EMPIRE telecom
A QualTek Company

December 19, 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, Windsor Locks, CT 06078

Dear Ms. Bachman:

Enclosed please find and 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

EMPIRE telecom
A QualTek Company

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 16, 2016

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

NOTICE OF EXEMPT MODIFICATION

55 King Spring Road, Windsor Locks, 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 Windsor Locks, 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.

EBI Consulting
environmental | engineering | due diligence

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
Windsor Locks, CT 06078

December 16, 2016

EBI Project Number: 6216005035

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

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

December 16, 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, Windsor Locks, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **55 King Spring Road, Windsor Locks, 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.

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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 ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	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:	6.93%

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.

at&t

SITE NAME: SUFFIELD SOUTH
PROJECT LTE2C
FA NUMBER: 10071274
SITE NUMBER: CT5400
55 KING SPRING ROAD
WINDSOR LOCKS, 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@EMPIRETELCOMM.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 MATEEN
E-MAIL:	MM093Q@ATT.COM

SITE INFORMATION

APPLICANT/LESSEE

at&t

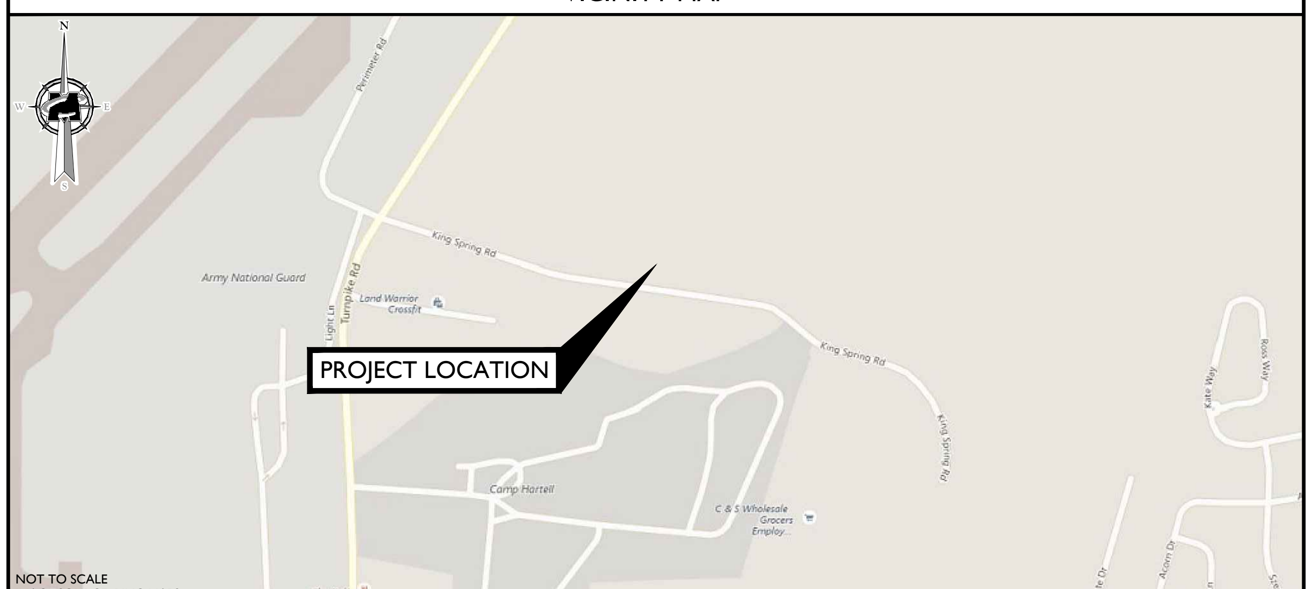
NEW CINGULAR WIRELESS PCS, LLC
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

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:	IIB
USE GROUP:	U

VICINITY MAP



NOT TO SCALE
IMAGE SOURCE: BING MAPS

DRIVING DIRECTIONS

DIRECTIONS FROM AT&T OFFICE AT 550 COCHITUATE ROAD, FARMINGHAM, 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
2. NATIONAL ELECTRIC CODE 2014
3. NATIONAL FIRE PROTECTION ASSOCIATION 70 - 2014
4. LIGHTNING PROTECTION CODE 201
5. AMERICAN CONCRETE INSTITUTE 318
6. AMERICAN INSTITUTE OF STEEL CONSTRUCTION 360-10
7. EIA/TIA-222 REVISION G
8. TIA 607 FOR GROUNDING
9. INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS 81
10. IEEE C2 LATEST EDITION
11. TELCORDIA GR-1275 12. 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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16 ESQUIRE ROAD
BILLERICA, MA 01862

at&t

NEW CINGULAR WIRELESS PCS, LLC
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

811 Know what's below. Call before you dig.

PROTECT YOURSELF
ALL STATES REQUIRE NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN ANY STATE

FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT:
WWW.CALL811.COM

SCALE :	JOB NUMBER :
AS SHOWN	16963018A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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1	12/15/16	REVISED PER COMMENTS	RA	MPC
0	11/08/16	ISSUED FOR CONST.	AJC	MPC
A	11/02/16	ISSUED FOR REVIEW	AJC	MPC

STATE OF CONNECTICUT
FRANK E. PAZDEN
PROFESSIONAL ENGINEER
LICENSED

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.28188

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

SITE NAME:

SUFFIELD SOUTH
FA10071274
CT5400

55 KING SPRING ROAD
WINDSOR LOCKS, CT 06078
HARTFORD COUNTY

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

SHEET TITLE :
TITLE SHEET

SHEET NUMBER :
T-1

GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5O HMS OR LESS.
4. THE SUBCONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
5. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
6. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
7. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE EQUIPMENT GROUND RING WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK TO BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE #2 AWG SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
10. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
11. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. ALL BENDS SHALL BE MADE WITH 12" RADIUS OR LARGER.
12. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
13. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS EXCEPT FOR GROUND BAR CONNECTION FROM MGB TO OUTSIDE EXTERIOR GROUND SHALL ALL BE CADWELD CONNECTIONS.
14. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
15. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED TO THE TOWER GROUND BAR.
16. APPROVED ANTIOXIDANT COATINGS (I.E. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
17. ALL EXTERIOR AND INTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
18. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
19. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF MAIN GROUND WIRES WITH 1-#2 AWG TIN-PLATED COPPER GROUND CONDUCTOR.
20. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G. NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
21. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/4" IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50.
22. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

    CONTRACTOR - EMPIRE TELECOM
    SUBCONTRACTOR - GENERAL CONTRACTOR (CONSTRUCTION)
    OWNER - AT&T (NEW CINGULAR WIRELESS PCS, LLC)

23. ALL SITE WORK SHALL BE COMPLETED AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
24. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
25. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
26. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
27. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
28. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
29. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
30. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
31. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
32. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE RESPONSIBLE ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING & EXCAVATION.
33. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, AS DIRECTED BY THE RESPONSIBLE ENGINEER, AND SUBJECT TO THE APPROVAL OF THE OWNER AND/OR LOCAL UTILITIES.
34. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION.
35. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
36. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
37. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
38. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.
39. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
40. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE.
41. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
42. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTOR.
43. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
44. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
45. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS.
46. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
47. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."
48. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
49. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION, ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
50. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN ALERT OF DANGEROUS EXPOSURE LEVELS.

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STATE OF CONNECTICUT
FRANK E. PAZDEN
LICENSED PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.28188

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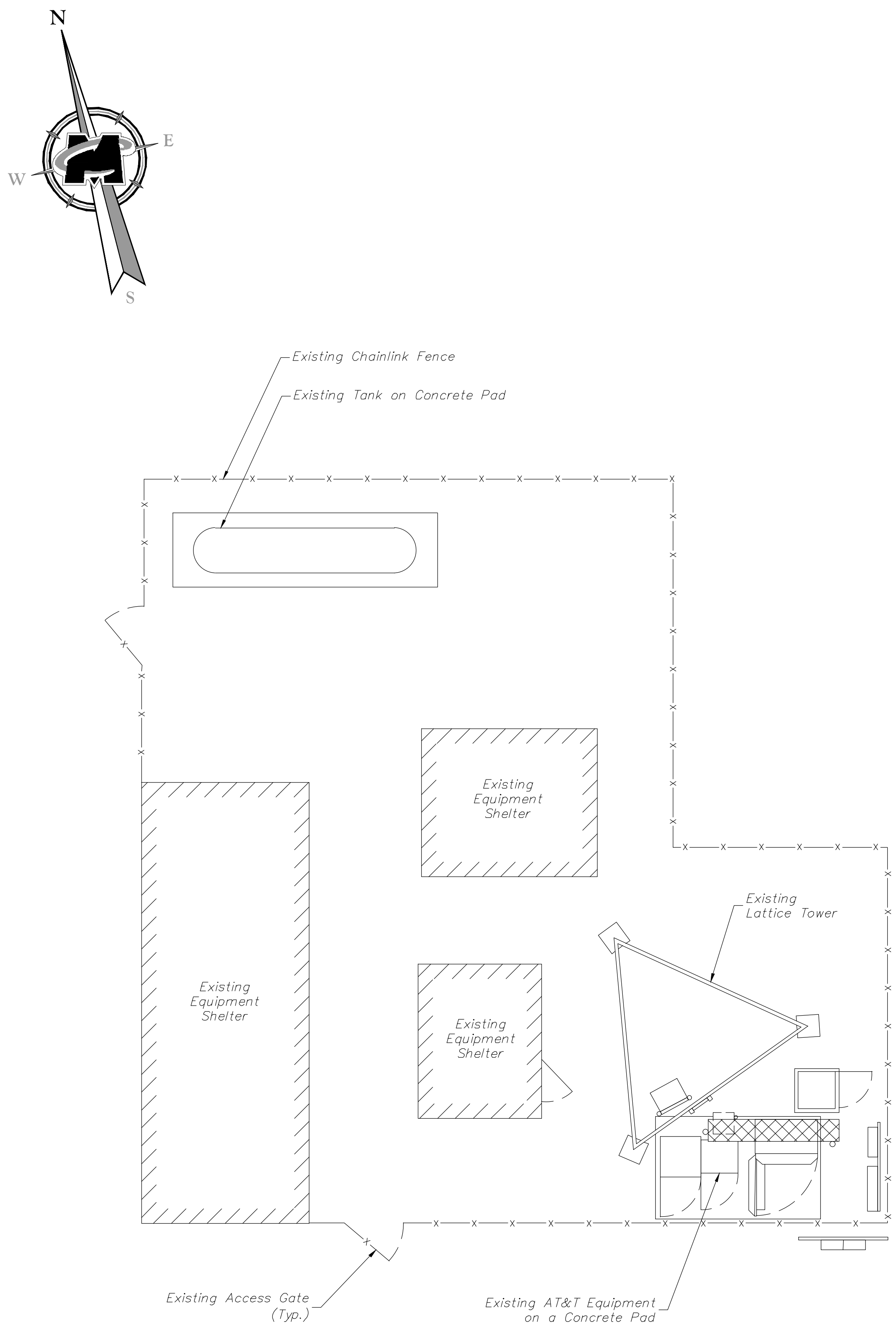
SHEET TITLE :

