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

September 12, 2016

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

NOTICE OF EXEMPT MODIFICATION

38 Lower Road, North Canaan, CT 06018

Lat: 42-00-53 (42.014722)
Long. 73-19-35 (-73.32638889)

Dear Ms. Bachman:

AT&T Wireless currently maintains nine (9) antennas at the 140 foot level of an existing 195 foot tall lattice tower located at 38 Lower Road in North Canaan, CT. The tower is owned by the Litchfield County Dispatch, Inc. The property is likewise owned by the Litchfield County Dispatch, Inc. AT&T Wireless now seeks to replace three (3) existing antennas; and install three (3) new RRUS-12+A2 ("RRU") remote radio units, one (1) RRU per sector, to the 140 foot level of the tower, to be mounted behind each replacement antenna and above the existing RRUS-11 units.

The facility was approved by the Connecticut Siting Council in EM-CING-100-130322 on April 5, 2013. Six (6) conditions were enumerated in the Council's decision: 1) AT&T shall submit to the Council a Radio Frequency Exposure Report with field measurements taken in the vicinity of the facility within three months after the installation in this notice of exempt modification has been completed; 2) any deviation from the modification as specified in the Notice and supporting documentation shall render the acknowledgement invalid: 3) Any material changes to the modification as proposed shall require the filing of a new Notice with the Council; 4) Not less than 45 days after the completion of construction the Council shall be notified in writing that the construction has been completed; 5) the validity of the action shall expire one year from the date of the letter; and 6) the applicant may request an extension of time beyond the one year deadline provided that such a request is submitted to the Council not less than 60 days prior to the expiration.

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 Douglas E. Humes, Jr., First Selectman of North Canaan, as well as Dan Soule, the Director of Litchfield County Dispatch, Inc., the property owner and 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 Douglas E. Humes, Jr., First Selectman of North Canaan
Dan Soule, Director, Litchfield County Dispatch, Inc., as Tower Owner

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

September 12, 2016

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

NOTICE OF EXEMPT MODIFICATION

38 Lower Road, North Canaan, CT 06018

Lat: 42-00-53 (42.014722)
Long. 73-19-35 (-73.32638889)

Dear Ms. Bachman:

AT&T Wireless currently maintains nine (9) antennas at the 140 foot level of an existing 195 foot tall lattice tower located at 38 Lower Road in North Canaan, CT. The tower is owned by the Litchfield County Dispatch, Inc. The property is likewise owned by the Litchfield County Dispatch, Inc. AT&T Wireless now seeks to replace three (3) existing antennas; and install three (3) new RRUS-12+A2 ("RRU") remote radio units, one (1) RRU per sector, to the 140 foot level of the tower, to be mounted behind each replacement antenna and above the existing RRUS-11 units.

The facility was approved by the Connecticut Siting Council in EM-CING-100-130322 on April 5, 2013. Six (6) conditions were enumerated in the Council's decision: 1) AT&T shall submit to the Council a Radio Frequency Exposure Report with field measurements taken in the vicinity of the facility within three months after the installation in this notice of exempt modification has been completed; 2) any deviation from the modification as specified in the Notice and supporting documentation shall render the acknowledgement invalid: 3) Any material changes to the modification as proposed shall require the filing of a new Notice with the Council; 4) Not less than 45 days after the completion of construction the Council shall be notified in writing that the construction has been completed; 5) the validity of the action shall expire one year from the date of the letter; and 6) the applicant may request an extension of time beyond the one year deadline provided that such a request is submitted to the Council not less than 60 days prior to the expiration.

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 Douglas E. Humes, Jr., First Selectman of North Canaan, as well as Dan Soule, the Director of Litchfield County Dispatch, Inc., the property owner and 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 Douglas E. Humes, Jr., First Selectman of North Canaan
Dan Soule, Director, Litchfield County Dispatch, Inc., as Tower Owner

MASER CONSULTING
— CONNECTICUT —

331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
www.maserconsulting.com

550 Cochituate Road
Framingham, MA 01701

LTE 2C

Antenna Mount Analysis

Site Name:	*North Canaan-Lower County RD*
FA #:	*10035410*
Site Number:	*CTL01134*
Site Address:	*38 Lower Road* *North Canaan, CT 06018* *Litchfield County*
Maser Project Number:	*16963008A*

September 13, 2016

Analysis Type	*Tower Feasibility*
Pass/Fail	*Pass*
Mount Utilization	*94.6 %*

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

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 195' lattice tower structure at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards.

Introduction:

Maser Consulting Connecticut has performed limited field observations on July 26, 2016 to visually verify the existing condition of the structure from grade and to locate and quantify the existing wireless appurtenances where possible. Maser Consulting P.A. has reviewed the following documents in completing this report:

- RFDS 1129378 provided by Empire Telecom, dated March 28, 2016 for LTE 2C scope of work.
- Rev 1 Construction Drawings prepared by Maser Consulting Connecticut for LTE 2C Scope of Work
- Limited Visual Site Visit photos and notes prepared by Maser Consulting Connecticut on July 26, 2016.
- Tower Mapping Report prepared by Tower Engineering Professionals TEP#72508_94731 dated, September 08, 2016.
- Previous structural Analysis and evaluation report performed by URS Corporation, dated March 13, 2013.

The existing **AT&T** equipment is supported on an existing 195' lattice tower structure. The primary tower structure is constructed of pirod lattice legs and diagonals, horizontals are constructed of angle members. The proposed **AT&T** antenna support pipes supported by pipes at a centerline of approximately **140'-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:

Maser Consulting Connecticut understands the existing & proposed **AT&T** loading to be as follows:

- **(1) Andrew SBNHH-1D65A Antennas (Proposed per RFDS)**
- *(6) Powerwave 7770 Antennas (Existing per Mount Mapping)*
- **(2) CCI HPA-65R-BUU-H6 Antennas (Proposed per RFDS)**
- *(3) Ericsson RRUS-11 B12 (Existing per Mount Mapping)*
- **(3) Ericsson RRUS-12+A2 (***Proposed per RFDS***)**
- **(1) Raycap DC6 (Proposed mounted to the tower leg)**
- *(6) Powerwave TMAs (Existing)*

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:

- 2005 CT State Building Code And All Subsequent Amendments
- Structural Standards for Antenna Supporting Structures and Antennas ANSI/TIA-222-F
    - Basic Wind Speed – 90 mph, Ice thickness of 0.5in.
- Specification for Structural Steel Buildings ANSI/AISC 360-05,

Analysis Approach & Assumptions:

The analysis approach used in this structural analysis is based on the premise that if the existing lattice 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. 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 Main Legs are constructed of A572-50 Grade Steel.
- Structural Steel Angles 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.

Calculations:

The calculations are found in Appendix A of this report.

Conclusion:

The existing lattice 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 lattice tower has been determined to be stressed to a maximum of **94.6%** of its structural capacity with the maximum usage occurring at the diagonal members at elevation 120'-140'. The proposed foundation reactions were compared with the previous structural analysis and the foundation has been determined to be **ADEQUATE** to support the proposed and existing antennas. 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.

The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the

existing structural members supporting the proposed **AT&T** telecommunications installation described herein. Further, no structural qualifications are made or implied by this document for the existing structure.

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

Sincerely,
Maser Consulting Connecticut

Frank Pazden, P.E.
Telecommunications Department Manager

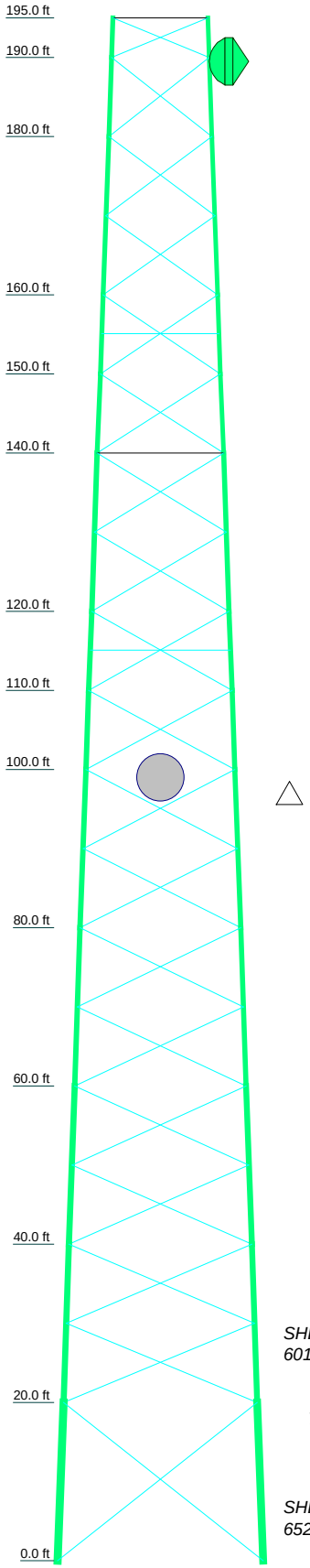
Gowtham Penumatsa E.I.T
Structural Design Engineer

\\maserconsulting.com\UNM\AllOffices\MtLaurel\Projects\2016\16963000A\16963008A\Structural\Tower Analysis\Rev 0\Word\

APPENDIX A

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13
Legs	Pirod 105244	Pirod 105216	Pirod 105217	Pirod 105218	Pirod 105219	Pirod 105220	Pirod 112738						
Leg Grade	A572-50												
Diagonals	L3x3x3/16			L3x3x5/16		L3 1/2x3 1/2x5/16		L4x4x1/4		L4x4x3/8		L5x5x3/8	2L3 1/2x3 1/2x5/16
Diagonal Grade	A36												
Top Girts	C		N.A.		L3x3x5/16		D		L4x4x1/4		L4x4x3/8		
Sec. Horizontals	N.A.			L3x3x5/16	N.A.								
Face Width (ft)	12	12.359	13.0769	14.5128	15.2308	15.9487	17.3846	18.1026	18.8205	20.2564	21.6923	23.1282	24.5641
# Panels @ (ft)	1 @ 5							17 @ 10					1 @ 20
Weight (lb)	1057.6	1157.7	2313.4	1897.3	1636.6	4053.3	2442.7	2073.5	4661.0	5684.7	7164.9	7368.8	7961.3

49472.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Andrew 6' w/Radome	189.5	Powerwave 7770 W/Mount Pipe	140
ATN 150F2	186	CCI HPA-65R-H6 W/Mount Pipe	140
ANT150D3	184.167	Powerwave 7770 W/Mount Pipe	140
Super station C21 6004569	184.167	Powerwave 7770 W/Mount Pipe	140
OGT9-840N	184	RRUS 11 B12	140
OGT9-840N	184	RRUS 11 B12	140
Pirod 7' Side arm mount	183.717	Powerwave 7770 W/Mount Pipe	140
Pirod 7' Side arm Mount	183.167	CCI HPA-65R-H6 W/Mount Pipe	140
3' Side Arm Mount	183	Powerwave 7770 W/Mount Pipe	140
DB222-A	172 - 171	SBNHH-1D65A W/ MOUNT PIPE	140
Amphenol LPA-80080-4CF-EDIN-4	169	Powerwave 7770 W/Mount Pipe	140
Amphenol LPA-80080-4CF-EDIN-4	169	PiROD 12' T-Frame	137 - 125
Amphenol BXA-70063-6CF-EDIN-4	169	PiROD 12' T-Frame	137
BXA-171085-8BF-EDIN-4	169	PiROD 12' T-Frame	137
Amphenol LPA-80080-4CF-EDIN-4	169	PiROD 12' Universal T-Frame Sector Mount	125
Amphenol LPA-80080-4CF-EDIN-4	169		
Amphenol BXA-70063-6CF-EDIN-4	169	PiROD 12' Universal T-Frame Sector Mount	125
BXA-171085-8BF-EDIN-4	169		
Amphenol LPA-80080-4CF-EDIN-4	169	PiROD 12' Universal T-Frame Sector Mount	125
Amphenol LPA-80080-4CF-EDIN-4	169		
Amphenol BXA-70063-6CF-EDIN-4	169	PiROD 6' side arm mount	120
Amphenol BXA-70063-6CF-EDIN-4	169	ANT150D3	109
Diplexers	169	PiROD 6' side arm mount	106
Diplexers	169	PD-458-2	99
Diplexers	169	PiROD 6' side arm mount	99
APXV9ERR18	157.417	PiROD 6' side arm mount	99
APXV9ERR18	157.417	Andrew 6' w/Radome	99
APXV9ERR18	157.417	2-element dipole	84
RRH 2x50 800	157.417	PD-1142-2C	79.6
RRH 2x50 800	157.417	1- Element Dipole	79.6
RRH 2x50 800	157.417	Amphenol BCD-80609	79.6
PiROD 13' Lightweight T-Frame	154	PD-1142-2C	79.6
PiROD 13' Lightweight T-Frame	154	Yagi Antenna	79.6
PiROD 13' Lightweight T-Frame	154	PiROD 7' side arm mount	79.6
RRUS 11 B12	140	PiROD 7' side arm mount	79.5
RRUS 12	140	PiROD 7' side arm mount	79
RRUS 12	140	GPS Antenna 18"x3" Dia	36.25
RRUS 12	140	4' Side Arm Mount	32.9167

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	2L2x2x3/16	C	2L2 1/2x2 1/2x3/16
B	L2 1/2x2 1/2x3/16	D	L3 1/2x3 1/2x5/16

MATERIAL STRENGTH

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

MAX. (

DOWN: 330112 lb
SHEAR: 42630 lb

UPLIFT: -270960 lb
SHEAR: 36410 lb

AXIAL
90854 lb

SHEAR
60174 lb

MOMENT
6483146 lb-ft

TORQUE 20305 lb-ft
78 mph WIND - 0.5000 in ICE

AXIAL
61323 lb

SHEAR
65291 lb

MOMENT
6972766 lb-ft

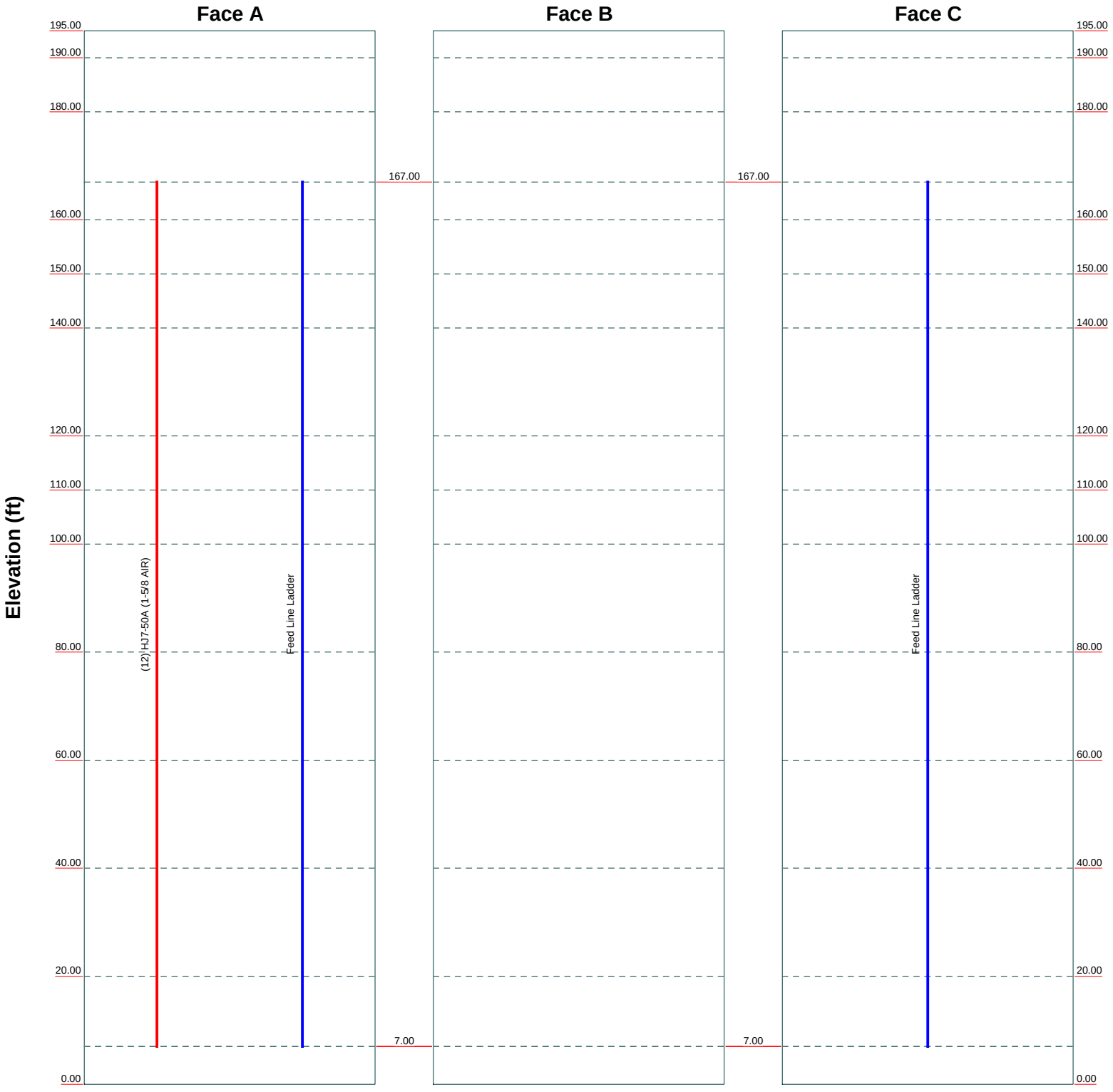
TORQUE 26540 lb-ft
REACTIONS - 90 mph WIND

