Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055

May 12, 2017

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

Notice of Exempt Modification
303 Boxwood Lane, Danbury, CT 06811
Latitude- 41.39472156
Longitude- -73.48666590

Dear Ms. Bachman,

T-Mobile currently maintains (6) antennas at the 83' level of the existing 100' lattice tower located at 303 Boxwood Lane in Danbury, CT. The tower and property is owned by Western Connecticut State University. T-Mobile now intends to replace (3) existing antennas with (6) new 700/1900/2100 MHz antennas. These antennas would be installed at the same 83' level of the tower. T-Mobile also intends to install (1) new hybrid cable.

This facility was approved by the Council in Docket No. 176 on October 21, 1996. This approval did not include conditions that could be feasibly violated by this modification. This modification complies with the approval.

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 Mark D. Boughton, Mayor of the City of Danbury, as well as the property and tower owner.

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

1. The proposed modification 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 modification 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.

For the foregoing reasons, T-Mobile 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).

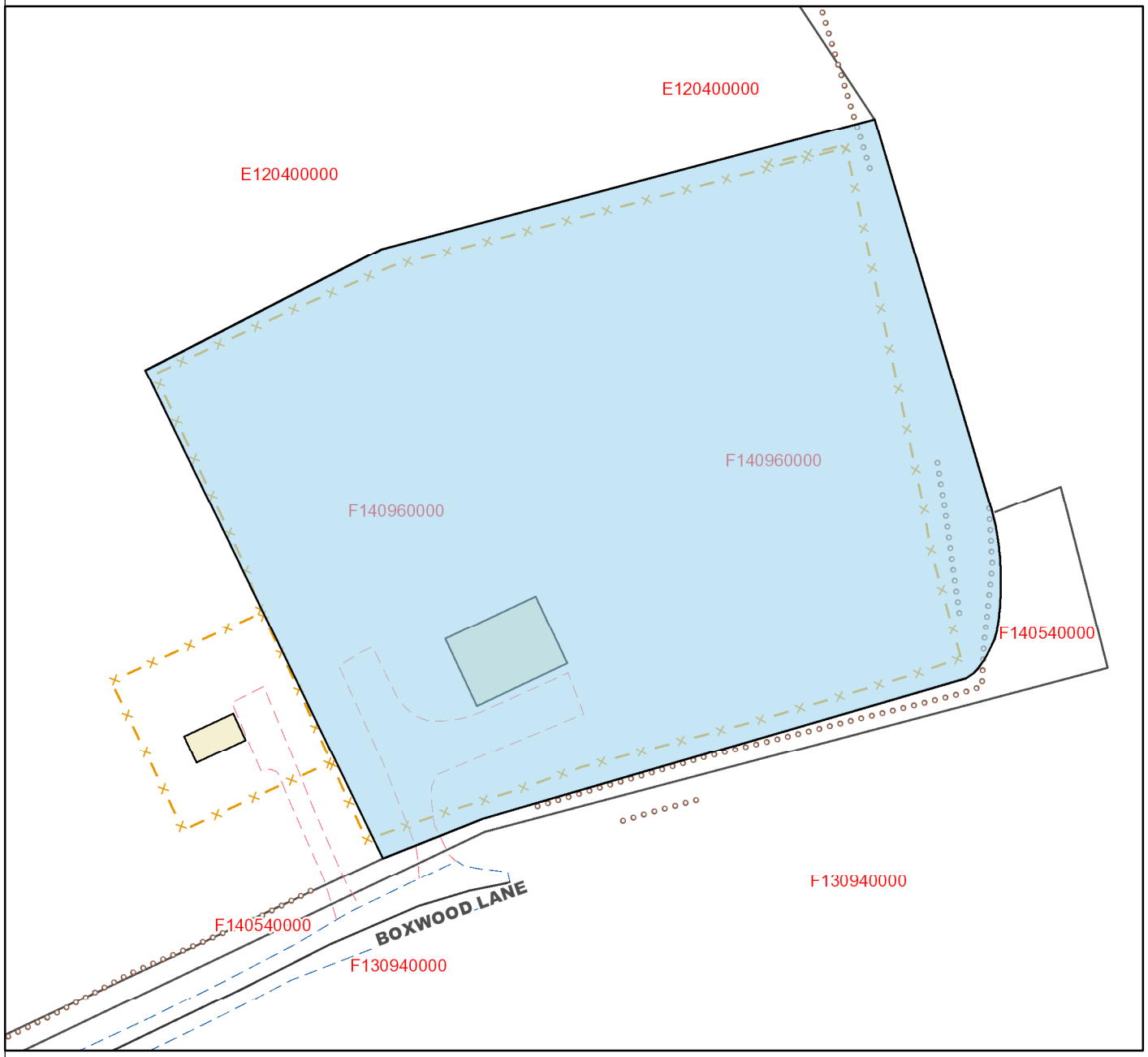
Sincerely,

Kyle Richers

Kyle Richers
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey 07430
908-447-4716
krichers@transcendwireless.com

cc: Mark D. Boughton- as elected official
Western Connecticut State University- as tower and property owner
Sharon Calitro- as zoning official

GIS



Not a legal survey.

303 BOXWOOD LN

Location	303 BOXWOOD LN	**Mblu**	F14/ / 96/ /
Acct#		**Owner**	STATE OF CONNECTICUT
Assessment	$65,800	**Appraisal**	$94,000
PID	24557	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$0	$94,000	$94,000
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$0	$65,800	$65,800

Owner of Record

Owner	STATE OF CONNECTICUT	**Sale Price**	$0
Co-Owner	WATER STORAGE&PUMPING STATION	**Book & Page**	0482/0104
Address	210 CAPITOL AVE STE 1 HARTFROD, CT 06106	**Sale Date**	01/02/1970

Ownership History

Ownership History			
Owner	**Sale Price**	**Book & Page**	**Sale Date**
STATE OF CONNECTICUT	$0	0482/0104	01/02/1970

Building Information

Building 1 : Section 1

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

Building Attributes	
Field	**Description**
Style	Vacant Land

Model	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Fireplaces	
Whirlpool	
Addn'l Kitchen	
Bsm Gar	
Fin Bsm Area	
Fin Bsm Qual	
Nhbd	
MH Park	

Building Photo

(http://images.vgsi.com/photos/DanburyCTPhotos//default.jpg)

Building Layout

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

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 946V

Land Line Valuation

Size (Acres) 1.86

Description	Rec. Vacant	**Frontage**	0
Zone	RA40	**Depth**	0
Neighborhood		**Assessed Value**	$65,800
Alt Land Appr	No	**Appraised Value**	$94,000
Category			

Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$0	$94,000	$94,000
2014	$0	$94,000	$94,000
2013	$0	$94,000	$94,000

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$0	$65,800	$65,800
2014	$0	$65,800	$65,800
2013	$0	$65,800	$65,800

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTFF703A

CT703/WCSU ET
303 Boxwood Lane
Danbury, CT 06811

May 3, 2017

EBI Project Number: 6217001898

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	31.53 %

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

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May 3, 2017

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CTFF703A – CT703/WCSU ET**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **303 Boxwood Lane, Danbury, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile 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 limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) 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 T-Mobile Wireless antenna facility located at **303 Boxwood Lane, Danbury, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile 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 GSM 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.

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 UMTS channels (AWS Band – 2100 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 (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

6) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

7) Since the 2100 MHz UMTS radios are ground mounted there are additional cabling losses accounted for. For each ground mounted 2100 MHz UMTS RF path an additional 1.33 dB of loss was factored into the calculations used for this analysis. This is based on manufacturers Specifications for 125 feet of 1-5/8" coax cable on each path.

8) 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.

9) For the following calculations the sample point was the top of a 6-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.

10) The antennas used in this modeling are the **Ericsson AIR32 B66Aa/B2A** & **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-A1M** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR32 B66Aa/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6515DS-A1M** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. 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.

11) The antenna mounting height centerlines of the proposed antennas are **83 & 81.5 feet** above ground level (AGL).

12) 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.

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

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	83	Height (AGL):	83	Height (AGL):	83
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	5.66	Antenna B1 MPE%	5.66	Antenna C1 MPE%	5.66
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	83	Height (AGL):	83	Height (AGL):	83
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	6,387.05	ERP (W):	6,387.05	ERP (W):	6,387.05
Antenna A2 MPE%	3.87	Antenna B2 MPE%	3.87	Antenna C2 MPE%	3.87
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	81.5	Height (AGL):	81.5	Height (AGL):	81.5
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	1.17	Antenna B3 MPE%	1.17	Antenna C3 MPE%	1.17

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**10.70 %**
AT&T	2.51 %
Sprint	2.82 %
WCXI (WCSU)	15.50 %
Site Total MPE %:	**31.53 %**

T-Mobile Sector A Total:	10.70 %
T-Mobile Sector B Total:	10.70 %
T-Mobile Sector C Total:	10.70 %
Site Total:	31.53 %

T-Mobile _per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	83	28.31	AWS - 2100 MHz	1000	2.83%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	83	28.31	PCS - 1900 MHz	1000	2.83%
T-Mobile AWS - 2100 MHz UMTS	2	859.25	83	10.42	AWS - 2100 MHz	1000	1.04%
T-Mobile PCS - 1900 MHz UMTS	2	1,167.14	83	14.15	PCS - 1900 MHz	1000	1.42%
T-Mobile PCS - 1900 MHz GSM	2	1,167.14	83	14.15	PCS - 1900 MHz	1000	1.42%
T-Mobile 700 MHz LTE	1	865.21	81.5	5.46	700 MHz	467	1.17%
						Total:	**10.70%**

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 T-Mobile 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:

T-Mobile Sector	Power Density Value (%)
Sector A:	10.70 %
Sector B:	10.70 %
Sector C:	10.70 %
T-Mobile Per Sector Maximum:	10.70 %
Site Total:	31.53 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **31.53%** 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.

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

100' Existing NUDD Lattice Tower

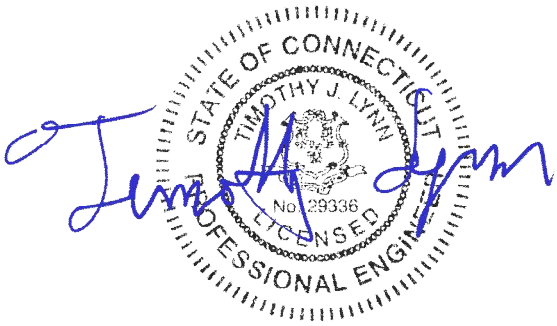
Proposed T-Mobile
Antenna Upgrade

T-Mobile Site Ref: CTFF703A

303 Boxwood Lane
Danbury, CT

CENTEK Project No. 17012.37

Date: April 21, 2017



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing self supporting lattice tower located in Danbury, Connecticut.

The host tower is a 100-ft, three-legged self-support lattice tower originally designed and manufactured by Fred A. Nudd Corporation; file no: 96-4992 dated January 21, 1997. Subsequent reinforcements were made to the tower per Centek job no. 361A dated November 28, 2001 and Centek job no. 10106 dated August 16, 2010. The tower geometry, structure member sizes and the foundation system information were taken from the aforementioned design documents.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no. 16159.06 dated October 13, 2016, visual verification from grade on March 3, 2017 and a T-Mobile RF sheet.

The tower is made up of five (5) steel sections consisting of A500-42, A500-50, and A500-61ksi pipe legs. Diagonal lateral support bracing consists of A36 single angle and steel rod construction. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by welded connections (40'-100'), bolted and welded gusset connections (0'-40'). The tower face width is 7.5-ft at the bottom tapering to 3.5-ft at the top.

T-Mobile proposes the removal of three (3) panel antennas and the installation of six (6) panel antennas mounted on three (3) proposed mounts. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- AT&T Mobility (Existing):
  Antennas: Six (6) CCI OPA-65R-LUCC-H4 panel antennas, six (6) Ericsson RRUS-11 remote radio heads, three (3) Ericsson RRUS-12 remote radio heads, three (3) Ericsson RRUS-32 remote radio heads, three (3) Ericsson A2 units and four (4) Raycap DC6-48-60-18-8F surge arrestors mounted on three (3) existing sector frames with a RAD center elevation of 98-ft above the existing tower base.
  Coax Cables: Two (2) fiber cable, eight (8) dc control cables and three (3) RET cables running on a face of the existing tower
- Unknown (Existing):
  Antennas: One (1) 3' parabolic grid antenna with a RAD center elevation of 96-ft above the existing tower base.
  Coax Cables: One (1) 1/2" ∅ coax cable.
- Sprint (Existing):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, six (6) Alcatel-Lucent 1900 MHz RRHs and three (3) Alcatel-Lucent 800 MHz RRHs pipe mounted frames with a RAD center elevation of 89-ft above the existing tower base.
  Coax Cables: Four (4) 1-1/4" ∅ fiber cables and one (1) RET cable.

- WCSU FM (Existing):
  Antennas: One (1) 4-Bay Shively Labs 6810 FM Antenna w/ Radomes with a RAD center elevation of 65-ft above the existing tower base.
  Coax Cables: One (1) 1 5/8" ∅ coax cable.
- Sprint (Existing):
  Antennas: (1) GPS antenna mounted to a 2' standoff mount with a RAD center elevation of 30-ft above the existing tower base.
  Coax Cables: One (1) 1/2" ∅ coax cable.
- T-Mobile: (Existing to Remain/Relocate):
  Antennas: Three (3) Ericsson AIR21 panel antennas, three (3) TMAs and three (3) Ericsson RRUS-11 remote radio heads relocated to proposed three (3) 10-ft t-Frames with a RAD center elevation of 83-ft above the existing tower base.
  Coax Cables: Six (6) 1 5/8" ∅ coax cables and one (1) 1 5/8" ∅ fiber cable running on a leg/face of the tower.
- T-Mobile: (Existing to Remove):
  Antennas: Three (3) Ericsson KRC-118 057/01 panel antennas mounted on three (3) SitePro WiMAX Tower mounts (p/n CWT02) with a RAD center elevation of 83-ft above the existing tower base.
  Coax Cables: Six (6) 1 5/8" ∅ coax cables running on a leg/face of the tower.
- **T-Mobile: (Proposed):**
  Antennas: Three (3) Andrew LNX-6515DS panel antennas and three (3) AIR32 panel antennas mounted on three (3) 10-ft T-Frames with RAD center elevations of 83-ft (AIR32) and 81.5-ft (LNX) above the existing tower base.
  Coax Cables: One (1) 1 5/8" ∅ fiber cable running on a leg/face of the tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables shall be routed as specified on in Section 3 of this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Fairfield; v = 90-110 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Danbury; v = 93 mph (3 second gust)	*[Appendix N of the 2016 CT Building Code]*
Load Cases:	Load Case 1; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2016 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 0.75" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 4-8 of the TIA code.

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxtower "Section Capacity Table", this tower was found to be at **99.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	40'-0"-53'-4"	99.7%	**PASS**
Diagonal (T2)	60'-0"-80'-0"	99.2%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 2.0-ft ∅ x 4.25-ft long reinforced concrete piers on a 14.5-ft square x 3-ft thick reinforced concrete pad bearing directly on existing sub grade. The existing foundation dimensions and sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned manufacturers original design documents; Fred A. Nudd Corporation; file no: 96-4992. Tower legs are connected to the foundation by means of (4) 1.5" ∅, ASTM A36 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 1 were used in the verification of the foundation:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**16 kips**
	Compression	**20 kips**
	Moment	**1039 kip-ft**
Leg	Shear	**11 kips**
	Compression	**167 kips**
	Uplift	**152 kips**

- The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	65.4%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS[(1)]	Proposed Loading (FS)[(1)]	Result
Reinforced Concrete Mat	OTM[(2)]	1.0	1.44	**PASS**

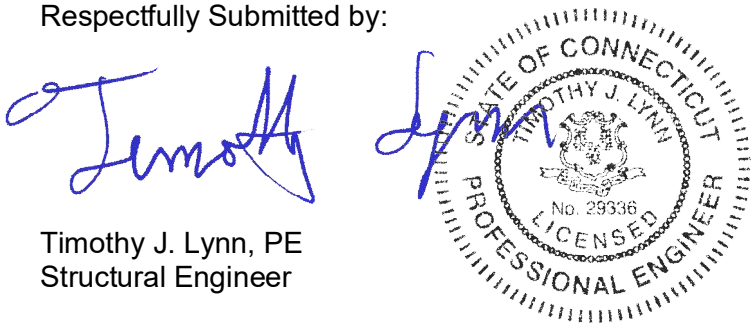
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration with the below recommendations.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provide to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

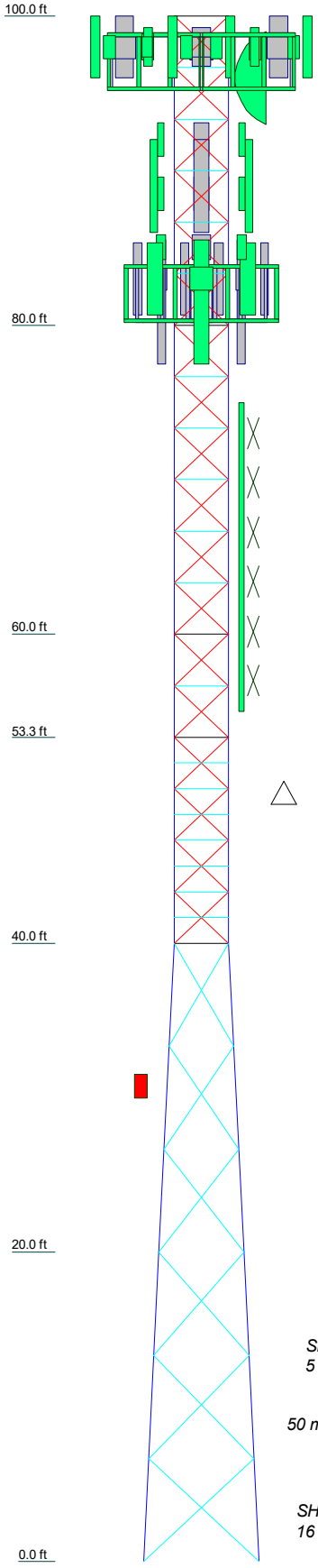
General Description of Structural Analysis Program

