03	12.75
Dead+Wind 300 deg - No Ice	52.43	-51.22	-29.50	-2860.44	4980.23	0.35
Dead+Wind 315 deg - No Ice	52.43	-41.89	-41.82	-4052.06	4069.19	-6.30
Dead+Wind 330 deg - No Ice	52.43	-29.60	-51.40	-4976.44	2871.46	-13.35
Dead+Ice+Temp	86.52	0.00	0.00	-8.76	25.53	-0.00
Dead+Wind 0 deg+Ice+Temp	86.52	-0.00	-70.39	-6971.68	24.85	-19.64
Dead+Wind 30 deg+Ice+Temp	86.52	34.63	-60.07	-5964.78	-3407.37	-29.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 45 deg+Ice+Temp	86.52	49.06	-48.85	-4852.49	-4846.33	-30.48
Dead+Wind 60 deg+Ice+Temp	86.52	59.97	-34.40	-3419.51	-5933.70	-29.84
Dead+Wind 90 deg+Ice+Temp	86.52	69.39	0.16	11.18	-6858.95	-23.79
Dead+Wind 120 deg+Ice+Temp	86.52	60.99	35.40	3489.19	-6011.82	-11.35
Dead+Wind 135 deg+Ice+Temp	86.52	49.02	49.03	4849.26	-4843.56	-3.31
Dead+Wind 150 deg+Ice+Temp	86.52	34.81	60.14	5949.09	-3433.12	5.02
Dead+Wind 180 deg+Ice+Temp	86.52	0.14	69.23	6862.17	7.79	21.02
Dead+Wind 210 deg+Ice+Temp	86.52	-34.70	60.10	5945.08	3471.28	29.27
Dead+Wind 225 deg+Ice+Temp	86.52	-48.96	48.99	4844.41	4886.99	31.09
Dead+Wind 240 deg+Ice+Temp	86.52	-60.92	35.36	3485.36	6054.87	32.08
Dead+Wind 270 deg+Ice+Temp	86.52	-69.34	0.09	4.33	6902.53	25.58
Dead+Wind 300 deg+Ice+Temp	86.52	-59.87	-34.51	-3432.02	5970.91	12.65
Dead+Wind 315 deg+Ice+Temp	86.52	-48.97	-48.92	-4860.71	4885.05	4.59
Dead+Wind 330 deg+Ice+Temp	86.52	-34.63	-60.10	-5968.06	3457.64	-4.46
Dead+Wind 0 deg - Service	52.43	-0.00	-20.83	-2008.92	10.04	-7.81
Dead+Wind 30 deg - Service	52.43	10.24	-17.77	-1722.17	-980.02	-8.62
Dead+Wind 45 deg - Service	52.43	14.53	-14.44	-1400.12	-1399.46	-8.00
Dead+Wind 60 deg - Service	52.43	17.76	-10.16	-985.91	-1715.39	-6.83
Dead+Wind 90 deg - Service	52.43	20.53	0.07	6.15	-1978.45	-3.63
Dead+Wind 120 deg - Service	52.43	18.05	10.51	1007.90	-1730.40	0.62
Dead+Wind 135 deg - Service	52.43	14.52	14.52	1401.45	-1398.38	2.73
Dead+Wind 150 deg - Service	52.43	10.32	17.80	1718.00	-991.24	4.85
Dead+Wind 180 deg - Service	52.43	0.06	20.51	1985.77	2.46	8.36
Dead+Wind 210 deg - Service	52.43	-10.27	17.79	1716.18	1005.92	8.74
Dead+Wind 225 deg - Service	52.43	-14.49	14.50	1399.22	1415.39	8.27
Dead+Wind 240 deg - Service	52.43	-18.02	10.49	1006.07	1747.30	7.66
Dead+Wind 270 deg - Service	52.43	-20.51	0.04	2.98	1995.70	4.40
Dead+Wind 300 deg - Service	52.43	-17.72	-10.21	-991.51	1730.02	0.12
Dead+Wind 315 deg - Service	52.43	-14.49	-14.47	-1403.85	1414.77	-2.18
Dead+Wind 330 deg - Service	52.43	-10.24	-17.78	-1723.72	1000.32	-4.61

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-52.43	0.00	0.00	52.43	0.00	0.000%
2	-0.00	-52.43	-60.21	0.00	52.43	60.21	0.000%
3	29.59	-52.43	-51.35	-29.59	52.43	51.35	0.000%
4	41.99	-52.43	-41.73	-41.99	52.43	41.73	0.000%
5	51.34	-52.43	-29.37	-51.34	52.43	29.37	0.000%
6	59.34	-52.43	0.20	-59.34	52.43	-0.20	0.000%
7	52.18	-52.43	30.36	-52.18	52.43	-30.36	0.000%
8	41.95	-52.43	41.97	-41.95	52.43	-41.97	0.000%
9	29.82	-52.43	51.45	-29.82	52.43	-51.45	0.000%
10	0.18	-52.43	59.27	-0.18	52.43	-59.27	0.000%
11	-29.67	-52.43	51.40	29.67	52.43	-51.40	0.000%
12	-41.86	-52.43	41.91	41.86	52.43	-41.91	0.000%
13	-52.09	-52.43	30.30	52.09	52.43	-30.30	0.000%
14	-59.27	-52.43	0.11	59.27	52.43	-0.11	0.000%
15	-51.22	-52.43	-29.50	51.22	52.43	29.50	0.000%
16	-41.89	-52.43	-41.82	41.89	52.43	41.82	0.000%
17	-29.60	-52.43	-51.40	29.60	52.43	51.40	0.000%
18	0.00	-86.52	0.00	-0.00	86.52	-0.00	0.000%
19	-0.00	-86.52	-70.39	0.00	86.52	70.39	0.000%
20	34.63	-86.52	-60.07	-34.63	86.52	60.07	0.000%
21	49.06	-86.52	-48.85	-49.06	86.52	48.85	0.000%
22	59.97	-86.52	-34.40	-59.97	86.52	34.40	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
23	69.40	-86.52	0.16	-69.39	86.52	-0.16	0.000%
24	60.99	-86.52	35.40	-60.99	86.52	-35.40	0.000%
25	49.02	-86.52	49.03	-49.02	86.52	-49.03	0.000%
26	34.81	-86.52	60.14	-34.81	86.52	-60.14	0.000%
27	0.14	-86.52	69.23	-0.14	86.52	-69.23	0.000%
28	-34.70	-86.52	60.10	34.70	86.52	-60.10	0.000%
29	-48.96	-86.52	48.99	48.96	86.52	-48.99	0.000%
30	-60.92	-86.52	35.36	60.92	86.52	-35.36	0.000%
31	-69.34	-86.52	0.09	69.34	86.52	-0.09	0.000%
32	-59.87	-86.52	-34.51	59.87	86.52	34.51	0.000%
33	-48.97	-86.52	-48.92	48.97	86.52	48.92	0.000%
34	-34.63	-86.52	-60.10	34.63	86.52	60.10	0.000%
35	-0.00	-52.43	-20.83	0.00	52.43	20.83	0.000%
36	10.24	-52.43	-17.77	-10.24	52.43	17.77	0.000%
37	14.53	-52.43	-14.44	-14.53	52.43	14.44	0.000%
38	17.76	-52.43	-10.16	-17.76	52.43	10.16	0.000%
39	20.53	-52.43	0.07	-20.53	52.43	-0.07	0.000%
40	18.05	-52.43	10.51	-18.05	52.43	-10.51	0.000%
41	14.52	-52.43	14.52	-14.52	52.43	-14.52	0.000%
42	10.32	-52.43	17.80	-10.32	52.43	-17.80	0.000%
43	0.06	-52.43	20.51	-0.06	52.43	-20.51	0.000%
44	-10.27	-52.43	17.79	10.27	52.43	-17.79	0.000%
45	-14.49	-52.43	14.50	14.49	52.43	-14.50	0.000%
46	-18.02	-52.43	10.49	18.02	52.43	-10.49	0.000%
47	-20.51	-52.43	0.04	20.51	52.43	-0.04	0.000%
48	-17.72	-52.43	-10.21	17.72	52.43	10.21	0.000%
49	-14.49	-52.43	-14.47	14.49	52.43	14.47	0.000%
50	-10.24	-52.43	-17.78	10.24	52.43	17.78	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000085
20	Yes	4	0.00000001	0.00000114
21	Yes	4	0.00000001	0.00000133
22	Yes	4	0.00000001	0.00000127
23	Yes	4	0.00000001	0.00000140