Maser Consulting P.A
400 Valley Road
Mt Arlington, NJ
Phone: 973.398.3110
FAX: 973.398.3199

Job: **16963007**			
Project: ***Tower Analysis***			
Client: SmartLink	Drawn by: gpenumatsa	App'd:	
Code: TIA/EIA-222-F	Date: 09/12/16	Scale: NTS	
Path:		Dwg No. E-1	

Feed Line Distribution Chart
0' - 195'

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



Maser Consulting P.A
400 Valley Road
Mt Arlington, NJ
Phone: 973.398.3110
FAX: 973.398.3199

Job: ***16963007***			
Project: ***Tower Analysis***			
Client: SmartLink	Drawn by: gpenumatsa	App'd:	
Code: TIA/EIA-222-F	Date: 09/12/16	Scale: NTS	
Path:		Dwg No. E-7	

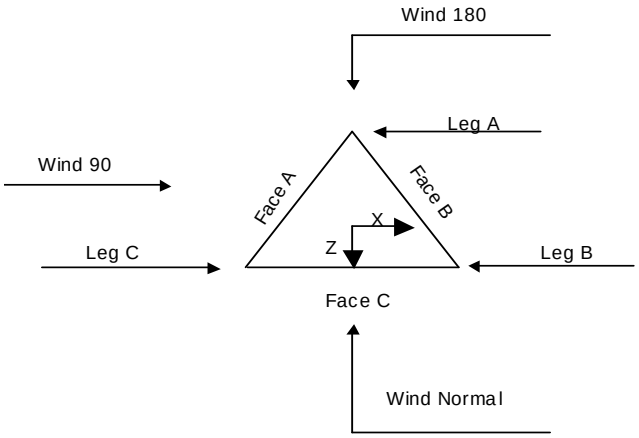
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 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 12.00 ft at the top and 26.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Litchfield County, Connecticut.
Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 78 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	195.00-190.00			12.00	1	5.00
T2	190.00-180.00			12.36	1	10.00
T3	180.00-160.00			13.08	1	20.00
T4	160.00-150.00			14.51	1	10.00
T5	150.00-140.00			15.23	1	10.00
T6	140.00-120.00			15.95	1	20.00
T7	120.00-110.00			17.38	1	10.00
T8	110.00-100.00			18.10	1	10.00
T9	100.00-80.00			18.82	1	20.00
T10	80.00-60.00			20.26	1	20.00
T11	60.00-40.00			21.69	1	20.00
T12	40.00-20.00			23.13	1	20.00
T13	20.00-0.00			24.56	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	195.00-190.00	5.00	X Brace	No	Yes	0.0000	0.0000
T2	190.00-180.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	*Tower Elevation* *ft*	*Diagonal Spacing* *ft*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* *in*	*Bottom Girt Offset* *in*
T3	180.00-160.00	10.00	X Brace	No	No	0.0000	0.0000
T4	160.00-150.00	10.00	X Brace	No	Yes	0.0000	0.0000
T5	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T6	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T7	120.00-110.00	10.00	X Brace	No	Yes	0.0000	0.0000
T8	110.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T9	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T10	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T11	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T12	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T13	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 195.00-190.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Double Equal Angle	2L2x2x3/16	A36 (36 ksi)
T2 190.00-180.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 180.00-160.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T4 160.00-150.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T5 150.00-140.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T6 140.00-120.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T7 120.00-110.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T8 110.00-100.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 100.00-80.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T10 80.00-60.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T11 60.00-40.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L5x5x3/8	A36 (36 ksi)
T12 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L5x5x3/8	A36 (36 ksi)
T13 20.00-0.00	Truss Leg	Pirod 112738	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Top Girt Type*	*Top Girt Size*	*Top Girt Grade*	*Bottom Girt Type*	*Bottom Girt Size*	*Bottom Girt Grade*
T6 140.00-120.00	Equal Angle	L3x3x5/16	A36 (36 ksi)	Pipe		A53-B-42 (42 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 195.00-190.00	None	Solid Round		A36 (36 ksi)	Double Equal Angle	2L2 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
T4 160.00-150.00	Equal Angle	L3x3x5/16	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T7 120.00-110.00	Equal Angle	L3 1/2x3 1/2x5/16	A572-50 (50 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 195.00-190.00	0.00	0.1875	A36 (36 ksi)	1	1	1.05	0.0000	Mid-Pt	36.0000
T2 190.00-180.00	0.00	0.1875	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T3 180.00-160.00	0.00	0.1875	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T4 160.00-150.00	0.00	0.1875	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T5 150.00-140.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T6 140.00-120.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T7 120.00-110.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T8 110.00-100.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T9 100.00-80.00	0.00	0.3750	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T10 80.00-60.00	0.00	0.3750	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T11 60.00-40.00	0.00	0.3750	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

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
T12 40.00-20.00	0.00	0.3750	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T13 20.00-0.00	0.00	0.3750	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
195.00-190.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
190.00-180.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
160.00-150.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
150.00-140.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
120.00-110.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
110.00-100.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T12	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T13	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors Truss-Legs Used As Leg Members Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members Leg Panels	X Brace Diagonals	Z Brace Diagonals
T1 195.00-190.00	1	0.5	0.85	1	0.5	0.85

	Truss-Leg K Factors					
	Truss-Legs Used As Leg Members			*Truss-Legs Used As Inner Members*		
Tower Elevation ft	*Leg Panels*	*X Brace Diagonals*	*Z Brace Diagonals*	*Leg Panels*	*X Brace Diagonals*	*Z Brace Diagonals*
T2 190.00-180.00	1	0.5	0.85	1	0.5	0.85
T3 180.00-160.00	1	0.5	0.85	1	0.5	0.85
T4 160.00-150.00	1	0.5	0.85	1	0.5	0.85
T5 150.00-140.00	1	0.5	0.85	1	0.5	0.85
T6 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T7 120.00-110.00	1	0.5	0.85	1	0.5	0.85
T8 110.00-100.00	1	0.5	0.85	1	0.5	0.85
T9 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T10 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T11 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T12 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T13 20.00-0.00	1	0.5	0.85	1	0.5	0.85

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 195.00-190.00	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 190.00-180.00	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 180.00-160.00	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 160.00-150.00	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
T5 150.00-140.00	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
T6 140.00-120.00	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
T7 120.00-110.00	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
T8 110.00-100.00	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
T9 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
T10 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

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
T11 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
T12 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
T13 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 195.00-190.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 190.00-180.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 180.00-160.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 160.00-150.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 150.00-140.00	Flange	1.0000 A325N	0	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 120.00-110.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 110.00-100.00	Flange	1.0000 A325N	0	1.0000 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 100.00-80.00	Flange	1.2500 A325N	6	1.2500 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 80.00-60.00	Flange	1.2500 A325N	6	1.2500 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 20.00-0.00	Flange	2.0000 A325N	6	1.0000 A325N	2	1.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
HJ7-50A (1-5/8 AIR)	A	No	Ar (CaAa)	167.00 - 7.00	-10.0000	0	12	6	1.9800	1.9800		1.04

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
Feed Line Ladder	A	No	CaAa (In Face)	167.00 - 7.00	-10.0000	0	1	No Ice	0.50	7.90
								1/2" Ice	0.75	10.60
Feed Line Ladder	C	No	CaAa (In Face)	167.00 - 7.00	-10.0000	0	1	No Ice	0.50	7.90
								1/2" Ice	0.75	10.60

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	195.00-190.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	190.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	180.00-160.00	A	0.000	0.000	19.021	0.000	142.66
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	3.500	0.000	55.30
T4	160.00-150.00	A	0.000	0.000	27.172	0.000	203.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	5.000	0.000	79.00
T5	150.00-140.00	A	0.000	0.000	27.172	0.000	203.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	5.000	0.000	79.00
T6	140.00-120.00	A	0.000	0.000	54.344	0.000	407.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	10.000	0.000	158.00
T7	120.00-110.00	A	0.000	0.000	27.172	0.000	203.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	5.000	0.000	79.00
T8	110.00-100.00	A	0.000	0.000	27.172	0.000	203.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	5.000	0.000	79.00
T9	100.00-80.00	A	0.000	0.000	54.344	0.000	407.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	10.000	0.000	158.00
T10	80.00-60.00	A	0.000	0.000	54.344	0.000	407.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	10.000	0.000	158.00
T11	60.00-40.00	A	0.000	0.000	54.344	0.000	407.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	10.000	0.000	158.00
T12	40.00-20.00	A	0.000	0.000	54.344	0.000	407.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	10.000	0.000	158.00
T13	20.00-0.00	A	0.000	0.000	35.324	0.000	264.94
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.500	0.000	102.70

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	195.00-190.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	190.00-180.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	180.00-160.00	A	0.500	0.000	0.000	21.470	0.000	288.82
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	5.250	0.000	74.20
T4	160.00-150.00	A	0.500	0.000	0.000	30.672	0.000	412.59
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	7.500	0.000	106.00
T5	150.00-140.00	A	0.500	0.000	0.000	30.672	0.000	412.59
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	7.500	0.000	106.00
T6	140.00-120.00	A	0.500	0.000	0.000	61.344	0.000	825.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	15.000	0.000	212.00
T7	120.00-110.00	A	0.500	0.000	0.000	30.672	0.000	412.59
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	7.500	0.000	106.00
T8	110.00-100.00	A	0.500	0.000	0.000	30.672	0.000	412.59
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	7.500	0.000	106.00
T9	100.00-80.00	A	0.500	0.000	0.000	61.344	0.000	825.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	15.000	0.000	212.00
T10	80.00-60.00	A	0.500	0.000	0.000	61.344	0.000	825.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	15.000	0.000	212.00
T11	60.00-40.00	A	0.500	0.000	0.000	61.344	0.000	825.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	15.000	0.000	212.00
T12	40.00-20.00	A	0.500	0.000	0.000	61.344	0.000	825.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	15.000	0.000	212.00
T13	20.00-0.00	A	0.500	0.000	0.000	39.874	0.000	536.37
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	9.750	0.000	137.80

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	195.00-190.00	0.0000	0.0000	0.0000	0.0000
T2	190.00-180.00	0.0000	0.0000	0.0000	0.0000
T3	180.00-160.00	-3.2008	-1.1816	-2.6033	-0.7817
T4	160.00-150.00	-4.9506	-1.8264	-4.2989	-1.2897
T5	150.00-140.00	-5.5004	-2.0280	-4.7831	-1.4336
T6	140.00-120.00	-5.6822	-2.0933	-4.9373	-1.4780
T7	120.00-110.00	-5.6870	-2.0937	-4.9730	-1.4871
T8	110.00-100.00	-6.3549	-2.3386	-5.5563	-1.6606
T9	100.00-80.00	-6.4689	-2.3793	-5.6800	-1.6961

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T10	80.00-60.00	-6.9341	-2.5488	-6.0909	-1.8171
T11	60.00-40.00	-6.9384	-2.5490	-6.1606	-1.8364
T12	40.00-20.00	-7.3377	-2.6945	-6.5206	-1.9423
T13	20.00-0.00	-6.9461	-2.5498	-6.0267	-1.7943

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
GPS Antenna 18"x3" Dia	C	From Leg	2.50 0.00 0.00	0.0000	36.25	No Ice 1/2" Ice	0.30 0.42	0.30 0.42	10.00 13.61
4' Side Arm Mount	C	From Leg	0.00 0.00 0.00	0.0000	32.92	No Ice 1/2" Ice	4.25 5.85	4.25 5.85	120.00 160.00
2-element dipole	A	From Leg	7.00 0.00 0.00	0.0000	84.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	20.00 26.00
PiROD 7' side arm mount	A	From Leg	3.50 0.00 0.00	0.0000	79.00	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
PiROD 7' side arm mount	B	From Leg	3.50 0.00 0.00	0.0000	79.50	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
Amphenol BCD-80609	B	From Leg	7.00 -4.00 0.00	0.0000	79.60	No Ice 1/2" Ice	2.43 3.39	2.43 3.39	27.00 45.00
1- Element Dipole	B	From Leg	7.00 0.00 0.00	0.0000	79.60	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	8.00 12.00
PD-1142-2C	B	From Leg	7.00 0.00 10.00	0.0000	79.60	No Ice 1/2" Ice	2.08 3.35	2.08 3.35	25.00 41.67
Yagi Antenna	C	From Leg	7.00 1.50 1.50	0.0000	79.60	No Ice 1/2" Ice	1.60 2.88	2.75 1.60	11.84 30.00
PD-1142-2C	C	From Leg	7.00 0.00 6.00	0.0000	79.60	No Ice 1/2" Ice	2.08 3.35	2.08 3.35	25.00 41.67
PiROD 7' side arm mount	C	From Leg	3.50 0.00 0.00	0.0000	79.60	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
PiROD 6' side arm mount	B	From Leg	3.00 0.00 0.00	0.0000	99.00	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
PiROD 6' side arm mount	C	From Leg	3.00 0.00 0.00	0.0000	99.00	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
PD-458-2	C	From Leg	6.00 0.00 10.00	0.0000	99.00	No Ice 1/2" Ice	3.66 5.02	3.66 5.02	50.00 76.76

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
ANT150D3	A	From Leg	6.00 0.00 10.00	0.0000	109.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	18.00 23.40
PiROD 6' side arm mount	B	From Leg	3.00 0.00 1.50	0.0000	106.00	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
PiROD 6' side arm mount	B	From Leg	3.00 0.00 1.50	0.0000	120.00	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
PiROD 12' Universal T-Frame Sector Mount	A	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
PiROD 12' Universal T-Frame Sector Mount	B	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
PiROD 12' Universal T-Frame Sector Mount	C	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
PiROD 12' T-Frame	A	From Leg	2.00 0.00 0.00	0.0000	125.00 - 137.00	No Ice 1/2" Ice	12.20 17.60	12.20 17.60	360.00 490.00
PiROD 12' T-Frame	B	From Leg	2.00 0.00 1.50	0.0000	137.00	No Ice 1/2" Ice	12.20 17.60	12.20 17.60	360.00 490.00
PiROD 12' T-Frame	C	From Leg	2.00 0.00 1.50	0.0000	137.00	No Ice 1/2" Ice	12.20 17.60	12.20 17.60	360.00 490.00
SBNHH-1D65A W/ MOUNT PIPE	A	From Leg	2.00 -5.00 0.00	0.0000	140.00	No Ice 1/2" Ice	6.43 6.87	3.91 4.27	40.90 80.32
Powerwave 7770 W/Mount Pipe	B	From Leg	2.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
Powerwave 7770 W/Mount Pipe	C	From Leg	2.00 5.00 0.00	0.0000	140.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
CCI HPA-65R-H6 W/Mount Pipe	A	From Leg	2.00 -5.00 0.00	0.0000	140.00	No Ice 1/2" Ice	10.08 10.64	6.45 6.91	51.00 112.92
Powerwave 7770 W/Mount Pipe	B	From Leg	2.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
Powerwave 7770 W/Mount Pipe	C	From Leg	2.00 5.00 0.00	0.0000	140.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
CCI HPA-65R-H6 W/Mount Pipe	A	From Leg	2.00 -5.00 0.00	0.0000	140.00	No Ice 1/2" Ice	10.08 10.64	6.45 6.91	51.00 112.92
Powerwave 7770 W/Mount Pipe	B	From Leg	2.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
Powerwave 7770 W/Mount Pipe	C	From Leg	2.00 5.00 0.00	0.0000	140.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
RRUS 11 B12	A	From Leg	2.00 -4.00 0.00	0.0000	140.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	55.00 74.32

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
RRUS 11 B12	B	From Leg	2.00 -4.00 0.00	0.0000	140.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	55.00 74.32
RRUS 11 B12	C	From Leg	2.00 -4.00 0.00	0.0000	140.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	55.00 74.32
RRUS 12	A	From Leg	2.00 -4.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	58.00 81.22
RRUS 12	B	From Leg	2.00 -4.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	58.00 81.22
RRUS 12	C	From Leg	2.00 -4.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	58.00 81.22
APXV9ERR18	A	From Leg	4.00 2.00 0.00	0.0000	157.42	No Ice 1/2" Ice	8.26 8.81	7.23 8.19	83.90 151.78
APXV9ERR18	B	From Leg	4.00 2.00 0.00	0.0000	157.42	No Ice 1/2" Ice	8.26 8.81	7.23 8.19	83.90 151.78
APXV9ERR18	C	From Leg	4.00 2.00 0.00	0.0000	157.42	No Ice 1/2" Ice	8.26 8.81	7.23 8.19	83.90 151.78
PiROD 13' Lightweight T-Frame	A	From Leg	2.00 2.00 0.00	0.0000	154.00	No Ice 1/2" Ice	10.60 16.80	10.60 16.80	255.00 359.00
PiROD 13' Lightweight T-Frame	B	From Leg	2.00 2.00 0.00	0.0000	154.00	No Ice 1/2" Ice	10.60 16.80	10.60 16.80	255.00 359.00
PiROD 13' Lightweight T-Frame	C	From Leg	2.00 2.00 0.00	0.0000	154.00	No Ice 1/2" Ice	10.60 16.80	10.60 16.80	255.00 359.00
RRH 2x50 800	A	From Leg	0.00 0.00 0.00	0.0000	157.42	No Ice 1/2" Ice	2.63 2.84	2.63 2.84	35.00 61.38
RRH 2x50 800	B	From Leg	0.00 0.00 0.00	0.0000	157.42	No Ice 1/2" Ice	2.63 2.84	2.63 2.84	35.00 61.38
RRH 2x50 800	C	From Leg	0.00 0.00 0.00	0.0000	157.42	No Ice 1/2" Ice	2.63 2.84	2.63 2.84	35.00 61.38
Amphenol LPA-80080-4CF-EDIN-4	A	From Leg	2.50 -4.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	12.00 45.12
Amphenol LPA-80080-4CF-EDIN-4	A	From Leg	2.50 4.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	12.00 45.12
Amphenol BXA-70063-6CF-EDIN-4	A	From Leg	2.50 -1.00 0.00	0.0000	169.00	No Ice 1/2" Ice	7.75 8.29	5.58 6.52	38.90 97.27
BXA-171085-8BF-EDIN-4	A	From Leg	2.50 1.00 0.00	0.0000	169.00	No Ice 1/2" Ice	3.39 3.87	3.56 4.36	31.10 65.66
Amphenol LPA-80080-4CF-EDIN-4	B	From Leg	2.50 -4.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	12.00 45.12