GENERAL NOTES

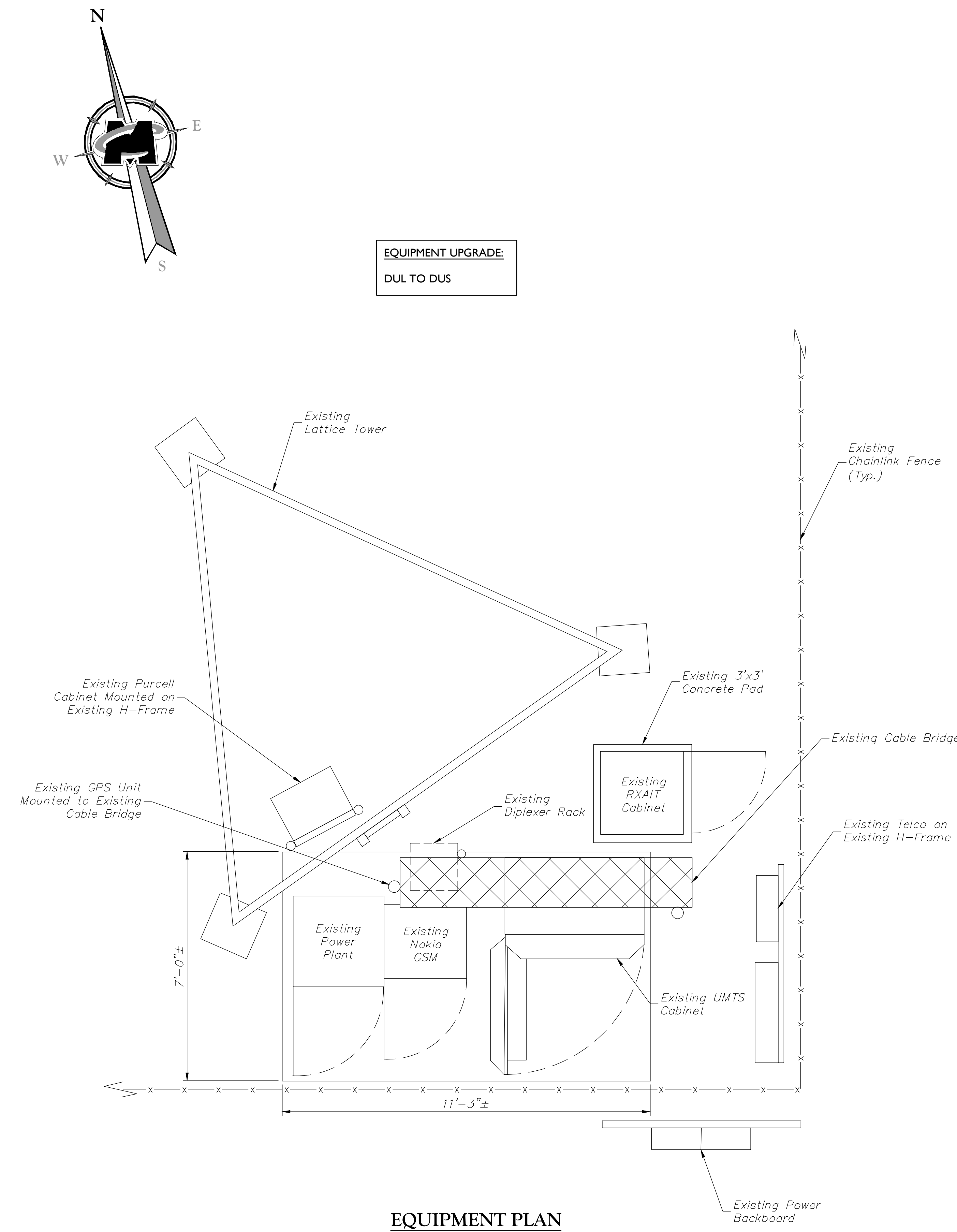
SHEET NUMBER :

GN-1



COMPOUND PLAN

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



EQUIPMENT PLAN

SCALE : 1" = 2'
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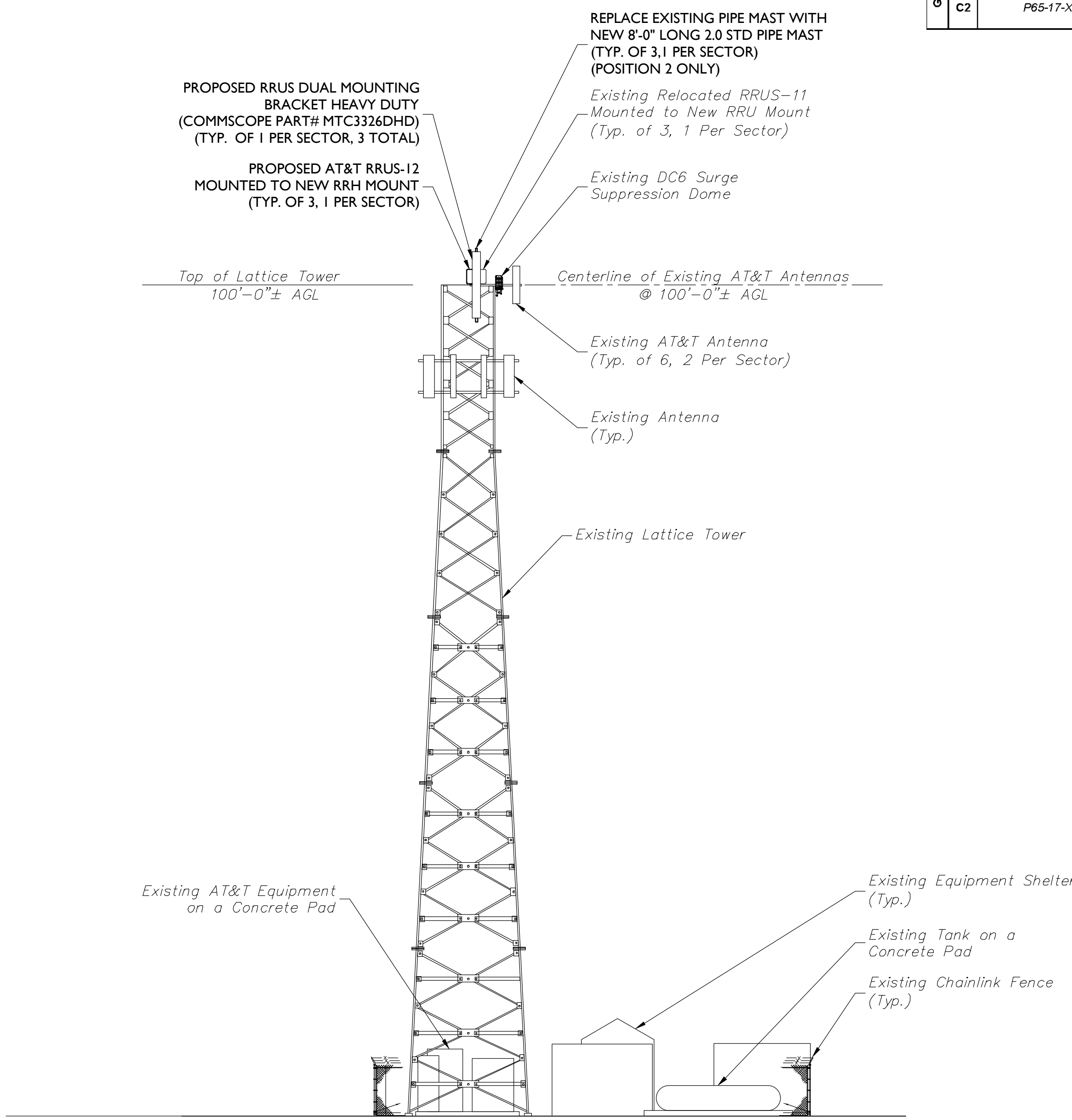
SHEET TITLE :
COMPOUND PLAN AND EQUIPMENT PLAN

SHEET NUMBER :
A-1

PROPOSED ANTENNA AND RRUS CONFIGURATION													
SECTOR		EXISTING ANTENNA CONFIGURATION	PROPOSED ANTENNA CONFIGURATION	TECHNOLOGY	ANTENNA STATUS	HEIGHT (in)	WIDTH (in)	DEPTH (in)	WEIGHT (lbs)	ANTENNA AZIMUTH	ANT. CL. ELEV (ft.)	RRUS/TMA CONFIGURATION	STATUS
ALPHA	A1	800-10121	800-10121	GSM/UMTS	REMAIN	54.90	10.30	5.90	51.20	50°	100'	(2) LGP 21401 TMA's	REMAIN
	A2	P65-17-XLH-RR	P65-17-XLH-RR	LTE	REMAIN	96.00	12.00	6.00	70.00	50°	100'	RRUS-12 RRUS-11	NEW REMAIN
BETA	B1	800-10121	800-10121	GSM/UMTS	REMAIN	54.90	10.30	5.90	51.20	160°	100'	(2) LGP 21401 TMA's	REMAIN
	B2	AM-X-CD-14-65-00T-RET	AM-X-CD-14-65-00T-RET	LTE	REMAIN	48.00	11.90	5.90	30.80	160°	100'	RRUS-12 RRUS-11	NEW REMAIN
GAMMA	C1	800-10121	800-10121	GSM/UMTS	REMAIN	54.90	10.30	5.90	51.20	290°	100'	(2) LGP 21401 TMA's	REMAIN
	C2	P65-17-XLH-RR	P65-17-XLH-RR	LTE	REMAIN	96.00	12.00	6.00	70.00	290°	100'	RRUS-12 RRUS-11	NEW REMAIN

ANTENNA SCHEDULE



ELEVATION VIEW

20 16 12 8 4 0 10 20 40

SCALE : 1" = 20'
(DO NOT SCALE 11"X17" DRAWINGS)

STRUCTURAL NOTES:

1. NO CONSTRUCTION OF THE PROPOSED LOADING SHOWN SHALL PROCEED UNTIL ADEQUACY OF THE EXISTING STRUCTURE AND FOUNDATION, INCLUDING THE PROPOSED AT&T ANTENNA MOUNTING CONFIGURATION SHOWN HEREIN, HAS BEEN COMPLETED.
2. THE STRUCTURE ELEVATION IS SHOWN FOR INFORMATIONAL PURPOSES ONLY AND MAY NOT REFLECT AS-BUILT FIELD CONDITIONS FOR ALL EXISTING INVENTORY LOADING/ANTENNAS/APPURTANENCES ON STRUCTURE. REFER TO THE LATEST STRUCTURAL ANALYSIS FOR EXISTING STRUCTURE LOADING AND THE PROPOSED METHOD OF ATTACHMENT OF THE PROPOSED ANTENNAS/CABLES.
3. THE CONTRACTOR IS RESPONSIBLE TO CONFIRM THAT ANY IMPROVEMENTS AND REINFORCEMENTS REQUIRED BY THE STRUCTURAL ANALYSIS CERTIFICATION ARE PROPERLY INSTALLED PRIOR TO THE ADDITION OF ANTENNAS, CABLES, SUPPORTS AND APPURTENANCES PROPOSED ON THESE DRAWINGS OR OTHERWISE NOTED IN THE STRUCTURAL ANALYSIS.