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4	T5	T6
Legs	P2.5x.276	P2.5x.276 (GR)	P3x.3 (GR)	P5x.375 (GR)		
Leg Grade	A500-50		A500M-61	A500-42		
Diagonals	SR 5/8		SR 3/4	L2x2x3/16		L2 1/2x2 1/2x3/16
Diagonal Grade	A36					
Top Girts	L1 1/2x1 1/2x3/16		2L1 1/2x1 1/2x3/16	N.A.		
Bottom Girts	N.A.		2L1 1/2x1 1/2x3/16	N.A.		
Horizontals	L1 1/2x1 1/2x3/16		2L1 1/2x1 1/2x3/16	N.A.		
Sec. Horizontals	N.A.		L2 1/2x2 1/2x5/16	N.A.		
Face Width (ft) 7.5	3.5			5.5		
# Panels @ (ft)	12 @ 3.33333		2 @ 3.335	4 @ 3.3325	6 @ 6.66667	
Weight (K) 9.3	0.8	1.1	0.5	1.3	2.7	2.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) OPA-65R-LCUU-H4 (ATI - Existing)	98	APXVSPP18-C-A20 (Sprint - Existing)	89
(2) OPA-65R-LCUU-H4 (ATI - Existing)	98	FD-RRH 4x45 1900 (Sprint - Existing)	88.5
(2) OPA-65R-LCUU-H4 (ATI - Existing)	98	FD-RRH 4x45 1900 (Sprint - Existing)	88.5
(2) RRUS-11 (ATI - Existing)	98	FD-RRH 4x45 1900 (Sprint - Existing)	88.5
RRUS-12 (ATI - Existing)	98	FD-RRH 2x50 800 (Sprint - Existing)	85
RRUS-32 (ATI - Existing)	98	FD-RRH 2x50 800 (Sprint - Existing)	85
A2 (ATI - Existing)	98	FD-RRH 2x50 800 (Sprint - Existing)	85
(2) RRUS-11 (ATI - Existing)	98	AIR21 B2A/B4P (T-Mobile - Existing)	83
RRUS-12 (ATI - Existing)	98	AIR21 B2A/B4P (T-Mobile - Existing)	83
RRUS-32 (ATI - Existing)	98	AIR21 B2A/B4P (T-Mobile - Existing)	83
A2 (ATI - Existing)	98	AIR32 (T-Mobile - Proposed)	83
(2) RRUS-11 (ATI - Existing)	98	AIR32 (T-Mobile - Proposed)	83
RRUS-12 (ATI - Existing)	98	AIR32 (T-Mobile - Proposed)	83
RRUS-32 (ATI - Existing)	98	RRUS-11 (T-Mobile - Existing)	83
A2 (ATI - Existing)	98	RRUS-11 (T-Mobile - Existing)	83
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	RRUS-11 (T-Mobile - Existing)	83
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	10-ft T-Frame (T-Mobile - Proposed)	82
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	10-ft T-Frame (T-Mobile - Proposed)	82
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	10-ft T-Frame (T-Mobile - Proposed)	82
12' Boom Starmount (ATI - Existing)	97	LNX-6515DS (T-Mobile - Proposed)	81.5
12' Boom Starmount (ATI - Existing)	97	LNX-6515DS (T-Mobile - Proposed)	81.5
12' Boom Starmount (ATI - Existing)	97	LNX-6515DS (T-Mobile - Proposed)	81.5
Parabolic Grid	96	ATMAA1412D-1A20 Twin TMA (T-Mobile - Existing)	80
FD-RRH 4x45 1900 (Sprint - Existing)	92	ATMAA1412D-1A20 Twin TMA (T-Mobile - Existing)	80
FD-RRH 4x45 1900 (Sprint - Existing)	92	ATMAA1412D-1A20 Twin TMA (T-Mobile - Existing)	80
FD-RRH 4x45 1900 (Sprint - Existing)	92	6810 4 Bay	65
APXVSPP18-C-A20 (Sprint - Existing)	89	2.5" Tube x 2' Standoff (Sprint)	30
APXVSPP18-C-A20 (Sprint - Existing)	89	GPS (Sprint)	30

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A500M-61	61 ksi	75 ksi
A36	36 ksi	58 ksi	A500-42	42 ksi	58 ksi

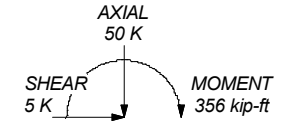
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Grouted pipe f'c is 5 ksi
8. 3/4" dia SR used for sections T3 _T4 to account for 5/8" SR with 1/4" bar
9. TOWER RATING: 99.7%

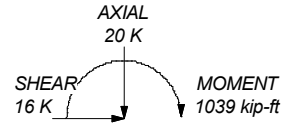
ALL REA
ARE FAC

MAX. CORNER REACTIONS AT BASE:
DOWN: 167 K
SHEAR: 11 K

UPLIFT: -152 K
SHEAR: 10 K



TORQUE 1 kip-ft
50 mph WIND - 0.7500 in ICE



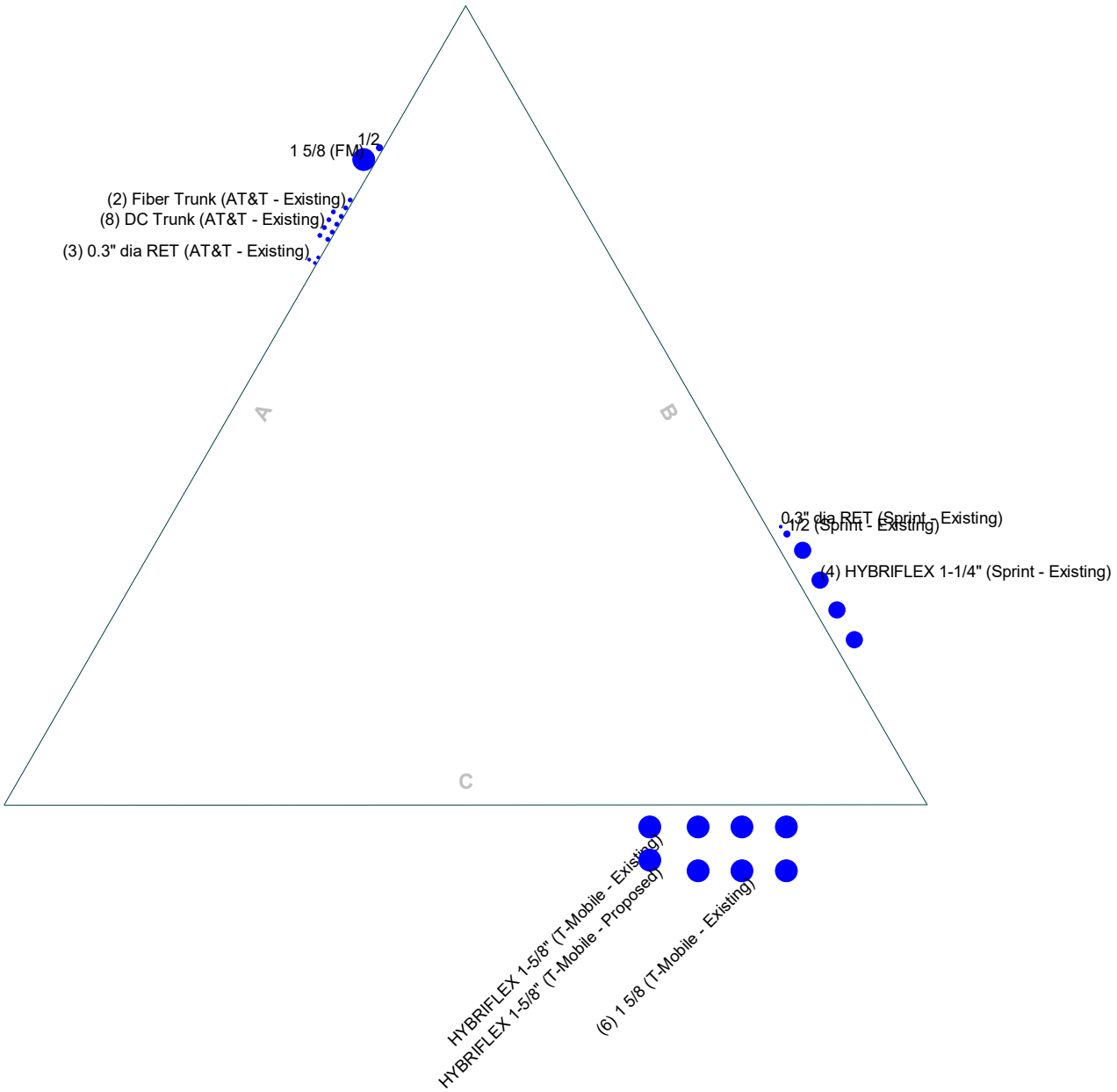
TORQUE 4 kip-ft
REACTIONS - 93 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***17012.37 - CTFF703A***		
Project:	***100' Nudd Lattice - 303 Boxwood Lane, Danbury, CT***		
Client: T-Mobile		Drawn by: TJL	App'd:
Code: TIA-222-G		Date: 04/21/17	Scale: NTS
Path: J:\Jobs\1701200.WI\37_CTFF703A\05_Structural\Backup Documentation\Calcs\ER Files\100-ft NUDD Lattice Tower Danbury, CT.eri			Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face



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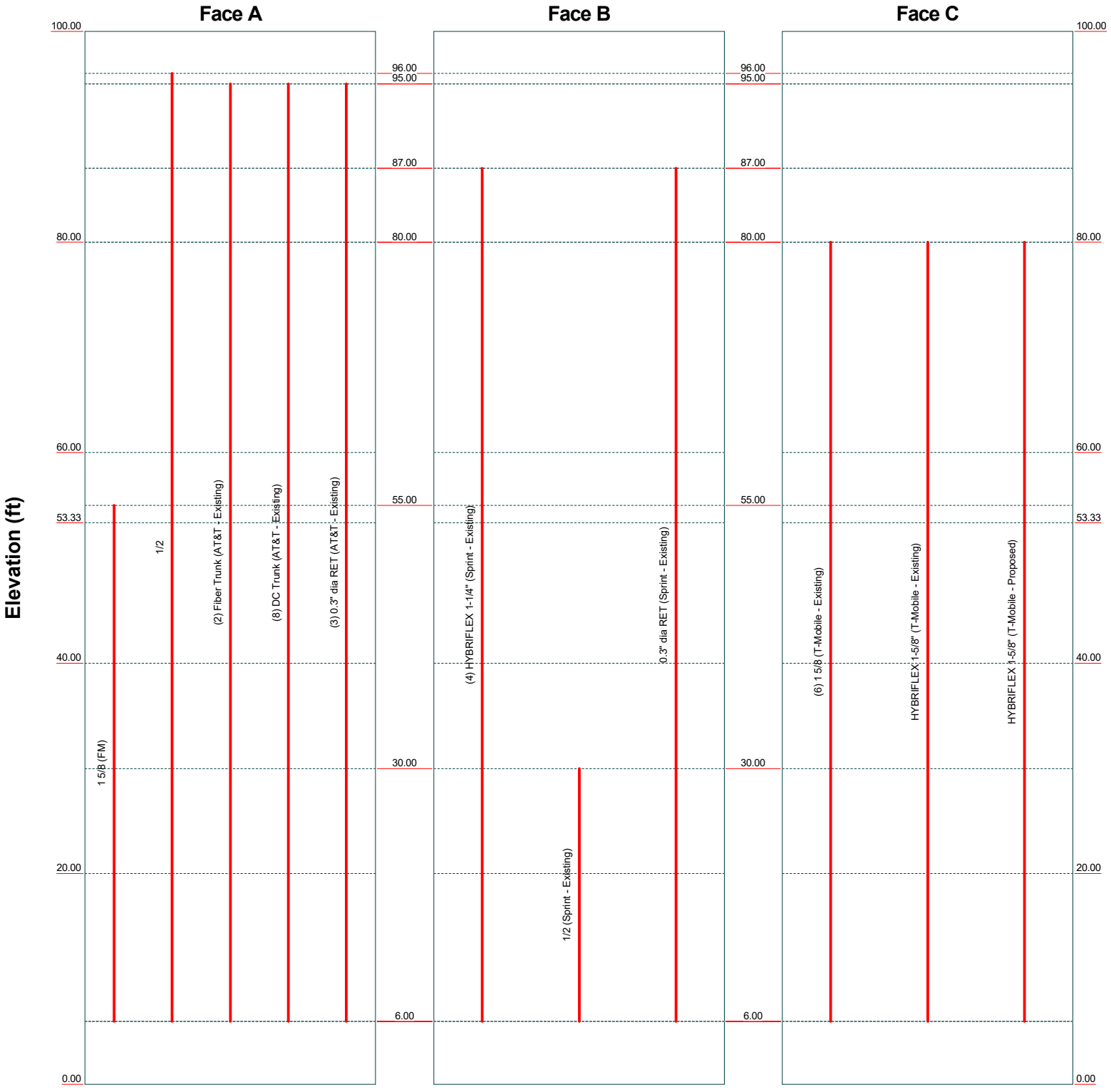
Code: TIA-222-G	Date: 04/21/17	Scale: NTS
Path: J:\Jobs\1701200.WI\37_CTFF703A\05_Structural\Backup Documentation\Calcs\ER Files\100-ft NUDD Lattice Tower Danbury, CT.eri		Dwg No. E-7

Feed Line Distribution Chart
0' - 100'

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



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Code: TIA-222-G	Date: 04/21/17	Scale: NTS
Path: J:\Jobs\1701200.WI\37_CTFF703A\05_Structural\Backup Documentation\Calcs\ER Files\100-ft NUDD Lattice Tower Danbury, CT.eri		Dwg No. E-7

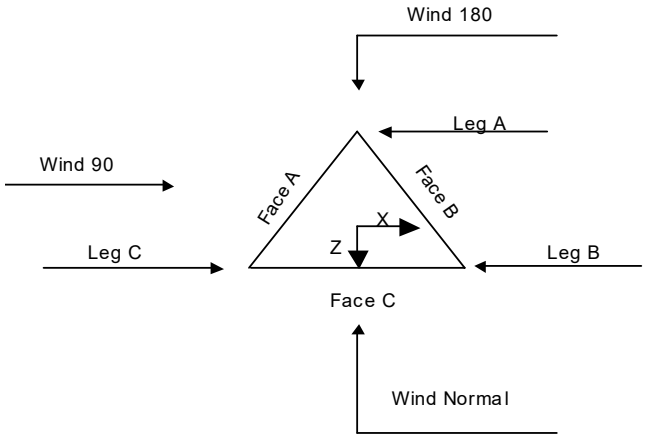
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.50 ft at the top and 7.50 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 93 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
3/4" dia SR used for sections T3 & T4 to account for 5/8" SR with 1/4" bar.
Tension only take-up is 0.0313 in.
A non-linear (P-delta) analysis was used.
Grouted pipe f'_c is 5 ksi.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	100.00-80.00			3.50	1	20.00
T2	80.00-60.00			3.50	1	20.00
T3	60.00-53.33			3.50	1	6.67
T4	53.33-40.00			3.50	1	13.33
T5	40.00-20.00			3.50	1	20.00
T6	20.00-0.00			5.50	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	100.00-80.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T2	80.00-60.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T3	60.00-53.33	3.34	TX Brace	No	Yes	0.0000	0.0000
T4	53.33-40.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T5	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T6	20.00-0.00	6.67	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 100.00-80.00	Pipe	P2.5x.276	A500-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T2 80.00-60.00	Grouted Pipe	P2.5x.276	A500-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T3 60.00-53.33	Grouted Pipe	P3x.3	A500M-61 (61 ksi)	Solid Round	3/4	A36 (36 ksi)
T4 53.33-40.00	Grouted Pipe	P3x.3	A500M-61 (61 ksi)	Solid Round	3/4	A36 (36 ksi)
T5 40.00-20.00	Grouted Pipe	P5x.375	A500-42 (42 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 20.00-0.00	Grouted Pipe	P5x.375	A500-42 (42 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	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 100.00-80.00	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T2 80.00-60.00	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-53.33	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T4 53.33-40.00	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 100.00-80.00	None	Solid Round		A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 80.00-60.00	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-53.33	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)
T4 53.33-40.00	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 53.33-40.00	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 60.00-53.33	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 53.33-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X 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
100.00-80.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
60.00-53.33				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
53.33-40.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T6 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 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
T3 60.00-53.33	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 53.33-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 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
T6 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 100.00-80.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T2 80.00-60.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T3 60.00-53.33	Flange	0.7500 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T4 53.33-40.00	Flange	1.0000 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.7500 A325N	1
T5 40.00-20.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T6 20.00-0.00	Flange	1.5000 A36	4	0.6250 A325N	1	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0

Grouted Pipe Properties

Size	F_y ksi	A_s in^2	A_c in^2	Wt plf	E_c ksi	E_m ksi	F_{ym} ksi
P2.5x.276 (GR)	50	2.2535	4.2383	16.498	4031	35064	58
P3x.3 (GR)	55	3.0159	6.6052	24.023	4031	36062	64
P5x.375 (GR)	42	6.1120	18.1937	58.701	4031	38598	55

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
1 5/8 (FM)	A	No	Ar (CaAa)	55.00 - 6.00	0.0000	0.3	1	1	1.9800	1.9800		1.04
1/2	A	No	Ar (CaAa)	96.00 - 6.00	0.0000	0.32	1	1	0.5800	0.5800		0.25

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
HYBRIFLEX 1-1/4" (Sprint - Existing)	B	No	Ar (CaAa)	87.00 - 6.00	1.0000	0.25	4	4	1.5400	1.5400		1.30
1/2 (Sprint - Existing)	B	No	Ar (CaAa)	30.00 - 6.00	1.0000	0.17	1	1	0.5800	0.5800		0.25
0.3" dia RET (Sprint - Existing)	B	No	Ar (CaAa)	87.00 - 6.00	1.0000	0.16	1	1	0.3000	0.3000		0.00
1 5/8 (T-Mobile - Existing)	C	No	Ar (CaAa)	80.00 - 6.00	1.0000	-0.3	6	3	1.9800	1.9800		1.04
Fiber Trunk (AT&T - Existing)	A	No	Ar (CaAa)	95.00 - 6.00	0.0000	0.25	2	2	0.4000	0.4000		1.00
DC Trunk (AT&T - Existing)	A	No	Ar (CaAa)	95.00 - 6.00	0.0000	0.22	8	4	0.4000	0.4000		0.11
0.3" dia RET (AT&T - Existing)	A	No	Ar (CaAa)	95.00 - 6.00	0.0000	0.18	3	2	0.3000	0.3000		0.00
HYBRIFLEX 1-5/8" (T-Mobile - Existing)	C	No	Ar (CaAa)	80.00 - 6.00	1.0000	-0.2	1	1	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	C	No	Ar (CaAa)	80.00 - 6.00	4.0000	-0.2	1	1	1.9800	1.9800		1.90

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	100.00-80.00	A	0.000	0.000	8.278	0.000	0.05
		B	0.000	0.000	4.522	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T2	80.00-60.00	A	0.000	0.000	10.960	0.000	0.06
		B	0.000	0.000	12.920	0.000	0.10
		C	0.000	0.000	31.680	0.000	0.20
T3	60.00-53.33	A	0.000	0.000	3.986	0.000	0.02
		B	0.000	0.000	4.309	0.000	0.03
		C	0.000	0.000	10.565	0.000	0.07
T4	53.33-40.00	A	0.000	0.000	9.944	0.000	0.06
		B	0.000	0.000	8.611	0.000	0.07
		C	0.000	0.000	21.115	0.000	0.13
T5	40.00-20.00	A	0.000	0.000	14.920	0.000	0.08
		B	0.000	0.000	13.500	0.000	0.11
		C	0.000	0.000	31.680	0.000	0.20
T6	20.00-0.00	A	0.000	0.000	10.444	0.000	0.06
		B	0.000	0.000	9.856	0.000	0.08
		C	0.000	0.000	22.176	0.000	0.14

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	100.00-80.00	A	1.658	0.000	0.000	42.639	0.000	0.42
		B		0.000	0.000	15.578	0.000	0.22
		C		0.000	0.000	0.000	0.000	0.00
T2	80.00-60.00	A	1.617	0.000	0.000	55.300	0.000	0.53
		B		0.000	0.000	44.082	0.000	0.60
		C		0.000	0.000	60.910	0.000	1.23
T3	60.00-53.33	A	1.583	0.000	0.000	19.019	0.000	0.19
		B		0.000	0.000	14.585	0.000	0.20
		C		0.000	0.000	20.145	0.000	0.40
T4	53.33-40.00	A	1.553	0.000	0.000	42.562	0.000	0.44
		B		0.000	0.000	28.938	0.000	0.39
		C		0.000	0.000	39.956	0.000	0.80
T5	40.00-20.00	A	1.486	0.000	0.000	61.907	0.000	0.62
		B		0.000	0.000	46.276	0.000	0.60
		C		0.000	0.000	58.945	0.000	1.16
T6	20.00-0.00	A	1.331	0.000	0.000	40.188	0.000	0.38
		B		0.000	0.000	33.334	0.000	0.40
		C		0.000	0.000	39.643	0.000	0.75

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	100.00-80.00	0.2159	-0.8935	0.1949	-0.3947
T2	80.00-60.00	1.7562	1.2544	0.9701	0.4968
T3	60.00-53.33	1.6456	1.1315	0.9218	0.4304
T4	53.33-40.00	1.4380	0.8695	0.6736	0.2183
T5	40.00-20.00	1.7656	0.9701	1.2728	0.3485
T6	20.00-0.00	2.0062	1.0026	1.6240	0.3943

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	1/2	80.00 - 96.00	0.6000	0.4243
T1	4	HYBRIFLEX 1-1/4"	80.00 - 87.00	0.6000	0.4243
T1	6	0.3" dia RET	80.00 - 87.00	0.6000	0.4243
T1	8	Fiber Trunk	80.00 - 95.00	0.6000	0.4243
T1	9	DC Trunk	80.00 - 95.00	0.6000	0.4243
T1	10	0.3" dia RET	80.00 - 95.00	0.6000	0.4243
T2	2	1/2	60.00 - 80.00	0.6000	0.4331
T2	4	HYBRIFLEX 1-1/4"	60.00 - 80.00	0.6000	0.4331
T2	6	0.3" dia RET	60.00 - 80.00	0.6000	0.4331
T2	7	1 5/8	60.00 - 80.00	0.6000	0.4331
T2	8	Fiber Trunk	60.00 - 80.00	0.6000	0.4331
T2	9	DC Trunk	60.00 - 80.00	0.6000	0.4331
T2	10	0.3" dia RET	60.00 - 80.00	0.6000	0.4331

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	11	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.4331
T2	12	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.4331
T3	1	1 5/8	53.33 - 55.00	0.6000	0.4183
T3	2	1/2	53.33 - 60.00	0.6000	0.4183
T3	4	HYBRIFLEX 1-1/4"	53.33 - 60.00	0.6000	0.4183
T3	6	0.3" dia RET	53.33 - 60.00	0.6000	0.4183
T3	7	1 5/8	53.33 - 60.00	0.6000	0.4183
T3	8	Fiber Trunk	53.33 - 60.00	0.6000	0.4183
T3	9	DC Trunk	53.33 - 60.00	0.6000	0.4183
T3	10	0.3" dia RET	53.33 - 60.00	0.6000	0.4183
T3	11	HYBRIFLEX 1-5/8"	53.33 - 60.00	0.6000	0.4183
T3	12	HYBRIFLEX 1-5/8"	53.33 - 60.00	0.6000	0.4183
T4	1	1 5/8	40.00 - 53.33	0.6000	0.2922
T4	2	1/2	40.00 - 53.33	0.6000	0.2922
T4	4	HYBRIFLEX 1-1/4"	40.00 - 53.33	0.6000	0.2922
T4	6	0.3" dia RET	40.00 - 53.33	0.6000	0.2922
T4	7	1 5/8	40.00 - 53.33	0.6000	0.2922
T4	8	Fiber Trunk	40.00 - 53.33	0.6000	0.2922
T4	9	DC Trunk	40.00 - 53.33	0.6000	0.2922
T4	10	0.3" dia RET	40.00 - 53.33	0.6000	0.2922
T4	11	HYBRIFLEX 1-5/8"	40.00 - 53.33	0.6000	0.2922
T4	12	HYBRIFLEX 1-5/8"	40.00 - 53.33	0.6000	0.2922
T5	1	1 5/8	20.00 - 40.00	0.6000	0.5531
T5	2	1/2	20.00 - 40.00	0.6000	0.5531
T5	4	HYBRIFLEX 1-1/4"	20.00 - 40.00	0.6000	0.5531
T5	5	1/2	20.00 - 30.00	0.6000	0.5531
T5	6	0.3" dia RET	20.00 - 40.00	0.6000	0.5531
T5	7	1 5/8	20.00 - 40.00	0.6000	0.5531
T5	8	Fiber Trunk	20.00 - 40.00	0.6000	0.5531
T5	9	DC Trunk	20.00 - 40.00	0.6000	0.5531
T5	10	0.3" dia RET	20.00 - 40.00	0.6000	0.5531
T5	11	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.5531
T5	12	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.5531
T6	1	1 5/8	6.00 - 20.00	0.6000	0.6000
T6	2	1/2	6.00 - 20.00	0.6000	0.6000
T6	4	HYBRIFLEX 1-1/4"	6.00 - 20.00	0.6000	0.6000
T6	5	1/2	6.00 - 20.00	0.6000	0.6000
T6	6	0.3" dia RET	6.00 - 20.00	0.6000	0.6000
T6	7	1 5/8	6.00 - 20.00	0.6000	0.6000
T6	8	Fiber Trunk	6.00 - 20.00	0.6000	0.6000
T6	9	DC Trunk	6.00 - 20.00	0.6000	0.6000
T6	10	0.3" dia RET	6.00 - 20.00	0.6000	0.6000
T6	11	HYBRIFLEX 1-5/8"	6.00 - 20.00	0.6000	0.6000
T6	12	HYBRIFLEX 1-5/8"	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) OPA-65R-LCUU-H4	A	From Leg	3.00	0.0000	98.00	No Ice	5.94	3.36	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T - Existing)			0.00			1/2" Ice	6.28	3.66	0.10
			0.00			1" Ice	6.62	3.97	0.14
(2) OPA-65R-LCUU-H4	B	From Leg	3.00	0.0000	98.00	No Ice	5.94	3.36	0.06
(AT&T - Existing)			0.00			1/2" Ice	6.28	3.66	0.10
			0.00			1" Ice	6.62	3.97	0.14
(2) OPA-65R-LCUU-H4	C	From Leg	3.00	0.0000	98.00	No Ice	5.94	3.36	0.06
(AT&T - Existing)			0.00			1/2" Ice	6.28	3.66	0.10
			0.00			1" Ice	6.62	3.97	0.14
(2) RRUS-11	A	From Leg	2.00	0.0000	98.00	No Ice	2.57	1.07	0.05
(AT&T - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-12	A	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS-32	A	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
A2	A	From Leg	2.00	0.0000	98.00	No Ice	2.08	0.50	0.02
(AT&T - Existing)			0.00			1/2" Ice	2.26	0.61	0.03
			0.00			1" Ice	2.44	0.73	0.05
(2) RRUS-11	B	From Leg	2.00	0.0000	98.00	No Ice	2.57	1.07	0.05
(AT&T - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-12	B	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS-32	B	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
A2	B	From Leg	2.00	0.0000	98.00	No Ice	2.08	0.50	0.02
(AT&T - Existing)			0.00			1/2" Ice	2.26	0.61	0.03
			0.00			1" Ice	2.44	0.73	0.05
(2) RRUS-11	C	From Leg	2.00	0.0000	98.00	No Ice	2.57	1.07	0.05
(AT&T - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-12	C	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS-32	C	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
A2	C	From Leg	2.00	0.0000	98.00	No Ice	2.08	0.50	0.02
(AT&T - Existing)			0.00			1/2" Ice	2.26	0.61	0.03
			0.00			1" Ice	2.44	0.73	0.05
DC6-48-60-18-8F Surge	A	From Leg	0.00	0.0000	98.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	B	From Leg	0.00	0.0000	98.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	C	From Leg	0.00	0.0000	98.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	C	From Leg	0.00	0.0000	98.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	2.29	2.29	0.06
12' Boom Starmount	A	From Leg	1.50	0.0000	97.00	No Ice	15.00	8.00	0.47

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T - Existing)			0.00			1/2" Ice	20.00	11.00	0.68
			0.00			1" Ice	26.00	14.00	0.88
12' Boom Starmount	B	From Leg	1.50	0.0000	97.00	No Ice	15.00	8.00	0.47
(AT&T - Existing)			0.00			1/2" Ice	20.00	11.00	0.68
			0.00			1" Ice	26.00	14.00	0.88
12' Boom Starmount	C	From Leg	1.50	0.0000	97.00	No Ice	15.00	8.00	0.47
(AT&T - Existing)			0.00			1/2" Ice	20.00	11.00	0.68
			0.00			1" Ice	26.00	14.00	0.88
Parabolic Grid	B	From Leg	0.50	0.0000	96.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	2.00	2.00	0.04
			0.00			1" Ice	2.80	2.80	0.06
APXVSPP18-C-A20	A	From Leg	1.50	0.0000	89.00	No Ice	8.02	5.28	0.06
(Sprint - Existing)			0.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVSPP18-C-A20	B	From Leg	1.50	0.0000	89.00	No Ice	8.02	5.28	0.06
(Sprint - Existing)			0.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVSPP18-C-A20	C	From Leg	1.50	0.0000	89.00	No Ice	8.02	5.28	0.06
(Sprint - Existing)			0.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
FD-RRH 4x45 1900	A	From Leg	1.00	0.0000	92.00	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	B	From Leg	1.00	0.0000	92.00	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	C	From Leg	1.00	0.0000	92.00	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	A	From Leg	1.00	0.0000	88.50	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	B	From Leg	1.00	0.0000	88.50	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	C	From Leg	1.00	0.0000	88.50	No Ice	2.32	2.38	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 2x50 800	A	From Leg	1.00	0.0000	85.00	No Ice	2.06	1.93	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	B	From Leg	1.00	0.0000	85.00	No Ice	2.06	1.93	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	C	From Leg	1.00	0.0000	85.00	No Ice	2.06	1.93	0.06
(Sprint - Existing)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
AIR21 B2A/B4P	A	From Face	2.00	0.0000	83.00	No Ice	6.05	4.36	0.08
(T-Mobile - Existing)			3.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
AIR21 B2A/B4P	B	From Face	2.00	0.0000	83.00	No Ice	6.05	4.36	0.08
(T-Mobile - Existing)			3.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
AIR21 B2A/B4P	C	From Face	2.00	0.0000	83.00	No Ice	6.05	4.36	0.08
(T-Mobile - Existing)			3.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
LNX-6515DS	A	From Face	2.00	0.0000	81.50	No Ice	11.45	7.70	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(T-Mobile - Proposed)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS	B	From Face	2.00	0.0000	81.50	No Ice	11.45	7.70	0.06
(T-Mobile - Proposed)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS	C	From Face	2.00	0.0000	81.50	No Ice	11.45	7.70	0.06
(T-Mobile - Proposed)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
AIR32	A	From Face	2.00	0.0000	83.00	No Ice	6.51	4.71	0.13
(T-Mobile - Proposed)			-3.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR32	B	From Face	2.00	0.0000	83.00	No Ice	6.51	4.71	0.13
(T-Mobile - Proposed)			-3.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR32	C	From Face	2.00	0.0000	83.00	No Ice	6.51	4.71	0.13
(T-Mobile - Proposed)			-3.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
RRUS-11	A	From Face	2.00	0.0000	83.00	No Ice	2.57	1.07	0.05
(T-Mobile - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	B	From Face	2.00	0.0000	83.00	No Ice	2.57	1.07	0.05
(T-Mobile - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	C	From Face	2.00	0.0000	83.00	No Ice	2.57	1.07	0.05
(T-Mobile - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
ATMAA1412D-1A20 Twin	A	From Face	1.00	0.0000	80.00	No Ice	0.00	0.33	0.01
TMA			0.00			1/2" Ice	0.00	0.41	0.02
(T-Mobile - Existing)			0.00			1" Ice	0.00	0.50	0.03
ATMAA1412D-1A20 Twin	B	From Face	1.00	0.0000	80.00	No Ice	0.00	0.33	0.01
TMA			0.00			1/2" Ice	0.00	0.41	0.02
(T-Mobile - Existing)			0.00			1" Ice	0.00	0.50	0.03
ATMAA1412D-1A20 Twin	C	From Face	1.00	0.0000	80.00	No Ice	0.00	0.33	0.01
TMA			0.00			1/2" Ice	0.00	0.41	0.02
(T-Mobile - Existing)			0.00			1" Ice	0.00	0.50	0.03
10-ft T-Frame	A	From Face	1.00	0.0000	82.00	No Ice	13.60	13.60	0.38
(T-Mobile - Proposed)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00			1" Ice	21.40	21.40	0.68
10-ft T-Frame	B	From Face	1.00	0.0000	82.00	No Ice	13.60	13.60	0.38
(T-Mobile - Proposed)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00			1" Ice	21.40	21.40	0.68
10-ft T-Frame	C	From Face	1.00	0.0000	82.00	No Ice	13.60	13.60	0.38
(T-Mobile - Proposed)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00			1" Ice	21.40	21.40	0.68
6810 4 Bay	B	From Leg	1.00	0.0000	65.00	No Ice	28.90	28.90	0.43
			0.00			1/2" Ice	34.00	34.00	1.01
			0.00			1" Ice	39.10	39.10	1.60
2.5" Tube x 2' Standoff	C	From Leg	1.00	0.0000	30.00	No Ice	1.11	0.63	0.12
(Sprint)			0.00			1/2" Ice	1.44	0.84	0.13
			0.00			1" Ice	1.79	1.06	0.14
GPS	C	From Leg	2.00	0.0000	30.00	No Ice	1.00	1.00	0.01
(Sprint)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02

Tower Pressures - No Ice

$G_H = 0.850$

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	90.00	1.238	23	74.792	A	2.445	12.397	9.583	64.57	8.278	0.000
100.00-80.00					B	2.445	12.397		64.57	4.522	0.000
					C	2.445	12.397		64.57	0.000	0.000
T2 80.00-60.00	70.00	1.174	22	74.792	A	2.445	12.397	9.583	64.57	10.960	0.000
					B	2.445	12.397		64.57	12.920	0.000
					C	2.445	12.397		64.57	31.680	0.000
T3 60.00-53.33	56.67	1.123	21	25.290	A	0.809	5.003	3.891	66.95	3.986	0.000
					B	0.809	5.003		66.95	4.309	0.000
					C	0.809	5.003		66.95	10.565	0.000
T4 53.33-40.00	46.67	1.078	20	50.543	A	4.679	9.991	7.776	53.01	9.944	0.000
					B	4.679	9.991		53.01	8.611	0.000
					C	4.679	9.991		53.01	21.115	0.000
T5 40.00-20.00	30.00	0.982	18	99.283	A	7.278	18.574	18.574	71.85	14.920	0.000
					B	7.278	18.574		71.85	13.500	0.000
					C	7.278	18.574		71.85	31.680	0.000
T6 20.00-0.00	10.00	0.85	16	139.283	A	10.818	18.574	18.574	63.19	10.444	0.000
					B	10.818	18.574		63.19	9.856	0.000
					C	10.818	18.574		63.19	22.176	0.000

Tower Pressure - With Ice

$G_H = 0.850$

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 100.00-80.00	90.00	1.238	7	1.6583	80.319	A	2.445	43.792	20.639	44.64	42.639	0.000
						B	2.445	43.792		44.64	15.578	0.000
						C	2.445	43.792		44.64	0.000	0.000
T2 80.00-60.00	70.00	1.174	6	1.6171	80.182	A	2.445	43.013	20.364	44.80	55.300	0.000
						B	2.445	43.013		44.80	44.082	0.000
						C	2.445	43.013		44.80	60.910	0.000
T3 60.00-53.33	56.67	1.123	6	1.5833	27.051	A	0.809	14.927	7.411	47.10	19.019	0.000
						B	0.809	14.927		47.10	14.585	0.000
						C	0.809	14.927		47.10	20.145	0.000
T4 53.33-40.00	46.67	1.078	6	1.5529	53.993	A	4.679	33.537	14.676	38.40	42.562	0.000
						B	4.679	33.537		38.40	28.938	0.000
						C	4.679	33.537		38.40	39.956	0.000
T5 40.00-20.00	30.00	0.982	5	1.4858	104.242	A	7.278	39.309	28.496	61.17	61.907	0.000
						B	7.278	39.309		61.17	46.276	0.000
						C	7.278	39.309		61.17	58.945	0.000
T6 20.00-0.00	10.00	0.85	5	1.3312	143.726	A	10.818	38.984	27.464	55.15	40.188	0.000
						B	10.818	38.984		55.15	33.334	0.000
						C	10.818	38.984		55.15	39.643	0.000

Tower Pressure - Service

$G_H = 0.850$

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	90.00	1.238	10	74.792	A	2.445	12.397	9.583	64.57	8.278	0.000
100.00-80.00					B	2.445	12.397		64.57	4.522	0.000
					C	2.445	12.397		64.57	0.000	0.000
T2 80.00-60.00	70.00	1.174	9	74.792	A	2.445	12.397	9.583	64.57	10.960	0.000
					B	2.445	12.397		64.57	12.920	0.000
					C	2.445	12.397		64.57	31.680	0.000
T3 60.00-53.33	56.67	1.123	9	25.290	A	0.809	5.003	3.891	66.95	3.986	0.000
					B	0.809	5.003		66.95	4.309	0.000
					C	0.809	5.003		66.95	10.565	0.000
T4 53.33-40.00	46.67	1.078	8	50.543	A	4.679	9.991	7.776	53.01	9.944	0.000
					B	4.679	9.991		53.01	8.611	0.000
					C	4.679	9.991		53.01	21.115	0.000
T5 40.00-20.00	30.00	0.982	8	99.283	A	7.278	18.574	18.574	71.85	14.920	0.000
					B	7.278	18.574		71.85	13.500	0.000
					C	7.278	18.574		71.85	31.680	0.000
T6 20.00-0.00	10.00	0.85	7	139.283	A	10.818	18.574	18.574	63.19	10.444	0.000
					B	10.818	18.574		63.19	9.856	0.000
					C	10.818	18.574		63.19	22.176	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	0.75	A	0.198	2.601	23	1	1	9.564	0.64	32.24	C
100.00-80.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T2	0.37	1.13	A	0.198	2.601	22	1	1	9.564	1.09	54.67	C
80.00-60.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T3	0.12	0.51	A	0.23	2.499	21	1	1	3.712	0.37	55.47	C
60.00-53.33			B	0.23	2.499		1	1	3.712			
			C	0.23	2.499		1	1	3.712			
T4	0.26	1.26	A	0.29	2.322	20	1	1	10.633	0.84	62.74	C
53.33-40.00			B	0.29	2.322		1	1	10.633			
			C	0.29	2.322		1	1	10.633			
T5	0.39	2.74	A	0.26	2.407	18	1	1	17.537	1.23	61.49	C
40.00-20.00			B	0.26	2.407		1	1	17.537			
			C	0.26	2.407		1	1	17.537			
T6 20.00-0.00	0.28	2.90	A	0.211	2.56	16	1	1	20.966	1.08	53.81	C
			B	0.211	2.56		1	1	20.966			
			C	0.211	2.56		1	1	20.966			
Sum Weight:	1.50	9.30						OTM	242.21 kip-ft	5.25		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	0.75	A	0.198	2.601	23	0.8	1	9.075	0.62	30.98	C
100.00-80.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T2	0.37	1.13	A	0.198	2.601	22	0.8	1	9.075	1.07	53.47	C
80.00-60.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T3	0.12	0.51	A	0.23	2.499	21	0.8	1	3.550	0.36	54.38	C
60.00-53.33			B	0.23	2.499		0.8	1	3.550			
			C	0.23	2.499		0.8	1	3.550			
T4	0.26	1.26	A	0.29	2.322	20	0.8	1	9.697	0.80	59.93	C
53.33-40.00			B	0.29	2.322		0.8	1	9.697			
			C	0.29	2.322		0.8	1	9.697			
T5	0.39	2.74	A	0.26	2.407	18	0.8	1	16.081	1.17	58.74	C
40.00-20.00			B	0.26	2.407		0.8	1	16.081			
			C	0.26	2.407		0.8	1	16.081			
T6 20.00-0.00	0.28	2.90	A	0.211	2.56	16	0.8	1	18.803	1.00	50.05	C
			B	0.211	2.56		0.8	1	18.803			
			C	0.211	2.56		0.8	1	18.803			
Sum Weight:	1.50	9.30						OTM	233.70 kip-ft	5.03		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	0.75	A	0.198	2.601	23	0.85	1	9.197	0.63	31.29	C
100.00-80.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T2	0.37	1.13	A	0.198	2.601	22	0.85	1	9.197	1.08	53.77	C
80.00-60.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T3	0.12	0.51	A	0.23	2.499	21	0.85	1	3.591	0.36	54.65	C
60.00-53.33			B	0.23	2.499		0.85	1	3.591			
			C	0.23	2.499		0.85	1	3.591			
T4	0.26	1.26	A	0.29	2.322	20	0.85	1	9.931	0.81	60.63	C
53.33-40.00			B	0.29	2.322		0.85	1	9.931			
			C	0.29	2.322		0.85	1	9.931			
T5	0.39	2.74	A	0.26	2.407	18	0.85	1	16.445	1.19	59.43	C
40.00-20.00			B	0.26	2.407		0.85	1	16.445			
			C	0.26	2.407		0.85	1	16.445			
T6 20.00-0.00	0.28	2.90	A	0.211	2.56	16	0.85	1	19.344	1.02	50.99	C
			B	0.211	2.56		0.85	1	19.344			
			C	0.211	2.56		0.85	1	19.344			
Sum Weight:	1.50	9.30						OTM	235.83 kip-ft	5.08		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.63	2.59	A	0.576	1.821	7	1	1	34.354	0.50	24.97	C
100.00-80.00			B	0.576	1.821		1	1	34.354			
			C	0.576	1.821		1	1	34.354			
T2	2.37	3.01	A	0.567	1.828	6	1	1	33.558	0.71	35.50	C
80.00-60.00			B	0.567	1.828		1	1	33.558			
			C	0.567	1.828		1	1	33.558			
T3	0.79	1.15	A	0.582	1.816	6	1	1	11.740	0.23	34.10	C
60.00-53.33			B	0.582	1.816		1	1	11.740			
			C	0.582	1.816		1	1	11.740			
T4	1.63	3.01	A	0.708	1.777	6	1	1	32.066	0.45	33.48	C
53.33-40.00			B	0.708	1.777		1	1	32.066			
			C	0.708	1.777		1	1	32.066			
T5	2.38	4.65	A	0.447	1.979	5	1	1	33.134	0.72	35.88	C
40.00-20.00			B	0.447	1.979		1	1	33.134			
			C	0.447	1.979		1	1	33.134			
T6 20.00-0.00	1.54	4.91	A	0.347	2.18	5	1	1	34.784	0.56	28.24	C
			B	0.347	2.18		1	1	34.784			
			C	0.347	2.18		1	1	34.784			
Sum Weight:	9.34	19.31						OTM	155.54 kip-ft	3.17		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.63	2.59	A	0.576	1.821	7	0.8	1	33.864	0.49	24.72	C
100.00-80.00			B	0.576	1.821		0.8	1	33.864			
			C	0.576	1.821		0.8	1	33.864			
T2	2.37	3.01	A	0.567	1.828	6	0.8	1	33.068	0.71	35.25	C
80.00-60.00			B	0.567	1.828		0.8	1	33.068			
			C	0.567	1.828		0.8	1	33.068			
T3	0.79	1.15	A	0.582	1.816	6	0.8	1	11.579	0.23	33.88	C
60.00-53.33			B	0.582	1.816		0.8	1	11.579			
			C	0.582	1.816		0.8	1	11.579			
T4	1.63	3.01	A	0.708	1.777	6	0.8	1	31.130	0.44	32.86	C
53.33-40.00			B	0.708	1.777		0.8	1	31.130			
			C	0.708	1.777		0.8	1	31.130			
T5	2.38	4.65	A	0.447	1.979	5	0.8	1	31.679	0.70	35.23	C
40.00-20.00			B	0.447	1.979		0.8	1	31.679			
			C	0.447	1.979		0.8	1	31.679			
T6 20.00-0.00	1.54	4.91	A	0.347	2.18	5	0.8	1	32.620	0.55	27.32	C
			B	0.347	2.18		0.8	1	32.620			
			C	0.347	2.18		0.8	1	32.620			
Sum Weight:	9.34	19.31						OTM	153.69 kip-ft	3.11		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.63	2.59	A	0.576	1.821	7	0.85	1	33.987	0.50	24.78	C
100.00-80.00			B	0.576	1.821		0.85	1	33.987			
			C	0.576	1.821		0.85	1	33.987			
T2	2.37	3.01	A	0.567	1.828	6	0.85	1	33.191	0.71	35.31	C
80.00-60.00			B	0.567	1.828		0.85	1	33.191			
			C	0.567	1.828		0.85	1	33.191			
T3	0.79	1.15	A	0.582	1.816	6	0.85	1	11.619	0.23	33.93	C
60.00-53.33			B	0.582	1.816		0.85	1	11.619			
			C	0.582	1.816		0.85	1	11.619			
T4	1.63	3.01	A	0.708	1.777	6	0.85	1	31.364	0.44	33.02	C
53.33-40.00			B	0.708	1.777		0.85	1	31.364			
			C	0.708	1.777		0.85	1	31.364			
T5	2.38	4.65	A	0.447	1.979	5	0.85	1	32.043	0.71	35.39	C
40.00-20.00			B	0.447	1.979		0.85	1	32.043			
			C	0.447	1.979		0.85	1	32.043			
T6 20.00-0.00	1.54	4.91	A	0.347	2.18	5	0.85	1	33.161	0.55	27.55	C
			B	0.347	2.18		0.85	1	33.161			
			C	0.347	2.18		0.85	1	33.161			
Sum Weight:	9.34	19.31						OTM	154.15 kip-ft	3.13		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.08	0.75	A	0.198	2.601	10	1	1	9.564	0.27	13.42	C
100.00-80.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T2	0.37	1.13	A	0.198	2.601	9	1	1	9.564	0.46	22.75	C
80.00-60.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T3	0.12	0.51	A	0.23	2.499	9	1	1	3.712	0.15	23.09	C
60.00-53.33			B	0.23	2.499		1	1	3.712			
			C	0.23	2.499		1	1	3.712			
T4	0.26	1.26	A	0.29	2.322	8	1	1	10.633	0.35	26.11	C
53.33-40.00			B	0.29	2.322		1	1	10.633			
			C	0.29	2.322		1	1	10.633			
T5	0.39	2.74	A	0.26	2.407	8	1	1	17.537	0.51	25.59	C
40.00-20.00			B	0.26	2.407		1	1	17.537			
			C	0.26	2.407		1	1	17.537			
T6 20.00-0.00	0.28	2.90	A	0.211	2.56	7	1	1	20.966	0.45	22.40	C
			B	0.211	2.56		1	1	20.966			
			C	0.211	2.56		1	1	20.966			
Sum Weight:	1.50	9.30						OTM	100.81 kip-ft	2.19		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.08	0.75	A	0.198	2.601	10	0.8	1	9.075	0.26	12.89	C
100.00-80.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T2	0.37	1.13	A	0.198	2.601	9	0.8	1	9.075	0.45	22.26	C
80.00-60.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T3	0.12	0.51	A	0.23	2.499	9	0.8	1	3.550	0.15	22.63	C
60.00-53.33			B	0.23	2.499		0.8	1	3.550			
			C	0.23	2.499		0.8	1	3.550			
T4	0.26	1.26	A	0.29	2.322	8	0.8	1	9.697	0.33	24.94	C
53.33-40.00			B	0.29	2.322		0.8	1	9.697			
			C	0.29	2.322		0.8	1	9.697			
T5	0.39	2.74	A	0.26	2.407	8	0.8	1	16.081	0.49	24.45	C
40.00-20.00			B	0.26	2.407		0.8	1	16.081			
			C	0.26	2.407		0.8	1	16.081			
T6 20.00-0.00	0.28	2.90	A	0.211	2.56	7	0.8	1	18.803	0.42	20.83	C
			B	0.211	2.56		0.8	1	18.803			
			C	0.211	2.56		0.8	1	18.803			
Sum Weight:	1.50	9.30						OTM	97.27 kip-ft	2.09		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.08	0.75	A	0.198	2.601	10	0.85	1	9.197	0.26	13.02	C
100.00-80.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T2	0.37	1.13	A	0.198	2.601	9	0.85	1	9.197	0.45	22.38	C
80.00-60.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T3	0.12	0.51	A	0.23	2.499	9	0.85	1	3.591	0.15	22.75	C
60.00-53.33			B	0.23	2.499		0.85	1	3.591			
			C	0.23	2.499		0.85	1	3.591			
T4	0.26	1.26	A	0.29	2.322	8	0.85	1	9.931	0.34	25.24	C
53.33-40.00			B	0.29	2.322		0.85	1	9.931			
			C	0.29	2.322		0.85	1	9.931			
T5	0.39	2.74	A	0.26	2.407	8	0.85	1	16.445	0.49	24.74	C
40.00-20.00			B	0.26	2.407		0.85	1	16.445			
			C	0.26	2.407		0.85	1	16.445			
T6 20.00-0.00	0.28	2.90	A	0.211	2.56	7	0.85	1	19.344	0.42	21.22	C
			B	0.211	2.56		0.85	1	19.344			
			C	0.211	2.56		0.85	1	19.344			
Sum Weight:	1.50	9.30						OTM	98.16 kip-ft	2.12		

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	6.99					
Bracing Weight	2.30					
Total Member Self-Weight	9.30			1.66	-2.13	
Total Weight	16.86			1.66	-2.13	
Wind 0 deg - No Ice		0.00	-9.84	-637.44	-2.22	1.99
Wind 30 deg - No Ice		4.84	-8.38	-546.34	-318.63	2.33
Wind 60 deg - No Ice		8.33	-4.81	-313.72	-548.38	2.07
Wind 90 deg - No Ice		9.68	-0.00	1.56	-634.96	1.26
Wind 120 deg - No Ice		8.53	4.92	321.13	-555.65	0.11
Wind 150 deg - No Ice		4.84	8.38	549.57	-318.46	-1.07
Wind 180 deg - No Ice		-0.00	9.62	632.26	-2.03	-1.96
Wind 210 deg - No Ice		-4.84	8.38	549.66	314.37	-2.33
Wind 240 deg - No Ice		-8.53	4.92	321.30	551.50	-2.10
Wind 270 deg - No Ice		-9.68	0.00	1.76	630.71	-1.26
Wind 300 deg - No Ice		-8.33	-4.81	-313.55	544.03	-0.11
Wind 330 deg - No Ice		-4.84	-8.38	-546.24	314.21	1.07
Member Ice	10.02					
Total Weight Ice	46.18			7.31	-13.00	
Wind 0 deg - Ice		0.00	-5.17	-321.12	-13.05	0.86
Wind 30 deg - Ice		2.57	-4.44	-275.95	-176.60	0.99
Wind 60 deg - Ice		4.43	-2.56	-156.03	-295.91	0.87
Wind 90 deg - Ice		5.13	-0.00	7.26	-340.11	0.51
Wind 120 deg - Ice		4.48	2.58	171.48	-297.46	0.01
Wind 150 deg - Ice		2.56	4.44	290.51	-176.51	-0.48
Wind 180 deg - Ice		-0.00	5.12	333.89	-12.95	-0.85
Wind 210 deg - Ice		-2.57	4.44	290.56	150.59	-0.99
Wind 240 deg - Ice		-4.48	2.59	171.57	271.50	-0.87
Wind 270 deg - Ice		-5.13	0.00	7.36	314.10	-0.51
Wind 300 deg - Ice		-4.43	-2.56	-155.94	269.85	-0.02
Wind 330 deg - Ice		-2.56	-4.44	-275.90	150.50	0.48
Total Weight	16.86			1.66	-2.13	
Wind 0 deg - Service		0.00	-4.10	-265.08	-0.78	0.83
Wind 30 deg - Service		2.02	-3.49	-227.17	-132.48	0.97
Wind 60 deg - Service		3.47	-2.00	-130.34	-228.11	0.86
Wind 90 deg - Service		4.03	-0.00	0.89	-264.15	0.53
Wind 120 deg - Service		3.55	2.05	133.90	-231.14	0.05
Wind 150 deg - Service		2.01	3.49	228.99	-132.41	-0.45
Wind 180 deg - Service		-0.00	4.00	263.40	-0.70	-0.81
Wind 210 deg - Service		-2.02	3.49	229.03	131.00	-0.97
Wind 240 deg - Service		-3.55	2.05	133.97	229.69	-0.87
Wind 270 deg - Service		-4.03	0.00	0.97	262.66	-0.53
Wind 300 deg - Service		-3.47	-2.00	-130.27	226.59	-0.05
Wind 330 deg - Service		-2.01	-3.49	-227.13	130.93	0.45

Load Combinations

Comb. No.	Description

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	1.2D+1.6W (pattern 1) 0 deg - No Ice
4	1.2D+1.6W (pattern 2) 0 deg - No Ice
5	0.9 Dead+1.6 Wind 0 deg - No Ice
6	1.2 Dead+1.6 Wind 30 deg - No Ice
7	1.2D+1.6W (pattern 1) 30 deg - No Ice
8	1.2D+1.6W (pattern 2) 30 deg - No Ice
9	0.9 Dead+1.6 Wind 30 deg - No Ice
10	1.2 Dead+1.6 Wind 60 deg - No Ice
11	1.2D+1.6W (pattern 1) 60 deg - No Ice
12	1.2D+1.6W (pattern 2) 60 deg - No Ice
13	0.9 Dead+1.6 Wind 60 deg - No Ice
14	1.2 Dead+1.6 Wind 90 deg - No Ice
15	1.2D+1.6W (pattern 1) 90 deg - No Ice
16	1.2D+1.6W (pattern 2) 90 deg - No Ice
17	0.9 Dead+1.6 Wind 90 deg - No Ice
18	1.2 Dead+1.6 Wind 120 deg - No Ice
19	1.2D+1.6W (pattern 1) 120 deg - No Ice
20	1.2D+1.6W (pattern 2) 120 deg - No Ice
21	0.9 Dead+1.6 Wind 120 deg - No Ice
22	1.2 Dead+1.6 Wind 150 deg - No Ice
23	1.2D+1.6W (pattern 1) 150 deg - No Ice
24	1.2D+1.6W (pattern 2) 150 deg - No Ice
25	0.9 Dead+1.6 Wind 150 deg - No Ice
26	1.2 Dead+1.6 Wind 180 deg - No Ice
27	1.2D+1.6W (pattern 1) 180 deg - No Ice
28	1.2D+1.6W (pattern 2) 180 deg - No Ice
29	0.9 Dead+1.6 Wind 180 deg - No Ice
30	1.2 Dead+1.6 Wind 210 deg - No Ice
31	1.2D+1.6W (pattern 1) 210 deg - No Ice
32	1.2D+1.6W (pattern 2) 210 deg - No Ice
33	0.9 Dead+1.6 Wind 210 deg - No Ice
34	1.2 Dead+1.6 Wind 240 deg - No Ice
35	1.2D+1.6W (pattern 1) 240 deg - No Ice
36	1.2D+1.6W (pattern 2) 240 deg - No Ice
37	0.9 Dead+1.6 Wind 240 deg - No Ice
38	1.2 Dead+1.6 Wind 270 deg - No Ice
39	1.2D+1.6W (pattern 1) 270 deg - No Ice
40	1.2D+1.6W (pattern 2) 270 deg - No Ice
41	0.9 Dead+1.6 Wind 270 deg - No Ice
42	1.2 Dead+1.6 Wind 300 deg - No Ice
43	1.2D+1.6W (pattern 1) 300 deg - No Ice
44	1.2D+1.6W (pattern 2) 300 deg - No Ice
45	0.9 Dead+1.6 Wind 300 deg - No Ice
46	1.2 Dead+1.6 Wind 330 deg - No Ice
47	1.2D+1.6W (pattern 1) 330 deg - No Ice
48	1.2D+1.6W (pattern 2) 330 deg - No Ice
49	0.9 Dead+1.6 Wind 330 deg - No Ice
50	1.2 Dead+1.0 Ice+1.0 Temp
51	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
52	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
53	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
54	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
55	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
56	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
57	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
58	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
59	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
60	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
61	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
62	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
63	Dead+Wind 0 deg - Service
64	Dead+Wind 30 deg - Service
65	Dead+Wind 60 deg - Service
66	Dead+Wind 90 deg - Service
67	Dead+Wind 120 deg - Service
68	Dead+Wind 150 deg - Service
69	Dead+Wind 180 deg - Service
70	Dead+Wind 210 deg - Service
71	Dead+Wind 240 deg - Service
72	Dead+Wind 270 deg - Service
73	Dead+Wind 300 deg - Service
74	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	100 - 80	Leg	Max Tension	13	14.85	-0.17	0.10
			Max. Compression	18	-28.33	-0.17	-0.10
			Max. Mx	14	-6.42	0.42	-0.01
			Max. My	2	-6.53	0.01	-0.43
			Max. Vy	38	-0.70	0.22	-0.01
			Max. Vx	26	0.70	0.02	-0.21
		Diagonal	Max Tension	14	7.04	0.00	0.00
		Horizontal	Max Tension	18	0.49	0.00	0.00
			Max. Compression	10	-5.93	0.00	0.00
			Max. Mx	50	0.20	-0.02	0.00
			Max. My	30	0.44	0.00	0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-3.03	0.00	0.00
			Max. Mx	50	-2.94	-0.02	0.00
			Max. My	30	-2.95	0.00	0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T2	80 - 60	Leg	Max Tension	29	67.79	-0.05	-0.23
			Max. Compression	18	-86.25	-0.37	-0.21
			Max. Mx	17	-73.48	-0.45	0.01
			Max. My	5	-83.88	0.03	0.46
			Max. Vy	13	-0.25	-0.26	0.19
			Max. Vx	6	0.34	-0.17	0.30
		Diagonal	Max Tension	14	9.86	0.00	0.00
		Horizontal	Max Tension	18	1.49	0.00	0.00
			Max. Compression	20	-8.50	0.00	0.00
			Max. Mx	50	0.23	0.02	0.00
			Max. My	30	1.28	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	20	-6.68	0.00	0.00
			Max. Mx	50	-5.76	0.02	0.00
			Max. My	30	-6.02	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T3	60 - 53.33	Leg	Max Tension	29	88.58	0.00	-0.48
			Max. Compression	18	-110.25	-0.57	-0.33
			Max. Mx	14	-96.76	-0.67	-0.04

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	26	-61.11	-0.15	-0.67
			Max. Vy	6	-0.13	-0.29	0.39
			Max. Vx	26	-0.15	-0.00	-0.50
		Diagonal	Max Tension	10	11.74	0.00	0.00
		Horizontal	Max Tension	18	1.91	0.00	0.00
			Max. Compression	18	-11.66	0.00	0.00
			Max. Mx	50	0.27	0.02	0.00
			Max. My	33	1.60	0.00	-0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	33	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-9.93	0.00	0.00
			Max. Mx	50	-6.98	0.02	0.00
			Max. My	33	-6.08	0.00	-0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	33	0.00	0.00	0.00
T4	53.33 - 40	Leg	Max Tension	29	135.46	0.00	0.49
			Max. Compression	18	-160.21	-2.03	-1.17
			Max. Mx	37	-157.00	2.29	-1.09
			Max. My	5	-156.99	0.20	2.53
			Max. Vy	46	1.30	1.34	0.85
			Max. Vx	26	-1.45	0.01	-1.71
		Diagonal	Max Tension	10	13.10	0.00	0.00
		Horizontal	Max Tension	18	2.77	0.00	0.00
			Max. Compression	18	-12.05	0.00	0.00
			Max. Mx	50	0.31	0.02	0.00
			Max. My	30	2.40	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	2.77	0.00	0.00
			Max. Compression	18	-2.77	0.00	0.00
			Max. Mx	50	0.31	-0.02	0.00
			Max. My	30	2.40	0.00	0.00
			Max. Vy	50	0.03	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-11.25	0.00	0.00
			Max. Mx	50	-7.72	0.02	0.00
			Max. My	30	-8.13	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-5.79	0.00	0.00
			Max. Mx	50	-3.95	0.02	0.00
			Max. My	30	-4.27	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T5	40 - 20	Leg	Max Tension	13	149.01	-1.21	-0.03
			Max. Compression	18	-159.47	1.00	0.00
			Max. Mx	21	-154.17	2.54	-0.00
			Max. My	30	-5.01	-0.25	2.76
			Max. Vy	37	0.30	2.53	0.20
			Max. Vx	22	-0.35	-0.26	-2.73
		Diagonal	Max Tension	37	3.15	0.00	0.00
			Max. Compression	10	-3.71	0.00	0.00
			Max. Mx	10	-0.69	0.06	0.01
			Max. My	10	0.55	-0.02	-0.02
			Max. Vy	57	0.02	0.03	-0.00
			Max. Vx	10	0.01	0.00	0.00
T6	20 - 0	Leg	Max Tension	29	150.71	-0.95	0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	18	-164.62	0.00	0.00
			Max. Mx	18	-160.86	1.22	0.00
			Max. My	30	-6.94	-0.07	1.89
			Max. Vy	61	-0.19	-0.84	-0.00
			Max. Vx	30	0.33	-0.07	1.89
		Diagonal	Max Tension	9	1.85	0.00	0.00
			Max. Compression	35	-2.11	0.00	0.00
			Max. Mx	18	0.14	0.07	-0.00
			Max. My	30	0.46	0.05	0.01
			Max. Vy	55	-0.03	0.05	-0.00
			Max. Vx	30	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	34	166.06	10.08	-5.51
	Max. H_x	34	166.06	10.08	-5.51
	Max. H_z	13	-151.96	-9.16	4.99
	Min. Vert	13	-151.96	-9.16	4.99
	Min. H_x	13	-151.96	-9.16	4.99
	Min. H_z	34	166.06	10.08	-5.51
Leg B	Max. Vert	18	166.71	-9.96	-5.74
	Max. H_x	45	-151.40	9.03	5.20
	Max. H_z	45	-151.40	9.03	5.20
	Min. Vert	45	-151.40	9.03	5.20
	Min. H_x	18	166.71	-9.96	-5.74
	Min. H_z	18	166.71	-9.96	-5.74
Leg A	Max. Vert	2	165.90	0.25	11.48
	Max. H_x	16	6.45	0.72	0.44
	Max. H_z	2	165.90	0.25	11.48
	Min. Vert	29	-152.01	-0.24	-10.43
	Min. H_x	34	-73.32	-0.71	-5.06
	Min. H_z	29	-152.01	-0.24	-10.43

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	16.86	0.00	0.00	1.69	-2.17	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	20.24	0.01	-15.75	-1033.73	-2.79	3.22
1.2D+1.6W (pattern 1) 0 deg - No Ice	20.24	0.01	-12.85	-770.13	-2.79	3.21
1.2D+1.6W (pattern 2) 0 deg - No Ice	20.24	0.00	-13.82	-953.22	-2.72	2.39
0.9 Dead+1.6 Wind 0 deg - No Ice	15.18	0.01	-15.75	-1030.95	-2.13	3.21
1.2 Dead+1.6 Wind 30 deg - No Ice	20.24	7.75	-13.41	-886.10	-515.59	3.80
1.2D+1.6W (pattern 1) 30 deg -	20.24	6.31	-10.91	-658.79	-384.35	3.76

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
No Ice						
1.2D+1.6W (pattern 2) 30 deg - No Ice	20.24	6.83	-11.82	-818.97	-476.75	2.80
0.9 Dead+1.6 Wind 30 deg - No Ice	15.18	7.75	-13.41	-883.76	-513.25	3.75
1.2 Dead+1.6 Wind 60 deg - No Ice	20.24	13.34	-7.70	-509.10	-887.95	3.36
1.2D+1.6W (pattern 1) 60 deg - No Ice	20.24	10.84	-6.26	-378.05	-660.95	3.31
1.2D+1.6W (pattern 2) 60 deg - No Ice	20.24	11.77	-6.80	-470.81	-821.62	2.46
0.9 Dead+1.6 Wind 60 deg - No Ice	15.18	13.34	-7.70	-507.93	-884.39	3.35
1.2 Dead+1.6 Wind 90 deg - No Ice	20.24	15.49	-0.01	1.88	-1028.23	2.04
1.2D+1.6W (pattern 1) 90 deg - No Ice	20.24	12.60	-0.01	1.87	-765.75	2.00
1.2D+1.6W (pattern 2) 90 deg - No Ice	20.24	13.65	-0.00	1.93	-950.67	1.49
0.9 Dead+1.6 Wind 90 deg - No Ice	15.18	15.49	-0.01	1.39	-1024.26	2.06
1.2 Dead+1.6 Wind 120 deg - No Ice	20.24	13.64	7.87	519.76	-899.66	0.15
1.2D+1.6W (pattern 1) 120 deg - No Ice	20.24	11.13	6.42	387.96	-671.38	0.12
1.2D+1.6W (pattern 2) 120 deg - No Ice	20.24	11.97	6.91	479.56	-829.91	0.09
0.9 Dead+1.6 Wind 120 deg - No Ice	15.18	13.64	7.87	517.61	-896.16	0.16
1.2 Dead+1.6 Wind 150 deg - No Ice	20.24	7.74	13.40	890.01	-515.28	-1.73
1.2D+1.6W (pattern 1) 150 deg - No Ice	20.24	6.30	10.91	662.70	-384.04	-1.75
1.2D+1.6W (pattern 2) 150 deg - No Ice	20.24	6.82	11.82	822.94	-476.56	-1.28
0.9 Dead+1.6 Wind 150 deg - No Ice	15.18	7.74	13.40	886.62	-512.99	-1.75
1.2 Dead+1.6 Wind 180 deg - No Ice	20.24	-0.01	15.39	1024.05	-2.47	-3.18
1.2D+1.6W (pattern 1) 180 deg - No Ice	20.24	-0.01	12.51	761.94	-2.46	-3.16
1.2D+1.6W (pattern 2) 180 deg - No Ice	20.24	-0.00	13.59	947.57	-2.53	-2.34
0.9 Dead+1.6 Wind 180 deg - No Ice	15.18	-0.01	15.39	1020.19	-1.82	-3.17
1.2 Dead+1.6 Wind 210 deg - No Ice	20.24	-7.75	13.41	890.19	510.32	-3.80
1.2D+1.6W (pattern 1) 210 deg - No Ice	20.24	-6.31	10.91	662.88	379.08	-3.76
1.2D+1.6W (pattern 2) 210 deg - No Ice	20.24	-6.83	11.82	823.05	471.49	-2.80
0.9 Dead+1.6 Wind 210 deg - No Ice	15.18	-7.75	13.41	886.80	509.35	-3.75
1.2 Dead+1.6 Wind 240 deg - No Ice	20.24	-13.65	7.88	520.07	894.61	-3.40
1.2D+1.6W (pattern 1) 240 deg - No Ice	20.24	-11.14	6.43	388.27	666.32	-3.36
1.2D+1.6W (pattern 2) 240 deg - No Ice	20.24	-11.97	6.91	479.75	824.80	-2.51
0.9 Dead+1.6 Wind 240 deg - No Ice	15.18	-13.65	7.88	517.91	892.42	-3.39

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
1.2 Dead+1.6 Wind 270 deg - No Ice	20.24	-15.49	0.01	2.20	1023.02	-2.04
1.2D+1.6W (pattern 1) 270 deg - No Ice	20.24	-12.60	0.01	2.20	760.54	-2.00
1.2D+1.6W (pattern 2) 270 deg - No Ice	20.24	-13.65	0.00	2.13	945.47	-1.49
0.9 Dead+1.6 Wind 270 deg - No Ice	15.18	-15.49	0.01	1.71	1020.37	-2.06
1.2 Dead+1.6 Wind 300 deg - No Ice	20.24	-13.33	-7.69	-508.85	882.57	-0.17
1.2D+1.6W (pattern 1) 300 deg - No Ice	20.24	-10.84	-6.25	-377.79	655.57	-0.13
1.2D+1.6W (pattern 2) 300 deg - No Ice	20.24	-11.77	-6.79	-470.67	816.31	-0.11
0.9 Dead+1.6 Wind 300 deg - No Ice	15.18	-13.33	-7.69	-507.68	880.33	-0.18
1.2 Dead+1.6 Wind 330 deg - No Ice	20.24	-7.74	-13.40	-885.96	510.06	1.73
1.2D+1.6W (pattern 1) 330 deg - No Ice	20.24	-6.30	-10.91	-658.65	378.83	1.75
1.2D+1.6W (pattern 2) 330 deg - No Ice	20.24	-6.82	-11.82	-818.89	471.35	1.28
0.9 Dead+1.6 Wind 330 deg - No Ice	15.18	-7.74	-13.40	-883.62	509.05	1.75
1.2 Dead+1.0 Ice+1.0 Temp	49.55	0.00	0.00	8.01	-14.09	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	49.55	0.00	-5.17	-331.94	-14.19	0.94
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	49.55	2.57	-4.44	-285.20	-183.47	1.09
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	49.55	4.43	-2.56	-161.06	-306.97	0.94
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	49.55	5.13	-0.00	7.99	-352.72	0.55
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	49.55	4.48	2.58	177.96	-308.55	0.01
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	49.55	2.56	4.44	301.16	-183.39	-0.53
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	49.55	-0.00	5.12	346.08	-14.07	-0.93
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	49.55	-2.57	4.44	301.24	155.23	-1.09
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	49.55	-4.48	2.59	178.06	280.35	-0.95
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	49.55	-5.13	0.00	8.11	324.47	-0.55
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	49.55	-4.43	-2.56	-160.95	278.66	-0.01
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	49.55	-2.56	-4.44	-285.15	155.10	0.53
Dead+Wind 0 deg - Service	16.86	0.00	-4.10	-267.21	-2.21	0.84
Dead+Wind 30 deg - Service	16.86	2.02	-3.49	-228.88	-135.33	0.98
Dead+Wind 60 deg - Service	16.86	3.47	-2.00	-131.01	-232.00	0.87
Dead+Wind 90 deg - Service	16.86	4.03	-0.00	1.64	-268.42	0.53
Dead+Wind 120 deg - Service	16.86	3.55	2.05	136.10	-235.06	0.04
Dead+Wind 150 deg - Service	16.86	2.01	3.49	232.21	-135.26	-0.45
Dead+Wind 180 deg - Service	16.86	-0.00	4.00	267.01	-2.12	-0.83
Dead+Wind 210 deg - Service	16.86	-2.02	3.49	232.25	131.00	-0.98
Dead+Wind 240 deg - Service	16.86	-3.55	2.05	136.18	230.76	-0.88
Dead+Wind 270 deg - Service	16.86	-4.03	0.00	1.73	264.10	-0.53
Dead+Wind 300 deg - Service	16.86	-3.47	-2.00	-130.94	227.63	-0.04
Dead+Wind 330 deg - Service	16.86	-2.01	-3.49	-228.84	130.93	0.45

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-16.86	0.00	0.00	16.86	0.00	0.000%
2	0.01	-20.24	-15.75	-0.01	20.24	15.75	0.000%
3	0.01	-20.24	-12.85	-0.01	20.24	12.85	0.000%
4	0.00	-20.24	-13.82	-0.00	20.24	13.82	0.000%
5	0.01	-15.18	-15.75	-0.01	15.18	15.75	0.000%
6	7.75	-20.24	-13.41	-7.75	20.24	13.41	0.000%
7	6.31	-20.24	-10.91	-6.31	20.24	10.91	0.000%
8	6.83	-20.24	-11.82	-6.83	20.24	11.82	0.000%
9	7.75	-15.18	-13.41	-7.75	15.18	13.41	0.000%
10	13.34	-20.24	-7.70	-13.34	20.24	7.70	0.000%
11	10.84	-20.24	-6.26	-10.84	20.24	6.26	0.000%
12	11.77	-20.24	-6.80	-11.77	20.24	6.80	0.000%
13	13.34	-15.18	-7.70	-13.34	15.18	7.70	0.000%
14	15.49	-20.24	-0.01	-15.49	20.24	0.01	0.000%
15	12.60	-20.24	-0.01	-12.60	20.24	0.01	0.000%
16	13.65	-20.24	-0.00	-13.65	20.24	0.00	0.000%
17	15.49	-15.18	-0.01	-15.49	15.18	0.01	0.000%
18	13.64	-20.24	7.87	-13.64	20.24	-7.87	0.000%
19	11.13	-20.24	6.42	-11.13	20.24	-6.42	0.000%
20	11.97	-20.24	6.91	-11.97	20.24	-6.91	0.000%
21	13.64	-15.18	7.87	-13.64	15.18	-7.87	0.000%
22	7.74	-20.24	13.40	-7.74	20.24	-13.40	0.000%
23	6.30	-20.24	10.91	-6.30	20.24	-10.91	0.000%
24	6.82	-20.24	11.82	-6.82	20.24	-11.82	0.000%
25	7.74	-15.18	13.40	-7.74	15.18	-13.40	0.000%
26	-0.01	-20.24	15.39	0.01	20.24	-15.39	0.000%
27	-0.01	-20.24	12.51	0.01	20.24	-12.51	0.000%
28	-0.00	-20.24	13.59	0.00	20.24	-13.59	0.000%
29	-0.01	-15.18	15.39	0.01	15.18	-15.39	0.000%
30	-7.75	-20.24	13.41	7.75	20.24	-13.41	0.000%
31	-6.31	-20.24	10.91	6.31	20.24	-10.91	0.000%
32	-6.83	-20.24	11.82	6.83	20.24	-11.82	0.000%
33	-7.75	-15.18	13.41	7.75	15.18	-13.41	0.000%
34	-13.65	-20.24	7.88	13.65	20.24	-7.88	0.000%
35	-11.14	-20.24	6.43	11.14	20.24	-6.43	0.000%
36	-11.97	-20.24	6.91	11.97	20.24	-6.91	0.000%
37	-13.65	-15.18	7.88	13.65	15.18	-7.88	0.000%
38	-15.49	-20.24	0.01	15.49	20.24	-0.01	0.000%
39	-12.60	-20.24	0.01	12.60	20.24	-0.01	0.000%
40	-13.65	-20.24	0.00	13.65	20.24	-0.00	0.000%
41	-15.49	-15.18	0.01	15.49	15.18	-0.01	0.000%
42	-13.33	-20.24	-7.69	13.33	20.24	7.69	0.000%
43	-10.84	-20.24	-6.25	10.84	20.24	6.25	0.000%
44	-11.77	-20.24	-6.79	11.77	20.24	6.79	0.000%
45	-13.33	-15.18	-7.69	13.33	15.18	7.69	0.000%
46	-7.74	-20.24	-13.40	7.74	20.24	13.40	0.000%
47	-6.30	-20.24	-10.91	6.30	20.24	10.91	0.000%
48	-6.82	-20.24	-11.82	6.82	20.24	11.82	0.000%
49	-7.74	-15.18	-13.40	7.74	15.18	13.40	0.000%
50	0.00	-49.55	0.00	0.00	49.55	0.00	0.000%
51	0.00	-49.55	-5.17	-0.00	49.55	5.17	0.000%
52	2.57	-49.55	-4.44	-2.57	49.55	4.44	0.000%
53	4.43	-49.55	-2.56	-4.43	49.55	2.56	0.000%
54	5.13	-49.55	-0.00	-5.13	49.55	0.00	0.000%
55	4.48	-49.55	2.58	-4.48	49.55	-2.58	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
56	2.56	-49.55	4.44	-2.56	49.55	-4.44	0.000%
57	-0.00	-49.55	5.12	0.00	49.55	-5.12	0.000%
58	-2.57	-49.55	4.44	2.57	49.55	-4.44	0.000%
59	-4.48	-49.55	2.59	4.48	49.55	-2.59	0.000%
60	-5.13	-49.55	0.00	5.13	49.55	-0.00	0.000%
61	-4.43	-49.55	-2.56	4.43	49.55	2.56	0.000%
62	-2.56	-49.55	-4.44	2.56	49.55	4.44	0.000%
63	0.00	-16.86	-4.10	-0.00	16.86	4.10	0.000%
64	2.02	-16.86	-3.49	-2.02	16.86	3.49	0.000%
65	3.47	-16.86	-2.00	-3.47	16.86	2.00	0.000%
66	4.03	-16.86	-0.00	-4.03	16.86	0.00	0.000%
67	3.55	-16.86	2.05	-3.55	16.86	-2.05	0.000%
68	2.01	-16.86	3.49	-2.01	16.86	-3.49	0.000%
69	-0.00	-16.86	4.00	0.00	16.86	-4.00	0.000%
70	-2.02	-16.86	3.49	2.02	16.86	-3.49	0.000%
71	-3.55	-16.86	2.05	3.55	16.86	-2.05	0.000%
72	-4.03	-16.86	0.00	4.03	16.86	-0.00	0.000%
73	-3.47	-16.86	-2.00	3.47	16.86	2.00	0.000%
74	-2.01	-16.86	-3.49	2.01	16.86	3.49	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00003467
2	Yes	4	0.00000001	0.00059467
3	Yes	4	0.00000001	0.00000885
4	Yes	4	0.00000001	0.00015945
5	Yes	4	0.00000001	0.00029738
6	Yes	4	0.00000001	0.00012998
7	Yes	4	0.00000001	0.00000999
8	Yes	4	0.00000001	0.00000979
9	Yes	4	0.00000001	0.00024277
10	Yes	4	0.00000001	0.00000888
11	Yes	4	0.00000001	0.00001014
12	Yes	4	0.00000001	0.00000892
13	Yes	4	0.00000001	0.00004296
14	Yes	4	0.00000001	0.00007258
15	Yes	4	0.00000001	0.00000942
16	Yes	4	0.00000001	0.00003107
17	Yes	4	0.00000001	0.00076985
18	Yes	4	0.00000001	0.00005638
19	Yes	4	0.00000001	0.00003746
20	Yes	4	0.00000001	0.00002829
21	Yes	4	0.00000001	0.00017875
22	Yes	4	0.00000001	0.00007062
23	Yes	4	0.00000001	0.00000943
24	Yes	4	0.00000001	0.00006804
25	Yes	4	0.00000001	0.00073959
26	Yes	4	0.00000001	0.00000884
27	Yes	4	0.00000001	0.00001012
28	Yes	4	0.00000001	0.00000889
29	Yes	4	0.00000001	0.00004189
30	Yes	4	0.00000001	0.00012994
31	Yes	4	0.00000001	0.00000998
32	Yes	4	0.00000001	0.00000976

33	Yes	4	0.00000001	0.00024269
34	Yes	4	0.00000001	0.00061815
35	Yes	4	0.00000001	0.00000886
36	Yes	4	0.00000001	0.00016469
37	Yes	4	0.00000001	0.00030377
38	Yes	4	0.00000001	0.00007324
39	Yes	4	0.00000001	0.00000944
40	Yes	4	0.00000001	0.00003130
41	Yes	4	0.00000001	0.00078662
42	Yes	4	0.00000001	0.00000869
43	Yes	4	0.00000001	0.00002150
44	Yes	4	0.00000001	0.00001467
45	Yes	4	0.00000001	0.00000298
46	Yes	4	0.00000001	0.00007127
47	Yes	4	0.00000001	0.00000946
48	Yes	4	0.00000001	0.00007047
49	Yes	4	0.00000001	0.00075625
50	Yes	4	0.00000001	0.00002071
51	Yes	4	0.00000001	0.00016277
52	Yes	4	0.00000001	0.00016695
53	Yes	4	0.00000001	0.00016965
54	Yes	4	0.00000001	0.00016815
55	Yes	4	0.00000001	0.00016704
56	Yes	4	0.00000001	0.00016809
57	Yes	4	0.00000001	0.00016947
58	Yes	4	0.00000001	0.00016667
59	Yes	4	0.00000001	0.00016249
60	Yes	4	0.00000001	0.00016182
61	Yes	4	0.00000001	0.00016321
62	Yes	4	0.00000001	0.00016203
63	Yes	4	0.00000001	0.00000551
64	Yes	4	0.00000001	0.00000569
65	Yes	4	0.00000001	0.00000582
66	Yes	4	0.00000001	0.00000565
67	Yes	4	0.00000001	0.00002591
68	Yes	4	0.00000001	0.00000565
69	Yes	4	0.00000001	0.00000582
70	Yes	4	0.00000001	0.00000569
71	Yes	4	0.00000001	0.00000551
72	Yes	4	0.00000001	0.00000563
73	Yes	4	0.00000001	0.00002016
74	Yes	4	0.00000001	0.00000563

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	5.215	67	0.4527	0.0720
T2	80 - 60	3.319	67	0.4328	0.0717
T3	60 - 53.33	1.630	67	0.3271	0.0589
T4	53.33 - 40	1.189	67	0.2798	0.0483
T5	40 - 20	0.546	67	0.1495	0.0262
T6	20 - 0	0.121	67	0.0609	0.0058

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	(2) OPA-65R-LCUU-H4	67	5.023	0.4528	0.0721	134665
97.00	12' Boom Starmount	67	4.927	0.4528	0.0722	134665
96.00	Parabolic Grid	67	4.832	0.4528	0.0722	134665
92.00	FD-RRH 4x45 1900	67	4.449	0.4519	0.0724	84165
89.00	APXVSPP18-C-A20	67	4.163	0.4499	0.0724	61211
88.50	FD-RRH 4x45 1900	67	4.116	0.4494	0.0724	58550
85.00	FD-RRH 2x50 800	67	3.785	0.4447	0.0723	44888
83.00	AIR21 B2A/B4P	67	3.598	0.4408	0.0721	39279
82.00	10-ft T-Frame	67	3.504	0.4384	0.0720	36437
81.50	LNX-6515DS	67	3.458	0.4371	0.0719	34958
80.00	ATMAA1412D-1A20 Twin TMA	67	3.319	0.4328	0.0717	30304
65.00	6810 4 Bay	67	2.009	0.3587	0.0646	8738
30.00	2.5" Tube x 2' Standoff	67	0.270	0.0910	0.0138	9409

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	19.975	21	1.7282	0.3816
T2	80 - 60	12.762	21	1.6514	0.3793
T3	60 - 53.33	6.277	21	1.2465	0.3225
T4	53.33 - 40	4.583	21	1.0670	0.2630
T5	40 - 20	2.086	18	0.5702	0.1014
T6	20 - 0	0.464	18	0.2327	0.0225

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	(2) OPA-65R-LCUU-H4	21	19.247	1.7287	0.3821	34596
97.00	12' Boom Starmount	21	18.883	1.7288	0.3824	34596
96.00	Parabolic Grid	21	18.519	1.7286	0.3827	34596
92.00	FD-RRH 4x45 1900	21	17.066	1.7251	0.3834	21622
89.00	APXVSPP18-C-A20	21	15.981	1.7175	0.3835	15725
88.50	FD-RRH 4x45 1900	21	15.801	1.7157	0.3834	15041
85.00	FD-RRH 2x50 800	21	14.542	1.6976	0.3825	11532
83.00	AIR21 B2A/B4P	21	13.827	1.6823	0.3816	10093
82.00	10-ft T-Frame	21	13.471	1.6731	0.3809	9369
81.50	LNX-6515DS	21	13.294	1.6681	0.3805	8993
80.00	ATMAA1412D-1A20 Twin TMA	21	12.762	1.6514	0.3793	7806
65.00	6810 4 Bay	21	7.734	1.3668	0.3446	2259
30.00	2.5" Tube x 2' Standoff	18	1.030	0.3473	0.0527	2379

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	100	Leg	A325N	0.7500	4	3.71	29.82	0.125 ✔	1	Bolt Tension
T2	80	Leg	A325N	0.7500	4	16.95	29.82	0.568 ✔	1	Bolt Tension
T4	53.33	Leg	A325N	1.0000	4	33.86	53.01	0.639 ✔	1	Bolt Tension
		Secondary Horizontal	A325N	0.7500	1	2.77	15.77	0.176 ✔	1	Member Bearing
T5	40	Leg	A325N	1.0000	6	24.72	53.01	0.466 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.15	7.83	0.402 ✔	1	Member Bearing
T6	20	Leg	A36	1.5000	4	37.68	57.65	0.654 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	1.85	7.83	0.237 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	P2.5x.276	20.00	3.33	43.3 K=1.00	2.2535	-28.33	88.43	0.320 [1] ✔
T2	80 - 60	P2.5x.276 (GR)	20.00	3.33	43.3 K=1.00	2.2535	-86.25	96.20	0.897 [1] ✔
T3	60 - 53.33	P3x.3 (GR)	6.67	3.34	35.2 K=1.00	3.0159	-110.25	148.57	0.742 [1] ✔
T4	53.33 - 40	P3x.3 (GR)	13.33	1.67	17.6 K=1.00	3.0159	-160.21	160.63	0.997 [1] ✔
T5	40 - 20	P5x.375 (GR)	20.03	6.68	43.6 K=1.00	6.1120	-159.47	249.26	0.640 [1] ✔
T6	20 - 0	P5x.375 (GR)	20.03	6.68	43.6 K=1.00	6.1120	-164.62	249.26	0.660 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	40 - 20	L2x2x3/16	7.69	3.68	114.1 K=1.02	0.7150	-3.71	11.67	0.318 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x3/16	9.79	4.69	115.2 K=1.01	0.9020	-2.11	14.53	0.145 [1] ✔

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

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	0.5273	-5.93	7.19	0.825 [1] ✔
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7 K=1.00	1.0547	-8.50	23.22	0.366 [1] ✔
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-11.66	23.51	0.496 [1] ✔
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-12.05	23.51	0.513 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	L2 1/2x2 1/2x5/16	3.50	2.94	96.0 K=1.33	1.4600	-2.77	29.11	0.095 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	0.5273	-3.03	7.19	0.421 [1] ✔
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7 K=1.00	1.0547	-6.68	23.22	0.288 [1] ✔
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7 K=1.00	1.0547	-9.93	23.22	0.428 [1] ✔
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-11.25	23.51	0.479 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-5.79	23.51	0.246 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	P2.5x.276	20.00	3.33	43.3	2.2535	14.85	101.41	0.146 [1] ✔
T2	80 - 60	P2.5x.276 (GR)	20.00	3.33	43.3	2.2535	67.79	101.41	0.669 [1] ✔
T3	60 - 53.33	P3x.3 (GR)	6.67	3.34	35.2	3.0159	88.58	165.57	0.535 [1] ✔
T4	53.33 - 40	P3x.3 (GR)	13.33	1.67	17.6	3.0159	135.46	165.57	0.818 [1] ✔
T5	40 - 20	P5x.375 (GR)	20.03	6.68	43.6	6.1120	149.01	231.03	0.645 [1] ✔
T6	20 - 0	P5x.375 (GR)	20.03	6.68	43.6	6.1120	150.71	231.03	0.652 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	5/8	4.83	4.50	345.8	0.3068	7.04	9.94	0.708 [1] ✔
T2	80 - 60	5/8	4.83	4.50	345.8	0.3068	9.86	9.94	0.992 [1] ✔
T3	60 - 53.33	3/4	4.83	4.43	283.6	0.4418	11.74	14.31	0.820 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	3/4	4.83	4.43	283.5	0.4418	13.10	14.31	0.915 [1] ✔
T5	40 - 20	L2x2x3/16	7.69	3.68	74.0	0.7150	3.15	23.17	0.136 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x3/16	9.79	4.69	74.1	0.9020	1.85	29.22	0.063 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	85.7	0.5273	0.49	17.09	0.029 [1] ✔
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7	1.0547	1.49	34.17	0.044 [1] ✔
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	1.91	34.17	0.056 [1] ✔
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	2.77	34.17	0.081 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	L2 1/2x2 1/2x5/16	3.50	2.94	50.6	1.4600	2.77	47.30	0.059 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	100 - 80	Leg	P2.5x.276	2	-28.33	88.43	32.0	Pass
T2	80 - 60	Leg	P2.5x.276 (GR)	59	-86.25	96.20	89.7	Pass
T3	60 - 53.33	Leg	P3x.3 (GR)	119	-110.25	148.57	74.2	Pass
T4	53.33 - 40	Leg	P3x.3 (GR)	137	-160.21	160.63	99.7	Pass
T5	40 - 20	Leg	P5x.375 (GR)	190	149.01	231.03	64.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T6	20 - 0	Leg	P5x.375 (GR)	212	-164.62	249.26	66.0	Pass
T1	100 - 80	Diagonal	5/8	7	7.04	9.94	70.8	Pass
T2	80 - 60	Diagonal	5/8	67	9.86	9.94	99.2	Pass
T3	60 - 53.33	Diagonal	3/4	121	11.74	14.31	82.0	Pass
T4	53.33 - 40	Diagonal	3/4	145	13.10	14.31	91.5	Pass
T5	40 - 20	Diagonal	L2x2x3/16	208	-3.71	11.67	31.8	Pass
							40.2 (b)	
T6	20 - 0	Diagonal	L2 1/2x2 1/2x3/16	214	-2.11	14.53	14.5	Pass
							23.7 (b)	
T1	100 - 80	Horizontal	L1 1/2x1 1/2x3/16	50	-5.93	7.19	82.5	Pass
T2	80 - 60	Horizontal	2L1 1/2x1 1/2x3/16	75	-8.50	23.22	36.6	Pass
T3	60 - 53.33	Horizontal	2L1 1/2x1 1/2x3/16	129	-11.66	23.51	49.6	Pass
T4	53.33 - 40	Horizontal	2L1 1/2x1 1/2x3/16	153	-12.05	23.51	51.3	Pass
T4	53.33 - 40	Secondary Horizontal	L2 1/2x2 1/2x5/16	154	-2.77	29.11	9.5	Pass
							17.6 (b)	
T1	100 - 80	Top Girt	L1 1/2x1 1/2x3/16	5	-3.03	7.19	42.1	Pass
T2	80 - 60	Top Girt	2L1 1/2x1 1/2x3/16	63	-6.68	23.22	28.8	Pass
T3	60 - 53.33	Top Girt	2L1 1/2x1 1/2x3/16	66	-9.93	23.22	42.8	Pass
T4	53.33 - 40	Top Girt	2L1 1/2x1 1/2x3/16	141	-11.25	23.51	47.9	Pass
T4	53.33 - 40	Bottom Girt	2L1 1/2x1 1/2x3/16	144	-5.79	23.51	24.6	Pass
							Summary	
						Leg (T4)	99.7	Pass
						Diagonal (T2)	99.2	Pass
						Horizontal (T1)	82.5	Pass
						Secondary Horizontal (T4)	17.6	Pass
						Top Girt (T4)	47.9	Pass
						Bottom Girt (T4)	24.6	Pass
						Bolt Checks	65.4	Pass
						RATING =	**99.7**	**Pass**

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Subject:	FOUNDATION ANALYSIS
Location:	Danbury, CT
Rev. 0: 4/21/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 17012.37

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 1039 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 16 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 20 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 167 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 152 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 100 \cdot ft$	(User Input)	
Tower Width =	$W_t := 7.5 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 7.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.25 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.25 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 2.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 14.5 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 10000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 8$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 4 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.750 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 15$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.000 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 15$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.442 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Load Factor = $LF := 1$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 120 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.44 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.44 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.52 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.98 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 3 \cdot ft$

$A_p := W_f \cdot T_p = 43.5 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 86.13 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 100.621 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 96.4 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_s = 24.612 \cdot kip$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 5.085$

$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 0$ $X_{off2} := 0$

$X_{off} := if(Pos_t = 1, X_{off1}, X_{off2})$ $X_{off} = 0 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 162.9 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) + 0.75WT_{s2} \cdot \left[W_f + \frac{(D_f - n) \cdot \tan(\Phi_s)}{3}\right] = 1668 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 1155 \cdot kip \cdot ft$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.44$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 159.415 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 217 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 210.25$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 508.1 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 3.305 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -1.241 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s), "Okay", "No Good"]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 3.514$

Distance to Kern = $X_k := \frac{W_f}{6} = 2.417$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 5.322$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 5.176 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 5.176 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 999.78 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if\left(P_b > LF \cdot C_t, "Okay", "No Good"\right)$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 32 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.794 \cdot ksf$

$V_{req} := FL \cdot \left(X_t - .5 \cdot d_p - d\right) \cdot W_f = 16.335 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 599 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 14.7$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 17.1$

Required Shear Strength = $V_{req} := FL \cdot \left(W_f^2 - A_{bo}\right) = 153 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1210.6 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Maximum Moment in Pad = $M_{max} := 700 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 777.778 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 \text{ if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 \text{ if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] \text{ otherwise} \end{cases} = 0.85 \quad \text{(ACI-200810.2.7.3)}$$

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 101.942 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 4.861 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.841 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 4.926 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.01812 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$ (ACI -2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 2.9 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 11.8 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 2.9 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 6.6 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 10.93 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 39 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No\ Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 452.39 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 2.26 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 6.28 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

$Steel\_Area\_Check = "Okay"$

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.425 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 18 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 816 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips}\right)$

$(D \ N \ n \ P_u \ M_{xu}) = (24 \ \ 8 \ \ 8 \ \ 222.611 \ \ 816)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (671.972 \ \ 2.463 \times 10^3 \ \ -19.254 \ \ 0.014)$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

$Axial\_Load\_Check = "Okay"$

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

$Bending\_Check = "Okay"$

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 48 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 33 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 23.72 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 13.282 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) = 23.717 \cdot in$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 18.974 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18.974 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Section 1 - Site Information

Site ID: CTFF703A
Status: Draft
Version: 2.1
Project Type: Capacity-L1900
Approved: Not Approved
Approved By: Not Approved
Last Modified: 3/8/2017 1:34:07 PM
Last Modified By: GSM1900\AMurill9

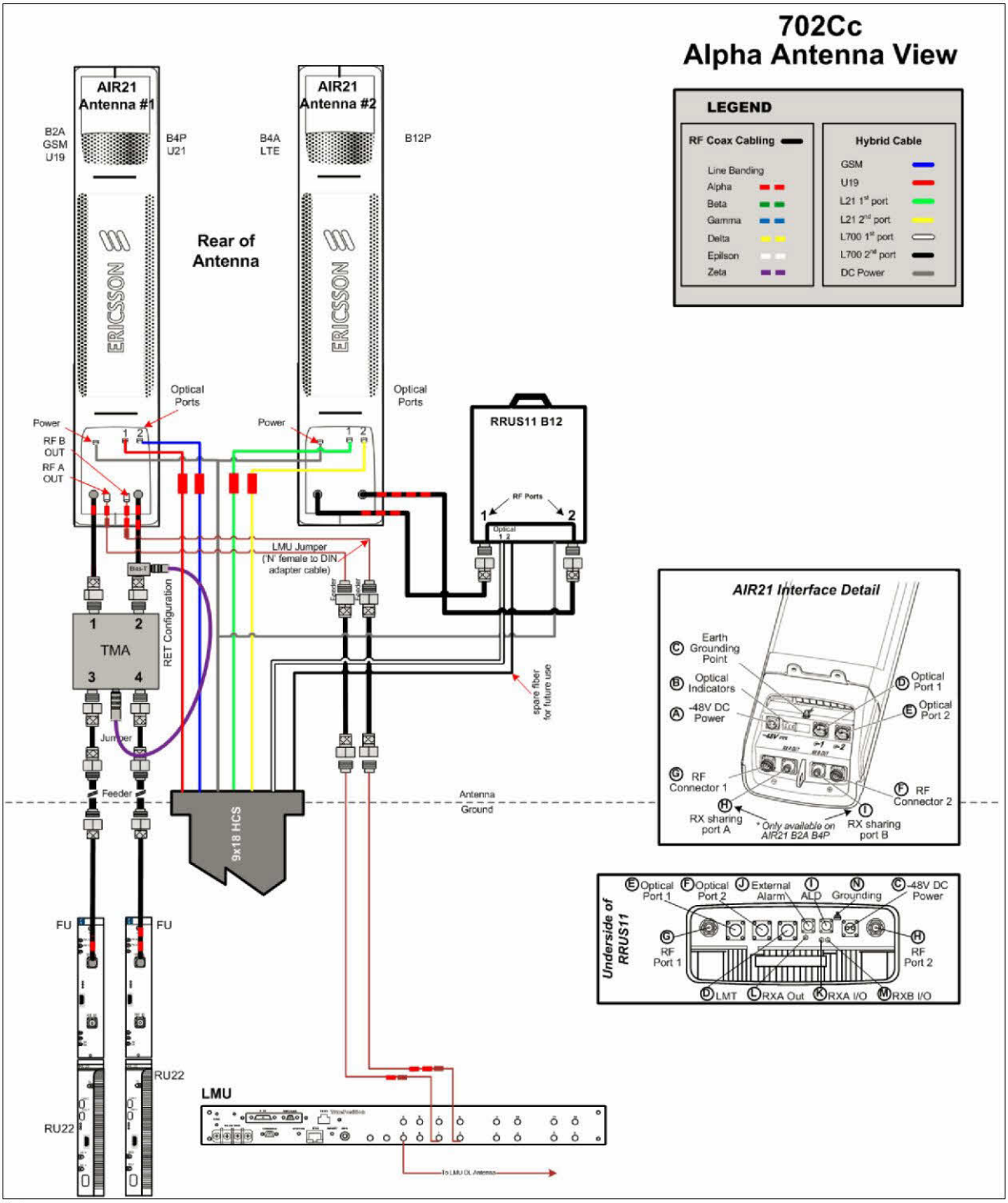
Site Name: CT703/WCSU ET
Site Class: Self Support Tower
Site Type: Structure Non Building
Solution Type:
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: State of Connecticut

Latitude: 41.39472156
Longitude: -73.48666590
Address: 303 Boxwood Lane
City, State: Danbury, CT
Region: NORTHEAST

RAN Template: 792DB Outdoor			AL Template: 792DB_2xAIR+1DP	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 6	**TMA Count:** 3	**RRU Count:** 3

Section 2 - Existing Template Images

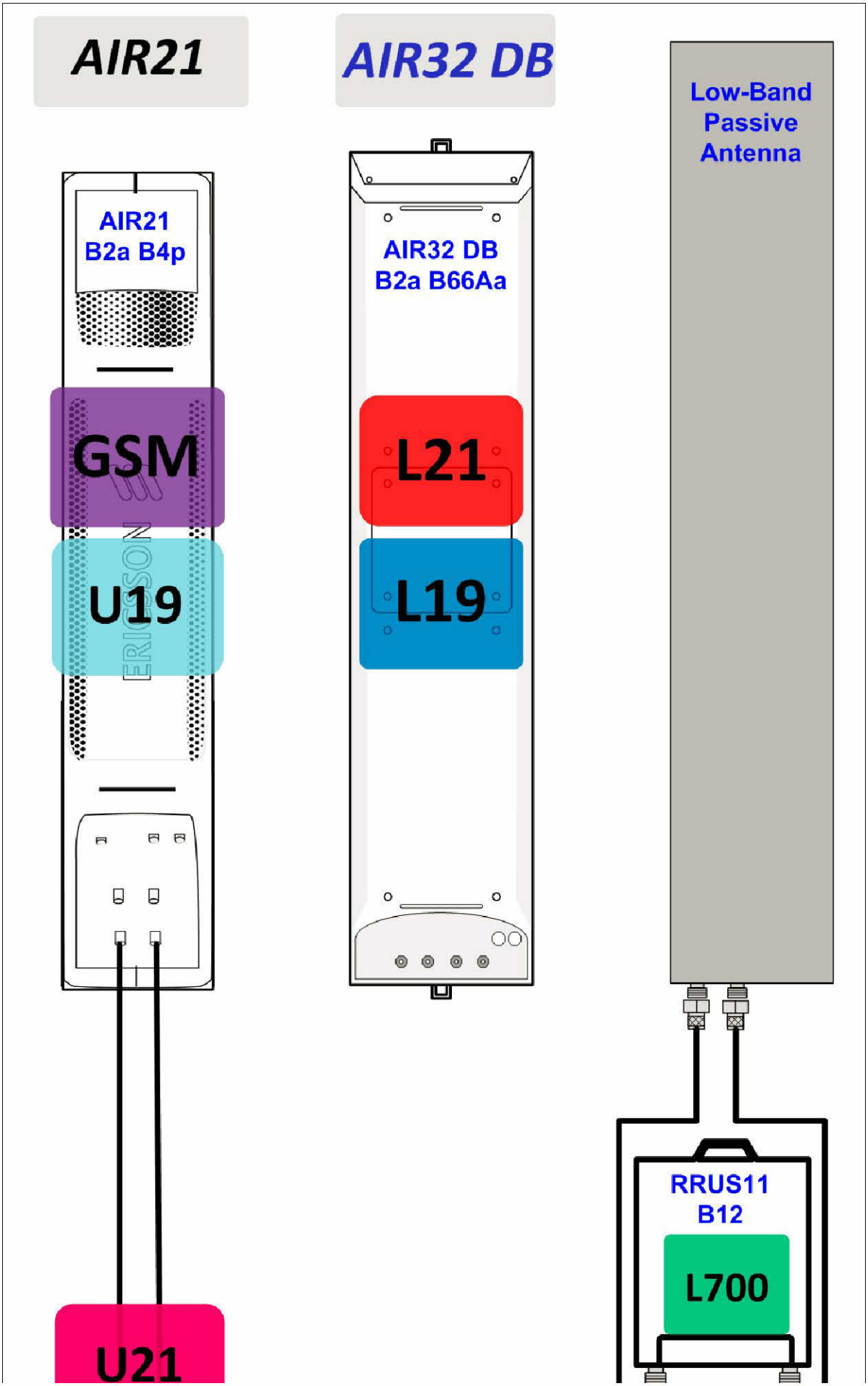
AL_702Cc.png


702Cc
Alpha Antenna View
LEGEND
RF Coax Cabling
Line Banding
Alpha
Beta
Gamma
Delta
Epilson
Zeta
Hybrid Cable
GSM
U19
L21 1st port
L21 2nd port
L700 1st port
L700 2nd port
DC Power
AIR21
Antenna #1
B2A
GSM
U19
B4P
U21
AIR21
Antenna #2
B4A
LTE
B12P
Rear of
Antenna
ERICSSON
Optical
Ports
Power
RF B
OUT
RF A
OUT
RRUS11 B12
RF Ports
Optical
LMU Jumper
(N female to DIN
adapter cable)
TMA
RET Configuration
Jumper
Feeder
spare fiber
for future use
Antenna
Ground
9x18 HCS
FU
RU22
LMU
AIR21 Interface Detail
Earth
Grounding
Point
Optical
Indicators
-48V DC
Power
Optical
Port 1
Optical
Port 2
RF
Connector 1
RF
Connector 2
RX sharing
port A
* Only available on
AIR21 B2A B4P
RX sharing
port B
Underside of
RRUS11
Optical
Port 1
Optical
Port 2
External
Alarm
ALD
Grounding
-48V DC
Power
RF
Port 1
RF
Port 2
LMT
RXA Out
RXA I/O
RXB I/O

Notes:

Section 3 - Proposed Template Images

792DB.png


AIR21
AIR32 DB
Low-Band
Passive
Antenna
AIR21
B2a B4p
AIR32 DB
B2a B66Aa
GSM
L21
U19
L19
ERICSSON
RRUS11
B12
L700
U21

Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Section 5 - RAN Equipment

Existing RAN Equipment		
Template: 702Cc Outdoor		
Enclosure	1	2
Enclosure Type	RBS 6131	Tower Top Mount
Baseband	DUS41 (L2100) (L700) DUW30 (U2100) DUW30 (U1900) DUG20 (G1900)	
Hybrid Cable System		Ericsson 9x18 HCS *Select Length*
Multiplexer	XMU	
Radio	RU22 (x6) (U2100)	

Proposed RAN Equipment		
Template: 792DB Outdoor		
Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment
Baseband	DUS41 (x2) DUW30 (x2) DUG20	
Hybrid Cable System		Ericsson 9x18 HCS *Select Length* Ericsson 6x12 HCS *Select Length & AWG*
Multiplexer	XMU	
Radio	RU22 (x6)	

RAN Scope of Work:

Remove LMU coax from all three sectors.

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Section 6 - A&L Equipment

Existing Template: 702Cc
Proposed Template: 792DB_2xAIR+1DP

Sector 1 (Existing) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1		2	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR21 B4A/B12P 4ft (Quad)	
Azimuth	30		30	
M. Tilt	0		0	
Height	83		83	
Ports	P1	P2	P3	P4
Active Tech.	U1900, G1900	U2100	L2100	L700
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables	1-5/8" LMU Coax - 125 ft. 1-5/8" LMU Coax - 125 ft. Fiber Jumper, Fiber Jumper	1-5/8" Coax - 125 ft. 1-5/8" Coax - 125 ft.	Fiber Jumper, Fiber Jumper	Fiber Jumper, Fiber Jumper
TMAs		Generic Style 1B - Twin AWS		
Diplexers / Combiners				
Radio				RRUS11 B12
Sector Equipment				

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Sector 1 (Proposed) view from behind							
Coverage Type	A - Outdoor Macro						
Antenna	1		2	3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)			
Azimuth	30		30	30			
M. Tilt	0		0	0			
Height	83		83	83			
Ports	P1	P2	P3	P4	P5	P6	P7
Active Tech.	U1900, G1900	U2100	L700	L2100	L2100	L1900	L1900
Dark Tech.							
Restricted Tech.							
Decomm. Tech.							
E. Tilt							
Cables		1-5/8" Coax - 125 ft. 1-5/8" Coax - 125 ft.					
TMAs		Generic Style 1B - Twin AWS					
Diplexers / Combiners							
Radio			RRUS11 B12				
Sector Equipment							

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Sector 2 (Existing) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1		2	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR21 B4A/B12P 4ft (Quad)	
Azimuth	150		150	
M. Tilt	0		0	
Height	83		83	
Ports	P1	P2	P3	P4
Active Tech.	U1900, G1900	U2100	L2100	L700
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables	1-5/8" LMU Coax - 125 ft. 1-5/8" LMU Coax - 125 ft. Fiber Jumper, Fiber Jumper	1-5/8" Coax - 125 ft. 1-5/8" Coax - 125 ft.	Fiber Jumper, Fiber Jumper	Fiber Jumper, Fiber Jumper
TMAs		Generic Style 1B - Twin AWS		
Diplexers / Combiners				
Radio				RRUS11 B12
Sector Equipment				

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Sector 2 (Proposed) view from behind							
Coverage Type	A - Outdoor Macro						
Antenna	1		2	3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)			
Azimuth	150		150	150			
M. Tilt	0		0	0			
Height	83		83	83			
Ports	P1	P2	P3	P4	P5	P6	P7
Active Tech.	U1900, G1900	U2100	L700	L2100	L2100	L1900	L1900
Dark Tech.							
Restricted Tech.							
Decomm. Tech.							
E. Tilt							
Cables		1-5/8" Coax - 125 ft. 1-5/8" Coax - 125 ft.					
TMAs		Generic Style 1B - Twin AWS					
Diplexers / Combiners							
Radio			RRUS 11 B12				
Sector Equipment							

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Sector 3 (Existing) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1		2	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR21 B4A/B12P 4ft (Quad)	
Azimuth	270		270	
M. Tilt	0		0	
Height	83		83	
Ports	P1	P2	P3	P4
Active Tech.	U1900, G1900	U2100	L2100	L700
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables	1-5/8" LMU Coax - 125 ft. 1-5/8" LMU Coax - 125 ft. Fiber Jumper, Fiber Jumper	1-5/8" Coax - 125 ft. 1-5/8" Coax - 125 ft.	Fiber Jumper, Fiber Jumper	Fiber Jumper, Fiber Jumper
TMAs		Generic Style 1B - Twin AWS		
Diplexers / Combiners				
Radio				RRUS11 B12
Sector Equipment				

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
792DB Outdoor	792DB_2xAIR+1DP

CTFF703A_2.1_Capacity-L1900

Sector 3 (Proposed) view from behind							
Coverage Type	A - Outdoor Macro						
Antenna	1		2	3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)			
Azimuth	270		270	270			
M. Tilt	0		0	0			
Height	83		83	83			
Ports	P1	P2	P3	P4	P5	P6	P7
Active Tech.	U1900, G1900	U2100	L700	L2100	L2100	L1900	L1900
Dark Tech.							
Restricted Tech.							
Decomm. Tech.							
E. Tilt							
Cables		1-5/8" Coax - 125 ft. 1-5/8" Coax - 125 ft.					
TMAs		Generic Style 1B - Twin AWS					
Diplexers / Combiners							
Radio			RRUS11 B12				
Sector Equipment							

Unconnected Equipment:

Scope of Work:

Product Specifications

COMMSCOPE®

POWERED BY ANDREW®

LNX-6515DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Exceptional horizontal pattern roll-off and strong front-to-back ratio
- Extended bandwidth allows one antenna to serve multiple frequency allocations
- Great solution to maximize network coverage and capacity
- The RF connectors are designed for IP67 rating and the radome for IP56 rating
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	16.6	16.9
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 16.6 4 ° | 16.6 8 ° | 16.4	0 ° | 17.0 4 ° | 17.0 8 ° | 16.8
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Horizontal Tolerance, degrees	±1	±0.9
Beamwidth, Vertical, degrees	9.7	8.6
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4
Beam Tilt, degrees	0–8	0–8
USLS, dB	18	18
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	698 – 896 MHz
Number of Ports, all types	2

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum

Product Specifications

LNX-6515DS-VTM

Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	878.0 N @ 150 km/h 197.4 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	2449.0 mm | 96.4 in
Width	301.0 mm | 11.9 in
Net Weight	22.8 kg | 50.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6515DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-6515DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

DB380-3 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Used for wide panel antennas. Includes three clamp sets.

DB5083D — Downtilt Mounting Kit for 2.4"-4.5" (60-115 mm) OD round members. Consists of two DB5083 heavy-duty, galvanized steel downtilt mounting brackets. This kit is compatible with the DB380-3 pipe mount for panel antennas with three mounting points.

AIR-32 B4A/B2P & B2A/B66AA

ERICSSON ANTENNA INTEGRATED RADIO AIR-32

Radio		
	Single Band (B4a/B2p)	**Dual Band (B2a/B66Aa)**
Band 2 (1850-1910 / 1930-1990 MHz)	Passive frequency band	Active frequency band
Band 4 (1710-1755 / 2110-2155 MHz)	Active frequency band	Subset of Band 66A (AWS 1+3)
Band 66A (1710-1780 / 2110-2180 MHz)	N/A	Active frequency band
PA Output Power	4 x 30W	2 x (4 x 30) W
Downlink EIRP in bore-sight direction for each active band	4 x 62.5 dBmi	4 x 62.5 dBmi
Instantaneous bandwidth	45 MHz (W, L)	B2: 40 MHz (W, L) B2: 20 MHz (G) B66A: 70 MHz (W, L)
Capacity (single standard per unit)	6 GSM 6 WCDMA 2 x 20 MHz LTE	6 GSM (B2 only) 6 WCDMA per Active frequency band 2 x 20 MHz LTE per band
Multi-RAT capability	WCDMA and LTE on both PAs	WCDMA and GSM on both PAs (B2 only) WCDMA and LTE on both PAs (B2 and B4) GSM and LTE (B2 only)

Interfaces		
Optical CPRI	2 x 10 Gbps	2 x 10 Gbps per Active frequency band
DC Power	-48 VDC 3-wire or 2-wire	-48 VDC 3-wire or 2-wire (separate input for both radios)
AC power (Optional)	PSU-AC 08	PSU-AC 08
Passive antenna	4 RF connectors (7/16 female)	N/A
Environmental		
Operating Temperature Range	-40 to +55 °C	-40 to +55 °C
Solar Radiation	≤ 1,120 W/m²	≤ 1,120 W/m²
Relative Humidity	5 to 100%	5 to 100%
Absolute Humidity	0.26 to 40 g/m^3	0.26 to 40 g/m^3
Maximum temperature change	1.0°C/min	1.0°C/min
Antenna		
Electrical Tilt	2º – 12º (B4) 2º – 12º (B2)	2º – 12º (B66A) 2º – 12º (B2)
Bore-sight antenna gain	18 dBi (B4) 17.5 dBi (B2)	18 dBi (B66A) 17.5 dBi (B2)
Nominal beam-width, azimuth	65º (B4) 63º (B2)	65º (B66A) 63º (B2)
Nominal beam-width, elevation	6º (B4) 6º (B2)	6º (B66A) 6º (B2)
Mechanical		
Weight	48 Kg (105.8 lbs)	60 Kg (132.2 lbs)
Dimensions (H x W x D)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)
Wind load at 42 m/s (150 km/h) Front / Lateral / Rear	640N / 300N / 660N	640N / 300N / 660N

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

CT703/WCSU ET

SITE ID: CTFF703A - L1900

303 BOXWOOD LANE

DANBURY, CT 06811

T-MOBILE RF CONFIGURATION

792DB_2xAIR+1DP

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. A TOTAL OF (3) EXISTING DIRECTIONAL PANEL ANTENNAS ARE TO BE REMOVED AND A TOTAL OF SIX (6) DIRECTIONAL PANEL ANTENNAS ARE TO BE INSTALLED ON A NEW MOUNT WITH THREE (3) EXISTING DIRECTIONAL PANEL ANTENNAS FOR A TOTAL OF NINE (9) AT A CENTERLINE ELEVATION OF ±83' A.G.L. ON A 100' TALL NUDD LATTICE TOWER.
2. INSTALL (1) NEW HYBRID CABLE FROM GROUND EQUIPMENT TO ANTENNA SECTOR LOCATIONS.

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE 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.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

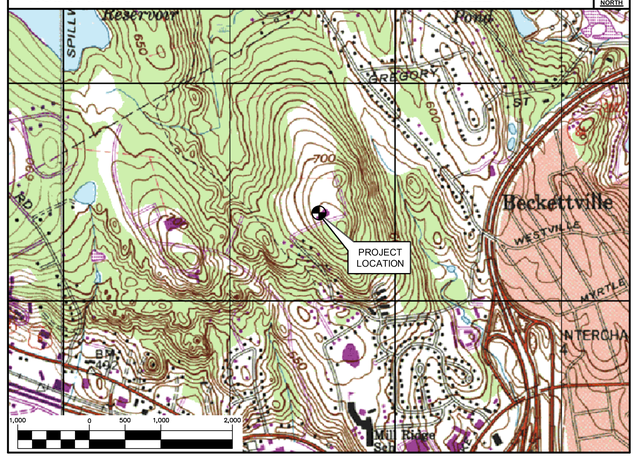
FROM: 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

TO: 303 BOXWOOD LANE
DANBURY, CT 06811

1.	TURN LEFT ONTO CAPITOL BLVD	0.4 MI
2.	TURN LEFT ONTO WEST STREET	0.2 MI
3.	TAKE RAMP LEFT FOR I-91 S	0.3 MI
4.	AT EXIT 18, TAKE RAMP RIGHT FOR I-691 WEST TOWARD MERIDEN/WATERBURY	8.8 MI
5.	CONTINUE ONTO I-691 WEST.	7.7 MI
6.	AT EXIT 1, TAKE RAMP LEFT FOR I-84 WEST TOWARD WATERBURY/DANBURY, MERGE ONTO I-84 WEST.	35.9 MI
7.	TAKE EXIST 4 FOR US-6 WEST/US-202 WEST TOWARD LAKE AVE.	0.3 MI
8.	TURN RIGHT ONTO US-202 WEST/US-6 WEST/LAKE AVE. EXT.	404 FT
9.	TURN RIGHT ONTO MILL RIDGE ROAD	0.3 MI
10.	TURN RIGHT ONTO HIGH RIDGE ROAD	0.2 MI
11.	TURN LEFT AT THE 1ST CROSS STREET ONTO SCUPPO ROAD	89 FT
12.	SLIGHT RIGHT ONTO BOXWOOD LANE	0.1 MI
		0.1 MI

VICINITY MAP

SCALE: 1" = 1000'



PROJECT INFORMATION

SITE NAME:	CT703/WCSU ET
SITE ID:	CTFF703A - L1900
SITE ADDRESS:	303 BOXWOOD LANE DANBURY, CT 06811
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	BRIAN PAUL (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (860) 550-5971
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-23'-41.90" N LONGITUDE: 73°-29'-12.27" W GROUND ELEVATION: 730'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM CSC WEBLOG.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	B
N-1	DESIGN BASIS AND SITE NOTES	B
C-1	SITE LOCATION PLAN	B
C-2	COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIG.	B
E-1	TYPICAL ELECTRICAL DETAILS	B

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
B	05/03/17	KAMJR	CAG	PRELIMINARY DRAWINGS - ISSUED FOR CLIENT REVIEW
A	04/12/17	KAMJR	CAG	PRELIMINARY DRAWINGS - ISSUED FOR CLIENT REVIEW

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T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY

CT703/WCSU ET
SITE ID: CTFF703A - L1900
303 BOXWOOD LANE
DANBURY, CT 06811

DATE:	04/12/17
SCALE:	AS NOTED
JOB NO.	17012.37

TITLE SHEET

T-1

Sheet No. 1 of 5

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 90-110 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 93 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
B	05/03/17	KAMJR	CAG	PRELIMINARY DRAWINGS - ISSUED FOR CLIENT REVIEW
A	04/12/17	KAMJR	CAG	PRELIMINARY DRAWINGS - ISSUED FOR CLIENT REVIEW

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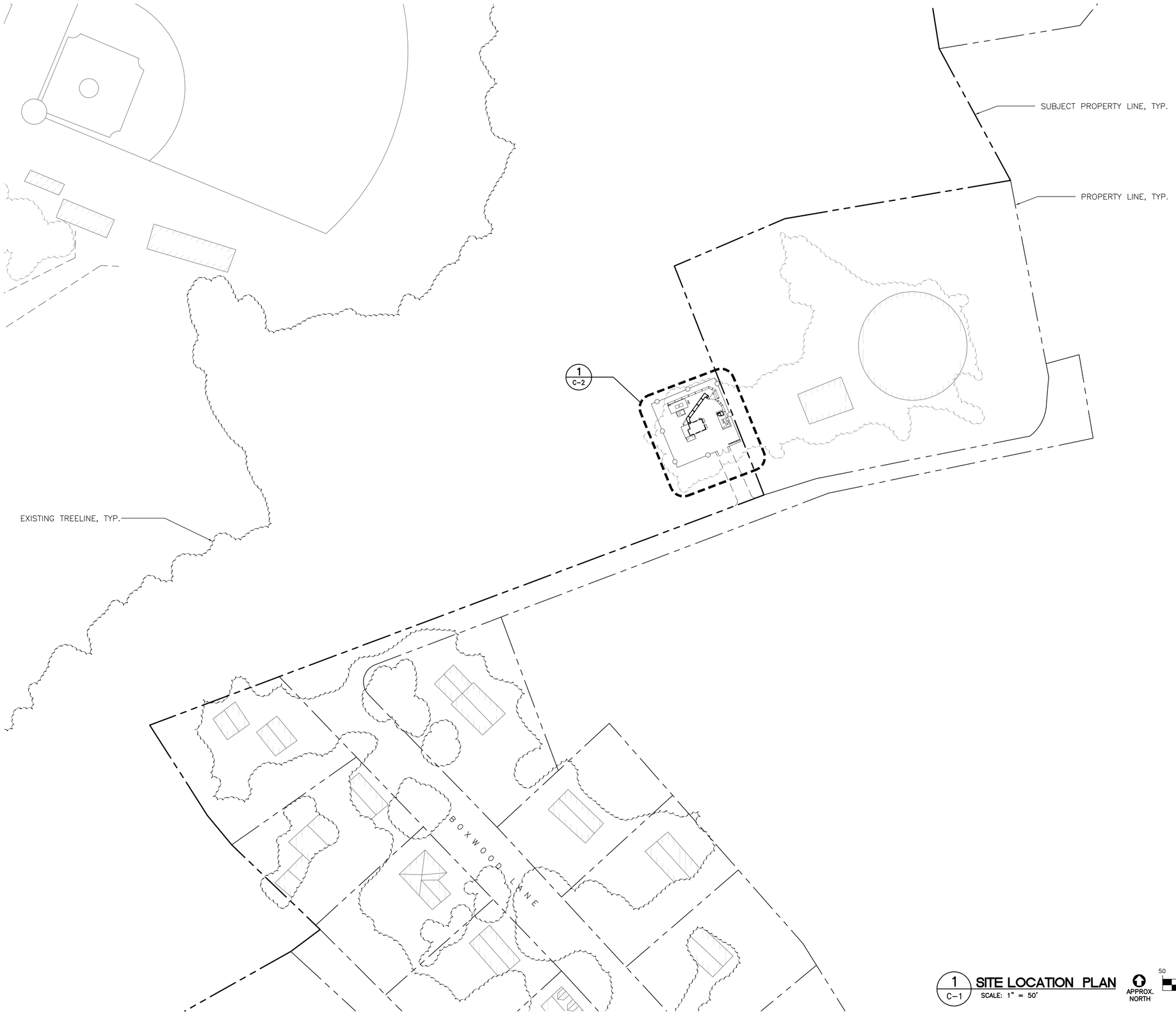
DATE: 04/12/17
SCALE: AS NOTED
JOB NO. 17012.37

DESIGN BASIS AND SITE NOTES

N-1

Sheet No. 2 of 5



1 / C-1 **SITE LOCATION PLAN**
SCALE: 1" = 50'

APPROX. NORTH

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

PROFESSIONAL ENGINEER SEAL

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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SITE ID: CTFF703A - L1900

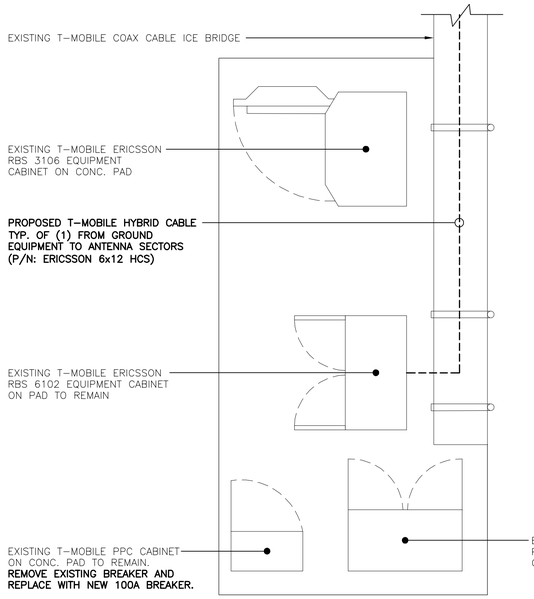
303 BOXWOOD LANE
DANBURY, CT 06811

DATE: 04/12/17
SCALE: AS NOTED
JOB NO. 17012.37

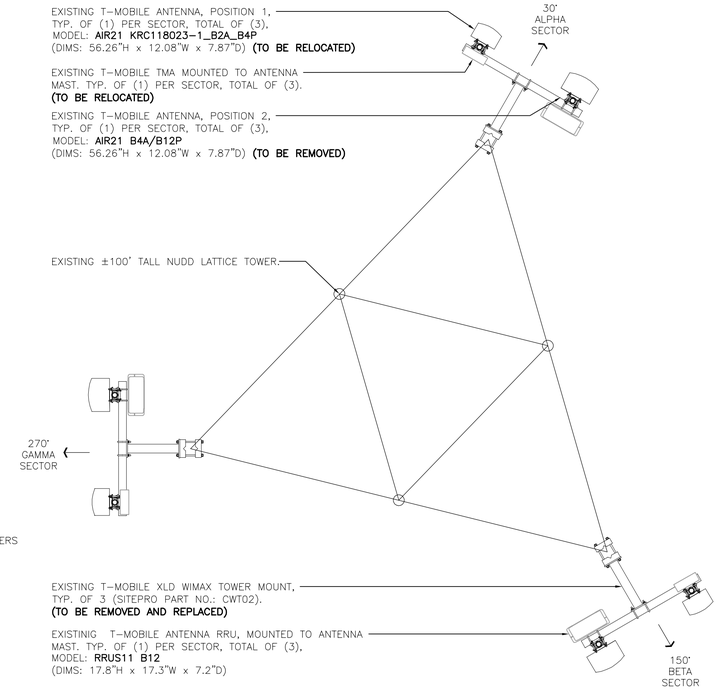
SITE LOCATION PLAN

C-1

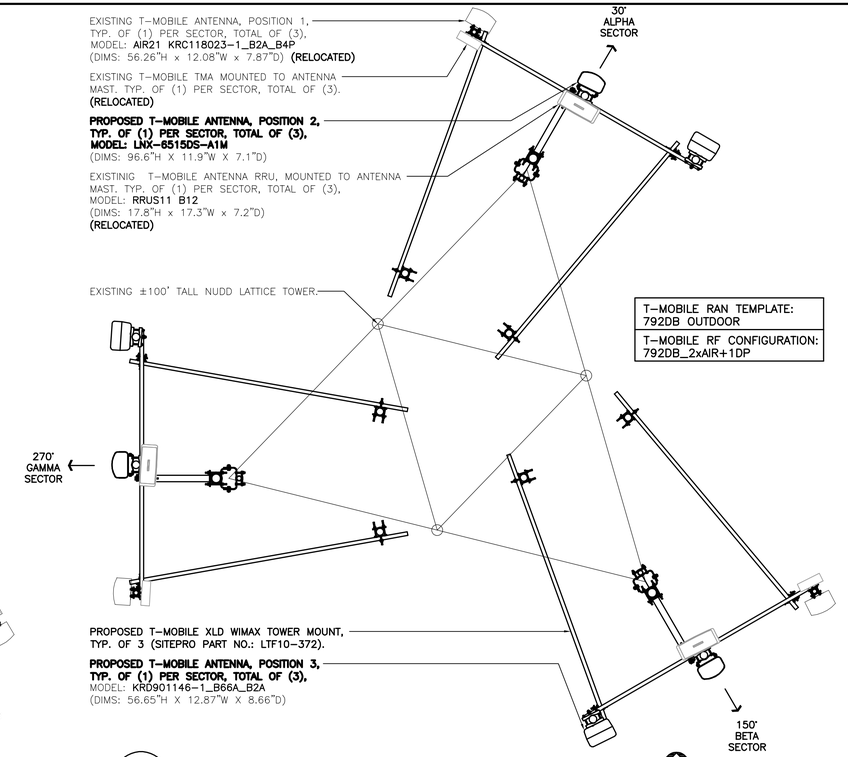
Sheet No. 3 of 5



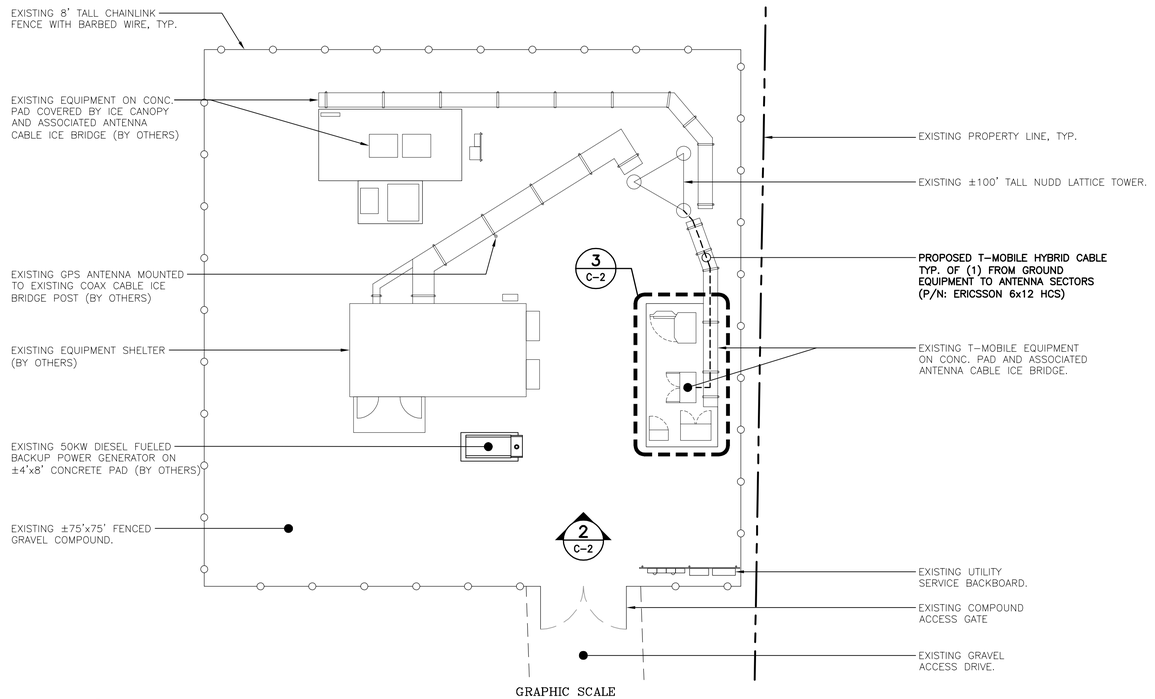
3 / C-2 **EQUIPMENT PLAN** SCALE: 3/8" = 1' TRUE NORTH



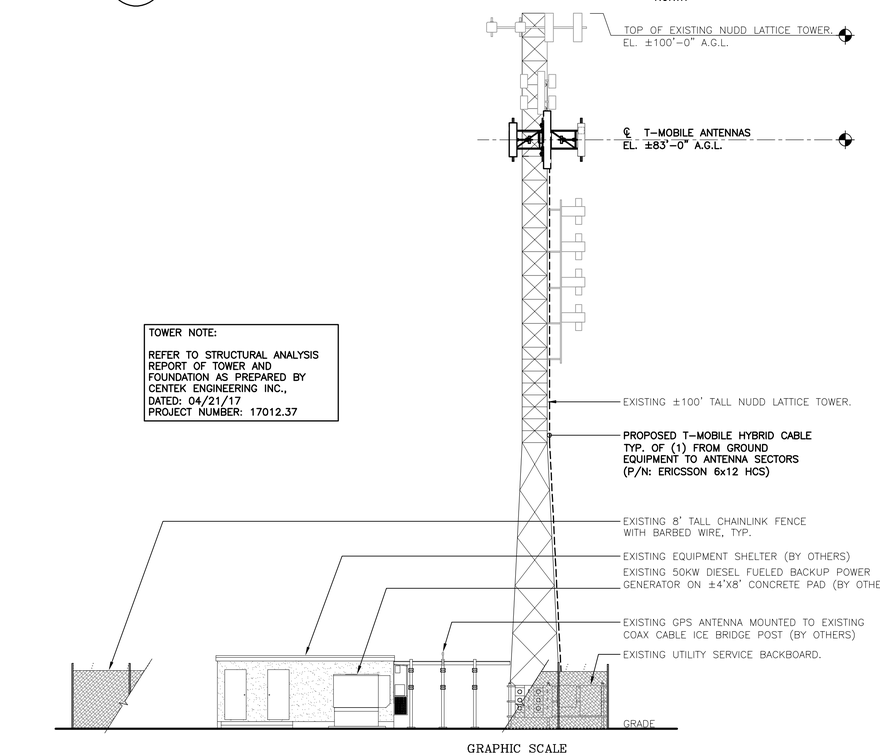
4 / C-2 **EXISTING ANTENNA MOUNTING CONFIGURATION** SCALE: 3/8" = 1' **83' ELEVATION** TRUE NORTH



5 / C-2 **PROPOSED ANTENNA MOUNTING CONFIGURATION** SCALE: 3/8" = 1' **83' ELEVATION** TRUE NORTH



1 / C-2 **COMPOUND PLAN** SCALE: 1" = 10' TRUE NORTH



2 / C-2 **NORTH TOWER ELEVATION** SCALE: 1" = 10'

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
B	05/03/17	KAM/JR	CAG	PRELIMINARY DRAWINGS – ISSUED FOR CLIENT REVIEW
A	04/12/17	KAM/JR	CAG	PRELIMINARY DRAWINGS – ISSUED FOR CLIENT REVIEW

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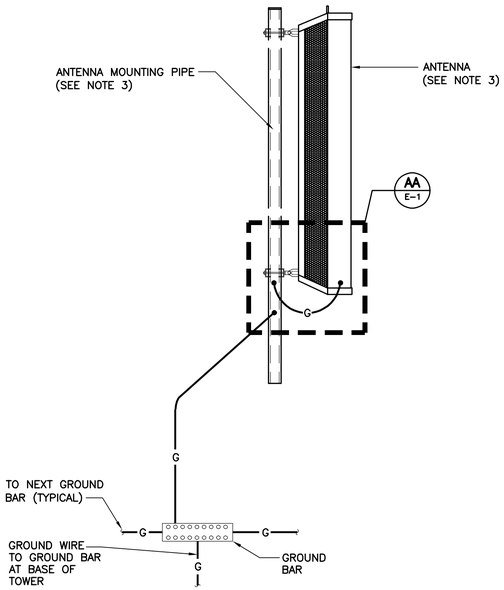
WIRELESS COMMUNICATIONS FACILITY
CT703/WCSU ET
SITE ID: CTFF703A - L1900
303 BOXWOOD LANE
DANBURY, CT 06811

DATE: 04/12/17
SCALE: AS NOTED
JOB NO. 17012.37

COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIG.

C-2

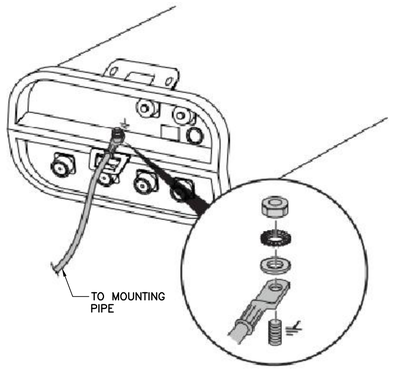
Sheet No. 4 of 5



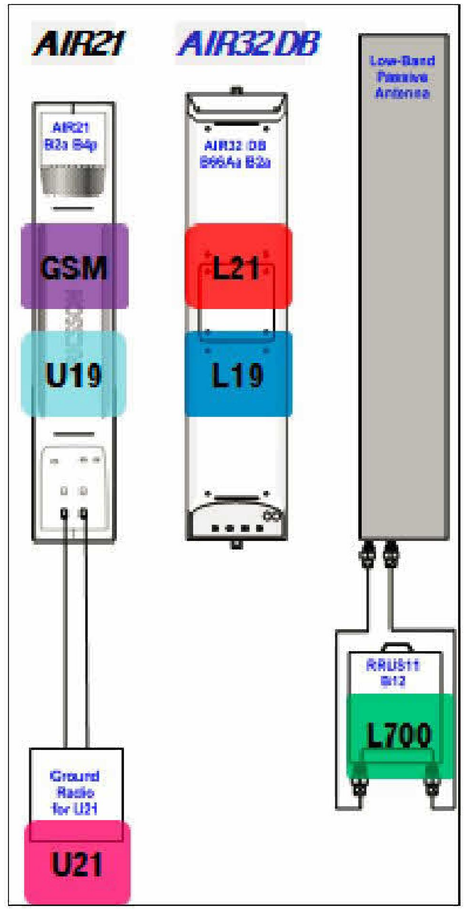
NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

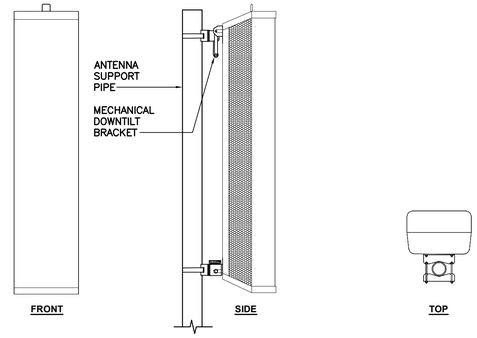
1 / E-1 **TYPICAL ANTENNA GROUNDING DETAIL**
SCALE: NONE



AA / E-1 **TYPICAL ANTENNA GROUNDING DETAIL**
SCALE: NONE



2 / E-1 **PROPOSED PLUMBING DIAGRAM**
SCALE: NONE



ALPHA/BETA/GAMMA ANTENNA			
EQUIPMENT		DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: KRD901146-1_B66A_B2A		56.65"L x 12.87"W x 8.66"D	132.2 LBS.

3 / E-1 **PROPOSED ANTENNA DETAIL**
SCALE: NONE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
B	05/03/17	KAMJR	CAG	PRELIMINARY DRAWINGS – ISSUED FOR CLIENT REVIEW
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TYPICAL ELECTRICAL DETAILS

E-1
Sheet No. 5 of 5