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
Amphenol LPA-80080-4CF-EDIN-4	B	From Leg	2.50 4.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	12.00 45.12
Amphenol BXA-70063-6CF-EDIN-4	B	From Leg	2.50 -1.00 0.00	0.0000	169.00	No Ice 1/2" Ice	7.75 8.29	5.58 6.52	38.90 97.27
BXA-171085-8BF-EDIN-4	B	From Leg	2.50 1.00 0.00	0.0000	169.00	No Ice 1/2" Ice	3.39 3.87	3.56 4.36	31.10 65.66
Amphenol LPA-80080-4CF-EDIN-4	C	From Leg	2.50 -4.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	12.00 45.12
Amphenol LPA-80080-4CF-EDIN-4	C	From Leg	2.50 4.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	12.00 45.12
Amphenol BXA-70063-6CF-EDIN-4	C	From Leg	2.50 -1.00 0.00	0.0000	169.00	No Ice 1/2" Ice	7.75 8.29	5.58 6.52	38.90 97.27
Amphenol BXA-70063-6CF-EDIN-4	C	From Leg	2.50 1.00 0.00	0.0000	169.00	No Ice 1/2" Ice	7.75 8.29	5.58 6.52	38.90 97.27
DB222-A	C	From Leg	2.50 1.00 0.00	0.0000	172.00 - 171.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	25.00 40.00
Diplexers	A	From Leg	2.50 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	0.23 0.30	0.17 0.24	10.00 10.00
Diplexers	B	From Leg	2.50 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	0.23 0.30	0.17 0.24	10.00 10.00
Diplexers	C	From Leg	2.50 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	0.23 0.30	0.17 0.25	10.00 10.00
ANT150D3	A	From Leg	7.00 0.00 -5.00	0.0000	184.17	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	18.00 23.40
Super station C21 6004569	A	From Leg	7.00 0.00 5.00	0.0000	184.17	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	10.00 20.28
Pirod 7' Side arm mount	A	From Leg	3.50 0.00 0.00	0.0000	183.72	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
OGT9-840N	B	From Leg	7.00 0.00 5.00	0.0000	184.00	No Ice 1/2" Ice	2.27 3.44	2.27 3.44	18.50 36.09
OGT9-840N	B	From Leg	7.00 0.00 5.00	0.0000	184.00	No Ice 1/2" Ice	2.27 3.44	2.27 3.44	18.50 36.09
Pirod 7' Side arm Mount	C	From Leg	3.50 0.00 0.00	0.0000	183.17	No Ice 1/2" Ice	9.63 11.56	9.63 11.56	160.00 190.00
ATN 150F2	C	From Leg	2.00 1.00 0.00	0.0000	186.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	12.00 22.28
3' Side Arm Mount	C	From Leg	1.00 1.00 0.00	0.0000	183.00	No Ice 1/2" Ice	3.15 5.67	3.15 5.67	100.00 130.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight lb
Andrew 6' w/Radome	A	Paraboloid w/Radome	From Leg	3.32 0.00 0.00	Worst		99.00	6.00	No Ice 1/2" Ice	28.27 29.07	380.00 450.00
Andrew 6' w/Radome	B	Paraboloid w/Radome	From Leg	0.00 0.00 0.00	Worst		189.50	6.00	No Ice 1/2" Ice	28.27 29.07	380.00 450.00

Truss-Leg Properties

Section Designation	Area in²	Area Ice in²	Self Weight lb	Ice Weight lb	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in²
Pirod 105244	1026.8606	1727.9786	562.76	211.31	7.1310	11.9999	3.6816
Pirod 105244	1026.8606	1727.9786	562.76	211.31	7.1310	11.9999	3.6816
Pirod 105216	1998.0891	3357.4497	505.25	428.24	6.9378	11.6578	3.6816
Pirod 105217	2130.7479	3520.4599	619.35	443.34	7.3984	12.2238	5.3014
Pirod 105217	2130.7479	3520.4599	619.35	443.34	7.3984	12.2238	5.3014
Pirod 105218	2263.4687	3690.8612	754.52	458.46	7.8593	12.8155	7.2158
Pirod 105218	2263.4687	3690.8612	754.52	458.46	7.8593	12.8155	7.2158
Pirod 105218	2263.4687	3690.8612	754.52	458.46	7.8593	12.8155	7.2158
Pirod 105219	2441.8688	3942.2854	944.27	485.72	8.4787	13.6885	9.4248
Pirod 105219	2441.8688	3942.2854	944.27	485.72	8.4787	13.6885	9.4248
Pirod 105220	2578.8005	4132.5504	1121.16	500.74	8.9542	14.3491	11.9282
Pirod 105220	2578.8005	4132.5504	1121.16	500.74	8.9542	14.3491	11.9282
Pirod 112738	3466.5160	5074.9521	1689.34	681.89	12.0365	17.6214	14.7262

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	26650.53					
Bracing Weight	22822.26					
Total Member Self-Weight	49472.79			-1559.43	12936.28	
Total Weight	61322.83			-1559.43	12936.28	
Wind 0 deg - No Ice		22.50	-65275.81	-6942875.44	7825.50	-25573.84
Wind 30 deg - No Ice		31061.82	-53783.45	-5753526.78	-3311619.70	-26512.81
Wind 60 deg - No Ice		52858.73	-30534.04	-3274998.88	-5652938.13	-21467.85
Wind 90 deg - No Ice		62084.69	-22.50	-6670.21	-6627323.55	-11398.59
Wind 120 deg - No Ice		56513.98	32618.42	3464672.50	-5997086.08	2424.78
Wind 150 deg - No Ice		31022.86	53760.95	5745297.13	-3302767.57	15114.22
Wind 180 deg - No Ice		-22.50	61029.11	6536467.33	18047.06	23519.89

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 210 deg - No Ice		-31061.82	53783.45	5750407.91	3337492.26	26512.81
Wind 240 deg - No Ice		-56536.47	32657.39	3473524.64	6028069.42	23149.06
Wind 270 deg - No Ice		-62084.69	22.50	3551.35	6653196.11	11398.59
Wind 300 deg - No Ice		-52836.23	-30495.07	-3266146.75	5673699.91	-2052.04
Wind 330 deg - No Ice		-31022.86	-53760.95	-5748416.00	3328640.13	-15114.22
Member Ice	22709.35					
Total Weight Ice	90854.14			-7723.95	28534.40	
Wind 0 deg - Ice		39.52	-60124.16	-6442497.61	22947.61	-20226.95
Wind 30 deg - Ice		29003.99	-50178.68	-5403014.30	-3091164.53	-20163.19
Wind 60 deg - Ice		49560.16	-28625.89	-3091246.07	-5309295.70	-15397.33
Wind 90 deg - Ice		57939.53	-39.52	-13310.74	-6201186.86	-6916.46
Wind 120 deg - Ice		52067.48	30027.85	3204824.57	-5543949.58	3881.16
Wind 150 deg - Ice		28935.54	50139.15	5381979.60	-3081487.93	13246.73
Wind 180 deg - Ice		-39.52	57183.32	6149643.67	34121.19	18976.66
Wind 210 deg - Ice		-29003.99	50178.68	5387566.39	3148233.34	20163.19
Wind 240 deg - Ice		-52107.00	30096.31	3214501.18	5606605.17	16345.79
Wind 270 deg - Ice		-57939.53	39.52	-2137.16	6258255.66	6916.46
Wind 300 deg - Ice		-49520.63	-28557.43	-3081569.46	5360777.71	-3579.32
Wind 330 deg - Ice		-28935.54	-50139.15	-5397427.50	3138556.73	-13246.73
Total Weight	61322.83			-1559.43	12936.28	
Wind 0 deg - Service		6.94	-20146.85	-2142074.51	-2533.84	-7893.16
Wind 30 deg - Service		9586.98	-16599.83	-1774991.59	-1027053.97	-8182.97
Wind 60 deg - Service		16314.42	-9424.09	-1010013.84	-1749683.11	-6625.88
Wind 90 deg - Service		19161.94	-6.94	-1270.43	-2050419.35	-3518.08
Wind 120 deg - Service		17442.59	10067.41	1070131.65	-1855901.61	748.39
Wind 150 deg - Service		9574.96	16592.89	1774028.14	-1024321.83	4664.88
Wind 180 deg - Service		-6.94	18836.15	2018216.47	620.96	7259.23
Wind 210 deg - Service		-9586.98	16599.83	1775605.54	1025141.08	8182.97
Wind 240 deg - Service		-17449.53	10079.44	1072863.79	1855566.13	7144.77
Wind 270 deg - Service		-19161.94	6.94	1884.38	2048506.47	3518.08
Wind 300 deg - Service		-16307.48	-9412.06	-1007281.70	1746192.83	-633.35
Wind 330 deg - Service		-9574.96	-16592.89	-1773414.19	1022408.94	-4664.88

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp

Comb. No.	Description
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	195 - 190	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-454.17	202.32	24.52
			Max. Mx	17	-451.60	-408.03	133.74
			Max. My	23	-446.52	-258.07	-340.53
			Max. Vy	17	161.15	-408.03	133.74
			Max. Vx	18	-142.68	-107.88	326.10
		Diagonal	Max Tension	16	389.64	0.00	0.00
			Max. Compression	3	-309.96	0.00	0.00
			Max. Mx	25	-222.60	-41.22	-2.44
			Max. My	24	176.09	-39.27	-4.89
			Max. Vy	25	-30.58	-41.22	-2.44
			Max. Vx	24	1.30	0.00	0.00
		Top Girt	Max Tension	12	51.00	0.00	0.00
			Max. Compression	15	-237.25	0.00	0.00
			Max. Mx	14	-119.60	176.47	0.00
			Max. My	15	-60.69	0.00	-3.66
			Max. Vy	14	-58.82	0.00	0.00
			Max. Vx	15	1.22	0.00	0.00
T2	190 - 180	Leg	Max Tension	12	754.63	-355.06	-24.47
			Max. Compression	19	-2604.46	846.98	-10.55
			Max. Mx	19	-2604.46	846.98	-10.55
			Max. My	24	-1207.85	56.13	932.83
			Max. Vy	12	-566.94	-355.06	-24.47
			Max. Vx	9	769.30	-62.67	-6.56
		Diagonal	Max Tension	8	1368.02	0.00	0.00
			Max. Compression	2	-1519.11	0.00	0.00
			Max. Mx	25	-411.97	38.35	-2.91
			Max. My	15	120.11	33.69	-5.40
			Max. Vy	15	22.79	38.13	-3.98
			Max. Vx	15	1.19	0.00	0.00
T3	180 - 160	Leg	Max Tension	8	8597.03	0.00	0.00
			Max. Compression	23	-13212.09	1145.76	-1.65
			Max. Mx	10	-12620.21	1194.75	1.30
			Max. My	7	-1891.76	45.89	-1025.31

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	4	-761.86	0.00	0.00
			Max. Vx	13	770.30	0.00	0.00
		Diagonal	Max Tension	5	3544.31	0.00	0.00
			Max. Compression	11	-3624.80	0.00	0.00
			Max. Mx	22	3092.72	56.56	5.46
			Max. My	22	-801.63	43.30	6.96
			Max. Vy	22	30.44	56.56	5.46
			Max. Vx	22	-1.46	0.00	0.00
T4	160 - 150	Leg	Max Tension	8	15710.95	-1042.23	-32.95
			Max. Compression	23	-22422.02	-347.04	-40.17
			Max. Mx	10	-21051.60	1194.75	1.30
			Max. My	11	-2716.71	-276.88	-1579.37
			Max. Vy	23	769.09	1168.95	7.22
			Max. Vx	26	-560.96	-442.52	1503.08
		Diagonal	Max Tension	5	5182.61	56.63	1.47
			Max. Compression	5	-5450.02	0.00	0.00
			Max. Mx	24	2564.14	83.14	5.94
			Max. My	25	-4294.48	75.72	9.07
			Max. Vy	24	43.67	83.14	5.94
			Max. Vx	25	1.89	0.00	0.00
		Secondary Horizontal	Max Tension	22	650.02	0.00	0.00
			Max. Compression	3	-481.46	46.93	7.65
			Max. Mx	25	-399.84	65.89	11.23
			Max. My	20	-223.05	65.58	11.83
			Max. Vy	25	-42.58	65.89	11.23
			Max. Vx	23	-2.43	0.00	0.00
T5	150 - 140	Leg	Max Tension	8	24929.35	-330.62	-46.46
			Max. Compression	23	-33800.36	1862.25	118.07
			Max. Mx	23	-33800.36	1862.25	118.07
			Max. My	11	-3061.46	-276.88	-1579.37
			Max. Vy	19	-483.58	1846.43	-63.00
			Max. Vx	11	-397.48	-276.88	-1579.37
		Diagonal	Max Tension	3	6089.80	0.00	0.00
			Max. Compression	3	-6180.18	0.00	0.00
			Max. Mx	24	5582.93	94.09	-8.60
			Max. My	15	434.87	87.77	10.48
			Max. Vy	24	46.23	94.09	-8.60
			Max. Vx	15	2.07	0.00	0.00
T6	140 - 120	Leg	Max Tension	12	50363.55	0.00	0.00
			Max. Compression	10	-64935.46	1758.03	-134.39
			Max. Mx	23	-47533.68	1862.25	118.07
			Max. My	11	-6000.98	-23.27	-1747.04
			Max. Vy	21	700.85	-1688.87	-110.90
			Max. Vx	24	706.25	22.31	-1735.85
		Diagonal	Max Tension	3	9193.00	0.00	0.00
			Max. Compression	3	-9265.76	0.00	0.00
			Max. Mx	23	6801.69	110.18	-8.57
			Max. My	21	-6654.42	85.23	-15.22
			Max. Vy	24	50.46	110.02	-9.47
			Max. Vx	21	2.53	0.00	0.00
		Top Girt	Max Tension	24	108.60	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	80.34	-288.48	0.00
			Max. My	15	97.52	0.00	5.98
			Max. Vy	14	72.35	0.00	0.00
			Max. Vx	15	-1.50	0.00	0.00
T7	120 - 110	Leg	Max Tension	12	64766.83	-1733.54	-17.05
			Max. Compression	10	-82037.04	-276.71	56.39
			Max. Mx	23	-81084.93	3776.49	8.36
			Max. My	9	-6608.42	-305.00	2841.40

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
			Max. Vy	23	988.05	3776.49	8.36
			Max. Vx	13	-578.74	-301.81	2739.25
		Diagonal	Max Tension	3	10295.17	101.47	-2.11
			Max. Compression	3	-10791.18	0.00	0.00
			Max. Mx	23	8094.85	142.05	7.81
			Max. My	16	-10233.57	99.68	16.86
			Max. Vy	22	61.50	141.44	-8.29
			Max. Vx	16	2.76	0.00	0.00
		Secondary Horizontal	Max Tension	10	1421.84	0.00	0.00
			Max. Compression	10	-1421.84	58.42	5.49
			Max. Mx	21	-435.54	111.00	20.32
			Max. My	20	-582.26	109.89	21.39
			Max. Vy	21	59.38	111.00	20.32
			Max. Vx	26	-3.54	0.00	0.00
T8	110 - 100	Leg	Max Tension	12	80768.42	-304.88	7.37
			Max. Compression	10	-101170.69	2837.75	70.56
			Max. Mx	23	-99859.02	3064.96	61.43
			Max. My	9	-7167.86	-305.00	2841.40
			Max. Vy	23	-653.26	3064.96	61.43
			Max. Vx	9	536.89	-305.00	2841.40
		Diagonal	Max Tension	3	10968.32	0.00	0.00
			Max. Compression	3	-10962.14	0.00	0.00
			Max. Mx	23	8337.45	161.60	-11.46
			Max. My	15	266.34	142.90	15.79
			Max. Vy	25	64.64	158.60	-13.63
			Max. Vx	15	2.71	0.00	0.00
T9	100 - 80	Leg	Max Tension	12	115436.43	0.00	0.00
			Max. Compression	10	-141690.78	5031.90	-160.08
			Max. Mx	23	-138679.52	5608.63	-131.88
			Max. My	11	-9822.48	-31.74	-2589.50
			Max. Vy	6	962.80	2823.88	-17.30
			Max. Vx	11	-941.73	86.23	-926.72
		Diagonal	Max Tension	3	12345.37	0.00	0.00
			Max. Compression	3	-12420.21	0.00	0.00
			Max. Mx	23	9107.74	190.09	-14.10
			Max. My	16	-11221.16	103.18	22.01
			Max. Vy	24	68.86	181.31	-14.97
			Max. Vx	17	-3.24	0.00	0.00
T10	80 - 60	Leg	Max Tension	12	152130.17	0.00	0.00
			Max. Compression	10	-185251.51	4653.37	-65.77
			Max. Mx	23	-180198.03	6397.05	-40.36
			Max. My	11	-12047.75	-242.37	-3118.89
			Max. Vy	23	1113.53	5608.63	-131.88
			Max. Vx	13	873.01	-26.48	2469.23
		Diagonal	Max Tension	9	14030.09	0.00	0.00
			Max. Compression	3	-14256.03	0.00	0.00
			Max. Mx	23	11052.85	301.87	19.62
			Max. My	22	-12612.73	139.70	-37.11
			Max. Vy	24	98.23	285.08	-22.53
			Max. Vx	22	4.89	0.00	0.00
T11	60 - 40	Leg	Max Tension	12	189231.14	0.00	0.00
			Max. Compression	10	-230017.71	2822.67	-14.49
			Max. Mx	23	-222465.34	7245.68	4.79
			Max. My	13	-14993.61	-790.93	6194.43
			Max. Vy	19	-924.57	7227.27	-17.66
			Max. Vx	13	-826.23	-790.93	6194.43
		Diagonal	Max Tension	3	14971.41	0.00	0.00
			Max. Compression	3	-15367.69	0.00	0.00
			Max. Mx	25	9357.87	472.93	27.75
			Max. My	21	-13122.81	320.05	-40.90