24	Yes	4	0.00000001	0.00000090
25	Yes	4	0.00000001	0.00000103
26	Yes	4	0.00000001	0.00000126
27	Yes	4	0.00000001	0.00000123
28	Yes	4	0.00000001	0.00000114
29	Yes	4	0.00000001	0.00000102
30	Yes	4	0.00000001	0.00000104
31	Yes	4	0.00000001	0.00000139
32	Yes	4	0.00000001	0.00000123
33	Yes	4	0.00000001	0.00000124
34	Yes	4	0.00000001	0.00000126
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	5.825	35	0.3299	0.0303
T2	150 - 140	4.454	35	0.3004	0.0369
T3	140 - 120	3.831	35	0.2800	0.0355
T4	120 - 100	2.735	35	0.2273	0.0214
T5	100 - 90	1.845	46	0.1805	0.0137
T6	90 - 80	1.482	46	0.1528	0.0113
T7	80 - 60	1.169	46	0.1321	0.0095
T8	60 - 40	0.657	46	0.0978	0.0067
T9	40 - 20	0.296	46	0.0590	0.0042
T10	20 - 0	0.087	46	0.0269	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	35	5.825	0.3299	0.0303	88933
179.75	15' Mount Pipe	35	5.825	0.3299	0.0303	88933
178.00	3" Dia 20' Omni	35	5.825	0.3299	0.0303	88933
175.00	2.5" x 14' Omni	35	5.825	0.3299	0.0303	88933
174.00	1.5" x 12' Omni	35	5.825	0.3299	0.0303	88933
170.00	APXVSPP18-C-A20	35	5.825	0.3299	0.0303	88933
168.00	HPD2-4.7	35	5.684	0.3272	0.0312	88933

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
159.50	APXV18-206517S-C w/ mounting hardware	35	5.092	0.3156	0.0346	42349
158.50	SC420-HF1LDF	35	5.023	0.3141	0.0350	38667
144.00	3" Dia 20' Omni	35	4.074	0.2889	0.0366	23391
141.00	2" Dia 15' Omni	35	3.891	0.2823	0.0358	23788
139.00	1.5" x 10' Omni	35	3.771	0.2776	0.0350	23932
138.50	9' Whip	35	3.742	0.2763	0.0348	23949
134.00	VHLP2.5-180	35	3.481	0.2648	0.0320	23929
125.50	PiROD 10' Lightweight T-Frame	35	3.016	0.2416	0.0254	23798
115.00	(2) TMA (shielded)	35	2.493	0.2156	0.0186	23163
101.00	BXA-171063-12BF	46	1.885	0.1832	0.0139	21831
87.00	3"x2"x22" Panel	46	1.383	0.1457	0.0107	24817
84.50	TMA	46	1.304	0.1405	0.0102	27439
83.50	3' Stand-off	46	1.273	0.1386	0.0100	28646
83.00	3' Dish	46	1.258	0.1376	0.0100	29260
82.50	TMA	46	1.243	0.1367	0.0099	29871
80.00	3"x2"x22" Panel	46	1.169	0.1321	0.0095	32473
30.00	Camera	46	0.173	0.0419	0.0031	32308
24.00	PC9013N	46	0.117	0.0327	0.0025	32850

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	20.000	19	1.1038	0.1287
T2	150 - 140	15.409	19	1.0170	0.1446
T3	140 - 120	13.291	19	0.9551	0.1346
T4	120 - 100	9.519	19	0.7859	0.0853
T5	100 - 90	6.429	30	0.6277	0.0566
T6	90 - 80	5.162	30	0.5321	0.0472
T7	80 - 60	4.070	30	0.4608	0.0390
T8	60 - 40	2.282	30	0.3412	0.0266
T9	40 - 20	1.025	30	0.2058	0.0160
T10	20 - 0	0.298	30	0.0934	0.0077

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	19	20.000	1.1038	0.1287	30833
179.75	15' Mount Pipe	19	20.000	1.1038	0.1287	30833
178.00	3" Dia 20' Omni	19	20.000	1.1038	0.1287	30833
175.00	2.5" x 14' Omni	19	20.000	1.1038	0.1287	30833
174.00	1.5" x 12' Omni	19	20.000	1.1038	0.1287	30833
170.00	APXVSPP18-C-A20	19	20.000	1.1038	0.1287	30833
168.00	HPD2-4.7	19	19.531	1.0960	0.1313	30833
159.50	APXV18-206517S-C w/ mounting hardware	19	17.551	1.0618	0.1409	14682
158.50	SC420-HF1LDF	19	17.321	1.0576	0.1417	13405
144.00	3" Dia 20' Omni	19	14.120	0.9823	0.1405	7956

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
141.00	2" Dia 15' Omni	19	13.496	0.9623	0.1363	7953
139.00	1.5" x 10' Omni	19	13.087	0.9476	0.1327	7906
138.50	9' Whip	19	12.986	0.9438	0.1318	7889
134.00	VHLP2.5-180	19	12.093	0.9073	0.1215	7686
125.50	PiROD 10' Lightweight T-Frame	19	10.492	0.8327	0.0990	7291
115.00	(2) TMA (shielded)	19	8.679	0.7470	0.0755	6852
101.00	BXA-171063-12BF	30	6.566	0.6368	0.0576	6368
87.00	3"x2"x22" Panel	30	4.818	0.5079	0.0446	7217
84.50	TMA	30	4.542	0.4899	0.0425	7944
83.50	3' Stand-off	30	4.435	0.4832	0.0417	8276
83.00	3' Dish	30	4.382	0.4799	0.0413	8445
82.50	TMA	30	4.329	0.4766	0.0409	8612
80.00	3"x2"x22" Panel	30	4.070	0.4608	0.0390	9319
30.00	Camera	30	0.596	0.1459	0.0116	9206
24.00	PC9013N	30	0.402	0.1137	0.0093	9357

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	170	Diagonal	A325N	0.6250	1	3.41	6.44	0.529 ✓	1.333	Bolt Shear
T2	150	Leg	A325N	1.0000	6	5.85	34.56	0.169 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.91	8.16	0.601 ✓	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.42	8.16	0.052 ✓	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	8.58	34.56	0.248 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.05	8.16	1.109 ✓	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	15.41	34.56	0.446 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.85	10.88	1.090 ✓	1.333	Member Bearing
		Mid Girt	A325N	1.0000	1	3.90	8.16	0.478 ✓	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	24.27	34.56	0.702 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.76	13.59	1.012 ✓	1.333	Member Bearing
T6	90	Leg	A325N	1.0000	6	29.05	34.56	0.841 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.63	13.59	1.003 ✓	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	6	33.51	34.56	0.970 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	14.40	16.49	0.873 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.2500	6	42.02	54.00	0.778 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	14.09	16.99	0.829 ✓	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	6	49.80	54.00	0.922 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	15.33	20.39	0.752 ✓	1.333	Member Bearing
T10	20	Diagonal	A325N	1.2500	1	19.04	16.99	1.120 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	1 3/4	20.00	2.49	68.3 K=1.00	21.253	2.4053	-36.17	51.12	0.708 ✔
T2	150 - 140	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-42.04	92.23	0.456 ✔
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-84.49	92.23	0.916 ✔
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-139.26	138.54	1.005 ✔
T5	100 - 90	Pirod 105217	10.02	10.02	37.8 K=1.00	26.132	5.3014	-172.07	138.54	1.242 ✔
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5 K=1.00	26.968	7.6570	-204.07	206.49	0.988 ✔
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6 K=1.00	27.439	9.9280	-264.25	272.41	0.970 ✔
T8	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-320.04	257.78	1.242 ✔
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4 K=1.00	27.705	11.7803	-373.39	326.37	1.144 ✔
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3 K=1.00	27.824	14.2843	-423.48	397.44	1.066 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.92	2.24	0.409 ✔
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	1.01	2.23	0.453 ✔
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.74	2.26	0.769 ✔
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.51	2.26	0.227 ✔
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.40	2.30	0.173 ✔
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.23	2.33	0.097 ✔
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.32	4.69	0.067 ✔
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.175 ✔
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.71	4.75	0.360