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FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.28188

SITE NAME:

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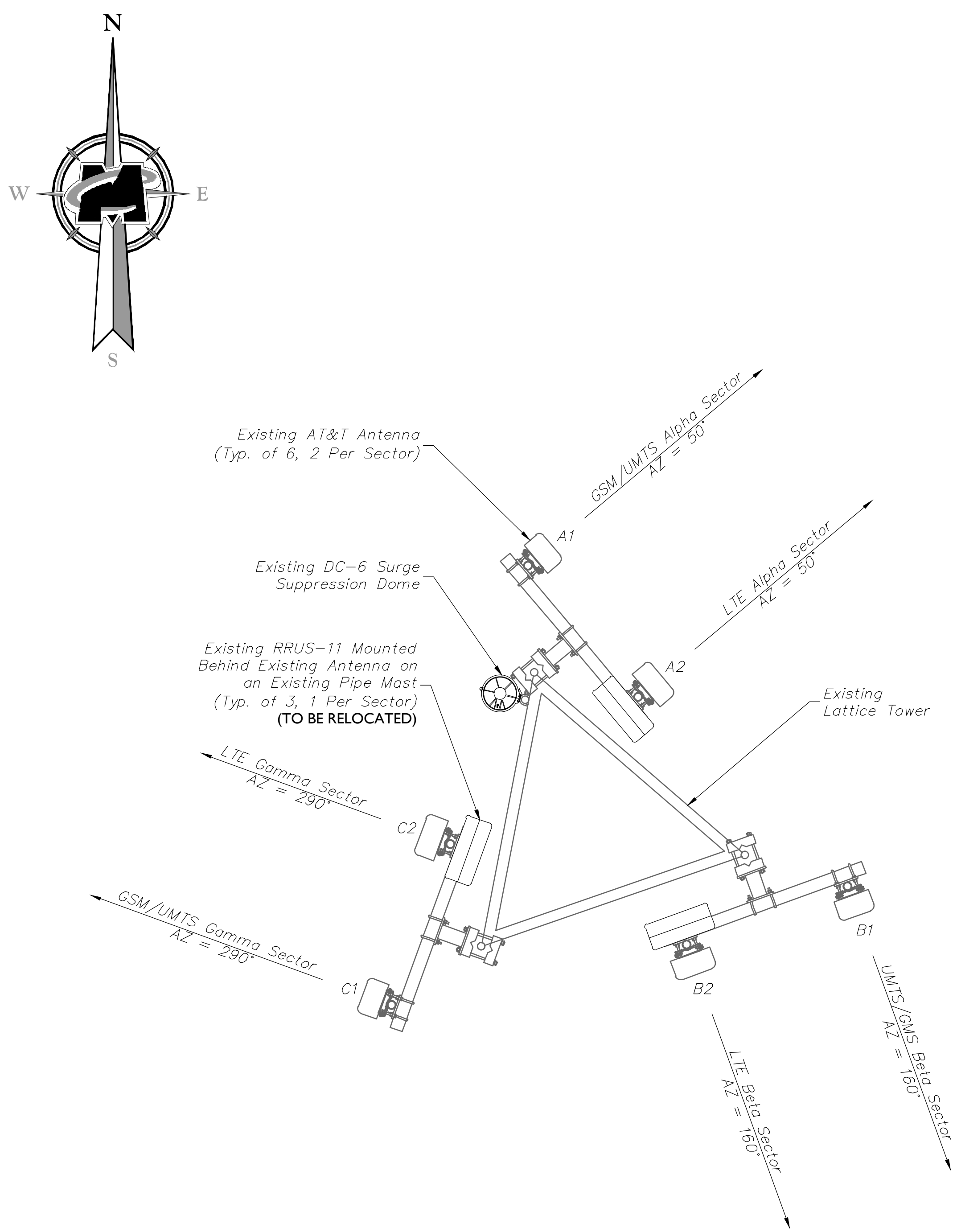
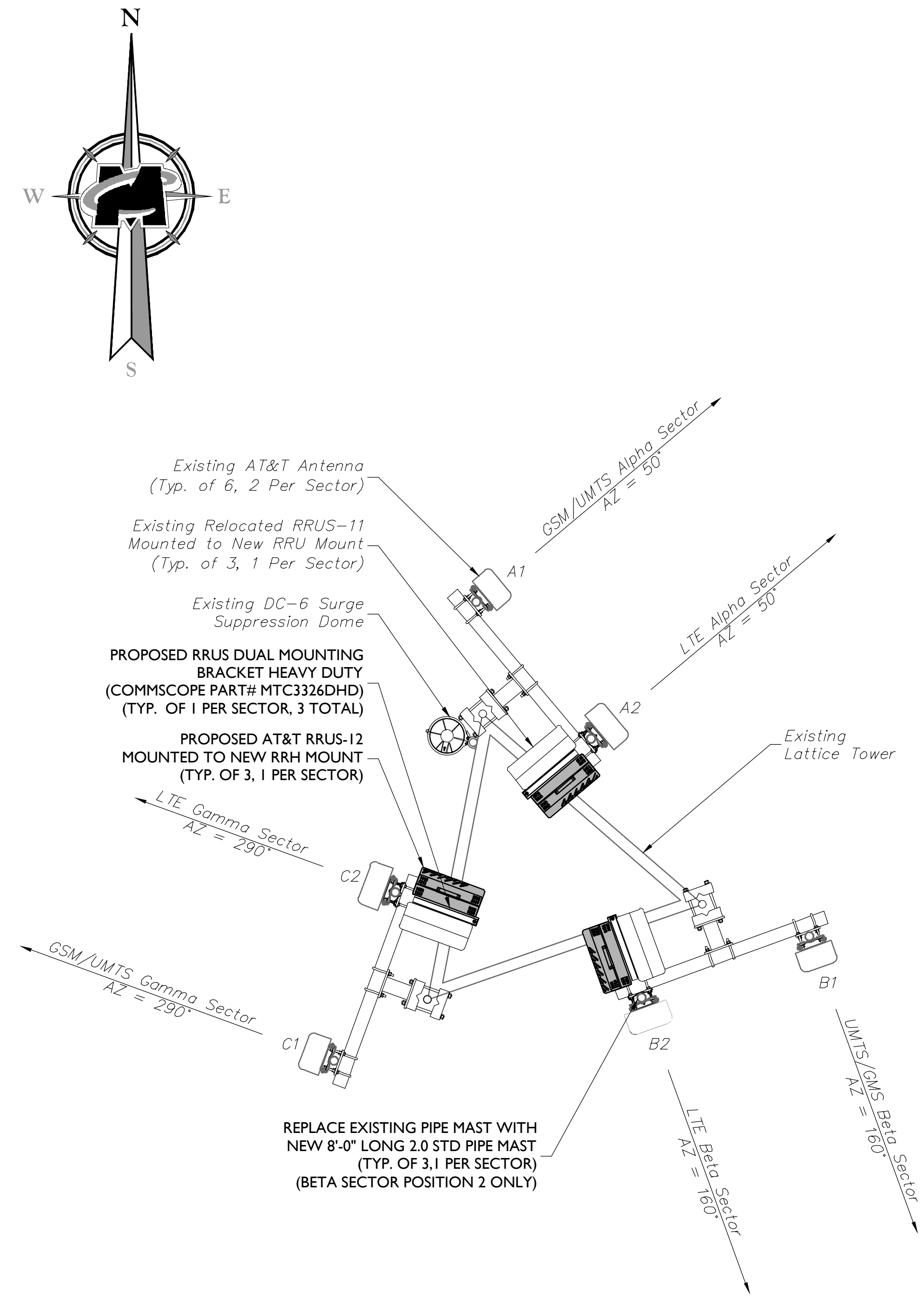
SHEET TITLE :
ELEVATION VIEW AND ANTENNA SCHEDULE

SHEET NUMBER :
A-2



EXISTING - ANTENNA LAYOUT
NOT TO SCALE



PROPOSED - ANTENNA LAYOUT
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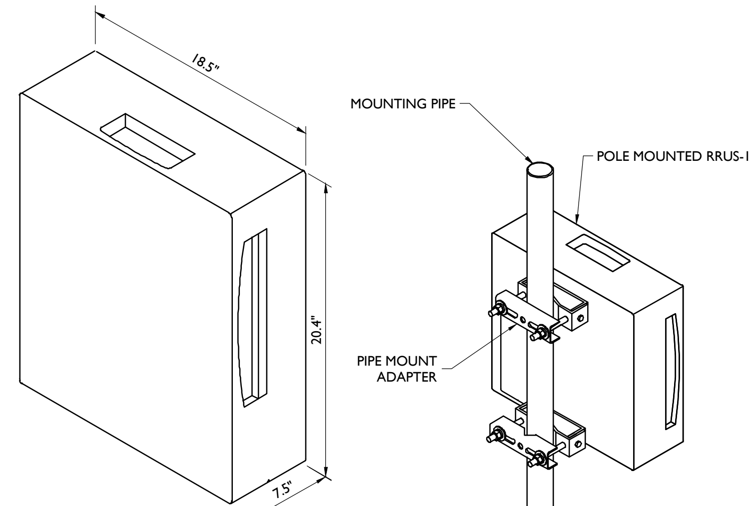
SHEET TITLE :
ANTENNA LAYOUTS