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	25	136.75	472.93	27.75
			Max. Vx	21	5.53	0.00	0.00
T12	40 - 20	Leg	Max Tension	12	226551.01	0.00	0.00
			Max. Compression	10	-275792.98	5405.18	-104.67
			Max. Mx	23	-265106.16	13419.99	-41.44
			Max. My	13	-17942.01	-1169.33	15924.19
			Max. Vy	19	-1516.62	13395.02	-14.36
			Max. Vx	13	-1774.86	-1169.33	15924.19
		Diagonal	Max Tension	16	16393.88	0.00	0.00
			Max. Compression	3	-16536.02	0.00	0.00
			Max. Mx	24	1400.45	654.21	24.04
			Max. My	22	-15996.55	374.20	-97.94
			Max. Vy	24	154.63	654.21	24.04
			Max. Vx	22	9.87	0.00	0.00
T13	20 - 0	Leg	Max Tension	12	249780.66	-7186.96	33.35
			Max. Compression	10	-302942.76	0.00	-0.13
			Max. Mx	23	-295043.52	13419.99	-41.44
			Max. My	13	-17969.76	-1169.33	15924.19
			Max. Vy	19	1042.82	13395.02	-14.36
			Max. Vx	13	1223.58	-1169.33	15924.19
		Diagonal	Max Tension	21	22318.64	0.00	0.00
			Max. Compression	2	-22697.38	0.00	0.00
			Max. Mx	24	20326.64	-530.32	51.31
			Max. My	22	5650.62	-483.35	68.51
			Max. Vy	24	-158.61	-530.32	51.31
			Max. Vx	22	-7.49	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	10	330112.22	36655.56	-21763.95
	Max. H_x	10	330112.22	36655.56	-21763.95
	Max. H_z	17	-243427.20	-33568.23	19749.78
	Min. Vert	4	-270356.90	-31299.32	18614.48
	Min. H_x	17	-243427.20	-33568.23	19749.78
	Min. H_z	10	330112.22	36655.56	-21763.95
Leg B	Max. Vert	6	328720.77	-36895.62	-21235.50
	Max. H_x	25	-245197.42	33775.89	19418.42
	Max. H_z	25	-245197.42	33775.89	19418.42
	Min. Vert	12	-270959.59	31550.63	18172.28
	Min. H_x	6	328720.77	-36895.62	-21235.50
	Min. H_z	6	328720.77	-36895.62	-21235.50
Leg A	Max. Vert	2	329473.53	-577.70	42602.33
	Max. H_x	10	-134166.57	2845.78	-18624.49
	Max. H_z	2	329473.53	-577.70	42602.33
	Min. Vert	8	-270506.94	508.62	-36409.52
	Min. H_x	5	20739.25	-2799.18	1822.04
	Min. H_z	21	-243695.69	390.80	-38927.83

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	61322.83	0.00	0.00	-1559.49	12936.40	0.03
Dead+Wind 0 deg - No Ice	61322.82	22.50	-65275.71	-6958381.80	7885.02	-25614.84
Dead+Wind 30 deg - No Ice	61322.82	31061.83	-53783.39	-5766483.07	-3319034.80	-26540.50
Dead+Wind 60 deg - No Ice	61322.82	52858.76	-30534.05	-3282406.05	-5665645.92	-21489.78
Dead+Wind 90 deg - No Ice	61322.82	62084.65	-22.53	-6716.88	-6642224.36	-11409.64
Dead+Wind 120 deg - No Ice	61322.82	56513.89	32618.37	3472407.08	-6010480.27	2438.52
Dead+Wind 150 deg - No Ice	61322.82	31022.81	53760.94	5758221.70	-3310166.86	15147.84
Dead+Wind 180 deg - No Ice	61322.82	-22.49	61029.15	6551174.66	18127.80	23554.79
Dead+Wind 210 deg - No Ice	61322.82	-31061.77	53783.42	5763313.77	3345031.20	26540.46
Dead+Wind 240 deg - No Ice	61322.82	-56536.39	32657.34	3481244.74	6041555.68	23175.91
Dead+Wind 270 deg - No Ice	61322.82	-62084.65	22.46	3537.91	6668148.14	11409.72
Dead+Wind 300 deg - No Ice	61322.82	-52836.26	-30495.09	-3273490.79	5686463.00	-2064.62
Dead+Wind 330 deg - No Ice	61322.82	-31022.88	-53760.90	-5761320.59	3336139.73	-15147.90
Dead+Ice+Temp	90854.14	0.00	0.00	-7737.82	28569.10	-0.03
Dead+Wind 0 deg+Ice+Temp	90854.10	39.52	-60123.74	-6462842.81	23046.18	-20305.13
Dead+Wind 30 deg+Ice+Temp	90854.11	29003.97	-50178.37	-5420134.27	-3100929.38	-20233.15
Dead+Wind 60 deg+Ice+Temp	90854.12	49560.04	-28625.81	-3101069.40	-5326106.31	-15454.60
Dead+Wind 90 deg+Ice+Temp	90854.12	57939.26	-39.65	-13379.15	-6220813.84	-6947.16
Dead+Wind 120 deg+Ice+Temp	90854.10	52067.12	30027.65	3214940.51	-5561450.04	3899.15
Dead+Wind 150 deg+Ice+Temp	90854.12	28935.30	50138.99	5399020.98	-3091216.02	13308.14
Dead+Wind 180 deg+Ice+Temp	90854.12	-39.51	57183.18	6169123.55	34261.08	19051.67
Dead+Wind 210 deg+Ice+Temp	90854.11	-29003.74	50178.50	5404603.24	3158221.28	20233.25
Dead+Wind 240 deg+Ice+Temp	90854.10	-52106.64	30096.10	3224627.10	5624319.34	16405.83
Dead+Wind 270 deg+Ice+Temp	90854.12	-57939.26	39.40	-2160.58	6278057.56	6947.17
Dead+Wind 300 deg+Ice+Temp	90854.12	-49520.51	-28557.36	-3091327.07	5377756.76	-3596.73
Dead+Wind 330 deg+Ice+Temp	90854.12	-28935.51	-50138.86	-5414498.11	3148504.80	-13308.25
Dead+Wind 0 deg - Service	61322.83	6.94	-20146.84	-2148760.16	11383.71	-7905.24
Dead+Wind 30 deg - Service	61322.83	9586.98	-16599.82	-1780868.34	-1015446.91	-8190.27
Dead+Wind 60 deg - Service	61322.83	16314.41	-9424.08	-1014168.90	-1739710.01	-6633.13
Dead+Wind 90 deg - Service	61322.83	19161.93	-6.94	-3149.09	-2041122.59	-3524.11
Dead+Wind 120 deg - Service	61322.83	17442.58	10067.41	1070664.22	-1846151.65	752.54
Dead+Wind 150 deg - Service	61322.83	9574.95	16592.88	1776157.88	-1012707.21	4677.94
Dead+Wind 180 deg - Service	61322.83	-6.94	18836.13	2020899.49	14548.04	7270.28
Dead+Wind 210 deg - Service	61322.83	-9586.98	16599.82	1777736.74	1041378.49	8190.28
Dead+Wind 240 deg - Service	61322.83	-17449.52	10079.43	1073401.80	1873660.10	7152.62
Dead+Wind 270 deg - Service	61322.83	-19161.93	6.94	15.98	2067046.77	3524.09
Dead+Wind 300 deg - Service	61322.83	-16307.47	-9412.05	-1011424.51	1764053.79	-637.16
Dead+Wind 330 deg - Service	61322.83	-9574.95	-16592.88	-1779282.07	1038636.79	-4677.93

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-61322.83	0.00	-0.00	61322.83	-0.00	0.000%
2	22.50	-61322.83	-65275.77	-22.50	61322.82	65275.71	0.000%
3	31061.80	-61322.83	-53783.41	-31061.83	61322.82	53783.39	0.000%
4	52858.69	-61322.83	-30534.02	-52858.76	61322.82	30534.05	0.000%
5	62084.65	-61322.83	-22.50	-62084.65	61322.82	22.53	0.000%
6	56513.94	-61322.83	32618.40	-56513.89	61322.82	-32618.37	0.000%
7	31022.84	-61322.83	53760.92	-31022.81	61322.82	-53760.94	0.000%
8	-22.50	-61322.83	61029.07	22.49	61322.82	-61029.15	0.000%
9	-31061.81	-61322.83	53783.41	31061.77	61322.82	-53783.42	0.000%
10	-56536.44	-61322.83	32657.37	56536.39	61322.82	-32657.34	0.000%
11	-62084.65	-61322.83	22.50	62084.65	61322.82	-22.46	0.000%
12	-52836.20	-61322.83	-30495.06	52836.26	61322.82	30495.09	0.000%
13	-31022.84	-61322.83	-53760.92	31022.88	61322.82	53760.90	0.000%
14	0.00	-90854.14	0.00	-0.00	90854.14	-0.00	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
15	39.52	-90854.14	-60124.12	-39.52	90854.10	60123.74	0.000%
16	29003.98	-90854.14	-50178.65	-29003.97	90854.11	50178.37	0.000%
17	49560.13	-90854.14	-28625.87	-49560.04	90854.12	28625.81	0.000%
18	57939.49	-90854.14	-39.52	-57939.26	90854.12	39.65	0.000%
19	52067.44	-90854.14	30027.83	-52067.12	90854.10	-30027.65	0.000%
20	28935.52	-90854.14	50139.12	-28935.30	90854.12	-50138.99	0.000%
21	-39.52	-90854.14	57183.28	39.51	90854.12	-57183.18	0.000%
22	-29003.98	-90854.14	50178.65	29003.74	90854.11	-50178.50	0.000%
23	-52106.97	-90854.14	30096.29	52106.64	90854.10	-30096.10	0.000%
24	-57939.49	-90854.14	39.52	57939.26	90854.12	-39.40	0.000%
25	-49520.60	-90854.14	-28557.41	49520.51	90854.12	28557.36	0.000%
26	-28935.52	-90854.14	-50139.12	28935.51	90854.12	50138.86	0.000%
27	6.94	-61322.83	-20146.84	-6.94	61322.83	20146.84	0.000%
28	9586.98	-61322.83	-16599.82	-9586.98	61322.83	16599.82	0.000%
29	16314.41	-61322.83	-9424.08	-16314.41	61322.83	9424.08	0.000%
30	19161.93	-61322.83	-6.94	-19161.93	61322.83	6.94	0.000%
31	17442.58	-61322.83	10067.41	-17442.58	61322.83	-10067.41	0.000%
32	9574.95	-61322.83	16592.88	-9574.95	61322.83	-16592.88	0.000%
33	-6.94	-61322.83	18836.13	6.94	61322.83	-18836.13	0.000%
34	-9586.98	-61322.83	16599.82	9586.98	61322.83	-16599.82	0.000%
35	-17449.52	-61322.83	10079.43	17449.52	61322.83	-10079.43	0.000%
36	-19161.93	-61322.83	6.94	19161.93	61322.83	-6.94	0.000%
37	-16307.47	-61322.83	-9412.05	16307.47	61322.83	9412.05	0.000%
38	-9574.95	-61322.83	-16592.88	9574.95	61322.83	16592.88	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	0.00000111
4	Yes	4	0.00000001	0.00000099
5	Yes	4	0.00000001	0.00000123
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000124
8	Yes	4	0.00000001	0.00000099
9	Yes	4	0.00000001	0.00000112
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000123
12	Yes	4	0.00000001	0.00000099
13	Yes	4	0.00000001	0.00000124
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000122
16	Yes	4	0.00000001	0.00000133
17	Yes	4	0.00000001	0.00000129
18	Yes	4	0.00000001	0.00000131
19	Yes	4	0.00000001	0.00000121
20	Yes	4	0.00000001	0.00000130
21	Yes	4	0.00000001	0.00000129
22	Yes	4	0.00000001	0.00000133
23	Yes	4	0.00000001	0.00000123
24	Yes	4	0.00000001	0.00000132
25	Yes	4	0.00000001	0.00000129
26	Yes	4	0.00000001	0.00000131
27	Yes	4	0.00000001	0.00000001

28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	195 - 190	3.128	35	0.1106	0.0050
T2	190 - 180	3.013	35	0.1106	0.0051
T3	180 - 160	2.778	35	0.1105	0.0061
T4	160 - 150	2.306	35	0.1075	0.0066
T5	150 - 140	2.074	35	0.1051	0.0066
T6	140 - 120	1.849	35	0.1015	0.0065
T7	120 - 110	1.412	35	0.0930	0.0052
T8	110 - 100	1.208	35	0.0870	0.0047
T9	100 - 80	1.018	35	0.0799	0.0043
T10	80 - 60	0.671	35	0.0665	0.0030
T11	60 - 40	0.395	35	0.0496	0.0022
T12	40 - 20	0.190	35	0.0338	0.0014
T13	20 - 0	0.052	35	0.0158	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
189.50	Andrew 6' w/Radome	35	3.001	0.1106	0.0051	240143
186.00	ATN 150F2	35	2.919	0.1106	0.0054	273098
184.17	ANT150D3	35	2.876	0.1106	0.0056	338020
184.00	OGT9-840N	35	2.872	0.1106	0.0056	345545
183.72	Pirod 7' Side arm mount	35	2.865	0.1106	0.0057	359082
183.17	Pirod 7' Side arm Mount	35	2.852	0.1106	0.0057	388340
183.00	3' Side Arm Mount	35	2.848	0.1106	0.0057	398073
172.00	DB222-A	35	2.588	0.1097	0.0065	Inf
171.50	DB222-A	35	2.576	0.1096	0.0066	Inf
171.00	DB222-A	35	2.565	0.1095	0.0066	Inf
169.00	Amphenol LPA-80080-4CF-EDIN-4	35	2.517	0.1092	0.0066	739675
157.42	APXV9ERR18	35	2.245	0.1070	0.0066	246648
154.00	PiROD 13' Lightweight T-Frame	35	2.166	0.1062	0.0066	205890
140.00	SBNHH-1D65A W/ MOUNT PIPE	35	1.849	0.1015	0.0065	367829
137.00	PiROD 12' T-Frame	35	1.782	0.1003	0.0064	315106
131.00	PiROD 12' T-Frame	35	1.649	0.0980	0.0060	194575
125.00	PiROD 12' Universal T-Frame Sector Mount	35	1.519	0.0954	0.0055	140004
120.00	PiROD 6' side arm mount	35	1.412	0.0930	0.0052	111845
109.00	ANT150D3	35	1.188	0.0863	0.0046	80619

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
106.00	PiROD 6' side arm mount	35	1.131	0.0842	0.0045	93932
99.00	Andrew 6' w/Radome	35	0.999	0.0792	0.0042	139510
84.00	2-element dipole	35	0.736	0.0694	0.0033	68747
79.60	Amphenol BCD-80609	35	0.665	0.0662	0.0030	61468
79.50	PiROD 7' side arm mount	35	0.663	0.0662	0.0030	61396
79.00	PiROD 7' side arm mount	35	0.655	0.0658	0.0030	61099
36.25	GPS Antenna 18"x3" Dia	35	0.158	0.0305	0.0013	76183
32.92	4' Side Arm Mount	35	0.132	0.0275	0.0011	64630

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 190	10.100	10	0.3568	0.0163
T2	190 - 180	9.727	10	0.3569	0.0165
T3	180 - 160	8.969	10	0.3563	0.0196
T4	160 - 150	7.446	10	0.3470	0.0215
T5	150 - 140	6.700	10	0.3392	0.0215
T6	140 - 120	5.972	10	0.3276	0.0211
T7	120 - 110	4.562	10	0.3003	0.0167
T8	110 - 100	3.903	10	0.2810	0.0151
T9	100 - 80	3.289	10	0.2580	0.0138
T10	80 - 60	2.168	10	0.2148	0.0099
T11	60 - 40	1.276	10	0.1601	0.0070
T12	40 - 20	0.615	10	0.1091	0.0046
T13	20 - 0	0.167	10	0.0509	0.0020