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
									✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.59	2.71	133.9 K=0.90	8.334	0.6013	-3.41	5.01	0.680 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.02	121.8 K=1.00	10.024	0.9020	-5.45	9.04	0.603 ✓
T3	140 - 120	L3x3x3/16	12.50	5.67	115.6 K=1.01	10.799	1.0900	-9.43	11.77	0.801 ✓
T4	120 - 100	L3x3x1/4	13.80	6.37	129.1 K=1.00	8.961	1.4400	-12.90	12.90	0.999 ✓
T5	100 - 90	L3x3x5/16	14.50	6.74	137.3 K=1.00	7.920	1.7800	-13.99	14.10	0.993 ✓
T6	90 - 80	L3x3x5/16	15.24	7.12	145.1 K=1.00	7.090	1.7800	-14.01	12.62	1.110 ✓
T7	80 - 60	L3x3x3/8	16.80	7.92	162.0 K=1.00	5.691	2.1100	-14.40	12.01	1.199 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.73	151.8 K=1.00	6.480	2.0900	-14.45	13.54	1.067 ✓
T9	40 - 20	L3 1/2x3 1/2x3/8	19.30	9.17	160.1 K=1.00	5.825	2.4800	-14.97	14.45	1.037 ✓
T10	20 - 0	L4x4x5/16	21.03	10.04	152.3 K=1.00	6.437	2.4000	-16.85	15.45	1.091 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.33	2.58	0.129 ✓
T2	150 - 140	L3x3x3/16	5.00	4.52	105.5 K=1.16	12.079	1.0900	-0.37	13.17	0.028 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.15	2.58	0.060

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
										✓

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.67	154.4 K=1.00	6.267	1.0900	-3.13	6.83	0.459 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	1 3/4	20.00	2.49	68.3	30.000	2.4053	29.84	72.16	0.414 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	35.11	110.45	0.318 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	30.000	3.6816	70.41	110.45	0.638 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	117.39	159.04	0.738 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8	30.000	5.3014	145.63	159.04	0.916 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5	30.000	7.6570	174.33	229.71	0.759 ✓
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6	30.000	9.9280	227.26	297.84	0.763 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	275.55	282.74	0.975 ✓
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4	30.000	11.7803	318.52	353.41	0.901 ✓
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3	30.000	14.2843	355.09	428.53	0.829 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.92	2.24	0.409 ✔
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	1.01	2.23	0.453 ✔
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.74	2.26	0.769 ✔
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.51	2.26	0.227 ✔
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.40	2.30	0.173 ✔
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.23	2.33	0.097 ✔
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.32	4.69	0.067 ✔
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.175 ✔
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.71	4.75	0.360 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.59	2.71	148.7	30.000	0.6013	3.35	18.04	0.186 ✔
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.02	80.1	21.600	0.9020	4.91	19.48	0.252 ✔
T3	140 - 120	L3x3x3/16	12.50	5.67	74.6	21.600	1.0900	9.05	23.54	0.384 ✔
T4	120 - 100	L3x3x1/4	13.80	6.37	84.3	21.600	1.4400	11.85	31.10	0.381 ✔
T5	100 - 90	L3x3x5/16	14.50	6.74	89.9	21.600	1.7800	13.76	38.45	0.358 ✔
T6	90 - 80	L3x3x5/16	15.24	7.12	94.9	21.600	1.7800	13.63	38.45	0.355 ✔
T7	80 - 60	L3x3x3/8	16.01	7.54	101.2	21.600	2.1100	14.03	45.58	0.308 ✔
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.73	99.2	21.600	2.0900	14.09	45.14	0.312 ✔
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.59	109.8	21.600	2.4800	15.33	53.57	0.286 ✔
T10	20 - 0	L4x4x5/16	21.92	10.48	103.3	21.600	2.4000	19.04	51.84	0.367 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.30	18.04	0.017 ✔
T2	150 - 140	L3x3x3/16	5.00	4.52	62.0	21.600	1.0900	0.42	23.54	0.018 ✔

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.15	18.04	0.008 ✔

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.67	102.2	21.600	1.0900	3.90	23.54	0.166 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	170 - 150	Leg	1 3/4	3	-36.17	68.14	53.1	Pass
T2	150 - 140	Leg	Pirod 105244	60	-42.04	122.94	34.2	Pass
T3	140 - 120	Leg	Pirod 105216	72	-84.49	122.94	68.7	Pass
T4	120 - 100	Leg	Pirod 105217	87	-139.26	184.67	75.4	Pass
T5	100 - 90	Leg	Pirod 105217	105	-172.07	184.67	93.2	Pass
T6	90 - 80	Leg	Pirod 105217 reinf w/ 1" dia bar	114	-204.07	275.26	74.1	Pass
T7	80 - 60	Leg	Pirod 105218 reinf w/ 1" dia bar	123	-264.25	363.13	72.8	Pass
T8	60 - 40	Leg	Pirod 105219	136	-320.04	343.62	93.1	Pass
T9	40 - 20	Leg	Pirod 105219 reinf w /1" dia bar	151	-373.39	435.06	85.8	Pass
T10	20 - 0	Leg	Pirod 105220 reinf w/ 1" dia bar	166	-423.48	529.79	79.9	Pass
T1	170 - 150	Diagonal	7/8	12	-3.41	6.68	51.0	Pass
T2	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	69	-5.45	12.05	45.2	Pass
T3	140 - 120	Diagonal	L3x3x3/16	78	-9.43	15.69	60.1	Pass
T4	120 - 100	Diagonal	L3x3x1/4	96	-12.90	17.20	75.0	Pass
T5	100 - 90	Diagonal	L3x3x5/16	111	-13.99	18.79	74.5	Pass
T6	90 - 80	Diagonal	L3x3x5/16	120	-14.01	16.82	83.3	Pass
T7	80 - 60	Diagonal	L3x3x3/8	129	-14.40	16.01	89.9	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	144	-14.45	18.05	80.0	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x3/8	165	-14.97	19.26	77.8	Pass
T10	20 - 0	Diagonal	L4x4x5/16	180	-16.85	20.59	81.8	Pass
T1	170 - 150	Top Girt	7/8	6	-0.33	3.45	9.7	Pass
T2	150 - 140	Top Girt	L3x3x3/16	62	-0.37	17.55	2.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	170 - 150	Bottom Girt	7/8	8	-0.15	3.45	4.5	Pass
T4	120 - 100	Mid Girt	L3x3x3/16	88	-3.13	9.11	34.4	Pass
						Summary		
						Leg (T5)	93.2	Pass
						Diagonal (T7)	89.9	Pass
						Top Girt (T1)	9.7	Pass
						Bottom Girt (T1)	4.5	Pass
						Mid Girt (T4)	34.4	Pass
						Bolt Checks	84.1	Pass
						RATING =	**93.2**	**Pass**

ANCHOR BOLT EVALUATION

AECOM

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Job	170' Self-Supporting Lattice Tower - Cromwell, CT	Project No.	CFD-010	Sheet 1	of 3
Description	Anchor Bolt Analysis	Computed by	MCD	Date	07/16/16
		Checked by		Date	

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 369·kips	*user input*
Shear:	Shear := 49·kips	*user input*
Compression:	Compression := 432·kips	*user input*

Anchor Bolt Data:

Use ASTM A687 Grade

Number of Anchor Bolts = N	N := 6	*user input*	
Bolt Ultimate Strength:	F_u := 150·ksi	*user input*	
Bolt Yield Strength:	Fy := 105·ksi	*user input*	
Bolt Modulus:	E := 29000·ksi	*user input*	
Thickness of Anchor Bolts	D := 1.25in	*user input*	
Threads per Inch:	n := 7	*user input*	
Coefficient of Friction:	μ := 0.55	*user input*	(for baseplate with grout ASCE 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 1.227 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_n = 0.969 \cdot in^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33 \cdot \left(0.33 \cdot A_g \cdot F_u \right) \qquad AllowableTension = 80.8 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33 \cdot \left(0.60 \cdot A_n \cdot Fy \right) \qquad F_{net.area} = 81.2 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 61.5 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.76$$

$$Condition1 := if\left(\frac{MaxTension}{F_{net.area}} \le 1.00, "OK", "Overstressed" \right)$$

Condition1 = "OK"

AECOM

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Job	170' Self-Supporting Lattice Tower - Cromwell, CT	Project No.	CFD-010	Sheet 3	of 3
Description	Anchor Bolt Analysis	Computed by	MCD	Date	07/16/16
		Checked by		Date	

Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 4.5 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.6 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 5.8 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.78$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.28$$

Condition3 = "OK"

FOUNDATION EVALUATION

AECOM

				Page	of
Job	170' Self-Supporting Lattice Tower - Cromwell, CT	Project No.	CFD-010	Sheet 1	of 2
Description	Drilled Pier Caisson Evaluation	Computed by	MCD	Date	07/16/16
		Checked by		Date	

FOUNDATION ANALYSIS

Input Data

Maximum Pier Reactions:

Compression: $C_t := 432\,kips$ *user input*

Uplift: $U_t := 369\,kips$ *user input*

Foundation Dimensions:

Drilled Caisson Length: $C_{Length} := 41.5\,ft$ *user input*

Diameter of Pier: $d_p := 5.5ft$ *user input*

Extension of Pier Above Grade: $L_{pag} := 0.5ft$ *user input*

Additional Concrete $Conc_{addl} := 5ft \cdot \left(13ft \cdot 13ft - \frac{\pi \cdot d_p^{\,2}}{4} \right)$

$Conc_{addl} = 726.2\,ft^3$

Material Properties:

Unit Weight of Concrete: $\gamma c := 150pcf$ *user input*

Unit Weight of Water: $\gamma w := 62.4pcf$ *user input*

Unit Weight of Soil: $\gamma s := 100pcf$ *user input*

Allowable Soil Bearing Capacity (Allowable Bearing Pressure at Depth 41'): $q_s := 6 \cdot ksf$ *user input*

Water Table Below Grade: $Wd := 41 \cdot ft$ *user input*

Average Allowable Shear: $fl := 859\,psf$ *user input*

Depth Neglected for Skin Friction at Top: $Depthunbond := 4\,ft$ *user input*

Foundation reinforcement per drawings by Tectonic, dated May 5, 2004

Loading:

$$TotalDownLoad := C_t + \pi \cdot \frac{d_p^{\,2}}{4} \cdot \left[L_{pag} \gamma c + \left[\gamma c \cdot \left(C_{Length} - L_{pag} \right) \right] \right]$$

$TotalDownLoad = 579.9\,kips$

$$PierWeight := \pi \cdot \frac{d_p^{\,2}}{4} \cdot \left[\left(Wd + L_{pag} \right) \cdot \gamma c + \left(C_{Length} - Wd - L_{pag} \right) \cdot (\gamma c - \gamma w) \right] + Conc_{addl} \gamma c$$

$PierWeight = 256.8\,kips$

$SoilShear := \pi\, d_p \cdot \left[fl \cdot \left(C_{Length} - Depthunbond \right) \right]$

$SoilShear = 556.6 \cdot kips$

AECOM

				Page	of
Job	170' Self-Supporting Lattice Tower - Cromwell, CT	Project No.	CFD-010	Sheet 2	of 2
Description	Drilled Pier Caisson Evaluation	Computed by	MCD	Date	07/16/16
		Checked by		Date	

Compression Capacity:

$$\text{TotalDownLoadCapacity} := \text{SoilShear} + q_s \cdot \left(\pi \cdot \frac{d_p^{\,2}}{4} \right)$$

$\text{TotalDownLoadCapacity} = 699.1 \cdot \text{kips}$

$\text{CheckDownLoadCapacity} := \text{if}(\text{TotalDownLoad} < \text{TotalDownLoadCapacity}, \text{"Okay"}, \text{"No Good"})$

CheckDownLoadCapacity = "Okay"

Tension Capacity:

$\text{TotalUpLiftCapacity} := \text{SoilShear} + \text{PierWeight}$

$\text{TotalUpLiftCapacity} = 813.4 \cdot \text{kips}$

$\text{CheckUpLiftCapacity} := \text{if}(U_t < \text{TotalUpLiftCapacity}, \text{"Okay"}, \text{"No Good"})$

CheckUpLiftCapacity = "Okay"

$$\text{SafetyFactor}_{\text{provided}} := \frac{\text{TotalUpLiftCapacity}}{U_t}$$

$\text{SafetyFactor}_{\text{provided}} = 2.20$

Check Cone Failure:

$$\text{ConeFailureCapacity} := \frac{\left[\left(C_{\text{Length}} - L_{\text{pag}} \right) \cdot \tan(30\text{deg}) \cdot 2 + d_p \right]^2 \cdot \pi}{4} \cdot \frac{C_{\text{Length}} - L_{\text{pag}}}{3} \cdot \gamma_s$$

$\text{ConeFailureCapacity} = 2997.25 \cdot \text{kips}$

$\text{CheckConeFailureCapacity} := \text{if}(U_t < \text{ConeFailureCapacity}, \text{"Okay"}, \text{"No Good"})$

CheckConeFailureCapacity = "Okay"

$$\text{ConeSafetyFactor}_{\text{provided}} := \frac{\text{ConeFailureCapacity}}{U_t}$$

$\text{ConeSafetyFactor}_{\text{provided}} = 8.12$

About AECOM

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With approximately 45,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and collaborative technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. A Fortune 500 company, AECOM serves clients in more than 100 countries and has annual revenue in excess of $6 billion.

More information on AECOM and its services can be found at www.aecom.com.

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Rocky Hill, CT 06067
860-529-8882
Fax: 860-529-3991

PROJECT INFORMATION

SCOPE OF WORK:

- AT&T ANTENNAS: (1) NEW ANTENNA PER SECTOR TO REPLACE EXISTING ANTENNA; (2) EXISTING ANTENNAS PER SECTOR TO REMAIN.
- AT&T RRUs: (2) NEW RRU PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (6) NEW RRUs; (1) NEW A2 MODULE PER SECTOR FOR A TOTAL OF (3) A2 MODULES; (1) EXISTING RRU PER SECTOR TO BE REUSED, FOR A TOTAL OF (3) EXISTING RRUs.
- AT&T SQUIDS: (1) NEW DC-6 SQUID; (1) EXISTING DC-6 SQUID TO REMAIN.
- AT&T CABLES: (1) NEW FIBER TRUNK & (2) NEW DC TRUNKS.

SITE ADDRESS:	179 SHUNPIKE ROAD CROMWELL, CT 06416
LATITUDE: LONGITUDE:	41.6232231 41° 37' 23.60316"N -72.6790381 72° 40' 44.53716"W
USID:	5814
TOWER OWNER:	CROMWELL FIRE DEPARTMENT
TYPE OF SITE:	LATTICE TOWER
TOWER HEIGHT:	170'-0"±
RAD CENTER:	115'±
CURRENT USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
PROPOSED USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

at&t MOBILITY

FA CODE: 10035331
SITE NUMBER: CT1141
SITE NAME: CROMWELL US MIL

PROJECT TEAM

CLIENT REPRESENTATIVE
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CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

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ENGINEERING:
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RF ENGINEER:
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CONTACT: CAMERON SYME
PHONE: 508-596-7146
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CONSTRUCTION MANAGEMENT:
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PHONE: 484-683-1750
EMAIL: gdorman@empiretelecomm.com

DRAWING INDEX

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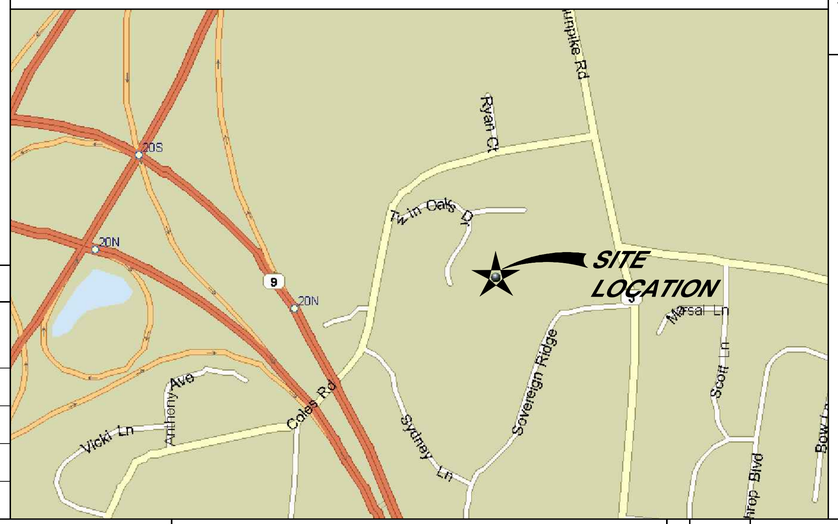
A-2	EQUIPMENT LAYOUT	0
A-3	ANTENNA LAYOUTS & ELEVATION	0
A-4	DETAILS	0
G-1	GROUNDING, ONE-LINE DIAGRAM & DETAILS	0

VICINITY MAP

DEPART 550 COCHITUATE RD, TOWN OF FRAMINGHAM, MA 01701: ON SR-30 [COCHITUATE RD] (WEST). BEAR LEFT (SOUTH) ONTO SR-126 [CONCORD ST], TURN LEFT (SOUTH) ONTO CONCORD ST. TURN RIGHT (WEST) ONTO SR-9 [WORCESTER RD], MERGE ONTO SR-30 [SR-9]. KEEP STRAIGHT ONTO SR-9 [WORCESTER RD], TURN RIGHT ONTO RAMP. KEEP LEFT TO STAY ON RAMP *TOLL ROAD*. MERGE ONTO I-90 [MASS PIKE], AT EXIT 9, TAKE RAMP (RIGHT) ONTO I-84. ENTERING CONNECTICUT. AT EXIT 57, TAKE RAMP (LEFT) ONTO SR-15, ROAD NAME CHANGES TO US-5 [SR-15]. AT EXIT 86, TAKE RAMP (RIGHT) ONTO I-91, AT EXIT 23, TURN RIGHT ONTO RAMP. TURN RIGHT (WEST) ONTO WEST ST, TURN LEFT (SOUTH) ONTO SR-3 [CROMWELL AVE]. BEAR LEFT (SOUTH) ONTO SR-3 [SHUNPIKE RD]. TURN RIGHT (WEST) ONTO COLES RD, TURN LEFT (EAST) ONTO TWIN OAKS DR. TURN LEFT (SOUTH-EAST) ONTO LOCAL ROAD ARRIVE AT SITE: THERE IS AN AUTOMATIC GATE AT THE ENTRANCE.



GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY, AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN, ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

DISCIPLINE:	NAME:	DATE:
SITE ACQUISITION:		
CONSTRUCTION MANAGER:		
AT&T PROJECT MANAGER:		

CONNECTICUT ONE CALL SYSTEM, INC. 1-800-922-4455 STOP - CALL BEFORE YOU DIG!

CONNECTICUT LAW REQUIRES TWO WORKING DAYS NOTICE PRIOR TO ANY EARTH MOVING ACTIVITIES BY CALLING 800-922-4455 OR DIAL 811

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SITE NUMBER: CT5144
SITE NAME: CROMWELL US MIL
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CROMWELL, CT 06416
MIDDLESEX COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	08/01/16	ISSUED AS FINAL	GR	DTS	NB

SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL: STATE OF CONNECTICUT, NICHOLAS D. BARILE, NO. 28643, LICENSED PROFESSIONAL ENGINEER, CT LICENSE NO. 28643

AT&T

DRAWING TITLE: TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
15108-EMP	T-1	0

GROUNDING NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471-000-3PS-EG00-0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE TO THE BRIDGE AND THE TOWER GROUND BAR.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

13. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV-G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM EIGHT FEET (8') TO TEN FEET (10').

14. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE ½" OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID TINNED COPPER GROUND WIRE, PER NEC 250.50.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   - CONTRACTOR – EMPIRE TELECOM
   - SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   - OWNER – AT&T MOBILITY
   - OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

6. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

7. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.

8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR

9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OFF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

12. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

13. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

14. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy=36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

15. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741-000-3APS-A00Z-00002, "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."

16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

17. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

19. SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
   - INTERNATIONAL BUILDING CODE: IBC 2009 WITH LOCAL & COUNTY AMENDMENTS
   - NATIONAL ELECTRICAL CODE: NEC 2011 WITH LOCAL & COUNTY AMENDMENTS
   - FIRE/LIFE SAFETY CODE: NFPA-101 2009 WITH LOCAL & COUNTY AMENDMENTS

20. SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:
   - AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
   - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION
   - AMERICAN SOCIETY OF TESTING OF MATERIALS, ASTM
   - TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA-222-G-1), STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
   - TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
   - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA
   - INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVELY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT
   - TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

21. FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

22. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS AT THE SITE PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.

23. INFORMATION SHOWN ON THIS SET OF PLANS TAKEN FROM DRAWINGS PREPARED BY DEWBERRY ENGINEERING FOR A RECENT UPGRADE DATED 06/29/2012. CONTRACTOR TO NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

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MIDDLESEX COUNTY

at&t MOBILITY
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NO.	DATE	REVISIONS	BY	CHK	APP'D
0	08/01/16	ISSUED AS FINAL	GR	DTS	NB

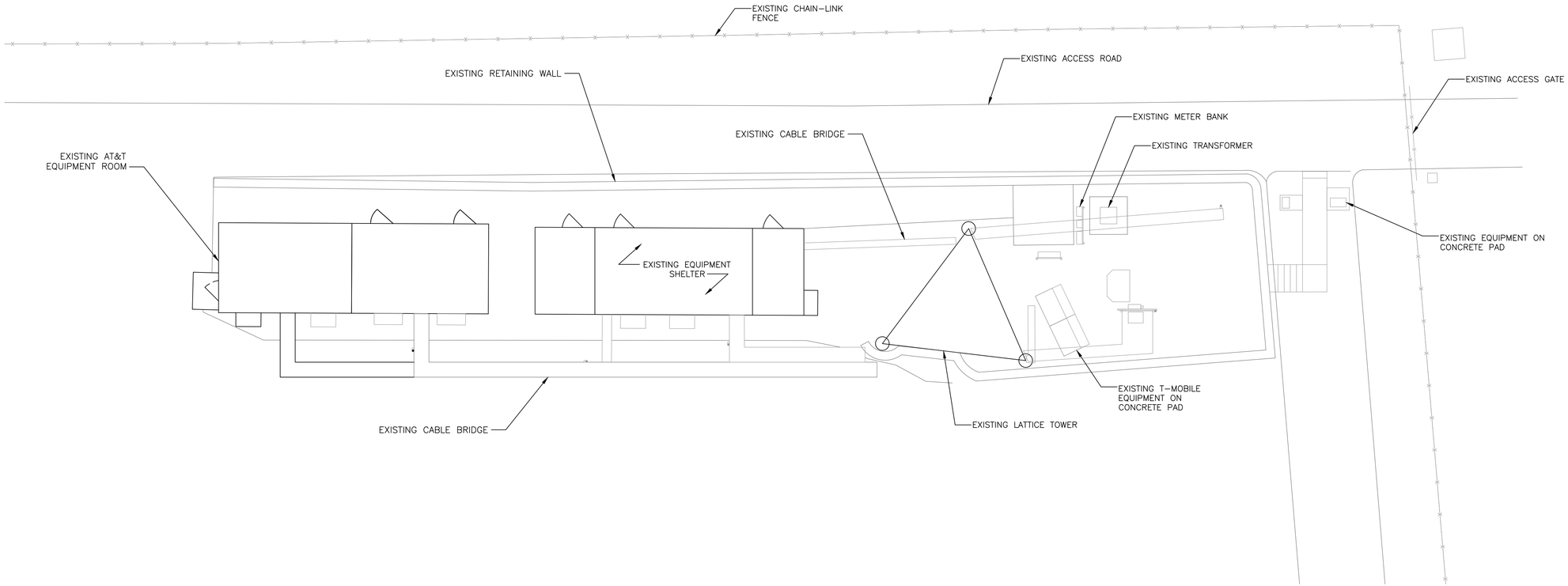
SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BYRNE
LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT 28643

AT&T

DRAWING TITLE:
GROUNDING NOTES & GENERAL NOTES

JOB NUMBER	DRAWING NUMBER	REV
15108-EMP	GN-1	0



NORTH

COMPOUND LAYOUT

SCALE: 1/8" = 1'–0"

0 4 8 16

GRAPHIC SCALE: 1/8"=1'–0"

COM-EX Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5144
SITE NAME: CROMWELL US MIL

179 SHUNPIKE ROAD
CROMWELL, CT 06416
MIDDLESEX COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	08/01/16	ISSUED AS FINAL	GR	DTS	NB

