

December 8, 2016

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

RE: AT&T Wireless NOTICE OF EXEMPT MODIFICATION
55 King Road, Suffield, CT 06078

Dear Ms. Bachman:

Enclosed please find an original and two (2) copies of a Notice of Exempt Modification including drawings and a check in the amount of six hundred twenty five (\$625.00) for the filing fee. In addition, I have included a single copy of each notification letter mailed this day to the municipality, and to the owner of both the property and the tower. Also enclosed are three (3) hard copies of the RF Report and Structural analyses of the tower.

I will submit copies of the structural analysis and the RF table to you via e mail this same day.

Please feel free to contact me with any questions or comments. Thank you for your kind cooperation in this matter.

Respectfully submitted,

Jack Andrews
Zoning Manager, Empire Telecom
o/b/o AT&T Wireless
10130 Donleigh Drive
Columbia, MD 21046
443-677-0144
jandrews@empiretelecomm.com

Enclosures

Jack Andrews
Zoning Manager, Empire Telecom
o/b/o AT&T Wireless
10130 Donleigh Drive
Columbia, MD 21046
443-677-0144
jandrews@empiretelecomm.com

December 12, 2016

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

NOTICE OF EXEMPT MODIFICATION

55 King Spring Road, Suffield, CT 06078

Lat: 41-56-47.42 (41.94650556)
Long: 72-39-54.22 (-72.66506111)

Dear Ms. Bachman:

AT&T Wireless currently maintains six (6) antennas at the 100 foot level of an existing 100 foot tall lattice tower located at 55 King Spring Road, in Suffield, CT. The tower is owned by the King Spring Tower, LLC. The property is owned by Samuel Sales. AT&T Wireless now seeks to install three (3) new RRUS-12 (“RRU”) remote radio units, one (1) RRU per sector, to the 100 foot level of the tower, install new RRH mounts for the new RRUs, and to relocate three (3) existing RRUS-11 units upon the new RRH mounts, adjacent to the proposed new RRUS-12 units.

The facility was approved by the Connecticut Siting Council in EM-AT&T-165-020814 on September 6, 2002. No conditions of approval were enumerated in the Council’s decision.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies section 16-50j-73 for construction that constitutes an exempt modification pursuant to RCSA section 16-50j-72(b)(2). In accordance with RCSA section 16-50j-73, a copy of this letter and attachments is being sent to the Honorable Christopher J. Kervick, First Selectman of Windsor Locks, as well as Samuel Sales, the property owner and to King Spring Tower, LLC, the tower owner.

The planned modifications to the facility fall squarely within those activities expressly provided for in RCSA section 50j-72(b)(2).

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

2. The proposed modifications will not require an 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 will exceed state and local limits.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

Respectfully submitted,

Jack Andrews
Zoning Manager, Empire Telecom
o/b/o AT&T Wireless
10130 Donleigh Drive
Columbia, MD 21046
443-677-0144
jandrews@empiretelecomm.com

Enclosures

cc: The Honorable Christopher J. Kervick, First Selectman of Windsor Locks
Samuel Sales, as the property owner
King Spring Tower, LLC, as the tower owner.

December 8, 2016

Samuel Sales
7 Woodland Hollow
Windsor Locks, CT 06096

RE: AT&T Wireless Modifications to Telecommunication Facility –
55 King Spring Road, Suffield, CT 06078

Dear Mr. Sales:

In order to accommodate technological changes, implement the Uniform Mobile Telecommunications System and enhance system performance in the State of Connecticut, AT&T Wireless (“AT&T”) will be changing its equipment configuration at the above referenced telecommunications facility. AT&T Wireless currently maintains six (6) antennas at the 100 foot level of an existing 100 foot tall lattice tower located at 55 King Spring Road, in Suffield, CT. The tower is owned by the King Spring Tower, LLC. The property is owned by Samuel Sales.

AT&T Wireless now seeks to install three (3) new RRUS-12 (“RRU”) remote radio units, one (1) RRU per sector, to the 100 foot level of the tower, install new RRH mounts for the new RRUs, and to relocate three (3) existing RRUS-11 units upon the new RRH mounts, adjacent to the proposed new RRUS-12 units.

This letter is intended to serve as the required notice to the property owner. As required by the Regulations of Connecticut State Agencies (“RCSA”) section 16-50j-73, the Connecticut Siting Council (“CSC”) has been notified of the proposed changes and will review AT&T’s proposal. Please accept this letter as notification under RCSA section 16-50j-73 of construction which constitutes an exempt modification pursuant to RCSA section 16-50j-72(b)(2).

The enclosed letter to the CSC fully describes AT&T's proposal for the above referenced site. However, if you have any questions or require any additional information concerning our plans or the CSC procedures, please contact me at 443-677-0144 or contact Melanie Bachman, Acting Executive Director of the CSC at 860-872-2935.

Respectfully submitted,

Jack Andrews
Zoning Manager, Empire Telecom
o/b/o AT&T Wireless
10130 Donleigh Drive
Columbia, MD 21046
443-677-0144
jandrews@empiretelecomm.com

Enclosures

cc: Melanie Bachman, Connecticut Siting Council

December 8, 2016

The Honorable Christopher J. Kervick, First Selectman of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

RE: AT&T Wireless Modifications to Telecommunication Facility –
55 King Spring Road, Suffield, CT 06078

Dear Selectman Kervick:

In order to accommodate technological changes, implement the Uniform Mobile Telecommunications System and enhance system performance in the State of Connecticut, AT&T Wireless (“AT&T”) will be changing its equipment configuration at the above referenced telecommunication facility. AT&T Wireless currently maintains six (6) antennas at the 100 foot level of an existing 100 foot tall lattice tower located at 55 King Spring Road, in Suffield, CT. The tower is owned by the King Spring Tower, LLC. The property is owned by Samuel Sales.

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10130 Donleigh Drive
Columbia, MD 21046
443-677-0144
jandrews@empiretelecomm.com

Enclosures

cc: Melanie Bachman, Connecticut Siting Council

December 8, 2016

King Spring Tower, LLC
7 Woodland Hollow
Windsor Locks, CT 06096

RE: AT&T Wireless Modifications to Telecommunication Facility –
55 King Spring Road, Suffield, CT 06078

To Whom It May Concern:

In order to accommodate technological changes, implement the Uniform Mobile Telecommunications System and enhance system performance in the State of Connecticut, AT&T Wireless (“AT&T”) will be changing its equipment configuration at the above referenced telecommunications facility. AT&T Wireless currently maintains six (6) antennas at the 100 foot level of an existing 100 foot tall lattice tower located at 55 King Spring Road, in Suffield, CT. The tower is owned by the King Spring Tower, LLC. The property is owned by Samuel Sales.

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Enclosures

cc: Melanie Bachman, Connecticut Siting Council



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

AT&T Existing Facility

Site ID: CT5400

Suffield South
55 King Spring Road
Suffield, CT 06078

November 7, 2016

EBI Project Number: 6216005035

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	15.62 %



November 7, 2016

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

Emissions Analysis for Site: **CT5400 – Suffield South**

EBI Consulting was directed to analyze the proposed AT&T facility located at **55 King Spring Road, Suffield, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ 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 ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately $467 \mu\text{W}/\text{cm}^2$ and $567 \mu\text{W}/\text{cm}^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is $1000 \mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **55 King Spring Road, Suffield, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

- 1) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 2 GSM channels (850 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 (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 2 GSM channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 5) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 6) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.



- 7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 8) For the following calculations the sample point was the top of a 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.
- 9) The antennas used in this modeling are the **Kathrein 800-10121 and the KMW AM-X-CD-14-65-00T-RET** for transmission in the 700 MHz, 850 MHz and 1900 MHz (PCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 10) The antenna mounting height centerlines of the proposed antennas are **100 feet** above ground level (AGL) for **Sector A**, **100 feet** above ground level (AGL) for **Sector B** and **100 feet** above ground level (AGL) for Sector C.
- 11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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



AT&T Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121
Gain:	11.45 / 14.35 dBd	Gain:	11.45 / 14.35 dBd	Gain:	11.45 / 14.35 dBd
Height (AGL):	100 feet	Height (AGL):	100 feet	Height (AGL):	100 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts
ERP (W):	4,942.88	ERP (W):	4,942.88	ERP (W):	4,942.88
Antenna A1 MPE%	2.53 %	Antenna B1 MPE%	2.53 %	Antenna C1 MPE%	2.53 %
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Powerwave P65-17-XLH-RR	Make / Model:	KMW AM-X-CD-14-65-00T-RET	Make / Model:	Powerwave P65-17-XLH-RR
Gain:	14.3 / 15.1 dBd	Gain:	11.85 / 14.15 dBd	Gain:	14.3 / 15.1 dBd
Height (AGL):	100 feet	Height (AGL):	100 feet	Height (AGL):	100 feet
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts
ERP (W):	7,112.97	ERP (W):	4,957.50	ERP (W):	7,112.97
Antenna A2 MPE%	4.39 %	Antenna B2 MPE%	2.87 %	Antenna C2 MPE%	4.39 %

Site Composite MPE%	
Carrier	MPE%
AT&T – Max per sector	6.93 %
Arch	0.76 %
Verizon Wireless	7.93 %
Site Total MPE %:	15.62 %

AT&T Sector A Total:	6.93 %
AT&T Sector B Total:	5.40 %
AT&T Sector C Total:	6.93 %
Site Total:	15.62 %

AT&T _ Frequency Band / Technology Max Values per Sector (Sectors A & C)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
AT&T 850 MHz UMTS	2	418.91	100	3.41	850 MHz	567	0.60%
AT&T 850 MHz GSM	2	418.91	100	3.41	850 MHz	567	0.60%
AT&T 1900 MHz (PCS) UMTS	2	816.81	100	6.65	1900 MHz (PCS)	1000	0.66%
AT&T 1900 MHz (PCS) GSM	2	816.81	100	6.65	1900 MHz (PCS)	1000	0.66%
AT&T 700 MHz LTE	2	1,614.92	100	13.14	700 MHz	467	2.81%
AT&T 1900 MHz (PCS) LTE	2	1,941.56	100	15.80	1900 MHz (PCS)	1000	1.58%
						Total*:	6.92%

*NOTE: Totals may vary by 0.01% due to summing of remainders



Summary

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

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

AT&T Sector	Power Density Value (%)
Sector A:	6.93 %
Sector B:	5.40 %
Sector C:	6.93 %
AT&T Maximum Total (per sector):	6.93 %
Site Total:	15.62 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **15.62 %** 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.

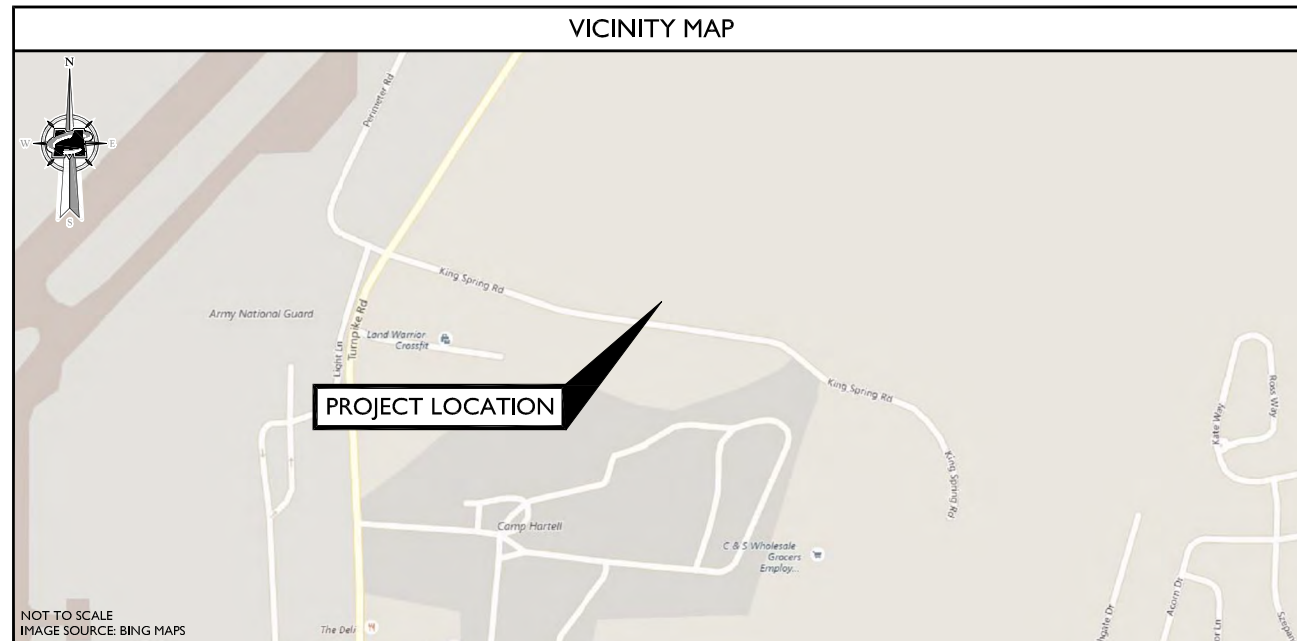
FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100%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



SITE NAME: SUFFIELD SOUTH
PROJECT LTE2C
FA NUMBER: 10071274
SITE NUMBER: CT5400
55 KING SPRING ROAD
SUFFIELD, CT 06078
HARTFORD COUNTY

PROJECT TEAM	
CLIENT REPRESENTATIVE	
COMPANY:	EMPIRE TELECOM
ADDRESS:	16 ESQUIRE ROAD
CITY, STATE, ZIP:	BILLERICA, MA 01862
CONTACT:	DAVID COOPER
E-MAIL:	DCOOPER@EMPIRETEL.COMM.COM
ENGINEER	
COMPANY:	MASER CONSULTING CONNECTICUT
ADDRESS:	331 NEWMAN SPRINGS ROAD, SUITE 203
CITY, STATE, ZIP:	RED BANK, NJ 07701
CONTACT:	MICHAEL CLEARY
PHONE:	(856) 717-0412 x4105
E-MAIL:	MCLEARY@MASERCONSULTING.COM
RF ENGINEER	
COMPANY:	NEW CINGULAR WIRELESS PCS, LLC
ADDRESS:	550 COCHITUATE ROAD
CITY, STATE, ZIP:	FRAMINGHAM, MA 01701
CONTACT:	MD MATTEEN
E-MAIL:	MM093Q@ATT.COM

SITE INFORMATION	
APPLICANT/LESSEE	
NEW CINGULAR WIRELESS PCS, LLC 550 COCHITUATE ROAD FRAMINGHAM, MA 01701	
TOWER OWNER:	
NAME: ADDRESS: CITY, STATE, ZIP:	
LATITUDE:	41.9484919° N
LONGITUDE:	72.6664989° W
LAT./LONG. TYPE:	NAD 83
AREA OF CONSTRUCTION:	TELECOMMUNICATIONS EQUIPMENT COMPOUND
ZONING/JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT/PROPOSED USE:	UNMANNED TELECOMMUNICATIONS FACILITY
HANDICAP REQUIREMENTS:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. HANDICAPPED ACCESS NOT REQUIRED.
CONSTRUCTION TYPE:	II B
USE GROUP:	U



DRIVING DIRECTIONS

DIRECTIONS FROM AT&T OFFICE AT 550 COCHITUATE ROAD, FRAMINGHAM, MA:

DEPART RT-30 WEST/COCHITUATE ROAD TOWARD BURR STREET. TURN BACK ON RT-30 EAST/COCHITUATE ROAD. TAKE RAMP RIGHT FOR I-90 WEST TOWARD WORCESTER/SPRINGFIELD. AT EXIT 9, TAKE RAMP RIGHT FOR I-84 TOWARD NEW YORK CITY/HARTFORD. AT EXIT 61, TAKE RAMP RIGHT FOR I-291 WEST TOWARD WINDSOR. AT EXIT 2B, TAKE RAMP RIGHT FOR I-91 NORTH TOWARD SPRINGFIELD. AT EXIT 40, TAKE RAMP RIGHT FOR CT-20 TOWARD BRADLEY INTERNATIONAL AIRPORT. TAKE RAMP RIGHT FOR CT-75 TOWARD POQUONOCK/SUFFIELD. TURN RIGHT ONTO CT-75/TURNPIKE ROAD. ARRIVE AT CT-75 /SOUTH ST ON THE RIGHT.