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
189.50	Andrew 6' w/Radome	10	9.689	0.3569	0.0165	75233
186.00	ATN 150F2	10	9.425	0.3569	0.0175	85951
184.17	ANT150D3	10	9.286	0.3568	0.0181	106923
184.00	OGT9-840N	10	9.274	0.3568	0.0182	109366
183.72	Pirod 7' Side arm mount	10	9.252	0.3568	0.0183	113765
183.17	Pirod 7' Side arm Mount	10	9.210	0.3567	0.0185	123304
183.00	3' Side Arm Mount	10	9.198	0.3567	0.0186	126485
172.00	DB222-A	10	8.358	0.3537	0.0212	487481
171.50	DB222-A	10	8.320	0.3535	0.0212	413046
171.00	DB222-A	10	8.282	0.3533	0.0213	358333
169.00	Amphenol LPA-80080-4CF-EDIN-4	10	8.129	0.3523	0.0214	234227
157.42	APXV9ERR18	10	7.252	0.3452	0.0215	77054
154.00	PiROD 13' Lightweight T-Frame	10	6.996	0.3427	0.0215	64242
140.00	SBNHH-1D65A W/ MOUNT PIPE	10	5.972	0.3276	0.0211	117080
137.00	PiROD 12' T-Frame	10	5.756	0.3239	0.0207	99784
131.00	PiROD 12' T-Frame	10	5.327	0.3163	0.0194	60870
125.00	PiROD 12' Universal T-Frame Sector Mount	10	4.906	0.3081	0.0179	43559
120.00	PiROD 6' side arm mount	10	4.562	0.3003	0.0167	34720

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
109.00	ANT150D3	10	3.840	0.2788	0.0150	25021
106.00	PiROD 6' side arm mount	10	3.652	0.2719	0.0146	29142
99.00	Andrew 6' w/Radome	10	3.229	0.2558	0.0136	43205
84.00	2-element dipole	10	2.376	0.2242	0.0107	21265
79.60	Amphenol BCD-80609	10	2.147	0.2139	0.0098	19012
79.50	PiROD 7' side arm mount	10	2.142	0.2136	0.0098	18990
79.00	PiROD 7' side arm mount	10	2.117	0.2124	0.0097	18898
36.25	GPS Antenna 18"x3" Dia	10	0.512	0.0986	0.0041	23592
32.92	4' Side Arm Mount	10	0.427	0.0888	0.0037	20028

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
T1	195	Leg	A325N	1.0000	6	0.00	34557.50	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	389.64	8156.25	0.048 ✔	1.333	Gusset Bearing
T2	190	Leg	A325N	1.0000	6	125.77	34557.00	0.004 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	1368.02	8156.25	0.168 ✔	1.333	Member Bearing
T3	180	Leg	A325N	1.0000	6	1432.84	34556.50	0.041 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	3544.31	8156.25	0.435 ✔	1.333	Gusset Bearing
T4	160	Leg	A325N	1.0000	6	2566.76	34557.10	0.074 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5182.61	8156.25	0.635 ✔	1.333	Gusset Bearing
T5	150	Diagonal	A325N	1.0000	1	6089.80	10875.00	0.560 ✔	1.333	Gusset Bearing
T6	140	Leg	A325N	1.0000	6	8393.92	34556.70	0.243 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9193.00	10875.00	0.845 ✔	1.333	Gusset Bearing
T7	120	Leg	A325N	1.0000	6	10728.60	34556.80	0.310 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	10295.20	10875.00	0.947 ✔	1.333	Gusset Bearing
T8	110	Diagonal	A325N	1.0000	1	10968.30	10875.00	1.009 ✔	1.333	Gusset Bearing
T9	100	Leg	A325N	1.2500	6	19239.40	53995.50	0.356 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	12345.40	13593.80	0.908 ✔	1.333	Member Bearing
T10	80	Leg	A325N	1.2500	6	25355.00	53995.60	0.470 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	14030.10	20390.60	0.688 ✔	1.333	Gusset Bearing
T11	60	Leg	A325N	1.2500	6	31538.50	53995.70	0.584 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	14971.40	20390.60	0.734 ✔	1.333	Member Bearing
T12	40	Leg	A325N	1.2500	6	37758.50	53995.20	0.699 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	16393.90	20390.60	0.804 ✔	1.333	Gusset Bearing
T13	20	Leg	A325N	2.0000	6	41630.10	138230.00	0.301 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	2	11348.70	26100.00	0.435 ✔	1.333	Gusset Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	195 - 190	Pirod 105244	5.00	5.00	45.4 K=1.00	25.051	3.6816	-450.51	92228.10	0.005* ✔
T2	190 - 180	Pirod 105244	10.01	10.01	45.4 K=1.00	25.051	3.6816	-2604.46	92228.10	0.028 ✔
T3	180 - 160	Pirod 105216	20.02	10.01	45.4 K=1.00	25.051	3.6816	-13212.10	92228.10	0.143 ✔
T4	160 - 150	Pirod 105217	10.01	5.13	37.8 K=1.00	26.132	5.3014	-22422.00	138539.00	0.162 ✔
T5	150 - 140	Pirod 105217	10.01	10.01	37.8 K=1.00	26.132	5.3014	-33800.40	138539.00	0.244 ✔
T6	140 - 120	Pirod 105218	20.02	10.01	32.4 K=1.00	26.848	7.2158	-64935.50	193727.00	0.335 ✔
T7	120 - 110	Pirod 105218	10.01	5.11	32.4 K=1.00	26.848	7.2158	-82037.00	193727.00	0.423 ✔
T8	110 - 100	Pirod 105218	10.01	10.01	32.4 K=1.00	26.848	7.2158	-101171.00	193727.00	0.522 ✔
T9	100 - 80	Pirod 105219	20.02	10.01	28.4 K=1.00	27.351	9.4248	-141691.00	257781.00	0.550 ✔
T10	80 - 60	Pirod 105219	20.02	10.01	28.4 K=1.00	27.351	9.4248	-185252.00	257781.00	0.719 ✔
T11	60 - 40	Pirod 105220	20.02	10.01	25.2 K=1.00	27.723	11.9282	-230018.00	330691.00	0.696 ✔
T12	40 - 20	Pirod 105220	20.02	10.01	25.2 K=1.00	27.723	11.9282	-275793.00	330691.00	0.834 ✔
T13	20 - 0	Pirod 112738	20.02	20.02	32.6 K=1.00	26.829	14.7262	-302943.00	395095.00	0.767 ✔

* DL controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V lb	Allow. V_a lb	Stress Ratio
T1	195 - 190	0.5	1.48	121.0	10.193	0.1963	170.77	2239.90	0.076 ✔
T2	190 - 180	0.5	1.48	121.0	10.193	0.1963	769.80	2239.90	0.344 ✔
T3	180 - 160	0.5	1.48	121.0	10.133	0.1963	788.41	2226.75	0.354 ✔
T4	160 - 150	0.5	1.47	120.0	10.279	0.1963	769.28	2258.95	0.341 ✔

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V lb	Allow. V_a lb	Stress Ratio
T5	150 - 140	0.5	1.47	120.0	10.279	0.1963	484.02	2258.95	0.214 ✔
T6	140 - 120	0.5	1.46	119.0	10.423	0.1963	741.35	2290.46	0.324 ✔
T7	120 - 110	0.5	1.46	119.0	10.423	0.1963	988.22	2290.46	0.431 ✔
T8	110 - 100	0.5	1.46	119.0	10.423	0.1963	654.46	2290.46	0.286 ✔
T9	100 - 80	0.625	1.45	94.4	13.671	0.3068	1003.58	4694.36	0.214 ✔
T10	80 - 60	0.625	1.45	94.4	13.671	0.3068	1114.84	4694.36	0.237 ✔
T11	60 - 40	0.625	1.43	93.6	13.766	0.3068	926.85	4726.89	0.196 ✔
T12	40 - 20	0.625	1.43	93.6	13.766	0.3068	1839.94	4726.89	0.389 ✔
T13	20 - 0	0.75	1.73	93.9	16.080	0.4418	1236.11	9783.96	0.126 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	195 - 190	2L2x2x3/16	13.17	5.97	116.2 K=1.00	10.825	1.4300	-309.95	15479.80	0.020 ✔
T2	190 - 180	L2 1/2x2 1/2x3/16	16.18	7.52	182.2 K=1.00	4.499	0.9020	-1519.11	4057.68	0.374 ✔
T3	180 - 160	L3x3x3/16	17.33	8.11	163.2 K=1.00	5.605	1.0900	-3624.80	6109.86	0.593 ✔
T4	160 - 150	L3x3x5/16	17.92	8.41	171.3 K=1.00	5.089	1.7800	-5450.02	9057.71	0.602 ✔
T5	150 - 140	L3x3x5/16	18.52	8.71	177.5 K=1.00	4.738	1.7800	-6180.18	8433.76	0.733 ✔
T6	140 - 120	L3x3x5/16	19.75	9.33	190.2 K=1.00	4.129	1.7800	-9265.76	7349.04	1.261 ✔
T7	120 - 110	L3 1/2x3 1/2x5/16	20.37	9.65	167.8 K=1.00	5.302	2.0900	-10791.20	11081.60	0.974 ✔
T8	110 - 100	L3 1/2x3 1/2x5/16	21.00	9.97	173.3 K=1.00	4.970	2.0900	-10962.10	10386.70	1.055 ✔
T9	100 - 80	L4x4x1/4	22.27	10.58	159.7 K=1.00	5.857	1.9400	-12420.20	11362.90	1.093 ✔
T10	80 - 60	L4x4x3/8	23.56	11.23	171.0 K=1.00	5.107	2.8600	-13764.60	14605.90	0.942 ✔
T11	60 - 40	L5x5x3/8	24.87	11.89	144.1 K=1.00	7.193	3.6100	-14766.80	25968.40	0.569 ✔
T12	40 - 20	L5x5x3/8	26.19	12.55	152.1 K=1.00	6.453	3.6100	-16104.50	23294.20	0.691 ✔
T13	20 - 0	2L3 1/2x3 1/2x5/16	32.24	15.33	158.4 K=0.93	5.953	4.1800	-22697.40	24881.70	0.912 ✔

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

Secondary Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	lb	lb	
T4	160 - 150	L3x3x5/16	14.86	13.86	157.2 K=0.87	6.046	1.7800	-481.46	10761.10	0.045 ✔
T7	120 - 110	L3 1/2x3 1/2x5/16	17.74	16.74	160.6 K=0.86	5.792	2.0900	-1421.84	12105.90	0.117 ✔

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	lb	lb	
T1	195 - 190	2L2 1/2x2 1/2x3/16	12.00	11.00	150.5 K=0.89	6.589	1.8000	-237.25	11860.30	0.020 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	lb	lb	
T2	190 - 180	Pirod 105244	10.01	10.01	45.4	30.000	3.6816	754.63	110447.00	0.007 ✔
T3	180 - 160	Pirod 105216	20.02	10.01	45.4	30.000	3.6816	8597.03	110447.00	0.078 ✔
T4	160 - 150	Pirod 105217	10.01	4.88	37.8	30.000	5.3014	15710.90	159043.00	0.099 ✔
T5	150 - 140	Pirod 105217	10.01	10.01	37.8	30.000	5.3014	24929.30	159043.00	0.157 ✔
T6	140 - 120	Pirod 105218	20.02	10.01	32.4	30.000	7.2158	50363.50	216475.00	0.233 ✔
T7	120 - 110	Pirod 105218	10.01	4.90	32.4	30.000	7.2158	64766.80	216475.00	0.299 ✔
T8	110 - 100	Pirod 105218	10.01	10.01	32.4	30.000	7.2158	80768.40	216475.00	0.373 ✔
T9	100 - 80	Pirod 105219	20.02	10.01	28.4	30.000	9.4248	115436.00	282743.00	0.408 ✔
T10	80 - 60	Pirod 105219	20.02	10.01	28.4	30.000	9.4248	152130.00	282743.00	0.538

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T11	60 - 40	Pirod 105220	20.02	10.01	25.2	30.000	11.9282	189231.00	357847.00	0.529
T12	40 - 20	Pirod 105220	20.02	10.01	25.2	30.000	11.9282	226551.00	357847.00	0.633
T13	20 - 0	Pirod 112738	20.02	20.02	32.6	30.000	14.7262	249781.00	441786.00	0.565

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V lb	Allow. V_a lb	Stress Ratio
T1	195 - 190	0.5	1.48	121.0	10.193	0.1963	170.77	2239.90	0.076
T2	190 - 180	0.5	1.48	121.0	10.193	0.1963	769.80	2239.90	0.344
T3	180 - 160	0.5	1.48	121.0	10.133	0.1963	788.41	2226.75	0.354
T4	160 - 150	0.5	1.47	120.0	10.279	0.1963	769.28	2258.95	0.341
T5	150 - 140	0.5	1.47	120.0	10.279	0.1963	484.02	2258.95	0.214
T6	140 - 120	0.5	1.46	119.0	10.423	0.1963	741.35	2290.46	0.324
T7	120 - 110	0.5	1.46	119.0	10.423	0.1963	988.22	2290.46	0.431
T8	110 - 100	0.5	1.46	119.0	10.423	0.1963	654.46	2290.46	0.286
T9	100 - 80	0.625	1.45	94.4	13.671	0.3068	1003.58	4694.36	0.214
T10	80 - 60	0.625	1.45	94.4	13.671	0.3068	1114.84	4694.36	0.237
T11	60 - 40	0.625	1.43	93.6	13.766	0.3068	926.85	4726.89	0.196
T12	40 - 20	0.625	1.43	93.6	13.766	0.3068	1839.94	4726.89	0.389
T13	20 - 0	0.75	1.73	93.9	16.080	0.4418	1236.11	9783.96	0.126

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	195 - 190	2L2x2x3/16	13.17	5.97	119.4	29.000	0.7561	389.64	21926.70	0.018

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T2	190 - 180	L2 1/2x2 1/2x3/16	16.18	7.52	118.5	29.000	0.5183	1368.02	15030.60	0.091 ✔
T3	180 - 160	L3x3x3/16	17.33	8.11	105.7	29.000	0.6593	3544.31	19119.60	0.185 ✔
T4	160 - 150	L3x3x5/16	17.92	8.41	111.6	29.000	1.0713	5182.61	31068.50	0.167 ✔
T5	150 - 140	L3x3x5/16	18.52	8.71	115.6	29.000	1.0713	6089.80	31068.50	0.196 ✔
T6	140 - 120	L3x3x5/16	19.75	9.33	123.7	29.000	1.0713	9193.00	31068.50	0.296 ✔
T7	120 - 110	L3 1/2x3 1/2x5/16	20.37	9.65	109.1	29.000	1.3038	10295.20	37811.00	0.272 ✔
T8	110 - 100	L3 1/2x3 1/2x5/16	21.00	9.97	112.6	29.000	1.3038	10968.30	37811.00	0.290 ✔
T9	100 - 80	L4x4x1/4	21.63	10.26	100.4	29.000	1.1972	12345.40	34718.40	0.356 ✔
T10	80 - 60	L4x4x3/8	22.91	10.91	108.3	29.000	1.7583	14030.10	50990.20	0.275 ✔
T11	60 - 40	L5x5x3/8	24.21	11.56	90.4	29.000	2.3208	14971.40	67302.70	0.222 ✔
T12	40 - 20	L5x5x3/8	25.53	12.22	95.5	29.000	2.3208	16393.90	67302.70	0.244 ✔
T13	20 - 0	2L3 1/2x3 1/2x5/16	32.24	15.33	173.6	29.000	2.6077	22318.60	75622.00	0.295 ✔

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T4	160 - 150	L3x3x5/16	14.86	13.86	180.4	32.500	1.3350	650.02	43387.50	0.015 ✔
T7	120 - 110	L3 1/2x3 1/2x5/16	17.74	16.74	186.0	32.500	1.5675	1421.84	50943.80	0.028 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	195 - 190	2L2 1/2x2 1/2x3/16	12.00	11.00	169.7	21.600	1.8000	51.00	38880.00	0.001 ✔
T6	140 - 120	L3x3x5/16	15.95	14.95	194.6	21.600	1.7800	84.58	38448.00	0.002* ✔

* DL controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	195 - 190	Leg	Pirod 105244	1	-450.51	92228.10	7.6	Pass
T2	190 - 180	Leg	Pirod 105244	14	-2604.46	122940.05	25.8	Pass
T3	180 - 160	Leg	Pirod 105216	22	-13212.10	122940.05	26.6	Pass
T4	160 - 150	Leg	Pirod 105217	37	-22422.00	184672.48	25.5	Pass
T5	150 - 140	Leg	Pirod 105217	49	-33800.40	184672.48	18.3	Pass
T6	140 - 120	Leg	Pirod 105218	58	-64935.50	258238.08	25.1	Pass
T7	120 - 110	Leg	Pirod 105218	76	-82037.00	258238.08	32.4	Pass
T8	110 - 100	Leg	Pirod 105218	88	-101171.00	258238.08	39.2	Pass
T9	100 - 80	Leg	Pirod 105219	97	-141691.00	343622.06	41.2	Pass
T10	80 - 60	Leg	Pirod 105219	112	-185252.00	343622.06	53.9	Pass
T11	60 - 40	Leg	Pirod 105220	127	-230018.00	440811.08	52.2	Pass
T12	40 - 20	Leg	Pirod 105220	142	-275793.00	440811.08	62.6	Pass
T13	20 - 0	Leg	Pirod 112738	157	-302943.00	526661.61	57.5	Pass
T1	195 - 190	Diagonal	2L2x2x3/16	10	-309.95	20634.57	1.5	Pass
T2	190 - 180	Diagonal	L2 1/2x2 1/2x3/16	19	-1519.11	5408.89	28.1	Pass
T3	180 - 160	Diagonal	L3x3x3/16	25	-3624.80	8144.44	44.5	Pass
T4	160 - 150	Diagonal	L3x3x5/16	41	-5450.02	12073.93	45.1	Pass
T5	150 - 140	Diagonal	L3x3x5/16	56	-6180.18	11242.20	55.0	Pass
T6	140 - 120	Diagonal	L3x3x5/16	68	-9265.76	9796.27	94.6	Pass
T7	120 - 110	Diagonal	L3 1/2x3 1/2x5/16	83	-10791.20	14771.77	73.1	Pass
T8	110 - 100	Diagonal	L3 1/2x3 1/2x5/16	95	-10962.10	13845.47	79.2	Pass
T9	100 - 80	Diagonal	L4x4x1/4	104	-12420.20	15146.75	82.0	Pass
T10	80 - 60	Diagonal	L4x4x3/8	119	-13764.60	19469.66	70.7	Pass
T11	60 - 40	Diagonal	L5x5x3/8	134	-14766.80	34615.88	42.7	Pass
T12	40 - 20	Diagonal	L5x5x3/8	149	-16104.50	31051.17	51.9	Pass
T13	20 - 0	Diagonal	2L3 1/2x3 1/2x5/16	164	-22697.40	33167.30	68.4	Pass
T4	160 - 150	Secondary Horizontal	L3x3x5/16	48	-481.46	14344.55	3.4	Pass
T7	120 - 110	Secondary Horizontal	L3 1/2x3 1/2x5/16	87	-1421.84	16137.16	8.8	Pass
T1	195 - 190	Top Girt	2L2 1/2x2 1/2x3/16	4	-237.25	15809.78	1.5	Pass
T6	140 - 120	Top Girt	L3x3x5/16	61	83.19	38448.00	0.4	Pass
						Summary		
						Leg (T12)	62.6	Pass
						Diagonal (T6)	94.6	Pass
						Secondary Horizontal (T7)	8.8	Pass
						Top Girt (T1)	1.5	Pass
						Bolt Checks	75.7	Pass
						RATING =	**94.6**	**Pass**

Base Reactions

Axial Tension: $T := 90854lbf$

Shear: $V := 65291lbf$

Moment: $M := 6972.766kip \cdot ft$

Since the Base reactions when compared with the previous analysis, The existing foundation is Adequate and the Proposed equipment can be installed as intended.