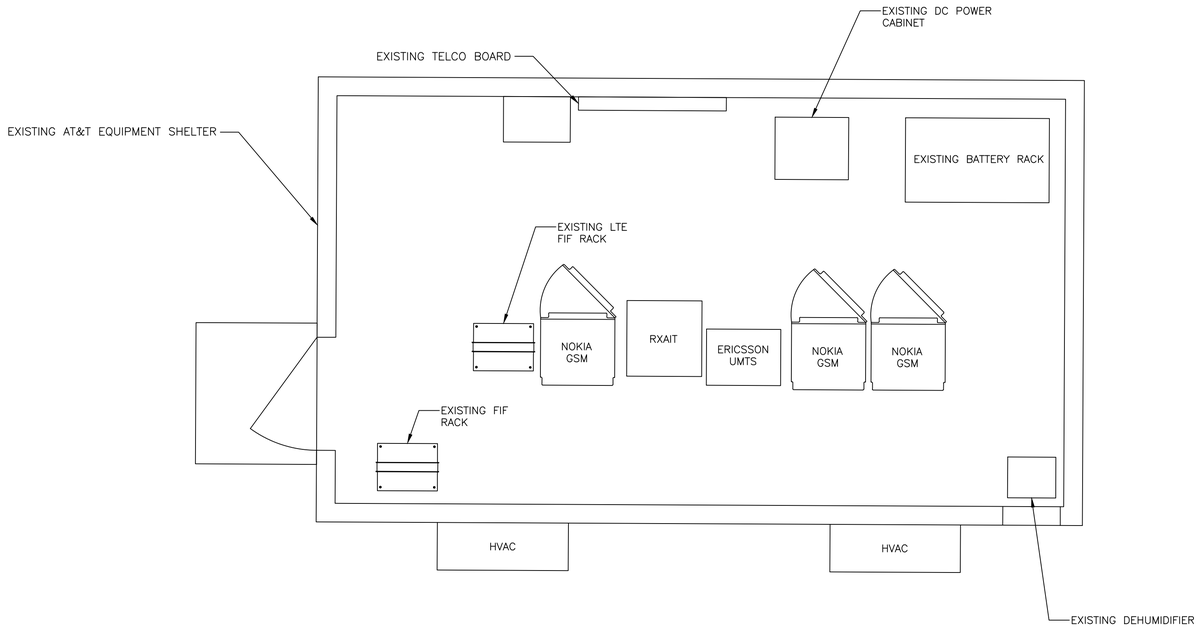
SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BELLE
No. 28643
REGISTERED
PROFESSIONAL ENGINEER
NICHOLAS D. BELLE
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
COMPOUND LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
15108–EMP	A–1	0

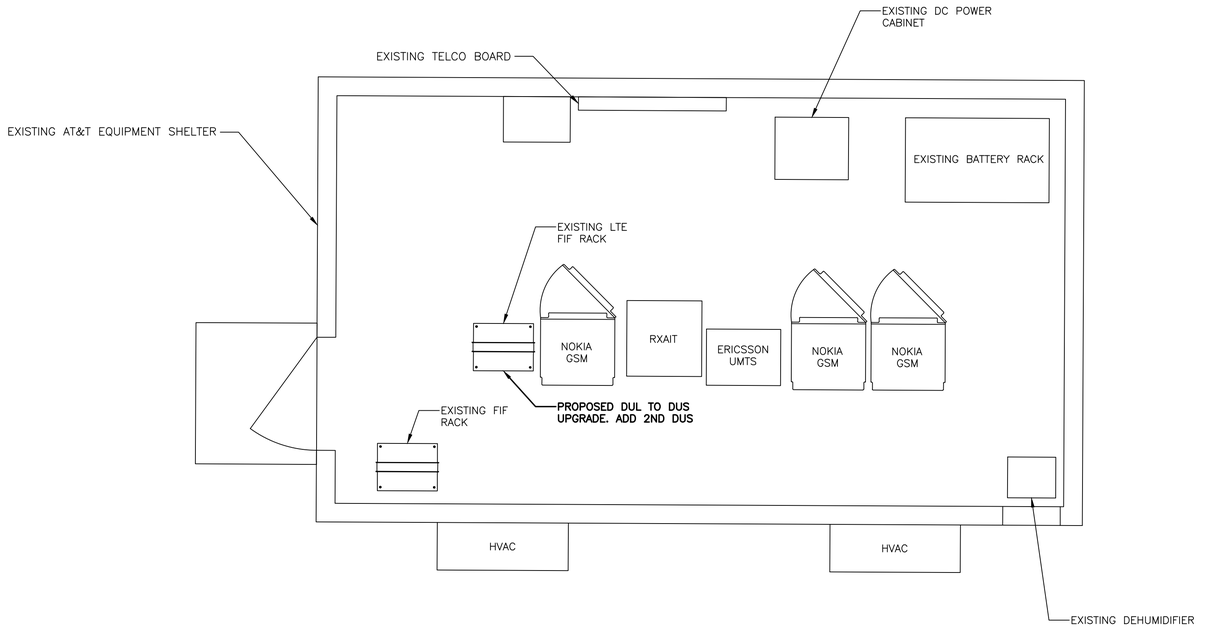


NORTH

EXISTING EQUIPMENT LAYOUT

SCALE: 1/2" = 1'-0"

GRAPHIC SCALE: 1/2"=1'-0"



NORTH

PROPOSED EQUIPMENT LAYOUT

SCALE: 1/2" = 1'-0"

GRAPHIC SCALE: 1/2"=1'-0"

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0	08/01/16	ISSUED AS FINAL	GR	DTS	NB

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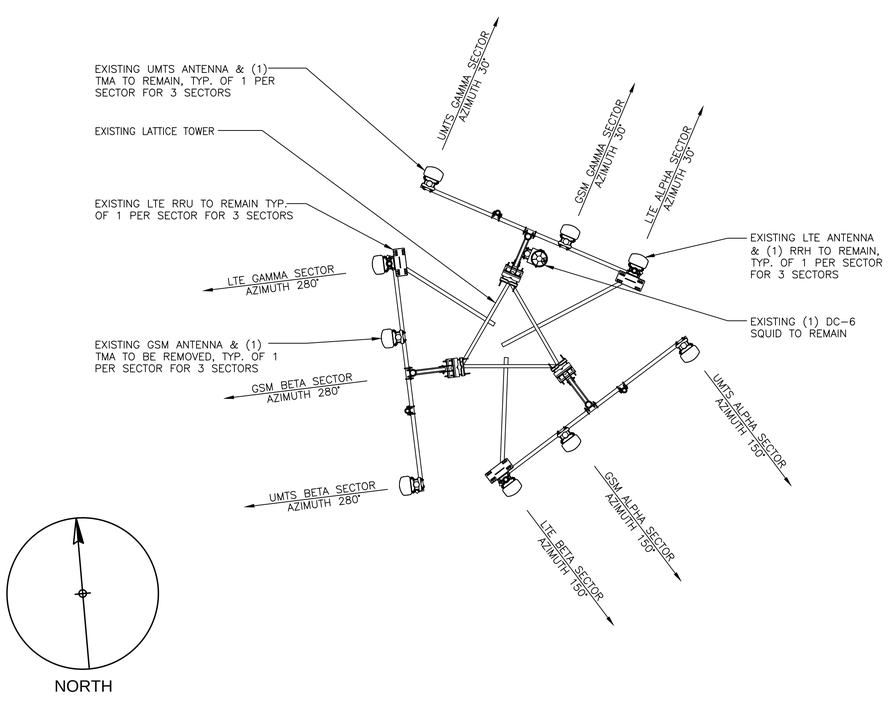
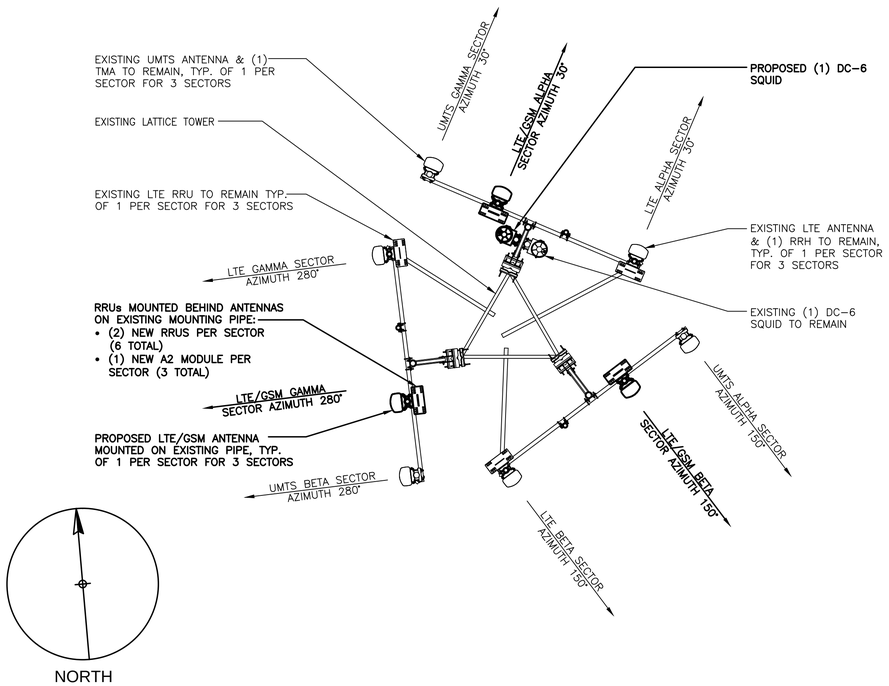
SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BAILEY
No. 29643
REGISTERED
PROFESSIONAL ENGINEER
NICHOLAS D. BAILEY
PROFESSIONAL ENGINEER
CT No. 29643

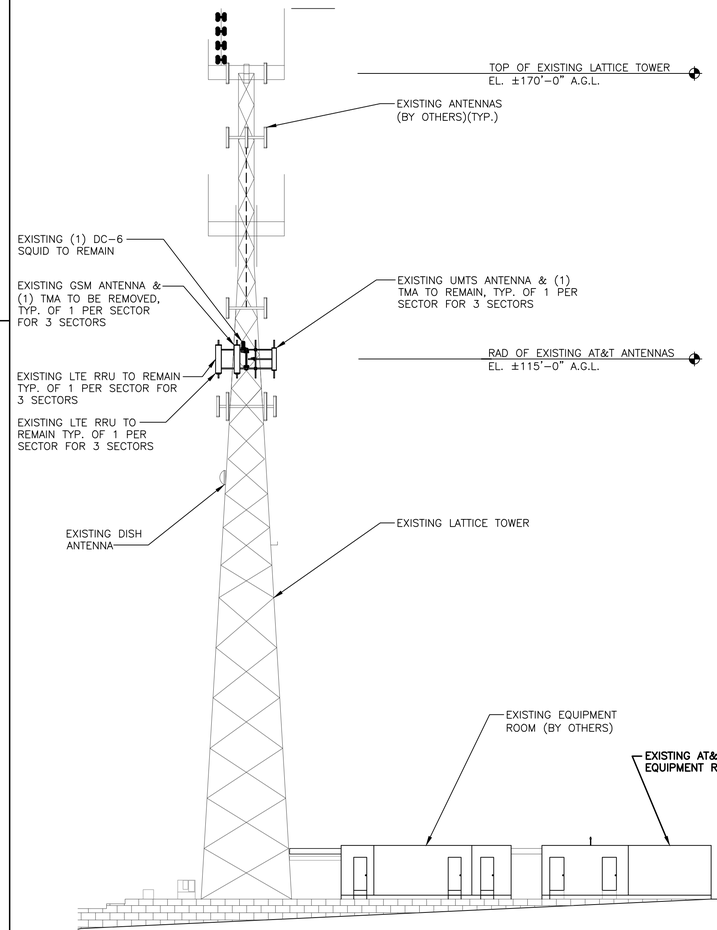
AT&T

DRAWING TITLE:
EQUIPMENT LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
15108-EMP	A-2	0

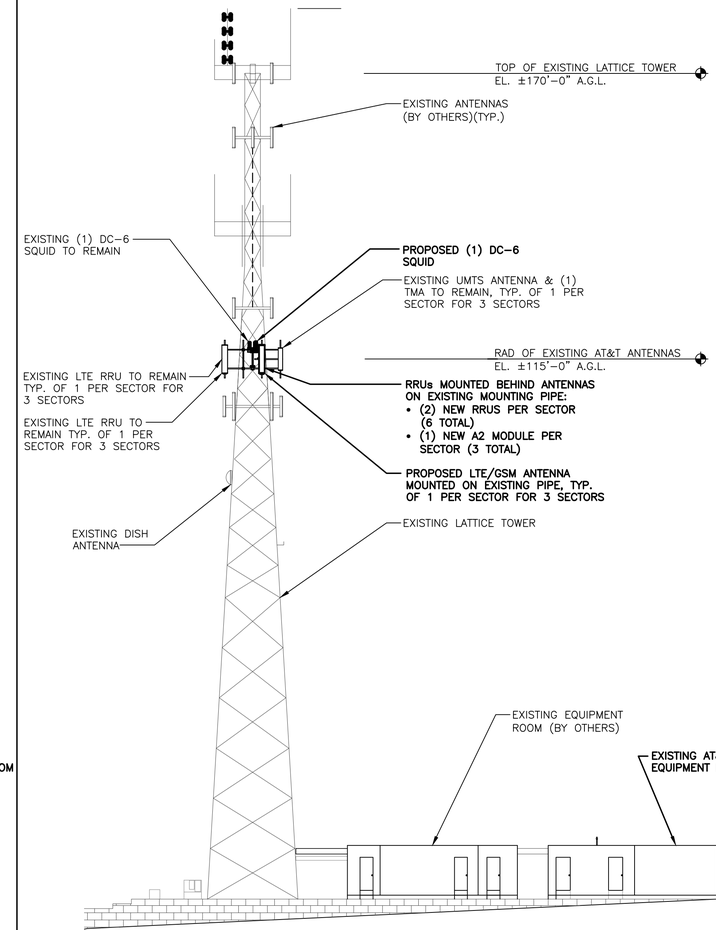






EXISTING TOWER ELEVATION
SCALE: NTS

PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.



PROPOSED TOWER ELEVATION
SCALE: NTS

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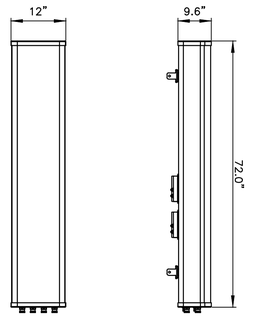
SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BARILE
No. 28643
LICENSED PROFESSIONAL ENGINEER
NICHOLAS D. BARILE
PROFESSIONAL ENGINEER
CT 28643

AT&T

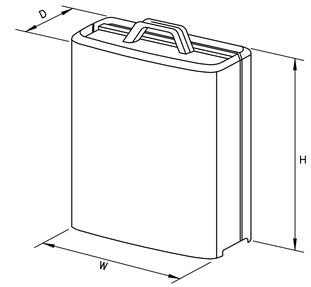
DRAWING TITLE:
ANTENNA LAYOUTS & ELEVATION

JOB NUMBER	DRAWING NUMBER	REV
15108-EMP	A-3	0



MANUFACTURER	QUINTEL
MODEL	QS66512-3
WEIGHT	47.6 LBS

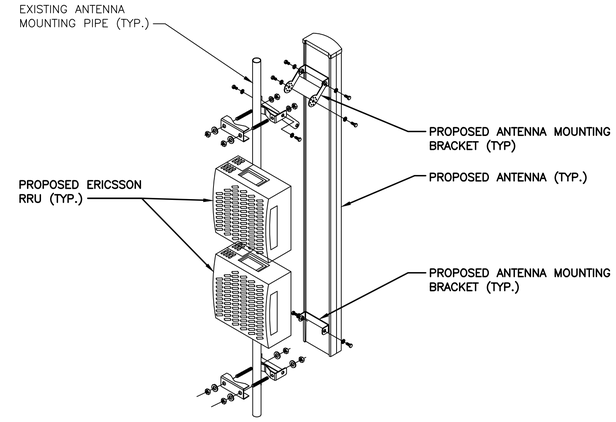
LTE ANTENNA DETAIL
SCALE: N.T.S.



MODEL	L x W x H	WEIGHT
*RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-12	20.4" x 18.5" x 7.5"	58 LBS
RRUS-32	29.9" x 13.3" x 9.5"	77 LBS
A2 MODULE	16.4" x 15.2" x 3.4"	22 LBS

*DENOTES EXISTING

RRUS DETAIL
SCALE: N.T.S.



ANTENNA AND RRU MOUNTING DETAIL
SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770.00	55"x11"x5"
	A2	–	–	–
	A3	POWERWAVE	7770.00	55"x11"x5"
	A4	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
BETA	B1	POWERWAVE	7770.00	55"x11"x5"
	B2	–	–	–
	B3	POWERWAVE	7770.00	55"x11"x5"
	B4	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
GAMMA	G1	POWERWAVE	7770.00	55"x11"x5"
	G2	–	–	–
	G3	POWERWAVE	7770.00	55"x11"x5"
	G4	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770.00	55"x11"x5"
	A2	**QUINTEL**	**QS66512-3**	**72"x12"x9.6"**
	A3	–	–	–
	A4	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
BETA	B1	POWERWAVE	7770.00	55"x11"x5"
	B2	**QUINTEL**	**QS66512-3**	**72"x12"x9.6"**
	B3	–	–	–
	B4	CCI	HPA-65R-BUU-H6	72"x14.8"x7.4"
GAMMA	G1	POWERWAVE	7770.00.	55"x11"x5"
	G2	**QUINTEL**	**QS66512-3**	**72"x12"x9.6"**
	G3	–	–	–
	G4	CCI	HPA-65R-BUU-H6	72"x14.8"x7.4"

PROPOSED RRH SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x7.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	**RRUS-32**	**29.9"x13.3"x9.5"**		
	ERICSSON	RRUS-11	19.7"x16.9"x7.2"		
BETA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x7.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	**RRUS-32**	**29.9"x13.3"x9.5"**		
	ERICSSON	RRUS-11	19.7"X16.9"X7.2"		
GAMMA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x7.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	**RRUS-32**	**29.9"x13.3"x9.5"**		
	ERICSSON	RRUS-11	19.7"X16.9"X7.2"		

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NO.	DATE	REVISIONS	BY	CHK	APP'D
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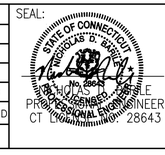
SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

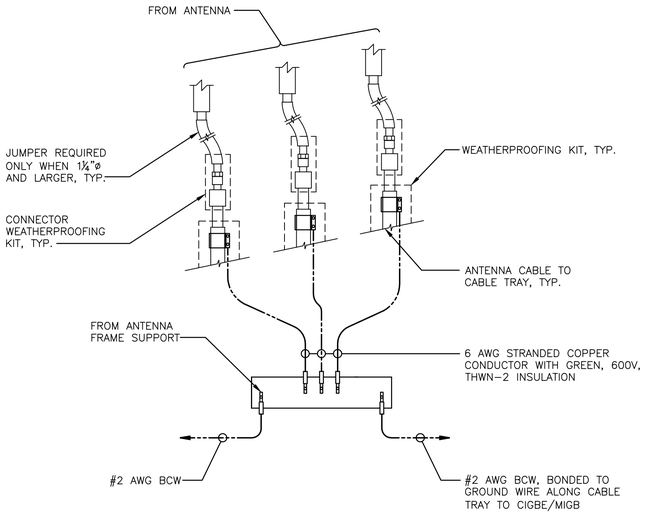
SEAL:


NICHOLAS D. BERGLE
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

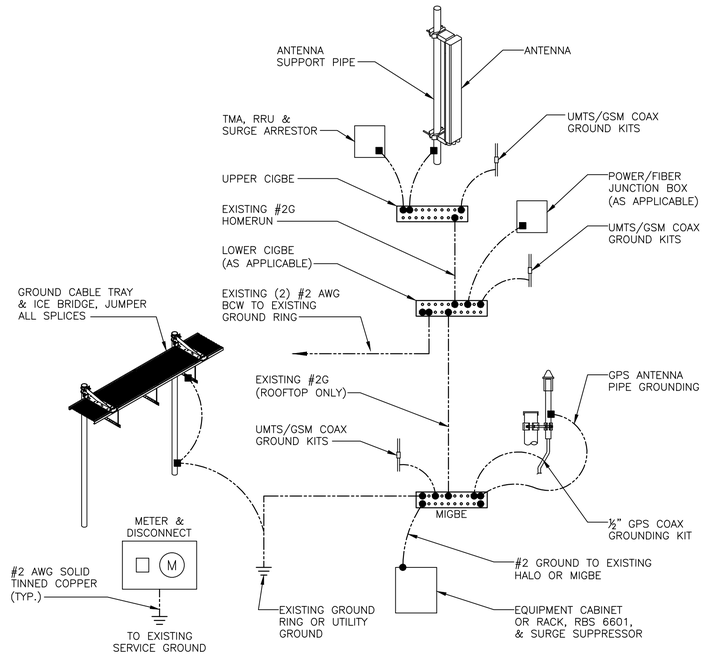
DRAWING TITLE:
DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15108-EMP	A-4	0



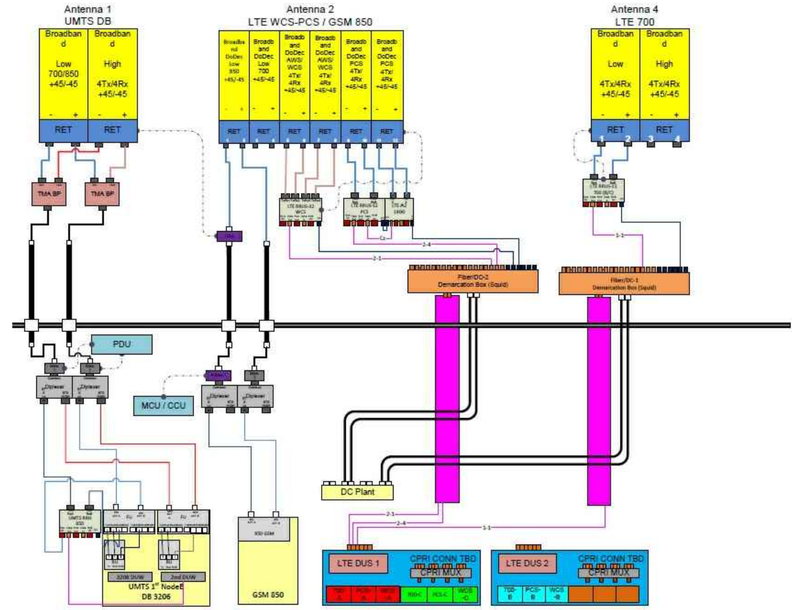
GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



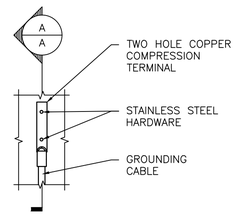
GROUNDING RISER DIAGRAM

SCALE: N.T.S.

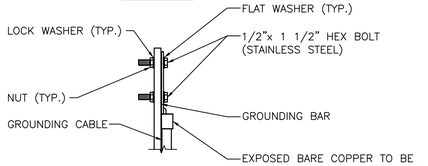


PLUMBING DIAGRAM

SCALE: N.T.S.



ELEVATION



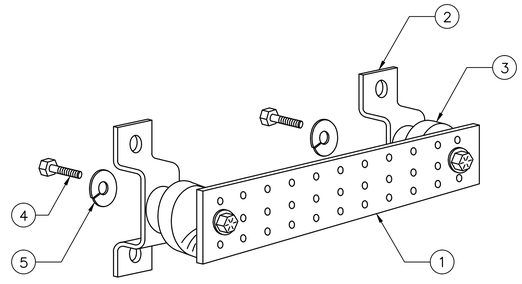
SECTION "A–A"

NOTE:

1. "DOUBLING UP" OR "STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x ¼")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	⅝"–11x1" H.H.C.S.
5	4	⅝" LOCK WASHER

NOTES:

EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION

SECTION "P" – SURGE PRODUCERS
- CABLE ENTRY PORTS (HATCH PLATES) (#2)
- GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
- TELCO GROUND BAR
- COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
- +24V POWER SUPPLY RETURN BAR (#2)
- –48V POWER SUPPLY RETURN BAR (#2)
- RECTIFIER FRAMES

SECTION "A" – SURGE ABSORBERS
- INTERIOR GROUND RING (#2)
- EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
- METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
- BUILDING STEEL (IF AVAILABLE) (#2)

GROUND BAR DETAIL

SCALE: N.T.S.

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SEAL:
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REGISTERED PROFESSIONAL ENGINEER
DOUGLAS D. BERUBE
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CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
GROUNDING, ONE-LINE DIAGRAM & DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15108-EMP	G-1	0