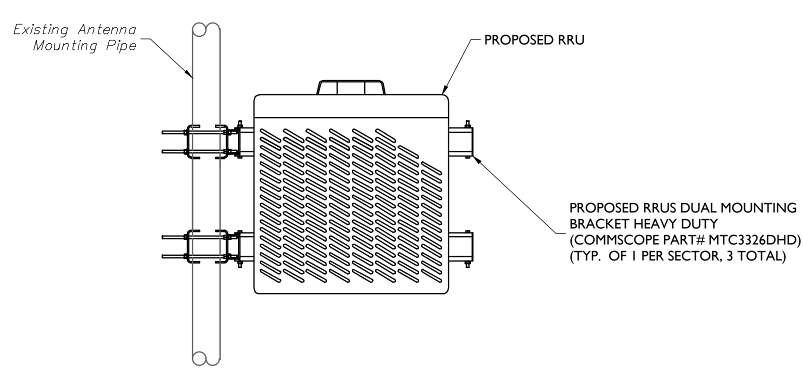
SHEET NUMBER :
A-3



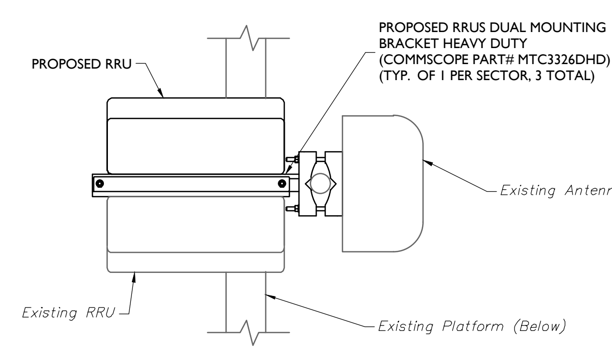
RRUS−12 DIMENSIONS (H X W X D): 20.4" X 18.5" X 7.5" (INCLUDES SUNSHIELD)
WEIGHT: 58 LBS

RRUS-12 DETAIL

NOT TO SCALE



ELEVATION VIEW



PLAN VIEW

RRUS MOUNTING DETAIL

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STATE OF CONNECTICUT · FRANK E. PAZDEN · No. 28188 · LICENSED · PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL
ENGINEER - LICENSE NUMBER: PEN.28188

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SHEET TITLE :
DETAILS

SHEET NUMBER :
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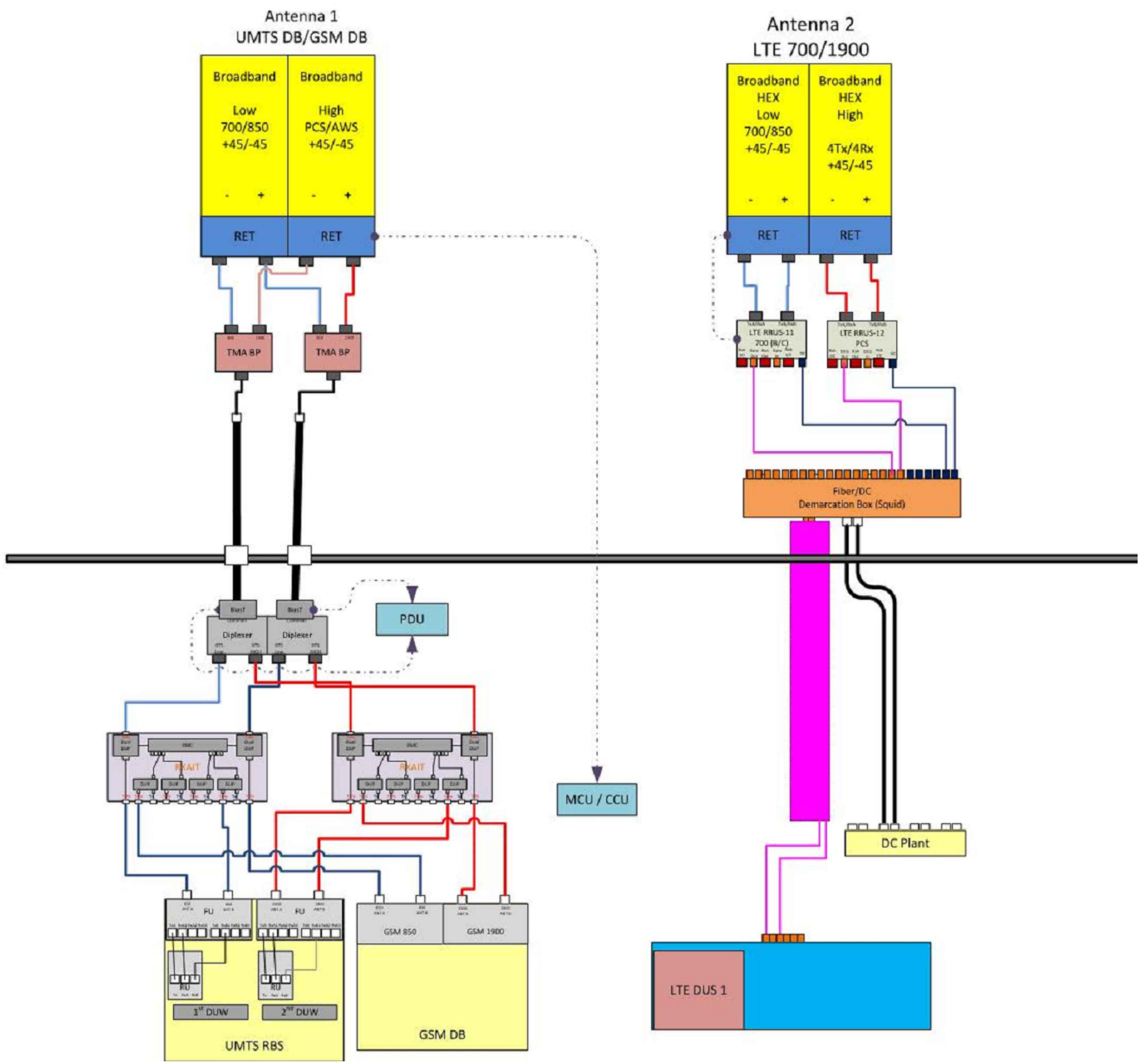

(TYP. OF ALL SECTORS)

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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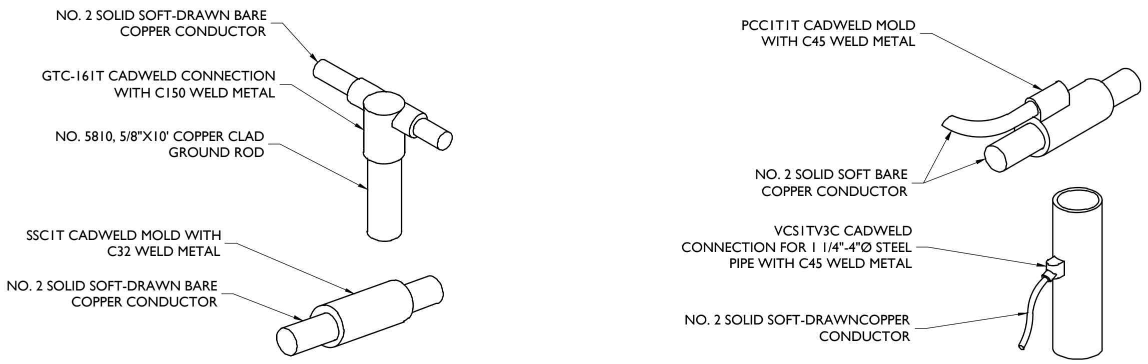

CADWELD DETAILS

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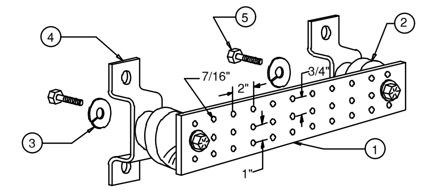


LEGEND

1- TINNED COPPER GROUND BAR, 1/4"x4"x20", NEWTON INSTRUMENT CO. CAT. NO. B-6142 OR EQUAL. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.

2- INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4

3- 5/8" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8

4- WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-5056

5- 5/8-11 X 1" HHCS BOLTS, NEWTON INSTRUMENT CO. CAT NO. 3012-1

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

SECTION "P" - SURGE PRODUCERS

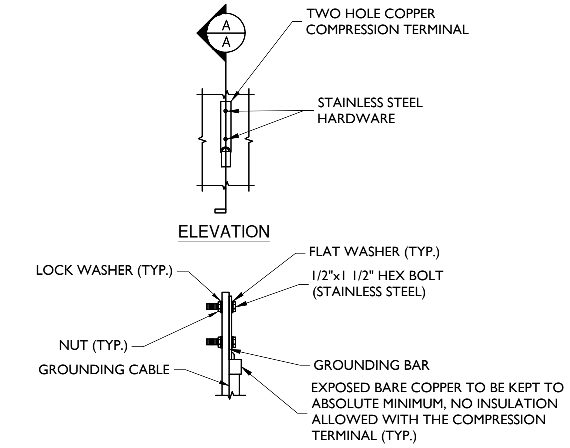
CABLE ENTRY PORTS (HATCH PLATES) (#2)
GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
TELCO GROUND BAR
COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
+24V POWER SUPPLY RETURN BAR (#2)
-48V POWER SUPPLY RETURN BAR (#2)
RECTIFIER FRAMES.

SECTION "A" - SURGE ABSORBERS

INTERIOR GROUND RING (#2)
EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
BUILDING STEEL (IF AVAILABLE) (#2)

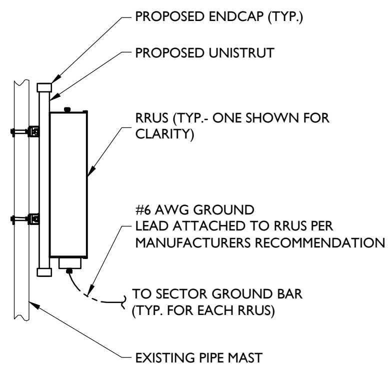
MASTER GROUND BAR

NOT TO SCALE



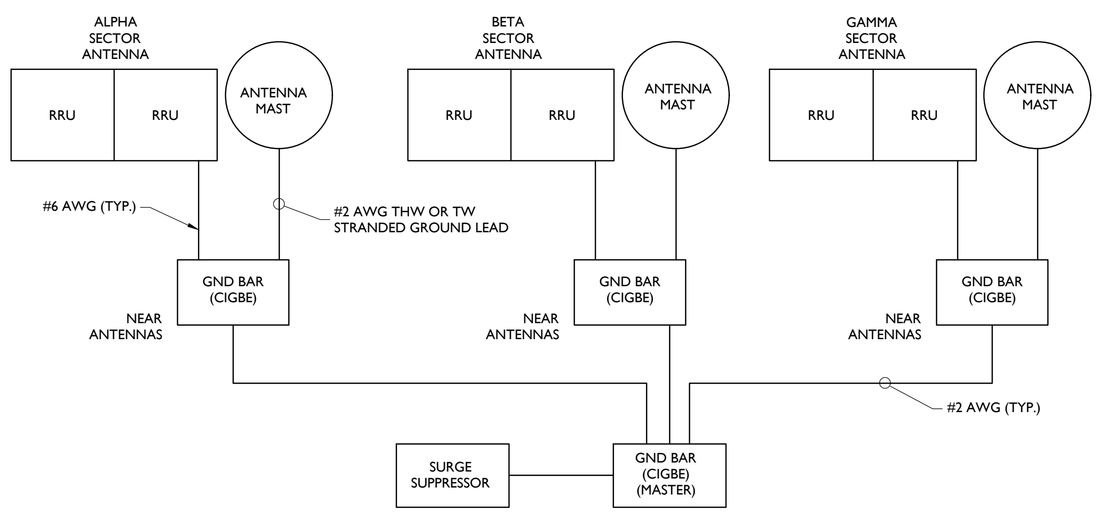
TYPICAL GROUND BAR CONNECTION DETAIL

NOT TO SCALE



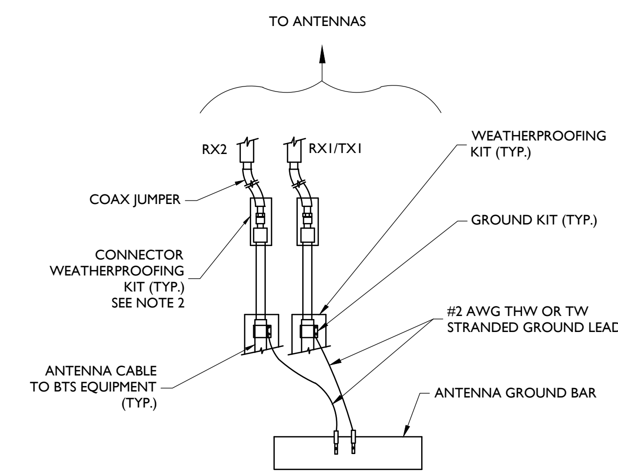
RRH GROUNDING

NOT TO SCALE



SCHEMATIC DIAGRAM GROUNDING SYSTEM

NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.

2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT, COLD SHRINK SHALL NOT BE USED.

TYPICAL GROUND WIRE TO GROUNDING BAR

NOT TO SCALE

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SCALE:	JOB NUMBER:
AS SHOWN	16963018A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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1	12/15/16	REVISED PER COMMENTS	RA	MPC
0	11/08/16	ISSUED FOR CONST.	AJC	MPC
A	11/02/16	ISSUED	AJC	MPC

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FRANK ... AZDEN
CONNECTICUT PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN...

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SITE NAME:

SUFFIELD SOUTH
FA10071274
CT5400

55 KING SPRING ROAD
WINDSOR LOCKS, CT 06078
HARTFORD COUNTY

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

SHEET TITLE:

GROUNDING DETAILS

SHEET NUMBER:

G-1

MASER CONSULTING
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at&t

550 Cochituate Road
Framingham, MA 01701

LTE 2C

Antenna Mount Analysis

Site Name: *Suffield South*
FA #: *10071274*
Site Number: *CT5400*
Site Address: *55 King Spring Road*
Windsor Locks, 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

Anwesha Bera

Frank Pazden, P.E.
Telecommunications Department Manager

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

5. LOADING SUMMARY

Quantity	Manufacterer	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	Manufacterer	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

ANALYSIS AND DESIGN

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

				Reference	Equation
Antenna Centerline	z	100	ft		
Normal Wind Speed (3 sec. Gust):	V	97	mph	Ref. 1, Eqn. 16-33	
Normal Wind Speed with Ice (3 sec. gust):	V_i	40.0	mph	(Figure a5-2a, p. 233)	
Service Wind Speed:	V_s	60.0	mph	(Figure a5-2a, p. 233)	
Design Ice Thickness:	t_i	1.00	in	(Figure A1-2a, p. 233)	
Exposure Category:		C		Ref. 3, Section 2.6.5.1	
Structure Class:		II		Ref. 3, Table 2-1	
Gust Effect Factor:	G_h	0.85		Ref. 3, Section 2.6.7	
Wind Directionality Factor:	K_d	0.85		Ref. 3, Table 2-2	
Topographic Category:		1		Ref. 3, Section 2.6.6.2	

Wind Load Coefficients

Importance Factors:					
Non-Iced:	I	1		Ref. 3, Table 2-3	
Iced:	I_{ice}	1		(Table 2-3, P. 39)	
Exposure Category Coefficients:					
3-s Gust-Speed Power Law Exponent:	α	9.5		Ref. 3, Table 2-4	
Nominal Height of the Atmospheric Boundary Layer:	Z_g	900	ft	Ref. 3, Table 2-4	
Min. Value for k_z:	Kz_{min}	0.85		Ref. 3, Table 2-4	
Terrain Constant:	K_e	1.00		Ref. 3, Table 2-4	
Velocity Pressure Exposure Coefficient:	K_z	1.266		Ref. 3, Section 2.6.5.2	$=2.01\cdot(z/z_g)^{2/\alpha}$
Topographic Category Coefficients:					
Topographic Constant:	K_t	N/A		Ref. 3, Table 2-5	
Height Attenuation Factor:	f	N/A		Ref. 3, Table 2-5	
Height Reduction Factor:	K_h	N/A		Ref. 3, Section 2.6.6.4	$=e^{(f\cdot z/H)}$
Topographic Factor:	K_{zt}	1.00		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			$=(z/33)^{0.10}$
Factored Ice Thickness:	t_{iz}	2.23	in	(Section 2.6.8, p. 16)	$=2.0\cdot t_i\cdot I\cdot K_{iz}\cdot K_{zt}$
Ice Density:	ρ_i	56.00	pcf		
Design Wind Pressures:					
Velocity Pressure:	q_z	25.91	psf	Ref. 3, Section 2.6.9.6	$=0.00256\cdot K_z\cdot K_{zt}\cdot K_d\cdot V^2\cdot I$
Velocity Pressure (With Ice):	q_{zi}	4.41	psf	(Section 2.6.9.6, P. 25)	$=.00256\cdot K_z\cdot K_{zt}\cdot K_d\cdot V_i^2\cdot I$
Velocity Pressure (Service):	q_{zs}	9.91	psf	(Section 2.6.9.6, P. 25)	$=.00256\cdot K_z\cdot K_{zt}\cdot K_d\cdot V_i^2\cdot I$

II. CALCULATIONS

▪ ***Wind Load on Appurtenances***

Dimensions and Force Coefficients

Antenna/ Appurtenance	*Non-Iced Condition*								*Iced Condition*							
	Mounting Pipe			Equipment					Mounting Pipe			Equipment				
	Length (in)	Diameter (in)	Force Coefficient C_a	Height (in)	Width (in)	Depth (in)	Force Coefficient $C_{a\ Front}$	Force Coefficient $C_{a\ Side}$	Length (in)	Diameter (in)	Force Coefficient C_a	Height (in)	Width (in)	Depth (in)	Force Coefficient $C_{a\ Front}$	Force Coefficient $C_{a\ Side}$
SBNH-1D6565C	108.0	2.375	1.200	96.40	11.90	7.10	1.44	1.62	112.5	6.8	1.010	100.87	16.37	11.57	1.36	1.46
80010121	96.0	2.375	1.200	54.50	10.30	5.90	1.32	1.47	100.5	6.8	0.971	58.97	14.77	10.37	1.27	1.34
RRUS 11	0.0	0.000	0.000	19.70	17.00	7.20	1.20	1.21	0.0	0.0	0.000	24.17	21.47	11.67	1.20	1.20
RRUS 12	0.0	0.000	0.000	20.40	18.50	7.50	1.20	1.21	0.0	0.0	0.000	24.87	22.97	11.97	1.20	1.20
LGP 21401	0.0	0.000	0.000	13.80	14.40	3.70	1.20	1.25	0.0	0.0	0.000	18.27	18.87	8.17	1.20	1.20

Antenna/ Appurtenance	# of Brackets	Non-Iced Condition				Iced Condition			
		Wind Force (lbs.) F_N	Wind Force (lbs.) F_T	Controlling Wind Force (lbs.)	Gravity (lbs.)	Wind Force (lbs.) F_N	Wind Force (lbs.) F_T	Controlling Wind Force (lbs.)	Gravity (lbs.)
SBNH-1D6565C	2	128.6	108.3	**128.6**	**33.4**	30.5	32.2	**32.2**	**184.6**
80010121	2	65.9	57.2	**65.9**	**30.7**	18.8	19.3	**19.3**	**94.6**
RRUS 11	1	61.5	26.3	**61.5**	**65.0**	16.2	8.8	**16.2**	**113.8**
RRUS 12	1	69.3	28.3	**69.3**	**73.0**	17.8	9.3	**17.8**	**125.6**
LGP 21401	1	36.5	9.8	**36.5**	**35.0**	10.8	4.7	**10.8**	**71.1**

** ALL CALCULATED LOADS ARE PER MOUNTING BRACKET. TO GET THE TOTAL EQUIPMENT LOAD, MULTIPLY THE INDIVIDUAL LOADS BY THE NUMBER OF BRACKETS*

▪ ***Wind Load on Framing Members***

Member Category	Member Shape	Length (in)	Member Surface	Non-Iced Condition			Iced Condition					
				Exposed Wind Height (in)	Force Coefficient C_a	Wind Load (plf)	Exposed Wind Height (in)	Depth (in)	Length (in)	Force Coefficient C_a	Wind Load (plf)	Ice Weight (plf)
Pipe	Pipe 3.0	60	Round	3.50	1.03	6.59	7.97	7.97	64.47	0.82	2.05	15.65
Pipe	Pipe 2.0	108	Round	2.38	1.20	5.23	6.84	6.84	112.47	1.01	2.16	12.58
Square HSS	HSS 4X4	7	Square	4.00	1.20	8.81	8.47	8.47	11.47	1.20	3.17	21.54

BASIC EQUATIONS

ANSI/TIA-222-G Reference

Importance Factor: (Table 2-3, Pg. 39)

$$I := \begin{cases} 1.0 & \text{if } Class = \text{"II"} \\ 1.15 & \text{if } Class = \text{"III"} \end{cases} = 1$$

Force Coefficient: (Square) (Table 2-8, P. 42)

$$C_{f\_square}(h, w) := \begin{cases} 1.2 & \text{if } \frac{h}{w} \le 2.5 \\ \left[1.2 + \frac{0.2}{4.5} \cdot \left(\frac{h}{w} - 2.5\right)\right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \le 7 \\ \left[1.4 + \frac{0.6}{18} \cdot \left(\frac{h}{w} - 7\right)\right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \le 25 \\ 2.0 & \text{otherwise} \end{cases}$$

Force Coefficient: (Round) (Table 2-8, P. 42)

$$C_{f\_round}(h, w) := \begin{cases} 0.7 & \text{if } \frac{h}{w} \le 2.5 \\ \left[0.7 + \frac{0.1}{4.5} \cdot \left(\frac{h}{w} - 2.5\right)\right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \le 7 \\ \left[0.8 + \frac{0.4}{18} \cdot \left(\frac{h}{w} - 7\right)\right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \le 25 \\ 1.2 & \text{otherwise} \end{cases}$$

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

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

BASIC EQUATIONS

ANSI/TIA-222-G Reference

Velocity Pressure Coefficient:

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

$K_z := Kz(z)$ — Section 2.6.5, P. 13

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

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

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

Velocity Pressure: — Section 2.6.9.6, P. 25

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

LOAD EQUATIONS

WIND LOAD

Area (Normal): $AN_{area} = H_{ant} \cdot Want$

Area (Side): $AT_{area} = H_{ant} \cdot Dant$

Force Coefficient (Normal): $C_{fn} = C_{fsquare}(H_{ant}, Want)$

Force Coefficient (Side): $C_{fs} = C_{fsquare}(H_{ant}, Dant)$

Pipe Area (Normal): $AN_p = \max[(L_p - H_{ant}) * Dp, 0]$

Pipe Area (Side): $AT_p = L_p \cdot Dp$

Force Coefficient (Normal): $C_{fp} = C_{fround}(Lp, Dp)$

Normal Effective Projected Area: $E_{pan} = (C_{fn} \cdot ANarea) + (Cfp \cdot ANp)$

Side Effective Projected Area: $E_{pat} = (C_{fs} \cdot ATarea) + (Cfp \cdot ATp)$

Effective Projected Area: $EPA = max(E_{pan}, Epat)$

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: $A_{ice\_ant} = \pi \cdot tiz \cdot (Dant + tiz)$

Total Ice Dead Load: $DL_{ice\_ant} = \boldsymbol{\rho}_\mathbf{i} \cdot (Aice_{\_ant} \cdot Hant)$

ICE WIND LOAD

Dimensions:

$H_{i_{ant}} = H_{ant} + 2tiz$

$W_{i_{ant}} = W_{ant} + 2tiz$

$D_{i_{ant}} = D_{ant} + 2tiz$

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): $AN_p = \max[(L_{ip} - H_{i\_ant}) * D_{ip}, 0]$

Pipe Area (Side): $AT_p = L_{ip} \cdot Dip$

Force Coefficient (Normal): $C_{fp} = C_{fround}(L_{ip}, D_{ip})$

Normal Effective Projected Area: $E_{pain} = (Ci_{fn} \cdot ANarea) + (Cfp \cdot ANp)$

Side Effective Projected Area: $E_{pait} = (Ci_{fs} \cdot ATarea) + (Cfp \cdot ATp)$

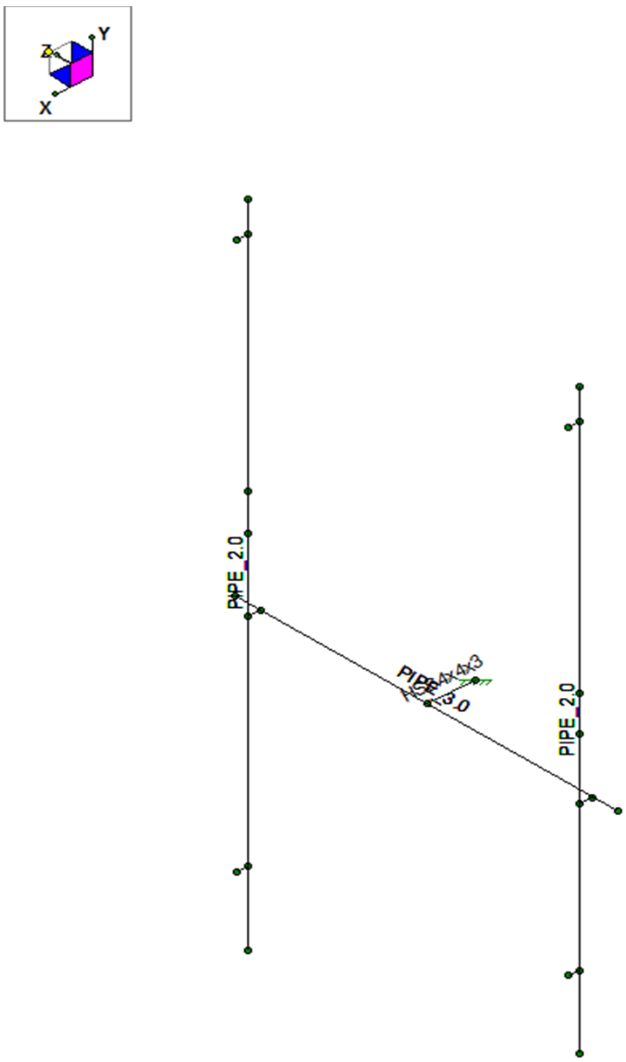
Effective Projected Area: $EPA_i = max(E_{pain}, Epait)$

Wind Force: $F_{i\_ant} = q_z \cdot Gh \cdot EPAi$

III. ATTACHMENTS

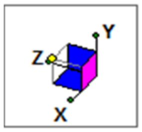
Client:	ATT	Computed By:	AB
Site Name:	Suffield South	Date:	12/2/2016
Project No.	16963018A	Verified By:	FEP
Title:	Antenna Mount Analysis	Page:	14

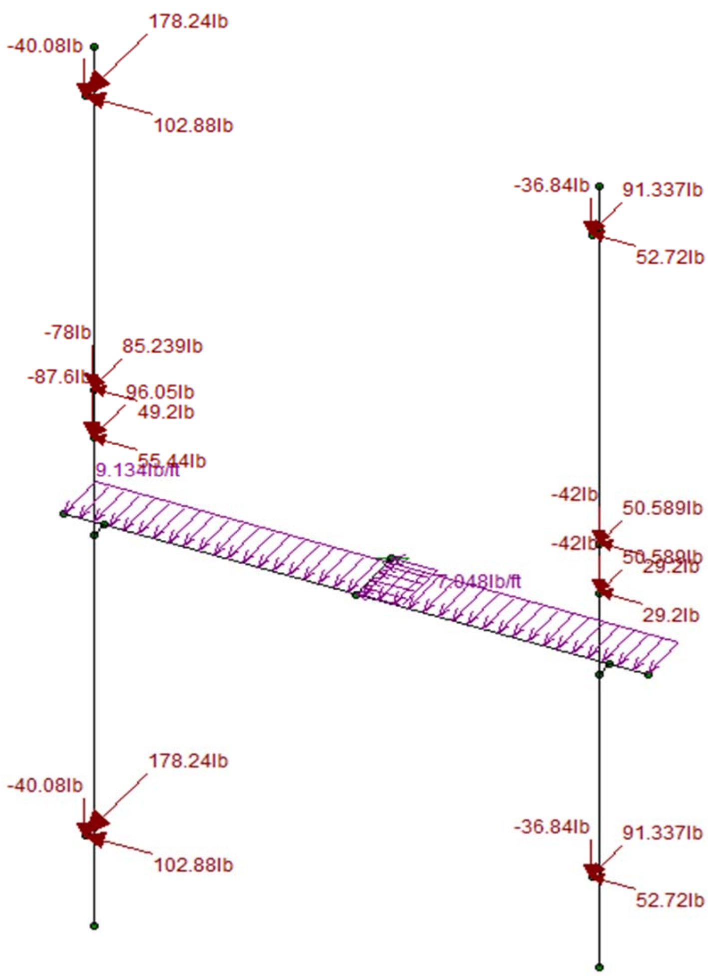
RISA MODEL



Envelope Only Solution

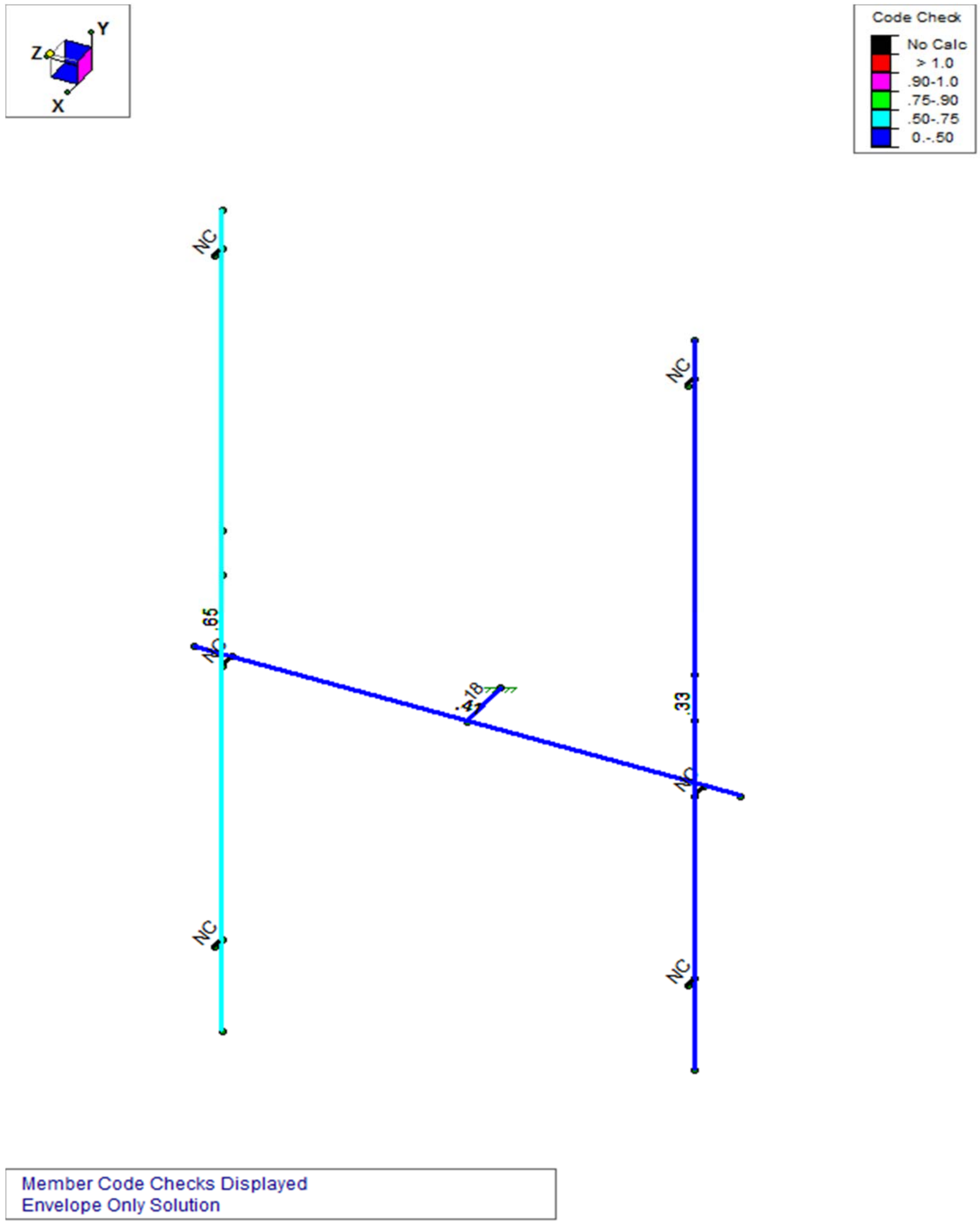
RISA WORST CASE LOADING





Loads: LC 3, 1.2D+1.6W2
Envelope Only Solution

RISA CODE CHECK



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...	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	.5								
17	1.2D+1.0ICE+1.0W3ICE	Yes	Y		1	1.2	6	1	4	.5	5	.866								
18	1.2D+1.0ICE+1.0W4ICE	Yes	Y		1	1.2	6	1	4		5	1								
19	1.2D+1.0ICE+1.0W5ICE	Yes	Y		1	1.2	6	1	4	-.5	5	.866								
20	1.2D+1.0ICE+1.0W6ICE	Yes	Y		1	1.2	6	1	4	-.866	5	.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	-.5								
23	1.2D+1.0ICE+1.0W9ICE	Yes	Y		1	1.2	6	1	4	-.5	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	5	-.866								
26	1.2D+1.0ICE+1.0W12ICE	Yes	Y		1	1.2	6	1	4	.866	5	-.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	18	1066...	106812	12.662	12.662	...	H1-1b

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at&t

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*
Windsor Locks, 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

Anwesha Bera

Frank Pazden, P.E.
Telecommunications Department Manager

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

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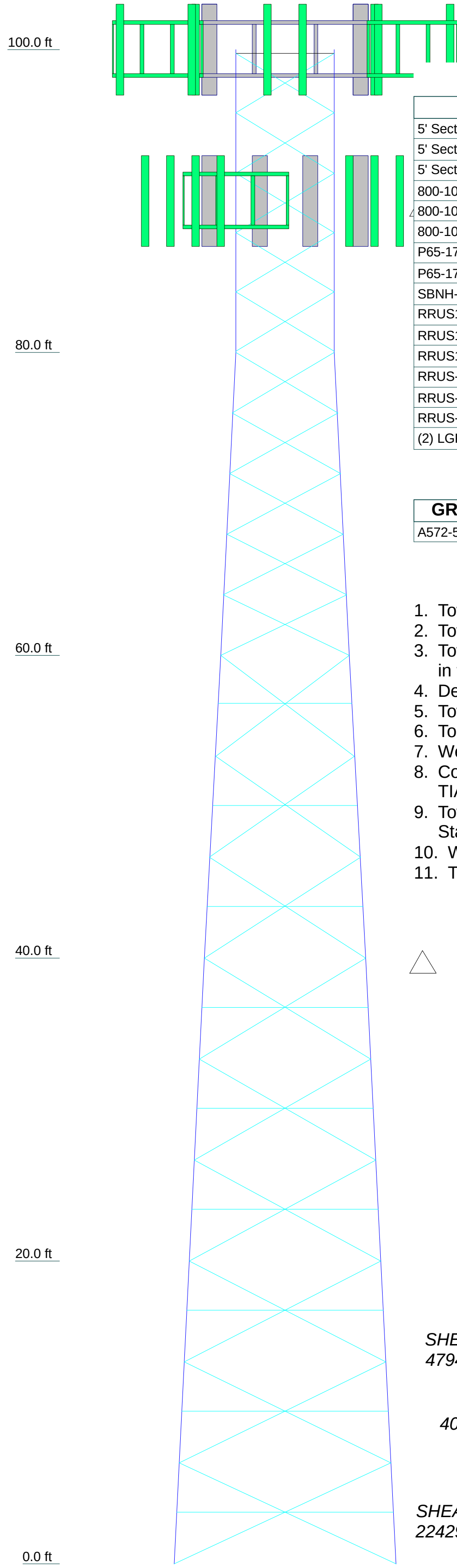
APPENDIX A

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Sec. Horizontals	Face Width (ft)	# Panels @ (ft)	Weight (lb)
L1	P2.4"x0.165"	A572-50	L1 1/2x1 1/2x1/8	A36	L2x2x1/8	N.A.	6.52083	5 @ 3.92917	548.1
T1	P2.9x0.214"	A572-50	L2x2x1/8	A36	N.A.	N.A.	6.52083	5 @ 4	791.8
T2	ROHN 2.5 X-STR	A572-50	L3x3x1/4	A36	N.A.	L2x2x3/16	8.5651	9 @ 6.66667	1701.0
T3	ROHN 3 STD	A572-50	L3x3x1/4	A36	N.A.	L2x2x3/16	10.6094	9 @ 6.66667	1893.1
T4	ROHN 3 X-STR	A572-50	L2 1/2x2 1/2x3/16	A36	N.A.	L2x2x3/16	12.6536	9 @ 6.66667	1756.8
							14.6979		6690.8



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

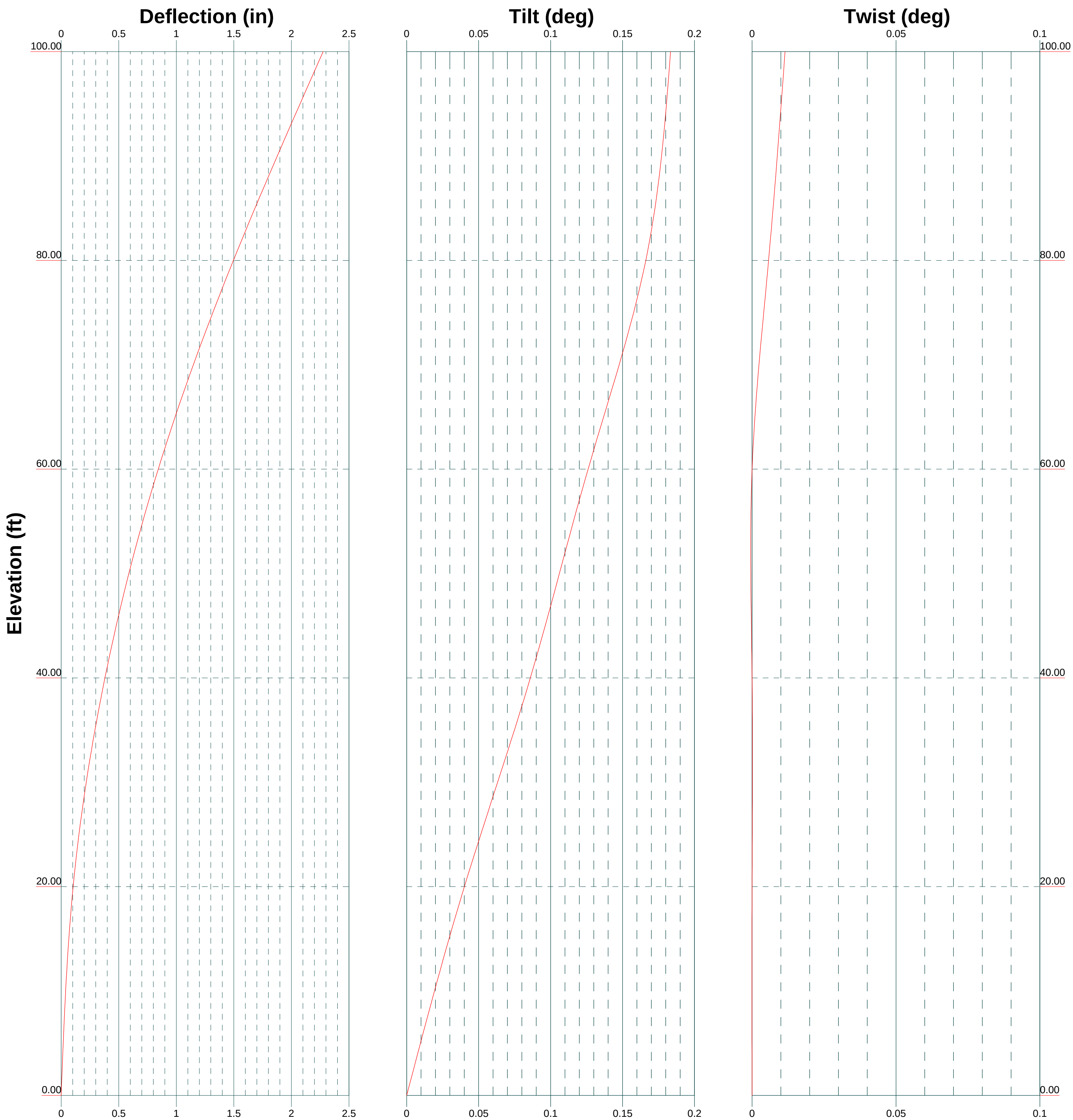
AXIAL
62815 lb
SHEAR 4794 lb
MOMENT 304 kip-ft
TORQUE 1 kip-ft
40 mph WIND - 1.0000 in ICE