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: CT1134

North Canaan-Lower County Rd.
38 Lower Road
North Canaan, CT 06018

August 24, 2016

EBI Project Number: 6216003660

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	11.93 %

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

EBI Consulting
environmental | engineering | due diligence

August 24, 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: **CT1134 – North Canaan-Lower County Rd.**

EBI Consulting was directed to analyze the proposed AT&T facility located at **38 Lower Road, North Canaan, 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 **38 Lower Road, North Canaan, 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 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

2) 2 LTE channels (2100 MHz (AWS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

3) 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.

4) 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.

5) 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.

6) 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.

7) 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.

8) The antennas used in this modeling are the **Commscope SBNHH-1D65A, CCI HPA-65R-BUU-H6, Powerwave 7770** for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) 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.

9) The antenna mounting height centerlines of the proposed antennas are **140 feet** above ground level (AGL) for **Sector A**, **140 feet** above ground level (AGL) for **Sector B** and **140 feet** above ground level (AGL) for Sector C.

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

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

AT&T Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Commscope SBNHH-1D65A	Make / Model:	CCI HPA-65R-BUU-H6	Make / Model:	CCI HPA-65R-BUU-H6
Gain:	10.85 / 14.65 dBd	Gain:	11.95 / 15.05 dBd	Gain:	11.95 / 15.05 dBd
Height (AGL):	**140 feet**	Height (AGL):	**140 feet**	Height (AGL):	**140 feet**
Frequency Bands	700 MHz / 2100 MHz (AWS)	Frequency Bands	700 MHz / 2100 MHz (AWS)	Frequency Bands	700 MHz / 2100 MHz (AWS)
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):	4,960.34	ERP (W):	5,718.78	ERP (W):	5,718.78
Antenna A1 MPE%	**1.33 %**	Antenna B1 MPE%	**1.57 %**	Antenna C1 MPE%	**1.57 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	**140 feet**	Height (AGL):	**140 feet**	Height (AGL):	**140 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A2 MPE%	**0.56 %**	Antenna B2 MPE%	**0.56 %**	Antenna C2 MPE%	**0.56 %**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770
Gain:	11.4 dBd	Gain:	11.4 dBd	Gain:	11.4 dBd
Height (AGL):	**140 feet**	Height (AGL):	**140 feet**	Height (AGL):	**140 feet**
Frequency Bands	850 MHz	Frequency Bands	850 MHz	Frequency Bands	850 MHz
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	60 Watts	Total TX Power(W):	60 Watts	Total TX Power(W):	60 Watts
ERP (W):	828.23	ERP (W):	828.23	ERP (W):	828.23
Antenna A3 MPE%	**0.29 %**	Antenna B3 MPE%	**0.29 %**	Antenna C3 MPE%	**0.29 %**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**2.42 %**
CT State Police	3.24 %
LCD	1.65 %
CL&P	2.17 %
Town of No. Canaan	0.49 %
Sprint	0.38 %
Verizon Wireless	1.18 %
Nextel	0.40 %
Site Total MPE %:	**11.93 %**

AT&T Sector A Total:	2.17 %
AT&T Sector B Total:	2.42 %
AT&T Sector C Total:	2.42 %
Site Total:	11.93 %

AT&T _ Max Values Per Sector (Sectors B&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 700 MHz LTE	2	940.05	140	3.76	700 MHz	467	0.81%
AT&T 2100 MHz (AWS) LTE	2	1,919.34	140	7.69	2100 MHz (AWS)	1000	0.77%
AT&T 850 MHz UMTS	2	414.12	140	1.66	850 MHz	567	0.29%
AT&T 1900 MHz (PCS) UMTS	2	656.33	140	2.63	1900 MHz (PCS)	1000	0.26%
AT&T 850 MHz GSM	2	414.12	140	1.66	850 MHz	567	0.29%
						Total*:	2.42%

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

Summary

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

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

AT&T Sector	Power Density Value (%)
Sector A:	2.17 %
Sector B:	2.42 %
Sector C:	2.42 %
AT&T Maximum Total (per sector):	2.42 %
Site Total:	11.93 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **11.93 %** 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.

MASER CONSULTING
— CONNECTICUT —

331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
www.maserconsulting.com

550 Cochituate Road
Framingham, MA 01701

LTE 2C

Antenna Mount Analysis

Site Name:	*North Canaan-Lower County RD*
FA #:	*10035410*
Site Number:	*CTL01134*
Site Address:	*38 Lower Road* *North Canaan, CT 06018* *Litchfield County*
Maser Project Number:	*16963008A*

September 13, 2016

Analysis Type	*Antenna Mount*
Pass/Fail	*Pass*
Mount Utilization	*68.2 %*

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 performed limited field observations on July 26, 2016 to visually verify the existing condition of the structure from grade and to locate and quantify the existing wireless appurtenances where possible. Maser Consulting P.A. has reviewed the following documents in completing this report:

- RFDS 1129378 provided by Empire Telecom, dated March 28, 2016 for LTE 2C scope of work.
- Rev 1 Construction Drawings prepared by Maser Consulting Connecticut for LTE 2C Scope of Work
- Limited Visual Site Visit photos and notes prepared by Maser Consulting Connecticut on July 26, 2016.
- Tower Mapping Report prepared by Tower Engineering Professionals TEP#72508_94731 dated, September 08, 2016.

The existing **AT&T** equipment is supported on an existing antenna support mounts constructed of structural steel antenna support pipes supported by pipes at a centerline of approximately 140'-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:

Maser Consulting Connecticut understands the existing & proposed **AT&T** loading to be as follows:

- **(1) Andrew SBNHH-1D65A Antennas (Proposed per RFDS)**
- *(6) Powerwave 7770 Antennas (Existing per Mount Mapping)*
- **(2) CCI HPA-65R-BUU-H6 Antennas (Proposed per RFDS)**
- *(3) Ericsson RRUS-11 B12 (Existing per Mount Mapping)*
- **(3) Ericsson RRUS-12+A2 (***Proposed per RFDS***)**
- **(1) Raycap DC6 (Proposed mounted to the tower leg)**
- *(6) Powerwave TMAs (Existing)*

The maximum antenna mount loading for all the sectors occur at the Beta sector and has been utilized for the purpose of this calculation:

- *(2) Powerwave 7770 Antennas (Existing per Mount Mapping)*
- **(1) CCI HPA-65R-BUU-H6 Antennas (Proposed per RFDS)**
- *(1) Ericsson RRUS-11 B12 (Existing per Mount Mapping)*
- **(1) Ericsson RRUS-12+A2 (***Proposed per RFDS mounted on a proposed pipe***)**
- *(2) Powerwave TMAs (Existing)*

Codes, Standards and Loading:

Maser Consulting Connecticut utilized the following codes and standards:

- 2005 CT State Building Code And All Subsequent Amendments
- Structural Standards for Antenna Supporting Structures and Antennas ANSI/TIA-222-F
    - Basic Wind Speed – 80 mph, Ice Wind Speed – 40 mph and Ice thickness - 0.75 in
- Specification for Structural Steel Buildings ANSI/AISC 360-05,

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.
- Solid Steel Round members are constructed of A36 Grade.
- 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.

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 **68.2%** of its structural capacity with the maximum usage occurring at the standoff pipe members. 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.

The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the existing structural members supporting the proposed **AT&T** telecommunications installation described herein.

Further, no structural qualifications are made or implied by this document for the existing structure.

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

Sincerely,
Maser Consulting Connecticut

Frank Pazden, P.E.
Telecommunications Department Manager

Gowtham Penumatsa E.I.T
Structural Design Engineer

\\maserconsulting.com\UNM\AllOffices\MtLaurel\Projects\2016\16963000A\16963008A\Structural\Mount Analysis\Rev 0\Word\

APPENDIX A

Mount analysis of antenna mounts supporting the existing and proposed AT&T appurtenances at 38 Lower Road, North Canaan, CT 06018.

Design Wind Load On Appurtenances:

Inputs:

TIA-222-F Reference

Location: **North Canaan, CT**

Basic Wind Speed : $V := 80$ MPH — Section 16 (CT County listings of minimum basic wind speeds, P. 28)

Antenna Centerline: $z := 140$ ft — (Section 2.3.3, P. 4)

Gust Effect Factors: (Section 2.3.4, P. 5)

$$G_H(z) := \begin{cases} 1.25 & \text{if } 0.65 + \dfrac{0.60}{\left(\frac{z}{33}\right)^{\frac{1}{7}}} > 1.25 \\ 1.0 & \text{if } 0.65 + \dfrac{0.60}{\left(\frac{z}{33}\right)^{\frac{1}{7}}} < 1.0 \\ 0.65 + \dfrac{0.60}{\left(\frac{z}{33}\right)^{\frac{1}{7}}} & \text{otherwise} \end{cases}$$

Gust Effect Factor: $G_h := G_H(z) = 1.138$

Force Coefficient: (Table 3, P. 8) Square Members

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

(Table 3, P. 8) Round Members

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

Velocity Pressure Coefficients:

$$K_z(z) := \begin{cases} 2.58 & \text{if } \left(\frac{z}{33}\right)^{\frac{2}{7}} > 2.58 \\ 1.0 & \text{if } \left(\frac{z}{33}\right)^{\frac{2}{7}} < 1.0 \\ \left(\frac{z}{33}\right)^{\frac{2}{7}} & \text{otherwise} \end{cases}$$

(Section 2.3.3, P. 4)

Velocity Pressure Coefficient: $K_z := K_z(z) = 1.511$ (Section 2.3.3, P. 4)

$K_{zt} := 1$ ASCE 7-05 (Section 10.4.5, P. 4)

Velocity Pressure: $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot psf = 24.759 \cdot psf$ (Section 2.3.3, P. 4)

AT&T Wind Loading:

CCI HPA-65R-BUU-H6

Dimensions: $h_{ant1} := 72 \cdot in$ $w_{ant1} := 14.4 \cdot in$ $d_{ant1} := 9.0 \cdot in$

Weight: $DL_{ant1} := 66 lb$ Assumed 15 lbs conservatively for Mount weight

Mounting Pipe: $L_{p1} := 84 in$ $d_{p1} := 2.375 \cdot in$

Area (Normal): $A_{Na} := h_{ant1} \cdot w_{ant1} = 7.2\,ft^2$

Area (Side): $A_{Ta} := h_{ant1} \cdot d_{ant1} = 4.5\,ft^2$

Force Coefficient (Normal): $C_{f\_N\_a} := C_{f\_square}(h_{ant1}, w_{ant1}) = 1.4$

Force Coefficient (Side): $C_{f\_T\_a} := C_{f\_square}(h_{ant1}, d_{ant1}) = 1.433$

Pipe Area (Normal): $A_{Np} := \max[(L_{p1} - h_{ant1}) \cdot (d_{p1}), 0] = 0.198\,ft^2$

Pipe Area (Side): $A_{Tp} := L_{p1} \cdot d_{p1} = 1.385\,ft^2$

Force Coefficient (Normal): $C_{f\_p} := C_{f\_round}(L_{p1}, d_{p1}) = 1.2$

Normal Effective Projected Area: $EPA_N := (C_{f\_N\_a} \cdot A_{Na}) + (C_{f\_p} \cdot A_{Np}) = 10.317\,ft^2$

Side Effective Projected Area: $EPA_T := (C_{f\_T\_a} \cdot A_{Ta}) + (C_{f\_p} \cdot A_{Tp}) = 8.112\,ft^2$

Effective Projected Area: $EPA_a := \max(EPA_N, EPA_T) = 10.317\,ft^2$

Wind Force: $F_{ant1} := q_z \cdot G_h \cdot EPA_a = 290.727 \cdot lbf$ (Section 2.3.2, P. 4)

Power Wave 7770

Dimensions: $h_{ant2} := 55 \cdot in$ $w_{ant2} := 11 \cdot in$ $d_{ant2} := 5 \cdot in$

Weight: $DL_{ant2} := 50lb$ Assumed 15 lbs conservatively for Mount weight

Mounting Pipe: $L_{p2} := 84in$ $d_{p2} := 2.375 \cdot in$

Area (Normal): $A_{Na} := h_{ant2} \cdot w_{ant2} = 4.201\ ft^2$

Area (Side): $A_{Ta} := h_{ant2} \cdot d_{ant2} = 1.91\ ft^2$

Force Coefficient (Normal): $C_{f\_N\_a} := C_{f\_square}(h_{ant2}, w_{ant2}) = 1.4$

Force Coefficient (Side): $C_{f\_T\_a} := C_{f\_square}(h_{ant2}, d_{ant2}) = 1.533$

Pipe Area (Normal): $A_{Np} := \max[(L_{p2} - h_{ant2}) \cdot (d_{p2}), 0] = 0.478\ ft^2$

Pipe Area (Side): $A_{Tp} := L_{p2} \cdot d_{p2} = 1.385\ ft^2$

Force Coefficient (Normal): $C_{f\_p} := C_{f\_round}(L_{p2}, d_{p2}) = 1.2$

Normal Effective Projected Area: $EPA_N := (C_{f\_N\_a} \cdot A_{Na}) + (C_{f\_p} \cdot A_{Np}) = 6.456\ ft^2$

Side Effective Projected Area: $EPA_T := (C_{f\_T\_a} \cdot A_{Ta}) + (C_{f\_p} \cdot A_{Tp}) = 4.591\ ft^2$

Effective Projected Area: $EPA_a := \max(EPA_N, EPA_T) = 6.456\ ft^2$

Wind Force: $F_{ant2} := q_z \cdot G_h \cdot EPA_a = 181.915 \cdot lbf$ (Section 2.3.2, P. 4)

RRUS 11

Dimensions: $h_{a1} := 19.7 \cdot in$ $w_{a1} := 17 \cdot in$ $d_{a1} := 7.2 \cdot in$

Weight: $DL_{a1} := 50 lbf$

Area (Normal): $A_N := h_{a1} \cdot w_{a1} = 2.326\ ft^2$

Area (Side): $A_T := h_{a1} \cdot d_{a1} = 0.985\ ft^2$

Force Coefficient (Normal): $C_{f\_N} := C_{f\_square}(h_{a1}, w_{a1}) = 1.4$

Force Coefficient (Side): $C_{f\_T} := C_{f\_square}(h_{a1}, d_{a1}) = 1.4$

Front Effective Projected Area: $EPA_N := C_{f\_N} \cdot A_N = 3.256\ ft^2$

Side Effective Projected Area: $EPA_T := C_{f\_T} \cdot A_T = 1.379\ ft^2$

Effective Projected Area: $EPA_a := \max(EPA_N, EPA_T) = 3.256\ ft^2$

Wind Force: $F_{a1} := q_z \cdot G_h \cdot EPA_a = 91.747 \cdot lbf$ (Section 2.3.2, P. 4)

RRUS 12+A2

Dimensions: $h_{a2} := 20.4 \cdot in$ $w_{a2} := 18.5 \cdot in$ $d_{a2} := 7.5 \cdot in$