CODE COMPLIANCE	
ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES.	
1. CONNECTICUT STATE BUILDING CODE (2016) & ALL SUBSEQUENT AMENDMENTS	6. AMERICAN INSTITUTE OF STEEL CONSTRUCTION 360-10
2. NATIONAL ELECTRIC CODE 2014	7. IAT/IA-222 REVISION G
3. NATIONAL FIRE PROTECTION ASSOCIATION 70 - 2014	8. TIA 607 FOR GROUNDING
4. LIGHTNING PROTECTION CODE 2011	9. INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS 81
5. AMERICAN CONCRETE INSTITUTE 318	10. IEEE C2 LATEST EDITION
	11. TELCORDIA GR-1275 I2, ANSI T1.311

GENERAL CONTRACTOR NOTES

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE; NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

SHEET	DESCRIPTION
T-1	TITLE SHEET
GN-1	GENERAL NOTES
A-1	COMPOUND PLAN AND EQUIPMENT PLAN
A-2	ELEVATION VIEW AND ANTENNA SCHEDULE
A-3	ANTENNA LAYOUTS
A-4	DETAILS
A-5	RF PLUMBING DIAGRAMS
G-1	GROUNDING DETAILS

PROJECT DESCRIPTION/SCOPE OF WORK

PROJECT SCOPE HEREIN BASED ON RFDS ID# 1394262, VERSION 2.0, LAST UPDATED 10/15/16 FOR LTE MULTI CARRIER SCOPE OF WORK.

THIS PROJECT WILL BE COMPRISED OF:

- (3) NEW RRH MOUNTS TO BE INSTALLED
- (3) NEW RRUS-12 TO BE INSTALLED
- (3) EXISTING RRUS-11 TO BE RELOCATED



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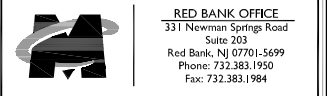
SCALE:	JOB NUMBER:
AS SHOWN	16963018A



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE AN ENGINEER IN THE DIRECTION OF THE RESPONSIBLE LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

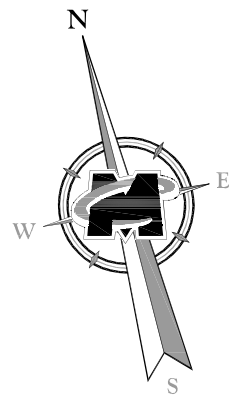
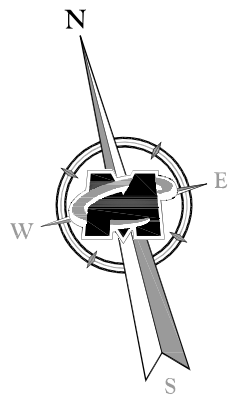
SITE NAME:

SUFFIELD SOUTH
FA10071274
CT5400
55 KING SPRING ROAD
SUFFIELD, CT 06078
HARTFORD COUNTY

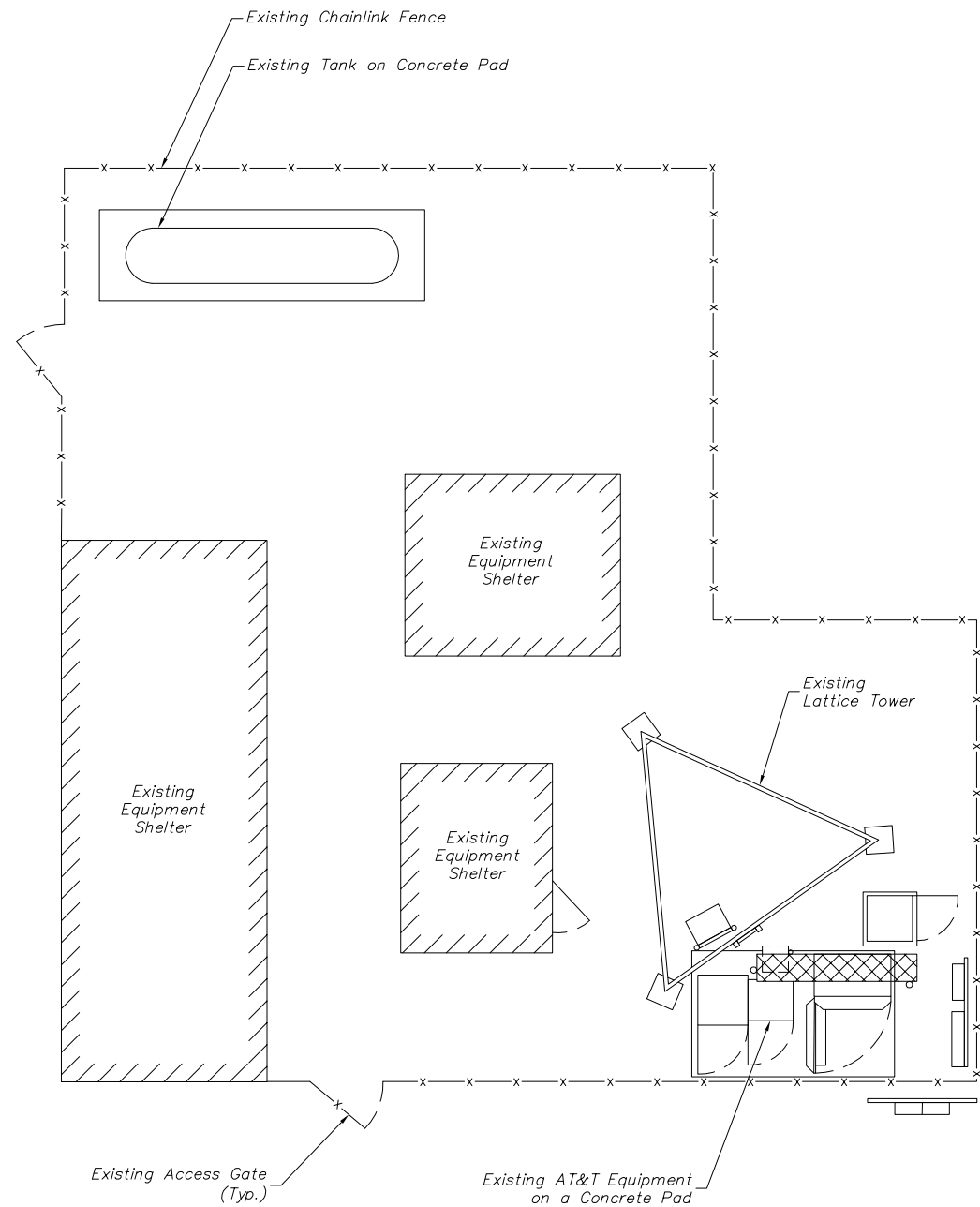


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TITLE SHEET

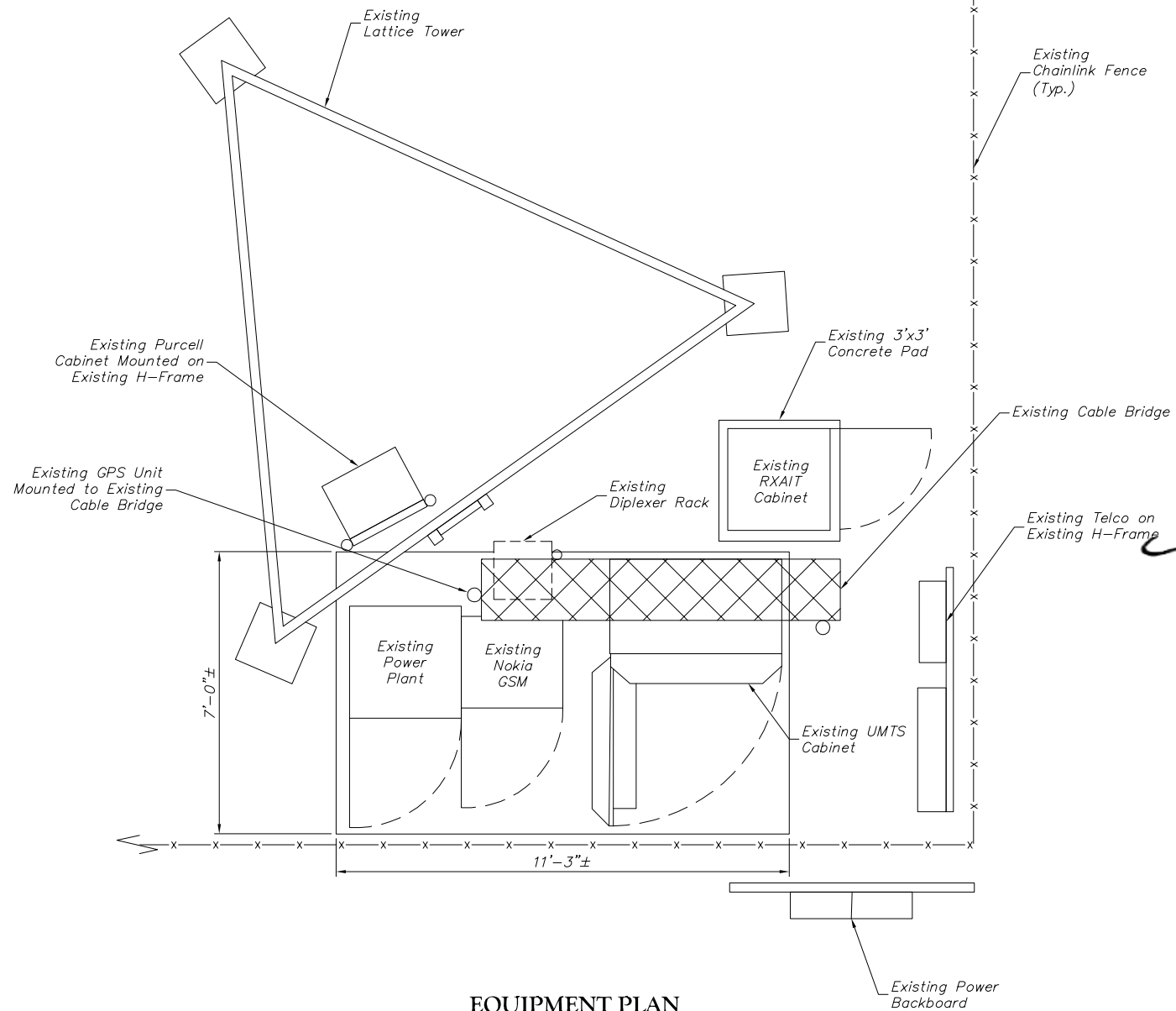
SHEET NUMBER:
T-1



EQUIPMENT UPGRADE:
DUL TO DUS



COMPOUND PLAN
SCALE : 1" = 5'
(DO NOT SCALE 11"X17" DRAWINGS)



EQUIPMENT PLAN
SCALE : 1" = 2'
(DO NOT SCALE 11"X17" DRAWINGS)



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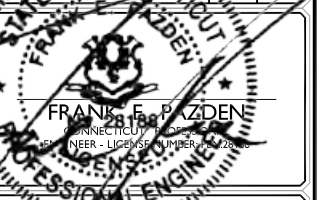
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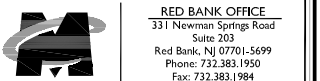


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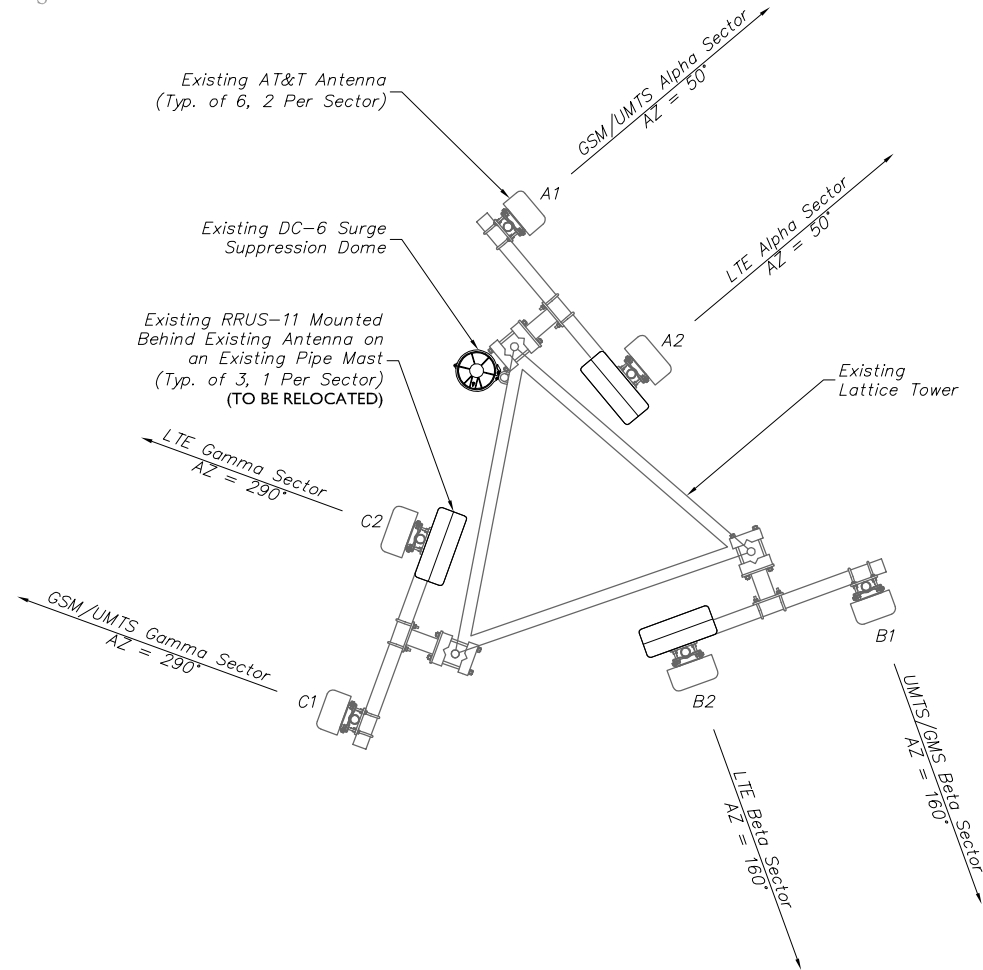
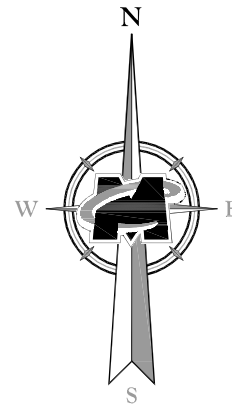
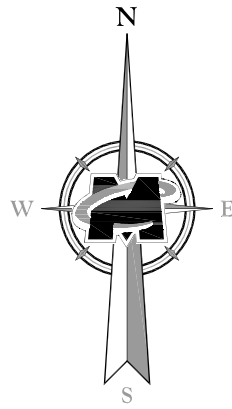
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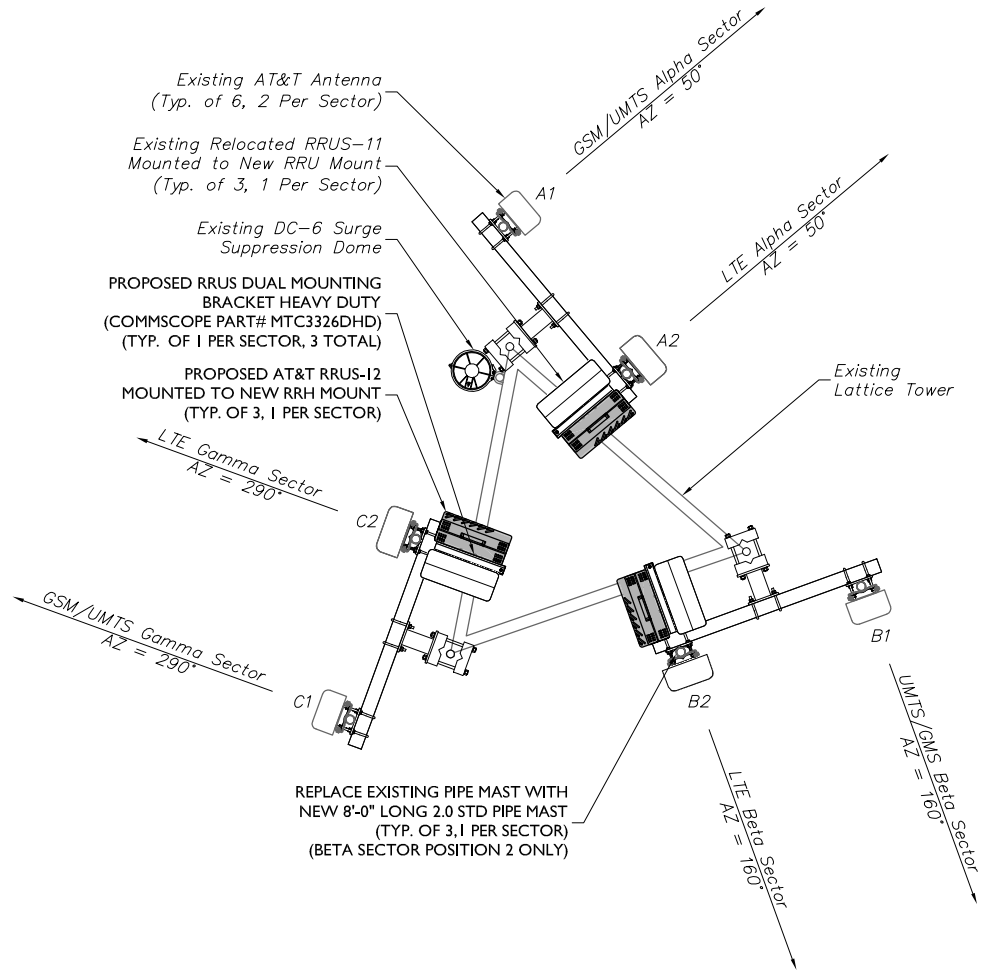
RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701-5699
Phone: 732.383.1950
Fax: 732.383.1984

SHEET TITLE:
**COMPOUND PLAN AND
EQUIPMENT PLAN**

SHEET NUMBER:
A-1



EXISTING - ANTENNA LAYOUT
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PROPOSED - ANTENNA LAYOUT
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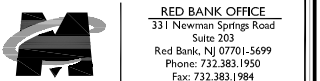


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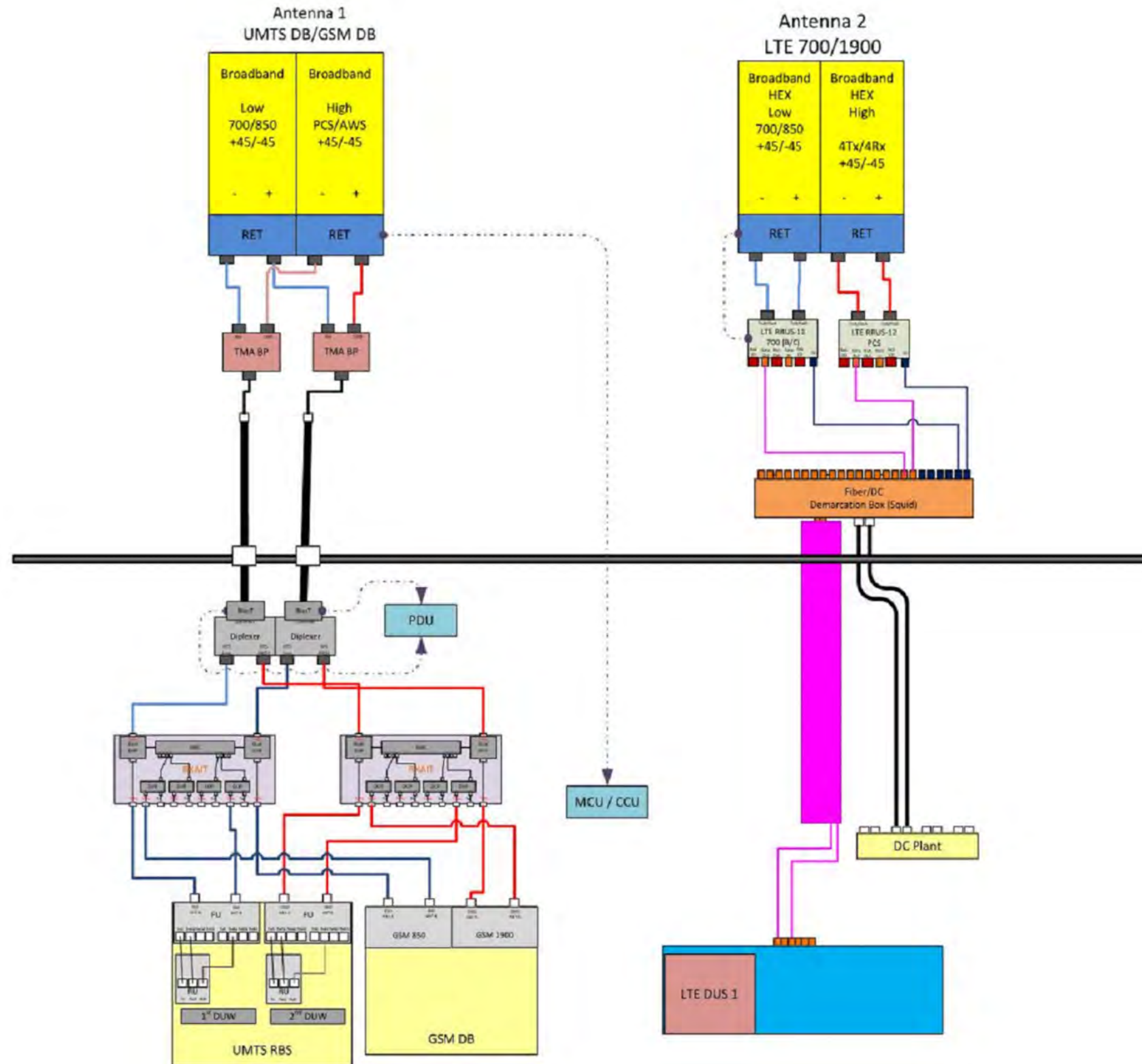
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ANTENNA LAYOUTS

SHEET NUMBER:

A-3

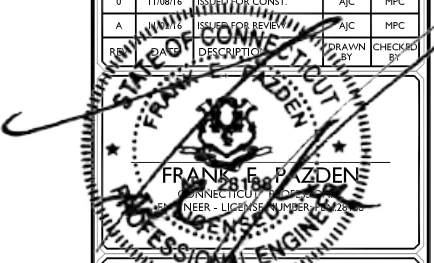


(TYP. OF ALL SECTORS)

BASED ON RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_CONNECTICUT_CTV5400_2017-LTE-Next-Carrier_LTE-2C_mm093q_2051A07A0C_10071274_26989_09-15-2016_Final-Approved_v2.00"

RF PLUMBING DIAGRAMS

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LTE 2C

Antenna Mount Analysis

Site Name: Suffield South

FA #: 10071274

Site Number: CT5400

Site Address: 55 King Spring Road
Suffield, CT 06078
Hartford County

Maser Project Number: 16963018A

December 2, 2016

Analysis Type	Sector Frame
Pass/Fail	Pass
Mount Utilization	65.0 %



Frank E. Pazden, P.E.
Connecticut Professional Engineer
PE License # 28188

Objective:

The objective of this report is to determine the capacity of the existing antenna support mounts at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards.

Introduction:

Maser Consulting Connecticut has reviewed the following documents in completing this report:

- RFDS 1394262 provided by Empire Telecom, dated October 5, 2016 for LTE 2C scope of work.
- Construction Drawings prepared by Maser Consulting Connecticut for LTE 2C Scope of Work.
- Tower and Mount Mapping Report prepared by Tower Engineering Professionals TEP# 74312.102186 dated, November 29, 2016.

The existing **AT&T** equipment is supported on an existing antenna support mounts constructed of structural steel antenna support pipes supported by HSS tubes and pipes at a centerline of approximately 100'-0" above ground level. This report is based only upon this information, as well as the information obtained in the field.

Discrete and Linear Appurtenances:

The overall mount loading is found in the Loading Summary section of this report.

Codes, Standards and Loading:

Maser Consulting Connecticut utilized the following codes and standards:

- 2016 Connecticut State Building Code, Incorporating The 2012 IBC
- Structural Standards for Antenna Supporting Structures and Antennas ANSI/TIA-222-G
 - Basic Wind Speed – 97 mph, Ice Wind Speed – 40 mph and Ice thickness - 1 in
 - Exposure Category – C
 - Structure Class – II
 - Topographic Category - 1
- Specification for Structural Steel Buildings ANSI/AISC 360-10

Analysis Approach & Assumptions:

The analysis approach used in this structural analysis is based on the premise that if the existing antenna mounts are structurally adequate to support the existing and proposed equipment per the aforementioned codes and standards, or if the increase in the forces in the structure are deemed to be negligible or acceptable, then the proposed equipment can be installed as intended. Risa-3D, a 3D finite element modeling and analysis program, was used to determine the capacity and usage of the existing antenna support frame.

The following assumptions were utilized in this report:

- Structural Steel Pipes are constructed of A53 Grade B Steel.
- Structural Steel HSS are constructed of A500 Grade B Steel.

- It is assumed that the telecommunication equipment supports, antenna supports, and existing structure have been designed by a registered licensed professional engineer for the existing loads acting on the structure, as required by all applicable codes.
- It is assumed that information provided by the client regarding the structure itself, the antenna models, feed lines, and other relevant information is current and correct.
- It is assumed all other existing appurtenances, antennas, cables, etc. belonging to others have been installed and supported per code and per specifications so as not to damage any existing structural support members, and that any contributing loads from adjacent equipment has been taken into consideration for their design.
- Proposed equipment and locations should not deviate from the proposed locations noted herein and shown on the associated Maser Consulting Connecticut final Construction Drawings.

Calculations:

The calculations are found in Appendix A of this report.

Conclusion:

The existing antenna mounts were analyzed for the loading in the applicable codes and standards. The mounts have been determined to be structurally **ADEQUATE** to support the proposed and existing antennas, based upon the aforementioned assumptions.

The antenna mounts have been determined to be stressed to a maximum of **65.0%** of its structural capacity with the maximum usage occurring at the main antenna mount pipe. Therefore, the proposed **AT&T** installation **CAN** be placed as intended in all sectors.

The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the existing structural members supporting the proposed **AT&T** telecommunications installation described herein. Further, no structural qualifications are made or implied by this document for the existing structure.

We appreciate the opportunity to be of service on this project. If you should have any questions or require any additional information, please do not hesitate to call our office.

Sincerely,
Maser Consulting Connecticut



Frank Pazden, P.E.
Telecommunications Department Manager



Anwesha Bera, E.I.T.
Structural Design Engineer



Client:	ATT	Computed By:	AB
Site Name:	Suffield South	Date:	12/2/2016
Project No.:	16963018A	Verified By:	FEP
Title:	Antenna Mount Analysis	Page:	5

5. LOADING SUMMARY

Quantity	Manufacturer	Antenna/ Appurtenance	Status	Sector
2	Powerwave	P65-17-XLH-RR	Existing	Alpha & Gamma
1	Commscope	SBNH-1D6565C	Existing	Beta
3	Kathrein	80010121	Existing	Alpha, Beta, & Gamma
3	Ericsson	RRUS 11	Existing	Alpha, Beta, & Gamma
3	Ericsson	RRUS 12	Proposed	Alpha, Beta, & Gamma
6	Powerwave	LGP 21401	Existing	Alpha, Beta, & Gamma

The worst case loading occurs in the **Beta Sector**

Quantity	Manufacturer	Antenna/ Appurtenance	Status
1	Commscope	SBNH-1D6565C	Existing
1	Kathrein	80010121	Existing
1	Ericsson	RRUS 11	Existing
1	Ericsson	RRUS 12	Proposed
2	Powerwave	LGP 21401	Existing



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ANALYSIS AND DESIGN



Client:	ATT	Computed By:	AB
Site Name:	Suffield South	Date:	12/2/2016
Project No.:	16963018A	Verified By:	FEP
Title:	Antenna Mount Analysis	Page:	8

I. DESIGN INPUTS

Calculations for gravity and lateral loading on equipment and support mounts are determined as per the ANSI/TIA-222-G Code, Addendum 2

Wind Load Inputs Parameters

Antenna Centerline

z 100 ft

Normal Wind Speed (3 sec. Gust):

V 97 mph

Normal Wind Speed with Ice (3 sec. gust):

V_i 40.0 mph

Service Wind Speed:

V_s 60.0 mph

Design Ice Thickness:

t_i 1.00 in

Exposure Category:

C

Structure Class:

II

Gust Effect Factor:

G_h 0.85

Wind Directionality Factor:

K_d 0.85

Topographic Category:

1

Reference

Equation

Ref. 1, Eqn. 16-33

(Figure a5-2a, p. 233)

(Figure a5-2a, p. 233)

(Figure A1-2a, p. 233)

Ref. 3, Section 2.6.5.1

Ref. 3, Table 2-1

Ref. 3, Section 2.6.7

Ref. 3, Table 2-2

Ref. 3, Section 2.6.6.2

Wind Load Coefficients

Importance Factors:

Non-Iced:

I 1

Iced:

I_{ice} 1

Ref. 3, Table 2-3

(Table 2-3, P. 39)

Exposure Category Coefficients:

3-s Gust-Speed Power Law Exponent:

α 9.5

Nominal Height of the Atmospheric Boundary Layer:

Z_g 900 ft

Min. Value for k_z :

$K_{z_{min}}$ 0.85

Terrain Constant:

K_e 1.00

Velocity Pressure Exposure Coefficient:

K_z 1.266

Ref. 3, Table 2-4

Ref. 3, Table 2-4

Ref. 3, Table 2-4

Ref. 3, Table 2-4

Ref. 3, Section 2.6.5.2 $=2.01 \cdot (z/z_g)^{2\alpha}$

Topographic Category Coefficients:

Topographic Constant:

K_t N/A

Height Attenuation Factor:

f N/A

Height Reduction Factor:

K_h N/A

Topographic Factor:

K_{zt} 1.00

Ref. 3, Table 2-5

Ref. 3, Table 2-5

Ref. 3, Section 2.6.6.4 $=e^{(fz/H)}$

Ref. 3, Section 2.6.6.4 $=[1+(K_e \cdot K_t/K_h)]^2$

Ice Accumulation:

Ice Velocity Pressure Exposure Coefficient:

K_{iz} 1.12

Factored Ice Thickness:

t_{iz} 2.23 in

Ice Density:

ρ_i 56.00 pcf

$=(z/33)^{0.10}$

(Section 2.6.8, p. 16) $=2.0 \cdot t_i \cdot I \cdot K_{iz} \cdot K_{zt}$

Design Wind Pressures:

Velocity Pressure:

q_z 25.91 psf

Velocity Pressure (With Ice):

q_{zi} 4.41 psf

Velocity Pressure (Service):

q_{zs} 9.91 psf

Ref. 3, Section 2.6.9.6 $=0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

(Section 2.6.9.6, P. 25) $=.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V_i^2 \cdot I$

(Section 2.6.9.6, P. 25) $=.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V_s^2 \cdot I$



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Site Name:	Suffield South	Date:	12/2/2016
Project No.:	16963018A	Verified By:	FEP
Title:	Antenna Mount Analysis	Page:	10

BASIC EQUATIONS

ANSI/TIA-222-G Reference

Importance Factor: $I := \begin{cases} 1.0 & \text{if Class} = \text{"II"} \\ 1.15 & \text{if Class} = \text{"III"} \end{cases} = 1$ Table 2-3, Pg. 39

Force Coefficient:
(Square) $C_{f_square}(h, w) := \begin{cases} 1.2 & \text{if } \frac{h}{w} \leq 2.5 \\ \left[1.2 + \frac{0.2}{4.5} \cdot \left(\frac{h}{w} - 2.5 \right) \right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \leq 7 \\ \left[1.4 + \frac{0.6}{18} \cdot \left(\frac{h}{w} - 7 \right) \right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \leq 25 \\ 2.0 & \text{otherwise} \end{cases}$ Table 2-8, P. 42

Force Coefficient:
(Round) $C_{f_round}(h, w) := \begin{cases} 0.7 & \text{if } \frac{h}{w} \leq 2.5 \\ \left[0.7 + \frac{0.1}{4.5} \cdot \left(\frac{h}{w} - 2.5 \right) \right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \leq 7 \\ \left[0.8 + \frac{0.4}{18} \cdot \left(\frac{h}{w} - 7 \right) \right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \leq 25 \\ 1.2 & \text{otherwise} \end{cases}$ Table 2-8, P. 42

Terrain Exposure Constants: Table 2-4, P. 40

$$\alpha := \begin{cases} 7.0 & \text{if Exp} = \text{"B"} \\ 9.5 & \text{if Exp} = \text{"C"} \\ 11.5 & \text{if Exp} = \text{"D"} \end{cases} \quad Z_g := \begin{cases} 1200\text{ft} & \text{if Exp} = \text{"B"} \\ 900\text{ft} & \text{if Exp} = \text{"C"} \\ 700\text{ft} & \text{if Exp} = \text{"D"} \end{cases} \quad K_{zmin} := \begin{cases} 0.70 & \text{if Exp} = \text{"B"} \\ 0.85 & \text{if Exp} = \text{"C"} \\ 1.03 & \text{if Exp} = \text{"D"} \end{cases}$$



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BASIC EQUATIONS

ANSI/TIA-222-G Reference

Velocity Pressure Coefficient:

$$K_z(z) := \begin{cases} K_z \leftarrow \max \left[2.01 \cdot \left(\frac{z}{Z_g} \right)^{\frac{2}{\alpha}}, K_{zmin} \right] \\ K_z \leftarrow \min(K_z, 2.01) \end{cases}$$

$$K_z := K_z(z)$$

Section 2.6.5, P. 13

$$K_{zt}(z) := K_{zt} \leftarrow \begin{cases} 1.0 & \text{if Topo} = "1" \\ \text{otherwise} \\ \begin{cases} K_e \leftarrow \begin{cases} 0.90 & \text{if Exp} = "B" \\ 1.00 & \text{if Exp} = "C" \\ 1.10 & \text{if Exp} = "D" \end{cases} \\ K_t \leftarrow \begin{cases} 0.43 & \text{if Topo} = "2" \\ 0.53 & \text{if Topo} = "3" \\ 0.72 & \text{if Topo} = "4" \end{cases} \\ f \leftarrow \begin{cases} 1.25 & \text{if Topo} = "2" \\ 2.00 & \text{if Topo} = "3" \\ 1.50 & \text{if Topo} = "4" \end{cases} \\ K_h \leftarrow e^{\left(\frac{f \cdot z}{CH} \right)} \\ \left(1 + \frac{K_e \cdot K_t}{K_h} \right)^2 \end{cases} \end{cases}$$

Section 2.6.6.4, p. 14

Table 2-4 p. 40

Table 2-5 p. 40

Table 2-5 p. 40

Section 2.6.6.4, P. 14

Section 2.6.6.4, P. 14

$$K_{zt} := K_{zt}(z)$$

Velocity Pressure:

Section 2.6.9.6, P. 25

$$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I \text{ psf}$$



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LOAD EQUATIONS

WIND LOAD

Area (Normal):	$AN_{area} = H_{ant} \cdot W_{ant}$
Area (Side):	$AT_{area} = H_{ant} \cdot D_{ant}$
Force Coefficient (Normal):	$C_{fn} = C_{fsquare}(H_{ant}, W_{ant})$
Force Coefficient (Side):	$C_{fs} = C_{fsquare}(H_{ant}, D_{ant})$
Pipe Area (Normal):	$AN_p = \max[(L_p - H_{ant}) \cdot D_p, 0]$
Pipe Area (Side):	$AT_p = L_p \cdot D_p$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(L_p, D_p)$
Normal Effective Projected Area:	$E_{pan} = (C_{fn} \cdot AN_{area}) + (C_{fp} \cdot AN_p)$
Side Effective Projected Area:	$E_{pat} = (C_{fs} \cdot AT_{area}) + (C_{fp} \cdot AT_p)$
Effective Projected Area:	$EPA = \max(E_{pan}, E_{pat})$
Wind Force:	$F_{ant} = q_z \cdot Gh \cdot EPA$

ICE DEAD LOAD

Largest Out-to-Out Dimension:	$D_{ant} = \sqrt{D_{ant}^2 + W_{ant}^2}$
Cross Sectional Area of Ice:	$A_{ice_ant} = \pi \cdot t_{iz} \cdot (D_{ant} + t_{iz})$
Total Ice Dead Load:	$DL_{ice_ant} = \rho_i \cdot (A_{ice_ant} \cdot H_{ant})$

ICE WIND LOAD

Dimensions:	$H_{i_ant} = H_{ant} + 2t_{iz}$
	$W_{i_ant} = W_{ant} + 2t_{iz}$
	$D_{i_ant} = D_{ant} + 2t_{iz}$
Area (Normal):	$AIN_{area} = H_{i_ant} \cdot W_{i_ant}$
Area (Side):	$AIT_{area} = H_{i_ant} \cdot D_{i_ant}$
Force Coefficient (Normal):	$Ci_{fn} = C_{fsquare}(H_{i_ant}, W_{i_ant})$
Force Coefficient (Side):	$Ci_{fs} = C_{fsquare}(H_{i_ant}, D_{i_ant})$
Pipe Area (Normal):	$AN_p = \max[(L_{ip} - H_{i_ant}) \cdot D_{ip}, 0]$
Pipe Area (Side):	$AT_p = L_{ip} \cdot D_{ip}$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(L_{ip}, D_{ip})$
Normal Effective Projected Area:	$E_{pain} = (Ci_{fn} \cdot AIN_{area}) + (C_{fp} \cdot AN_p)$
Side Effective Projected Area:	$E_{pait} = (Ci_{fs} \cdot AIT_{area}) + (C_{fp} \cdot AT_p)$
Effective Projected Area:	$EPA_i = \max(E_{pain}, E_{pait})$
Wind Force:	$F_{i_ant} = q_z \cdot Gh \cdot EPA_i$



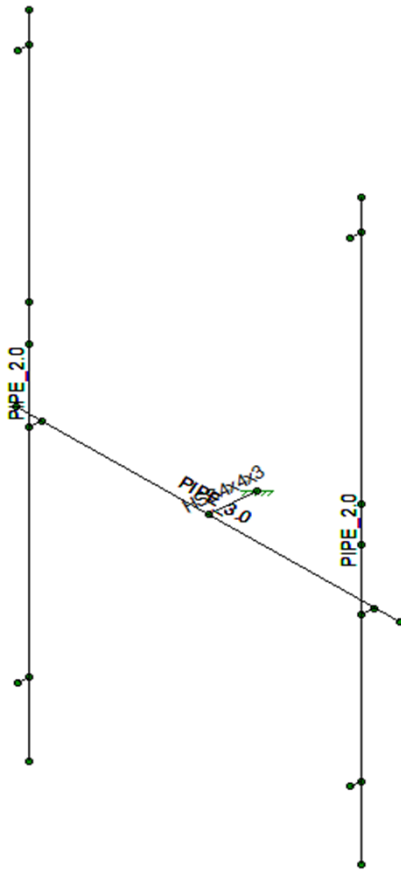
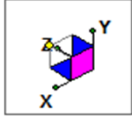
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III. ATTACHMENTS



Client:	ATT	Computed By:	AB
Site Name:	Suffield South	Date:	12/2/2016
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RISA MODEL

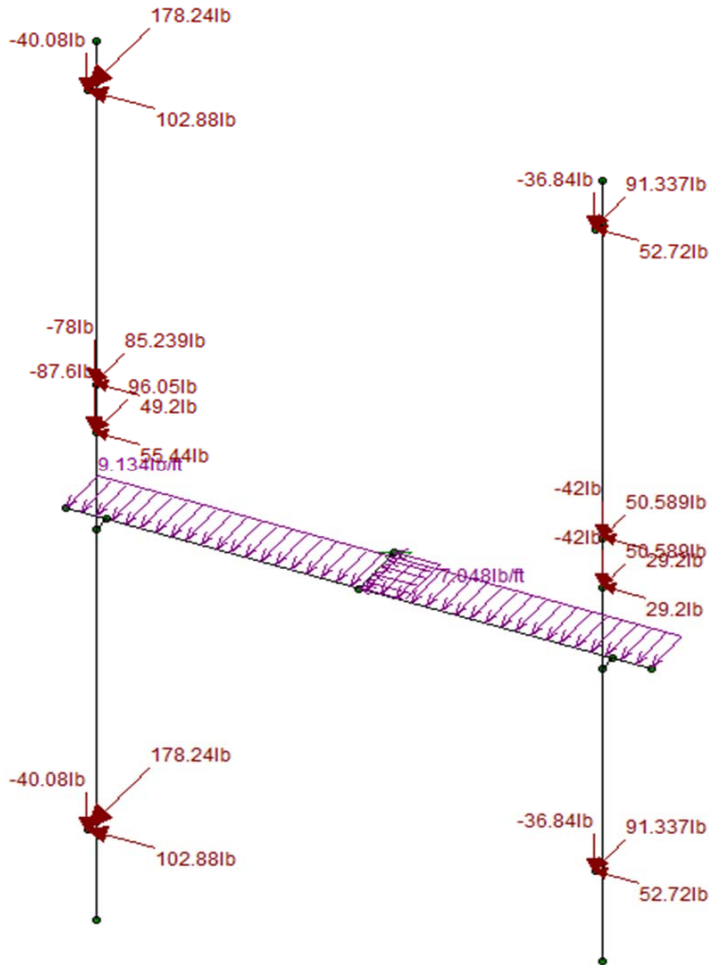
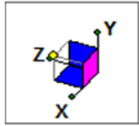


Envelope Only Solution



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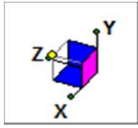
RISA WORST CASE LOADING



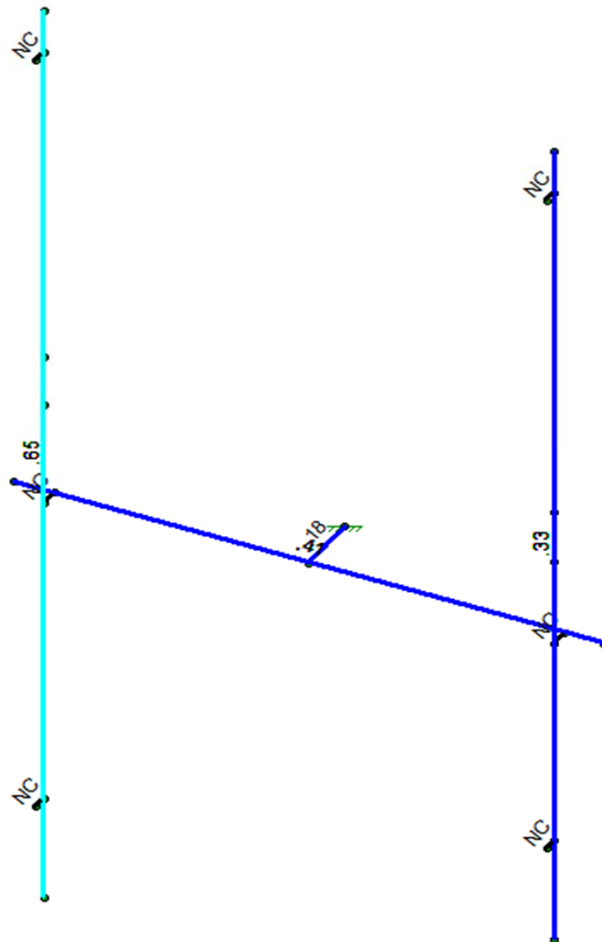


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RISA CODE CHECK



Code Check	
Black	No Calc
Red	> 1.0
Pink	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50



Member Code Checks Displayed
Envelope Only Solution

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			Hss member s...	Beam	SquareTube	A500 Gr. ...	Typical
2	M3	N5	N6			Horizontal mo...	Beam	Pipe	A53 Gr. B	Typical
3	M6	N8	N20			RIGID	None	None	RIGID	Typical
4	M7	N9	N21			RIGID	None	None	RIGID	Typical
5	M10	N12	N16			Antenna Pipe	Beam	Pipe	A53 Gr. B	Typical
6	M11	N13	N17			Antenna Pipe	Beam	Pipe	A53 Gr. B	Typical
7	M17	N29	N37			RIGID	None	None	RIGID	Typical
8	M18	N25	N33			RIGID	None	None	RIGID	Typical
9	M19	N26	N34			RIGID	None	None	RIGID	Typical
10	M20	N30	N38			RIGID	None	None	RIGID	Typical

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
1	N33	L	Y	-33.4
2	N37	L	Y	-33.4
3	N34	L	Y	-30.7
4	N38	L	Y	-30.7
5	N48	L	Y	-65
6	N27	L	Y	-73
7	N40B	L	Y	-35
8	N41A	L	Y	-35

Joint Loads and Enforced Displacements (BLC 2 : Wx)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
1	N33	L	X	128.6
2	N37	L	X	128.6
3	N34	L	X	65.9
4	N38	L	X	65.9
5	N48	L	X	61.5
6	N27	L	X	69.3
7	N40B	L	X	36.5
8	N41A	L	X	36.5

Joint Loads and Enforced Displacements (BLC 3 : Wz)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
1	N33	L	Z	128.6
2	N37	L	Z	128.6
3	N34	L	Z	65.9
4	N38	L	Z	65.9
5	N48	L	Z	61.5
6	N27	L	Z	69.3
7	N40B	L	Z	36.5
8	N41A	L	Z	36.5

Joint Loads and Enforced Displacements (BLC 4 : Ice Wx)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
1	N33	L	X	32.2
2	N37	L	X	32.2
3	N34	L	X	19.3
4	N38	L	X	19.3
5	N48	L	X	16.2
6	N27	L	X	17.8
7	N40B	L	X	10.8



Joint Loads and Enforced Displacements (BLC 4 : Ice Wx) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
8	N41A	L	X	10.8

Joint Loads and Enforced Displacements (BLC 5 : Ice Wz)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
1	N33	L	Z	32.2
2	N37	L	Z	32.2
3	N34	L	Z	19.3
4	N38	L	Z	19.3
5	N48	L	Z	16.2
6	N27	L	Z	17.8
7	N40B	L	Z	10.8
8	N41A	L	Z	10.8

Joint Loads and Enforced Displacements (BLC 6 : Ice weight)

	Joint Label	L,D,M	Direction	Magnitude[(lb.k-ft), (in.rad), (lb*s^2/in, lb*s^2*in)]
1	N33	L	Y	-184.6
2	N37	L	Y	-184.6
3	N34	L	Y	-94.6
4	N38	L	Y	-94.6
5	N48	L	Y	-113.8
6	N27	L	Y	-125.6
7	N40B	L	Y	-71.1
8	N41A	L	Y	-71.1

Member Distributed Loads (BLC 2 : Wx)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in...]
1	M3	PX	6.59	6.59	0	0
2	M1	PX	8.81	8.81	0	0

Member Distributed Loads (BLC 3 : Wz)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in...]
1	M3	PZ	6.59	6.59	0	0
2	M1	PZ	8.81	8.81	0	0

Member Distributed Loads (BLC 4 : Ice Wx)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in...]
1	M3	PX	2.05	2.05	0	0
2	M1	PX	3.17	3.17	0	0

Member Distributed Loads (BLC 5 : Ice Wz)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in...]
1	M3	PZ	2.05	2.05	0	0
2	M1	PZ	3.17	3.17	0	0

Member Distributed Loads (BLC 6 : Ice weight)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in...]
1	M3	Y	-15.65	-15.65	0	0
2	M1	Y	-21.54	-21.54	0	0
3	M10	Y	-12.58	-12.58	0	0
4	M11	Y	-12.58	-12.58	0	0



Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(Plat...
1	Dead	DL		-1.05		8			
2	Wx	WL				8		2	
3	Wz	WL				8		2	
4	Ice Wx	WL				8		2	
5	Ice Wz	None				8		2	
6	Ice weight	None				8		4	

Load Combinations

	Description	Sol...	PD...	SR...	BLC Fact...	BLC Fact...	BLC Fact...	BLC Fact...	BLC Fact...	BLC Fact...	BLC Fact...
1	1.4D	Yes	Y		1	1.4					
2	1.2D+1.6W1	Yes	Y		1	1.2	2	1.6	3		
3	1.2D+1.6W2	Yes	Y		1	1.2	2	1.386	3	.8	
4	1.2D+1.6W3	Yes	Y		1	1.2	2	.8	3	1.386	
5	1.2D+1.6W4	Yes	Y		1	1.2	2		3	1.6	
6	1.2D+1.6W5	Yes	Y		1	1.2	2	-.8	3	1.386	
7	1.2D+1.6W6	Yes	Y		1	1.2	2	-1.3...	3	.8	
8	1.2D+1.6W7	Yes	Y		1	1.2	2	-1.6	3		
9	1.2D+1.6W8	Yes	Y		1	1.2	2	-1.3...	3	-.8	
10	1.2D+1.6W9	Yes	Y		1	1.2	2	-.8	3	-1.3...	
11	1.2D+1.6W10	Yes	Y		1	1.2	2		3	-1.6	
12	1.2D+1.6W11	Yes	Y		1	1.2	2	.8	3	-1.3...	
13	1.2D+1.6W12	Yes	Y		1	1.2	2	1.386	3	-.8	
14	1.2D+1.0 Ice	Yes	Y		1	1.2	6	1			
15	1.2D+1.0ICE+1.0W1ICE	Yes	Y		1	1.2	6	1	4	1	5
16	1.2D+1.0ICE+1.0W2ICE	Yes	Y		1	1.2	6	1	4	.866	.5
17	1.2D+1.0ICE+1.0W3ICE	Yes	Y		1	1.2	6	1	4	.5	.866
18	1.2D+1.0ICE+1.0W4ICE	Yes	Y		1	1.2	6	1	4		1
19	1.2D+1.0ICE+1.0W5ICE	Yes	Y		1	1.2	6	1	4	-.5	.866
20	1.2D+1.0ICE+1.0W6ICE	Yes	Y		1	1.2	6	1	4	-.866	.5
21	1.2D+1.0ICE+1.0W7ICE	Yes	Y		1	1.2	6	1	4	-1	5
22	1.2D+1.0ICE+1.0W8ICE	Yes	Y		1	1.2	6	1	4	-.866	-.5
23	1.2D+1.0ICE+1.0W9ICE	Yes	Y		1	1.2	6	1	4	-.5	-.866
24	1.2D+1.0ICE+1.0W10ICE	Yes	Y		1	1.2	6	1	4	5	-1
25	1.2D+1.0ICE+1.0W11ICE	Yes	Y		1	1.2	6	1	4	.5	-.866
26	1.2D+1.0ICE+1.0W12ICE	Yes	Y		1	1.2	6	1	4	.866	-.5

Envelope Joint Reactions

	Joint	X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC	
1	N1	max	1001.133	8	1773.29	17	956.689	11	.792	11	1.001	6	1.566	15
2		min	-1001.128	2	528.612	10	-956.684	5	-1.19	5	-1.005	12	-.588	8
3	Totals:	max	1001.133	8	1773.29	17	956.689	11						
4		min	-1001.128	2	528.612	10	-956.684	5						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

Member	Shape	Code Check	Lo...	LC	She...	Lo...	phi*P...	phi*P...	phi*M...	phi*M...	Eqn		
1	M10	PIPE 2.0	.650	59...	3	.059	48...	5	1214...	32130	1.872	1.872	H1-1b
2	M3	PIPE 3.0	.411	30	18	.163	30	2	5703...	65205	5.749	5.749	H1-1b
3	M11	PIPE 2.0	.334	60	2	.031	60	11	1491...	32130	1.872	1.872	H1-1b
4	M1	HSS4x4x3	.179	0	13	.154	0	y	181066...	106812	12.662	12.662	H1-1b



550 Cochituate Road
Framingham, MA 01701

LTE 2C
Revision 0

Self-Support Tower Feasibility Study

Site Name: Suffield South

FA #: 10071274

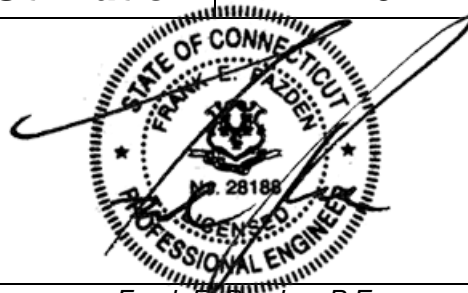
Site Number: CT5400

Site Address: 55 King Spring Road
Suffield, CT 06078
Hartford County

Maser Project Number: 16963018A

December 2, 2016

Analysis Type	Self-Support Tower
Pass/Fail	Pass
Mount Utilization	94.4 %



Frank E. Pazden, P.E.
Connecticut Professional Engineer
PE License # 28188

Objective:

The objective of this report is to determine the capacity of the existing 100' self-support tower structure at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards.

Introduction:

Maser Consulting Connecticut has reviewed the following documents in completing this report:

- RFDS 1394262 provided by Empire Telecom, dated October 5, 2016 for LTE 2C scope of work.
- Construction Drawings prepared by Maser Consulting Connecticut for LTE 2C Scope of Work.
- Tower and Mount Mapping Report prepared by Tower Engineering Professionals TEP# 74312.102186 dated, November 29, 2016.
- Previous Structural Analysis prepared by Tectonic Engineering Consultants P.C., dated July 12, 2002.
- Previous Structural Analysis prepared by Malouf Engineering Intl, Inc., dated November 29, 2007.

The existing **AT&T** equipment is supported on an existing 100' self-support tower structure. The primary tower structure is constructed of pipe legs, and angle diagonals and horizontals. The existing **AT&T** equipment is supported on an existing antenna support mounts constructed of structural steel antenna support pipes supported by HSS tubes and pipes at a centerline of approximately 100'-0" above ground level. This report is based only upon this information, as well as the information obtained in the field.

Discrete and Linear Appurtenances:

The overall antenna loading is found in the Appendix A of this report.

Codes, Standards and Loading:

Maser Consulting Connecticut utilized the following codes and standards:

- 2016 Connecticut State Building Code, Incorporating The 2012 IBC
- Structural Standards for Antenna Supporting Structures and Antennas ANSI/TIA-222-G
 - Basic Wind Speed – 97 mph, Ice Wind Speed – 40 mph and Ice thickness - 1 in
 - Exposure Category – C
 - Structure Class – II
 - Topographic Category - 1

Analysis Approach & Assumptions:

The analysis approach used in this structural analysis is based on the premise that if the existing self-support structure is structurally adequate to support the existing and proposed equipment per the aforementioned codes and standards, or if the increase in the forces in the structure are deemed to be negligible or acceptable, then the proposed equipment can be installed as intended. Tower Numerics, tnx Tower, a tower analysis and design program, designed specifically for the telecommunications industry and for all applicable codes and standards was used for this structural analysis.

The following assumptions were utilized in this report:

- Structural Steel Legs are constructed of A572-50 Grade Steel.
- Structural Steel Diagonals and Horizontal members are constructed of A36 Grade.
- Structural Bolts are assumed to be A325N grade.
- Tower is installed to plumb and is maintained properly without any structural deficiencies or deteriorations to the original design.
- It is assumed that the telecommunication equipment supports, antenna supports, and existing structure have been designed by a registered licensed professional engineer for the existing loads acting on the structure, as required by all applicable codes, prior to the proposed modifications listed within this report.
- It is assumed that information provided by the client regarding the structure itself, the antenna models, feed lines, and other relevant information is current and correct.
- It is assumed all other existing appurtenances, antennas, cables, etc. belonging to others have been installed and supported per code and per specifications so as not to damage any existing structural support members, and that any contributing loads from adjacent equipment has been taken into consideration for their design.
- Proposed equipment and locations should not deviate from the proposed locations noted herein and shown on the associated Maser Consulting Connecticut final Construction Drawings.
- It should be noted that due to a lack of information Maser Consulting Connecticut did not perform an analysis on the foundation. If information is provided then this report can be amended.

Calculations:

The calculations are found in Appendix A of this report.

Conclusion:

The existing self-support tower was analyzed for the loading in the applicable codes and standards. The tower has been determined to be structurally **ADEQUATE** to support the proposed and existing antennas, based upon the aforementioned assumptions.

The self-support tower has been determined to be stressed to a maximum of **94.4%** of its structural capacity with the maximum usage occurring at the tower legs located between the elevations 20'-40'. Therefore, the proposed **AT&T** installation **CAN** be placed as intended in all sectors.

Prior to the installation of the proposed equipment, the contractor shall verify that all bolted connections are properly fastened from the original installation. Additionally, the contractor shall inspect all existing hardware and verify that it is in its original condition and free of rust and deterioration. If any deficiencies are noted the contractor shall notify the engineer of the conditions prior to installation of any equipment for additional evaluation.

It should be noted that due to a lack of information Maser Consulting Connecticut did not perform an analysis on the foundation. If information is provided then this report can be amended. The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the existing structural members supporting the proposed **AT&T** telecommunications installation described herein. Further, no structural qualifications are made or implied by this document for the existing structure.

We appreciate the opportunity to be of service on this project. If you should have any questions or require any additional information, please do not hesitate to call our office.

Sincerely,
Maser Consulting Connecticut



Frank Pazden, P.E.
Telecommunications Department Manager



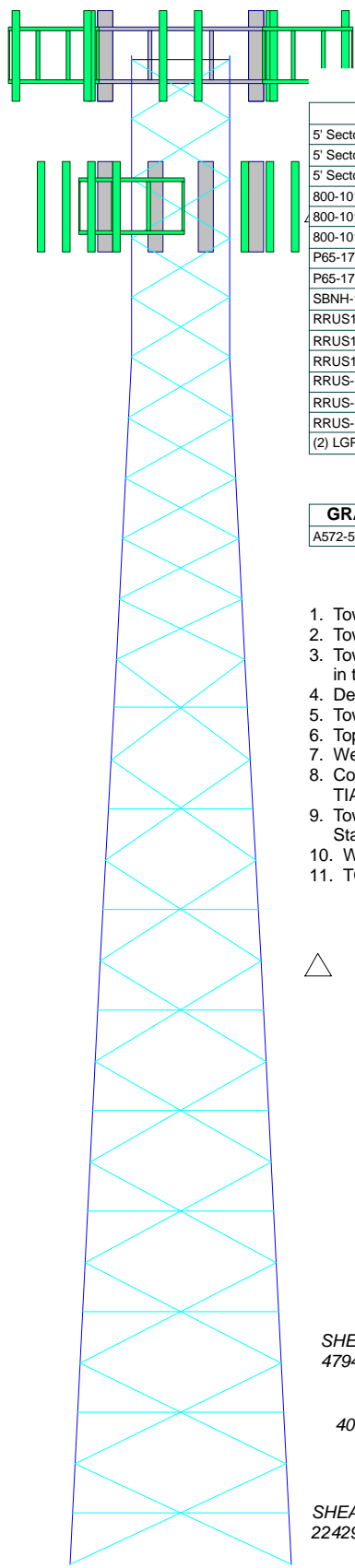
Anwesha Bera, E.I.T.
Structural Design Engineer



APPENDIX A

Section	T1	T2	T3	T4	
Legs	P2.4"x0.165"	ROHN 2.5 X-STR A572-50	ROHN 3 STD	ROHN 3 X-STR	
Leg Grade					
Diagonals	L1 1/2x1 1/2x1/8	A36	L3x3x1/4	L2 1/2x2 1/2x3/16	
Diagonal Grade					
Top Girts	L2x2x1/8				
Sec. Horizontals	N.A.				
Face Width (ft)	6.52083	8.5651	10.6094	12.6636	
# Panels @ (ft)	5 @ 3.92917		9 @ 6.66667		
Weight (lb)	548.1	1701.0	1883.1	1756.8	6690.8

100.0 ft
80.0 ft
60.0 ft
40.0 ft
20.0 ft
0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
5' Sector Frame T-arm	100	(2) LGP21401	100
5' Sector Frame T-arm	100	(2) LGP21401	100
5' Sector Frame T-arm	100	DC6-48-06-18-8F	100
800-10121	100	BXA-171063-12BF-EDIN-X	90
800-10121	100	BXA-171063-12BF-EDIN-X	90
800-10121	100	BXA-171063-12BF-EDIN-X	90
P65-17-XLH-RR	100	(2) E15V95P08	90
P65-17-XLH-RR	100	(2) E15V95P08	90
SBNH-1D6565C	100	(2) E15V95P08	90
RRUS11 B12	100	14'-6" Sector Frame (3)	90
RRUS11 B12	100	(2) LPA-70063-8CF-EDIN-X	90
RRUS11 B12	100	(2) LPA-70063-8CF-EDIN-X	90
RRUS-12	100	(2) LPA-70063-8CF-EDIN-X	90
RRUS-12	100	BXA-70040-6CF-EDIN-X	90
RRUS-12	100	BXA-70040-6CF-EDIN-X	90
(2) LGP21401	100	BXA-70040-6CF-EDIN-X	90

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 40 mph basic wind with 1.00 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. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. TOWER RATING: 95%

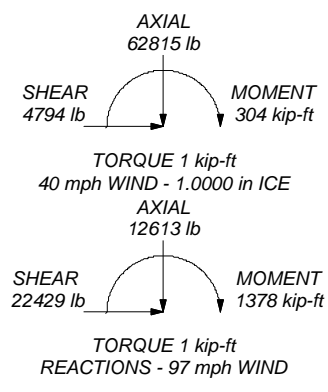


ALL REACTIONS ARE FACTORED

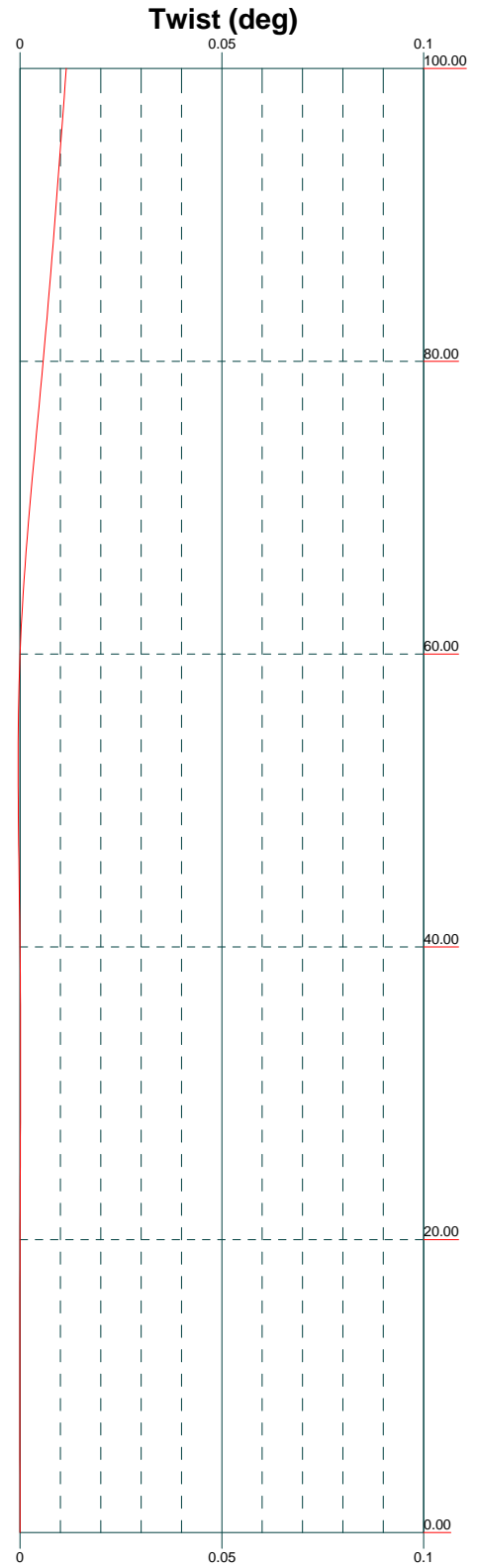
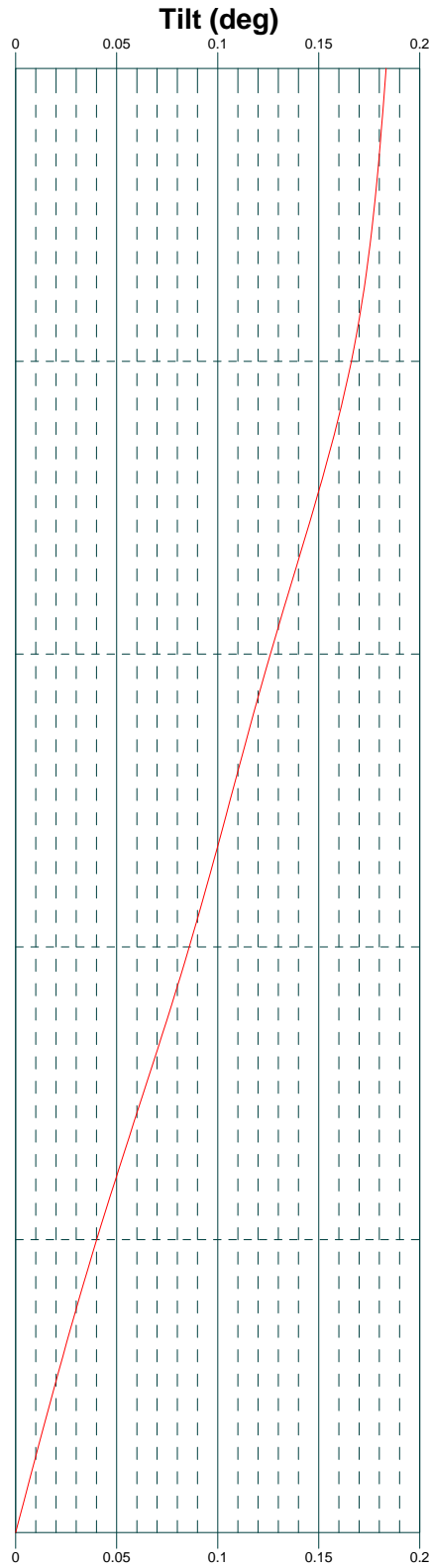
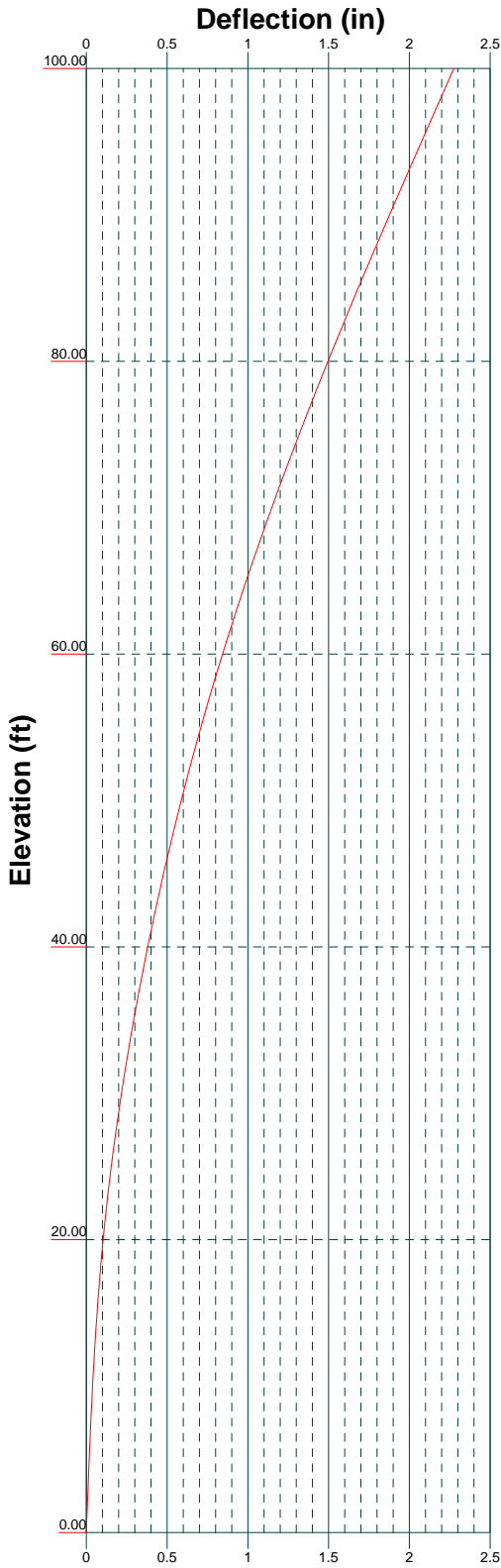
MAX. CORNER REACTIONS AT BASE:

DOWN: 112452 lb
SHEAR: 13498 lb

UPLIFT: -99428 lb
SHEAR: 12046 lb



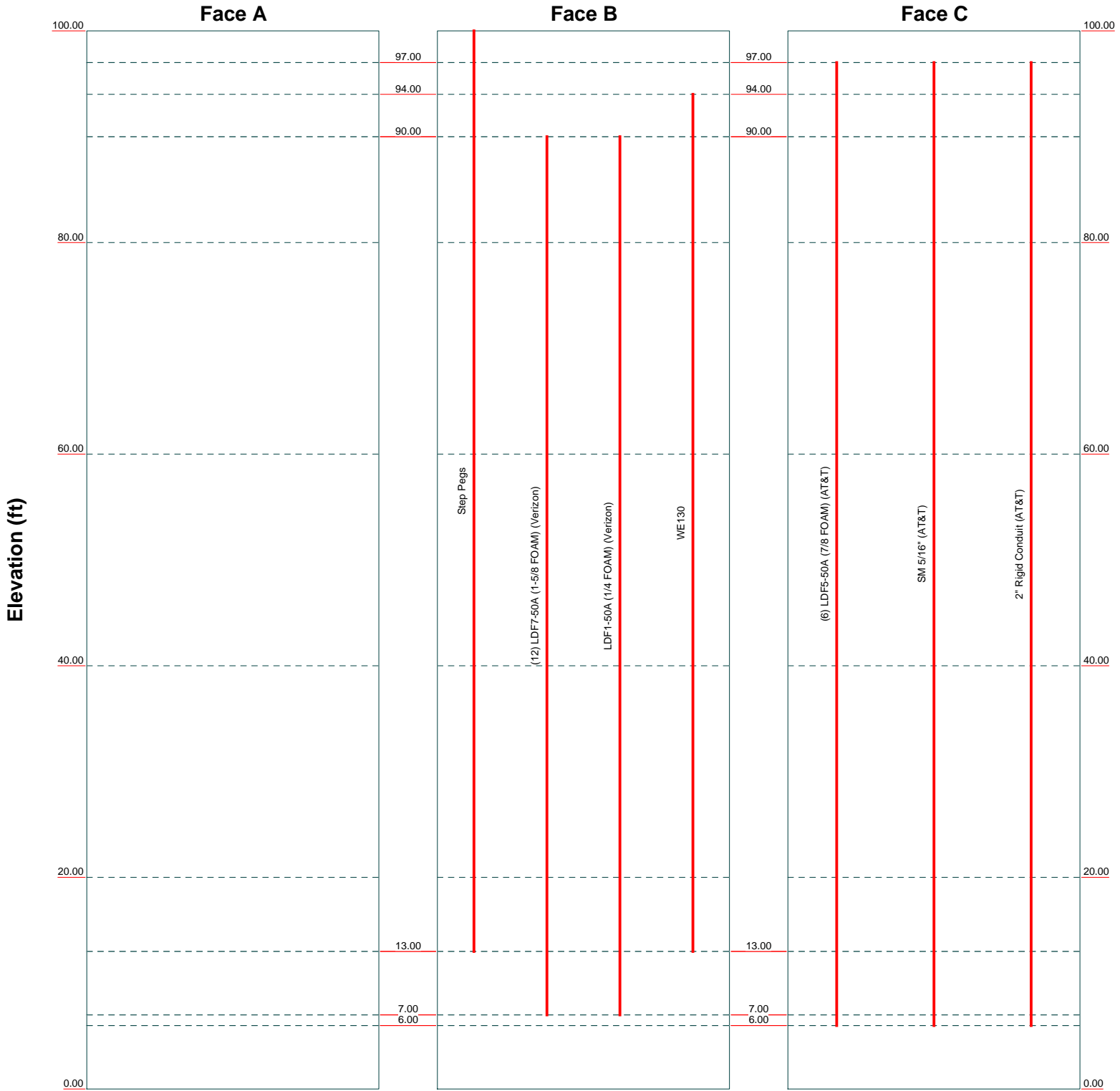
Maser Consulting P.A. 2000 Midlantic Drive Suite 100 Mount Laurel, NJ Phone: 856.797.0412 FAX: 856.722.1120 Consulting Engineers		Job: 16963018A
		Project: Suffield South
Client: AT&T	Drawn by: ABera	App'd:
Code: TIA-222-G	Date: 12/02/16	Scale: NTS
Path:	Dwg No. E-1	



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Job: 16963018A		
Project: Suffield South		
Client: AT&T	Drawn by: ABera	App'd:
Code: TIA-222-G	Date: 12/02/16	Scale: NTS
Path:	Dwg No. E-5	

Feed Line Distribution Chart 0' - 100'

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



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FAX: 856.722.1120		
Job: 16963018A		
Project: Suffield South		
Client: AT&T	Drawn by: ABera	App'd:
Code: TIA-222-G	Date: 12/02/16	Scale: NTS
Path:	Dwg No. E-7	

<p>tnxTower</p> <p>Maser Consulting P.A. 2000 Midlantic Drive Suite 100 Mount Laurel, NJ Phone: 856.797.0412 FAX: 856.722.1120</p>	Job 16963018A	Page 1 of 22
	Project Suffield South	Date 16:41:24 12/02/16
	Client AT&T	Designed by ABera

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 6.52 ft at the top and 14.70 ft at the base.

There is a 3 sided latticed pole with a face width of 6.52 ft.

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

The following design criteria apply:

Basic wind speed of 97 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 40 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Weld together tower sections have flange connections..

Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

Welds are fabricated with ER-70S-6 electrodes..

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

Pressures are calculated at each section.

Stress ratio used in latticed pole member design is 1.

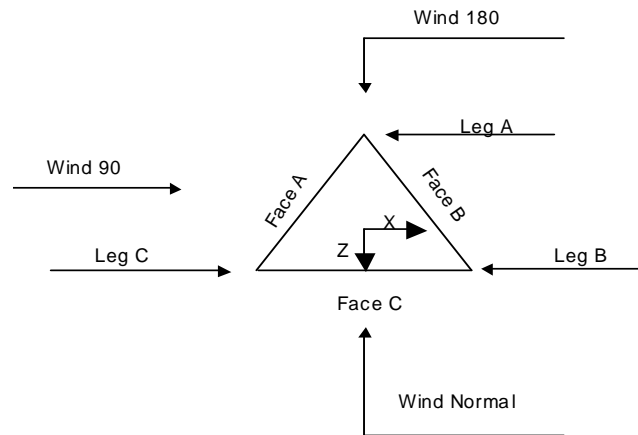
Stress ratio used in tower member design is 1.

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

Options

<ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric 	<ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r Retension Guys To Initial Tension Bypass Mast Stability Checks Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing √ Treat Feed Line Bundles As Cylinder 	<ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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tnxTower Maser Consulting P.A. 2000 Midlantic Drive Suite 100 Mount Laurel, NJ Phone: 856.797.0412 FAX: 856.722.1120	Job 16963018A	Page 2 of 22
	Project Suffield South	Date 16:41:24 12/02/16
	Client AT&T	Designed by ABera



Triangular Tower

3 Sided Latticed Pole Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
L1	100.00-80.00			6.52	1	20.00

3 Sided Latticed Pole 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
L1	100.00-80.00	3.93	X Brace	No	No	3.2500	1.0000

3 Sided Latticed Pole Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						
L1 100.00-80.00	Pipe	P2.4"x0.165"	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)

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3 Sided Latticed Pole 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
L1 100.00-80.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Flat Bar		A36 (36 ksi)

3 Sided Latticed Pole 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
L1 100.00-80.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

3 Sided Latticed Pole Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags	X Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
L1 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

¹Note: 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.

3 Sided Latticed Pole 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
L1 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

3 Sided Latticed Pole Section Geometry (cont'd)

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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.
L1 100.00-80.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	80.00-60.00			6.52	1	20.00
T2	60.00-40.00			8.57	1	20.00
T3	40.00-20.00			10.61	1	20.00
T4	20.00-0.00			12.65	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	80.00-60.00	4.00	X Brace	No	No	0.0000	0.0000
T2	60.00-40.00	6.67	X Brace	No	Yes	0.0000	0.0000
T3	40.00-20.00	6.67	X Brace	No	Yes	0.0000	0.0000
T4	20.00-0.00	6.67	X Brace	No	Yes	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 80.00-60.00	Pipe	P2.9x0.214"	A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T2 60.00-40.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T3 40.00-20.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T4 20.00-0.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

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Tower Elevation	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
<i>ft</i>						
T2 60.00-40.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T3 40.00-20.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T4 20.00-0.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals <i>in</i>	Double Angle Stitch Bolt Spacing Horizontals <i>in</i>	Double Angle Stitch Bolt Spacing Redundants <i>in</i>
<i>ft</i>	<i>ft²</i>	<i>in</i>							
T1 80.00-60.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 60.00-40.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 40.00-20.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 20.00-0.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	<i>K Factors¹</i>								
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace	
				X Y	X Y	X Y	X Y	X Y	X Y	X Y	
<i>ft</i>											
T1 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

¹Note: 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)

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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 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
				Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 80.00-60.00	Flange	0.6250	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 60.00-40.00	Flange	0.7500	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 40.00-20.00	Flange	0.8750	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 20.00-0.00	Flange	0.8750	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

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
Step Pegs	B	No	Ar (CaAa)	100.00 - 13.00	1.0000	0.5	1	1	0.2500	7.0000		1.50
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	90.00 - 7.00	1.0000	-0.25	12	12	1.9800	1.9800		0.82
(Verizon) LDF1-50A (1/4 FOAM)	B	No	Ar (CaAa)	90.00 - 7.00	1.0000	-0.25	1	1	0.3500	0.3500		0.06
(Verizon) WE130	B	No	Ar (CaAa)	94.00 - 13.00	-2.0000	0.45	1	1	0.8601	0.8601		0.25
LDF5-50A (7/8 FOAM)	C	No	Ar (CaAa)	97.00 - 6.00	1.0000	0.4	6	6	1.0900	1.0900		0.33
(AT&T) SM 5/16"	C	No	Ar (CaAa)	97.00 - 6.00	1.0000	0.25	1	1	0.3125	0.3125		0.25
(AT&T) 2" Rigid Conduit (AT&T)	C	No	Ar (CaAa)	97.00 - 6.00	1.0000	0.2	1	1	2.0000	2.0000		2.80

Feed Line/Linear Appurtenances Section Areas

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Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
L1	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	32.430	0.000	132.50
		C	0.000	0.000	15.049	0.000	85.51
T1	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	57.247	0.000	233.00
		C	0.000	0.000	17.705	0.000	100.60
T2	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	57.511	0.000	233.00
		C	0.000	0.000	17.705	0.000	100.60
T3	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	57.929	0.000	233.00
		C	0.000	0.000	17.705	0.000	100.60
T4	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	34.923	0.000	140.95
		C	0.000	0.000	12.394	0.000	70.42

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} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
L1	100.00-80.00	A	2.211	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	97.975	0.000	1881.49
		C		0.000	0.000	55.757	0.000	912.74
T1	80.00-60.00	A	2.156	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	167.914	0.000	3092.71
		C		0.000	0.000	64.810	0.000	1042.38
T2	60.00-40.00	A	2.085	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	166.660	0.000	2997.03
		C		0.000	0.000	63.789	0.000	1002.17
T3	40.00-20.00	A	1.981	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	164.836	0.000	2859.57
		C		0.000	0.000	62.306	0.000	944.99
T4	20.00-0.00	A	1.775	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	95.817	0.000	1526.45
		C		0.000	0.000	41.558	0.000	585.31

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	100.00-80.00	1.3921	-0.2473	0.9212	-0.1010
T1	80.00-60.00	1.6879	-1.8321	1.3008	-1.4475
T2	60.00-40.00	1.9452	-2.0746	1.5327	-1.7893
T3	40.00-20.00	2.2638	-2.2930	1.7459	-2.1424
T4	20.00-0.00	1.1384	-2.6376	0.7972	-2.5189

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Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L1	1	Step Pegs	80.00 - 100.00	1.0000	0.5589
L1	2	LDF7-50A (1-5/8 FOAM)	80.00 - 90.00	0.6000	0.5589
L1	3	LDF1-50A (1/4 FOAM)	80.00 - 90.00	0.6000	0.5589
L1	4	WE130	80.00 - 94.00	0.6000	0.5589
L1	5	LDF5-50A (7/8 FOAM)	80.00 - 97.00	0.6000	0.5589
L1	6	SM 5/16"	80.00 - 97.00	0.6000	0.5589
L1	7	2" Rigid Conduit	80.00 - 97.00	0.6000	0.5589
T1	1	Step Pegs	60.00 - 80.00	1.0000	0.5850
T1	2	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.5850
T1	3	LDF1-50A (1/4 FOAM)	60.00 - 80.00	0.6000	0.5850
T1	4	WE130	60.00 - 80.00	0.6000	0.5850
T1	5	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.5850
T1	6	SM 5/16"	60.00 - 80.00	0.6000	0.5850
T1	7	2" Rigid Conduit	60.00 - 80.00	0.6000	0.5850
T2	1	Step Pegs	40.00 - 60.00	1.0000	0.6000
T2	2	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T2	3	LDF1-50A (1/4 FOAM)	40.00 - 60.00	0.6000	0.6000
T2	4	WE130	40.00 - 60.00	0.6000	0.6000
T2	5	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T2	6	SM 5/16"	40.00 - 60.00	0.6000	0.6000
T2	7	2" Rigid Conduit	40.00 - 60.00	0.6000	0.6000
T3	1	Step Pegs	20.00 - 40.00	1.0000	0.6000
T3	2	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T3	3	LDF1-50A (1/4 FOAM)	20.00 - 40.00	0.6000	0.6000
T3	4	WE130	20.00 - 40.00	0.6000	0.6000
T3	5	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T3	6	SM 5/16"	20.00 - 40.00	0.6000	0.6000
T3	7	2" Rigid Conduit	20.00 - 40.00	0.6000	0.6000
T4	1	Step Pegs	13.00 - 20.00	1.0000	0.6000
T4	2	LDF7-50A (1-5/8 FOAM)	7.00 - 20.00	0.6000	0.6000
T4	3	LDF1-50A (1/4 FOAM)	7.00 - 20.00	0.6000	0.6000
T4	4	WE130	13.00 - 20.00	0.6000	0.6000
T4	5	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T4	6	SM 5/16"	6.00 - 20.00	0.6000	0.6000
T4	7	2" Rigid Conduit	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz Lateral	Vert					
			ft	ft	°	ft	ft ²	ft ²	lb
(2) LPA-70063-8CF-EDIN-X	A	From Leg	4.00	0.0000	90.00	No Ice	13.65	12.13	14.60
			0.00			1/2" Ice	14.25	12.73	111.92
			0.00			1" Ice	14.85	13.33	217.41
(2) LPA-70063-8CF-EDIN-X	B	From Leg	4.00	0.0000	90.00	No Ice	13.65	12.13	14.60
			0.00			1/2" Ice	14.25	12.73	111.92
			0.00			1" Ice	14.85	13.33	217.41
(2) LPA-70063-8CF-EDIN-X	C	From Leg	4.00	0.0000	90.00	No Ice	13.65	12.13	14.60

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft ²	ft ²	lb
			0.00						
			0.00			1/2" Ice	14.25	12.73	111.92
			0.00			1" Ice	14.85	13.33	217.41
BXA-70040-6CF-EDIN-X	A	From Leg	4.00	0.0000	90.00	No Ice	14.41	5.72	38.00
			0.00			1/2" Ice	14.92	6.17	120.76
			0.00			1" Ice	15.44	6.63	210.38
BXA-70040-6CF-EDIN-X	B	From Leg	4.00	0.0000	90.00	No Ice	14.41	5.72	38.00
			0.00			1/2" Ice	14.92	6.17	120.76
			0.00			1" Ice	15.44	6.63	210.38
BXA-70040-6CF-EDIN-X	C	From Leg	4.00	0.0000	90.00	No Ice	14.41	5.72	38.00
			0.00			1/2" Ice	14.92	6.17	120.76
			0.00			1" Ice	15.44	6.63	210.38
BXA-171063-12BF-EDIN-X	A	From Leg	4.00	0.0000	90.00	No Ice	4.80	3.63	12.80
			0.00			1/2" Ice	5.25	4.06	40.29
			0.00			1" Ice	5.71	4.51	73.33
BXA-171063-12BF-EDIN-X	B	From Leg	4.00	0.0000	90.00	No Ice	4.80	3.63	12.80
			0.00			1/2" Ice	5.25	4.06	40.29
			0.00			1" Ice	5.71	4.51	73.33
BXA-171063-12BF-EDIN-X	C	From Leg	4.00	0.0000	90.00	No Ice	4.80	3.63	12.80
			0.00			1/2" Ice	5.25	4.06	40.29
			0.00			1" Ice	5.71	4.51	73.33
(2) E15V95P08	A	From Leg	4.00	0.0000	90.00	No Ice	0.39	0.11	4.40
			0.00			1/2" Ice	0.46	0.17	7.14
			0.00			1" Ice	0.55	0.23	11.06
(2) E15V95P08	B	From Leg	4.00	0.0000	90.00	No Ice	0.39	0.11	4.40
			0.00			1/2" Ice	0.46	0.17	7.14
			0.00			1" Ice	0.55	0.23	11.06
(2) E15V95P08	C	From Leg	4.00	0.0000	90.00	No Ice	0.39	0.11	4.40
			0.00			1/2" Ice	0.46	0.17	7.14
			0.00			1" Ice	0.55	0.23	11.06
14'-6" Sector Frame (3)	C	From Leg	0.00	0.0000	90.00	No Ice	38.60	38.60	1060.00
			0.00			1/2" Ice	57.40	57.40	1650.00
			0.00			1" Ice	76.20	76.20	2240.00
5' Sector Frame T-arm	A	From Leg	0.00	0.0000	100.00	No Ice	2.72	2.72	50.00
			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
5' Sector Frame T-arm	B	From Leg	0.00	0.0000	100.00	No Ice	2.72	2.72	50.00
			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
5' Sector Frame T-arm	C	From Leg	0.00	0.0000	100.00	No Ice	2.72	2.72	50.00
			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
800-10121	A	From Leg	0.50	0.0000	100.00	No Ice	5.16	3.29	46.30
			0.00			1/2" Ice	5.51	3.64	79.21
			0.00			1" Ice	5.87	3.99	116.89
800-10121	B	From Leg	0.50	0.0000	100.00	No Ice	5.16	3.29	46.30
			0.00			1/2" Ice	5.51	3.64	79.21
			0.00			1" Ice	5.87	3.99	116.89
800-10121	C	From Leg	0.50	0.0000	100.00	No Ice	5.16	3.29	46.30
			0.00			1/2" Ice	5.51	3.64	79.21
			0.00			1" Ice	5.87	3.99	116.89
P65-17-XLH-RR	A	From Leg	0.50	0.0000	100.00	No Ice	11.47	6.80	70.00
			0.00			1/2" Ice	12.08	7.38	132.06
			0.00			1" Ice	12.71	7.98	201.70
P65-17-XLH-RR	C	From Leg	0.50	0.0000	100.00	No Ice	11.47	6.80	70.00
			0.00			1/2" Ice	12.08	7.38	132.06
			0.00			1" Ice	12.71	7.98	201.70
SBNH-1D6565C	B	From Leg	0.50	0.0000	100.00	No Ice	11.45	7.70	66.10

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			Vert		°	ft	ft ²	ft ²	lb
			ft						
			ft						
			0.00			1/2" Ice	12.06	8.29	131.97
			0.00			1" Ice	12.69	8.89	205.51
RRUS11 B12	A	From Leg	0.50	0.0000	100.00	No Ice	2.83	1.18	50.70
			0.00			1/2" Ice	3.04	1.33	71.57
			0.00			1" Ice	3.26	1.48	95.49
RRUS11 B12	B	From Leg	0.50	0.0000	100.00	No Ice	2.83	1.18	50.70
			0.00			1/2" Ice	3.04	1.33	71.57
			0.00			1" Ice	3.26	1.48	95.49
RRUS11 B12	C	From Leg	0.50	0.0000	100.00	No Ice	2.83	1.18	50.70
			0.00			1/2" Ice	3.04	1.33	71.57
			0.00			1" Ice	3.26	1.48	95.49
RRUS-12	A	From Leg	0.50	0.0000	100.00	No Ice	3.15	1.29	58.00
			0.00			1/2" Ice	3.36	1.44	81.22
			0.00			1" Ice	3.59	1.60	107.64
RRUS-12	B	From Leg	0.50	0.0000	100.00	No Ice	3.15	1.29	58.00
			0.00			1/2" Ice	3.36	1.44	81.22
			0.00			1" Ice	3.59	1.60	107.64
RRUS-12	C	From Leg	0.50	0.0000	100.00	No Ice	3.15	1.29	58.00
			0.00			1/2" Ice	3.36	1.44	81.22
			0.00			1" Ice	3.59	1.60	107.64
(2) LGP21401	A	From Leg	0.50	0.0000	100.00	No Ice	1.66	0.44	35.00
			0.00			1/2" Ice	1.82	0.54	45.89
			0.00			1" Ice	1.98	0.65	59.04
(2) LGP21401	B	From Leg	0.50	0.0000	100.00	No Ice	1.66	0.44	35.00
			0.00			1/2" Ice	1.82	0.54	45.89
			0.00			1" Ice	1.98	0.65	59.04
(2) LGP21401	C	From Leg	0.50	0.0000	100.00	No Ice	1.66	0.44	35.00
			0.00			1/2" Ice	1.82	0.54	45.89
			0.00			1" Ice	1.98	0.65	59.04
DC6-48-06-18-8F	B	From Leg	0.00	0.0000	100.00	No Ice	1.20	1.20	32.00
			0.00			1/2" Ice	1.88	1.88	53.81
			0.00			1" Ice	2.09	2.09	78.48

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice

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Comb. No.	Description
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	100 - 80	Latticed Pole Leg	Max Tension	15	18011.86	0.00	-0.01
			Max. Compression	18	-21022.87	0.34	-0.20
			Max. Mx	8	3597.65	1.06	-0.04
			Max. My	2	1908.74	0.04	-1.18
			Max. Vy	10	4065.89	-0.35	-0.17
			Max. Vx	2	-4541.88	-0.02	0.39
		Latticed Pole Diagonal	Max Tension	20	3499.83	0.00	0.00
			Max. Compression	20	-3516.49	0.00	0.00
			Max. Mx	34	192.06	0.03	-0.00
			Max. My	22	-3174.61	0.00	0.00
			Max. Vy	34	-28.07	0.03	-0.00
			Max. Vx	22	1.11	0.00	0.00
		Latticed Pole Top Girt	Max Tension	2	549.56	0.00	0.00
			Max. Compression	7	-534.55	0.00	0.00
		Max. Mx	26	2.49	-0.08	0.00	

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	80 - 60	Leg	Max. My	12	7.51	0.00	0.00
			Max. Vy	26	-50.83	0.00	0.00
			Max. Vx	12	-0.00	0.00	0.00
			Max Tension	15	38593.99	-0.09	0.00
			Max. Compression	18	-42903.97	0.00	-0.00
			Max. Mx	18	-23415.18	0.40	0.00
			Max. My	24	-2198.07	-0.01	0.21
		Diagonal	Max. Vy	18	140.48	0.40	0.00
			Max. Vx	20	82.44	-0.01	-0.21
			Max Tension	8	3070.11	0.00	0.00
			Max. Compression	8	-3097.44	0.00	0.00
			Max. Mx	35	531.40	0.04	-0.00
			Max. My	38	-401.18	0.04	0.01
			Max. Vy	33	40.71	0.04	-0.01
T2	60 - 40	Leg	Max. Vx	38	-2.28	0.00	0.00
			Max Tension	15	57600.63	0.18	0.00
			Max. Compression	18	-64061.72	-0.30	-0.00
			Max. Mx	18	-64035.53	0.39	-0.00
			Max. My	20	-2093.46	-0.02	-0.28
			Max. Vy	18	217.66	0.39	-0.00
			Max. Vx	20	127.62	-0.02	-0.28
		Diagonal	Max Tension	5	3826.62	0.08	0.00
			Max. Compression	4	-4010.57	0.00	0.00
			Max. Mx	35	630.85	0.12	-0.01
			Max. My	37	-836.13	0.05	0.02
			Max. Vy	35	-72.83	0.12	-0.01
			Max. Vx	37	4.61	0.00	0.00
			Max Tension	20	259.07	0.01	-0.00
T3	40 - 20	Secondary Horizontal	Max. Compression	21	-297.44	0.01	0.01
			Max. Mx	31	71.10	0.05	0.00
			Max. My	14	-148.32	0.01	0.01
			Max. Vy	33	48.51	0.05	0.00
			Max. Vx	38	-1.94	0.00	0.00
			Max Tension	15	77475.09	0.33	0.00
			Max. Compression	18	-86915.78	-0.49	-0.00
		Leg	Max. Mx	18	-86889.58	0.67	-0.00
			Max. My	20	-3097.33	-0.04	-0.35
			Max. Vy	18	357.71	0.67	-0.00
			Max. Vx	20	-168.77	-0.02	-0.35
			Max Tension	5	4277.73	0.08	-0.00
			Max. Compression	4	-4445.09	0.00	0.00
			Max. Mx	27	682.24	0.17	-0.02
Diagonal	Max. My	28	-1567.47	0.12	0.02		
	Max. Vy	27	-87.25	0.17	-0.02		
	Max. Vx	37	4.88	0.00	0.00		
	Max Tension	20	423.22	0.01	-0.00		
	Max. Compression	21	-468.05	0.01	0.01		
	Max. Mx	35	99.89	0.08	0.00		
	Max. My	14	-330.65	0.01	0.01		
T4	20 - 0	Leg	Max. Vy	35	57.15	0.08	0.00
			Max. Vx	38	-2.05	0.00	0.00
			Max Tension	15	96347.06	0.35	-0.00
			Max. Compression	18	-108782.25	0.00	-0.00
			Max. Mx	18	-101789.64	0.63	0.00
			Max. My	20	-3664.97	-0.05	-0.53
			Max. Vy	18	-354.34	0.61	-0.00
		Diagonal	Max. Vx	20	210.85	-0.05	-0.53
			Max Tension	5	4441.90	0.04	-0.00
			Max. Compression	4	-4650.31	0.00	0.00

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	37	133.35	0.12	-0.01
			Max. My	28	-1743.03	0.11	0.02
			Max. Vy	37	68.84	0.12	-0.01
			Max. Vx	28	3.78	0.00	0.00
		Secondary Horizontal	Max Tension	20	394.40	0.01	-0.00
			Max. Compression	21	-432.06	0.02	0.00
			Max. Mx	38	-39.52	0.09	0.01
			Max. My	37	-20.51	0.09	0.01
			Max. Vy	38	-56.56	0.09	0.01
			Max. Vx	38	-2.64	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	18	112452.31	11672.96	-6778.11
	Max. H _x	18	112452.31	11672.96	-6778.11
	Max. H _z	5	-86649.56	-8736.36	6046.44
	Min. Vert	7	-99175.73	-10413.87	6045.07
	Min. H _x	7	-99175.73	-10413.87	6045.07
Leg B	Min. H _z	18	112452.31	11672.96	-6778.11
	Max. Vert	10	111847.72	-11671.92	-6738.20
	Max. H _x	23	-99361.48	10425.83	6011.60
	Max. H _z	23	-99361.48	10425.83	6011.60
	Min. Vert	23	-99361.48	10425.83	6011.60
Leg A	Min. H _x	10	111847.72	-11671.92	-6738.20
	Min. H _z	10	111847.72	-11671.92	-6738.20
	Max. Vert	2	112115.49	-34.07	13491.82
	Max. H _x	21	3009.25	1687.26	221.63
	Max. H _z	2	112115.49	-34.07	13491.82
	Min. Vert	15	-99428.28	34.92	-12045.81
	Min. H _x	8	4217.90	-1695.02	327.72
	Min. H _z	15	-99428.28	34.92	-12045.81

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	10510.45	-0.00	0.00	0.78	2.76	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	12612.54	11.20	-22429.44	-1373.58	2.21	-0.76
0.9 Dead+1.6 Wind 0 deg - No Ice	9459.40	11.20	-22429.43	-1372.86	1.38	-0.75
1.2 Dead+1.6 Wind 30 deg - No Ice	12612.54	10643.07	-18434.32	-1145.45	-658.54	-0.97
0.9 Dead+1.6 Wind 30 deg - No Ice	9459.40	10643.06	-18434.32	-1144.88	-658.91	-0.96
1.2 Dead+1.6 Wind 60 deg - No Ice	12612.54	18091.21	-10457.90	-653.00	-1127.10	-0.72
0.9 Dead+1.6 Wind 60 deg - No Ice	9459.40	18091.21	-10457.90	-652.78	-1127.14	-0.72

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Maser Consulting P.A. 2000 Midlantic Drive Suite 100 Mount Laurel, NJ Phone: 856.797.0412 FAX: 856.722.1120</p>	Job	16963018A	Page	14 of 22
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<i>Load Combination</i>	<i>Vertical</i> lb	<i>Shear_x</i> lb	<i>Shear_z</i> lb	<i>Overturning Moment, M_x</i> kip-ft	<i>Overturning Moment, M_z</i> kip-ft	<i>Torque</i> kip-ft
Ice						
1.2 Dead+1.6 Wind 90 deg - No Ice	12612.89	21266.88	-11.42	-0.17	-1318.47	-0.33
0.9 Dead+1.6 Wind 90 deg - No Ice	9459.40	21266.72	-11.20	-0.41	-1318.38	-0.34
1.2 Dead+1.6 Wind 120 deg - No Ice	12612.54	19407.65	11205.01	687.24	-1185.36	-0.07
0.9 Dead+1.6 Wind 120 deg - No Ice	9459.40	19407.65	11205.01	686.52	-1185.36	-0.09
1.2 Dead+1.6 Wind 150 deg - No Ice	12612.88	10623.56	18423.36	1146.22	-656.59	0.63
0.9 Dead+1.6 Wind 150 deg - No Ice	9459.40	10623.66	18423.12	1145.18	-656.96	0.62
1.2 Dead+1.6 Wind 180 deg - No Ice	12612.54	-11.20	20896.40	1306.89	4.45	0.98
0.9 Dead+1.6 Wind 180 deg - No Ice	9459.40	-11.20	20896.40	1305.73	3.62	0.97
1.2 Dead+1.6 Wind 210 deg - No Ice	12612.54	-10643.06	18434.33	1147.33	665.19	0.97
0.9 Dead+1.6 Wind 210 deg - No Ice	9459.40	-10643.06	18434.32	1146.29	663.90	0.96
1.2 Dead+1.6 Wind 240 deg - No Ice	12612.54	-19418.86	11224.42	689.17	1193.13	0.83
0.9 Dead+1.6 Wind 240 deg - No Ice	9459.40	-19418.86	11224.42	688.46	1191.46	0.83
1.2 Dead+1.6 Wind 270 deg - No Ice	12612.89	-21266.88	10.99	2.07	1325.11	0.33
0.9 Dead+1.6 Wind 270 deg - No Ice	9459.40	-21266.72	11.20	1.83	1323.35	0.34
1.2 Dead+1.6 Wind 300 deg - No Ice	12612.54	-18080.00	-10438.49	-651.05	1132.62	-0.25
0.9 Dead+1.6 Wind 300 deg - No Ice	9459.40	-18080.00	-10438.49	-650.83	1130.99	-0.24
1.2 Dead+1.6 Wind 330 deg - No Ice	12612.88	-10623.91	-18423.16	-1144.32	663.25	-0.63
0.9 Dead+1.6 Wind 330 deg - No Ice	9459.40	-10623.66	-18423.12	-1143.75	661.96	-0.62
1.2 Dead+1.0 Ice+1.0 Temp	62815.42	-0.00	0.00	-7.44	0.06	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	62815.42	1.22	-4793.56	-304.00	-0.03	-0.67
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	62815.42	2350.38	-4070.98	-260.76	-146.16	-0.50
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	62815.42	4042.77	-2335.50	-153.08	-251.91	-0.18
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	62815.42	4698.65	-1.22	-7.57	-292.20	0.18
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	62815.42	4149.52	2395.72	140.73	-256.55	0.48
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	62815.42	2348.27	4069.76	245.75	-145.95	0.68
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	62815.42	-1.22	4668.89	283.62	0.21	0.68
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	62815.42	-2350.38	4070.98	245.87	146.34	0.50
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	62815.42	-4150.73	2397.83	140.94	256.85	0.19
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	62815.42	-4698.65	1.22	-7.32	292.38	-0.18
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	62815.42	-4041.55	-2333.39	-152.87	251.97	-0.50
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	62815.42	-2348.27	-4069.76	-260.64	146.13	-0.68

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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	10510.45	2.68	-5363.61	-327.76	2.50	-0.18
Dead+Wind 30 deg - Service	10510.45	2545.10	-4408.25	-273.23	-155.43	-0.23
Dead+Wind 60 deg - Service	10510.45	4326.20	-2500.83	-155.52	-267.43	-0.17
Dead+Wind 90 deg - Service	10510.45	5085.57	-2.68	0.52	-313.17	-0.08
Dead+Wind 120 deg - Service	10510.45	4641.01	2679.49	164.83	-281.36	-0.02
Dead+Wind 150 deg - Service	10510.45	2540.46	4405.57	274.53	-154.97	0.15
Dead+Wind 180 deg - Service	10510.45	-2.68	4997.01	312.94	3.03	0.23
Dead+Wind 210 deg - Service	10510.45	-2545.10	4408.25	274.79	160.96	0.23
Dead+Wind 240 deg - Service	10510.45	-4643.68	2684.13	165.29	287.16	0.20
Dead+Wind 270 deg - Service	10510.45	-5085.57	2.68	1.05	318.71	0.08
Dead+Wind 300 deg - Service	10510.45	-4323.52	-2496.19	-155.06	272.69	-0.06
Dead+Wind 330 deg - Service	10510.45	-2540.46	-4405.57	-272.96	160.50	-0.15

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	-0.00	-10510.45	0.00	0.00	10510.45	-0.00	0.000%
2	11.20	-12612.54	-22429.43	-11.20	12612.54	22429.44	0.000%
3	11.20	-9459.40	-22429.43	-11.20	9459.40	22429.43	0.000%
4	10643.06	-12612.54	-18434.32	-10643.07	12612.54	18434.32	0.000%
5	10643.06	-9459.40	-18434.32	-10643.06	9459.40	18434.32	0.000%
6	18091.21	-12612.54	-10457.90	-18091.21	12612.54	10457.90	0.000%
7	18091.21	-9459.40	-10457.90	-18091.21	9459.40	10457.90	0.000%
8	21266.72	-12612.54	-11.20	-21266.88	12612.89	11.42	0.002%
9	21266.72	-9459.40	-11.20	-21266.72	9459.40	11.20	0.000%
10	19407.65	-12612.54	11205.01	-19407.65	12612.54	-11205.01	0.000%
11	19407.65	-9459.40	11205.01	-19407.65	9459.40	-11205.01	0.000%
12	10623.66	-12612.54	18423.12	-10623.56	12612.88	-18423.36	0.002%
13	10623.66	-9459.40	18423.12	-10623.66	9459.40	-18423.12	0.000%
14	-11.20	-12612.54	20896.40	11.20	12612.54	-20896.40	0.000%
15	-11.20	-9459.40	20896.40	11.20	9459.40	-20896.40	0.000%
16	-10643.06	-12612.54	18434.32	10643.06	12612.54	-18434.33	0.000%
17	-10643.06	-9459.40	18434.32	10643.06	9459.40	-18434.32	0.000%
18	-19418.86	-12612.54	11224.42	19418.86	12612.54	-11224.42	0.000%
19	-19418.86	-9459.40	11224.42	19418.86	9459.40	-11224.42	0.000%
20	-21266.72	-12612.54	11.20	21266.88	12612.89	-10.99	0.002%
21	-21266.72	-9459.40	11.20	21266.72	9459.40	-11.20	0.000%
22	-18080.00	-12612.54	-10438.49	18080.00	12612.54	10438.49	0.000%
23	-18080.00	-9459.40	-10438.49	18080.00	9459.40	10438.49	0.000%
24	-10623.66	-12612.54	-18423.12	10623.91	12612.88	18423.16	0.002%
25	-10623.66	-9459.40	-18423.12	10623.66	9459.40	18423.12	0.000%
26	-0.00	-62815.42	0.00	0.00	62815.42	-0.00	0.000%
27	1.22	-62815.42	-4793.56	-1.22	62815.42	4793.56	0.000%
28	2350.38	-62815.42	-4070.98	-2350.38	62815.42	4070.98	0.000%
29	4042.77	-62815.42	-2335.50	-4042.77	62815.42	2335.50	0.000%
30	4698.65	-62815.42	-1.22	-4698.65	62815.42	1.22	0.000%
31	4149.52	-62815.42	2395.72	-4149.52	62815.42	-2395.72	0.000%
32	2348.27	-62815.42	4069.76	-2348.27	62815.42	-4069.76	0.000%
33	-1.22	-62815.42	4668.89	1.22	62815.42	-4668.89	0.000%
34	-2350.38	-62815.42	4070.98	2350.38	62815.42	-4070.98	0.000%
35	-4150.74	-62815.42	2397.83	4150.73	62815.42	-2397.83	0.000%
36	-4698.65	-62815.42	1.22	4698.65	62815.42	-1.22	0.000%
37	-4041.55	-62815.42	-2333.39	4041.55	62815.42	2333.39	0.000%
38	-2348.27	-62815.42	-4069.76	2348.27	62815.42	4069.76	0.000%
39	2.68	-10510.45	-5363.61	-2.68	10510.45	5363.61	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
40	2545.10	-10510.45	-4408.25	-2545.10	10510.45	4408.25	0.000%
41	4326.20	-10510.45	-2500.83	-4326.20	10510.45	2500.83	0.000%
42	5085.57	-10510.45	-2.68	-5085.57	10510.45	2.68	0.000%
43	4641.01	-10510.45	2679.49	-4641.01	10510.45	-2679.49	0.000%
44	2540.46	-10510.45	4405.57	-2540.46	10510.45	-4405.57	0.000%
45	-2.68	-10510.45	4997.01	2.68	10510.45	-4997.01	0.000%
46	-2545.10	-10510.45	4408.25	2545.10	10510.45	-4408.25	0.000%
47	-4643.68	-10510.45	2684.13	4643.68	10510.45	-2684.13	0.000%
48	-5085.57	-10510.45	2.68	5085.57	10510.45	-2.68	0.000%
49	-4323.52	-10510.45	-2496.19	4323.52	10510.45	2496.19	0.000%
50	-2540.46	-10510.45	-4405.57	2540.46	10510.45	4405.57	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000194
7	Yes	4	0.00000001	0.00000180
8	Yes	4	0.00000001	0.00000215
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000213
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000197
15	Yes	4	0.00000001	0.00000183
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000216
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000197
23	Yes	4	0.00000001	0.00000183
24	Yes	4	0.00000001	0.00000213
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000668
28	Yes	4	0.00000001	0.00000653
29	Yes	4	0.00000001	0.00000650
30	Yes	4	0.00000001	0.00000648
31	Yes	4	0.00000001	0.00000662
32	Yes	4	0.00000001	0.00000680
33	Yes	4	0.00000001	0.00000699
34	Yes	4	0.00000001	0.00000702
35	Yes	4	0.00000001	0.00000704
36	Yes	4	0.00000001	0.00000705
37	Yes	4	0.00000001	0.00000706
38	Yes	4	0.00000001	0.00000689
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001

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41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 80	2.275	47	0.1845	0.0129
T1	80 - 60	1.496	47	0.1667	0.0077
T2	60 - 40	0.843	47	0.1283	0.0016
T3	40 - 20	0.380	47	0.0866	0.0008
T4	20 - 0	0.104	47	0.0382	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	5' Sector Frame T-arm	47	2.275	0.1845	0.0129	138166
90.00	(2) LPA-70063-8CF-EDIN-X	47	1.877	0.1776	0.0105	69083

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 80	9.338	18	0.7458	0.0543
T1	80 - 60	6.175	18	0.6805	0.0321
T2	60 - 40	3.492	18	0.5288	0.0068
T3	40 - 20	1.577	18	0.3586	0.0032
T4	20 - 0	0.433	18	0.1588	0.0015

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	5' Sector Frame T-arm	18	9.338	0.7458	0.0543	37807

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
90.00	(2) LPA-70063-8CF-EDIN-X	18	7.725	0.7216	0.0441	18903

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
L1	100	Latticed Pole Leg	A325N	0.6250	4	4502.96	20708.70	0.217 ✓	1	Bolt Tension
		Latticed Pole Diagonal	A325N	0.5000	1	3499.83	4132.50	0.847 ✓	1	Member Bearing
		Latticed Pole Top Girt	A325N	0.5000	1	549.56	4132.50	0.133 ✓	1	Member Bearing
T1	80	Leg	A325N	0.6250	4	9648.50	20708.70	0.466 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3070.11	4132.50	0.743 ✓	1	Member Bearing
T2	60	Leg	A325N	0.7500	4	14385.30	29820.60	0.482 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4010.57	7952.16	0.504 ✓	1	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	259.07	7830.00	0.033 ✓	1	Member Bearing
T3	40	Leg	A325N	0.8750	4	19349.60	40589.10	0.477 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4445.09	7952.16	0.559 ✓	1	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	423.22	7830.00	0.054 ✓	1	Member Bearing
T4	20	Leg	A325N	0.8750	4	24068.10	40589.10	0.593 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4441.90	6198.75	0.717 ✓	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	394.40	7830.00	0.050 ✓	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	Mast Stability Index	P _u lb	φP _n lb	Ratio P _u / φP _n
L1	100 - 80	P2.4"x0.165"	20.00	3.93	59.5 K=1.00	1.1585	1.00	-17933.40	40241.90	0.446 ¹ ✓
T1	80 - 60	P2.9x0.214"	20.03	4.01	50.5 K=1.00	1.8058	1.00	-42904.00	67450.70	0.636 ¹ ✓
T2	60 - 40	ROHN 2.5 X-STR	20.03	3.45	44.8 K=1.00	2.2535	1.00	-64061.70	87567.00	0.732 ¹ ✓
T3	40 - 20	ROHN 3 STD	20.03	3.43	35.4 K=1.00	2.2285	1.00	-86915.80	91506.00	0.950 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	Mast Stability Index	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T4	20 - 0	ROHN 3 X-STR	20.03	3.42	36.1 K=1.00	3.0159	1.00	-108782.00	123382.00	0.882 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 lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 80	L1 1/2x1 1/2x1/8	7.61	3.59	145.3 K=1.00	0.3594	-3516.49	3847.02	0.914 ¹ ✓
T1	80 - 60	L2x2x1/8	9.27	4.51	136.1 K=1.00	0.4844	-3097.44	5905.11	0.525 ¹ ✓
T2	60 - 40	L3x3x1/4	12.24	6.08	123.2 K=1.00	1.4400	-4010.57	20980.80	0.191 ¹ ✓
T3	40 - 20	L3x3x1/4	14.00	6.93	140.4 K=1.00	1.4400	-4445.09	16508.10	0.269 ¹ ✓
T4	20 - 0	L2 1/2x2 1/2x3/16	15.83	7.84	190.0 K=1.00	0.9020	-4650.31	5643.59	0.824 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 lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	60 - 40	L2x2x3/16	10.26	9.78	190.2 K=1.00	0.7150	-297.44	4466.19	0.067 ¹ ✓
T3	40 - 20	L2x2x3/16	12.30	11.77	229.0 K=1.00	0.7150	-468.05	3081.31	0.152 ¹ ✓
T4	20 - 0	L2x2x3/16	13.67	13.14	255.5 K=1.00	0.7150	-432.06	2474.72	0.175 ¹ ✓

KL/R > 250 (C) - 149

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 80	L2x2x1/8	6.52	6.11	184.5 K=1.00	0.4844	-534.55	3214.31	0.166 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 lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 80	P2.4"x0.165"	20.00	0.08	1.3	1.1585	18011.90	52134.30	0.345 ¹ ✓
T1	80 - 60	P2.9x0.214"	20.03	4.01	50.5	1.8058	38594.00	81261.00	0.475 ¹ ✓
T2	60 - 40	ROHN 2.5 X-STR	20.03	3.23	41.9	2.2535	57600.60	101409.00	0.568 ¹ ✓
T3	40 - 20	ROHN 3 STD	20.03	3.25	33.5	2.2285	77475.10	100281.00	0.773 ¹ ✓
T4	20 - 0	ROHN 3 X-STR	20.03	3.26	34.4	3.0159	96347.10	135717.00	0.710 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 lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 80	L1 1/2x1 1/2x1/8	7.61	3.59	95.2	0.2109	3499.83	9175.78	0.381 ¹ ✓
T1	80 - 60	L2x2x1/8	8.90	4.33	84.9	0.3047	3070.11	13253.90	0.232 ¹ ✓
T2	60 - 40	L3x3x1/4	12.24	6.08	79.8	0.9628	3826.62	41882.30	0.091 ¹ ✓
T3	40 - 20	L3x3x1/4	14.00	6.93	90.7	0.9628	4277.73	41882.30	0.102 ¹ ✓
T4	20 - 0	L2 1/2x2 1/2x3/16	15.83	7.84	122.5	0.5886	4441.90	25604.50	0.173 ¹ ✓

¹ P_u / φP_n controls

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Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	60 - 40	L2x2x3/16	10.26	9.78	194.8	0.4308	259.07	18739.00	0.014 ¹
T3	40 - 20	L2x2x3/16	12.30	11.77	233.6	0.4308	423.22	18739.00	0.023 ¹
T4	20 - 0	L2x2x3/16	13.67	13.14	260.1	0.4308	394.40	18739.00	0.021 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 80	L2x2x1/8	6.52	6.11	121.1	0.3047	549.56	13253.90	0.041 ¹

¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	φP _{allow} lb	% Capacity	Pass Fail
L1	100 - 80	Latticed Pole Leg	P2.4"x0.165"	1	-17933.40	40241.90	44.6	Pass
		Latticed Pole Diagonal	L1 1/2x1 1/2x1/8	7	-3516.49	3847.02	91.4	Pass
		Latticed Pole Top Girt	L2x2x1/8	5	-534.55	3214.31	16.6	Pass
T1	80 - 60	Leg	P2.9x0.214"	37	-42904.00	67450.70	63.6	Pass
		Diagonal	L2x2x1/8	41	-3097.44	5905.11	52.5	Pass
T2	60 - 40	Leg	ROHN 2.5 X-STR	70	-64061.70	87567.00	73.2	Pass
		Diagonal	L3x3x1/4	77	-4010.57	20980.80	19.1	Pass
		Secondary Horizontal	L2x2x3/16	80	-297.44	4466.19	6.7	Pass
T3	40 - 20	Leg	ROHN 3 STD	100	-86915.80	91506.00	95.0	Pass
		Diagonal	L3x3x1/4	107	-4445.09	16508.10	26.9	Pass
		Secondary Horizontal	L2x2x3/16	110	-468.05	3081.31	15.2	Pass
T4	20 - 0	Leg	ROHN 3 X-STR	130	-108782.00	123382.00	88.2	Pass
		Diagonal	L2 1/2x2 1/2x3/16	137	-4650.31	5643.59	82.4	Pass
		Secondary Horizontal	L2x2x3/16	149	-432.06	2474.72	17.5	Pass
Summary								
Latticed Pole Leg (L1)							44.6	Pass
Latticed Pole Diagonal							91.4	Pass

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<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Size</i>	<i>Critical Element</i>	<i>P lb</i>	<i>ϕP_{allow} lb</i>	<i>% Capacity</i>	<i>Pass Fail</i>
						(L1)		
						Latticed Pole Top Girt (L1)	16.6	Pass
						Leg (T3)	95.0	Pass
						Diagonal (T4)	82.4	Pass
						Secondary Horizontal (T4)	17.5	Pass
						Bolt Checks	84.7	Pass
						RATING =	95.0	Pass