AXIAL
12613 lb
SHEAR 22429 lb
MOMENT 1378 kip-ft
TORQUE 1 kip-ft
REACTIONS - 97 mph WIND

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: \\maserconsulting.com\lul\Projects\2016\16963000A\16963018A\Structural\Tower Analysis\Rev 0\TNX\Tower.eri		Dwg No. E-1

TIA-222-G - Service - 60 mph

Maximum Values



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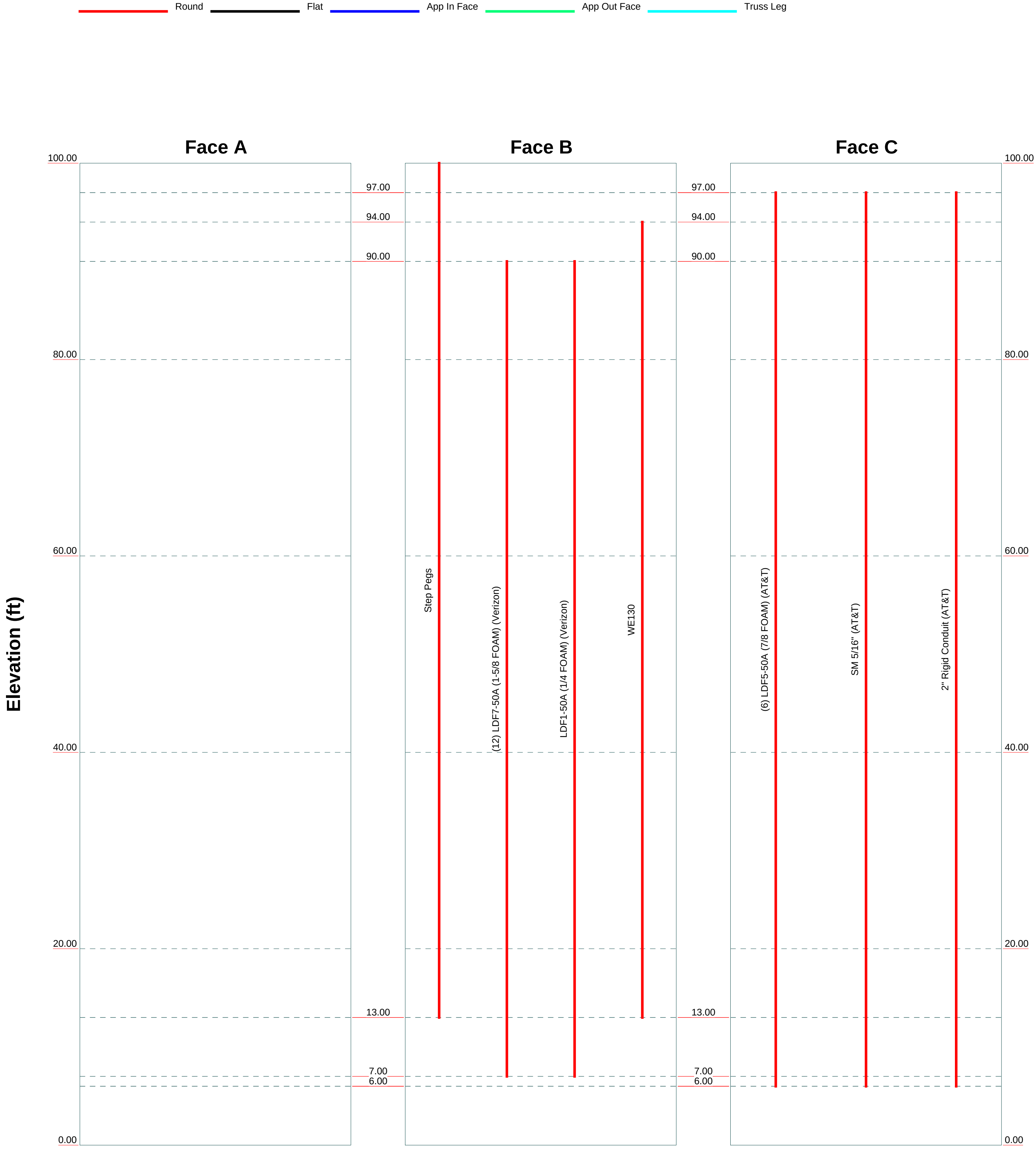
Feed Line Distribution Chart
0' - 100'



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	Code: TIA-222-G	Date: 12/02/16	Scale: NTS
	Path: \\maserconsulting.com\luj\Projects\2016\16963000A\16963018A\Structural\Tower Analysis\Rev 0\TNX\Tower.eri		Dwg No. E-7

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 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

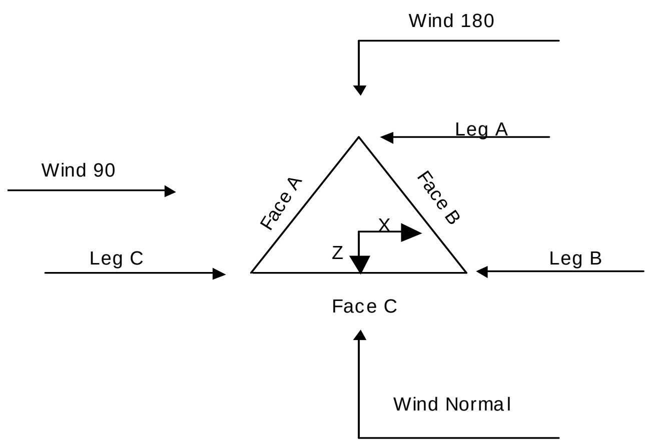
Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
√ Treat Feed Line Bundles As Cylinder

Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-G Bracing Resist. Exemption
Use TIA-222-G Tension Splice Exemption

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets



Triangular Tower

3 Sided Latticed Pole Section Geometry

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

3 Sided Latticed Pole 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*
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 *ft*	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
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)

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) ft²*	*Gusset Thickness in*	*Gusset Grade*	*Adjust. Factor A_f*	*Adjust. Factor A_r*	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals in*	*Double Angle Stitch Bolt Spacing Horizontals in*	*Double Angle Stitch Bolt Spacing Redundants in*
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)*

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

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

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)*

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)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
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 ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 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)*

			K Factors[1]							
Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 80.00-60.00	Yes	Yes	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
T3 40.00-20.00	Yes	Yes	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]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

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

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) (Verizon)	B	No	Ar (CaAa)	90.00 - 7.00	1.0000	-0.25	12	12	1.9800	1.9800		0.82
LDF1-50A (1/4 FOAM) (Verizon)	B	No	Ar (CaAa)	90.00 - 7.00	1.0000	-0.25	1	1	0.3500	0.3500		0.06
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) (AT&T)	C	No	Ar (CaAa)	97.00 - 6.00	1.0000	0.4	6	6	1.0900	1.0900		0.33
SM 5/16" (AT&T)	C	No	Ar (CaAa)	97.00 - 6.00	1.0000	0.25	1	1	0.3125	0.3125		0.25
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

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	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 ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	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

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: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *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

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *lb*
			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

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert*	*Azimuth Adjustment*	*Placement*		C_AA_A *Front*	C_AA_A *Side*	*Weight*
			ft ft ft	*°*	*ft*		*ft²*	*ft²*	*lb*
			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

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

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			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
T1	80 - 60	Leg	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
			Max. Vy	18	140.48	0.40	0.00
			Max. Vx	20	82.44	-0.01	-0.21
		Diagonal	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
			Max. Vx	38	-2.28	0.00	0.00
T2	60 - 40	Leg	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
		Secondary Horizontal	Max Tension	20	259.07	0.01	-0.00
			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
T3	40 - 20	Leg	Max Tension	15	77475.09	0.33	0.00
			Max. Compression	18	-86915.78	-0.49	-0.00
			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
		Diagonal	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
			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
		Secondary Horizontal	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
			Max. Vy	35	57.15	0.08	0.00
			Max. Vx	38	-2.05	0.00	0.00
T4	20 - 0	Leg	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
			Max. Vx	20	210.85	-0.05	-0.53
		Diagonal	Max Tension	5	4441.90	0.04	-0.00
			Max. Compression	4	-4650.31	0.00	0.00

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
	Min. H_z	18	112452.31	11672.96	-6778.11
Leg B	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
	Min. H_x	10	111847.72	-11671.92	-6738.20
	Min. H_z	10	111847.72	-11671.92	-6738.20
Leg A	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	9459.40	18091.21	-10457.90	-652.78	-1127.14	-0.72

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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
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	62815.42	-2348.27	-4069.76	-260.64	146.13	-0.68

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

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX* *lb*	*PY* *lb*	*PZ* *lb*	*PX* *lb*	*PY* *lb*	*PZ* *lb*	*% Error*
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%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
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

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature 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 $\frac{P_u}{\phi P_n}$
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]

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 KL/R > 250 (C) - 149	13.67	13.14	255.5 K=1.00	0.7150	-432.06	2474.72	0.175 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u 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

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	$øP_{allow}$ 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

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$øP_{allow}$ lb	% Capacity	Pass Fail
						(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**

EMPIRE telecom
A QualTek Company

December 19, 2016

Samuel Sales
7 Woodland Hollow
Windsor Locks, CT 06096

RE: AT&T Wireless Modifications to Telecommunication Facility –
55 King Spring Road, Windsor Locks, 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 Windsor locks, 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).

1150 First Ave
Suite 600
King of Prussia, PA 19406

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

EMPIRE telecom
A QualTek Company

December 19, 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, Windsor Locks, 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 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 Windsor Locks, CT. The tower is owned by the King Spring Tower, LLC. The property is owned by Samuel Sales.

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This letter is intended to serve as the required notice to the municipality. 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).

EMPIRE telecom
A QualTek Company

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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

EMPIRE telecom
A QualTek Company

December 19, 2016

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

RE: AT&T Wireless Modifications to Telecommunication Facility –
55 King Spring Road, Windsor Locks, 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 Windsor Locks, 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 tower 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