Weight: $DL_{a2} := 58 lbf$

Area (Normal): $A_N := h_{a2} \cdot w_{a2} = 2.621\ ft^2$

Area (Side): $A_T := h_{a2} \cdot d_{a2} = 1.062\ ft^2$

Force Coefficient (Normal): $C_{f\_N} := C_{f\_square}(h_{a2}, w_{a2}) = 1.4$

Force Coefficient (Side): $C_{f\_T} := C_{f\_square}(h_{a2}, d_{a2}) = 1.4$

Front Effective Projected Area: $EPA_N := C_{f\_N} \cdot A_N = 3.669\ ft^2$

Side Effective Projected Area: $EPA_T := C_{f\_T} \cdot A_T = 1.487\ ft^2$

Effective Projected Area: $EPA_a := \max(EPA_N, EPA_T) = 3.669\ ft^2$

Wind Force: $F_{a2} := q_z \cdot G_h \cdot EPA_a = 103.39 \cdot lbf$ (Section 2.3.2, P. 4)

Powerwave TMAs

Dimensions: $h_{a3} := 9.9 \cdot in$ $w_{a3} := 6.7 \cdot in$ $d_{a3} := 5.4 \cdot in$

Weight: $DL_{a3} := 16 lbf$

Area (Normal): $A_N := h_{a3} \cdot w_{a3} = 0.461\ ft^2$

Area (Side): $A_T := h_{a3} \cdot d_{a3} = 0.371\ ft^2$

Force Coefficient (Normal): $C_{f\_N} := C_{f\_square}(h_{a3}, w_{a3}) = 1.4$

Force Coefficient (Side): $C_{f\_T} := C_{f\_square}(h_{a3}, d_{a3}) = 1.4$

Front Effective Projected Area: $EPA_N := C_{f\_N} \cdot A_N = 0.645\ ft^2$

Side Effective Projected Area: $EPA_T := C_{f\_T} \cdot A_T = 0.52\ ft^2$

Effective Projected Area: $EPA_a := \max(EPA_N, EPA_T) = 0.645\ ft^2$

Wind Force: $F_{a3} := q_z \cdot G_h \cdot EPA_a = 18.171 \cdot lbf$ (Section 2.3.2, P. 4)

Antenna Mount Loading:

Horizontal Pipe Loading:

Height: $h_{m1} := 12ft$

Width: $w_{m1} := 1.7 \cdot in$

Area: $A_a := h_{m1} \cdot w_{m1} = 1.7\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m1}, w_{m1}) = 1.2$

Wind Load: $f_{m1} := q_z \cdot G_h \cdot C_f \cdot w_{m1} = 4.79 \cdot plf$ (Section 2.3.2, P. 4)

1.25 Dia Pipe Loading:

Height: $h_{m2} := 2.5ft$

Width: $w_{m2} := 1.25 \cdot in$

Area: $A_a := h_{m2} \cdot w_{m2} = 0.26\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m2}, w_{m2}) = 1.178$

Wind Load: $f_{m2} := q_z \cdot G_h \cdot C_f \cdot w_{m2} = 3.457 \cdot plf$ (Section 2.3.2, P. 4)

Horizontal Standoff member Loading:

Height: $h_{m3} := 26in$

Width: $w_{m3} := 2.9 \cdot in$

Area: $A_a := h_{m3} \cdot w_{m3} = 0.524\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m3}, w_{m3}) = 0.844$

Wind Load: $f_{m3} := q_z \cdot G_h \cdot C_f \cdot w_{m3} = 5.745 \cdot plf$ (Section 2.3.2, P. 4)

5/8" Solid Rod bracing Loading:

Height: $h_{m4} := 50in$

Width: $w_{m4} := 0.625in$

Area: $A_a := h_{m4} \cdot w_{m4} = 0.217\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m4}, w_{m4}) = 1.2$

Wind Load: $f_{m4} := q_z \cdot G_h \cdot C_f \cdot w_{m4} = 1.761 \cdot plf$ (Section 2.3.2, P. 4)

Center Mast Pipe Loading:

Height: $h_{m5} := 5ft$

Width: $w_{m5} := 4.5in$

Area: $A_a := h_{m5} \cdot w_{m5} = 1.875\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m5}, w_{m5}) = 0.941$

Wind Load: $f_{m5} := q_z \cdot G_h \cdot C_f \cdot w_{m5} = 9.941 \cdot plf$ (Section 2.3.2, P. 4)

1" Solid Rod bracing Loading:

Height: $h_{m6} := 36in$

Width: $w_{m6} := 1in$

Area: $A_a := h_{m6} \cdot w_{m6} = 0.25\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m6}, w_{m6}) = 1.2$

Wind Load: $f_{m6} := q_z \cdot G_h \cdot C_f \cdot w_{m6} = 2.818 \cdot plf$ (Section 2.3.2, P. 4)

Antenna Pipe Loading:

Height: $h_{m7} := 7ft$

Width: $w_{m7} := 2.375in$

Area: $A_a := h_{m7} \cdot w_{m7} = 1.385\,ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{m7}, w_{m7}) = 1.2$

Wind Load: $f_{m7} := q_z \cdot G_h \cdot C_f \cdot w_{m7} = 6.692 \cdot plf$ (Section 2.3.2, P. 4)

Design Wind Load On Appurtenances With Ice:

Inputs:

ASCE 7-05 Reference (Ice Only)
TIA-222-F Reference (As Specified)

Basic Wind Speed With Ice: $V_i := 40$ MPH (Figure 10-2, P. 105)

Design Ice thickness: $t_i := 0.75in$ (Figure 10-2, P. 105)

Ice Density: $\rho_i := 56pcf$ (Section 10.4.1, P. 100)

Importance Factor: $I_{wind} := 1.00$ (Table 10-1, P. 100)

Importance Factor: $I_{ice} := 1.0$ (Table 10-1, P. 100)

Importance Factor: (Section 10.4.3, P. 100)

$$t_{iz.}(z) := \left| \begin{array}{l} K_{iz.} \leftarrow \left(\frac{z}{33}\right)^{0.10} \\ K_{iz} \leftarrow \min\left(K_{iz.}, 1.4\right) \\ 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot \left(K_{zt}\right)^{0.35} \end{array} \right.$$ (Section 10.4.6, P. 100)

$$t_{iz} := t_{iz.}(z) = 1.733 \cdot in$$

Velocity Pressure: $q_z := 0.00256 \cdot K_z \cdot V_i^{\,2} \cdot psf = 6.19 \cdot psf$ (TIA Section 2.3.3, P. 4)

AT&T Wind Loading (With Ice):

CCI HPA-65R-BUU-H6

Dimensions: $h_{i\_ant1} := h_{ant1} + 2 \cdot t_{iz} = 6.289\,ft$

$w_{i\_ant1} := w_{ant1} + 2 \cdot t_{iz} = 1.489\,ft$

$d_{i\_ant1} := d_{ant1} + 2 \cdot t_{iz} = 1.039\,ft$

Mounting Pipe $L_{i\_p1} := L_{p1} + 2 \cdot t_{iz} = 7.289\,ft$

$d_{i\_p1} := d_{p1} + 2 \cdot t_{iz} = 0.487\,ft$

Area (Normal): $A_{iN} := h_{i\_ant1} \cdot w_{i\_ant1} = 9.363\,ft^2$

Area (Side): $A_{iT} := h_{i\_ant1} \cdot d_{i\_ant1} = 6.533\,ft^2$

Force Coefficient (Normal): $C_{if\_N} := C_{f\_square}\left(h_{i\_ant1}, w_{i\_ant1}\right) = 1.4$

Force Coefficient (Side): $C_{if\_T} := C_{f\_square}\left(h_{i\_ant1}, d_{i\_ant1}\right) = 1.4$

Pipe Area (Normal): $A_{Np} := \max\left[\left(L_{i\_p1} - h_{i\_ant1}\right) \cdot \left(d_{i\_p1}\right), 0\right] = 0.487\,ft^2$

Pipe Area (Side): $A_{Tp} := L_{i\_p1} \cdot d_{i\_p1} = 3.548\,ft^2$

Force Coefficient (Normal): $C_{f\_p} := C_{f\_round}\left(L_{i\_p1}, d_{i\_p1}\right) = 0.977$

Normal Effective Projected Area: $EPA_{iN} := \left(C_{if\_N} \cdot A_{iN}\right) + \left(C_{f\_p} \cdot A_{Np}\right) = 13.584\,ft^2$

Side Effective Projected Area: $EPA_{iT} := \left(C_{if\_T} \cdot A_{iT}\right) + C_{f\_p} \cdot A_{Tp} = 12.614\,ft^2$

Effective Projected Area: $EPA_i := \max\left(EPA_{iN}, EPA_{iT}\right) = 13.584\,ft^2$

Wind Force: $F_{iant1} := q_z \cdot G_h \cdot EPA_i = 95.695 \cdot lbf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_ant1} := \sqrt{w_{ant1}^2 + d_{ant1}^2} = 1.415\,ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_ant1} := \pi \cdot t_{iz} \cdot \left(D_{c\_ant1} + t_{iz}\right) = 0.708\,ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_ant1} := \left(A_{iz\_ant1} \cdot h_{i\_ant1}\right) \cdot \rho_i = 249.216\,lbf$

Power Wave 7770

Dimensions:

$h_{i\_ant2} := h_{ant2} + 2 \cdot t_{iz} = 4.872\ ft$

$w_{i\_ant2} := w_{ant2} + 2 \cdot t_{iz} = 1.206\ ft$

$d_{i\_ant2} := d_{ant2} + 2 \cdot t_{iz} = 0.706\ ft$

Mounting Pipe

$L_{i\_p2} := L_{p2} + 2 \cdot t_{iz} = 7.289\ ft$

$d_{i\_p2} := d_{p2} + 2 \cdot t_{iz} = 0.487\ ft$

Area (Normal):

$A_{iN} := h_{i\_ant2} \cdot w_{i\_ant2} = 5.874\ ft^2$

Area (Side):

$A_{iT} := h_{i\_ant2} \cdot d_{i\_ant2} = 3.438\ ft^2$

Force Coefficient (Normal):

$C_{if\_N} := C_{f\_square}\left(h_{i\_ant2}, w_{i\_ant2}\right) = 1.4$

Force Coefficient (Side):

$C_{if\_T} := C_{f\_square}\left(h_{i\_ant2}, d_{i\_ant2}\right) = 1.4$

Pipe Area (Normal):

$A_{Np} := \max\left[\left(L_{i\_p2} - h_{i\_ant2}\right) \cdot \left(d_{i\_p2}\right), 0\right] = 1.176\ ft^2$

Pipe Area (Side):

$A_{Tp} := L_{i\_p2} \cdot d_{i\_p2} = 3.548\ ft^2$

Force Coefficient (Normal):

$C_{f\_p} := C_{f\_round}\left(L_{i\_p2}, d_{i\_p2}\right) = 0.977$

Normal Effective Projected Area:

$EPA_{iN} := \left(C_{if\_N} \cdot A_{iN}\right) + \left(C_{f\_p} \cdot A_{Np}\right) = 9.373\ ft^2$

Side Effective Projected Area:

$EPA_{iT} := \left(C_{if\_T} \cdot A_{iT}\right) + C_{f\_p} \cdot A_{Tp} = 8.28\ ft^2$

Effective Projected Area:

$EPA_i := \max\left(EPA_{iN}, EPA_{iT}\right) = 9.373\ ft^2$

Wind Force:

$F_{iant2} := q_z \cdot G_h \cdot EPA_i = 66.026 \cdot lbf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension:

$D_{c\_ant2} := \sqrt{w_{ant2}^2 + d_{ant2}^2} = 1.007\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice:

$A_{iz\_ant2} := \pi \cdot t_{iz} \cdot \left(D_{c\_ant2} + t_{iz}\right) = 0.522\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load:

$DL_{iz\_ant2} := \left(A_{iz\_ant2} \cdot h_{i\_ant2}\right) \cdot \rho_i = 142.542\ lbf$

RRUS 11

Dimensions:

$h_{i\_a1} := h_{a1} + 2 \cdot t_{iz} = 1.931\ ft$

$w_{i\_a1} := w_{a1} + 2 \cdot t_{iz} = 1.706\ ft$

$d_{i\_a1} := d_{a1} + 2 \cdot t_{iz} = 0.889\ ft$

Area (Normalt):

$A_{iN} := h_{i\_a1} \cdot w_{i\_a1} = 3.293\ ft^2$

Area (Side):

$A_{iT} := h_{i\_a1} \cdot d_{i\_a1} = 1.716\ ft^2$

Force Coefficient (Normal):

$C_{if\_N} := C_{f\_square}(h_{i\_a1}, w_{i\_a1}) = 1.4$

Force Coefficient (Side):

$C_{if\_T} := C_{f\_square}(h_{i\_a1}, d_{i\_a1}) = 1.4$

Front Effective Wind Area:

$EPA_{iN} := C_{if\_N} \cdot A_{iN} = 4.61\ ft^2$

Side Effective Wind Area:

$EPA_{iT} := C_{if\_T} \cdot A_{iT} = 2.402\ ft^2$

Side Effective Wind Area:

$EPA_{ia} := \max(EPA_{iN}, EPA_{iT}) = 4.61\ ft^2$

Wind Force:

$F_{ia1} := q_z \cdot G_h \cdot EPA_{ia} = 32.473 \cdot lbf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension:

$D_{c\_a1} := \sqrt{w_{a1}^2 + d_{a1}^2} = 1.538\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice:

$A_{iz\_a1} := \pi \cdot t_{iz} \cdot (D_{c\_a1} + t_{iz}) = 0.764\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load:

$DL_{iz\_a1} := (A_{iz\_a1} \cdot h_{i\_a1}) \cdot \rho_i = 82.557\ lbf$

RRUS 12+A2

Dimensions:

$h_{i\_a2} := h_{a2} + 2 \cdot t_{iz} = 1.989\ ft$

$w_{i\_a2} := w_{a2} + 2 \cdot t_{iz} = 1.831\ ft$

$d_{i\_a2} := d_{a2} + 2 \cdot t_{iz} = 0.914\ ft$

Area (Normalt):

$A_{iN} := h_{i\_a2} \cdot w_{i\_a2} = 3.641\ ft^2$

Area (Side):

$A_{iT} := h_{i\_a2} \cdot d_{i\_a2} = 1.818\ ft^2$

Force Coefficient (Normal):

$C_{if\_N} := C_{f\_square}\left(h_{i\_a2}, w_{i\_a2}\right) = 1.4$

Force Coefficient (Side):

$C_{if\_T} := C_{f\_square}\left(h_{i\_a2}, d_{i\_a2}\right) = 1.4$

Front Effective Wind Area:

$EPA_{iN} := C_{if\_N} \cdot A_{iN} = 5.097\ ft^2$

Side Effective Wind Area:

$EPA_{iT} := C_{if\_T} \cdot A_{iT} = 2.545\ ft^2$

Side Effective Wind Area:

$EPA_{ia} := \max\left(EPA_{iN}, EPA_{iT}\right) = 5.097\ ft^2$

Wind Force:

$F_{ia2} := q_z \cdot G_h \cdot EPA_{ia} = 35.906 \cdot lbf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension:

$D_{c\_a2} := \sqrt{w_{a2}^2 + d_{a2}^2} = 1.664\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice:

$A_{iz\_a2} := \pi \cdot t_{iz} \cdot \left(D_{c\_a2} + t_{iz}\right) = 0.82\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load:

$DL_{iz\_a2} := \left(A_{iz\_a2} \cdot h_{i\_a2}\right) \cdot \rho_i = 91.371\ lbf$

Powerwave TMA

Dimensions:

$h_{i\_a3} := h_{a3} + 2 \cdot t_{iz} = 1.114\,ft$

$w_{i\_a3} := w_{a3} + 2 \cdot t_{iz} = 0.847\,ft$

$d_{i\_a3} := d_{a3} + 2 \cdot t_{iz} = 0.739\,ft$

Area (Normalt): $A_{iN} := h_{i\_a3} \cdot w_{i\_a3} = 0.944\,ft^2$

Area (Side): $A_{iT} := h_{i\_a3} \cdot d_{i\_a3} = 0.823\,ft^2$

Force Coefficient (Normal): $C_{if\_N} := C_{f\_square}\left(h_{i\_a3}, w_{i\_a3}\right) = 1.4$

Force Coefficient (Side): $C_{if\_T} := C_{f\_square}\left(h_{i\_a3}, d_{i\_a3}\right) = 1.4$

Front Effective Wind Area: $EPA_{iN} := C_{if\_N} \cdot A_{iN} = 1.321\,ft^2$

Side Effective Wind Area: $EPA_{iT} := C_{if\_T} \cdot A_{iT} = 1.152\,ft^2$

Side Effective Wind Area: $EPA_{ia} := \max\left(EPA_{iN}, EPA_{iT}\right) = 1.321\,ft^2$

Wind Force: $F_{ia3} := q_z \cdot G_h \cdot EPA_{ia} = 9.307 \cdot lbf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_a3} := \sqrt{w_{a3}^2 + d_{a3}^2} = 0.717\,ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_a3} := \pi \cdot t_{iz} \cdot \left(D_{c\_a3} + t_{iz}\right) = 0.391\,ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_a3} := \left(A_{iz\_a3} \cdot h_{i\_a3}\right) \cdot \rho_i = 24.385\,lbf$

Antenna Mount Loading With Ice:

Horizontal Pipe Loading:

Height: $h_{im1} := h_{m1} + 2 \cdot t_{iz}$

Width: $w_{im1} := w_{m1} + 2 \cdot t_{iz}$

Area: $A_a := h_{im1} \cdot w_{im1} = 5.291\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im1}, w_{im1}) = 1.2$

Wind Load: $f_{im1} := q_z \cdot G_h \cdot C_f \cdot w_{im1} = 3.64 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_m1} := w_{m1} = 0.142\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m1} := \pi \cdot t_{iz} \cdot (D_{c\_m1} + t_{iz}) = 0.13\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_m1} := (A_{iz\_m1}) \cdot \rho_i = 7.27 \cdot plf$

1.25 Dia Pipe Loading:

Height: $h_{im2} := h_{m2} + 2 \cdot t_{iz}$

Width: $w_{im2} := w_{m2} + 2 \cdot t_{iz}$

Area: $A_a := h_{im2} \cdot w_{im2} = 1.096\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im2}, w_{im2}) = 0.802$

Wind Load: $f_{im2} := q_z \cdot G_h \cdot C_f \cdot w_{im2} = 2.221 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_m2} := \sqrt{w_{m2}^2 + w_{m2}^2} = 0.147\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m2} := \pi \cdot t_{iz} \cdot (D_{c\_m2} + t_{iz}) = 0.132\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_m2} := (A_{iz\_m2}) \cdot \rho_i = 7.413 \cdot plf$

Horizontal Standoff member Loading:

Height: $h_{im3} := h_{m3} + 2 \cdot t_{iz}$

Width: $w_{im3} := w_{m3} + 2 \cdot t_{iz}$

Area: $A_a := h_{im3} \cdot w_{im3} = 1.303\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im3}, w_{im3}) = 0.8$

Wind Load: $f_{im3} := q_z \cdot G_h \cdot C_f \cdot w_{im3} = 2.99 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_m3} := \sqrt{w_{m3}^2 + w_{m3}^2} = 0.342\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m3} := \pi \cdot t_{iz} \cdot (D_{c\_m3} + t_{iz}) = 0.221\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_m3} := (A_{iz\_m3}) \cdot \rho_i = 12.355 \cdot plf$

5/8" Solid Rod Loading:

Height: $h_{im4} := h_{m4} + 2 \cdot t_{iz}$

Width: $w_{im4} := w_{m4} + 2 \cdot t_{iz}$

Area: $A_a := h_{im4} \cdot w_{im4} = 1.519\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im4}, w_{im4}) = 0.935$

Wind Load: $f_{im4} := q_z \cdot G_h \cdot C_f \cdot w_{im4} = 2.245 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_m4} := \sqrt{w_{m4}^2 + w_{m4}^2} = 0.074\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m4} := \pi \cdot t_{iz} \cdot (D_{c\_m4} + t_{iz}) = 0.099\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_m4} := (A_{iz\_m4}) \cdot \rho_i = 5.542 \cdot plf$

Center Mast Pipe Loading:

Height: $h_{im5} := h_{m5} + 2 \cdot t_{iz}$

Width: $w_{im5} := w_{m5} + 2 \cdot t_{iz}$

Area: $A_a := h_{im5} \cdot w_{im5} = 3.511\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im5}, w_{im5}) = 0.821$

Wind Load: $f_{im5} := q_z \cdot G_h \cdot C_f \cdot w_{im5} = 3.842 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_m5} := \sqrt{w_{m5}^2 + w_{m5}^2} = 0.53\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m5} := \pi \cdot t_{iz} \cdot (D_{c\_m5} + t_{iz}) = 0.306\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_m5} := (A_{iz\_m5}) \cdot \rho_i = 17.146 \cdot plf$

1" Solid Rod Loading:

Height: $h_{im6} := h_{m6} + 2 \cdot t_{iz}$

Width: $w_{im6} := w_{m6} + 2 \cdot t_{iz}$

Area: $A_a := h_{im6} \cdot w_{im6} = 1.224\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im6}, w_{im6}) = 0.841$

Wind Load: $f_{im6} := q_z \cdot G_h \cdot C_f \cdot w_{im6} = 2.205 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

Largest Out-to-Out Dimension: $D_{c\_m6} := \sqrt{w_{m6}^2 + w_{m6}^2} = 0.118\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m6} := \pi \cdot t_{iz} \cdot (D_{c\_m6} + t_{iz}) = 0.119\ ft^2$ (Section 10.4.1, P. 100)

Total Ice Dead Load: $DL_{iz\_m6} := (A_{iz\_m6}) \cdot \rho_i = 6.665 \cdot plf$

Antenna Pipe Loading:

Height: $h_{im7} := h_{m7} + 2 \cdot t_{iz}$

Width: $w_{im7} := w_{m7} + 2 \cdot t_{iz}$

Area: $A_a := h_{im7} \cdot w_{im7} = 3.548\ ft^2$

Force Coefficient: $C_f := C_{f\_round}(h_{im7}, w_{im7}) = 0.977$

Wind Load: $f_{im7} := q_z \cdot G_h \cdot C_f \cdot w_{im7} = 3.351 \cdot plf$ (TIA Section 2.3.2, P. 4)

Additional Ice Dead Load

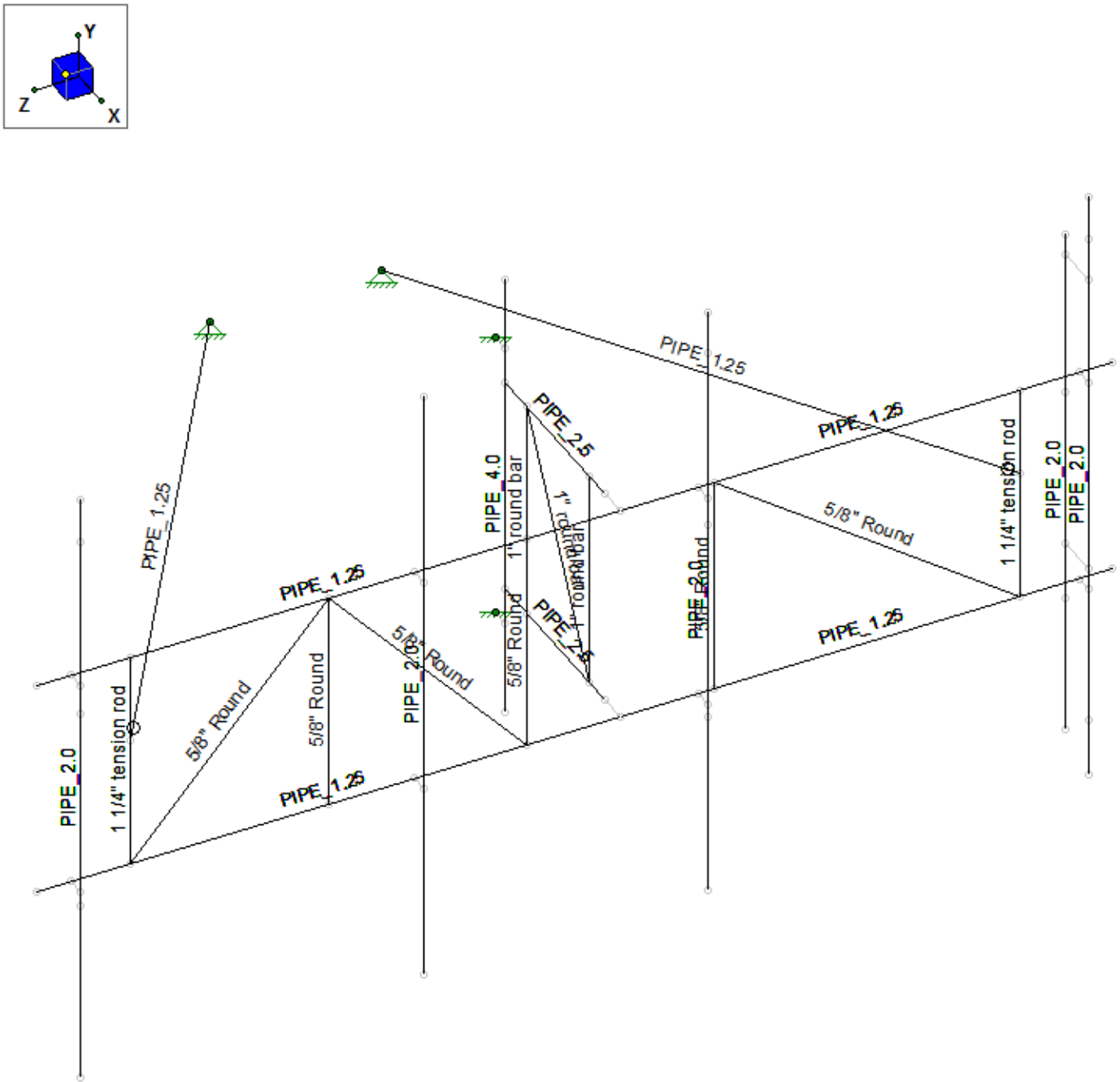
Largest Out-to-Out Dimension: $D_{c\_m7} := \sqrt{w_{m7}^2 + w_{m7}^2} = 0.28\ ft$ (Figure 10-1, P. 102)

Cross Sectional Area of Ice: $A_{iz\_m7} := \pi \cdot t_{iz} \cdot (D_{c\_m7} + t_{iz}) = 0.193\ ft^2$ (Section 10.4.1, P. 100)

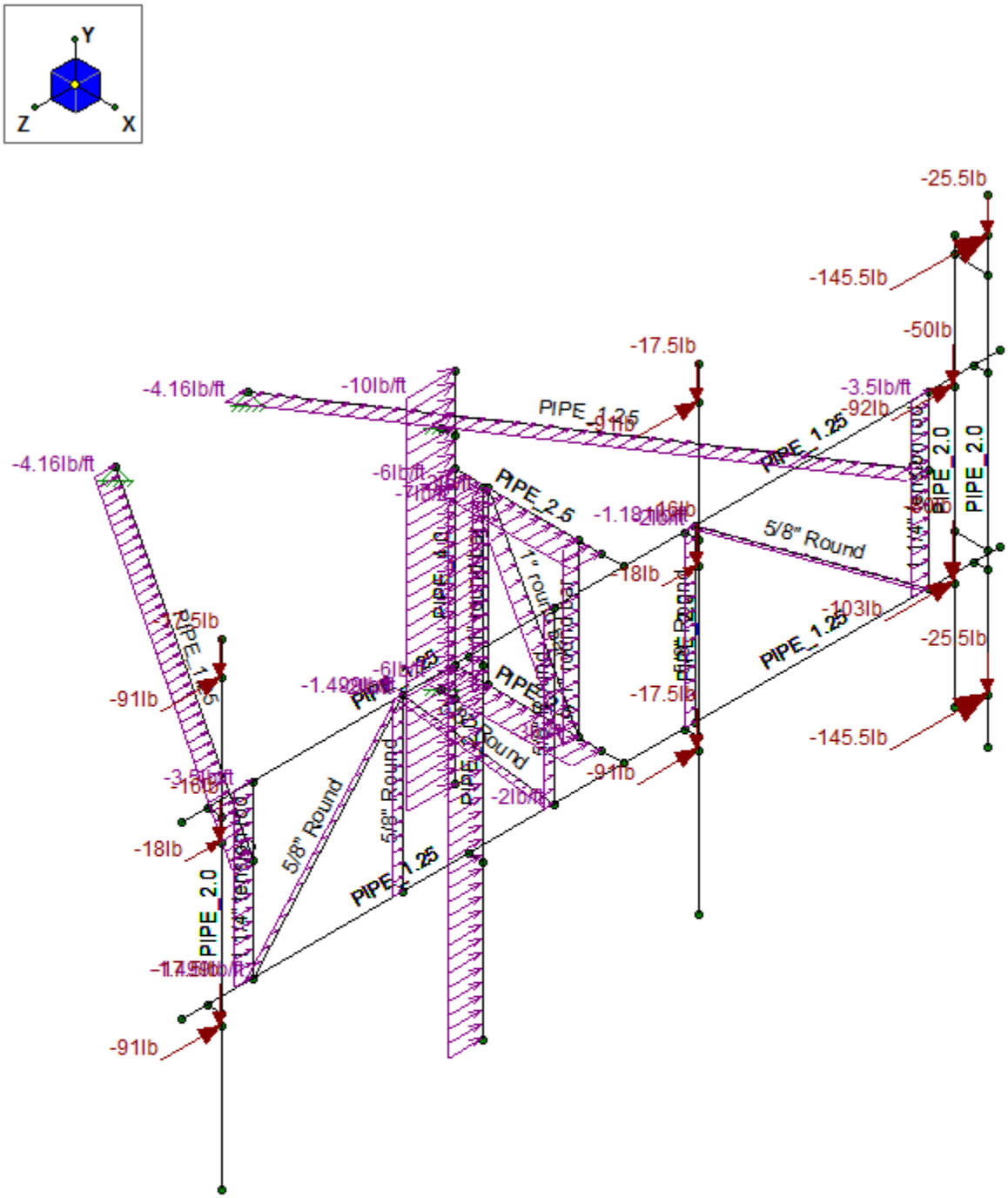
Total Ice Dead Load: $DL_{iz\_m7} := (A_{iz\_m7}) \cdot \rho_i = 10.782 \cdot plf$

Summary:	**Dead Load (No Ice)**	**Wind Load (No Ice)**	**Wind Load (With Ice)**	**Dead Load (With Ice)**
CCI HPA-65R-BUU H6	$DL_{ant1} = 66\,lb$	$F_{ant1} = 291\,lbf$	$F_{iant1} = 96\,lbf$	$DL_{iz\_ant1} = 249\,lbf$
Powerwave 7770	$DL_{ant2} = 50\,lb$	$F_{ant2} = 182\,lbf$	$F_{iant2} = 66\,lbf$	$DL_{iz\_ant2} = 143\,lbf$
RRUS 11	$DL_{a1} = 50\,lbf$	$F_{a1} = 92\,lbf$	$F_{ia1} = 32\,lbf$	$DL_{iz\_a1} = 83\,lbf$
RRUS 12+A2	$DL_{a2} = 58\,lbf$	$F_{a2} = 103\,lbf$	$F_{ia2} = 36\,lbf$	$DL_{iz\_a2} = 91\,lbf$
TMAs	$DL_{a3} = 16\,lbf$	$F_{a3} = 18\,lbf$	$F_{ia3} = 9\,lbf$	$DL_{iz\_a3} = 24\,lbf$
Horizontal Pipe Loading:		$f_{m1} = 5 \cdot plf$	$f_{im1} = 4 \cdot plf$	$DL_{iz\_m1} = 7 \cdot plf$
1.7" Dia Pipe Loading:		$f_{m2} = 3 \cdot plf$	$f_{im2} = 2 \cdot plf$	$DL_{iz\_m2} = 7 \cdot plf$
Horizontal Standoff member Loading:		$f_{m3} = 6 \cdot plf$	$f_{im3} = 3 \cdot plf$	$DL_{iz\_m3} = 12 \cdot plf$
5/8" Solid rod Loading:		$f_{m4} = 2 \cdot plf$	$f_{im4} = 2 \cdot plf$	$DL_{iz\_m4} = 6 \cdot plf$
Center Mast Pipe Loading:		$f_{m5} = 10 \cdot plf$	$f_{im5} = 4 \cdot plf$	$DL_{iz\_m5} = 17 \cdot plf$
1" Solid rod Loading:		$f_{m6} = 3 \cdot plf$	$f_{im6} = 2 \cdot plf$	$DL_{iz\_m6} = 7 \cdot plf$
Antenna Pipe Loading:		$f_{m7} = 7 \cdot plf$	$f_{im7} = 3 \cdot plf$	$DL_{iz\_m7} = 11 \cdot plf$

Risa Model:


Y
Z
X
PIPE_1.25
PIPE_2.5
PIPE_4.0
1" round bar
PIPE_2.0
1 1/4" tension rod
5/8" Round
PIPE_1.25

Most Critical Loading:



Loads: LC 5, D+W4
Envelope Only Solution

Load Combinations:

Combinations | Design

	Description	Sol...	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	D	☑	Y		1	1						
2	D+W1	☑	Y		1	1	2	1	3			
3	D+W2	☑	Y		1	1	2	.866	3	.5		
4	D+W3	☑	Y		1	1	2	.5	3	.866		
5	D+W4	☑	Y		1	1	2		3	1		
6	D+W5	☑	Y		1	1	2	-.5	3	.866		
7	D+W6	☑	Y		1	1	2	-.866	3	.5		
8	D+W7	☑	Y		1	1	2	-1	3			
9	D+W8	☑	Y		1	1	2	-.866	3	-.5		
10	D+W9	☑	Y		1	1	2	-.5	3	-.866		
11	D+W10	☑	Y		1	1	2		3	-1		
12	D+W11	☑	Y		1	1	2	.5	3	-.866		
13	D+W12	☑	Y		1	1	2	.866	3	-.5		
14	D+Ice	☑	Y		1	1	6	1				
15	D+Ice+W1Ice	☑	Y		1	1	6	1	4	1	5	
16	D+Ice+W2Ice	☑	Y		1	1	6	1	4	.866	5	.5
17	D+Ice+W3Ice	☑	Y		1	1	6	1	4	.5	5	.866
18	D+Ice+W4Ice	☑	Y		1	1	6	1	4		5	1
19	D+Ice+W5Ice	☑	Y		1	1	6	1	4	-.5	5	.866
20	D+Ice+W6Ice	☑	Y		1	1	6	1	4	-.866	5	.5
21	D+Ice+W7Ice	☑	Y		1	1	6	1	4	-1	5	
22	D+Ice+W8Ice	☑	Y		1	1	6	1	4	-.866	5	-.5
23	D+Ice+W9Ice	☑	Y		1	1	6	1	4	-.5	5	-.866
24	D+Ice+W10Ice	☑	Y		1	1	6	1	4		5	-1
25	D+Ice+W11Ice	☑	Y		1	1	6	1	4	.5	5	-.866
26	D+Ice+W12Ice	☑	Y		1	1	6	1	4	.866	5	-.5

Member Code Check: