EVERSOURCE ENERGY

56 Prospect Street,
P.O. Box 270
Hartford, CT 06103

Kathleen M. Shanley
Manager – Transmission Siting
Tel: (860) 728-4527

January 15, 2021

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

RE: **Notice of Exempt Modification**
Eversource Site # ES-077 Litchfield
452 Bantam Road (AKA 438 Bantam Road), Litchfield, CT 06759
Latitude: 41-44-10.24 N / Longitude: 73-13-5.04 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains two antennas on an existing 180-foot self-support tower located at 452 Bantam Road in Litchfield. See Attachment A, Parcel Map and Property Card. The tower and property are owned by the State of Connecticut Department of Emergency Services and Public Protection ("DESPP"). Eversource and DESPP have entered into an agreement allowing the modification of Eversource's equipment on the Connecticut State Police tower. See Attachment B, Letter of Authorization. Eversource plans to install two 3-foot 8-inch tall omni-directional antennas to be mounted at 111 feet and 126 feet above ground level ("AGL"), and two 7/8-inch diameter coaxial cables. There will be no changes to the area of the fenced compound, the tower or the existing antennas and equipment currently mounted on the tower. The antennas will be mounted to the existing tower on new 4-foot stand-off mounts. See Attachment C, Mount Analysis. The tower and existing and proposed equipment are depicted on Attachment D, Construction Drawings, dated November 17, 2020 and Attachment E, Structural Analysis, dated October 27, 2020. The Connecticut Siting Council approved the self-support tower at this location in Docket No. 118 in February 1990.

The proposed installation is part of Eversource's program to update the current obsolete analog voice radio communications system to a modern digital voice communications system. The new system will enable the highest level of voice communications under all operating conditions, including during critical emergency and storm restoration activities. The new radio system will also provide for remote control of distribution safety equipment.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies ("R.C.S.A.") §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to Denise Raap, First Selectman for the Town of Litchfield and Dennis P. Tobin, PhD, Land Use

Administrator for the Town of Litchfield, via private carrier. Proof of delivery is attached. See Attachment F, Proof of Delivery of Notice.

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

1. There will be no change to the height of the existing tower.
2. The proposed modifications will not require an extension of the site boundary.
3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the new antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard as shown in the attached Radio Frequency Emissions Report, dated November 19, 2020 (Attachment G – Power Density Report)[1].
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure, antenna mounts, and its foundation can support the proposed loading.

For the foregoing reasons, Eversource respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2). One original copy of this notice is enclosed.

Communications regarding this Notice of Exempt Modification should be directed to Kathleen Shanley at (860) 728-4527.

By: _____
Kathleen M. Shanley
Manager – Transmission Siting

cc: Honorable Denise Raap, First Selectman, Town of Litchfield
Dennis P. Tobin, PhD, Land Use Administrator, Town of Litchfield
DESPP

Attachments

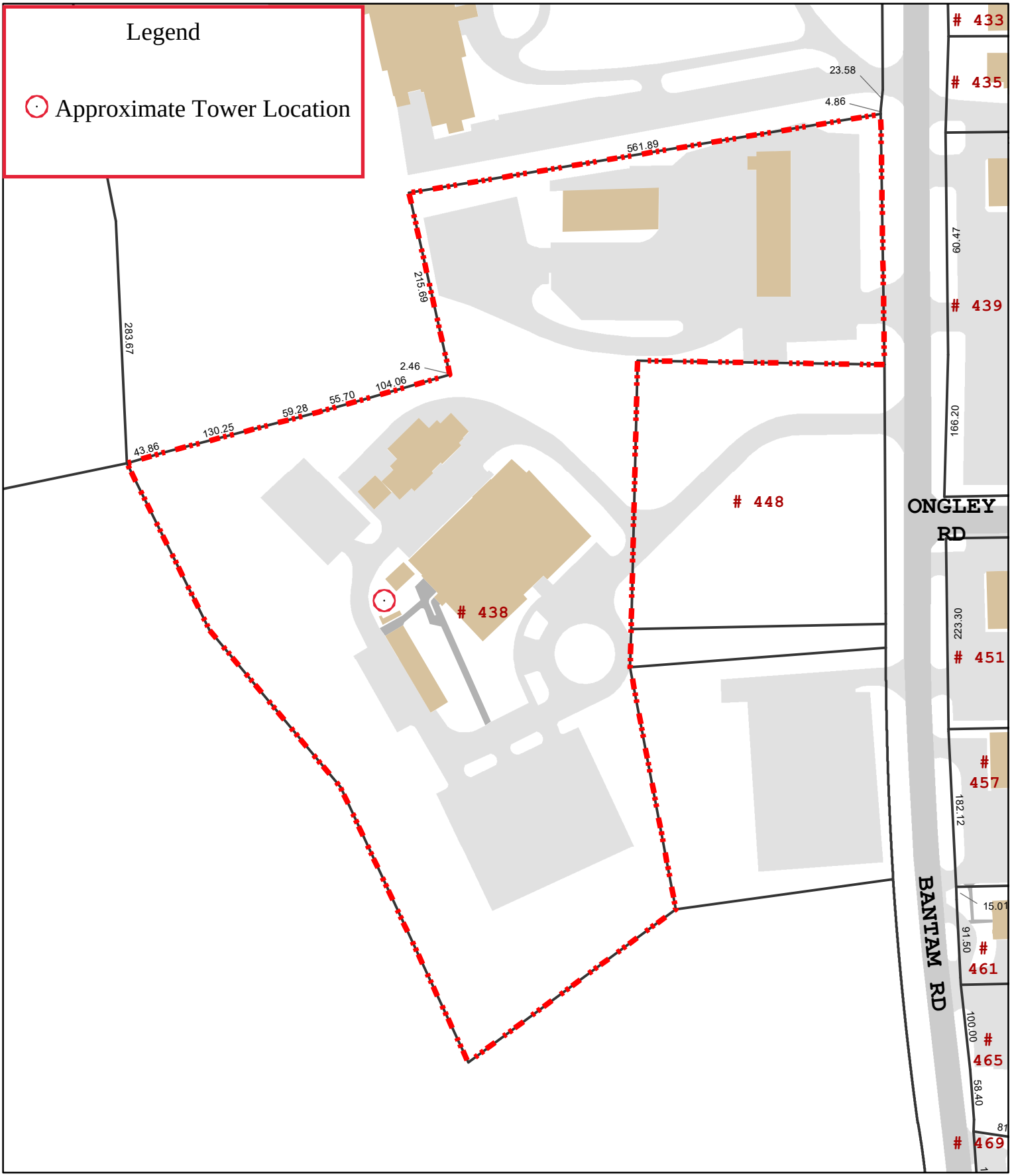
A. Parcel Map and Property Card
B. Letter of Authorization
C. Mount Analysis
D. Construction Drawings
E. Structural Analysis
F. Proof of Delivery of Notice
G. Power Density Report

[1] Any receive-only antennas are not included in the Power Density Report, as they are irrelevant in terms of the % MPE calculations.

ATTACHMENT A – PARCEL MAP AND PROPERTY CARD

Town of Litchfield, CT: Parcel Map

MBL: 085-067-032 LOCATION: 438 BANTAM RD



Disclaimer: This map is for informational purposes only.
All information is subject to verification by any user.
The Town of Litchfield and its mapping contractors assume
no legal responsibility for the information contained herein.

1 inch = 200 feet

0 100 200 300 400 Feet

Map Produced
October 2019

Town of Litchfield, CT

Property Listing Report

Map Block Lot	085-067-032	Building #	1	Section #	1	Account	030050

Property Information

Property Location	438 BANTAM RD
Owner	CONNECTICUT STATE OF
Co-Owner	
Mailing Address	2800 BERLIN TURNPIKE NEWINGTON CT 06111-4113
Land Use	920 Exempt Comm
Land Class	E
Zoning Code	9
Census Tract	

Street Index	200
Acreage	10.92
Utilities	Water/Sewer/Electric
Lot Setting/Desc	High
Additional Info	

Photo

Sketch

Primary Construction Details

Year Built	1949	Bedrooms		Exterior Walls	Brick
Stories	1	Full Bathrooms	1	Exterior Walls 2	
Building Style	Comm Garage	Half Bathrooms		Interior Walls	Minimum
Building Use	Comm/Ind	Extra Fixtures		Interior Walls 2	
Building Condition	G	Bath Style		Heating Type	Forced Hot Air
Interior Floors 1	Concrete	Kitchen Style		Heating Fuel	Oil
Interior Floors 2		Roof Style	Flat	Sq. Ft. Basement	
Total Rooms	0	Roof Cover	Tar & Gravel	Fin BSMT Quality	
Basement Garages		AC Type	Partial	Extra Kitchens	
Occupancy	1	Fireplaces			
Building Grade					

Report Created On 2/27/2020

Town of Litchfield, CT

Property Listing Report

Map Block Lot	085-067-032	Building #	1	Section #	1	Account	030050

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	7556780	5289750
Extras	9480	6630
Improvements		
Outbuildings	686880	480820
Land	784200	548940
Total	9037340	6326140

Outbuilding and Extra Features

Type	Description
Sprinklers-Wet	12580 S.F.
Shed	72 S.F.
Cell Tower	3 UNITS
Carport	2000 S.F.
Lights	9 UNITS
W/Double Light	1 UNITS
Gas Canopy	625 S.F.
Lights	2 UNITS
Paving	108400 S.F.
Air Condition	400 UNITS

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	6720	6720
Total Area	6720	6720

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
CONNECTICUT STATE OF	182/ 282	9/16/1985	0

Report Created On 2/27/2020

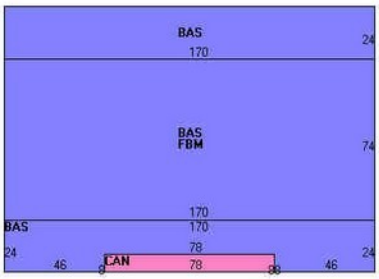
Town of Litchfield, CT

Property Listing Report

Map Block Lot	085-067-032	Building #	2	Section #	1	Account	030050

Photo

Sketch



Primary Construction Details

Year Built	1989	Bedrooms		Exterior Walls	Brick
Stories	2	Full Bathrooms	0	Exterior Walls 2	
Building Style	Jail	Half Bathrooms		Interior Walls	Drywall
Building Use	Comm/Ind	Extra Fixtures		Interior Walls 2	
Building Condition	G	Bath Style		Heating Type	Forced Hot Air
Interior Floors 1	Vinyl	Kitchen Style		Heating Fuel	Oil
Interior Floors 2		Roof Style	Hip	Sq. Ft. Basement	
Total Rooms	0	Roof Cover	Asphalt	Fin BSMT Quality	
Basement Garages		AC Type	Central	Extra Kitchens	
Occupancy	1	Fireplaces			
Building Grade					

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Finished Basement	12580	0
First Floor	20116	20116
Canopy	624	0

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	33320	20116

Report Created On

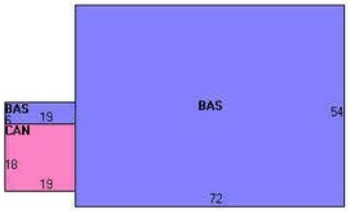
Town of Litchfield, CT

Property Listing Report

Map Block Lot	085-067-032	Building #	3	Section #	1	Account	030050

Photo

Sketch



Primary Construction Details

Year Built	1989	Bedrooms		Exterior Walls	Brick
Stories	1	Full Bathrooms	0	Exterior Walls 2	
Building Style	Comm Garage	Half Bathrooms		Interior Walls	Minimum
Building Use	Comm/Ind	Extra Fixtures		Interior Walls 2	
Building Condition	G	Bath Style		Heating Type	Forced Hot Air
Interior Floors 1	Concrete	Kitchen Style		Heating Fuel	Gas
Interior Floors 2		Roof Style	Flat	Sq. Ft. Basement	
Total Rooms	0	Roof Cover	Rolled	Fin BSMT Quality	
Basement Garages		AC Type	None	Extra Kitchens	
Occupancy	1	Fireplaces			
Building Grade					

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Canopy	342	0
First Floor	4002	4002

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	4344	4002

Report Created On

Town of Litchfield, CT

Property Listing Report

Map Block Lot	085-067-032	Building #	4	Section #	1	Account	030050

Photo

Sketch

Primary Construction Details

Year Built	1990	Bedrooms		Exterior Walls	Wood Shingle
Stories	1	Full Bathrooms	0	Exterior Walls 2	
Building Style	Storage Building	Half Bathrooms		Interior Walls	Typical
Building Use	Comm/Ind	Extra Fixtures		Interior Walls 2	
Building Condition	G	Bath Style		Heating Type	None
Interior Floors 1	Concrete	Kitchen Style		Heating Fuel	None
Interior Floors 2		Roof Style	Mansard	Sq. Ft. Basement	
Total Rooms	0	Roof Cover	Arch Shingles	Fin BSMT Quality	
Basement Garages		AC Type	None	Extra Kitchens	
Occupancy	1	Fireplaces			
Building Grade					

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	4950	4950

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	4950	4950

Report Created On

ATTACHMENT B – LETTER OF AUTHORIZATION

STATE OF CONNECTICUT

DEPARTMENT OF EMERGENCY SERVICES AND PUBLIC PROTECTION

May 5, 2020

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Letter of Authorization** – Co-location on Connecticut State Police tower
Property address: 438 Bantam Road, Litchfield, CT
Latitude: 41-44-10.27" Longitude: 73-13-05.27"

To Whom It May Concern:

Eversource Energy (Eversource) has an Agreement with the Connecticut Department of Emergency Services and Public Protection (DESPP) to co-locate its communications equipment on the DESPP tower located at 438 Bantam Road, Litchfield, Connecticut.

Eversource shall be required by the terms of the agreement to seek and obtain all necessary permits and approvals. As a duly authorized representative of the DESPP, permission is hereby granted to Eversource and agents thereof, for the purpose of consummating any applications necessary to gain the required approvals from the State of Connecticut.

Any fees or charges associated with all applications or permits and any conditions placed on the applicant shall be the sole responsibility of Eversource.

Yours truly,

Brian Benito
Planning Specialist
State Of Connecticut
Department of Emergency Services and Public Protection
CTS Unit
860-685-8297
brian.benito@ct.gov

ATTACHMENT C – MOUNT ANALYSIS

BLACK & VEATCH
Building a world of difference.
BLACK & VEATCH CORPORATION
6800 W 115TH ST, SUITE 2292, OVERLAND PARK, KS 66211
+1 913-458-2522 | RILEYJJ@BV.COM

November 30, 2020

MOUNT EVALUATION LETTER

Site Number: 3791
Site Name: LITCHFIELD TROOP L CSP
Site Data: 452 Bantam Rd.
Litchfield, CT 06759
Latitude: 41° 44’ 10.24”
Longitude: -73° 13’ 5.04”

Black & Veatch Corporation is pleased to submit this “Mount Evaluation Letter” to determine the structural integrity of antenna mounting system on the above-mentioned site. The purpose of this evaluation is to determine the capacity of the system in supporting the final loading in the attached “Loading Summary”.

Based on our evaluation we have determined the existing antenna mounting system to be: **SUFFICIENT**

Structure Rating (max from all components) =	17.1%

Proposed Mounting System
SitePro 1 (USF-4U) 48” Ultimate Universal Stand-off Frame

This analysis analyzes the worst-case scenario for the proposed custom omni stand-off frame. All levels are deemed sufficient. The proposed mounting system will be capable of supporting the proposed equipment, under the following conditions:

- Contractor shall be responsible for the means and methods of construction.
- Contractor shall inspect the condition of all existing and proposed structural members, all relevant members and connections and report any deficiencies to the engineer prior to installation of any new antennas and other equipment.

The scope of this evaluation pertains only to the proposed antenna mounting system and does not include examination of the loads imparted by the antenna mounting system to the existing tower and its structural components. This document was prepared based on information provided to Black & Veatch. If existing conditions do not reflect those represented, this analysis is no longer valid.

Please contact Josh Riley in our Overland Park Office
at 913-458-2522 if you have any questions or comments.

Sincerely,
Black & Veatch Corporation

Prepared By: Joohwan Jung
Submitted By: Josh Riley, P.E.

12/01/2020

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
Eversource	1	-	129	126	1	Omni	Telewave	ANT220F2
Eversource	1	-	114	111	1	Omni	Telewave	ANT220F2

This analysis analyzes the worst-case scenario for the proposed Site Pro 1 USF-4U Standoff Frame. Both levels are deemed sufficient.

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 125 mph
WIND SPEED WITH ICE	40 mph with 2" radial ice thickness
EXPOSURE CATEGORY	C
RISK CATEGORY	III
TOPO CATEGORY	Flat
CREST HEIGHT	N/A

3. REFERENCES

- American Institute of Steel Construction, AISC 15th Edition
- Telecommunications Industry Association Standard, TIA-222-H & 2018 Connecticut State Building Code
- Antenna Mount Assembly Drawing (Model: USF-4U) by SitePro 1, dated 02/16/2011

4. ASSUMPTIONS

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch should be notified to determine the effect on the structural integrity of the antenna mounting system.

- The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- The configuration of antennas, mounts, and other appurtenances are as specified in the Loading Summary and the referenced drawings.
- All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- Sector frame center line: located equidistant between top & bottom boom; Platform center line: located at the base perimeter of platform, unless otherwise specified.
- Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR B-35)
Connection Bolts	ASTM A325

5. RESULTS SUMMARY

Name	Bending Stress Ratio		Shear Stress Ratio	
Arm: HSS3X3X3/16	11.7%	Pass	2.5%	Pass
Bracing: Pipe 2.0 Std	17.1%	Pass	2.2%	Pass
Mount Pipe: Pipe 3.0 Std	8.6%	Pass	3.8%	Pass

*Von Mises SR = (Max Von Mises Value From RISA-3D)/(0.9*Fy)

**Capacity rating per TIA-222-H Section 15.5.

APPENDIX 1:
MOUNT ANALYSIS REPORT

Dead and Live Loads

Maintenance Live Load: L_V = 250 lb
Installation Live Load: L_M = 0 lb

Appurtenance Dead Loads	
Name	Weight (lb)
ANT220F2	11

BLACK & VEATCH

Client: Eversource | Computed By: Joohwan Jung
Site Name: LITCHFIELD TROOP L CSP (3791) | Date: 11/30/2020
Verified By: JW
Title: MOUNT ANALYSIS REPORT | Date: 11/30/2020

Appurtenance Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Basic Wind Speed, V =	125	mph		
Height Above Ground, z =	129	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	1.34		$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factor, K_e =	1.000		$F_A = q_z G_h (EPA)$	2.6.11.2
Wind Velocity Pressure, q_z =	50.74	psf		
Gust Effect Factor, G_h =	1.00		$F_M = q_z G_h C_f D_p$	2.6.11.2

Appurtenance Wind Loads

Name	Height (ft)	Width (ft)	Depth (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
ANT220F2	4.25	0.23	0.23	1.78	1.56	79.39	1.78	1.56	79.39

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: LITCHFIELD TROOP L CSP (3791)		Date: 11/30/2020
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 11/30/2020

Member Wind Loading

Exposure Category =	C	
Risk Category =	III	
Topographic Category =	1	
Basic Wind Speed, V =	125	mph
Height Above Ground, z =	129	ft
Crest Height, H =	N/A	ft
Velocity Pressure Coefficient, K_z =	1.34	
Topographic Factor, K_{zt} =	1.00	
Wind Directionality Factor, K_d =	0.95	
Shielding Factor, K_a =	0.90	
Ground Elevation Factor, K_e =	1.000	
Wind Velocity Pressure, q_z =	50.74	psf
Gust Effect Factor, G_h =	1.00	

Equations

	TIA-222-H
$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
$K_e = e^{-0.000032 z^{2.5}}$	2.6.8
$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
$F_A = q_z G_h (EPA)$	2.6.11.2
$F_M = q_z G_h C_f D_p$	2.6.11.2

Member Wind Loads

Name	Depth (ft)	Width (ft)	C_f	D_p (ft)	F_M (lb)
Arm: HSS3X3X3/16	0.25	0.25	2	0.25	25.37
Bracing: Pipe 2.0 Std	0.20		1.2	0.20	12.05
Mount Pipe: Pipe 3.0 Std	0.29		1.2	0.29	17.76

Appurtenance Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	C			
Risk Category =	III		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	129	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Design Ice Thickness, T_i =	2.00	in	$K_{iz} = (z/33)^{0.10}$	2.6.10
Importance Factor, I =	1.15			
Topographic Factor, K_{zt} =	1.00		$T_{iz} = T_i I K_{iz}(K_{zt})^{0.35}$	2.6.10
Height Escalation Factor, K_{iz} =	1.15			
Factored Ice Thickness, T_{iz} =	2.64	in	$DL_{ice}=[(H_{ice}*D_{ice}*W_{ice}) - (H*W*D)]*56pcf$	
Grating Ice Dead Load, D_{Gice} =	12.30	psf		

Appurtenance Ice Dead Loads

Name	Height w/ ice (ft)	Width w/ice (ft)	Depth w/ ice (ft)	V_{ice} (ft^3)	DL_{ice} (lb)
ANT220F2	4.69	0.67	0.67	1.87	104.85

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	LITCHFIELD TROOP L CSP (3791)	Date: 11/30/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/30/2020

Member Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	C			
Risk Category =	III		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	129	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Design Ice Thickness, T_i =	2.00	in	$K_{iz} = (z/33)^{0.10}$	2.6.10
Importance Factor, I =	1.15			
Topographic Factor, K_{zt} =	1.00		$T_{iz} = T_i I K_{iz}(K_{zt})^{0.35}$	2.6.10
Height Escalation Factor, K_{iz} =	1.15			
Factored Ice Thickness, T_{iz} =	2.64	in	Aiz = pi*Tiz*(Dc+Tiz)	2.6.10
Grating Ice Dead Load, D_{Gice} =	12.30	psf		
			DL_{ice}=Aiz*56pcf	

Member Ice Dead Loads

Name	Depth w/ ice (ft)	Width w/ ice (ft)	Dc (ft)	Aiz (ft^2)	DL_{ice} (lb/ft)
Arm: HSS3X3X3/16	0.69	0.69	0.35	0.40	22.15
Bracing: Pipe 2.0 Std	0.64		0.20	0.29	16.14
Mount Pipe: Pipe 3.0 Std	0.73		0.29	0.35	19.76

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: LITCHFIELD TROOP L CSP (3791)		Date: 11/30/2020
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 11/30/2020

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	40	mph		
Height Above Ground, z =	129	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	1.34	psf	$K_e = e^{-0.000032 \cdot z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	1.000		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.196			
Factored Ice Thickness, T_{iz} =	2.64	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Appurtenance Ice Wind Loads

Name	Height w/ Ice (ft)	Width w/ Ice (ft)	Depth w/ Ice (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
ANT220F2	4.69	0.67	0.67	-	2.78	14.47	-	2.78	14.47

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: LITCHFIELD TROOP L CSP (3791)		Date: 11/30/2020
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 11/30/2020

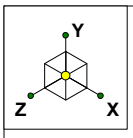
Member Ice Wind Loading

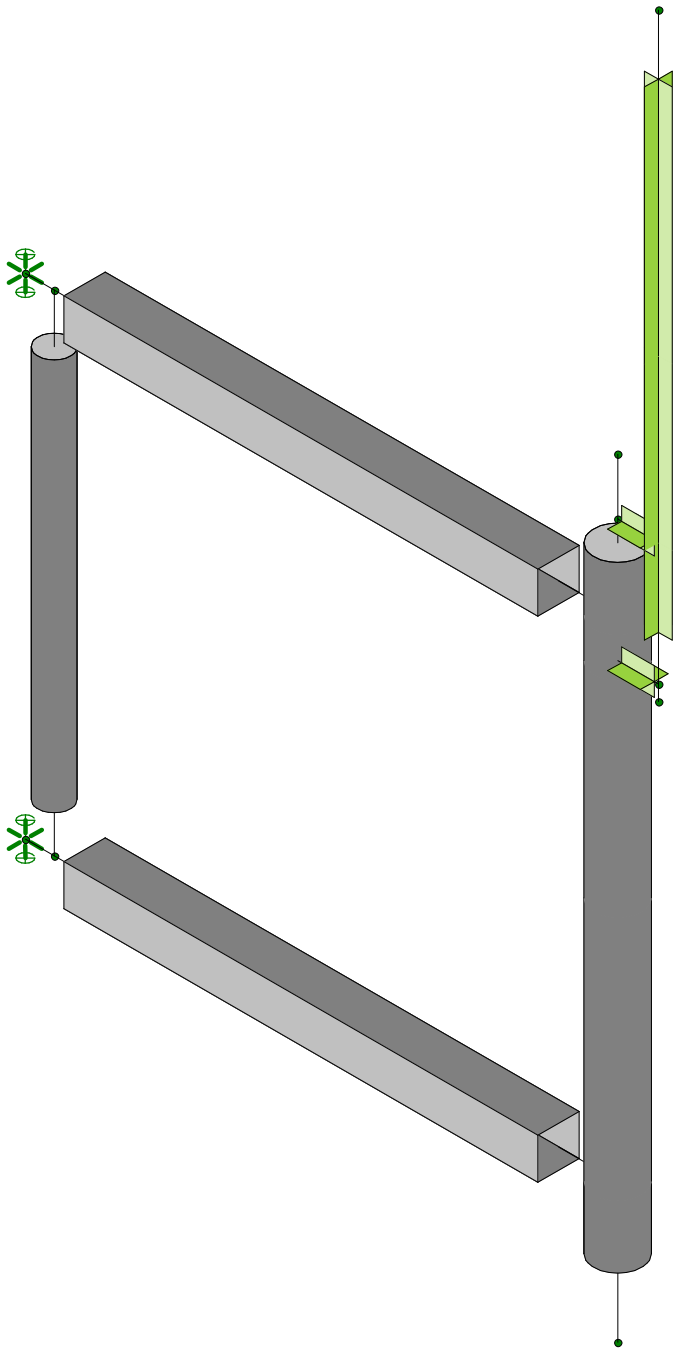
			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	40	mph		
Height Above Ground, z =	129	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	1.34	psf	$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	1.000		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.196			
Factored Ice Thickness, T_{iz} =	2.64	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Member Ice Wind Loads

Name	Depth w/ Ice (ft)	Width w/ Ice (ft)	C_f	$D_{p(ice)}$ (ft)	$F_{M(ice)}$ (lb/ft)
Arm: HSS3X3X3/16	0.69	0.69	2	0.69	7.16
Bracing: Pipe 2.0 Std	0.64		1.2	0.64	3.97
Mount Pipe: Pipe 3.0 Std	0.73		1.2	0.73	4.56

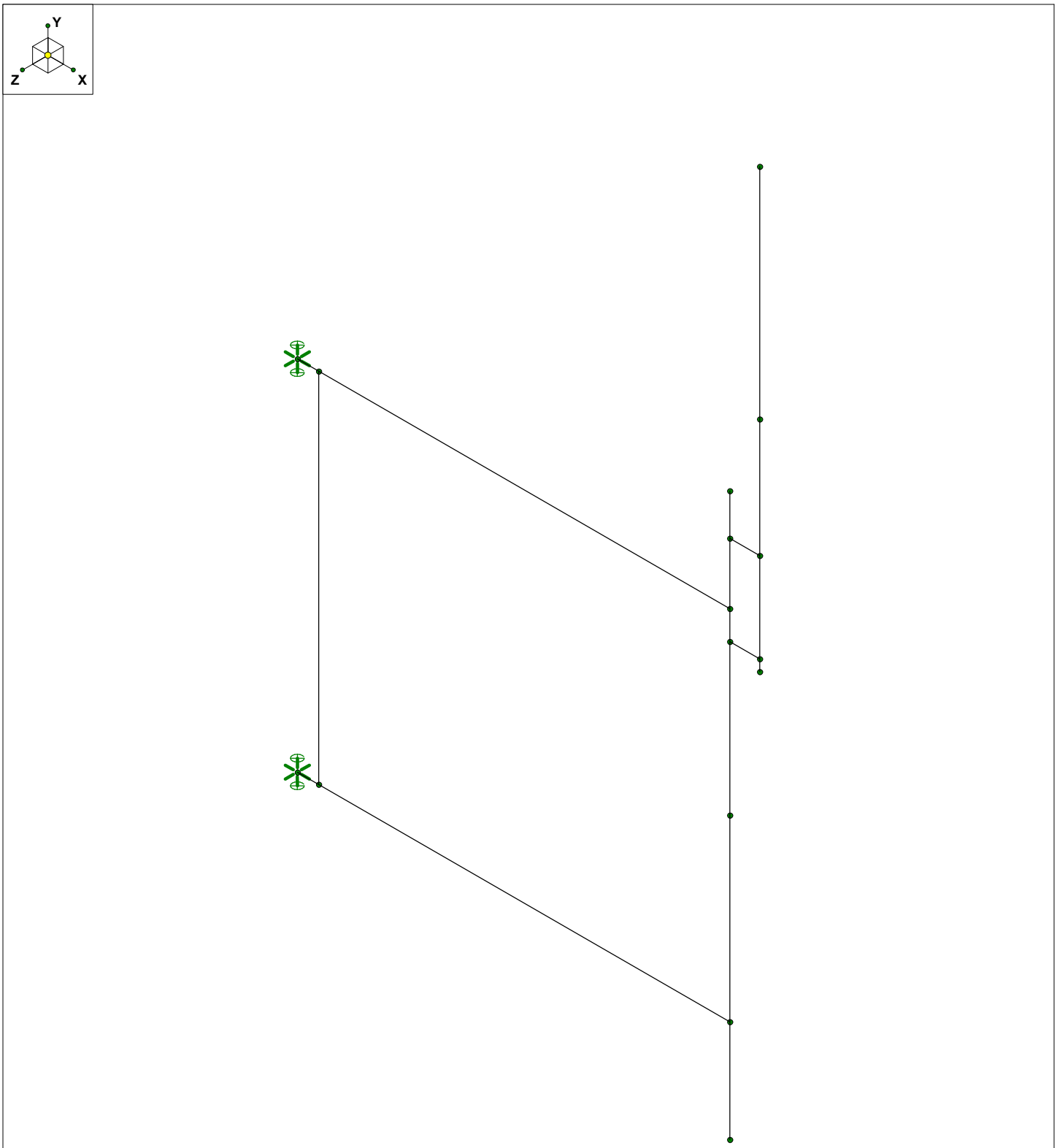
APPENDIX 2:
RISA PRINTOUTS





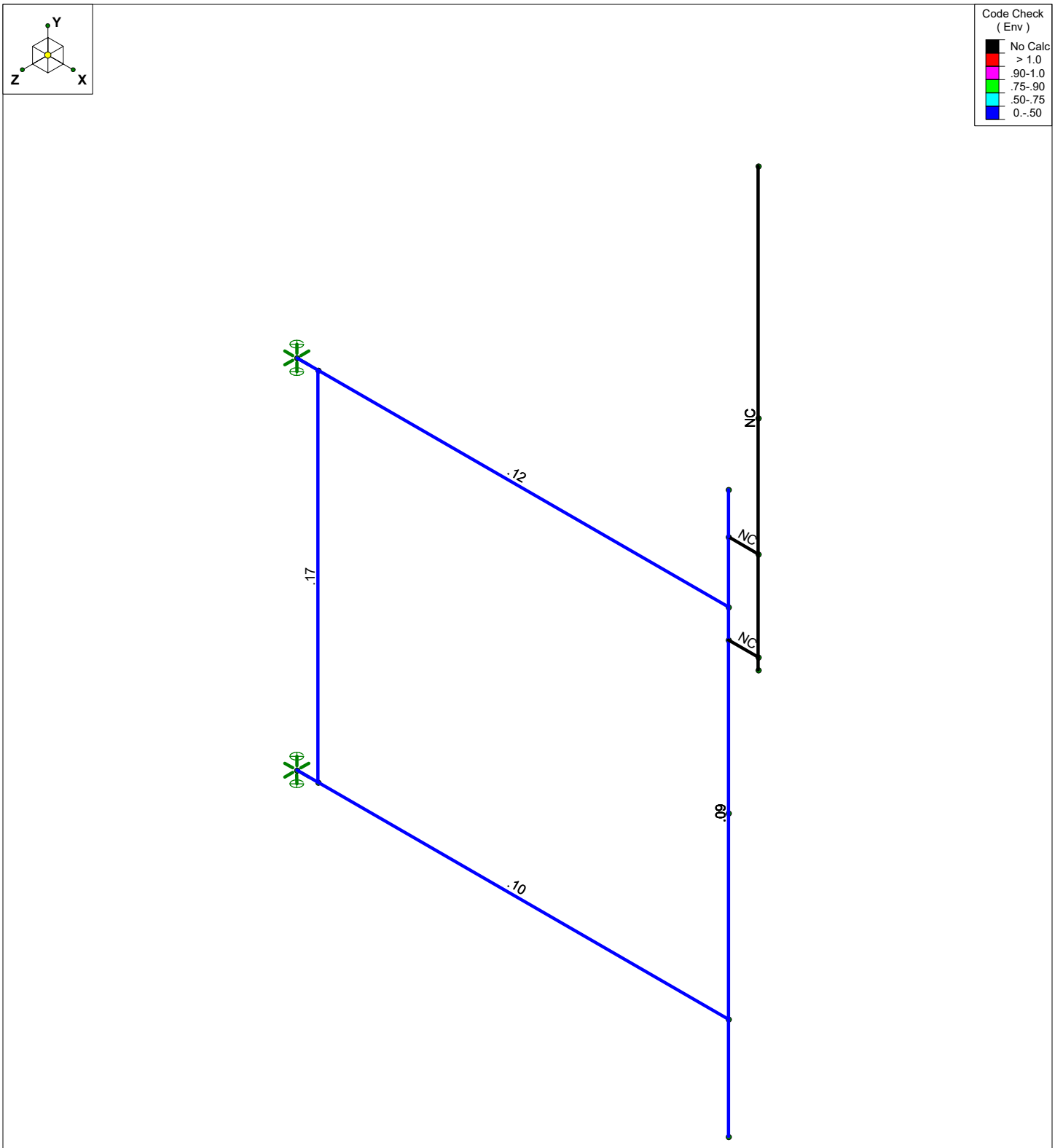
Envelope Only Solution

Black & Veatch	LITCHFIELDTRPL USF-4U Model	SK - 1
Joohwan Jung		Nov 30, 2020 at 1:54 PM
405025.2021.2200		LITCHFIELDTRPL USF-4U Model....



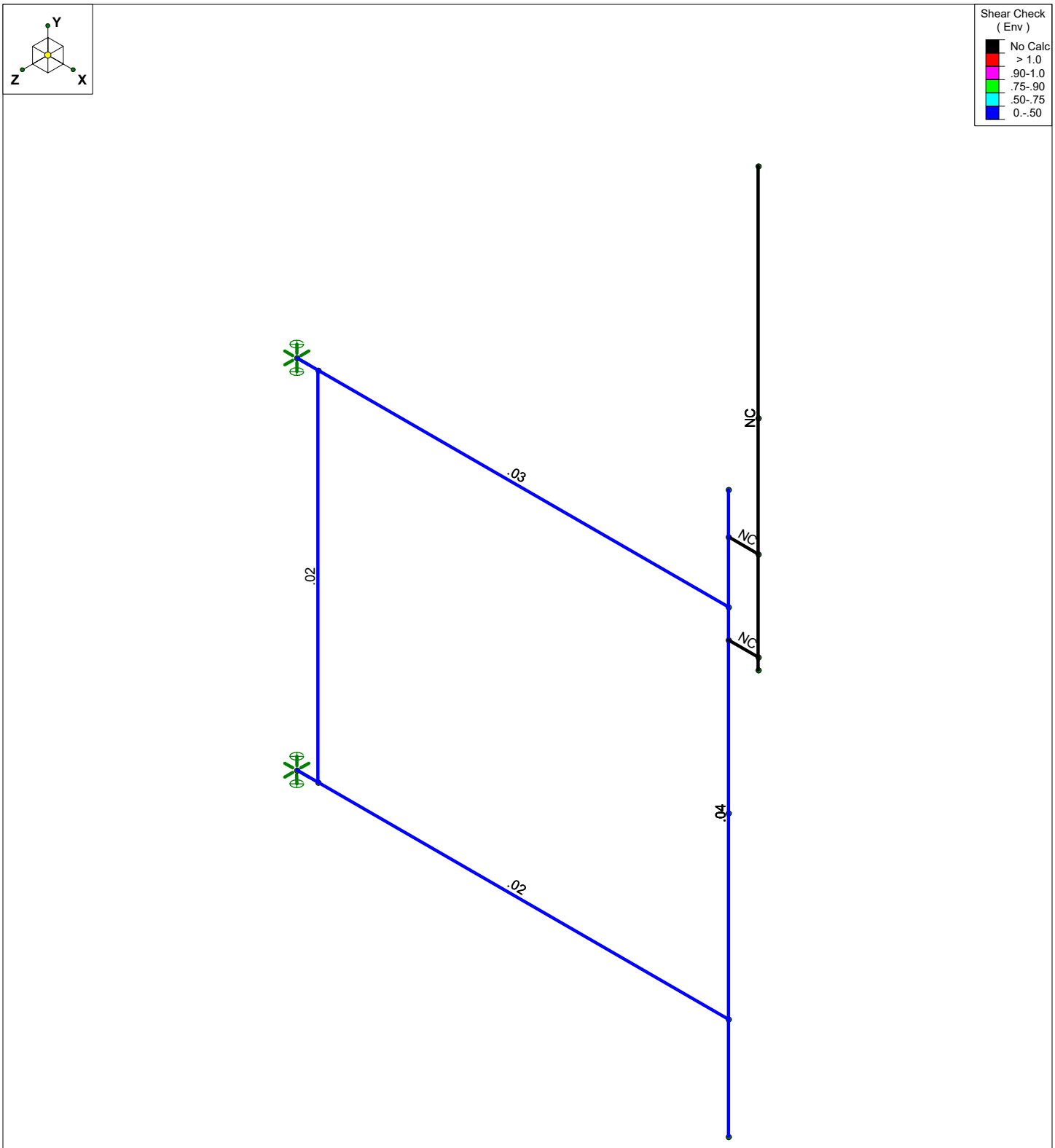
Envelope Only Solution

Black & Veatch	LITCHFIELDTRPL USF-4U Model	SK - 2
Joohwan Jung		Nov 30, 2020 at 1:54 PM
405025.2021.2200		LITCHFIELDTRPL USF-4U Model....



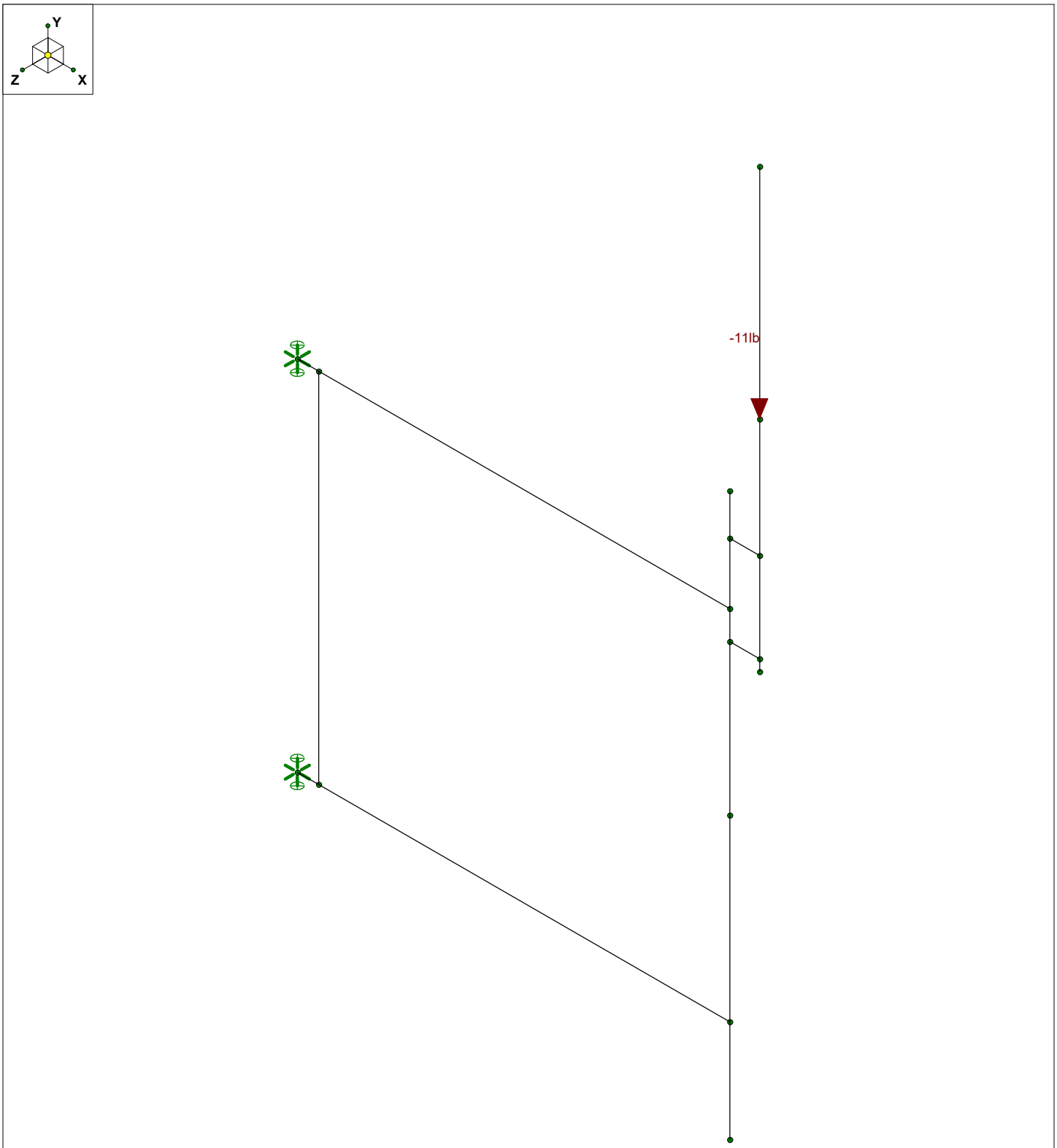
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	LITCHFIELDTRPL USF-4U Model	SK - 3
Joohwan Jung		Nov 30, 2020 at 1:54 PM
405025.2021.2200		LITCHFIELDTRPL USF-4U Model....



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	LITCHFIELDTRPL USF-4U Model	SK - 4
Joohwan Jung		Nov 30, 2020 at 1:54 PM
405025.2021.2200		LITCHFIELDTRPL USF-4U Model....



Loads: BLC 1, DL
Envelope Only Solution

Black & Veatch	LITCHFIELDTRPL USF-4U Model	SK - 5
Joohwan Jung		Nov 30, 2020 at 1:55 PM
405025.2021.2200		LITCHFIELDTRPL USF-4U Model....

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building
Stainless Steel Code	None

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-16
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Arm	HSS3X3X3	Beam	SquareTube	A53 Gr.B	Typical	1.89	2.46	2.46	4.03
2	Bracing	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	Mount Pipe	PIPE_3.0	Column	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69

General Material Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]
1	gen_Conc3NW	3155	1372	.15	.6	.145
2	gen_Conc4NW	3644	1584	.15	.6	.145
3	gen_Conc3LW	2085	906	.15	.6	.11
4	gen_Conc4LW	2408	1047	.15	.6	.11
5	gen_Alum	10100	4077	.3	1.29	.173
6	gen_Steel	29000	11154	.3	.65	.49
7	gen_Plywood	1800	38	0	.3	.035
8	RIGID	1e+6		.3	0	0

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction		Reaction	
2	N3	Reaction	Reaction	Reaction		Reaction	

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			Arm	Beam	SquareTube	A53 Gr.B	Typical
2	M2	N3	N4			Arm	Beam	SquareTube	A53 Gr.B	Typical
3	M3	N5	N6			Bracing	Column	Pipe	A53 Gr.B	Typical
4	M4	N7	N8			Mount Pipe	Column	Pipe	A53 Gr.B	Typical
5	M5	N9	N10			RIGID	None	None	RIGID	Typical
6	M6	N12	N13			RIGID	None	None	RIGID	Typical
7	M7	N15	N14			RIGID	None	None	RIGID	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M1						Yes				None
2	M2						Yes				None
3	M3						Yes	** NA **			None
4	M4						Yes	** NA **			None
5	M5						Yes	** NA **			None
6	M6						Yes	** NA **			None
7	M7						Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Arm	43.5			Lbyy						Lateral
2	M2	Arm	43.5			Lbyy						Lateral
3	M3	Bracing	36									Lateral
4	M4	Mount Pipe	56.5									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
1	DL	DL		-1		1				
2	Maintenance LL - LV	LL				1				
3	Installation LL - LM	LL				1				
4	Wind - 0 Deg (X)	WL				1		4		
5	Wind - 30 Deg (X)	WL				1		4		
6	Wind - 60 Deg (X)	WL				1		4		
7	Wind - 90 Deg (X)	WL				1		4		
8	Wind - 120 Deg (X)	WL				1		4		
9	Wind - 150 Deg (X)	WL				1		4		
10	Wind - 180 Deg (X)	WL				1		4		
11	Wind - 210 Deg (X)	WL				1		4		
12	Wind - 240 Deg (X)	WL				1		4		
13	Wind - 270 Deg (X)	WL				1		4		
14	Wind - 300 Deg (X)	WL				1		4		
15	Wind - 330 Deg (X)	WL				1		4		
16	Wind - 0 Deg (Z)	WL				1		4		
17	Wind - 30 Deg (Z)	WL				1		4		
18	Wind - 60 Deg (Z)	WL				1		4		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
19	Wind - 90 Deg (Z)	WL				1		4		
20	Wind - 120 Deg (Z)	WL				1		4		
21	Wind - 150 Deg (Z)	WL				1		4		
22	Wind - 180 Deg (Z)	WL				1		4		
23	Wind - 210 Deg (Z)	WL				1		4		
24	Wind - 240 Deg (Z)	WL				1		4		
25	Wind - 270 Deg (Z)	WL				1		4		
26	Wind - 300 Deg (Z)	WL				1		4		
27	Wind - 330 Deg (Z)	WL				1		4		
28	Ice DL	DL				1		4		
29	Ice Wind - 0 Deg (X)	WL				1		4		
30	Ice Wind - 30 Deg (X)	WL				1		4		
31	Ice Wind - 60 Deg (X)	WL				1		4		
32	Ice Wind - 90 Deg (X)	WL				1		4		
33	Ice Wind - 120 Deg (X)	WL				1		4		
34	Ice Wind - 150 Deg (X)	WL				1		4		
35	Ice Wind - 180 Deg (X)	WL				1		4		
36	Ice Wind - 210 Deg (X)	WL				1		4		
37	Ice Wind - 240 Deg (X)	WL				1		4		
38	Ice Wind - 270 Deg (X)	WL				1		4		
39	Ice Wind - 300 Deg (X)	WL				1		4		
40	Ice Wind - 330 Deg (X)	WL				1		4		
41	Ice Wind - 0 Deg (Z)	WL				1		4		
42	Ice Wind - 30 Deg (Z)	WL				1		4		
43	Ice Wind - 60 Deg (Z)	WL				1		4		
44	Ice Wind - 90 Deg (Z)	WL				1		4		
45	Ice Wind - 120 Deg (Z)	WL				1		4		
46	Ice Wind - 150 Deg (Z)	WL				1		4		
47	Ice Wind - 180 Deg (Z)	WL				1		4		
48	Ice Wind - 210 Deg (Z)	WL				1		4		
49	Ice Wind - 240 Deg (Z)	WL				1		4		
50	Ice Wind - 270 Deg (Z)	WL				1		4		
51	Ice Wind - 300 Deg (Z)	WL				1		4		
52	Ice Wind - 330 Deg (Z)	WL				1		4		

Load Combinations

	Description	S...	PDe...	SRSS	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	WIND LOAD COMBOS (125 MPH)																									
2	1.2DL + WL (0 DEG)	Y...	Y		1	1.2	4	1	16	1																
3	1.2DL + WL (30 DEG)	Y...	Y		1	1.2	5	1	17	1																
4	1.2DL + WL (60 DEG)	Y...	Y		1	1.2	6	1	18	1																
5	1.2DL + WL (90 DEG)	Y...	Y		1	1.2	7	1	19	1																
6	1.2DL + WL (120 DEG)	Y...	Y		1	1.2	8	1	20	1																
7	1.2DL + WL (150 DEG)	Y...	Y		1	1.2	9	1	21	1																
8	1.2DL + WL (180 DEG)	Y...	Y		1	1.2	10	1	22	1																
9	1.2DL + WL (210 DEG)	Y...	Y		1	1.2	11	1	23	1																
10	1.2DL + WL (240 DEG)	Y...	Y		1	1.2	12	1	24	1																
11	1.2DL + WL (270 DEG)	Y...	Y		1	1.2	13	1	25	1																
12	1.2DL + WL (300 DEG)	Y...	Y		1	1.2	14	1	26	1																
13	1.2DL + WL (330 DEG)	Y...	Y		1	1.2	15	1	27	1																
14																										
15	MOUNT LOAD COMBOS (30 MPH)																									
16	1.4DL	Y...	Y		1	1.4																				
17	1.2DL + 1.5LV	Y...	Y		1	1.2	2	1.5																		
18	1.2DL + 1.5LM + WL (0 DEG)	Y...	Y		1	1.2	3	1.5	4	.058	16	.058														

Load Combinations (Continued)

	Description	S...	PDe...	SRSS	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
19	1.2DL + 1.5LM + WL (30 DEG)	Y...	Y		1	1.2	3	1.5	5	.058	17	.058														
20	1.2DL + 1.5LM + WL (60 DEG)	Y...	Y		1	1.2	3	1.5	6	.058	18	.058														
21	1.2DL + 1.5LM + WL (90 DEG)	Y...	Y		1	1.2	3	1.5	7	.058	19	.058														
22	1.2DL + 1.5LM + WL (120 DEG)	Y...	Y		1	1.2	3	1.5	8	.058	20	.058														
23	1.2DL + 1.5LM + WL (150 DEG)	Y...	Y		1	1.2	3	1.5	9	.058	21	.058														
24	1.2DL + 1.5LM + WL (180 DEG)	Y...	Y		1	1.2	3	1.5	10	.058	22	.058														
25	1.2DL + 1.5LM + WL (210 DEG)	Y...	Y		1	1.2	3	1.5	11	.058	23	.058														
26	1.2DL + 1.5LM + WL (240 DEG)	Y...	Y		1	1.2	3	1.5	12	.058	24	.058														
27	1.2DL + 1.5LM + WL (270 DEG)	Y...	Y		1	1.2	3	1.5	13	.058	25	.058														
28	1.2DL + 1.5LM + WL (300 DEG)	Y...	Y		1	1.2	3	1.5	14	.058	26	.058														
29	1.2DL + 1.5LM + WL (330 DEG)	Y...	Y		1	1.2	3	1.5	15	.058	27	.058														
30																										
31	ICE LOAD COMBOS (2", 40 MPH)																									
32	1.2DL + Ice DL + Ice WL (0 DEG)	Y...	Y		1	1.2	28	1	29	1	41	1														
33	1.2DL + Ice DL + Ice WL (30 DEG)	Y...	Y		1	1.2	28	1	30	1	42	1														
34	1.2DL + Ice DL + Ice WL (60 DEG)	Y...	Y		1	1.2	28	1	31	1	43	1														
35	1.2DL + Ice DL + Ice WL (90 DEG)	Y...	Y		1	1.2	28	1	32	1	44	1														
36	1.2DL + Ice DL + Ice WL (120 DEG)	Y...	Y		1	1.2	28	1	33	1	45	1														
37	1.2DL + Ice DL + Ice WL (150 DEG)	Y...	Y		1	1.2	28	1	34	1	46	1														
38	1.2DL + Ice DL + Ice WL (180 DEG)	Y...	Y		1	1.2	28	1	35	1	47	1														
39	1.2DL + Ice DL + Ice WL (210 DEG)	Y...	Y		1	1.2	28	1	36	1	48	1														
40	1.2DL + Ice DL + Ice WL (240 DEG)	Y...	Y		1	1.2	28	1	37	1	49	1														
41	1.2DL + Ice DL + Ice WL (270 DEG)	Y...	Y		1	1.2	28	1	38	1	50	1														
42	1.2DL + Ice DL + Ice WL (300 DEG)	Y...	Y		1	1.2	28	1	39	1	51	1														
43	1.2DL + Ice DL + Ice WL (330 DEG)	Y...	Y		1	1.2	28	1	40	1	52	1														
44																										

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	171.17	2	274.763	38	270.944	5	0	43	598.552	11	0	43
2		min	-552.814	17	8.668	2	-270.944	11	0	2	-598.552	5	0	2
3	N3	max	552.813	17	278.191	32	112.147	5	0	43	351.864	11	0	43
4		min	-12.58	8	11.303	8	-112.147	11	0	2	-351.864	5	0	2
5	Totals:	max	383.093	2	528.34	38	383.091	5						
6		min	-383.093	8	121.444	2	-383.091	11						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear...	Loc[...	Dir	LC	phi*Pn...	phi*Pnt...	phi*Mn...	phi*Mn...	Cb	Eqn
1	M1	HSS3X3X3	.117	2.266	11	.025	2.266	z	11	55265....	59535	5171.25	5171.25	2..	H1-1b
2	M2	HSS3X3X3	.099	43.5	17	.017	0	y	32	55265....	59535	5171.25	5171.25	2..	H1-1b
3	M3	PIPE_2.0	.171	0	17	.022	0		17	28843....	32130	1871.6...	1871.6...	2..	H1-1b
4	M4	PIPE_3.0	.086	45.906	17	.038	10.5...		17	57908....	65205	5748.75	5748.75	1..	H1-1b

APPENDIX 3:
ATTACHMENTS

TELEWAVE, INC.®

195 - 260 MHz

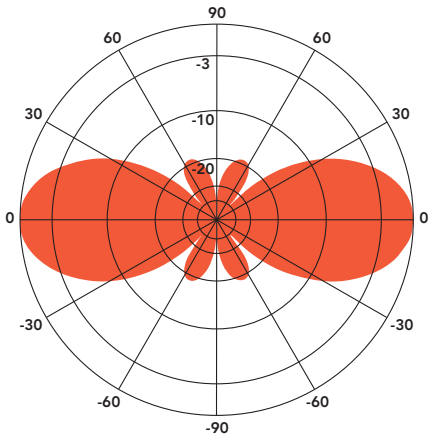
ANT220F2DIN

FIBERGLASS COLLINEAR ANTENNA 2.5 dBd

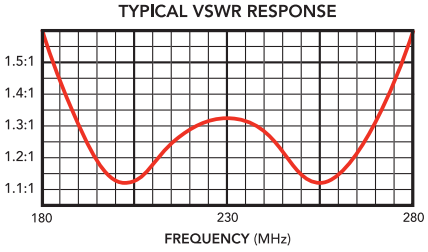
The Telewave ANT220F2 is an extremely rugged collinear antenna, with moderate gain and wide vertical beamwidth. This compact antenna produces 2.5 dBd gain, and is designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, with a path to ground potential for lightning impulse protection. The ANT220F2 is an excellent choice for wireless PTC systems in urban or rural areas.

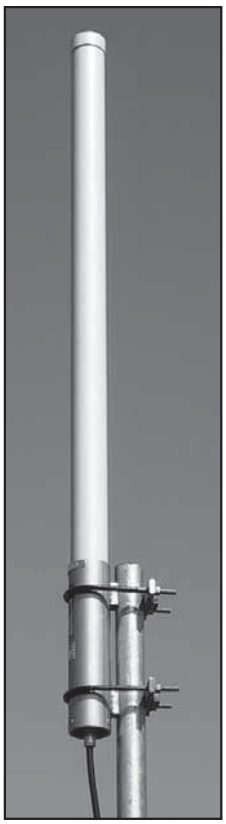
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray, acid rain, and wind blown abrasives.

The ANT220F2 includes the ANTC485 dual clamp set for mounting to a 1.5" to 3" O.D. support pipe, and a 24" removable RG-213 DIN-Male jumper.



ANT220F2 - 230 MHz
Vertical Plane
Gain = 2.58 dBd



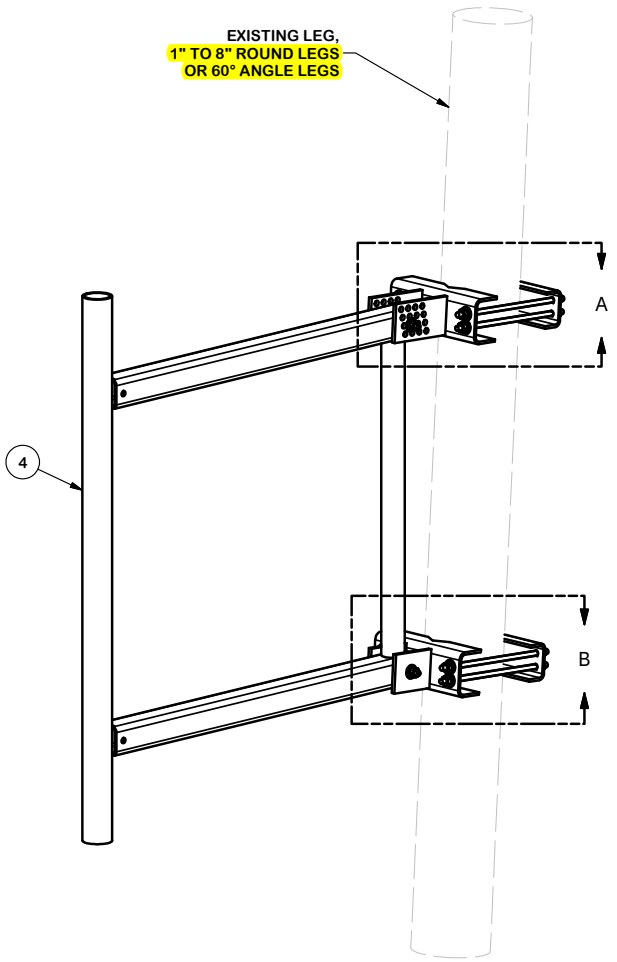


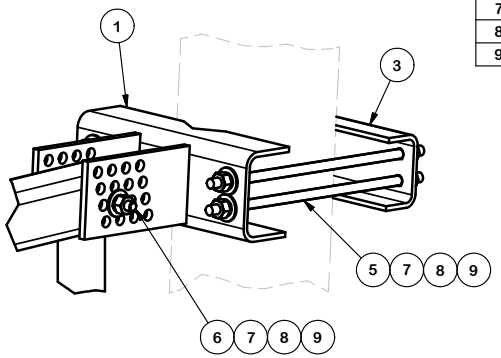
ONE SITE PRO 1 P/N DCP12K CLAMP SET REQUIRED.

SPECIFICATIONS			
Frequency (continuous)	195-260 MHz	**Dimensions (L x base diam.) in.**	51 x 2.75
Gain	2.5 dBd	**Tower weight (antenna + clamps)**	11 lb.
Power rating (typ.)	500 watts	**Shipping weight**	14 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	200 / 150 MPH
VSWR	1.5:1 or less	**Maximum exposed area**	1.1 ft.²
Pattern	Omnidirectional	**Lateral thrust at 100 MPH**	44 lb.
Vertical beamwidth	38°	**Bending moment at top clamp**	47 ft. lb.
Termination	7-16 DIN-F	**(100 MPH, 40 PSF flat plate equiv.)**	

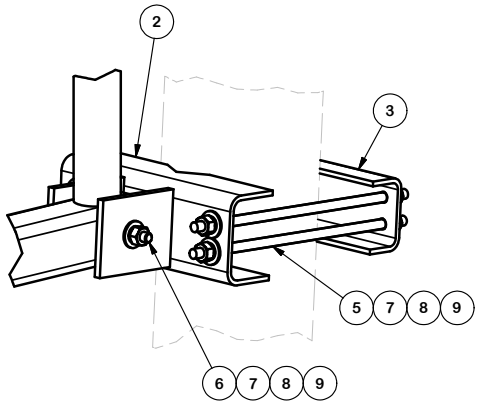
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 5" ± DIAMETER.

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	CFM	UPPER GATE FOOT WELDMENT		13.90	13.90
2	1	CFS	LOWER GATE FOOT WELDMENT		12.72	12.72
3	2	GBB	GATE BACKING BAR		4.53	9.06
4	1	4PBG	48" PIPE MOUNT STANDOFF ARM		113.96	113.96
5	8	G12R-12	1/2" x 12" GALV. THREADED ROD		0.67	5.35
5	8	G12R-15	1/2" x 15" GALV. THREADED ROD		0.84	6.69
6	2	A1205	1/2" x 5" A325 HDG BOLT		0.34	0.69
7	18	G12FW	1/2" HDG USS FLATWASHER		0.03	0.61
8	18	G12LW	1/2" HDG LOCKWASHER		0.01	0.25
9	18	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	1.29
					TOTAL WT. #	164.53

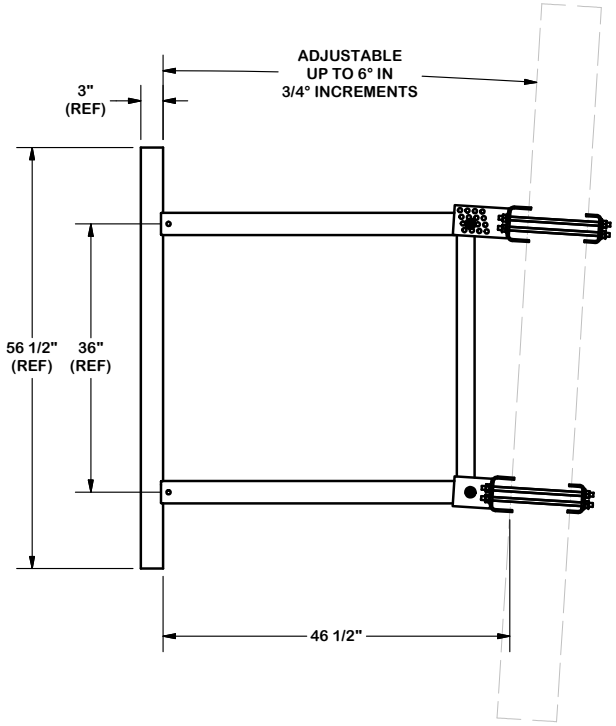




DETAIL A



DETAIL B



TOLERANCE NOTES

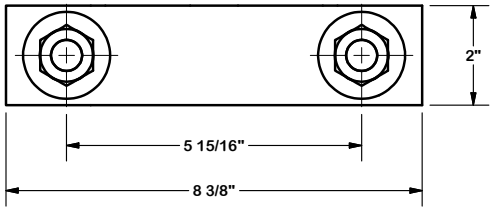
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

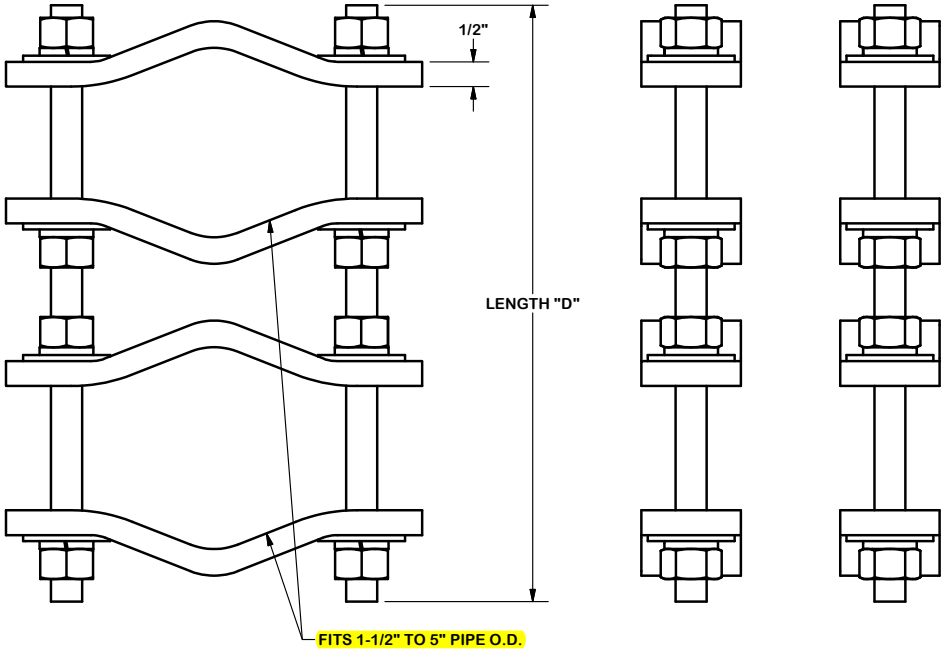
DESCRIPTION: 48" ULTIMATE UNIVERSAL STANDOFF FRAME

SITE PRO 1 — A valmont COMPANY
Engineering Support Team: 1-888-753-7446
Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Plymouth, IN; Salem, OR; Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
	RCH 2/4/2011		USF-4U	1 OF 1

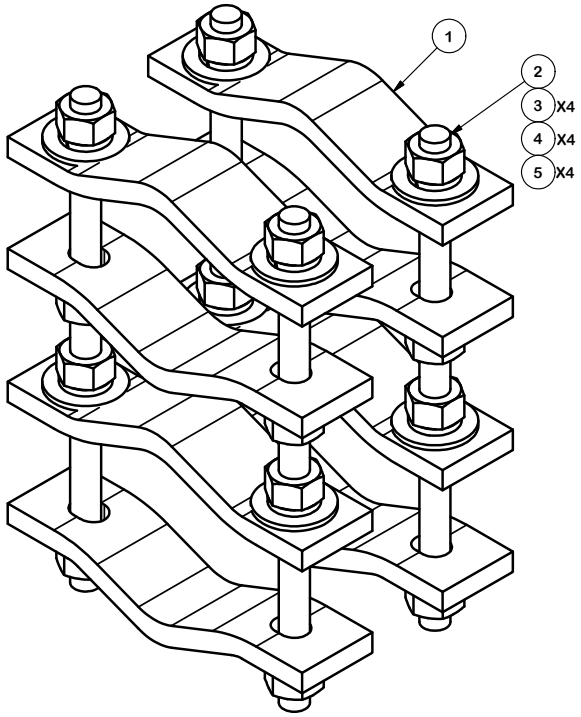
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 2/16/2011	USF-4U





PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	8	DCP	CLAMP HALF, 1/2" THICK, 8-3/8"		2.40	19.20
2	B	C	5/8" THREADED ROD	D	E	F
3	16	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	2.08
4	16	G58LW	5/8" HDG LOCKWASHER		0.03	0.42
5	16	G58FW	5/8" HDG USS FLATWASHER		0.07	1.13

VARIABLE PARTS TABLE						
ASSEMBLY "A"	QTY "B"	PART "C"	LENGTH "D"	UNIT WT. "E"	NET WT. "F"	TOTAL WEIGHT
DCP12K	4	G58R-12	12"	1.05	4.18	27.01
DCP18K	4	G58R-18	18"	1.57	6.27	29.10



TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION: PIPE TO PIPE CLAMP SET
1-1/2" TO 5" PIPE
1/2" THICK CLAMP

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
	KC8 8/21/2012		SEE ASSEMBLY "A"	1 OF 1

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	CEK 1/22/2013	DCPxxK

ATTACHMENT D – CONSTRUCTION DRAWINGS

EVERSOURCE ENERGY

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (2) NEW OMNI/WHIP ANTENNAS, (1) AT ELEVATION 130'–4 3/16"± AGL AND (1) AT ELEVATION 115'–4 3/16"± AGL
2. INSTALL (1) NEW RACK WITH DMR EQUIPMENT IN EXISTING BUILDING

GOVERNING CODES

2018 CONNECTICUT STATE BUILDING CODE (2015 IBC BASIS)
2017 NATIONAL ELECTRIC CODE
TIA–222–H

GENERAL NOTES

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

SITE INFORMATION

SITE NAME:	LITCHFIELD TROOP L CSP
SITE ID NUMBER:	#3791
SITE ADDRESS:	452 BANTAM RD LITCHFIELD, CT 06759
MAP:	085
BLOCK:	067
LOT:	032
ZONE:	C202
LATITUDE:	41° 44' 10.24" N
LONGITUDE:	73° 13' 5.04" W
ELEVATION:	943'± AMSL
FEMA/FIRM DESIGNATION:	C
ACREAGE:	10.92± AC (BOOK: 182, PAGE: 282)

CONTACT INFORMATION

APPLICANTS:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
STATE OF CONNECTICUT
24 WOLCOTT HILL RD
WETHERSFIELD, CT 06109

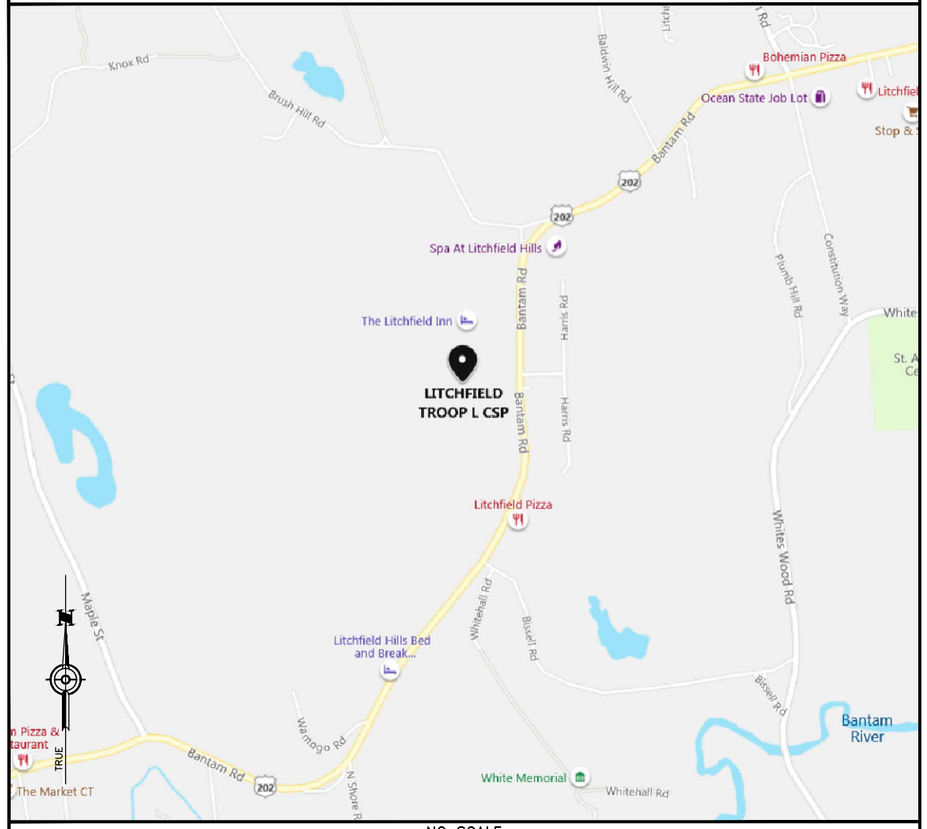
EVERSOURCE ENERGY
PROJECT MANAGER:
NIKOLL PRECI
(860) 655–3079

POWER PROVIDER:
EVERSOURCE ENERGY
(800) 286–2000

TELCO PROVIDER:
FRONTIER
(800) 921–8102

CALL BEFORE YOU DIG:
(800) 922–4455

LOCATION MAP



NO SCALE

DESIGN TYPE

SITE UPGRADE
SELF–SUPPORT TOWER

DRAWING INDEX

SHEET NO:	SHEET TITLE
T–1	TITLE SHEET
C–1	SITE PLAN
C–2	TOWER ELEVATION
G–1	GROUNDING DETAILS
N–1	NOTES & SPECIFICATIONS
N–2	NOTES & SPECIFICATIONS
N–3	NOTES & SPECIFICATIONS

DO NOT SCALE DRAWINGS

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

UNDERGROUND SERVICE ALERT

UTILITIES PROTECTION CENTER, INC.
811

48 HOURS BEFORE YOU DIG

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286–2000

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458–3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

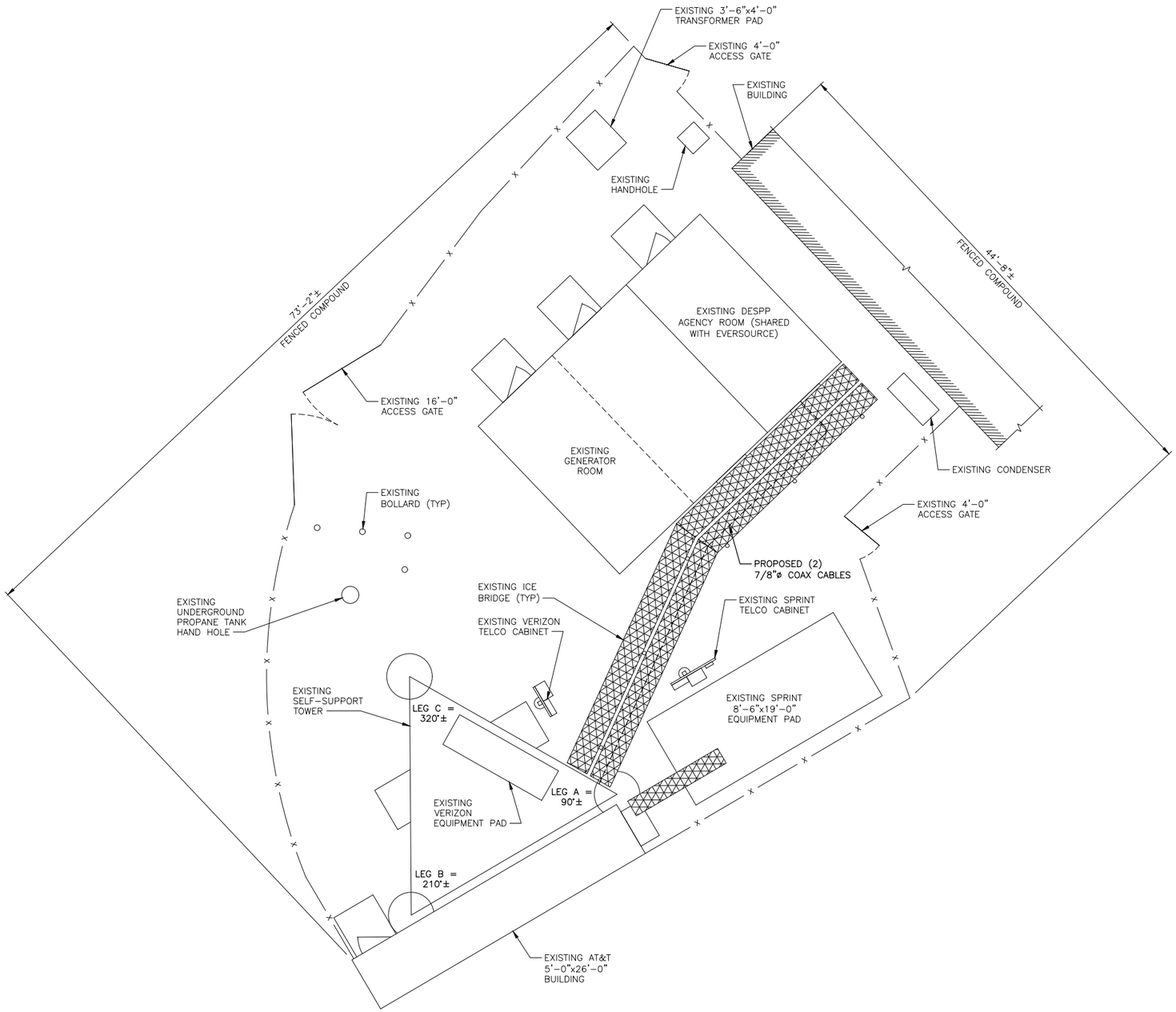
REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
11/17/2020

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



SITE PLAN
NO SCALE

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

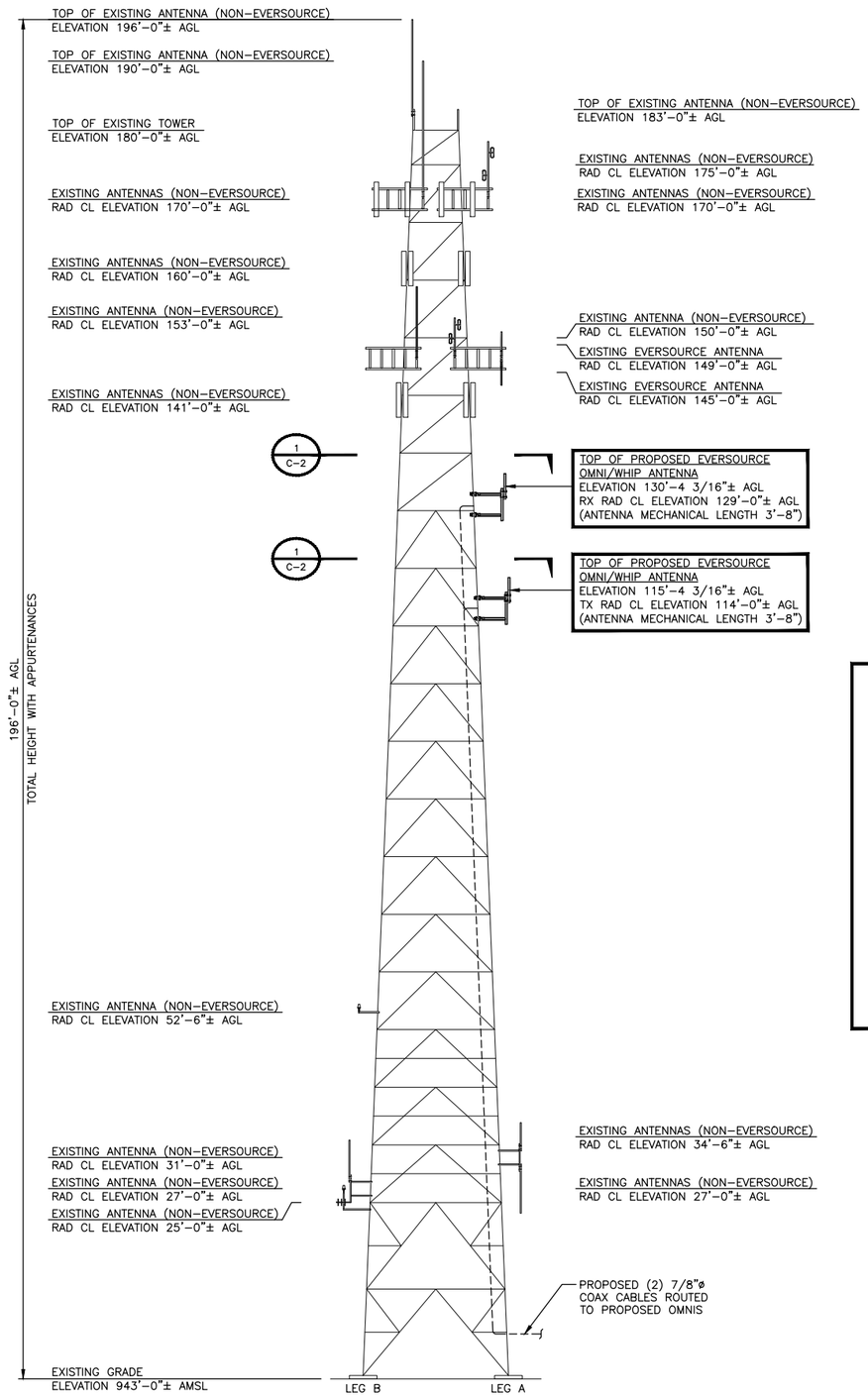
REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
11/17/2020

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

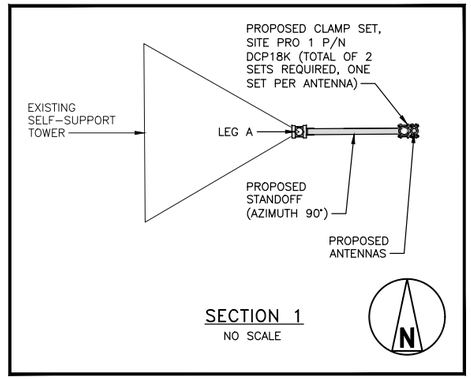
SHEET TITLE
SITE PLAN

SHEET NUMBER
C-1



TOWER ELEVATION FACE BA

NO SCALE

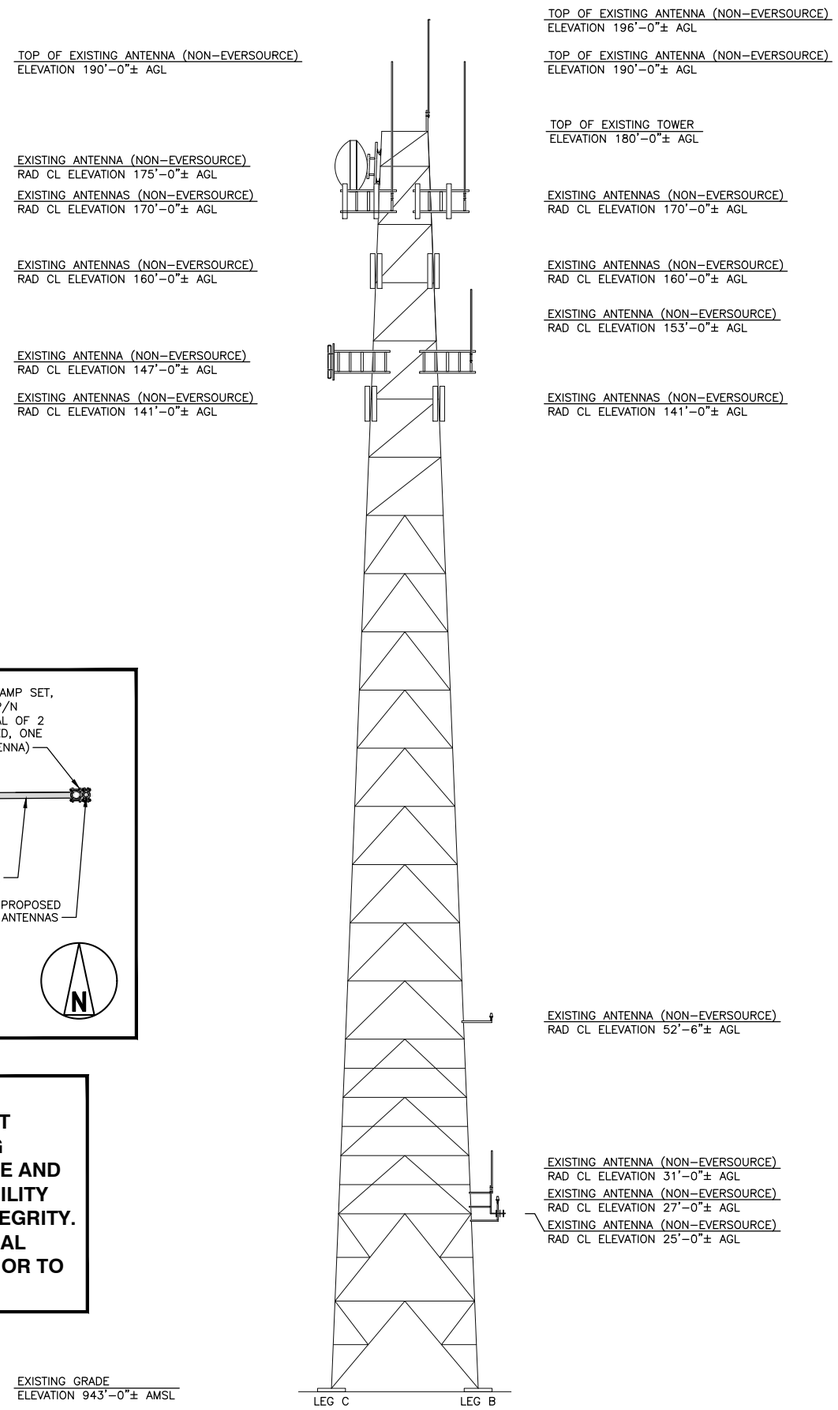


SECTION 1

NO SCALE

NOTES

BLACK & VEATCH HAS NOT EVALUATED THE EXISTING STRUCTURE FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO THE STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ANY CONSTRUCTION.



TOWER ELEVATION FACE CB

NO SCALE

EVERSOURCE ENERGY

107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED
PROFESSIONAL ENGINEER

11/17/2020

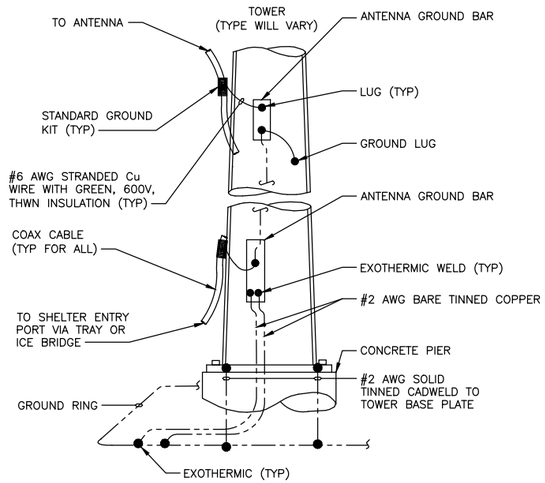
LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

SHEET TITLE

TOWER ELEVATION & ANTENNA EQUIPMENT

SHEET NUMBER

C-2

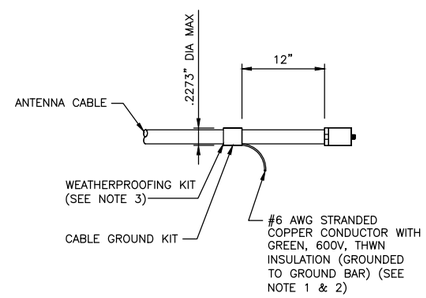


NOTE

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.

ANTENNA CABLE GROUNDING

NO SCALE

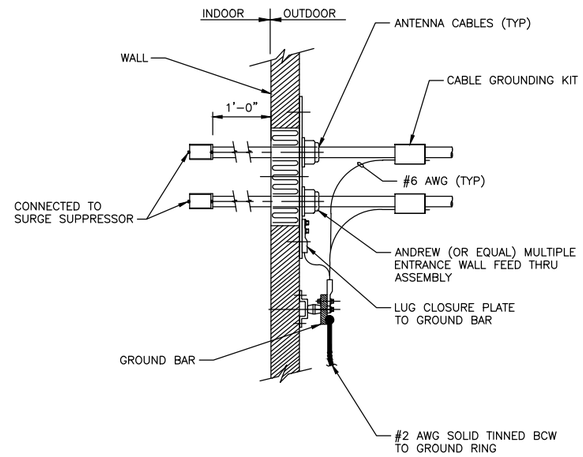


NOTES

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.

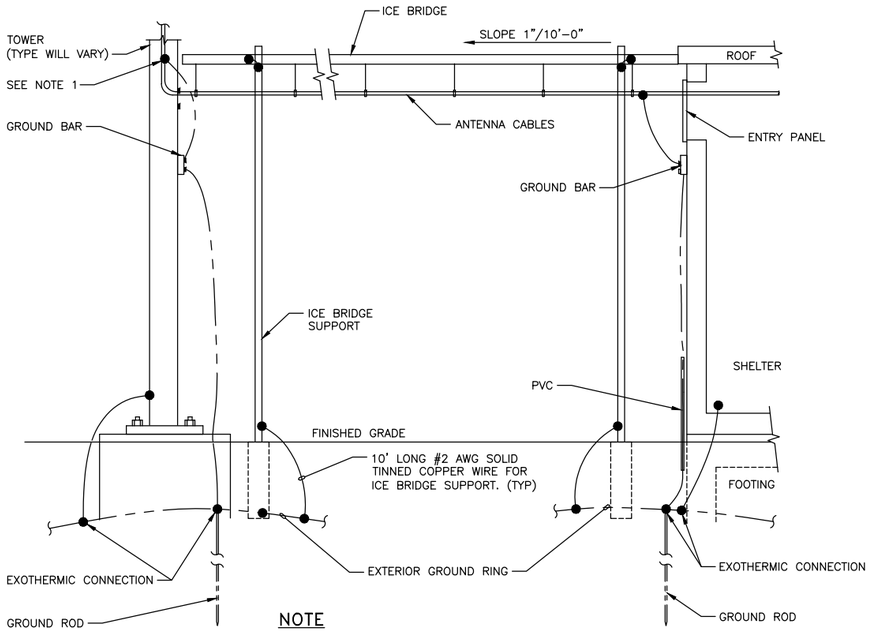
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NO SCALE



CABLE INSTALLATION WITH WALL FEED THRU ASSEMBLY

NO SCALE



NOTE

1. PROVIDE GROUND KIT 6" BEFORE TURN

ICE BRIDGE AND ANTENNA CABLE DETAIL

NO SCALE

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

11/17/2020

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

SHEET TITLE

GROUNDING DETAILS

SHEET NUMBER

G-1

DESIGN BASIS

1. GOVERNING CODE: 2018 CONNECTICUT STATE BUILDING CODE (2015 IBC BASIS).

GENERAL CONDITIONS

1. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL BUILDING CODES, PERMIT CONDITIONS AND SAFETY CODES DURING CONSTRUCTION.

2. THE ENGINEER IS NOT: A GUARANTOR OF THE INSTALLING CONTRACTOR'S WORK; RESPONSIBLE FOR SAFETY IN, ON OR ABOUT THE WORK SITE; IN CONTROL OF THE SAFETY OR ADEQUACY OF ANY BUILDING COMPONENT, SCAFFOLDING OR SUPERINTENDING THE WORK.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL PERMITS, INSPECTIONS, TESTING AND CERTIFICATES NEEDED FOR LEGAL OCCUPANCY OF THE FINISHED PROJECT.

4. THE CONTRACTOR IS RESPONSIBLE TO REVIEW THIS COMPLETE PLAN SET AND VERIFY THE EXISTING CONDITIONS SHOWN IN THESE PLANS AS THEY RELATE TO THE WORK PRIOR TO SUBMITTING PRICE. SIGNIFICANT DEVIATIONS FROM WHAT IS SHOWN AFFECTING THE WORK SHALL BE REPORTED IMMEDIATELY TO THE CONSTRUCTION MANAGER.

5. DETAILS INCLUDED IN THIS PLAN SET ARE TYPICAL AND APPLY TO SIMILAR CONDITIONS.

6. EXISTING ELECTRICAL AND MECHANICAL FIXTURES, PIPING, WIRING, AND EQUIPMENT OBSTRUCTING THE WORK SHALL BE REMOVED AND/OR RELOCATED AS DIRECTED BY THE CONSTRUCTION MANAGER. TEMPORARY SERVICE INTERRUPTIONS MUST BE COORDINATED WITH OWNER.

7. THE CONTRACTOR SHALL DILIGENTLY PROTECT THE EXISTING BUILDING/SITE CONDITIONS AND THOSE OF ANY ADJOINING BUILDING/SITES AND RESTORE ANY DAMAGE CAUSED BY HIS ACTIVITIES TO THE PRE-CONSTRUCTION CONDITION.

8. THE CONTRACTOR SHALL SAFEGUARD AGAINST: CREATING A FIRE HAZARD, AFFECTING TENANT EGRESS OR COMPROMISING BUILDING SITE SECURITY MEASURES.

9. THE CONTRACTOR SHALL REMOVE ALL DEBRIS AND CONSTRUCTION WASTE FROM THE SITE EACH DAY. WORK AREAS SHALL BE SWEPT AND MADE CLEAN AT THE END OF EACH WORK DAY.

10. THE CONTRACTOR'S HOURS OF WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES AND ORDINANCES AND BE APPROVED BY OWNER.

11. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CONSTRUCTION MANAGER IF ASBESTOS IS ENCOUNTERED DURING THE EXECUTION OF HIS WORK. THE CONTRACTOR SHALL CEASE ALL ACTIVITIES WHERE THE ASBESTOS MATERIAL IS FOUND UNTIL NOTIFIED BY THE CONSTRUCTION MANAGER TO RESUME OPERATIONS.

THERMAL & MOISTURE PROTECTION

1. FIRE-STOP ALL PENETRATIONS FOR ELECTRICAL CONDUITS OR WAVEGUIDE CABLING THROUGH BUILDING WALLS, FLOORS, AND CEILINGS SHALL BE FIRESTOPPED WITH ACCEPTED MATERIALS TO MAINTAIN THE FIRE RATING OF THE EXISTING ASSEMBLY. ALL FILL MATERIAL SHALL BE SHAPED, FITTED, AND PERMANENTLY SECURED IN PLACE. FIRESTOPPING SHALL BE INSTALLED IN ACCORDANCE WITH ASTM E814.

2. HILTI CP620 FIRE FOAM OR 3M FIRE BARRIER FILL, VOID OR CAVITY MATERIAL OR ACCEPTED EQUAL SHALL BE APPLIED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND ASSOCIATED UNDERWRITERS LABORATORIES (UL) SYSTEM NUMBER.

3. FIRESTOPPING SHALL BE APPLIED AS SOON AS PRACTICABLE AFTER PENETRATIONS ARE MADE AND EQUIPMENT INSTALLED.

4. FIRESTOPPED PENETRATIONS SHALL BE LEFT EXPOSED AND MADE AVAILABLE FOR INSPECTION BEFORE CONCEALING SUCH PENETRATIONS. FIRESTOPPING MATERIAL CERTIFICATES SHALL BE MADE AVAILABLE AT THE TIME OF INSPECTION.

5. ANY BUILDING ROOF PENETRATION AND/OR RESTORATION SHALL BE PERFORMED SO THAT THE ROOF WARRANTY IN PLACE IS NOT COMPROMISED. CONTRACTOR SHALL ARRANGE FOR OWNER'S ROOFING CONTRACTOR TO PERFORM ANY AND ALL ROOFING WORK IF SO REQUIRED BY EXISTING ROOF WARRANTY. OTHERWISE, ROOF SHALL BE MADE WATERTIGHT WITH LIKE CONSTRUCTION AS SOON AS PRACTICABLE AND AT COMPLETION OF CONSTRUCTION.

6. ALL PENETRATIONS INTO AND/OR THROUGH BUILDING EXTERIOR WALLS SHALL BE SEALED WITH SILICONE SEALER.

7. WHERE CONDUIT AND CABLES PENETRATES FIRE RATED WALLS AND FLOORS, FIRE GROUT ALL PENETRATIONS IN ORDER TO MAINTAIN THE FIRE RATING USING A LISTED FIRE SEALING DEVICE OR GROUT.

8. CONTRACTOR TO REMOVE AND RE-INSTALL ALL FIRE PROOFING AS REQUIRED DURING CONSTRUCTION.

SUBMITTALS

1. CONTRACTOR TO SUBMIT SHOP DRAWINGS TO ENGINEER FOR REVIEW PRIOR TO FABRICATION.

2. CONTRACTOR TO NOTIFY ENGINEER FOR INSPECTION PRIOR TO CLOSING PENETRATIONS.

3. CONTRACTORS SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. THE ENGINEER SHALL BE NOTIFIED OF ANY CONDITIONS WHICH PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

4. ALL STEEL MATERIAL EXPOSED TO WEATHER SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 " ZINC (HOT-DIPPED GALVANIZED) COATINGS" ON IRON AND STEEL PRODUCTS.

5. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NONCONFORMING MATERIALS OR CONDITIONS FOR REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

STEEL

1. MATERIAL:

WIDE FLANGE:	ASTM A572, GR 50
TUBING:	ASTM A500, GR C
PIPE:	ASTM A53, GR B AND ASTM A572, GR 50
ANGLE:	ASTM A570, GR 50 AND ASTM A36
BOLTS:	ASTM A325
GRATING:	TYPE GW-2 (1"x3/16" BARS)
MISC. MATERIAL:	ASTM A36

ALL STEEL SHAPES SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123 WITH A COATING WEIGHT OF 2 OZ/SF.

2. DAMAGED GALVANIZED SURFACES SHALL BE CLEANED WITH A WIRE BRUSH AND PAINTED WITH TWO COATS OF COLD ZINC, "GALVANOX", "DRY GALV", "ZINC IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES. TOUCH UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT IN SHOP OR FIELD.

3. DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AISC "MANUAL OF STEEL CONSTRUCTION" 13TH EDITION.

4. THE STEEL STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER COMPLETION. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION.

5. ALL STEEL ELEMENTS SHALL BE INSTALLED PLUMB AND LEVEL.

6. TOWER MANUFACTURER'S DESIGNS SHALL PREVAIL FOR TOWER.

SITE GENERAL

1. CONTRACTOR SHALL FOLLOW CONDITIONS OF ALL APPLICABLE PERMITS AND WORK IN ACCORDANCE WITH OSHA REGULATIONS.

2. THESE PLANS DEPICT KNOWN UNDERGROUND STRUCTURES, CONDUITS, AND/OR PIPELINES. THE LOCATIONS FOR THESE ELEMENTS ARE BASED UPON THE VARIOUS RECORD DRAWINGS AVAILABLE. THE CONTRACTOR IS HEREBY ADVISED THAT THESE DRAWINGS MAY NOT ACCURATELY DEPICT AS-BUILT LOCATIONS AND OTHER UNKNOWN STRUCTURES. THE CONTRACTOR SHALL THEREFORE DETERMINE THE EXACT LOCATION OF EXISTING UNDERGROUND ELEMENTS AND EXCAVATE WITH CARE AFTER CALLING MARKOUT SERVICE AT 1-800-272-4480 48 HOURS BEFORE DIGGING, DRILLING OR BLASTING.

3. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, FIBER OPTIC, AND OTHER UTILITIES WHERE ENCOUNTERED, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION, SHALL BE RELOCATED AS DIRECTED BY ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. CONTRACTOR SHALL HAND DIG UTILITIES AS NEEDED. CONTRACTOR SHALL PROVIDE, BUT IS NOT LIMITED TO, APPROPRIATE A) FALL PROTECTION, B) CONFINED SPACE ENTRY, C) ELECTRICAL SAFETY, AND D) TRENCHING AND EXCAVATION.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC, FIBER OPTIC, OR OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED, AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT THE POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF THE CONSTRUCTION MANAGER.

6. CONTRACTOR IS RESPONSIBLE FOR REPAIRING OR REPLACING STRUCTURES OR UTILITIES DAMAGED DURING CONSTRUCTION.

7. CONTRACTOR SHALL PROTECT EXISTING PAVED AND GRAVEL SURFACES, CURBS, LANDSCAPE AND STRUCTURES AND RESTORE SITE OR PRE-CONSTRUCTION CONDITION WITH AS GOOD, OR BETTER, MATERIALS. NEW MATERIALS SHALL MATCH EXISTING THICKNESS AND TYPE.

8. THE CONTRACTOR SHALL SHORE ALL TRENCH EXCAVATIONS GREATER THAN 5 FEET IN DEPTH OR LESS WHERE SOIL CONDITIONS ARE DEEMED UNSTABLE. ALL SHEETING AND/OR SHORING METHODS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER.

9. THE CONTRACTOR IS RESPONSIBLE FOR MANAGING GROUNDWATER LEVELS IN THE VICINITY OF EXCAVATIONS TO PROTECT ADJACENT PROPERTIES AND NEW WORK. GROUNDWATER SHALL BE DRAINED IN ACCORDANCE WITH LOCAL SEDIMENTATION AND EROSION CONTROL GUIDELINES.

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

STATE OF CONNECTICUT · JOSHUA J. RILEY · 33208 · LICENSED PROFESSIONAL ENGINEER

11/17/2020

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-1

ELECTRICAL

1. CONTRACTOR SHALL VERIFY EXISTING ELECTRIC SERVICE TYPE AND CAPACITY AND ORDER NEW ELECTRIC SERVICE FROM LOCAL ELECTRIC UTILITY, WHERE APPLICABLE.

2. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, AND SHALL BE ACCEPTABLE TO ALL AUTHORITIES HAVING JURISDICTION. WHERE A CONFLICT EXISTS BETWEEN CODES, PLAN AND SPECIFICATIONS, OR AUTHORITIES HAVING JURISDICTION, THE MORE STRINGENT AUTHORITIES SHALL APPLY.

3. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC, FOR A COMPLETE AND PROPERLY OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN AND/OR OTHERWISE REQUIRED.

4. ALL ELECTRICAL CONDUCTORS SHALL BE 100% COPPER AND SHALL HAVE TYPE THHN INSULATION UNLESS INDICATED OTHERWISE.

5. CONDUIT SHALL BE THREADED RIGID GALVANIZED STEEL OR EMT WITH ONLY COMPRESSION TYPE COUPLINGS AND CONNECTORS, ALL MADE UP WRENCH TIGHT.

6. ALL BURIED CONDUIT SHALL BE MINIMUM SCH 40 PVC UNLESS NOTED OTHERWISE, OR AS PER LOCAL CODE REQUIREMENTS.

7. PROVIDE FLEXIBLE STEEL CONDUIT OR LIQUID TIGHT FLEXIBLE STEEL CONDUIT TO ALL VIBRATING EQUIPMENT, INCLUDING HVAC UNITS, TRANSFORMERS, MOTORS, ETC, OR WHERE EQUIPMENT IS PLACED UPON A SLAB ON GRADE.

8. ALL BRANCH CIRCUITS AND FEEDERS SHALL HAVE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR BONDED TO ALL ENCLOSURES, PULLBOXES, ETC.

9. CONDUIT AND CABLE WITHIN CORRIDORS SHALL BE CONCEALED AND EXPOSED ELSEWHERE, UNLESS NOTED OTHERWISE.

10. ELECTRICAL MATERIALS INSTALLED ON ROOFTOP SHALL BE LISTED FOR NEMA 3R USE. –AND ALL WIRING WITHIN A VENTILATION DUCT SHALL BE LISTED FOR SUCH USE. IN GENERAL WIRING METHODS WITHIN A DUCT SHALL BE AN MC CABLE WITH SMOOTH OR CORRUGATED METAL JACKET AND HAVE NO OUTER COVERING OVER THE METAL JACKET. INTERLOCKED ARMOR TYPE OF MC CABLE IS NOT ACCEPTABLE FOR THIS APPLICATION. CONTRACTOR CAN ALSO USE TYPE MI CABLE IN THE VENTILATION DUCT PROVIDED IT DOES NOT HAVE ANY OUTER COVERINGS OVER THE METAL EXTERIOR.

11. WIRING DEVICES SHALL BE SPECIFICATION GRADE, AND WIRING DEVICE COVER PLATES SHALL BE PLASTIC WITH ENGRAVING AS SPECIFIED.

12. GROUNDING SYSTEM RESISTANCE SHALL BE MEASURED, RECORDED, AND DATED USING MEGGER DET14 OR SIMILAR INSTRUMENT. GROUND RESISTANCE SHALL NOT EXCEED 5 OHMS. IF THE RESISTANCE VALUE IS EXCEEDED, NOTIFY CONSTRUCTION MANAGER FOR FURTHER INSTRUCTION.

13. COORDINATE WITH BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK INVOLVING EXISTING SYSTEMS OR EQUIPMENT IN ORDER TO DETERMINE THE EFFECT, IF ANY, ON OTHER TENANTS WITHIN THE BUILDING, AND TO DETERMINE THE APPROPRIATE TIME FOR PERFORMING THIS WORK.

14. THE CONTRACTOR SHALL BE REQUIRED TO VISIT THE SITE PRIOR TO SUBMITTING BID IN ORDER TO DETERMINE THE EXTENT OF THE EXISTING CONDITIONS.

15. ALL CONDUCTOR ENDS SHALL BE TAGGED AND ELECTRICAL EQUIPMENT LABELED WITH ENGRAVED IDENTIFICATION PLATES.

16. CONTRACTOR IS RESPONSIBLE FOR ALL CONTROL WIRING AND ALARM TIE–INS.

GROUNDING

1. #6 THWN SHALL BE STRANDED #6 COPPER WITH GREEN THWN INSULATION SUITABLE FOR WET INSTALLATIONS.

2. #2 THWN SHALL BE STRANDED #2 COPPER WITH THWN INSULATION SUITABLE FOR WET INSTALLATIONS.

3. #2 BARE TINNED SHALL BE SOLID COPPER TINNED. ALL BURIED WIRE SHALL MEET THIS CRITERIA.

4. ALL LUGS SHALL BE 2–HOLE, LONG BARREL, TINNED SOLID COPPER UNLESS OTHERWISE SPECIFIED, LUGS SHALL BE THOMAS AND BETTS SERIES 548##BE OR EQUIVALENT (IE #2 THWN – 54856BE, #2 SOLID – 54856BE, AND #6 THWN – 54852BE).

5. ALL HARDWARE, BOLTS, NUTS, AND WASHERS SHALL BE 18–8 STAINLESS STEEL. EVERY CONNECTION SHALL BE BOLT–FLAT WASHER–BUSS–LUG–FLAT WASHER–BELLEVILLE WASHER–NUT IN THAT EXACT ORDER. BACK–TO–BACK LUGGING, BOLT–FLAT WASHER–LUG–BUSS–LUG–FLAT WASHER–BELLEVILLE WASHER–NUT, IN THAT EXACT ORDER, IS ACCEPTED WHERE NECESSARY TO CONNECT MANY LUGS TO A BUSS BAR. STACKING OF LUGS, BUSS–LUG–LUG, IS NOT ACCEPTABLE.

6. WHERE CONNECTIONS ARE MADE TO STEEL OR DISSIMILAR METALS, A THOMAS AND BETTS DRAGON TOOTH WASHER MODEL DTWXXX SHALL BE USED BETWEEN THE LUG AND THE STEEL, BOLT–FLAT WASHER–STEEL–DRAGON TOOTH WASHER–LUG–FLAT WASHER–BELEVILE WASHER–NUT.

7. ALL CONNECTIONS, INTERIOR AND EXTERIOR, SHALL BE MADE WITH THOMAS AND BETTS KPOR–SHIELD. COAT ALL WIRES BEFORE LUGGING AND COAT ALL SURFACES BEFORE CONNECTING.

8. THE MINIMUM BEND RADIUS SHALL BE 8 INCHES FOR #6 WIRE AND SMALLER AND 12 INCHES FOR WIRE LARGER THAN #6.

9. ALL CONNECTIONS TO THE GROUND RING SHALL BE EXOTHERMIC WELD.

10. BOND THE FENCE TO THE GROUND RING AT EACH CORNER, AND AT EACH GATE POST WITH #2 SOLID TINNED WIRE. EXOTHERMIC WELD BOTH ENDS.

11. GROUND KITS SHALL BE SOLID COPPER STRAP WITH #6 WIRE 2–HOLE COMPRESSION CRIMPED LUGS AND SHALL BE SEALED ACCORDING TO MANUFACTURER INSTRUCTIONS.

12. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL BE USED.

13. GROUND BARS SHALL BE FURNISHED AND INSTALLED WITH PRE–DRILLED HOLE DIAMETERS AND SPACINGS. GROUND BARS SHALL NEITHER BE FIELD FABRICATED NOR NEW HOLES DRILLED. GROUND LUGS SHALL MATCH THE SPACING ON THE BAR. HARDWARE DIAMETER SHALL BE MINIMUM 3.8 INCH.

14. MGB GROUND CONNECTION SHALL BE EXOTHERMIC WELDED TO THE GROUND SYSTEM.

15. ALL CABLE TRAY AND/OR PLATFORM STEEL SHALL BE BONDED TOGETHER WITH JUMPERS (#6 IN EQUIPMENT ROOM, #2 ELSEWHERE AND HOMERUN).

ANTENNA & CABLE NOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL TRANSMISSION CABLES, JUMPERS, CONNECTORS, GROUNDING STRAPS, ANTENNAS, MOUNTS AND HARDWARE. ALL MATERIALS SHALL BE INSPECTED BY THE CONTRACTOR FOR DAMAGE UPON DELIVERY. JUMPERS SHALL BE SUPPLIED AT ANTENNAS AND EQUIPMENT INSIDE SHELTER COORDINATE LENGTH OF JUMP CABLES WITH EVERSOURCE. COORDINATE AND VERIFY ALL OF THE MATERIALS TO BE PROVIDED WITH EVERSOURCE PRIOR TO SUBMITTING BID AND ORDERING MATERIALS.

2. AFTER INSTALLATION, THE TRANSMISSION LINE SYSTEM SHALL BE PIM/SWEEP TESTED FOR PROPER INSTALLATION AND DAMAGE WITH ANTENNAS CONNECTED. CONTRACTOR TO OBTAIN LATEST TESTING PROCEDURES FROM EVERSOURCE PRIOR TO BIDDING.

3. ANTENNA CABLES SHALL BE COLOR CODED AT THE FOLLOWING LOCATIONS:
   – AT THE ANTENNAS.
   – AT THE WAVEGUIDE ENTRY PLATE ON BOTH SIDES OF THE EQUIPMENT SHELTER WALL.
   – JUMPER CABLES AT THE EQUIPMENT ENTER.

4. SYSTEM INSTALLATION:
   THE CONTRACTOR SHALL INSTALL ALL CABLES AND ANTENNAS TO THE MANUFACTURER'S SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR THE PROCUREMENT AND INSTALLATION OF THE FOLLOWING:
   – ALL CONNECTORS, ASSOCIATED CABLE MOUNTING, AND GROUNDING HARDWARE.
   – WALL MOUNTS, STANDOFFS, AND ASSOCIATED HARDWARE.
   – 1/2 INCH HELIAX ANTENNA JUMPERS OF APPROPRIATE LENGTHS.

5. MINIMUM BENDING RADIUS FOR COAXIAL CABLES:
   – 7/8 INCH, RMIN = 15 INCHES
   – 1 5/8 INCH, RMIN = 25 INCHES

6. CABLE SHALL BE INSTALLED WITH A MINIMUM NUMBER OF BENDS WHERE POSSIBLE. CABLE SHALL NOT BE LEFT UNTERMINATED AND SHALL BE SEALED IMMEDIATELY AFTER BEING INSTALLED.

7. ALL CABLE CONNECTIONS OUTSIDE SHALL BE COVERED WITH WATERPROOF SPLICING KIT.

8. CONTRACTOR SHALL VERIFY EXACT LENGTH AND DIRECTION OF TRAVEL IN FIELD PRIOR TO CONSTRUCTION.

9. CABLE SHALL BE FURNISHED WITHOUT SPLICES AND WITH CONNECTORS AT EACH END.

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286–2000

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458–3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

STATE OF CONNECTICUT · MARK P. STILES · 24358 · LICENSED PROFESSIONAL ENGINEER

11/17/2020

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

SHEET TITLE
NOTES
& SPECIFICATIONS

SHEET NUMBER
N-2

SYMBOLS

●	EXOTHERMIC CONNECTION
■	COMPRESSION CONNECTION
	5/8"ø x 10'-0" COPPER CLAD STEEL GROUND ROD.
	TEST GROUND ROD WITH INSPECTION SLEEVE
	GROUNDING CONDUCTOR
(A)	KEY NOTES
CHAINLINK FENCE	X X X X X
WOOD FENCE	
LEASE AREA	
ICE BRIDGE	
CABLE TRAY	
GAS LINE	G G G G G
UNDERGROUND ELECTRICAL/TELCO	E/T E/T E/T E/T
UNDERGROUND ELECTRICAL/CONTROL	E/C E/C E/C E/C
UNDERGROUND ELECTRICAL	E E E E E
UNDERGROUND TELCO	T T T T T
PROPERTY LINE (PL)	

ABBREVIATIONS

AC	ALTERNATING CURRENT
AIC	AMPERAGE INTERRUPTION CAPACITY
ANI	AUXILIARY NETWORK INTERFACE
ATM	ASYNCHRONOUS TRANSFER MODE
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
AWS	ADVANCED WIRELESS SERVICES
BATT	BATTERY
BBU	BASEBAND UNIT
BTC	BARE TINNED COPPER CONDUCTOR
BTS	BASE TRANSCEIVER STATION
CCU	CLIMATE CONTROL UNIT
CDMA	CODE DIVISION MULTIPLE ACCESS
CHG	CHARGING
CLU	CLIMATE UNIT
COMM	COMMON
DC	DIRECT CURRENT
DIA	DIAMETER
DWG	DRAWING
EC	ELECTRICAL CONDUCTOR
EMT	ELECTRICAL METALLIC TUBING
FIF	FACILITY INTERFACE FRAME
GEN	GENERATOR
GPS	GLOBAL POSITIONING SYSTEM
GSM	GLOBAL SYSTEM FOR MOBILE
HVAC	HEAT/VENTILATION/AIR CONDITIONING
ICF	INTERCONNECTION FRAME
IGR	INTERIOR GROUNDING RING (HALO)
LTE	LONG TERM EVOLUTION
MGB	MASTER GROUNDING BAR
MIN	MINIMUM
MW	MICROWAVE
MTS	MANUAL TRANSFER SWITCH
NEC	NATIONAL ELECTRICAL CODE
OC	ON CENTER
PP	POLARIZING PRESERVING
PCU	PRIMARY CONTROL UNIT
PDU	PROTOCOL DATA UNIT
PWR	POWER
RECT	RECTIFIER
RET	REMOTE ELECTRICAL TILT
RMC	RIGID METALLIC CONDUIT
RF	RADIO FREQUENCY
RUC	RACK USER COMMISSIONING
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
RWY	RACEWAY
SFP	SMALL FORM-FACTOR PLUGGABLE
SIAD	SMART INTEGRATED ACCESS DEVICE
SSC	SITE SOLUTIONS CABINET
T1	1544KBPS DIGITAL LINE
TDMA	TIME-DIVISION MULTIPLE ACCESS
TMA	TOWER MOUNT AMPLIFIER
TVSS	TRANSIENT VOLTAGE SUPPRESSION SYSTEM
TYP	TYPICAL
UMTS	UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM
UPS	UNINTERRUPTIBLE POWER SUPPLY (DC POWER PLANT)

EVERSOURCE ENERGY

107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	JR

REV	DATE	DESCRIPTION
0	11/17/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER

11/17/2020

LITCHFIELD TROOP L CSP
452 BANTAM RD
LITCHFIELD, CT 06759

SHEET TITLE

NOTES
& SPECIFICATIONS

SHEET NUMBER

N-3

REFERENCE CUTSHEETS

TELEWAVE, INC.®

195 - 260 MHz

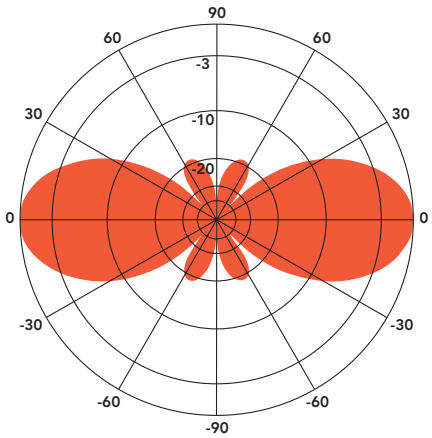
ANT220F2DIN

FIBERGLASS COLLINEAR ANTENNA 2.5 dBd

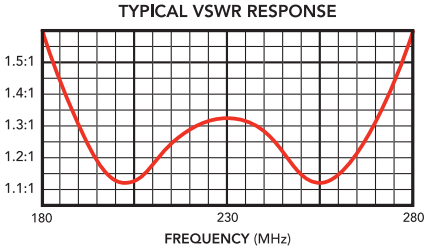
The Telewave ANT220F2 is an extremely rugged collinear antenna, with moderate gain and wide vertical beamwidth. This compact antenna produces 2.5 dBd gain, and is designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, with a path to ground potential for lightning impulse protection. The ANT220F2 is an excellent choice for wireless PTC systems in urban or rural areas.

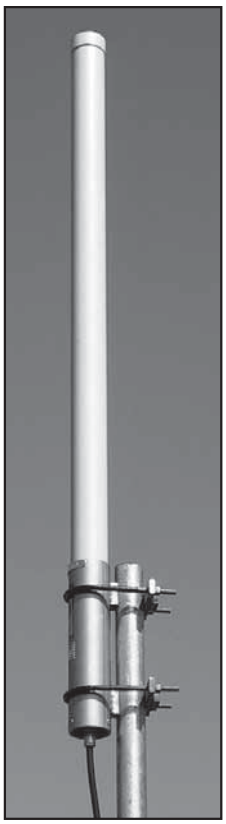
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray, acid rain, and wind blown abrasives.

The ANT220F2 includes the ANTC485 dual clamp set for mounting to a 1.5" to 3" O.D. support pipe, and a 24" removable RG-213 DIN-Male jumper.



ANT220F2 - 230 MHz
Vertical Plane
Gain = 2.58 dBd



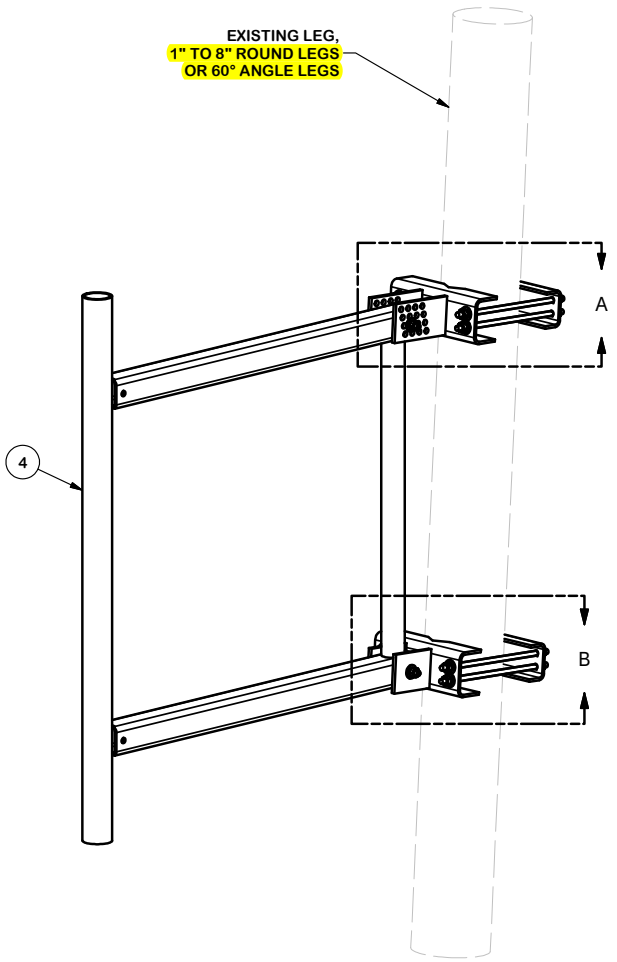


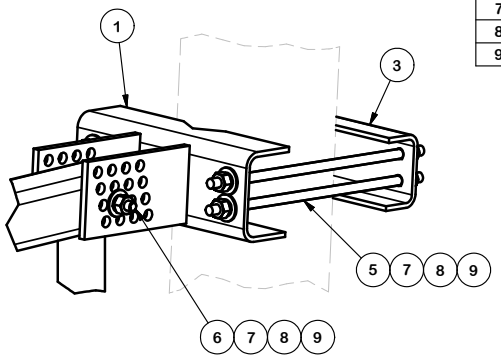
ONE SITE PRO 1 P/N DCP12K CLAMP SET REQUIRED.

SPECIFICATIONS			
Frequency (continuous)	195-260 MHz	**Dimensions (L x base diam.) in.**	51 x 2.75
Gain	2.5 dBd	**Tower weight (antenna + clamps)**	11 lb.
Power rating (typ.)	500 watts	**Shipping weight**	14 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	200 / 150 MPH
VSWR	1.5:1 or less	**Maximum exposed area**	1.1 ft.²
Pattern	Omnidirectional	**Lateral thrust at 100 MPH**	44 lb.
Vertical beamwidth	38°	**Bending moment at top clamp**	47 ft. lb.
Termination	7-16 DIN-F	**(100 MPH, 40 PSF flat plate equiv.)**	

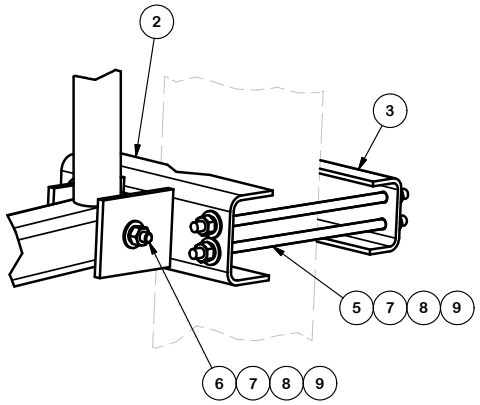
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 5" ± DIAMETER.

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	CFM	UPPER GATE FOOT WELDMENT		13.90	13.90
2	1	CFS	LOWER GATE FOOT WELDMENT		12.72	12.72
3	2	GBB	GATE BACKING BAR		4.53	9.06
4	1	4PBG	48" PIPE MOUNT STANDOFF ARM		113.96	113.96
5	8	G12R-12	1/2" x 12" GALV. THREADED ROD		0.67	5.35
5	8	G12R-15	1/2" x 15" GALV. THREADED ROD		0.84	6.69
6	2	A1205	1/2" x 5" A325 HDG BOLT		0.34	0.69
7	18	G12FW	1/2" HDG USS FLATWASHER		0.03	0.61
8	18	G12LW	1/2" HDG LOCKWASHER		0.01	0.25
9	18	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	1.29
					TOTAL WT. #	164.53

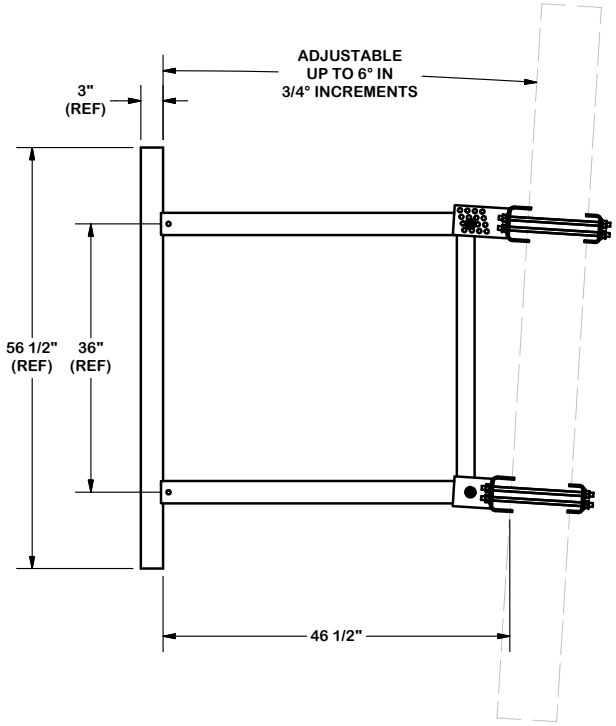




DETAIL A



DETAIL B



TOLERANCE NOTES

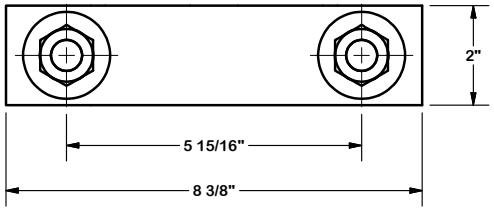
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

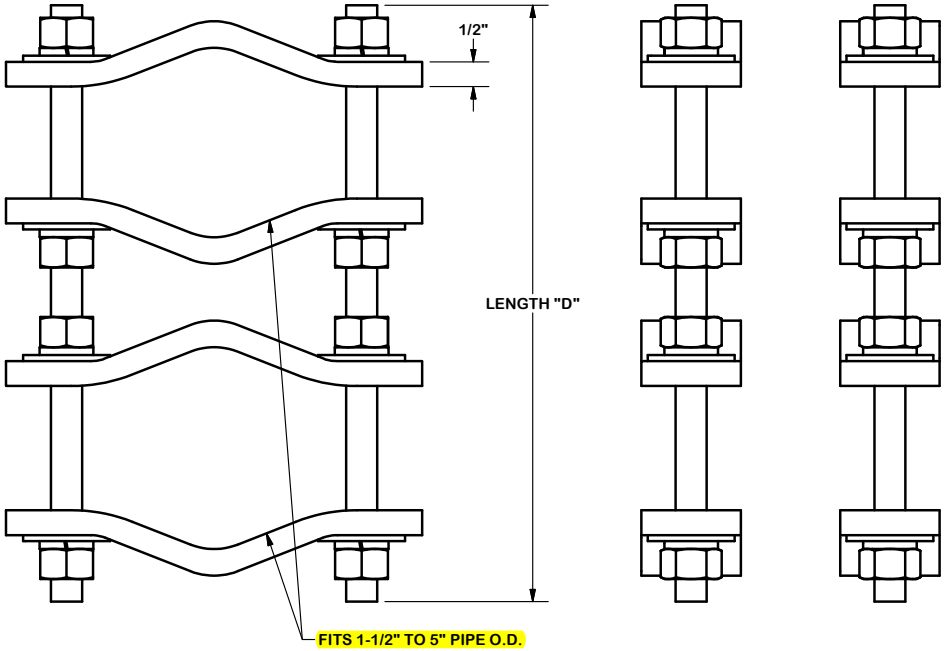
DESCRIPTION: 48" ULTIMATE UNIVERSAL STANDOFF FRAME

SITE PRO 1 — A valmont COMPANY
Engineering Support Team: 1-888-753-7446
Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Plymouth, IN; Salem, OR; Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
	RCH 2/4/2011		USF-4U	1 OF 1

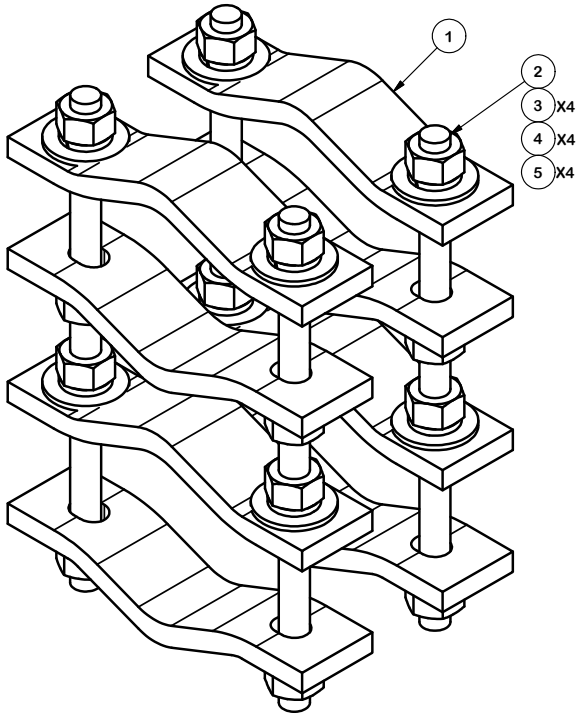
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 2/16/2011	USF-4U





PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	8	DCP	CLAMP HALF, 1/2" THICK, 8-3/8"		2.40	19.20
2	B	C	5/8" THREADED ROD	D	E	F
3	16	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	2.08
4	16	G58LW	5/8" HDG LOCKWASHER		0.03	0.42
5	16	G58FW	5/8" HDG USS FLATWASHER		0.07	1.13

VARIABLE PARTS TABLE						
ASSEMBLY "A"	QTY "B"	PART "C"	LENGTH "D"	UNIT WT. "E"	NET WT. "F"	TOTAL WEIGHT
DCP12K	4	G58R-12	12"	1.05	4.18	27.01
DCP18K	4	G58R-18	18"	1.57	6.27	29.10



TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
PIPE TO PIPE CLAMP SET
1-1/2" TO 5" PIPE
1/2" THICK CLAMP

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
	KC8 8/21/2012		SEE ASSEMBLY "A"	1 OF 1

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	CEK 1/22/2013	DCPxxK

ATTACHMENT E – STRUCTURAL ANALYSIS

AECOM

Submitted to
Eversource Energy
107 Selden Street
Berlin, CT 06037

Submitted by
AECOM
1255 Broad St,
Suite 201
Clifton, NJ 07013
October 27, 2020

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 180' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED EXISTING ANTENNA ARRANGEMENT

EVERSOURCE ENERGY

Site Name : CSP #07 Litchfield
Site Address: 452 Bantam Road
Connecticut State Police Site #07
Litchfield, Connecticut

60624419
EVS-013 Rev. 1 (b.1)

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the 180' self-supporting lattice tower located at 438 Bantam Road in Litchfield, Connecticut.

The structural analysis was conducted in accordance with the 2018 Connecticut State Building Code which includes the TIA-222-H[1] Standard, 2018 International Building Code, the 2018 Connecticut State Building Code Amendments to the International Building Code, the AISC[2] Load Resistance Factor Design (LRFD), the ASCE 7[3] design Code, and the Department of Emergency Services and Public Protection (DESPP) / Connecticut State Police (CSP) design requirements.

The antenna loading considered in the analysis consists of all the existing antennas, transmission lines and ancillary items as outlined in the Introduction Section of this report.

The proposed Eversource antenna installation is listed below:

Antenna and Other Appurtenances	Carrier	Antenna Center Elevation
Install: **(1) Telewave ANT220F2 Omni Antenna (Antenna Centerline Install @ 114')** **(1) SitePro USF-4U (Mount Centerline Install @ 111')** **(1) RFS LCF78-50JA-A7 Cellflex Coaxial Cable** **(1) Telewave ANT220F2 Omni Antenna (Antenna Centerline Install @ 129')** **(1) SitePro USF-4U (Mount Centerline Install @ 126')** **(1) RFS LCF78-50JA-A7 Cellflex Coaxial Cable**	**Eversource (Proposed)**	**@ 111'-129'**

The results of the structural analysis herein in indicates:

1. The existing steel tower structure IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
2. The existing tower anchor bolts ARE considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
3. The existing foundation IS considered structurally adequate for the proposed antenna loading with the load classification specified herein.
4. The maximum structural capacity rating calculated herein is **88.1%**

1. TIA = Telecommunications Industry Association Structural Standard for Antenna Supporting Structures and Antennas (Version H)

2. AISC = American Institute of Steel Construction (15th Edition)

1. EXECUTIVE SUMMARY *(continued)*

This analysis is based on:

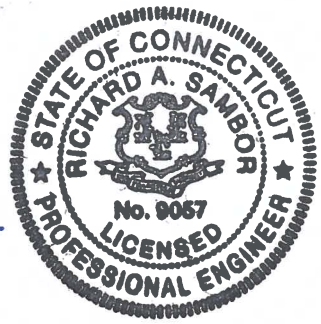
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry and structural member sizes utilized in the preparation of this report were taken from Tower and Foundation reports prepared by Stainless, Inc. project number 358803 dated November 23, 1993.
3) Foundation information taken from as-build drawings prepared by Stainless, Inc. project number 358803 signed and sealed March 3, 1994.
4) Geotechnical information taken from Supplemental Geotechnical Report prepared by Dr. Clarence Welti, P.E., P.C., dated February 22, 1994.
5) Previous structural analysis report prepared by URS Corporation on behalf of Verizon Wireless, project number VZ4-046 Rev 2 / 36931122, signed and sealed April 7, 2008.
6) Existing inventory taken from Tower Mapping and Inventory by Northeast Towers, Inc., climbed January 14, 2013.
7) Previous structural analysis and evaluation performed by AECOM, on behalf of Eversource, project number 60602416/EVS-013, signed and sealed January 28, 2020.
8) Proposed Eversource antenna inventory, obtained via e-mail dated August 28, 2019.
9) Antenna and mount configuration as specified within Section 2 and 6 of this report.
10) Coax cable orientation as specified in section 6 of this report.

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

If you should have any questions, please contact Mike Egan at (860) 263-5817.

Sincerely,

AECOM,



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

RAS/cmc

2. INTRODUCTION

The subject tower is located at 438 Bantam Road in Litchfield, CT. The structure is a 180' self-supporting three-legged steel tapered lattice tower designed and manufactured by Stainless Incorporated.

The tower geometry and structure member sizes were taken from the original construction drawings prepared by Stainless, Inc., dated November 23, 1993, and have considered previous tower modifications as stated in the Executive Summary of this report.

The structural analysis was conducted in accordance with the following:

- 2018 International Building Code (compliant with the TIA-222-H design loads)
- 2018 International Building Code with 2018 Connecticut State Building Code Amendments for a wind speed of 97 mph (3-second gust)
- 2016 AISC Load Resistance Factor Design (LRFD)
- 2016 ASCE 7 Minimum Design Loads for Buildings and Other Structures for the ice thickness referenced in the TIA-222-H Standard.

The inventory together with the proposed Eversource antenna arrangement is summarized in the table below:

Antenna Type	***Carrier***	***Mount***	***Centerline Elevation***	***Cable***
(1) 4' Lightning Rod	n/a	10' Pipe Mount extension at Leg	192'	n/a
(1) PD-1142-30 10' Omni Antenna	CSP – 22 (existing)	6' Pipe Mount extension at Leg	191'	(1) 7/8"
(1) 5' x 2" Omni Antenna	CSP (existing)	6' Pipe Mount extension at Leg	184'	(1) 7/8"
(1) SC479-HF1LDF Omni (2) SC479-HF1LDF (Inverted Omni) (1) Bird TTA Unit	CSP-Troop L 44 to 47 (future)	6' Side-Arm Mount	180'	(3) 1-5/8" (1) 1/2"
(1) 20' x 2" Omni Antenna	LCD-9 (existing)	*Shared with Sprint Mount @ 169' (Below)*	182'	(1) 7/8"
(1) 20' x 2" Omni Antenna	LCD-28 (existing)	*Shared with Sprint Mount @ 169' (Below)*	182'	(1) 7/8"
(1) PD220 2-Bay Dipole	LCD - 27 (existing)	*Shared with Sprint Mount @ 169' (Below)*	176'	(1) 7/8"
(1) PA6-65	CSP - 3 (existing)	Leg Mount	176'	(1) EW63

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(1) DB292 Yagi Antenna	LCD – 10 (existing)	*Shared with Sprint Mount @ 169' (Below)*	170'	(1) 7/8"
(6) DB980F90E-M	Sprint (existing)	(3) 12' Wide Antenna Mount Frames	169'	(6) 1 5/8"
(6) Powerwave 7770.00 antennas, (6) LGP 13519 Diplexers and (6) LGP 21401 TMA's	AT&T (existing)	*(3) Double Antenna Clamp Assemblies Mounted to Leg*	162'	(12) 1 5/8"
(1) PD1142-1 20' Omni	CSP (existing)	*Shared with VZW Mount @ 148'' (Below)*	158'	(1) 7/8"
(1) DB 222 Dipole (2-bay)	CSP (existing)	*Shared with VZW Mount @ 148'' (Below)*	153'	(1) 7/8"
(1) DB 586-Y Omni Antenna	CSP (existing)	*Shared with VZW Mount @ 148'' (Below)*	150.5'	(1) 7/8"
(1) TMA Unit	CSP (existing)	*Shared with VZW Mount @ 148''*	148'	(1) 1/2"
(1) 10' Dipole on 20' Pipe	CSP (existing)	*20' Pipe mounted to Shared with VZW Mount @ 148''*	148'	(1) 7/8"
(3) Amphenol BXA-185085-12CF Panels (3) Amphenol BXA-80080-6CF Panels *(Panels CL @142')*	VZW (existing)	(3) 12' Wide Antenna Mount Frames	148'	(12) 1 5/8"
(1) (inverted) DB 586-Y Omni Antenna	CSP (existing)	*Shared with VZW Mount @ 148'' (Above)*	144'	(1) 7/8"
(1) Telewave ANT220F2 Omni Antenna	**Eversource (proposed)**	**(1) SitePro USF-4U**	**126'**	**(1) 7/8" CELLFLEX LCF78-50JA-A7 Feed Line**
(1) Telewave ANT220F2 Omni Antenna	**Eversource (proposed)**	**(1) SitePro USF-4U**	**111'**	**(1) 7/8" CELLFLEX LCF78-50JA-A7 Feed Line**
GPS	Sprint (existing)	4' (Square Tube) Stand Off Mount	52'	(1) 1/2"
(1) DB803M Omni Antenna	CSP (existing)	Shared with Below Mount	33.5'	(1) 1/2"

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(1) DB803M Omni Antenna	CSP (existing)	2’ Stand Off Mount @ 25’	29.5’	(1) 1/2”
(1) (inverted) DB803 Omni Antenna	CSP (existing)	3’ Stand-off Mount @ 31’	27’	(1) 1/2”
(1) 2’ Yagi	CSP (existing)	Shared with Above	16’	(1) RG6

NOTES: Antenna ID Numbering obtained from Connecticut State Police inventory, dated January, 27, 2014.

This structural analysis of the communications tower was performed by AECOM, on behalf of Eversource. The purpose of this analysis was to investigate the structural integrity of the existing tower and foundation for existing antenna loads in compliance with the 2018 Connecticut State Building Code. This analysis was conducted to evaluate stress on the tower and the effect forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with, the TIA-222-H–Structural Standard for Antenna Towers and Antenna Supporting Structures and Antennas, the 2018 International Building Code with 2018 Connecticut State Building Code Amendments and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Load Resistance Factor Design (LRFD)

The structural analysis was conducted using TNX Tower version 8.0.7.4 and used the following conditions for this tower review (following the TIA-222-H Standard):

- Structure Class 3 – (Essential Communications)
    - NOTE: ASCE 7 and CT State Building Code Applied Risk Category 4 for design wind loads (see below)
- Topographic Category 1 – (No Abrupt elevation changes to location of structure)
- Exposure Class C – (Open Terrain with scattered obstructions)
- Load Conditions:
    - Two load conditions were evaluated as shown which were compared to design stresses according to AISC and TIA-222-H Standard.

Basic Wind Speed:

- IBC 2018 w/ 2018 CT State Building Code Amendment:
    - (2018) IBC Section 1609.1.1 – Determination of Wind Loads – Exception 5 "Designs using TIA-222" applies for determination of Design Wind Load obtained as "V.ult" are to be converted to "V.asd" when applying the TIA-222-H design Standard (under Section 1609.3) for Basic Wind Speed.
        - Due to tnxTower program options for TIA-222-H, the program appears to perform tower analysis with speeds according to ASCE 7-16 V.ult loads, therefore, V.ult speeds are to be used.
    - (2018) CT State Building Code Amendment to the IBC Section 1609.3 wind loads are obtained from Appendix N of the State Building Code.
        - **V.ult = 125 mph** (3-Second Gust) Wind Design Parameter for the Town of Litchfield, Connecticut for Risk Category four (IV) for essential communications (Connecticut State Police). NOTE: Because the State of Connecticut has not officially published the design wind-speeds, use the state of Connecticut wind-speeds per municipality (indicated above).

LOAD CONDITION 1 = 125 MPH (3-SECOND GUST) WIND LOAD (WITHOUT ICE) + TOWER DEAD LOAD
Load Condition 2 = 40 mph (3-second gust) Wind Load (with ice) + Ice Load + Tower Dead Load

Ice thickness used for this analysis is **1.00 inch** (assumed to start at the base of the tower) and is considered to increase in thickness with height. The initial ice thickness for design is referenced in the Annex of TIA-222-H and follows the same design criteria as the ASCE 7 Standard.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS (cont.)

Load Condition 3 = 90 mph (fastest mile) Wind Load (with Ice) + Ice Load + Dead Load

Seismic event consideration factors/values for design:

- S.s = 0.184 (2018 CT State Building Code – Location Specific Value)
- S.1 = 0.065 (2018 CT State Building Code – Location Specific Value)
- Site Classification = “D”
- Seismic Design Category = “C” – (2018 International Building Code)
- F.a = 1.6 (Obtained from TIA-222-H Table 2-11 Considering above conditions)
- F.v = 2.4 (Obtained from TIA-222-H Table 2-12 Considering above conditions)

Strength Limit State Load Combinations (TIA-222-H Section 2.3.2):

The structural analysis herein has considered the following load combinations within the analysis:

1. ***1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.6 Wind load without ice***
2. 1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.0 Dead weight of ice due to factored ice thickness + 1.0 Concurrent wind load with factored ice thickness + 1.0 Load effects due to temperature
3. 1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.0 Earthquake Load

NOTE 1: The above **bolded** load combination is considered to create the governing design loads per the results of the analysis.

NOTE 2: The above “Dead Load Guy Assemblies” are not considered as part of the analysis and are considered as a value of zero.

NOTE 3: The “Load effects due to temperature” do not apply for structures that are self-sustaining (from the TIA-222-H Standard)

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the strength design in accordance with AISC (LRFD). The results of the analysis indicated the existing tower structure DOES have enough capacity to support the proposed loading conditions indicated herein. The results of the analysis indicated the existing tower anchor bolts and foundation has enough capacity to support the proposed loading conditions indicated herein.

Tower Base Reactions (Factored):

Description	Current (TIA-222-H)
Pier Compression (kips)	325
Pier Uplift (kips)	286
Overall Overturning (kip-ft)	5659
Overall Shear (kips)	60
Shear per Leg (kips)	35

Proposed Tower Component Stress vs. Capacity Summary

Component / (Section No.)	*Controlling Component/ Elevation*	Stress (% capacity)	Pass/Fail
Leg (T6)	HSS 5x0.5 / Compression / 50'-75'	78.3	**Pass**
Diagonal (T5)	(2L) 2-1/2x2x3/16" (3/8" gap) / Compression / 75'-100'	82.2	**Pass**
Horizontal (T4)	L2 1/2x2 1/2x3/16 / Compression / 100'-125'	75.9	**Pass**
Secondary Horizontal (T7)	L3x3x1/4 / Compression / 25'-50'	80.7	**Pass**
Top Girt (T1)	L2-1/2x2x3/16 / Compression / 175'-180'	9.3	**Pass**
Redundant Horizontal Bracing (T8)	L3x3x1/4 / Compression / 0'-25'	15.7	**Pass**
Redundant Diagonal (T8)	L3x3x1/4 / Compression / 0'-25'	22.0	**Pass**
Bolt Checks	(2) 5/8" Dia A325X Bolts / Member Block Shear / Horizontal / 100'-125'	75.9	**Pass**

4. FINDINGS AND EVALUATION (cont.)

Foundation Summary

Component	Required	Computed	% Capacity	Pass/Fail
Tower Anchor Rod Capacity (TIA-222-H – 4.9.9)	Ratio < 1.0	0.63	63.0	Pass
Foundation – Drilled Pier Bearing Capacity	1237 kips (factored resistance)	326 kips	29.57	Pass
Foundation – Drilled Pier Uplift Capacity	911.02 kips (factored resistance)	286 kips	31.39	Pass
Foundation – Drilled Pier Soil Failure – Cone Uplift Capacity	433.04 kips (factored resistance	286 kips	88.1	Pass

Structure Rating (Maximum from all components) =	**88.1 %**	**PASS**

Maximum Deformations – Proposed Condition

TIA-222-H Section 2.8.2 - Limit State Deformations

1. A rotation of 4 degrees about the vertical axis (twist) or any horizontal axis (sway) of the structure
2. A horizontal displacement (in feet) of 3% of the height of the structure.

Load Case Description	Current		Allowable	
	Sway (degree)	Displacement (Feet)	Sway (degree)	Displacement (Feet)
Service Wind Load	0.1893	0.359	4.0	5.4

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the structural analysis herein in indicates:

1. The existing steel tower structure IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
2. The existing tower anchor bolts ARE considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
3. The existing foundation IS considered structurally adequate for the proposed antenna loading with the load classification specified herein.
4. The maximum structural capacity rating calculated herein is **88.1%**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations are in good condition without defects and were properly constructed to support original design loads as specified in the original design documents.
10. Previous Modification analysis as stated within the Executive Summary of this report are assumed constructed unless noted otherwise.

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

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

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

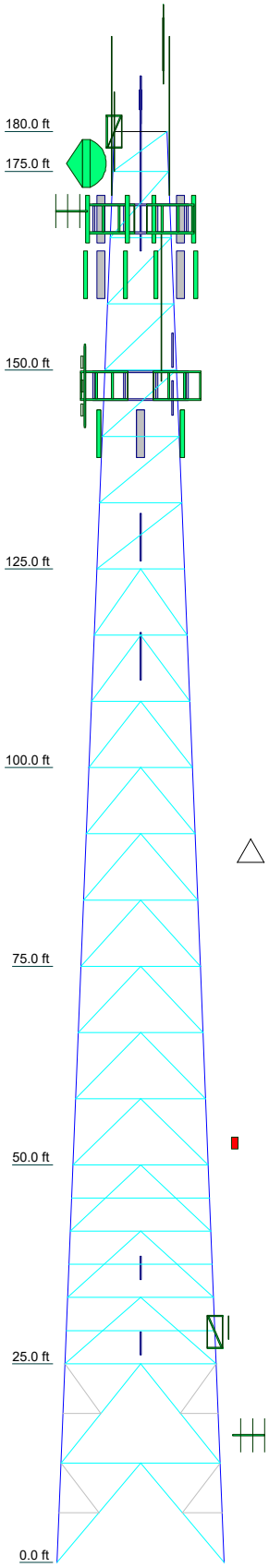
Ongoing and Periodic Inspection and Maintenance:

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

The owner shall refer to TIA-222-H Section 14.2 for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

TNX TOWER INPUT / OUTPUT SUMMARY



Section	T8	T7	T6	T5	T4	T3	T2	T1	
Legs	HSS6.875x0.5	HSS5x0.5	A514-60	N.A.	HSS5x.375	HSS5x0.25	A500-50		
Leg Grade									
Diagonals	2L3x3x5/16x3/8	2L3x2 1/2x1/4x3/8	2L2 1/2x2 1/2x1/4x3/8	L3x2 1/2x1/4	L2 1/2x2 1/2x3/16	L3x3x1/4	2L2 1/2x2x3/16x3/8	2L2 1/2x2x3/16x3/8	
Diagonal Grade				A36					
Top Girts				N.A.				A	
Horizontals	L4x4x1/4	L3x3x1/4		L3x2 1/2x1/4	L2 1/2x2 1/2x3/16	L3x3x1/4		L2 1/2x2 1/2x3/16	N.A.
Sec. Horizontals	N.A.	L3x3x1/4			N.A.				
Red. Horizontals	L3x3x1/4			N.A.					
Red. Diagonals	L3x3x1/4			N.A.					
Face Width (ft) 21	19	17	15	13	11	9	7	6.6	
# Panels @ (ft)	2 @ 12.5	18 @ 8.33333						1 @ 5	
Weight (lb) 26891.4	6565.1	5524.6	4289.0	3089.2	2786.9	2485.0	1760.6	391.0	

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8x4' (Lightning Rod)	192	PD1142-1 (CSP @ 158')	158
PD1142-30 (CSP (22) @ 191')	191	DB586-Y (CSP @ 150.5' (Upright))	155 - 150
6'8"x4" Pipe Mount (CSP (22) @ 191')	191	DB222 (CSP @ 153')	153
2" Dia 8' Omni (CSP @ 184')	184	432E-83I-01T TTA Unit (CSP @ 148' (TTA Unit))	153
2'6"x4" Pipe Mount (CSP @ 184')	184		
3" Dia 20' Omni (CSP (LCD-9) @ 182')	182	DB586-Y (CSP @ 148' (Inverted))	149 - 144
3" Dia 20' Omni (CSP (LCD-28) @ 182')	182	SitePro1 VFA12-RRU Mount Assembly (VZW)	148
10'6"x4" Pipe Mount (Extension for Lightning Rod)	180	SitePro1 VFA12-RRU Mount Assembly (VZW)	148
SC479-HF1LDF (Inverted) (CSP Troop L @ 180')	180 - 165.5	10' Dipole (Generic) (CSP @ 148')	148
SC479-HF1LDF (Inverted) (CSP Troop L @ 180')	180 - 165.5	10'6"x4" Pipe Mount (Pipe Mt. Connected to Dipole)	148
SC479-HF1LDF (CSP Troop L @ 180')	180	SitePro1 VFA12-RRU Mount Assembly (VZW)	148
432E-83I-01T TTA Unit (CSP Troop L @ 180')	180	BXA-185085-12CF Panel Antennas w/ Pipe Mount (VZW)	142
Pirod 4' Side Mount Standoff (1) (CSP Troop L @ 180')	180	BXA-185085-12CF Panel Antennas w/ Pipe Mount (VZW)	142
PD220 (CSP (LCD-27) @ 176')	176	BXA-185085-12CF Panel Antennas w/ Pipe Mount (VZW)	142
3'4"x4" Pipe Mount (Dish Mount (CSP-3) @ 176')	176	BXA-80080-8CF Panel Antenna w/ Pipe Mount (VZW)	142
PA6-65	176	BXA-80080-8CF Panel Antenna w/ Pipe Mount (VZW)	142
DB292-A (CSP (LCD-10) @ 170')	170	BXA-80080-8CF Panel Antenna w/ Pipe Mount (VZW)	142
SitePro1 VFA12-RRU Mount Assembly (Sprint)	169	ANT220F2 Antenna (Eversource - Proposed)	129
SitePro1 VFA12-RRU Mount Assembly (Sprint)	169	Site Pro USF-4U w/ (2) Stiff-Arm Supports (Eversource - Proposed)	126
(2) DB980F90E-M w/Mount Pipe (Sprint)	169	ANT220F2 Antenna (Eversource - Proposed)	114
(2) DB980F90E-M w/Mount Pipe (Sprint)	169	Site Pro USF-4U w/ (2) Stiff-Arm Supports (Eversource - Proposed)	111
SitePro1 VFA12-RRU Mount Assembly (Sprint)	169	GPS (GPS @ 52')	52
(2) DB980F90E-M w/Mount Pipe (Sprint)	169	4' Side Arm (Sq Tube) (GPS@52)	52
(2) 7770.00 panel antenna (ATI)	162	DB803M-Y (CSP @ 33.5' (Upright))	40.5 - 33.5
(2) 7770.00 panel antenna (ATI)	162	3' Side Arm Mount (Mt. for CSP @ 31', 33.5')	31
(2) LGP 13519 Diplexer Units (ATI)	162	DB803M-Y (CSP @ 31' (Upright))	31 - 24
(2) LGP 21401 TMA Units (ATI)	162	DB803M-Y (CSP @ 29.5' (Upright))	29.5
(2) LGP 13519 Diplexer Units (ATI)	162	2' Side Arm Mount (Mt @ 29')	29
(2) LGP 21401 TMA Units (ATI)	162	3' Yagi (CSP @ 16')	16
(2) 7770.00 panel antenna (ATI)	162		
(2) LGP 13519 Diplexer Units (ATI)	162		
(2) LGP 21401 TMA Units (ATI)	162		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2 1/2x2x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A514-60	60 ksi	80 ksi
A36	36 ksi	58 ksi			

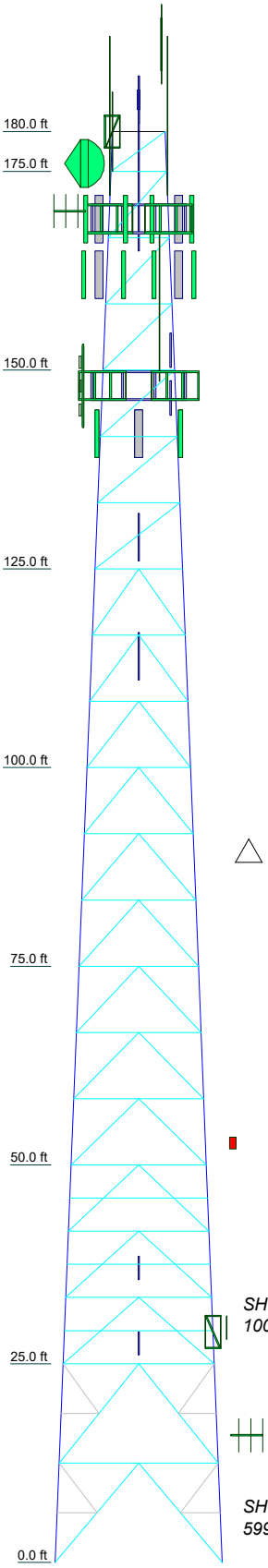
TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category III.
7. Topographic Category 1 with Crest Height of 0.00 ft

AECOM
1255 Broad St. Suite 201
Clifton, NJ 07013
Phone: (973) 883-8663
FAX: (973) 883-8500

Job: ***180' Stainless Self-Support Tower***			
Project: ***CSP Tower - Litchfield, CT***			
Client: EVS-013 / Eversource / S.A. Phase (b.1)	Drawn by: christina.carlos	App'd:	
Code: TIA-222-H	Date: 11/06/20	Scale: NTS	
Path:		Dwg No. E-1	

Section	T8	T7	T6	T5	T4	T3	T2	T1
Legs	HSS6.875x0.5	HSS5x0.5	A514-60	HSS5x.375		HSS5x0.25		
Leg Grade						A500-50		
Diagonals	2L3x3x5/16x3/8	2L3x2 1/2x1/4x3/8	2L2 1/2x2 1/2x1/4x3/8	2L2 1/2x2x3/16x3/8		2L3x2 1/2x1/4x3/8	2L2 1/2x2x3/16x3/8	
Diagonal Grade				A36				
Top Girts				N.A.				A
Horizontals	L4x4x1/4	L3x3x1/4		L3x2 1/2x1/4	L2 1/2x2 1/2x3/16	L3x3x1/4	L2 1/2x2 1/2x3/16	N.A.
Sec. Horizontals	N.A.	L3x3x1/4			N.A.			
Red. Horizontals	L3x3x1/4							
Red. Diagonals	L3x3x1/4			N.A.	N.A.			
Face Width (ft) 21	19	17	15	13	11	9	7	6.6
# Panels @ (ft)	2 @ 12.5			18 @ 8.33333				1 @ 5
Weight (lb) 26891.4	6565.1	5524.6	4289.0	3089.2	2786.9	2485.0	1760.6	391.0



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2 1/2x2x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A514-60	60 ksi	80 ksi
A36	36 ksi	58 ksi			

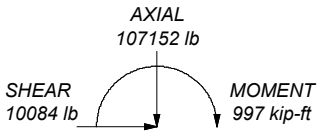
TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 82.2%

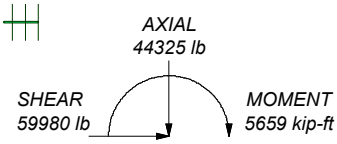
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 325897 lb
SHEAR: 34484 lb

UPLIFT: -285917 lb
SHEAR: 30894 lb



TORQUE 7 kip-ft
40 mph WIND - 1.0000 in ICE



TORQUE 21 kip-ft
REACTIONS - 125 mph WIND

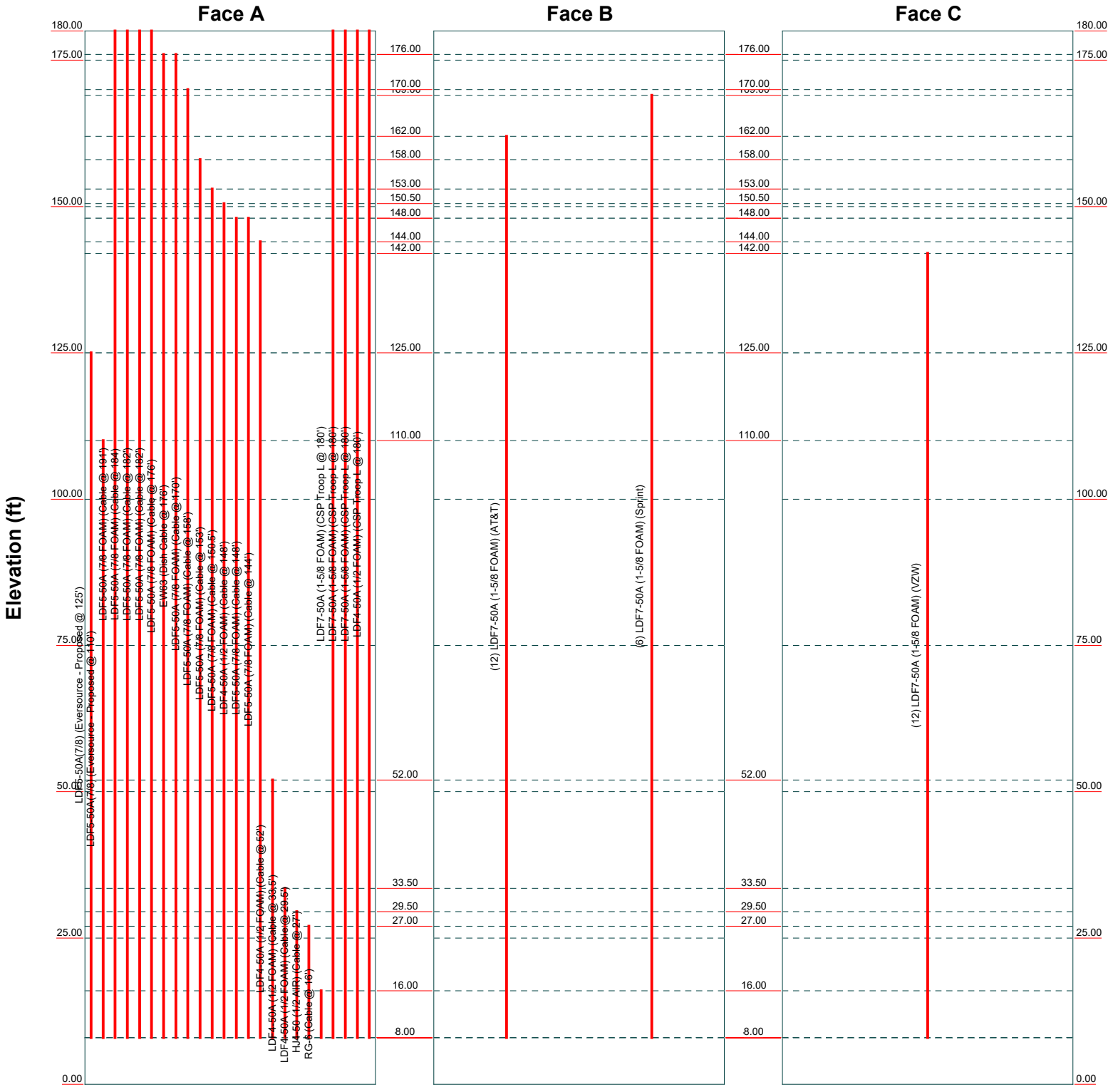
AECOM
1255 Broad St. Suite 201
Clifton, NJ 07013
Phone: (973) 883-8663
FAX: (973) 883-8500

Job: **180' Stainless Self-Support Tower**			
Project: **CSP Tower - Litchfield, CT**			
Client: EVS-013 / Eversource / S.A. Phase (b.1)	Drawn by: christina.carlos	App'd:	
Code: TIA-222-H	Date: 11/06/20	Scale: NTS	
Path:		Dwg No. E-1	

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feed Line Distribution Chart
0' - 180'

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



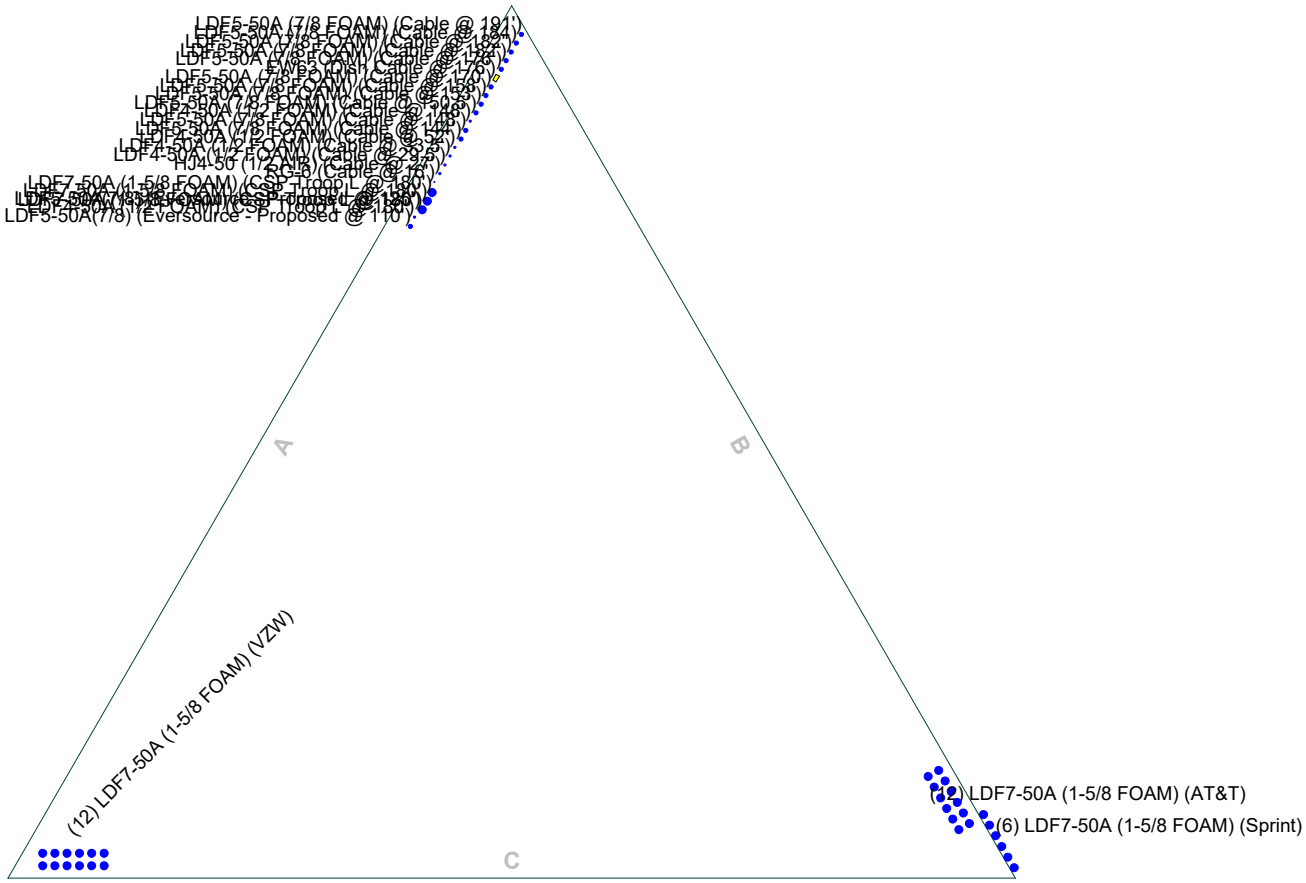
AECOM
1255 Broad St. Suite 201
Clifton, NJ 07013
Phone: (973) 883-8663
FAX: (973) 883-8500

Job: ***180' Stainless Self-Support Tower***			
Project: ***CSP Tower - Litchfield, CT***			
Client: EVS-013 / Eversource / S.A. Phase (b.1)	Drawn by: christina.carlos	App'd:	
Code: TIA-222-H	Date: 11/06/20	Scale: NTS	
Path:		Dwg No. E-7	

TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round Flat App In Face App Out Face



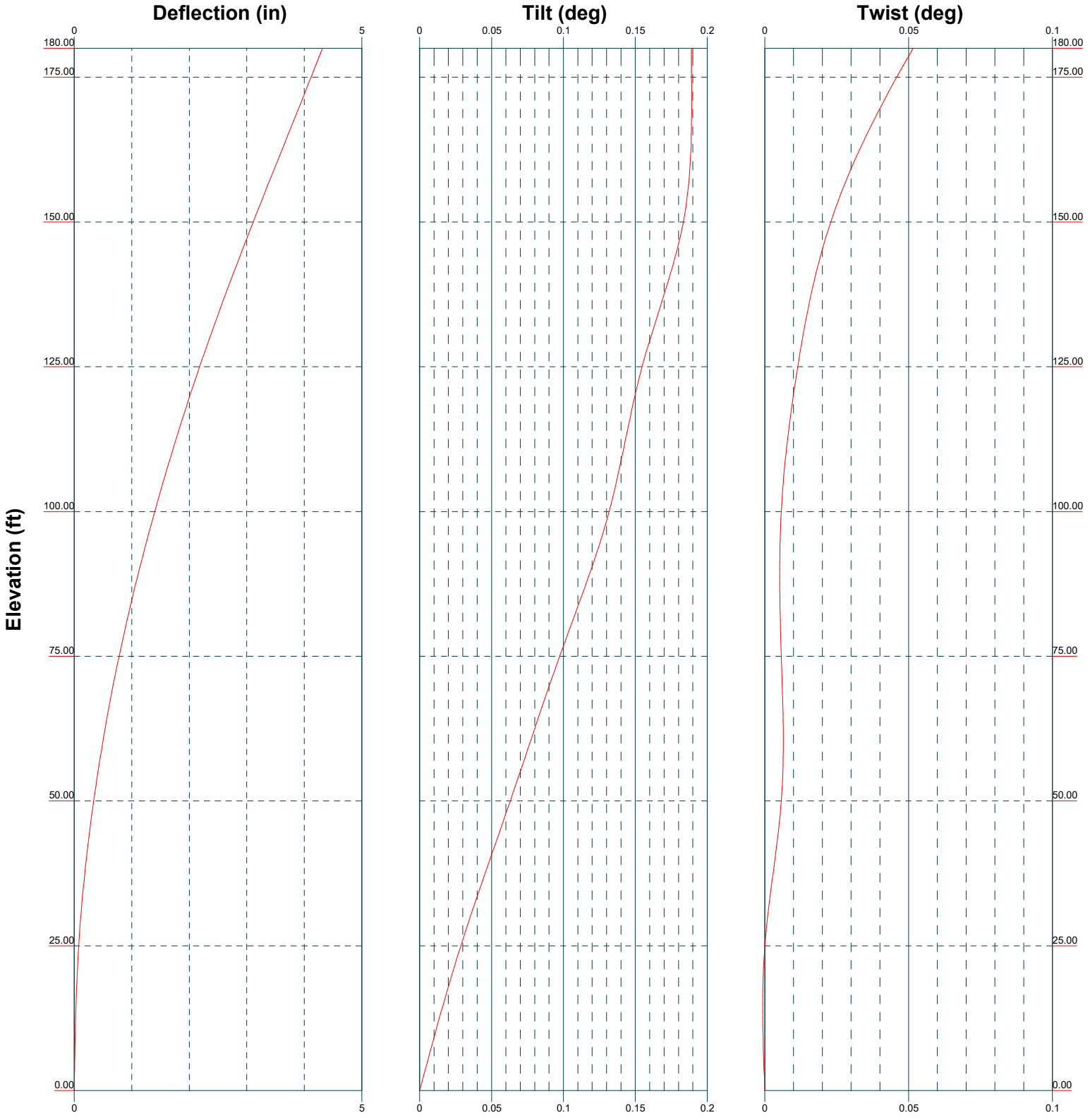
AECOM
1255 Broad St. Suite 201
Clifton, NJ 07013
Phone: (973) 883-8663
FAX: (973) 883-8500

Job: ***180' Stainless Self-Support Tower***			
Project: ***CSP Tower - Litchfield, CT***			
Client: EVS-013 / Eversource / S.A. Phase (b.1)	Drawn by: christina.carlos	App'd:	
Code: TIA-222-H	Date: 11/06/20	Scale: NTS	
Path:		Dwg No. E-7	

TNX TOWER DEFLECTION, TILT, AND TWIST

TIA-222-H - Service - 60 mph

Maximum Values



AECOM
1255 Broad St. Suite 201
Clifton, NJ 07013
Phone: (973) 883-8663
FAX: (973) 883-8500

Job: ***180' Stainless Self-Support Tower***			
Project: ***CSP Tower - Litchfield, CT***			
Client: EVS-013 / Eversource / S.A. Phase (b.1)	Drawn by: christina.carlos	App'd:	
Code: TIA-222-H	Date: 11/06/20	Scale: NTS	
Path:		Dwg No. E-5	

TNX TOWER DETAILED OUTPUT

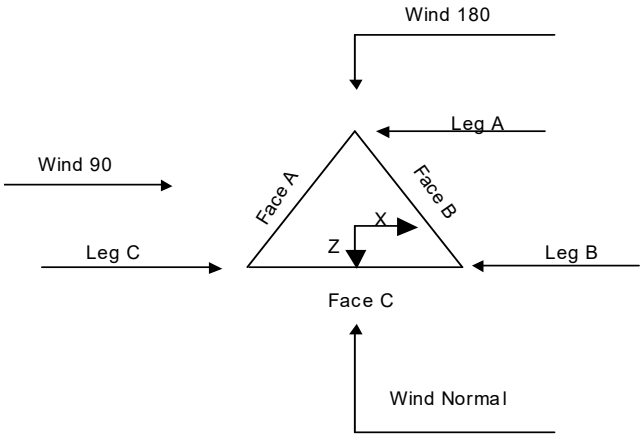
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.60 ft at the top and 21.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Litchfield County, Connecticut.
Tower base elevation above sea level: 0.00 ft.
Basic wind speed of 125 mph.
Risk Category III.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals		Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz		Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H 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		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-175.00			6.60	1	5.00
T2	175.00-150.00			7.00	1	25.00
T3	150.00-125.00			9.00	1	25.00
T4	125.00-100.00			11.00	1	25.00
T5	100.00-75.00			13.00	1	25.00
T6	75.00-50.00			15.00	1	25.00
T7	50.00-25.00			17.00	1	25.00
T8	25.00-0.00			19.00	1	25.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-175.00	5.00	Diag Up	No	Yes	0.0000	0.0000
T2	175.00-150.00	8.33	Diag Up	No	Yes	0.0000	0.0000
T3	150.00-125.00	8.33	Diag Up	No	Yes	0.0000	0.0000
T4	125.00-100.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T5	100.00-75.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T6	75.00-50.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T7	50.00-25.00	8.33	K Brace Down	No	Yes	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
T8	25.00-0.00	12.50	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-175.00	Pipe	HSS5x0.25	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T2 175.00-150.00	Pipe	HSS5x0.25	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T3 150.00-125.00	Pipe	HSS5x0.25	A500-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4x3/8	A36 (36 ksi)
T4 125.00-100.00	Pipe	HSS5x.375	A514-60 (60 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T5 100.00-75.00	Pipe	HSS5x.375	A514-60 (60 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T6 75.00-50.00	Pipe	HSS5x0.5	A514-60 (60 ksi)	Double Angle	2L2 1/2x2 1/2x1/4x3/8	A36 (36 ksi)
T7 50.00-25.00	Pipe	HSS5x0.5	A514-60 (60 ksi)	Double Angle	2L3x2 1/2x1/4x3/8	A36 (36 ksi)
T8 25.00-0.00	Pipe	HSS6.875x0.5	A514-60 (60 ksi)	Double Angle	2L3x3x5/16x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.00-175.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T2 175.00-150.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 150.00-125.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T4 125.00-100.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 100.00-75.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x2 1/2x1/4	A36 (36 ksi)
T6 75.00-50.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T7 50.00-25.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T8 25.00-0.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/4	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
T7 50.00-25.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T8 25.00-0.00	A36 (36 ksi)	Horizontal (1)	Single Angle	L3x3x1/4	1
		Diagonal (1)	Single Angle	L3x3x1/4	1

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 180.00-175.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T2 175.00-150.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T3 150.00-125.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T4 125.00-100.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T5 100.00-75.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T6 75.00-50.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T7 50.00-25.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000
T8 25.00-0.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	Third-Pt	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	No	1	1	1	1	1	1	1	1
180.00-175.00				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
175.00-150.00				1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T3	Yes	No	1	1	1	1	1	1	1	1
150.00-125.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
125.00-100.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
100.00-75.00				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
75.00-50.00				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1
50.00-25.00				1	1	1	1	1	1	1
T8 25.00-0.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
180.00-175.00														
T2	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
175.00-150.00														
T3	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
150.00-125.00														
T4	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
125.00-100.00														
T5	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
100.00-75.00														
T6 75.00-50.00	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 50.00-25.00	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 25.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1	Flange	0.7500	0	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	2	2.0000	0
180.00-175.00		A325X		A325X		A325N		A325X		A325N		A325X		A325X	
T2	Flange	0.7500	6	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	2	2.0000	0
175.00-150.00		A325X		A325X		A325N		A325X		A325N		A325X		A325X	

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.
T3 150.00-125.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	2.0000 A325X	0
T4 125.00-100.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	2.0000 A325X	0
T5 100.00-75.00	Flange	1.0000 A325X	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	2.0000 A325X	0
T6 75.00-50.00	Flange	1.0000 A325X	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	2.0000 A325X	0
T7 50.00-25.00	Flange	1.0000 A325X	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.7500 A325X	1
T8 25.00-0.00	Flange	1.0000 A325X	8	1.0000 A325X	1	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	2.0000 A325X	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Proposed LDF5-50A(7/8) (Eversource - Proposed @ 125')	A	No	No	Ar (CaAa)	125.00 - 8.00	-5.0000	0.28	1	1	0.5000	1.0300		0.33
LDF5-50A(7/8) (Eversource - Proposed @ 110')	A	No	No	Ar (CaAa)	110.00 - 8.00	-5.0000	0.26	1	1	0.5000	1.0300		0.33
Proposed * VZW Cables - Existing LDF7-50A (1-5/8 FOAM) (VZW) * VZW Cables - Existing * AT&T Cables - Existing	C	No	No	Ar (CaAa)	142.00 - 8.00	-5.0000	0.435	12	6	1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (AT&T) * AT&T Cables - Existing * Sprint Cables - Existing	B	No	No	Ar (CaAa)	162.00 - 8.00	-5.0000	0.4	12	6	1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (Sprint) * Sprint	B	No	No	Ar (CaAa)	169.00 - 8.00	0.0000	0.46	6	6	1.0000	1.9800		0.82

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Cables - Existing * Remaining CSP Cables													
LDF5-50A (7/8 FOAM) (Cable @ 191')	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.48	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 184)	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.47	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 182')	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.46	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 182')	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.45	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 176')	A	No	No	Ar (CaAa)	176.00 - 8.00	-5.0000	0.44	1	1	1.0900	1.0900		0.33
EW63 (Dish Cable @ 176')	A	No	No	Af (CaAa)	176.00 - 8.00	-5.0000	0.43	1	1	1.5742	1.5742		0.51
LDF5-50A (7/8 FOAM) (Cable @ 170')	A	No	No	Ar (CaAa)	170.00 - 8.00	-5.0000	0.42	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 158')	A	No	No	Ar (CaAa)	158.00 - 8.00	-5.0000	0.41	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 153')	A	No	No	Ar (CaAa)	153.00 - 8.00	-5.0000	0.4	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 150.5')	A	No	No	Ar (CaAa)	150.50 - 8.00	-5.0000	0.39	1	1	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (Cable @ 148')	A	No	No	Ar (CaAa)	148.00 - 8.00	-5.0000	0.38	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM) (Cable @ 148')	A	No	No	Ar (CaAa)	148.00 - 8.00	-5.0000	0.37	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (Cable @ 144')	A	No	No	Ar (CaAa)	144.00 - 8.00	-5.0000	0.36	1	1	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (Cable @ 52')	A	No	No	Ar (CaAa)	52.00 - 8.00	-5.0000	0.35	1	1	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (Cable @	A	No	No	Ar (CaAa)	33.50 - 8.00	-5.0000	0.34	1	1	0.6300	0.6300		0.15

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
33.5')													
LDF4-50A (1/2 FOAM) (Cable @ 29.5')	A	No	No	Ar (CaAa)	29.50 - 8.00	-5.0000	0.33	1	1	0.6300	0.6300		0.15
HJ4-50 (1/2 AIR) (Cable @ 27')	A	No	No	Ar (CaAa)	27.00 - 8.00	-5.0000	0.32	1	1	0.5800	0.5800		0.25
RG-6 (Cable @ 16') * CSP Troop L	A	No	No	Ar (CaAa)	16.00 - 8.00	-5.0000	0.31	1	1	0.3200	0.3200		0.09
LDF7-50A (1-5/8 FOAM) (CSP Troop L @ 180')	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.3	1	1	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (CSP Troop L @ 180')	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.29	1	1	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (CSP Troop L @ 180')	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.28	1	1	1.9800	1.9800		0.82
LDF4-50A (1/2 FOAM) (CSP Troop L @ 180') * CSP Troop L	A	No	No	Ar (CaAa)	180.00 - 8.00	-5.0000	0.27	1	1	0.6300	0.6300		0.15

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
Proposed								
* VZW Cables - Existing								
* AT&T Cables - Existing								
* Sprint Cables - Existing								
* CSP Troop L								

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	180.00-175.00	A	0.000	0.000	5.836	0.000	20.49
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	175.00-150.00	A	0.000	0.000	40.043	0.000	129.65
		B	0.000	0.000	51.084	0.000	211.56
		C	0.000	0.000	0.000	0.000	0.00
T3	150.00-125.00	A	0.000	0.000	53.536	0.000	169.56
		B	0.000	0.000	89.100	0.000	369.00
		C	0.000	0.000	40.392	0.000	167.28
T4	125.00-100.00	A	0.000	0.000	58.139	0.000	184.05
		B	0.000	0.000	89.100	0.000	369.00
		C	0.000	0.000	59.400	0.000	246.00
T5	100.00-75.00	A	0.000	0.000	59.684	0.000	189.00
		B	0.000	0.000	89.100	0.000	369.00
		C	0.000	0.000	59.400	0.000	246.00
T6	75.00-50.00	A	0.000	0.000	59.810	0.000	189.30
		B	0.000	0.000	89.100	0.000	369.00
		C	0.000	0.000	59.400	0.000	246.00
T7	50.00-25.00	A	0.000	0.000	62.194	0.000	195.20
		B	0.000	0.000	89.100	0.000	369.00
		C	0.000	0.000	59.400	0.000	246.00
T8	25.00-0.00	A	0.000	0.000	45.040	0.000	141.14
		B	0.000	0.000	60.588	0.000	250.92
		C	0.000	0.000	40.392	0.000	167.28

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	180.00-175.00	A	1.361	0.000	0.000	17.266	0.000	211.31
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	175.00-150.00	A	1.349	0.000	0.000	115.977	0.000	1384.85
		B		0.000	0.000	79.338	0.000	1222.25
		C		0.000	0.000	0.000	0.000	0.00
T3	150.00-125.00	A	1.326	0.000	0.000	163.628	0.000	1899.20
		B		0.000	0.000	128.246	0.000	2066.07
		C		0.000	0.000	44.548	0.000	875.63
T4	125.00-100.00	A	1.300	0.000	0.000	177.744	0.000	2027.78
		B		0.000	0.000	127.834	0.000	2041.86
		C		0.000	0.000	65.299	0.000	1274.82
T5	100.00-75.00	A	1.268	0.000	0.000	180.124	0.000	2017.11
		B		0.000	0.000	127.331	0.000	2012.33
		C		0.000	0.000	65.038	0.000	1259.12
T6	75.00-50.00	A	1.226	0.000	0.000	176.756	0.000	1932.32
		B		0.000	0.000	126.678	0.000	1974.13
		C		0.000	0.000	64.699	0.000	1238.80
T7	50.00-25.00	A	1.165	0.000	0.000	182.168	0.000	1906.45
		B		0.000	0.000	125.729	0.000	1918.92
		C		0.000	0.000	64.207	0.000	1209.43
T8	25.00-0.00	A	1.044	0.000	0.000	128.320	0.000	1229.04
		B		0.000	0.000	84.219	0.000	1231.26
		C		0.000	0.000	42.997	0.000	783.22

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	180.00-175.00	-0.1230	-7.7324	-0.0854	-12.6006
T2	175.00-150.00	11.7601	-2.7608	10.2746	-9.2140
T3	150.00-125.00	7.8186	2.7576	8.1631	-7.7951
T4	125.00-100.00	4.9388	4.0628	6.1182	-8.5409
T5	100.00-75.00	5.3253	4.2291	6.5232	-9.8598
T6	75.00-50.00	5.8187	4.6275	7.1267	-10.7205
T7	50.00-25.00	5.2520	3.8143	6.6172	-11.4065
T8	25.00-0.00	4.4579	2.6273	5.5662	-11.1785

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	15	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	16	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	17	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	18	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	19	LDF5-50A (7/8 FOAM)	175.00 - 176.00	0.6000	0.6000
T1	20	EW63	175.00 - 176.00	0.6000	0.6000
T1	34	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	35	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	36	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	37	LDF4-50A (1/2 FOAM)	175.00 - 180.00	0.6000	0.6000
T2	9	LDF7-50A (1-5/8 FOAM)	150.00 - 162.00	0.6000	0.6000
T2	12	LDF7-50A (1-5/8 FOAM)	150.00 - 169.00	0.6000	0.6000
T2	15	LDF5-50A (7/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	16	LDF5-50A (7/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	17	LDF5-50A (7/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	18	LDF5-50A (7/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	19	LDF5-50A (7/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	20	EW63	150.00 - 175.00	0.6000	0.6000
T2	21	LDF5-50A (7/8 FOAM)	150.00 - 170.00	0.6000	0.6000
T2	22	LDF5-50A (7/8 FOAM)	150.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	23	LDF5-50A (7/8 FOAM)	158.00 150.00 - 153.00	0.6000	0.6000
T2	24	LDF5-50A (7/8 FOAM)	150.00 - 150.50	0.6000	0.6000
T2	34	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	35	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	36	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	37	LDF4-50A (1/2 FOAM)	150.00 - 175.00	0.6000	0.6000
T3	6	LDF7-50A (1-5/8 FOAM)	125.00 - 142.00	0.6000	0.6000
T3	9	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	12	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	15	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	16	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	17	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	18	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	19	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	20	EW63	125.00 - 150.00	0.6000	0.6000
T3	21	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	22	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	23	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	24	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	25	LDF4-50A (1/2 FOAM)	125.00 - 148.00	0.6000	0.6000
T3	26	LDF5-50A (7/8 FOAM)	125.00 - 148.00	0.6000	0.6000
T3	27	LDF5-50A (7/8 FOAM)	125.00 - 144.00	0.6000	0.6000
T3	34	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	35	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	36	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	37	LDF4-50A (1/2 FOAM)	125.00 - 150.00	0.6000	0.6000
T4	2	LDF5-50A(7/8)	100.00 - 125.00	0.6000	0.6000
T4	3	LDF5-50A(7/8)	100.00 - 110.00	0.6000	0.6000
T4	6	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	9	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	12	LDF7-50A (1-5/8 FOAM)	100.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			125.00		
T4	15	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	16	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	17	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	18	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	19	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	20	EW63	100.00 - 125.00	0.6000	0.6000
T4	21	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	22	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	23	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	24	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	25	LDF4-50A (1/2 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	26	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	27	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	34	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	35	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	36	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	37	LDF4-50A (1/2 FOAM)	100.00 - 125.00	0.6000	0.6000
T5	2	LDF5-50A(7/8)	75.00 - 100.00	0.6000	0.6000
T5	3	LDF5-50A(7/8)	75.00 - 100.00	0.6000	0.6000
T5	6	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	9	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	12	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	15	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	16	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	17	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	18	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	19	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	20	EW63	75.00 - 100.00	0.6000	0.6000
T5	21	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	22	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	23	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	24	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	25	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	26	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	27	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	34	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	35	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	36	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	37	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T6	2	LDF5-50A(7/8)	50.00 - 75.00	0.6000	0.6000
T6	3	LDF5-50A(7/8)	50.00 - 75.00	0.6000	0.6000
T6	6	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	9	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	12	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	15	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	16	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	17	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	18	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	19	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	20	EW63	50.00 - 75.00	0.6000	0.6000
T6	21	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	22	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	23	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	24	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	25	LDF4-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	26	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	27	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	28	LDF4-50A (1/2 FOAM)	50.00 - 52.00	0.6000	0.6000
T6	34	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	35	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	36	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	37	LDF4-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T7	2	LDF5-50A(7/8)	25.00 - 50.00	0.6000	0.6000
T7	3	LDF5-50A(7/8)	25.00 - 50.00	0.6000	0.6000
T7	6	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	9	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	12	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	15	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	16	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	17	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	18	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	19	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	20	EW63	25.00 - 50.00	0.6000	0.6000
T7	21	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	22	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	23	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	24	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	25	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	26	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	27	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	28	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	29	LDF4-50A (1/2 FOAM)	25.00 - 33.50	0.6000	0.6000
T7	30	LDF4-50A (1/2 FOAM)	25.00 - 29.50	0.6000	0.6000
T7	31	HJ4-50 (1/2 AIR)	25.00 - 27.00	0.6000	0.6000
T7	34	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	35	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	36	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	37	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T8	2	LDF5-50A(7/8)	8.00 - 25.00	0.6000	0.6000
T8	3	LDF5-50A(7/8)	8.00 - 25.00	0.6000	0.6000
T8	6	LDF7-50A (1-5/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	9	LDF7-50A (1-5/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	12	LDF7-50A (1-5/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	15	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	16	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	17	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	18	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	19	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	20	EW63	8.00 - 25.00	0.6000	0.6000
T8	21	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	22	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	23	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	24	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	25	LDF4-50A (1/2 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	26	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	27	LDF5-50A (7/8 FOAM)	8.00 - 25.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	28	LDF4-50A (1/2 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	29	LDF4-50A (1/2 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	30	LDF4-50A (1/2 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	31	HJ4-50 (1/2 AIR)	8.00 - 25.00	0.6000	0.6000
T8	32	RG-6	8.00 - 16.00	0.6000	0.6000
T8	34	LDF7-50A (1-5/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	35	LDF7-50A (1-5/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	36	LDF7-50A (1-5/8 FOAM)	8.00 - 25.00	0.6000	0.6000
T8	37	LDF4-50A (1/2 FOAM)	8.00 - 25.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Proposed									
ANT220F2 Antenna	A	From Leg	4.00	0.0000	114.00	No Ice	1.74	1.74	14.00
(Eversource - Proposed)			0.00			1/2" Ice	2.05	2.05	25.20
			0.00			1" Ice	2.37	2.37	40.25
ANT220F2 Antenna	A	From Leg	4.00	0.0000	129.00	No Ice	1.74	1.74	14.00
(Eversource - Proposed)			0.00			1/2" Ice	2.05	2.05	25.20
			0.00			1" Ice	2.37	2.37	40.25
Site Pro USF-4U w/ (2)	A	From Leg	0.50	0.0000	111.00	No Ice	1.25	2.50	165.00
Stiff-Arm Supports			0.00			1/2" Ice	1.49	2.76	198.00
(Eversource - Proposed)			0.00			1" Ice	1.73	3.02	231.00
Site Pro USF-4U w/ (2)	A	From Leg	0.50	0.0000	126.00	No Ice	1.25	2.50	165.00
Stiff-Arm Supports			0.00			1/2" Ice	1.49	2.76	198.00
(Eversource - Proposed)			0.00			1" Ice	1.73	3.02	231.00
* AT&T Existing Inventory									
(2) 7770.00 panel antenna	A	From Leg	0.50	0.0000	162.00	No Ice	5.90	4.01	52.03
(AT&T)			0.00			1/2" Ice	6.34	4.64	97.08
			0.00			1" Ice	6.78	5.28	148.33
(2) LGP 13519 Diplexer	A	From Leg	0.50	0.0000	162.00	No Ice	0.15	0.11	5.30
Units			0.00			1/2" Ice	0.21	0.15	6.98
(AT&T)			0.00			1" Ice	0.27	0.21	9.57
(2) LGP 21401 TMA Units	A	From Leg	0.50	0.0000	162.00	No Ice	0.95	0.37	17.50
(AT&T)			0.00			1/2" Ice	1.09	0.48	23.31
			0.00			1" Ice	1.24	0.60	30.86
(2) 7770.00 panel antenna	B	From Leg	0.50	0.0000	162.00	No Ice	5.90	4.01	52.03
(AT&T)			0.00			1/2" Ice	6.34	4.64	97.08
			0.00			1" Ice	6.78	5.28	148.33
(2) LGP 13519 Diplexer	B	From Leg	0.50	0.0000	162.00	No Ice	0.15	0.11	5.30
Units			0.00			1/2" Ice	0.21	0.15	6.98
(AT&T)			0.00			1" Ice	0.27	0.21	9.57
(2) LGP 21401 TMA Units	B	From Leg	0.50	0.0000	162.00	No Ice	0.95	0.37	17.50
(AT&T)			0.00			1/2" Ice	1.09	0.48	23.31
			0.00			1" Ice	1.24	0.60	30.86
(2) 7770.00 panel antenna	C	From Leg	0.50	0.0000	162.00	No Ice	5.90	4.01	52.03
(AT&T)			0.00			1/2" Ice	6.34	4.64	97.08
			0.00			1" Ice	6.78	5.28	148.33
(2) LGP 13519 Diplexer	C	From Leg	0.50	0.0000	162.00	No Ice	0.15	0.11	5.30

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Units			0.00			1/2" Ice	0.21	0.15	6.98
(AT&T)			0.00			1" Ice	0.27	0.21	9.57
(2) LGP 21401 TMA Units	C	From Leg	0.50	0.0000	162.00	No Ice	0.95	0.37	17.50
(AT&T)			0.00			1/2" Ice	1.09	0.48	23.31
			0.00			1" Ice	1.24	0.60	30.86
* Panels Have Pipes Included (5' Length) on Panels									
* AT&T Existing Inventory									
* Sprint Existing Inventory									
(2) DB980F90E-M w/Mount Pipe	A	From Leg	0.50	0.0000	169.00	No Ice	4.37	3.95	34.05
(Sprint)			0.00			1/2" Ice	4.96	5.04	73.52
			0.00			1" Ice	5.47	5.85	119.55
(2) DB980F90E-M w/Mount Pipe	B	From Leg	0.50	0.0000	169.00	No Ice	4.37	3.95	34.05
(Sprint)			0.00			1/2" Ice	4.96	5.04	73.52
			0.00			1" Ice	5.47	5.85	119.55
(2) DB980F90E-M w/Mount Pipe	C	From Leg	0.50	0.0000	169.00	No Ice	4.37	3.95	34.05
(Sprint)			0.00			1/2" Ice	4.96	5.04	73.52
			0.00			1" Ice	5.47	5.85	119.55
SitePro1 VFA12-RRU Mount Assembly	A	From Leg	0.00	0.0000	169.00	No Ice	12.02	7.98	450.00
(Sprint)			0.00			1/2" Ice	17.63	11.95	580.00
			0.00			1" Ice	23.07	15.72	769.00
SitePro1 VFA12-RRU Mount Assembly	B	From Leg	0.00	0.0000	169.00	No Ice	12.02	7.98	450.00
(Sprint)			0.00			1/2" Ice	17.63	11.95	580.00
			0.00			1" Ice	23.07	15.72	769.00
SitePro1 VFA12-RRU Mount Assembly	C	From Leg	0.00	0.0000	169.00	No Ice	12.02	7.98	450.00
(Sprint)			0.00			1/2" Ice	17.63	11.95	580.00
			0.00			1" Ice	23.07	15.72	769.00
* Sprint Existing Inventory									
* Verizon Existing Inventory									
BXA-185085-12CF Panel Antennas w/ Pipe Mount	A	From Leg	0.50	0.0000	142.00	No Ice	4.79	5.34	47.74
(VZW)			0.00			1/2" Ice	5.24	6.15	93.92
			0.00			1" Ice	5.70	6.96	148.13
BXA-185085-12CF Panel Antennas w/ Pipe Mount	B	From Leg	0.50	0.0000	142.00	No Ice	4.79	5.34	47.74
(VZW)			0.00			1/2" Ice	5.24	6.15	93.92
			0.00			1" Ice	5.70	6.96	148.13
BXA-185085-12CF Panel Antennas w/ Pipe Mount	C	From Leg	0.50	0.0000	142.00	No Ice	4.79	5.34	47.74
(VZW)			0.00			1/2" Ice	5.24	6.15	93.92
			0.00			1" Ice	5.70	6.96	148.13
BXA-80080-8CF Panel Antenna w/ Pipe Mount	A	From Leg	0.50	0.0000	142.00	No Ice	10.84	8.45	65.74
(VZW)			0.00			1/2" Ice	11.46	9.39	143.51
			0.00			1" Ice	12.08	10.36	231.28
BXA-80080-8CF Panel Antenna w/ Pipe Mount	B	From Leg	0.50	0.0000	142.00	No Ice	10.84	8.45	65.74
(VZW)			0.00			1/2" Ice	11.46	9.39	143.51
			0.00			1" Ice	12.08	10.36	231.28
BXA-80080-8CF Panel Antenna w/ Pipe Mount	C	From Leg	0.50	0.0000	142.00	No Ice	10.84	8.45	65.74
(VZW)			0.00			1/2" Ice	11.46	9.39	143.51
			0.00			1" Ice	12.08	10.36	231.28
SitePro1 VFA12-RRU Mount Assembly	A	From Leg	0.00	0.0000	148.00	No Ice	12.02	7.98	450.00
(VZW)			0.00			1/2" Ice	17.63	11.95	580.00
			0.00			1" Ice	23.07	15.72	769.00
SitePro1 VFA12-RRU Mount Assembly	B	From Leg	0.00	0.0000	148.00	No Ice	12.02	7.98	450.00
(VZW)			0.00			1/2" Ice	17.63	11.95	580.00
			0.00			1" Ice	23.07	15.72	769.00
SitePro1 VFA12-RRU Mount Assembly	C	From Leg	0.00	0.0000	148.00	No Ice	12.02	7.98	450.00
(VZW)			0.00			1/2" Ice	17.63	11.95	580.00
			0.00			1" Ice	23.07	15.72	769.00
* Double Antenna Clamp									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Attached to Leg									
* Panels considering Pipes for Mount									
* Verizon Existing Inventory									
* CSP Inventory - Existing									
10'6"x4" Pipe Mount	C	From Leg	0.00	0.0000	180.00	No Ice	3.28	3.28	114.00
(Extension for Lightning			0.00			1/2" Ice	5.62	5.62	146.84
Rod)			0.00			1" Ice	6.25	6.25	186.71
Lightning Rod 5/8x4'	C	From Leg	0.00	0.0000	192.00	No Ice	0.25	0.25	31.00
(Lightning Rod)			0.00			1/2" Ice	0.66	0.66	33.82
			0.00			1" Ice	0.97	0.97	39.29
PD1142-30	B	From Leg	0.00	0.0000	191.00	No Ice	0.14	0.14	10.00
(CSP (22) @ 191')			0.00			1/2" Ice	1.49	1.49	110.00
			0.00			1" Ice	2.84	2.84	210.00
6'8"x4" Pipe Mount	B	From Leg	0.00	0.0000	191.00	No Ice	1.93	1.93	72.00
(CSP (22) @ 191')			0.00			1/2" Ice	3.01	3.01	93.13
			0.00			1" Ice	3.42	3.42	118.95
2" Dia 8' Omni	A	From Leg	0.50	0.0000	184.00	No Ice	2.00	2.00	5.00
(CSP @ 184')			0.00			1/2" Ice	3.03	3.03	18.00
			0.00			1" Ice	4.06	4.06	31.00
2'6"x4" Pipe Mount	A	From Leg	0.50	0.0000	184.00	No Ice	0.64	0.64	27.00
(CSP @ 184')			0.00			1/2" Ice	0.91	0.91	35.41
			0.00			1" Ice	1.09	1.09	45.95
3" Dia 20' Omni	B	From Leg	0.50	0.0000	182.00	No Ice	4.00	4.00	55.00
(CSP (LCD-9) @ 182')			0.00			1/2" Ice	6.00	6.00	100.00
			0.00			1" Ice	8.00	8.00	145.00
3" Dia 20' Omni	C	From Leg	0.50	0.0000	182.00	No Ice	4.00	4.00	55.00
(CSP (LCD-28) @ 182')			0.00			1/2" Ice	6.00	6.00	100.00
			0.00			1" Ice	8.00	8.00	145.00
PD220	A	From Leg	0.50	0.0000	176.00	No Ice	3.08	3.08	23.00
(CSP (LCD-27) @ 176')			0.00			1/2" Ice	5.30	5.30	48.68
			0.00			1" Ice	7.54	7.54	88.10
3'4"x4" Pipe Mount	C	From Leg	0.00	0.0000	176.00	No Ice	0.88	0.88	36.00
(Dish Mount (CSP-3) @ 176')			0.00			1/2" Ice	1.27	1.27	46.95
			0.00			1" Ice	1.49	1.49	60.55
DB292-A	C	From Leg	0.50	0.0000	170.00	No Ice	1.80	1.80	15.00
(CSP (LCD-10) @ 170')			5.00			1/2" Ice	3.24	3.24	19.50
			0.00			1" Ice	4.68	4.68	24.00
* CSP Mounts from 170' to 182' Mt on Sprint Frame									
PD1142-1	B	From Leg	0.50	0.0000	158.00	No Ice	1.32	1.32	10.00
(CSP @ 158')			4.00			1/2" Ice	3.21	3.21	23.85
			0.00			1" Ice	5.12	5.12	49.42
DB222	A	From Leg	0.50	0.0000	153.00	No Ice	1.60	1.60	16.00
(CSP @ 153')			-4.00			1/2" Ice	2.88	2.88	20.80
			0.00			1" Ice	4.16	4.16	25.60
DB586-Y	A	From Leg	0.50	0.0000	155.00 - 150.00	No Ice	1.01	1.01	8.25
(CSP @ 150.5' (Upright))			4.00			1/2" Ice	1.28	1.28	16.59
			0.00			1" Ice	1.56	1.56	28.01
432E-83I-01T TTA Unit	A	From Leg	0.50	0.0000	153.00	No Ice	3.33	1.11	25.00
(CSP @ 148' (TTA Unit))			4.00			1/2" Ice	3.57	1.27	44.70
			0.00			1" Ice	3.82	1.45	67.39
DB586-Y	A	From Leg	0.50	0.0000	144.00 - 149.00	No Ice	1.01	1.01	8.25
(CSP @ 148' (Inverted))			4.00			1/2" Ice	1.28	1.28	16.59
			0.00			1" Ice	1.56	1.56	28.01
10' Dipole (Generic)	C	From Leg	0.50	0.0000	148.00	No Ice	4.00	4.00	55.00
(CSP @ 148')			4.00			1/2" Ice	6.00	6.00	100.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	8.00	8.00	145.00
10'6"x4" Pipe Mount	C	From Leg	0.50	0.0000	148.00	No Ice	3.35	3.35	114.00
(Pipe Mt. Connected to			4.00			1/2" Ice	5.62	5.62	146.84
Dipole)			0.00			1" Ice	6.25	6.25	186.71
* CSP Mounts from 158' to 144' mounted to VZW Frame									
GPS	B	From Leg	4.00	0.0000	52.00	No Ice	1.00	1.00	10.00
(GPS @ 52')			0.00			1/2" Ice	1.50	1.50	15.00
			0.00			1" Ice	2.00	2.00	20.00
4' Side Arm (Sq Tube)	B	From Leg	0.00	0.0000	52.00	No Ice	2.72	2.72	50.00
(GPS@52)			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
DB803M-Y	A	From Leg	3.00	0.0000	40.50 - 33.50	No Ice	0.50	0.50	4.30
(CSP @ 33.5' (Upright))			0.00			1/2" Ice	0.68	0.68	8.98
			0.00			1" Ice	0.87	0.87	15.80
DB803M-Y	A	From Leg	3.00	0.0000	24.00 - 31.00	No Ice	0.50	0.50	4.30
(CSP @ 31' (Upright))			0.00			1/2" Ice	0.68	0.68	8.98
			0.00			1" Ice	0.87	0.87	15.80
3' Side Arm Mount	A	From Leg	0.00	0.0000	31.00	No Ice	2.72	2.72	50.00
(Mt. for CSP @ 31', 33.5')			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
DB803M-Y	B	From Leg	2.00	0.0000	29.50	No Ice	0.50	0.50	4.30
(CSP @ 29.5' (Upright))			0.00			1/2" Ice	0.68	0.68	8.98
			0.00			1" Ice	0.87	0.87	15.80
3' Yagi	B	From Leg	2.00	0.0000	16.00	No Ice	2.08	2.08	30.95
(CSP @ 16')			0.00			1/2" Ice	3.79	3.79	52.87
			0.00			1" Ice	5.52	5.52	85.27
2' Side Arm Mount	B	From Leg	0.00	0.0000	29.00	No Ice	2.72	2.72	50.00
(Mt @ 29')			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
*** CSP Troop L Antennas									
SC479-HF1LDF (Inverted)	C	From Leg	6.00	0.0000	165.50 - 180.00	No Ice	5.06	5.06	34.00
(CSP Troop L @ 180')			0.00			1/2" Ice	6.54	6.54	69.82
			0.00			1" Ice	8.04	8.04	114.98
SC479-HF1LDF (Inverted)	C	From Leg	3.00	0.0000	165.50 - 180.00	No Ice	5.06	5.06	34.00
(CSP Troop L @ 180')			0.00			1/2" Ice	6.54	6.54	69.82
			0.00			1" Ice	8.04	8.04	114.98
SC479-HF1LDF	C	From Leg	6.00	0.0000	180.00	No Ice	5.06	5.06	34.00
(CSP Troop L @ 180')			0.00			1/2" Ice	6.54	6.54	69.82
			0.00			1" Ice	8.04	8.04	114.98
432E-83I-01T TTA Unit	C	From Leg	3.00	0.0000	180.00	No Ice	3.33	1.11	25.00
(CSP Troop L @ 180')			0.00			1/2" Ice	3.57	1.27	44.70
			0.00			1" Ice	3.82	1.45	67.39
Pirod 4' Side Mount Standoff	C	From Leg	0.00	0.0000	180.00	No Ice	2.72	2.72	50.00
(1)			0.00			1/2" Ice	4.91	4.91	89.00
(CSP Troop L @ 180')			0.00			1" Ice	7.10	7.10	128.00

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
PA6-65	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	Worst		176.00	6.00	No Ice 1/2" Ice 1" Ice	28.27 29.05 29.83	90.00 240.00 390.00

222-H Verification Constants

Constant	Value
K_d	0.85
Ice Thickness Importance Factor	1.15
Z_g	900
α	9.5
K_{zmin}	0.85
K_c	n/a
K_t	1
f	1
K_e	1

222-H Section Verification ArRr By Element

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
T1 180.00-175.00	1	HSS5x0.25	62.242	30.758	C	0.201	0.342	2.086	3.221	1.039	1.975
	1	HSS5x0.25	62.242	30.758	A	0.201	0.342	2.086	3.221	1.039	1.975
	2	HSS5x0.25	62.242	30.758	C	0.201	0.342	2.086	3.221	1.039	1.975
	2	HSS5x0.25	62.242	30.758	B	0.201	0.342	2.086	3.221	1.039	1.975
	3	HSS5x0.25	62.242	30.758	B	0.201	0.342	2.086	3.221	1.039	1.975
	3	HSS5x0.25	62.242	30.758	A	0.201	0.342	2.086	3.221	1.039	1.975
					A		Sum:	4.171	6.441	2.078	3.949
					B			4.171	6.441	2.078	3.949
					C			4.171	6.441	2.078	3.949
T2 175.00-150.00	10	HSS5x0.25	61.666	30.379	C	0.156	0.261	10.428	16.054	5.037	9.435
	10	HSS5x0.25	61.666	30.379	A	0.156	0.261	10.428	16.054	5.037	9.435
	11	HSS5x0.25	61.666	30.379	C	0.156	0.261	10.428	16.054	5.037	9.435
	11	HSS5x0.25	61.666	30.379	B	0.156	0.261	10.428	16.054	5.037	9.435
	12	HSS5x0.25	61.666	30.379	B	0.156	0.261	10.428	16.054	5.037	9.435
	12	HSS5x0.25	61.666	30.379	A	0.156	0.261	10.428	16.054	5.037	9.435
					A		Sum:	20.856	32.107	10.074	18.870
					B			20.856	32.107	10.074	18.870
					C			20.856	32.107	10.074	18.870
T3 150.00-125.00	31	HSS5x0.25	60.591	29.676	C	0.146	0.239	10.428	15.960	5.045	9.293
	31	HSS5x0.25	60.591	29.676	A	0.146	0.239	10.428	15.960	5.045	9.293
	32	HSS5x0.25	60.591	29.676	C	0.146	0.239	10.428	15.960	5.045	9.293
	32	HSS5x0.25	60.591	29.676	B	0.146	0.239	10.428	15.960	5.045	9.293
	33	HSS5x0.25	60.591	29.676	B	0.146	0.239	10.428	15.960	5.045	9.293
	33	HSS5x0.25	60.591	29.676	A	0.146	0.239	10.428	15.960	5.045	9.293
					A		Sum:	20.856	31.921	10.089	18.587
					B			20.856	31.921	10.089	18.587
					C			20.856	31.921	10.089	18.587

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
T4 125.00-100.00	52	HSS5x.375	59.325	28.856	C	0.133	0.23	10.428	15.850	5.057	9.198
	52	HSS5x.375	59.325	28.856	A	0.133	0.23	10.428	15.850	5.057	9.198
	53	HSS5x.375	59.325	28.856	C	0.133	0.23	10.428	15.850	5.057	9.198
	53	HSS5x.375	59.325	28.856	B	0.133	0.23	10.428	15.850	5.057	9.198
	54	HSS5x.375	59.325	28.856	B	0.133	0.23	10.428	15.850	5.057	9.198
	54	HSS5x.375	59.325	28.856	A	0.133	0.23	10.428	15.850	5.057	9.198
					A		Sum:	20.856	31.701	10.114	18.397
					B			20.856	31.701	10.114	18.397
					C			20.856	31.701	10.114	18.397
T5 100.00-75.00	82	HSS5x.375	57.776	27.864	C	0.126	0.213	10.428	15.716	5.100	9.065
	82	HSS5x.375	57.776	27.864	A	0.126	0.213	10.428	15.716	5.100	9.065
	83	HSS5x.375	57.776	27.864	C	0.126	0.213	10.428	15.716	5.100	9.065
	83	HSS5x.375	57.776	27.864	B	0.126	0.213	10.428	15.716	5.100	9.065
	84	HSS5x.375	57.776	27.864	B	0.126	0.213	10.428	15.716	5.100	9.065
	84	HSS5x.375	57.776	27.864	A	0.126	0.213	10.428	15.716	5.100	9.065
					A		Sum:	20.856	31.432	10.200	18.131
					B			20.856	31.432	10.200	18.131
					C			20.856	31.432	10.200	18.131
T6 75.00-50.00	112	HSS5x0.5	55.765	26.595	C	0.116	0.196	10.428	15.541	5.163	8.916
	112	HSS5x0.5	55.765	26.595	A	0.116	0.196	10.428	15.541	5.163	8.916
	113	HSS5x0.5	55.765	26.595	C	0.116	0.196	10.428	15.541	5.163	8.916
	113	HSS5x0.5	55.765	26.595	B	0.116	0.196	10.428	15.541	5.163	8.916
	114	HSS5x0.5	55.765	26.595	B	0.116	0.196	10.428	15.541	5.163	8.916
	114	HSS5x0.5	55.765	26.595	A	0.116	0.196	10.428	15.541	5.163	8.916
					A		Sum:	20.856	31.082	10.326	17.833
					B			20.856	31.082	10.326	17.833
					C			20.856	31.082	10.326	17.833
T7 50.00-25.00	142	HSS5x0.5	52.846	24.79	C	0.146	0.24	10.428	15.286	5.358	8.905
	142	HSS5x0.5	52.846	24.79	A	0.146	0.24	10.428	15.286	5.358	8.905
	143	HSS5x0.5	52.846	24.79	C	0.146	0.24	10.428	15.286	5.358	8.905
	143	HSS5x0.5	52.846	24.79	B	0.146	0.24	10.428	15.286	5.358	8.905
	144	HSS5x0.5	52.846	24.79	B	0.146	0.24	10.428	15.286	5.358	8.905
	144	HSS5x0.5	52.846	24.79	A	0.146	0.24	10.428	15.286	5.358	8.905
					A		Sum:	20.856	30.573	10.716	17.809
					B			20.856	30.573	10.716	17.809
					C			20.856	30.573	10.716	17.809
T8 25.00-0.00	181	HSS6.875x0.5	66.025	27.543	C	0.138	0.203	14.338	18.691	6.593	10.748
	181	HSS6.875x0.5	66.025	27.543	A	0.138	0.203	14.338	18.691	6.593	10.748
	182	HSS6.875x0.5	66.025	27.543	C	0.138	0.203	14.338	18.691	6.593	10.748
	182	HSS6.875x0.5	66.025	27.543	B	0.138	0.203	14.338	18.691	6.593	10.748
	183	HSS6.875x0.5	66.025	27.543	B	0.138	0.203	14.338	18.691	6.593	10.748
	183	HSS6.875x0.5	66.025	27.543	A	0.138	0.203	14.338	18.691	6.593	10.748
					A		Sum:	28.676	37.382	13.187	21.497
					B			28.676	37.382	13.187	21.497
					C			28.676	37.382	13.187	21.497

222-H Section Verification Tables - No Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft²

Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{zt}	t_z	q_z	Face	e	A_rR_r
ft	ft	ft				in	psf			ft^2
T1 180.00-175.00	177.50		1.428	1	1		49	A	0.201	2.078
								B	0.201	2.078
								C	0.201	2.078
T2 175.00-150.00	162.50		1.402	1	1		48	A	0.156	10.074
								B	0.156	10.074
								C	0.156	10.074
T3 150.00-125.00	137.50		1.353	1	1		46	A	0.146	10.089
								B	0.146	10.089
								C	0.146	10.089
T4 125.00-100.00	112.50		1.297	1	1		44	A	0.133	10.114
								B	0.133	10.114
								C	0.133	10.114
T5 100.00-75.00	87.50		1.231	1	1		42	A	0.126	10.200
								B	0.126	10.200
								C	0.126	10.200
T6 75.00-50.00	62.50		1.146	1	1		39	A	0.116	10.326
								B	0.116	10.326
								C	0.116	10.326
T7 50.00-25.00	37.50		1.029	1	1		35	A	0.146	10.716
								B	0.146	10.716
								C	0.146	10.716
T8 25.00-0.00	12.50		0.85	1	1		29	A	0.138	13.187
								B	0.138	13.187
								C	0.138	13.187

222-H Section Verification Tables - Ice

Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{zt}	t_z	q_z	Face	e	A_rR_r
ft	ft	ft				in	psf			ft^2
T1 180.00-175.00	177.50	177.50	1.428	1	1	1.3607	5	A	0.342	5.911
								B	0.342	5.911
								C	0.342	5.911
T2 175.00-150.00	162.50	162.50	1.402	1	1	1.3488	5	A	0.261	26.086
								B	0.261	26.086
								C	0.261	26.086
T3 150.00-125.00	137.50	137.50	1.353	1	1	1.3264	5	A	0.239	26.978
								B	0.239	26.978
								C	0.239	26.978
T4 125.00-100.00	112.50	112.50	1.297	1	1	1.3001	5	A	0.23	30.201
								B	0.23	30.201
								C	0.23	30.201
T5 100.00-75.00	87.50	87.50	1.231	1	1	1.2678	4	A	0.213	30.782
								B	0.213	30.782
								C	0.213	30.782
T6 75.00-50.00	62.50	62.50	1.146	1	1	1.2258	4	A	0.196	31.194
								B	0.196	31.194
								C	0.196	31.194
T7 50.00-25.00	37.50	37.50	1.029	1	1	1.1648	4	A	0.24	37.843
								B	0.24	37.843
								C	0.24	37.843
T8 25.00-0.00	12.50	12.50	0.85	1	1	1.0436	3	A	0.203	36.326
								B	0.203	36.326
								C	0.203	36.326

222-H Section Verification Tables - Service

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft²
T1 180.00-175.00	177.50		1.428	1	1		11	A	0.201	2.078
								B	0.201	2.078
								C	0.201	2.078
T2 175.00-150.00	162.50		1.402	1	1		11	A	0.156	10.074
								B	0.156	10.074
								C	0.156	10.074
T3 150.00-125.00	137.50		1.353	1	1		11	A	0.146	10.089
								B	0.146	10.089
								C	0.146	10.089
T4 125.00-100.00	112.50		1.297	1	1		10	A	0.133	10.114
								B	0.133	10.114
								C	0.133	10.114
T5 100.00-75.00	87.50		1.231	1	1		10	A	0.126	10.200
								B	0.126	10.200
								C	0.126	10.200
T6 75.00-50.00	62.50		1.146	1	1		9	A	0.116	10.326
								B	0.116	10.326
								C	0.116	10.326
T7 50.00-25.00	37.50		1.029	1	1		8	A	0.146	10.716
								B	0.146	10.716
								C	0.146	10.716
T8 25.00-0.00	12.50		0.85	1	1		7	A	0.138	13.187
								B	0.138	13.187
								C	0.138	13.187

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	177.50	1.428	49	36.085	A	3.086	4.171	4.171	57.48	5.836	0.000
180.00-175.00					B	3.086	4.171		57.48	0.000	0.000
					C	3.086	4.171		57.48	0.000	0.000
T2	162.50	1.402	48	210.425	A	11.948	20.856	20.856	63.58	40.043	0.000
175.00-150.00					B	11.948	20.856		63.58	51.084	0.000
					C	11.948	20.856		63.58	0.000	0.000
T3	137.50	1.353	46	260.425	A	17.112	20.856	20.856	54.93	53.536	0.000
150.00-125.00					B	17.112	20.856		54.93	89.100	0.000
					C	17.112	20.856		54.93	40.392	0.000
T4	112.50	1.297	44	310.425	A	20.535	20.856	20.856	50.39	58.139	0.000
125.00-100.00					B	20.535	20.856		50.39	89.100	0.000
					C	20.535	20.856		50.39	59.400	0.000
T5	87.50	1.231	42	360.425	A	24.445	20.856	20.856	46.04	59.684	0.000
100.00-75.00					B	24.445	20.856		46.04	89.100	0.000
					C	24.445	20.856		46.04	59.400	0.000
T6 75.00-50.00	62.50	1.146	39	410.425	A	26.937	20.856	20.856	43.64	59.810	0.000
					B	26.937	20.856		43.64	89.100	0.000
					C	26.937	20.856		43.64	59.400	0.000
T7 50.00-25.00	37.50	1.029	35	460.425	A	46.504	20.856	20.856	30.96	62.194	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					B	46.504	20.856		30.96	89.100	0.000
					C	46.504	20.856		30.96	59.400	0.000
T8 25.00-0.00	12.50	0.85	29	514.334	A	42.230	28.676	28.676	40.44	45.040	0.000
					B	42.230	28.676		40.44	60.588	0.000
					C	42.230	28.676		40.44	40.392	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	177.50	1.428	5	1.3607	37.220	A	3.086	9.641	6.441	50.61	17.266	0.000
180.00-175.00						B	3.086	9.641		50.61	0.000	0.000
						C	3.086	9.641		50.61	0.000	0.000
T2	162.50	1.402	5	1.3488	216.049	A	11.948	44.385	32.107	56.99	115.977	0.000
175.00-150.00						B	11.948	44.385		56.99	79.338	0.000
						C	11.948	44.385		56.99	0.000	0.000
T3	137.50	1.353	5	1.3264	265.956	A	17.112	46.332	31.921	50.31	163.628	0.000
150.00-125.00						B	17.112	46.332		50.31	128.246	0.000
						C	17.112	46.332		50.31	44.548	0.000
T4	112.50	1.297	5	1.3001	315.846	A	20.535	52.041	31.701	43.68	177.744	0.000
125.00-100.00						B	20.535	52.041		43.68	127.834	0.000
						C	20.535	52.041		43.68	65.299	0.000
T5 100.00-75.00	87.50	1.231	4	1.2678	365.712	A	24.445	53.365	31.432	40.40	180.124	0.000
						B	24.445	53.365		40.40	127.331	0.000
						C	24.445	53.365		40.40	65.038	0.000
T6 75.00-50.00	62.50	1.146	4	1.2258	415.537	A	26.937	54.371	31.082	38.23	176.756	0.000
						B	26.937	54.371		38.23	126.678	0.000
						C	26.937	54.371		38.23	64.699	0.000
T7 50.00-25.00	37.50	1.029	4	1.1648	465.282	A	46.504	64.965	30.573	27.43	182.168	0.000
						B	46.504	64.965		27.43	125.729	0.000
						C	46.504	64.965		27.43	64.207	0.000
T8 25.00-0.00	12.50	0.85	3	1.0436	518.686	A	42.230	63.170	37.382	35.47	128.320	0.000
						B	42.230	63.170		35.47	84.219	0.000
						C	42.230	63.170		35.47	42.997	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	177.50	1.428	11	36.085	A	3.086	4.171	4.171	57.48	5.836	0.000
180.00-175.00					B	3.086	4.171		57.48	0.000	0.000
					C	3.086	4.171		57.48	0.000	0.000
T2	162.50	1.402	11	210.425	A	11.948	20.856	20.856	63.58	40.043	0.000
175.00-150.00					B	11.948	20.856		63.58	51.084	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	11.948	20.856		63.58	0.000	0.000
T3	137.50	1.353	11	260.425	A	17.112	20.856	20.856	54.93	53.536	0.000
150.00-125.00					B	17.112	20.856		54.93	89.100	0.000
					C	17.112	20.856		54.93	40.392	0.000
T4	112.50	1.297	10	310.425	A	20.535	20.856	20.856	50.39	58.139	0.000
125.00-100.00					B	20.535	20.856		50.39	89.100	0.000
					C	20.535	20.856		50.39	59.400	0.000
T5	87.50	1.231	10	360.425	A	24.445	20.856	20.856	46.04	59.684	0.000
100.00-75.00					B	24.445	20.856		46.04	89.100	0.000
					C	24.445	20.856		46.04	59.400	0.000
T6 75.00-50.00	62.50	1.146	9	410.425	A	26.937	20.856	20.856	43.64	59.810	0.000
					B	26.937	20.856		43.64	89.100	0.000
					C	26.937	20.856		43.64	59.400	0.000
T7 50.00-25.00	37.50	1.029	8	460.425	A	46.504	20.856	20.856	30.96	62.194	0.000
					B	46.504	20.856		30.96	89.100	0.000
					C	46.504	20.856		30.96	59.400	0.000
T8 25.00-0.00	12.50	0.85	7	514.334	A	42.230	28.676	28.676	40.44	45.040	0.000
					B	42.230	28.676		40.44	60.588	0.000
					C	42.230	28.676		40.44	40.392	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	20.49	391.02	A	0.201	2.592	49	1	1	5.164	697.05	139.41	C
180.00-175.00			B	0.201	2.592		1	1	5.164			
			C	0.201	2.592		1	1	5.164			
T2	341.20	1760.62	A	0.156	2.75	48	1	1	22.023	4668.54	186.74	C
175.00-150.00			B	0.156	2.75		1	1	22.023			
			C	0.156	2.75		1	1	22.023			
T3	705.84	2485.05	A	0.146	2.787	46	1	1	27.202	7260.46	290.42	C
150.00-125.00			B	0.146	2.787		1	1	27.202			
			C	0.146	2.787		1	1	27.202			
T4	799.05	2786.86	A	0.133	2.834	44	1	1	30.648	7905.15	316.21	C
125.00-100.00			B	0.133	2.834		1	1	30.648			
			C	0.133	2.834		1	1	30.648			
T5	804.00	3089.16	A	0.126	2.863	42	1	1	34.645	7969.53	318.78	C
100.00-75.00			B	0.126	2.863		1	1	34.645			
			C	0.126	2.863		1	1	34.645			
T6	804.30	4289.03	A	0.116	2.899	39	1	1	37.262	7719.50	308.78	C
75.00-50.00			B	0.116	2.899		1	1	37.262			
			C	0.116	2.899		1	1	37.262			
T7	810.20	5524.59	A	0.146	2.785	35	1	1	57.219	8502.72	340.11	C
50.00-25.00			B	0.146	2.785		1	1	57.219			
			C	0.146	2.785		1	1	57.219			
T8 25.00-0.00	559.34	6565.08	A	0.138	2.817	29	1	1	55.417	5986.57	239.46	C
			B	0.138	2.817		1	1	55.417			
			C	0.138	2.817		1	1	55.417			
Sum Weight:	4844.43	26891.41						OTM	4343.49 kip-ft	50709.52		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	20.49	391.02	A	0.201	2.592	49	0.8	1	4.547	631.01	126.20	C
180.00-175.00			B	0.201	2.592		0.8	1	4.547			
			C	0.201	2.592		0.8	1	4.547			
T2	341.20	1760.62	A	0.156	2.75	48	0.8	1	19.633	4402.32	176.09	C
175.00-150.00			B	0.156	2.75		0.8	1	19.633			
			C	0.156	2.75		0.8	1	19.633			
T3	705.84	2485.05	A	0.146	2.787	46	0.8	1	23.779	6887.38	275.50	C
150.00-125.00			B	0.146	2.787		0.8	1	23.779			
			C	0.146	2.787		0.8	1	23.779			
T4	799.05	2786.86	A	0.133	2.834	44	0.8	1	26.541	7468.79	298.75	C
125.00-100.00			B	0.133	2.834		0.8	1	26.541			
			C	0.133	2.834		0.8	1	26.541			
T5	804.00	3089.16	A	0.126	2.863	42	0.8	1	29.756	7471.75	298.87	C
100.00-75.00			B	0.126	2.863		0.8	1	29.756			
			C	0.126	2.863		0.8	1	29.756			
T6	804.30	4289.03	A	0.116	2.899	39	0.8	1	31.875	7202.10	288.08	C
75.00-50.00			B	0.116	2.899		0.8	1	31.875			
			C	0.116	2.899		0.8	1	31.875			
T7	810.20	5524.59	A	0.146	2.785	35	0.8	1	47.919	7732.01	309.28	C
50.00-25.00			B	0.146	2.785		0.8	1	47.919			
			C	0.146	2.785		0.8	1	47.919			
T8 25.00-0.00	559.34	6565.08	A	0.138	2.817	29	0.8	1	46.971	5402.18	216.09	C
			B	0.138	2.817		0.8	1	46.971			
			C	0.138	2.817		0.8	1	46.971			
Sum Weight:	4844.43	26891.41						OTM	4076.02 kip-ft	47197.54		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	20.49	391.02	A	0.201	2.592	49	0.85	1	4.701	647.52	129.50	C
180.00-175.00			B	0.201	2.592		0.85	1	4.701			
			C	0.201	2.592		0.85	1	4.701			
T2	341.20	1760.62	A	0.156	2.75	48	0.85	1	20.230	4468.87	178.75	C
175.00-150.00			B	0.156	2.75		0.85	1	20.230			
			C	0.156	2.75		0.85	1	20.230			
T3	705.84	2485.05	A	0.146	2.787	46	0.85	1	24.635	6980.65	279.23	C
150.00-125.00			B	0.146	2.787		0.85	1	24.635			
			C	0.146	2.787		0.85	1	24.635			
T4	799.05	2786.86	A	0.133	2.834	44	0.85	1	27.568	7577.88	303.12	C
125.00-100.00			B	0.133	2.834		0.85	1	27.568			
			C	0.133	2.834		0.85	1	27.568			
T5	804.00	3089.16	A	0.126	2.863	42	0.85	1	30.979	7596.20	303.85	C
100.00-75.00			B	0.126	2.863		0.85	1	30.979			
			C	0.126	2.863		0.85	1	30.979			
T6	804.30	4289.03	A	0.116	2.899	39	0.85	1	33.222	7331.45	293.26	C
75.00-50.00			B	0.116	2.899		0.85	1	33.222			
			C	0.116	2.899		0.85	1	33.222			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T7	810.20	5524.59	A	0.146	2.785	35	0.85	1	50.244	7924.69	316.99	C
50.00-25.00			B	0.146	2.785		0.85	1	50.244			
			C	0.146	2.785		0.85	1	50.244			
T8 25.00-0.00	559.34	6565.08	A	0.138	2.817	29	0.85	1	49.082	5548.28	221.93	C
			B	0.138	2.817		0.85	1	49.082			
			C	0.138	2.817		0.85	1	49.082			
Sum Weight:	4844.43	26891.41						OTM	4142.89 kip-ft	48075.54		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	211.31	983.53	A	0.342	2.19	5	1	1	8.997	127.07	25.41	C
180.00-175.00			B	0.342	2.19		1	1	8.997			
			C	0.342	2.19		1	1	8.997			
T2	2607.10	4254.13	A	0.261	2.406	5	1	1	38.034	865.73	34.63	C
175.00-150.00			B	0.261	2.406		1	1	38.034			
			C	0.261	2.406		1	1	38.034			
T3	4840.90	5502.71	A	0.239	2.472	5	1	1	44.091	1245.03	49.80	C
150.00-125.00			B	0.239	2.472		1	1	44.091			
			C	0.239	2.472		1	1	44.091			
T4	5344.46	6323.76	A	0.23	2.5	5	1	1	50.735	1341.28	53.65	C
125.00-100.00			B	0.23	2.5		1	1	50.735			
			C	0.23	2.5		1	1	50.735			
T5	5288.56	6839.82	A	0.213	2.554	4	1	1	55.228	1327.52	53.10	C
100.00-75.00			B	0.213	2.554		1	1	55.228			
			C	0.213	2.554		1	1	55.228			
T6	5145.25	8220.65	A	0.196	2.611	4	1	1	58.131	1264.18	50.57	C
75.00-50.00			B	0.196	2.611		1	1	58.131			
			C	0.196	2.611		1	1	58.131			
T7	5034.80	11046.56	A	0.24	2.469	4	1	1	84.347	1314.72	52.59	C
50.00-25.00			B	0.24	2.469		1	1	84.347			
			C	0.24	2.469		1	1	84.347			
T8 25.00-0.00	3243.52	11181.22	A	0.203	2.585	3	1	1	78.556	896.54	35.86	C
			B	0.203	2.585		1	1	78.556			
			C	0.203	2.585		1	1	78.556			
Sum Weight:	31715.90	54352.38						OTM	741.00 kip-ft	8382.08		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	211.31	983.53	A	0.342	2.19	5	0.8	1	8.379	121.36	24.27	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
180.00-175.00			B	0.342	2.19		0.8	1	8.379			
			C	0.342	2.19		0.8	1	8.379			
T2	2607.10	4254.13	A	0.261	2.406	5	0.8	1	35.644	841.88	33.68	C
175.00-150.00			B	0.261	2.406		0.8	1	35.644			
			C	0.261	2.406		0.8	1	35.644			
T3	4840.90	5502.71	A	0.239	2.472	5	0.8	1	40.668	1211.14	48.45	C
150.00-125.00			B	0.239	2.472		0.8	1	40.668			
			C	0.239	2.472		0.8	1	40.668			
T4	5344.46	6323.76	A	0.23	2.5	5	0.8	1	46.628	1301.87	52.07	C
125.00-100.00			B	0.23	2.5		0.8	1	46.628			
			C	0.23	2.5		0.8	1	46.628			
T5	5288.56	6839.82	A	0.213	2.554	4	0.8	1	50.339	1282.05	51.28	C
100.00-75.00			B	0.213	2.554		0.8	1	50.339			
			C	0.213	2.554		0.8	1	50.339			
T6	5145.25	8220.65	A	0.196	2.611	4	0.8	1	52.744	1216.47	48.66	C
75.00-50.00			B	0.196	2.611		0.8	1	52.744			
			C	0.196	2.611		0.8	1	52.744			
T7	5034.80	11046.56	A	0.24	2.469	4	0.8	1	75.046	1244.75	49.79	C
50.00-25.00			B	0.24	2.469		0.8	1	75.046			
			C	0.24	2.469		0.8	1	75.046			
T8 25.00-0.00	3243.52	11181.22	A	0.203	2.585	3	0.8	1	70.110	841.62	33.66	C
			B	0.203	2.585		0.8	1	70.110			
			C	0.203	2.585		0.8	1	70.110			
Sum Weight:	31715.90	54352.38						OTM	716.75 kip-ft	8061.14		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	211.31	983.53	A	0.342	2.19	5	0.85	1	8.534	122.78	24.56	C
180.00-175.00			B	0.342	2.19		0.85	1	8.534			
			C	0.342	2.19		0.85	1	8.534			
T2	2607.10	4254.13	A	0.261	2.406	5	0.85	1	36.242	847.85	33.91	C
175.00-150.00			B	0.261	2.406		0.85	1	36.242			
			C	0.261	2.406		0.85	1	36.242			
T3	4840.90	5502.71	A	0.239	2.472	5	0.85	1	41.524	1219.61	48.78	C
150.00-125.00			B	0.239	2.472		0.85	1	41.524			
			C	0.239	2.472		0.85	1	41.524			
T4	5344.46	6323.76	A	0.23	2.5	5	0.85	1	47.655	1311.72	52.47	C
125.00-100.00			B	0.23	2.5		0.85	1	47.655			
			C	0.23	2.5		0.85	1	47.655			
T5	5288.56	6839.82	A	0.213	2.554	4	0.85	1	51.561	1293.42	51.74	C
100.00-75.00			B	0.213	2.554		0.85	1	51.561			
			C	0.213	2.554		0.85	1	51.561			
T6	5145.25	8220.65	A	0.196	2.611	4	0.85	1	54.091	1228.40	49.14	C
75.00-50.00			B	0.196	2.611		0.85	1	54.091			
			C	0.196	2.611		0.85	1	54.091			
T7	5034.80	11046.56	A	0.24	2.469	4	0.85	1	77.371	1262.24	50.49	C
50.00-25.00			B	0.24	2.469		0.85	1	77.371			
			C	0.24	2.469		0.85	1	77.371			
T8 25.00-0.00	3243.52	11181.22	A	0.203	2.585	3	0.85	1	72.221	855.35	34.21	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			B	0.203	2.585		0.85	1	72.221			
			C	0.203	2.585		0.85	1	72.221			
Sum Weight:	31715.90	54352.38						OTM	722.81 kip-ft	8141.37		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	20.49	391.02	A	0.201	2.592	11	1	1	5.164	160.60	32.12	C
180.00-175.00			B	0.201	2.592		1	1	5.164			
			C	0.201	2.592		1	1	5.164			
T2	341.20	1760.62	A	0.156	2.75	11	1	1	22.023	1075.63	43.03	C
175.00-150.00			B	0.156	2.75		1	1	22.023			
			C	0.156	2.75		1	1	22.023			
T3	705.84	2485.05	A	0.146	2.787	11	1	1	27.202	1672.81	66.91	C
150.00-125.00			B	0.146	2.787		1	1	27.202			
			C	0.146	2.787		1	1	27.202			
T4	799.05	2786.86	A	0.133	2.834	10	1	1	30.648	1821.35	72.85	C
125.00-100.00			B	0.133	2.834		1	1	30.648			
			C	0.133	2.834		1	1	30.648			
T5	804.00	3089.16	A	0.126	2.863	10	1	1	34.645	1836.18	73.45	C
100.00-75.00			B	0.126	2.863		1	1	34.645			
			C	0.126	2.863		1	1	34.645			
T6	804.30	4289.03	A	0.116	2.899	9	1	1	37.262	1778.57	71.14	C
75.00-50.00			B	0.116	2.899		1	1	37.262			
			C	0.116	2.899		1	1	37.262			
T7	810.20	5524.59	A	0.146	2.785	8	1	1	57.219	1959.03	78.36	C
50.00-25.00			B	0.146	2.785		1	1	57.219			
			C	0.146	2.785		1	1	57.219			
T8 25.00-0.00	559.34	6565.08	A	0.138	2.817	7	1	1	55.417	1379.31	55.17	C
			B	0.138	2.817		1	1	55.417			
			C	0.138	2.817		1	1	55.417			
Sum Weight:	4844.43	26891.41						OTM	1000.74 kip-ft	11683.47		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	20.49	391.02	A	0.201	2.592	11	0.8	1	4.547	145.39	29.08	C
180.00-175.00			B	0.201	2.592		0.8	1	4.547			
			C	0.201	2.592		0.8	1	4.547			
T2	341.20	1760.62	A	0.156	2.75	11	0.8	1	19.633	1014.29	40.57	C
175.00-150.00			B	0.156	2.75		0.8	1	19.633			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.156	2.75		0.8	1	19.633			
T3	705.84	2485.05	A	0.146	2.787	11	0.8	1	23.779	1586.85	63.47	C
150.00-125.00			B	0.146	2.787		0.8	1	23.779			
			C	0.146	2.787		0.8	1	23.779			
T4	799.05	2786.86	A	0.133	2.834	10	0.8	1	26.541	1720.81	68.83	C
125.00-100.00			B	0.133	2.834		0.8	1	26.541			
			C	0.133	2.834		0.8	1	26.541			
T5	804.00	3089.16	A	0.126	2.863	10	0.8	1	29.756	1721.49	68.86	C
100.00-75.00			B	0.126	2.863		0.8	1	29.756			
			C	0.126	2.863		0.8	1	29.756			
T6	804.30	4289.03	A	0.116	2.899	9	0.8	1	31.875	1659.36	66.37	C
75.00-50.00			B	0.116	2.899		0.8	1	31.875			
			C	0.116	2.899		0.8	1	31.875			
T7	810.20	5524.59	A	0.146	2.785	8	0.8	1	47.919	1781.45	71.26	C
50.00-25.00			B	0.146	2.785		0.8	1	47.919			
			C	0.146	2.785		0.8	1	47.919			
T8 25.00-0.00	559.34	6565.08	A	0.138	2.817	7	0.8	1	46.971	1244.66	49.79	C
			B	0.138	2.817		0.8	1	46.971			
			C	0.138	2.817		0.8	1	46.971			
Sum Weight:	4844.43	26891.41						OTM	939.12 kip-ft	10874.31		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	20.49	391.02	A	0.201	2.592	11	0.85	1	4.701	149.19	29.84	C
180.00-175.00			B	0.201	2.592		0.85	1	4.701			
			C	0.201	2.592		0.85	1	4.701			
T2	341.20	1760.62	A	0.156	2.75	11	0.85	1	20.230	1029.63	41.19	C
175.00-150.00			B	0.156	2.75		0.85	1	20.230			
			C	0.156	2.75		0.85	1	20.230			
T3	705.84	2485.05	A	0.146	2.787	11	0.85	1	24.635	1608.34	64.33	C
150.00-125.00			B	0.146	2.787		0.85	1	24.635			
			C	0.146	2.787		0.85	1	24.635			
T4	799.05	2786.86	A	0.133	2.834	10	0.85	1	27.568	1745.94	69.84	C
125.00-100.00			B	0.133	2.834		0.85	1	27.568			
			C	0.133	2.834		0.85	1	27.568			
T5	804.00	3089.16	A	0.126	2.863	10	0.85	1	30.979	1750.16	70.01	C
100.00-75.00			B	0.126	2.863		0.85	1	30.979			
			C	0.126	2.863		0.85	1	30.979			
T6	804.30	4289.03	A	0.116	2.899	9	0.85	1	33.222	1689.17	67.57	C
75.00-50.00			B	0.116	2.899		0.85	1	33.222			
			C	0.116	2.899		0.85	1	33.222			
T7	810.20	5524.59	A	0.146	2.785	8	0.85	1	50.244	1825.85	73.03	C
50.00-25.00			B	0.146	2.785		0.85	1	50.244			
			C	0.146	2.785		0.85	1	50.244			
T8 25.00-0.00	559.34	6565.08	A	0.138	2.817	7	0.85	1	49.082	1278.32	51.13	C
			B	0.138	2.817		0.85	1	49.082			
			C	0.138	2.817		0.85	1	49.082			
Sum Weight:	4844.43	26891.41						OTM	954.52 kip-ft	11076.60		

Discrete Appurtenance Pressures - No Ice $G_H = 0.850$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
ANT220F2 Antenna	0.0000	14.00	0.00	-10.86	114.00	1.301	44	1.74	1.74
ANT220F2 Antenna	0.0000	14.00	0.00	-10.17	129.00	1.335	45	1.74	1.74
Site Pro USF-4U w/ (2) Stiff-Arm Supports	0.0000	165.00	0.00	-7.50	111.00	1.294	44	1.25	2.50
Site Pro USF-4U w/ (2) Stiff-Arm Supports	0.0000	165.00	0.00	-6.80	126.00	1.329	45	1.25	2.50
7770.00 panel antenna	0.0000	104.06	0.00	-5.14	162.00	1.401	48	11.80	8.01
LGP 13519 Diplexer Units	0.0000	10.60	0.00	-5.14	162.00	1.401	48	0.31	0.21
LGP 21401 TMA Units	0.0000	35.00	0.00	-5.14	162.00	1.401	48	1.91	0.73
7770.00 panel antenna	120.0000	104.06	4.45	2.57	162.00	1.401	48	11.80	8.01
LGP 13519 Diplexer Units	120.0000	10.60	4.45	2.57	162.00	1.401	48	0.31	0.21
LGP 21401 TMA Units	120.0000	35.00	4.45	2.57	162.00	1.401	48	1.91	0.73
7770.00 panel antenna	240.0000	104.06	-4.45	2.57	162.00	1.401	48	11.80	8.01
LGP 13519 Diplexer Units	240.0000	10.60	-4.45	2.57	162.00	1.401	48	0.31	0.21
LGP 21401 TMA Units	240.0000	35.00	-4.45	2.57	162.00	1.401	48	1.91	0.73
DB980F90E-M w/Mount Pipe	0.0000	68.10	0.00	-4.82	169.00	1.413	48	8.74	7.91
DB980F90E-M w/Mount Pipe	120.0000	68.10	4.17	2.41	169.00	1.413	48	8.74	7.91
DB980F90E-M w/Mount Pipe	240.0000	68.10	-4.17	2.41	169.00	1.413	48	8.74	7.91
SitePro1 VFA12-RRU Mount Assembly	0.0000	450.00	0.00	-4.32	169.00	1.413	48	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	120.0000	450.00	3.74	2.16	169.00	1.413	48	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	240.0000	450.00	-3.74	2.16	169.00	1.413	48	12.02	7.98
BXA-185085-12CF Panel Antennas w/ Pipe Mount	0.0000	47.74	0.00	-6.07	142.00	1.363	46	4.79	5.34
BXA-185085-12CF Panel Antennas w/ Pipe Mount	120.0000	47.74	5.25	3.03	142.00	1.363	46	4.79	5.34
BXA-185085-12CF Panel Antennas w/ Pipe Mount	240.0000	47.74	-5.25	3.03	142.00	1.363	46	4.79	5.34
BXA-80080-8CF Panel Antenna w/ Pipe Mount	0.0000	65.74	0.00	-6.07	142.00	1.363	46	10.84	8.45
BXA-80080-8CF Panel Antenna w/ Pipe Mount	120.0000	65.74	5.25	3.03	142.00	1.363	46	10.84	8.45
BXA-80080-8CF Panel Antenna w/ Pipe Mount	240.0000	65.74	-5.25	3.03	142.00	1.363	46	10.84	8.45
SitePro1 VFA12-RRU Mount Assembly	0.0000	450.00	0.00	-5.29	148.00	1.375	47	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	120.0000	450.00	4.58	2.64	148.00	1.375	47	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	240.0000	450.00	-4.58	2.64	148.00	1.375	47	12.02	7.98
10'6"x4" Pipe Mount	240.0000	114.00	-3.30	1.91	180.00	1.432	49	3.28	3.28
Lightning Rod 5/8x4'	240.0000	31.00	-2.82	1.63	192.00	1.452	49	0.25	0.25

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
PD1142-30	120.0000	10.00	2.86	1.65	191.00	1.450	49	0.14	0.14
6'8"x4" Pipe Mount	120.0000	72.00	2.86	1.65	191.00	1.450	49	1.93	1.93
2" Dia 8' Omni	0.0000	5.00	0.00	-4.13	184.00	1.439	49	2.00	2.00
2'6"x4" Pipe Mount	0.0000	27.00	0.00	-4.13	184.00	1.439	49	0.64	0.64
3" Dia 20' Omni	120.0000	55.00	3.65	2.11	182.00	1.436	49	4.00	4.00
3" Dia 20' Omni	240.0000	55.00	-3.65	2.11	182.00	1.436	49	4.00	4.00
PD220	0.0000	23.00	0.00	-4.50	176.00	1.426	48	3.08	3.08
3'4"x4" Pipe Mount	240.0000	36.00	-3.46	2.00	176.00	1.426	48	0.88	0.88
DB292-A	240.0000	15.00	-6.63	-1.94	170.00	1.415	48	1.80	1.80
PD1142-1	120.0000	10.00	2.61	6.13	158.00	1.394	47	1.32	1.32
DB222	0.0000	16.00	-4.00	-5.56	153.00	1.384	47	1.60	1.60
DB586-Y	0.0000	8.25	4.00	-5.58	152.50	1.383	47	1.01	1.01
432E-83I-01T TTA Unit	0.0000	25.00	4.00	-5.56	153.00	1.384	47	3.33	1.11
DB586-Y	0.0000	8.25	4.00	-5.86	146.50	1.372	47	1.01	1.01
10' Dipole (Generic)	240.0000	55.00	-7.01	-0.57	148.00	1.375	47	4.00	4.00
10'6"x4" Pipe Mount	240.0000	114.00	-7.01	-0.57	148.00	1.375	47	3.35	3.35
GPS	120.0000	10.00	11.88	6.86	52.00	1.103	37	1.00	1.00
4' Side Arm (Sq Tube)	120.0000	50.00	8.42	4.86	52.00	1.103	37	2.72	2.72
DB803M-Y	0.0000	4.30	0.00	-13.42	37.00	1.027	35	0.50	0.50
DB803M-Y	0.0000	4.30	0.00	-13.85	27.50	0.964	33	0.50	0.50
3' Side Arm Mount	0.0000	50.00	0.00	-10.69	31.00	0.989	34	2.72	2.72
DB803M-Y	120.0000	4.30	11.05	6.38	29.50	0.979	33	0.50	0.50
3' Yagi	120.0000	30.95	11.59	6.69	16.00	0.860	29	2.08	2.08
2' Side Arm Mount	120.0000	50.00	9.34	5.39	29.00	0.975	33	2.72	2.72
SC479-HF1LDF (Inverted)	240.0000	34.00	-8.79	5.07	172.75	1.420	48	5.06	5.06
SC479-HF1LDF (Inverted)	240.0000	34.00	-6.19	3.57	172.75	1.420	48	5.06	5.06
SC479-HF1LDF	240.0000	34.00	-8.50	4.91	180.00	1.432	49	5.06	5.06
432E-83I-01T TTA Unit	240.0000	25.00	-5.90	3.41	180.00	1.432	49	3.33	1.11
Pirod 4' Side Mount Standoff (1)	240.0000	50.00	-3.30	1.91	180.00	1.432	49	2.72	2.72
	Sum Weight:	5112.07							

Discrete Appurtenance Pressures - With Ice $G_H = 0.850$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
ANT220F2 Antenna	0.0000	53.07	0.00	-10.86	114.00	1.301	5	2.56	2.56	1.3018
ANT220F2 Antenna	0.0000	53.75	0.00	-10.17	129.00	1.335	5	2.57	2.57	1.3180
Site Pro USF-4U w/ (2) Stiff-Arm Supports	0.0000	250.69	0.00	-7.50	111.00	1.294	5	1.87	3.18	1.2983
Site Pro USF-4U w/ (2) Stiff-Arm Supports	0.0000	251.78	0.00	-6.80	126.00	1.329	5	1.88	3.18	1.3149
7770.00 panel antenna	0.0000	382.99	0.00	-5.14	162.00	1.401	5	14.21	11.49	1.3483
LGP 13519 Diplexer Units	0.0000	25.18	0.00	-5.14	162.00	1.401	5	0.66	0.51	1.3483
LGP 21401 TMA Units	0.0000	76.39	0.00	-5.14	162.00	1.401	5	2.71	1.39	1.3483
7770.00 panel antenna	120.0000	382.99	4.45	2.57	162.00	1.401	5	14.21	11.49	1.3483
LGP 13519 Diplexer Units	120.0000	25.18	4.45	2.57	162.00	1.401	5	0.66	0.51	1.3483
LGP 21401 TMA Units	120.0000	76.39	4.45	2.57	162.00	1.401	5	2.71	1.39	1.3483
7770.00 panel antenna	240.0000	382.99	-4.45	2.57	162.00	1.401	5	14.21	11.49	1.3483
LGP 13519 Diplexer Units	240.0000	25.18	-4.45	2.57	162.00	1.401	5	0.66	0.51	1.3483
LGP 21401 TMA Units	240.0000	76.39	-4.45	2.57	162.00	1.401	5	2.71	1.39	1.3483

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
DB980F90E-M w/Mount Pipe	0.0000	320.81	0.00	-4.82	169.00	1.413	5	11.68	12.86	1.3541
DB980F90E-M w/Mount Pipe	120.0000	320.81	4.17	2.41	169.00	1.413	5	11.68	12.86	1.3541
DB980F90E-M w/Mount Pipe	240.0000	320.81	-4.17	2.41	169.00	1.413	5	11.68	12.86	1.3541
SitePro1 VFA12-RRU Mount Assembly	0.0000	902.83	0.00	-4.32	169.00	1.413	5	26.92	18.39	1.3541
SitePro1 VFA12-RRU Mount Assembly	120.0000	902.83	3.74	2.16	169.00	1.413	5	26.92	18.39	1.3541
SitePro1 VFA12-RRU Mount Assembly	240.0000	902.83	-3.74	2.16	169.00	1.413	5	26.92	18.39	1.3541
BXA-185085-12CF Panel Antennas w/ Pipe Mount	0.0000	191.43	0.00	-6.07	142.00	1.363	5	6.01	7.52	1.3307
BXA-185085-12CF Panel Antennas w/ Pipe Mount	120.0000	191.43	5.25	3.03	142.00	1.363	5	6.01	7.52	1.3307
BXA-185085-12CF Panel Antennas w/ Pipe Mount	240.0000	191.43	-5.25	3.03	142.00	1.363	5	6.01	7.52	1.3307
BXA-80080-8CF Panel Antenna w/ Pipe Mount	0.0000	298.74	0.00	-6.07	142.00	1.363	5	12.49	11.01	1.3307
BXA-80080-8CF Panel Antenna w/ Pipe Mount	120.0000	298.74	5.25	3.03	142.00	1.363	5	12.49	11.01	1.3307
BXA-80080-8CF Panel Antenna w/ Pipe Mount	240.0000	298.74	-5.25	3.03	142.00	1.363	5	12.49	11.01	1.3307
SitePro1 VFA12-RRU Mount Assembly	0.0000	896.08	0.00	-5.29	148.00	1.375	5	26.73	18.25	1.3362
SitePro1 VFA12-RRU Mount Assembly	120.0000	896.08	4.58	2.64	148.00	1.375	5	26.73	18.25	1.3362
SitePro1 VFA12-RRU Mount Assembly	240.0000	896.08	-4.58	2.64	148.00	1.375	5	26.73	18.25	1.3362
10'6"x4" Pipe Mount	240.0000	223.48	-3.30	1.91	180.00	1.432	5	6.72	6.72	1.3626
Lightning Rod 5/8x4'	240.0000	46.55	-2.82	1.63	192.00	1.452	5	1.17	1.17	1.3714
PD1142-30	120.0000	284.14	2.86	1.65	191.00	1.450	5	3.84	3.84	1.3707
6'8"x4" Pipe Mount	120.0000	143.52	2.86	1.65	191.00	1.450	5	3.74	3.74	1.3707
2" Dia 8' Omni	0.0000	40.51	0.00	-4.13	184.00	1.439	5	4.81	4.81	1.3656
2'6"x4" Pipe Mount	0.0000	56.23	0.00	-4.13	184.00	1.439	5	1.23	1.23	1.3656
3" Dia 20' Omni	120.0000	177.77	3.65	2.11	182.00	1.436	5	9.46	9.46	1.3641
3" Dia 20' Omni	240.0000	177.77	-3.65	2.11	182.00	1.436	5	9.46	9.46	1.3641
PD220	0.0000	131.47	0.00	-4.50	176.00	1.426	5	9.16	9.16	1.3596
3'4"x4" Pipe Mount	240.0000	73.40	-3.46	2.00	176.00	1.426	5	1.67	1.67	1.3596
DB292-A	240.0000	27.19	-6.63	-1.94	170.00	1.415	5	5.70	5.70	1.3549
PD1142-1	120.0000	79.38	2.61	6.13	158.00	1.394	5	6.46	6.46	1.3450
DB222	0.0000	28.87	-4.00	-5.56	153.00	1.384	5	5.03	5.03	1.3407
DB586-Y	0.0000	39.14	4.00	-5.58	152.50	1.383	5	1.76	1.76	1.3402
432E-83I-01T TTA Unit	0.0000	86.16	4.00	-5.56	153.00	1.384	5	4.00	1.58	1.3407
DB586-Y	0.0000	38.96	4.00	-5.86	146.50	1.372	5	1.75	1.75	1.3348
10' Dipole (Generic)	240.0000	175.26	-7.01	-0.57	148.00	1.375	5	9.34	9.34	1.3362
10'6"x4" Pipe Mount	240.0000	220.80	-7.01	-0.57	148.00	1.375	5	6.69	6.69	1.3362
GPS	120.0000	22.04	11.88	6.86	52.00	1.103	4	2.20	2.20	1.2035
4' Side Arm (Sq Tube)	120.0000	143.87	8.42	4.86	52.00	1.103	4	7.99	7.99	1.2035
DB803M-Y	0.0000	19.18	0.00	-13.42	37.00	1.027	4	0.94	0.94	1.1632
DB803M-Y	0.0000	18.48	0.00	-13.85	27.50	0.964	3	0.93	0.93	1.1292
3' Side Arm Mount	0.0000	139.14	0.00	-10.69	31.00	0.989	3	7.73	7.73	1.1428
DB803M-Y	120.0000	18.64	11.05	6.38	29.50	0.979	3	0.93	0.93	1.1372
3' Yagi	120.0000	92.12	11.59	6.69	16.00	0.860	3	5.76	5.76	1.0697
2' Side Arm Mount	120.0000	138.55	9.34	5.39	29.00	0.975	3	7.69	7.69	1.1352
SC479-HF1LDF (Inverted)	240.0000	157.45	-8.79	5.07	172.75	1.420	5	9.03	9.03	1.3570

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
SC479-HF1LDF (Inverted)	240.0000	157.45	-6.19	3.57	172.75	1.420	5	9.03	9.03	1.3570
SC479-HF1LDF	240.0000	158.11	-8.50	4.91	180.00	1.432	5	9.04	9.04	1.3626
432E-83I-01T TTA Unit	240.0000	87.37	-5.90	3.41	180.00	1.432	5	4.01	1.59	1.3626
Pirod 4' Side Mount Standoff (1)	240.0000	156.28	-3.30	1.91	180.00	1.432	5	8.69	8.69	1.3626
	Sum Weight:	13251.92								

Discrete Appurtenance Pressures - Service $G_H = 0.850$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
ANT220F2 Antenna	0.0000	14.00	0.00	-10.86	114.00	1.301	10	1.74	1.74
ANT220F2 Antenna	0.0000	14.00	0.00	-10.17	129.00	1.335	10	1.74	1.74
Site Pro USF-4U w/ (2) Stiff-Arm Supports	0.0000	165.00	0.00	-7.50	111.00	1.294	10	1.25	2.50
Site Pro USF-4U w/ (2) Stiff-Arm Supports	0.0000	165.00	0.00	-6.80	126.00	1.329	10	1.25	2.50
7770.00 panel antenna	0.0000	104.06	0.00	-5.14	162.00	1.401	11	11.80	8.01
LGP 13519 Diplexer Units	0.0000	10.60	0.00	-5.14	162.00	1.401	11	0.31	0.21
LGP 21401 TMA Units	0.0000	35.00	0.00	-5.14	162.00	1.401	11	1.91	0.73
7770.00 panel antenna	120.0000	104.06	4.45	2.57	162.00	1.401	11	11.80	8.01
LGP 13519 Diplexer Units	120.0000	10.60	4.45	2.57	162.00	1.401	11	0.31	0.21
LGP 21401 TMA Units	120.0000	35.00	4.45	2.57	162.00	1.401	11	1.91	0.73
7770.00 panel antenna	240.0000	104.06	-4.45	2.57	162.00	1.401	11	11.80	8.01
LGP 13519 Diplexer Units	240.0000	10.60	-4.45	2.57	162.00	1.401	11	0.31	0.21
LGP 21401 TMA Units	240.0000	35.00	-4.45	2.57	162.00	1.401	11	1.91	0.73
DB980F90E-M w/Mount Pipe	0.0000	68.10	0.00	-4.82	169.00	1.413	11	8.74	7.91
DB980F90E-M w/Mount Pipe	120.0000	68.10	4.17	2.41	169.00	1.413	11	8.74	7.91
DB980F90E-M w/Mount Pipe	240.0000	68.10	-4.17	2.41	169.00	1.413	11	8.74	7.91
SitePro1 VFA12-RRU Mount Assembly	0.0000	450.00	0.00	-4.32	169.00	1.413	11	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	120.0000	450.00	3.74	2.16	169.00	1.413	11	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	240.0000	450.00	-3.74	2.16	169.00	1.413	11	12.02	7.98
BXA-185085-12CF Panel Antennas w/ Pipe Mount	0.0000	47.74	0.00	-6.07	142.00	1.363	11	4.79	5.34
BXA-185085-12CF Panel Antennas w/ Pipe Mount	120.0000	47.74	5.25	3.03	142.00	1.363	11	4.79	5.34
BXA-185085-12CF Panel Antennas w/ Pipe Mount	240.0000	47.74	-5.25	3.03	142.00	1.363	11	4.79	5.34
BXA-80080-8CF Panel Antenna w/ Pipe Mount	0.0000	65.74	0.00	-6.07	142.00	1.363	11	10.84	8.45
BXA-80080-8CF Panel Antenna w/ Pipe Mount	120.0000	65.74	5.25	3.03	142.00	1.363	11	10.84	8.45
BXA-80080-8CF Panel	240.0000	65.74	-5.25	3.03	142.00	1.363	11	10.84	8.45

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Antenna w/ Pipe Mount SitePro1 VFA12-RRU Mount Assembly	0.0000	450.00	0.00	-5.29	148.00	1.375	11	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	120.0000	450.00	4.58	2.64	148.00	1.375	11	12.02	7.98
SitePro1 VFA12-RRU Mount Assembly	240.0000	450.00	-4.58	2.64	148.00	1.375	11	12.02	7.98
10'6"x4" Pipe Mount	240.0000	114.00	-3.30	1.91	180.00	1.432	11	3.28	3.28
Lightning Rod 5/8x4'	240.0000	31.00	-2.82	1.63	192.00	1.452	11	0.25	0.25
PD1142-30	120.0000	10.00	2.86	1.65	191.00	1.450	11	0.14	0.14
6'8"x4" Pipe Mount	120.0000	72.00	2.86	1.65	191.00	1.450	11	1.93	1.93
2" Dia 8' Omni	0.0000	5.00	0.00	-4.13	184.00	1.439	11	2.00	2.00
2'6"x4" Pipe Mount	0.0000	27.00	0.00	-4.13	184.00	1.439	11	0.64	0.64
3" Dia 20' Omni	120.0000	55.00	3.65	2.11	182.00	1.436	11	4.00	4.00
3" Dia 20' Omni	240.0000	55.00	-3.65	2.11	182.00	1.436	11	4.00	4.00
PD220	0.0000	23.00	0.00	-4.50	176.00	1.426	11	3.08	3.08
3'4"x4" Pipe Mount	240.0000	36.00	-3.46	2.00	176.00	1.426	11	0.88	0.88
DB292-A	240.0000	15.00	-6.63	-1.94	170.00	1.415	11	1.80	1.80
PD1142-1	120.0000	10.00	2.61	6.13	158.00	1.394	11	1.32	1.32
DB222	0.0000	16.00	-4.00	-5.56	153.00	1.384	11	1.60	1.60
DB586-Y	0.0000	8.25	4.00	-5.58	152.50	1.383	11	1.01	1.01
432E-83I-01T TTA Unit	0.0000	25.00	4.00	-5.56	153.00	1.384	11	3.33	1.11
DB586-Y	0.0000	8.25	4.00	-5.86	146.50	1.372	11	1.01	1.01
10' Dipole (Generic)	240.0000	55.00	-7.01	-0.57	148.00	1.375	11	4.00	4.00
10'6"x4" Pipe Mount	240.0000	114.00	-7.01	-0.57	148.00	1.375	11	3.35	3.35
GPS	120.0000	10.00	11.88	6.86	52.00	1.103	9	1.00	1.00
4' Side Arm (Sq Tube)	120.0000	50.00	8.42	4.86	52.00	1.103	9	2.72	2.72
DB803M-Y	0.0000	4.30	0.00	-13.42	37.00	1.027	8	0.50	0.50
DB803M-Y	0.0000	4.30	0.00	-13.85	27.50	0.964	8	0.50	0.50
3' Side Arm Mount	0.0000	50.00	0.00	-10.69	31.00	0.989	8	2.72	2.72
DB803M-Y	120.0000	4.30	11.05	6.38	29.50	0.979	8	0.50	0.50
3' Yagi	120.0000	30.95	11.59	6.69	16.00	0.860	7	2.08	2.08
2' Side Arm Mount	120.0000	50.00	9.34	5.39	29.00	0.975	8	2.72	2.72
SC479-HF1LDF (Inverted)	240.0000	34.00	-8.79	5.07	172.75	1.420	11	5.06	5.06
SC479-HF1LDF (Inverted)	240.0000	34.00	-6.19	3.57	172.75	1.420	11	5.06	5.06
SC479-HF1LDF	240.0000	34.00	-8.50	4.91	180.00	1.432	11	5.06	5.06
432E-83I-01T TTA Unit	240.0000	25.00	-5.90	3.41	180.00	1.432	11	3.33	1.11
Pirod 4' Side Mount Standoff (1)	240.0000	50.00	-3.30	1.91	180.00	1.432	11	2.72	2.72
	Sum Weight:	5112.07							

Dish Pressures - No Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z psf
176.00	PA6-65	325.4000	90.00	-4.33	2.50	1.426	28.27	48
		Sum Weight:	90.00					

Dish Pressures - With Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z psf	t_z in
176.00	PA6-65	325.4000	444.67	-4.33	2.50	1.426	30.11	5	1.1822
		Sum Weight:	444.67						

Dish Pressures - Service

Elevation ft	Dish Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z psf
176.00	PA6-65	325.4000	90.00	-4.33	2.50	1.426	28.27	11
		Sum Weight:	90.00					

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	10861.49					
Bracing Weight	16029.92					
Total Member Self-Weight	26891.41			3.56	-3.70	
Total Weight	36937.91			3.56	-3.70	
Wind 0 deg - No Ice		39.73	-59907.02	-5780.96	-10.85	16.36
Wind 30 deg - No Ice		28696.90	-49619.77	-4835.83	-2804.81	21.33
Wind 60 deg - No Ice		48904.39	-28231.93	-2761.16	-4790.31	20.59
Wind 90 deg - No Ice		57324.98	-39.73	-3.59	-5593.54	14.33
Wind 120 deg - No Ice		51906.12	29919.10	2889.63	-5014.80	4.23
Wind 150 deg - No Ice		28628.08	49580.04	4835.80	-2792.43	-7.00
Wind 180 deg - No Ice		-39.73	56395.04	5520.61	3.45	-16.36
Wind 210 deg - No Ice		-28696.90	49619.77	4842.95	2797.42	-21.33
Wind 240 deg - No Ice		-51945.85	29987.92	2902.01	5014.55	-20.59
Wind 270 deg - No Ice		-57324.98	39.73	10.71	5586.15	-14.33
Wind 300 deg - No Ice		-48864.65	-28163.11	-2748.77	4775.77	-4.23
Wind 330 deg - No Ice		-28628.08	-49580.04	-4828.68	2785.03	7.00
Member Ice	27460.97					
Total Weight Ice	99764.86			-12.54	-24.60	
Wind 0 deg - Ice		4.46	-10075.99	-1016.48	-25.40	3.53
Wind 30 deg - Ice		4924.18	-8519.84	-866.62	-518.47	-0.04
Wind 60 deg - Ice		8454.99	-4881.39	-503.08	-873.96	-3.60
Wind 90 deg - Ice		9840.65	-4.46	-13.35	-1010.96	-6.20
Wind 120 deg - Ice		8728.48	5034.14	488.73	-894.16	-7.13
Wind 150 deg - Ice		4916.46	8515.38	840.74	-517.08	-6.16
Wind 180 deg - Ice		-4.46	9755.05	967.14	-23.80	-3.53
Wind 210 deg - Ice		-4924.18	8519.84	841.54	469.27	0.04
Wind 240 deg - Ice		-8732.94	5041.86	490.12	845.76	3.60
Wind 270 deg - Ice		-9840.65	4.46	-11.74	961.75	6.20
Wind 300 deg - Ice		-8450.54	-4873.67	-501.69	823.96	7.13
Wind 330 deg - Ice		-4916.46	-8515.38	-865.82	467.88	6.16
Total Weight	36937.91			3.56	-3.70	
Wind 0 deg - Service		9.15	-13802.58	-1334.26	-0.07	3.77
Wind 30 deg - Service		6611.77	-11432.39	-1116.51	-643.80	4.91
Wind 60 deg - Service		11267.57	-6504.64	-638.50	-1101.26	4.74
Wind 90 deg - Service		13207.67	-9.15	-3.16	-1286.32	3.30
Wind 120 deg - Service		11959.17	6893.36	663.44	-1152.98	0.97

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 150 deg - Service		6595.91	11423.24	1111.84	-640.95	-1.61
Wind 180 deg - Service		-9.15	12993.42	1269.62	3.22	-3.77
Wind 210 deg - Service		-6611.77	11432.39	1113.49	646.95	-4.91
Wind 240 deg - Service		-11968.32	6909.22	666.29	1157.78	-4.74
Wind 270 deg - Service		-13207.67	9.15	0.14	1289.48	-3.30
Wind 300 deg - Service		-11258.42	-6488.78	-635.65	1102.76	-0.97
Wind 330 deg - Service		-6595.91	-11423.24	-1114.86	644.10	1.61

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service

Comb. No.	Description
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 175	Leg	Max Tension	23	1308.94	-0.44	0.08
			Max. Compression	34	-2484.35	0.03	-0.04
			Max. Mx	22	1246.73	-0.45	0.08
			Max. My	24	121.29	-0.04	0.55
			Max. Vy	6	479.36	-0.44	0.01
			Max. Vx	24	-861.26	-0.04	0.55
		Diagonal	Max Tension	10	1891.76	0.00	0.00
			Max. Compression	22	-1844.36	0.00	0.00
			Max. Mx	26	65.66	0.13	0.00
			Max. My	26	79.91	0.00	-0.00
			Max. Vy	26	-61.67	0.00	0.00
			Max. Vx	26	1.77	0.00	0.00
		Top Girt	Max Tension	23	885.98	0.00	0.00
			Max. Compression	10	-921.91	0.00	0.00
			Max. Mx	26	-18.99	-0.06	0.00
			Max. My	26	-40.68	0.00	0.00
			Max. Vy	26	-36.47	0.00	0.00
			Max. Vx	26	0.84	0.00	0.00
T2	175 - 150	Leg	Max Tension	23	19825.99	-0.25	-0.07
			Max. Compression	10	-23703.27	0.52	0.11
			Max. Mx	22	11142.26	-0.77	-0.02
			Max. My	16	-484.82	-0.05	0.74
			Max. Vy	6	625.73	-0.76	-0.03
			Max. Vx	12	631.77	-0.01	-0.72
		Diagonal	Max Tension	8	8863.20	0.00	0.00
			Max. Compression	20	-8836.49	0.00	0.00
			Max. Mx	26	87.35	0.23	0.00
			Max. My	26	99.55	0.00	-0.01
			Max. Vy	26	-78.09	0.00	0.00
			Max. Vx	26	-2.50	0.00	0.00
		Horizontal	Max Tension	20	6004.71	0.00	0.00
			Max. Compression	10	-6013.42	0.00	0.00
			Max. Mx	26	92.72	-0.10	0.00
			Max. My	26	101.75	0.00	0.00
			Max. Vy	26	49.64	0.00	0.00
			Max. Vx	26	-1.15	0.00	0.00
T3	150 - 125	Leg	Max Tension	23	54451.13	-0.20	-0.09
			Max. Compression	18	-62960.59	0.50	-0.22
			Max. Mx	14	27870.82	-0.57	-0.07
			Max. My	22	-35370.96	0.16	-0.57
			Max. Vy	6	629.35	-0.42	-0.04
			Max. Vx	4	640.60	0.01	-0.42
		Diagonal	Max Tension	8	13717.57	0.00	0.00
			Max. Compression	20	-13717.21	0.00	0.00
			Max. Mx	26	65.43	0.43	0.00
			Max. My	26	71.00	0.00	-0.01
			Max. Vy	26	126.67	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	26	3.71	0.00	0.00
		Horizontal	Max Tension	20	10472.32	0.00	0.00
			Max. Compression	8	-10472.32	0.00	0.00
			Max. Mx	26	189.76	-0.20	0.00
			Max. My	26	188.35	0.00	0.00
			Max. Vy	26	78.51	0.00	0.00
			Max. Vx	26	1.81	0.00	0.00
T4	125 - 100	Leg	Max Tension	7	87934.25	-0.37	0.03
			Max. Compression	18	-100375.78	0.40	0.06
			Max. Mx	11	-68714.08	0.50	-0.21
			Max. My	22	-36021.93	0.16	-0.57
			Max. Vy	11	-123.90	0.38	-0.02
			Max. Vx	19	151.44	-0.19	0.54
		Diagonal	Max Tension	9	11069.70	0.00	0.00
			Max. Compression	8	-11193.32	0.00	0.00
			Max. Mx	26	-115.32	0.15	0.00
			Max. My	26	-113.68	0.00	-0.01
			Max. Vy	26	-57.02	0.00	0.00
			Max. Vx	26	2.14	0.00	0.00
		Horizontal	Max Tension	21	10916.96	0.01	0.00
			Max. Compression	8	-10946.92	0.00	0.00
			Max. Mx	29	57.77	0.07	0.02
			Max. My	29	57.77	0.07	0.02
			Max. Vy	29	46.25	0.07	0.02
			Max. Vx	31	-3.79	0.00	0.00
T5	100 - 75	Leg	Max Tension	7	131481.16	-0.40	-0.03
			Max. Compression	18	-148536.10	0.48	0.04
			Max. Mx	19	-146787.62	0.48	0.04
			Max. My	16	-6771.32	-0.01	0.51
			Max. Vy	3	-94.85	0.48	-0.03
			Max. Vx	4	120.25	-0.01	-0.51
		Diagonal	Max Tension	9	12496.38	0.00	0.00
			Max. Compression	8	-12656.18	0.00	0.00
			Max. Mx	26	-151.14	0.18	0.00
			Max. My	26	-163.80	0.00	-0.01
			Max. Vy	26	-64.61	0.00	0.00
			Max. Vx	26	2.23	0.00	0.00
		Horizontal	Max Tension	8	8427.10	0.00	0.00
			Max. Compression	9	-8358.11	0.00	0.00
			Max. Mx	29	107.25	0.11	0.02
			Max. My	29	107.25	0.11	0.02
			Max. Vy	29	64.28	0.11	0.02
			Max. Vx	31	-4.49	0.00	0.00
T6	75 - 50	Leg	Max Tension	7	176968.68	-0.44	-0.05
			Max. Compression	18	-199710.80	0.56	0.05
			Max. Mx	19	-197482.42	0.56	0.05
			Max. My	16	-8838.19	-0.02	0.53
			Max. Vy	22	125.60	-0.55	0.00
			Max. Vx	4	171.61	-0.02	-0.53
		Diagonal	Max Tension	21	13720.02	0.00	0.00
			Max. Compression	20	-13962.85	0.00	0.00
			Max. Mx	26	-225.67	0.25	0.00
			Max. My	26	-222.00	0.00	-0.01
			Max. Vy	26	-85.36	0.00	0.00
			Max. Vx	26	2.76	0.00	0.00
		Horizontal	Max Tension	20	9914.48	0.06	0.02
			Max. Compression	21	-9791.31	0.04	0.01
			Max. Mx	29	160.53	0.14	0.03
			Max. My	27	263.27	0.12	0.03
			Max. Vy	29	-75.58	0.14	0.03
			Max. Vx	31	5.47	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T7	50 - 25	Leg	Max Tension	7	223457.70	-0.67	-0.02
			Max. Compression	18	-253117.83	-1.57	0.08
			Max. Mx	10	-252831.71	-1.57	0.00
			Max. My	16	-11432.24	-0.20	2.09
			Max. Vy	18	556.91	0.48	-0.02
			Max. Vx	16	-564.21	-0.20	2.09
		Diagonal	Max Tension	21	15115.00	0.00	0.00
			Max. Compression	20	-15412.05	0.00	0.00
			Max. Mx	26	-277.32	0.33	0.00
			Max. My	26	-277.45	0.00	-0.01
			Max. Vy	26	104.50	0.00	0.00
			Max. Vx	26	3.21	0.00	0.00
		Horizontal	Max Tension	20	11506.40	0.07	0.02
			Max. Compression	21	-11367.41	0.05	0.02
			Max. Mx	29	163.84	0.16	0.04
			Max. My	27	190.82	0.15	0.04
			Max. Vy	29	-81.51	0.16	0.04
			Max. Vx	31	6.15	0.00	0.00
		Secondary Horizontal	Max Tension	18	4497.01	0.00	0.00
			Max. Compression	18	-4497.01	0.00	0.00
			Max. Mx	26	531.59	-0.60	0.00
			Max. My	26	530.68	0.00	0.01
			Max. Vy	26	129.41	0.00	0.00
			Max. Vx	26	2.99	0.00	0.00
T8	25 - 0	Leg	Max Tension	7	260777.05	5.68	-0.13
			Max. Compression	18	-297176.99	0.00	0.00
			Max. Mx	18	-296923.29	7.72	-0.09
			Max. My	16	-12588.65	-0.54	3.80
			Max. Vy	18	2393.82	7.70	-0.10
			Max. Vx	16	-972.49	-0.54	3.80
		Diagonal	Max Tension	21	20089.73	-0.19	0.01
			Max. Compression	20	-20726.26	0.00	0.00
			Max. Mx	6	14584.92	-0.27	0.02
			Max. My	35	-491.67	-0.12	0.03
			Max. Vy	29	-81.58	-0.14	-0.03
			Max. Vx	27	-5.61	0.00	0.00
		Horizontal	Max Tension	20	12264.96	0.11	0.04
			Max. Compression	20	-12277.84	0.11	0.04
			Max. Mx	29	-44.60	0.24	0.07
			Max. My	37	1689.19	0.18	0.08
			Max. Vy	29	105.17	0.24	0.07
			Max. Vx	33	9.50	0.00	0.00
		Redund Horz 1 Bracing	Max Tension	18	5154.04	0.00	0.00
			Max. Compression	18	-5154.04	0.00	0.00
			Max. Mx	26	602.78	-0.04	0.00
			Max. My	26	563.41	0.00	0.00
			Max. Vy	26	32.28	0.00	0.00
			Max. Vx	26	-0.75	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	18	4179.01	0.00	0.00
			Max. Compression	18	-4179.01	0.00	0.00
			Max. Mx	26	552.19	-0.06	0.00
			Max. My	26	521.27	0.00	-0.00
			Max. Vy	26	30.66	0.00	0.00
			Max. Vx	26	1.17	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	18	325896.51	30145.26	-16744.99
	Max. H_x	18	325896.51	30145.26	-16744.99
	Max. H_z	5	-249257.00	-22196.24	15683.56
	Min. Vert	7	-285916.64	-27032.61	14955.83
	Min. H_x	7	-285916.64	-27032.61	14955.83
	Min. H_z	18	325896.51	30145.26	-16744.99
Leg B	Max. Vert	10	325638.02	-29886.84	-17116.71
	Max. H_x	23	-284918.54	26769.01	15318.57
	Max. H_z	25	-248153.53	21761.43	16329.54
	Min. Vert	23	-284918.54	26769.01	15318.57
	Min. H_x	10	325638.02	-29886.84	-17116.71
	Min. H_z	12	274585.37	-23234.57	-17178.12
Leg A	Max. Vert	2	325170.54	451.13	34433.27
	Max. H_x	20	14147.05	5751.39	939.82
	Max. H_z	2	325170.54	451.13	34433.27
	Min. Vert	15	-285437.38	-445.95	-30845.97
	Min. H_x	9	11298.47	-5746.21	748.38
	Min. H_z	15	-285437.38	-445.95	-30845.97

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	36937.91	0.00	0.00	3.56	-3.70	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	44325.49	39.73	-59907.02	-5645.02	-11.59	16.36
0.9 Dead+1.0 Wind 0 deg - No Ice	33244.12	39.73	-59907.02	-5646.08	-10.48	16.36
1.2 Dead+1.0 Wind 30 deg - No Ice	44325.49	28696.90	-49619.77	-4722.96	-2740.80	21.33
0.9 Dead+1.0 Wind 30 deg - No Ice	33244.12	28696.90	-49619.77	-4724.03	-2739.69	21.33
1.2 Dead+1.0 Wind 60 deg - No Ice	44325.49	48904.39	-28231.93	-2696.64	-4680.54	20.59
0.9 Dead+1.0 Wind 60 deg - No Ice	33244.12	48904.39	-28231.93	-2697.71	-4679.43	20.59
1.2 Dead+1.0 Wind 90 deg - No Ice	44325.49	57324.98	-39.73	-2.88	-5464.77	14.33
0.9 Dead+1.0 Wind 90 deg - No Ice	33244.12	57324.98	-39.73	-3.95	-5463.66	14.33
1.2 Dead+1.0 Wind 120 deg - No Ice	44325.49	51906.12	29919.10	2822.72	-4898.42	4.23
0.9 Dead+1.0 Wind 120 deg - No Ice	33244.12	51906.12	29919.10	2821.65	-4897.31	4.23
1.2 Dead+1.0 Wind 150 deg - No Ice	44325.49	28628.08	49580.04	4724.35	-2728.41	-7.01
0.9 Dead+1.0 Wind 150 deg - No Ice	33244.12	28628.08	49580.04	4723.28	-2727.30	-7.01
1.2 Dead+1.0 Wind 180 deg - No Ice	44325.49	-39.73	56395.04	5393.72	2.71	-16.36
0.9 Dead+1.0 Wind 180 deg - No Ice	33244.12	-39.73	56395.04	5392.65	3.82	-16.36
1.2 Dead+1.0 Wind 210 deg -	44325.49	-28696.90	49619.77	4731.50	2731.92	-21.33

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
No Ice						
0.9 Dead+1.0 Wind 210 deg - No Ice	33244.12	-28696.90	49619.77	4730.43	2733.03	-21.33
1.2 Dead+1.0 Wind 240 deg - No Ice	44325.49	-51945.85	29987.92	2835.11	4896.70	-20.59
0.9 Dead+1.0 Wind 240 deg - No Ice	33244.12	-51945.85	29987.92	2834.04	4897.81	-20.59
1.2 Dead+1.0 Wind 270 deg - No Ice	44325.49	-57324.98	39.73	11.42	5455.89	-14.33
0.9 Dead+1.0 Wind 270 deg - No Ice	33244.12	-57324.98	39.73	10.36	5457.00	-14.33
1.2 Dead+1.0 Wind 300 deg - No Ice	44325.49	-48864.65	-28163.11	-2684.26	4664.52	-4.23
0.9 Dead+1.0 Wind 300 deg - No Ice	33244.12	-48864.65	-28163.11	-2685.33	4665.62	-4.23
1.2 Dead+1.0 Wind 330 deg - No Ice	44325.49	-28628.08	-49580.04	-4715.81	2719.53	7.01
0.9 Dead+1.0 Wind 330 deg - No Ice	33244.12	-28628.08	-49580.04	-4716.87	2720.64	7.01
1.2 Dead+1.0 Ice+1.0 Temp	107152.44	0.00	-0.00	-11.83	-25.34	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	107152.44	4.46	-10075.99	-992.73	-26.14	3.53
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	107152.44	4924.18	-8519.84	-846.45	-507.98	-0.04
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	107152.44	8454.99	-4881.39	-491.23	-855.40	-3.60
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	107152.44	9840.65	-4.46	-12.63	-989.23	-6.20
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	107152.44	8728.48	5034.14	477.92	-874.95	-7.13
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	107152.44	4916.46	8515.38	821.99	-506.59	-6.16
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	107152.44	-4.46	9755.05	945.57	-24.54	-3.53
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	107152.44	-4924.18	8519.84	822.79	457.30	0.04
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	107152.44	-8732.94	5041.86	479.31	825.07	3.60
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	107152.44	-9840.65	4.46	-11.03	938.54	6.20
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	107152.44	-8450.54	-4873.67	-489.84	803.92	7.13
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	107152.44	-4916.46	-8515.38	-845.65	455.91	6.16
Dead+Wind 0 deg - Service	36937.91	9.15	-13802.58	-1298.04	-5.35	3.77
Dead+Wind 30 deg - Service	36937.91	6611.77	-11432.39	-1085.59	-634.16	4.91
Dead+Wind 60 deg - Service	36937.91	11267.57	-6504.64	-618.73	-1081.07	4.74
Dead+Wind 90 deg - Service	36937.91	13207.67	-9.15	1.91	-1261.76	3.30
Dead+Wind 120 deg - Service	36937.91	11959.17	6893.36	652.93	-1131.27	0.97
Dead+Wind 150 deg - Service	36937.91	6595.91	11423.24	1091.07	-631.30	-1.61
Dead+Wind 180 deg - Service	36937.91	-9.15	12993.42	1245.29	-2.05	-3.77
Dead+Wind 210 deg - Service	36937.91	-6611.77	11432.39	1092.71	626.76	-4.91
Dead+Wind 240 deg - Service	36937.91	-11968.32	6909.22	655.78	1125.52	-4.74
Dead+Wind 270 deg - Service	36937.91	-13207.67	9.15	5.21	1254.36	-3.30
Dead+Wind 300 deg - Service	36937.91	-11258.42	-6488.78	-615.88	1072.03	-0.97
Dead+Wind 330 deg - Service	36937.91	-6595.91	-11423.24	-1083.95	623.91	1.61

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-36937.91	0.00	-0.00	36937.91	-0.00	0.000%
2	39.73	-44325.49	-59907.02	-39.73	44325.49	59907.02	0.000%
3	39.73	-33244.12	-59907.02	-39.73	33244.12	59907.02	0.000%
4	28696.90	-44325.49	-49619.77	-28696.90	44325.49	49619.77	0.000%
5	28696.90	-33244.12	-49619.77	-28696.90	33244.12	49619.77	0.000%
6	48904.39	-44325.49	-28231.93	-48904.39	44325.49	28231.93	0.000%
7	48904.39	-33244.12	-28231.93	-48904.39	33244.12	28231.93	0.000%
8	57324.98	-44325.49	-39.73	-57324.98	44325.49	39.73	0.000%
9	57324.98	-33244.12	-39.73	-57324.98	33244.12	39.73	0.000%
10	51906.12	-44325.49	29919.10	-51906.12	44325.49	-29919.10	0.000%
11	51906.12	-33244.12	29919.10	-51906.12	33244.12	-29919.10	0.000%
12	28628.08	-44325.49	49580.04	-28628.08	44325.49	-49580.04	0.000%
13	28628.08	-33244.12	49580.04	-28628.08	33244.12	-49580.04	0.000%
14	-39.73	-44325.49	56395.04	39.73	44325.49	-56395.04	0.000%
15	-39.73	-33244.12	56395.04	39.73	33244.12	-56395.04	0.000%
16	-28696.90	-44325.49	49619.77	28696.90	44325.49	-49619.77	0.000%
17	-28696.90	-33244.12	49619.77	28696.90	33244.12	-49619.77	0.000%
18	-51945.85	-44325.49	29987.92	51945.85	44325.49	-29987.92	0.000%
19	-51945.85	-33244.12	29987.92	51945.85	33244.12	-29987.92	0.000%
20	-57324.98	-44325.49	39.73	57324.98	44325.49	-39.73	0.000%
21	-57324.98	-33244.12	39.73	57324.98	33244.12	-39.73	0.000%
22	-48864.65	-44325.49	-28163.11	48864.65	44325.49	28163.11	0.000%
23	-48864.65	-33244.12	-28163.11	48864.65	33244.12	28163.11	0.000%
24	-28628.08	-44325.49	-49580.04	28628.08	44325.49	49580.04	0.000%
25	-28628.08	-33244.12	-49580.04	28628.08	33244.12	49580.04	0.000%
26	0.00	-107152.45	0.00	-0.00	107152.44	0.00	0.000%
27	4.46	-107152.45	-10075.99	-4.46	107152.44	10075.99	0.000%
28	4924.18	-107152.45	-8519.84	-4924.18	107152.44	8519.84	0.000%
29	8454.99	-107152.45	-4881.39	-8454.99	107152.44	4881.39	0.000%
30	9840.65	-107152.45	-4.46	-9840.65	107152.44	4.46	0.000%
31	8728.48	-107152.45	5034.14	-8728.48	107152.44	-5034.14	0.000%
32	4916.46	-107152.45	8515.38	-4916.46	107152.44	-8515.38	0.000%
33	-4.46	-107152.45	9755.05	4.46	107152.44	-9755.05	0.000%
34	-4924.18	-107152.45	8519.84	4924.18	107152.44	-8519.84	0.000%
35	-8732.94	-107152.45	5041.86	8732.94	107152.44	-5041.86	0.000%
36	-9840.65	-107152.45	4.46	9840.65	107152.44	-4.46	0.000%
37	-8450.54	-107152.45	-4873.67	8450.54	107152.44	4873.67	0.000%
38	-4916.46	-107152.45	-8515.38	4916.46	107152.44	8515.38	0.000%
39	9.15	-36937.91	-13802.58	-9.15	36937.91	13802.58	0.000%
40	6611.77	-36937.91	-11432.39	-6611.77	36937.91	11432.39	0.000%
41	11267.57	-36937.91	-6504.64	-11267.57	36937.91	6504.64	0.000%
42	13207.67	-36937.91	-9.15	-13207.67	36937.91	9.15	0.000%
43	11959.17	-36937.91	6893.36	-11959.17	36937.91	-6893.36	0.000%
44	6595.91	-36937.91	11423.24	-6595.91	36937.91	-11423.24	0.000%
45	-9.15	-36937.91	12993.42	9.15	36937.91	-12993.42	0.000%
46	-6611.77	-36937.91	11432.39	6611.77	36937.91	-11432.39	0.000%
47	-11968.32	-36937.91	6909.22	11968.32	36937.91	-6909.22	0.000%
48	-13207.67	-36937.91	9.15	13207.67	36937.91	-9.15	0.000%
49	-11258.42	-36937.91	-6488.78	11258.42	36937.91	6488.78	0.000%
50	-6595.91	-36937.91	-11423.24	6595.91	36937.91	11423.24	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	4.316	47	0.1893	0.0514
T2	175 - 150	4.117	47	0.1891	0.0484
T3	150 - 125	3.112	47	0.1812	0.0237
T4	125 - 100	2.180	47	0.1569	0.0089
T5	100 - 75	1.401	43	0.1316	0.0074
T6	75 - 50	0.780	43	0.0974	0.0054
T7	50 - 25	0.339	43	0.0654	0.0035
T8	25 - 0	0.078	47	0.0285	0.0015

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	Lightning Rod 5/8x4'	47	4.316	0.1893	0.0514	162500
191.00	PD1142-30	47	4.316	0.1893	0.0514	162500
184.00	2" Dia 8' Omni	47	4.316	0.1893	0.0514	162500
182.00	3" Dia 20' Omni	47	4.316	0.1893	0.0514	162500
180.00	10'6"x4" Pipe Mount	47	4.316	0.1893	0.0514	162500
176.00	PA6-65	47	4.157	0.1892	0.0491	162500
172.75	SC479-HF1LDF (Inverted)	47	4.027	0.1889	0.0468	161887
170.00	DB292-A	47	3.916	0.1886	0.0444	219638
169.00	(2) DB980F90E-M w/Mount Pipe	47	3.875	0.1885	0.0435	260076
165.50	SC479-HF1LDF (Inverted)	47	3.734	0.1879	0.0400	731351
162.00	(2) 7770.00 panel antenna	47	3.592	0.1870	0.0361	425251
158.00	PD1142-1	47	3.431	0.1856	0.0316	195333
155.00	DB586-Y	47	3.311	0.1842	0.0282	138978
153.00	DB222	47	3.231	0.1831	0.0262	116718
152.50	DB586-Y	47	3.211	0.1828	0.0258	112328
150.00	DB586-Y	47	3.112	0.1812	0.0237	95488
149.00	DB586-Y	47	3.073	0.1805	0.0229	90626
148.00	SitePro1 VFA12-RRU Mount Assembly	47	3.033	0.1797	0.0221	86497
146.50	DB586-Y	47	2.975	0.1785	0.0209	81271
144.00	DB586-Y	47	2.878	0.1764	0.0190	74123
142.00	BXA-185085-12CF Panel Antennas w/ Pipe Mount	47	2.801	0.1745	0.0175	69270
129.00	ANT220F2 Antenna	47	2.321	0.1610	0.0103	48599
126.00	Site Pro USF-4U w/ (2) Stiff-Arm Supports	47	2.215	0.1579	0.0092	45962
114.00	ANT220F2 Antenna	43	1.818	0.1462	0.0093	46632
111.00	Site Pro USF-4U w/ (2) Stiff-Arm Supports	43	1.724	0.1433	0.0090	47248
52.00	GPS	43	0.368	0.0681	0.0037	44737
40.50	DB803M-Y	43	0.216	0.0514	0.0028	39220
37.00	DB803M-Y	43	0.178	0.0460	0.0025	37336
33.50	DB803M-Y	43	0.144	0.0407	0.0022	35625
31.00	DB803M-Y	43	0.122	0.0370	0.0020	34496
29.50	DB803M-Y	43	0.109	0.0348	0.0019	33853
29.00	2' Side Arm Mount	43	0.105	0.0341	0.0019	33655
27.50	DB803M-Y	43	0.094	0.0319	0.0017	33215
24.00	DB803M-Y	47	0.072	0.0271	0.0015	34179
16.00	3' Yagi	47	0.035	0.0172	0.0009	50089

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	18.709	18	0.8163	0.1606
T2	175 - 150	17.847	18	0.8157	0.1488
T3	150 - 125	13.504	18	0.7842	0.0658
T4	125 - 100	9.466	19	0.6803	0.0384
T5	100 - 75	6.078	19	0.5712	0.0319
T6	75 - 50	3.384	19	0.4226	0.0233
T7	50 - 25	1.469	19	0.2833	0.0153
T8	25 - 0	0.337	19	0.1233	0.0067

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	Lightning Rod 5/8x4'	18	18.709	0.8163	0.1606	39873
191.00	PD1142-30	18	18.709	0.8163	0.1606	39873
184.00	2" Dia 8' Omni	18	18.709	0.8163	0.1606	39873
182.00	3" Dia 20' Omni	18	18.709	0.8163	0.1606	39873
180.00	10'6"x4" Pipe Mount	18	18.709	0.8163	0.1606	39873
176.00	PA6-65	18	18.020	0.8159	0.1514	39873
172.75	SC479-HF1LDF (Inverted)	18	17.458	0.8152	0.1424	40114
170.00	DB292-A	18	16.979	0.8143	0.1336	55985
169.00	(2) DB980F90E-M w/Mount Pipe	18	16.805	0.8138	0.1302	67551
165.50	SC479-HF1LDF (Inverted)	18	16.193	0.8115	0.1175	243950
162.00	(2) 7770.00 panel antenna	18	15.582	0.8080	0.1041	120801
158.00	PD1142-1	18	14.884	0.8024	0.0888	48784
155.00	DB586-Y	18	14.364	0.7967	0.0778	33711
153.00	DB222	18	14.018	0.7922	0.0720	27994
152.50	DB586-Y	18	13.932	0.7910	0.0709	26883
150.00	DB586-Y	18	13.504	0.7842	0.0658	22667
149.00	DB586-Y	18	13.333	0.7812	0.0638	21465
148.00	SitePro1 VFA12-RRU Mount Assembly	18	13.163	0.7780	0.0619	20450
146.50	DB586-Y	18	12.909	0.7729	0.0592	19173
144.00	DB586-Y	18	12.489	0.7637	0.0551	17436
142.00	BXA-185085-12CF Panel Antennas w/ Pipe Mount	18	12.156	0.7559	0.0521	16263
129.00	ANT220F2 Antenna	19	10.073	0.6982	0.0408	11316
126.00	Site Pro USF-4U w/ (2) Stiff-Arm Supports	19	9.616	0.6847	0.0390	10689
114.00	ANT220F2 Antenna	19	7.890	0.6345	0.0370	10797
111.00	Site Pro USF-4U w/ (2) Stiff-Arm Supports	19	7.484	0.6220	0.0361	10927
52.00	GPS	19	1.594	0.2952	0.0160	10311
40.50	DB803M-Y	19	0.938	0.2226	0.0121	9047
37.00	DB803M-Y	19	0.772	0.1994	0.0108	8614
33.50	DB803M-Y	19	0.623	0.1764	0.0096	8220
31.00	DB803M-Y	19	0.527	0.1602	0.0087	7960
29.50	DB803M-Y	19	0.475	0.1507	0.0082	7812
29.00	2' Side Arm Mount	19	0.458	0.1476	0.0080	7767
27.50	DB803M-Y	19	0.409	0.1383	0.0075	7665
24.00	DB803M-Y	19	0.311	0.1175	0.0064	7889
16.00	3' Yagi	18	0.152	0.0745	0.0041	11561

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Diagonal	A325X	0.7500	1	1891.76	17943.80	0.105 ✔	1	Member Block Shear
T2	175	Leg	A325X	0.7500	6	896.84	30101.40	0.030 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	8863.20	17943.80	0.494 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	3002.36	7187.70	0.418 ✔	1	Member Block Shear
T3	150	Leg	A325X	0.7500	6	4945.66	30101.40	0.164 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	13717.60	25230.00	0.544 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	5236.16	10263.30	0.510 ✔	1	Member Block Shear
T4	125	Leg	A325X	0.7500	6	10143.00	30101.40	0.337 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	11069.70	17943.80	0.617 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	5458.48	7187.70	0.759 ✔	1	Member Block Shear
T5	100	Leg	A325X	1.0000	6	17023.50	54517.00	0.312 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	12496.40	17943.80	0.696 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	4213.55	10263.30	0.411 ✔	1	Member Block Shear
T6	75	Leg	A325X	1.0000	6	24420.00	54517.00	0.448 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	13720.00	23925.00	0.573 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	4957.24	10263.30	0.483 ✔	1	Member Block Shear
T7	50	Leg	A325X	1.0000	6	32062.60	54517.00	0.588 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	15115.00	25230.00	0.599 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	5753.20	10263.30	0.561 ✔	1	Member Block Shear
		Secondary Horizontal	A325X	0.7500	1	4497.01	12615.00	0.356 ✔	1	Member Bearing
T8	25	Leg	A325X	1.0000	8	29573.50	54517.00	0.542 ✔	1	Bolt Tension
		Diagonal	A325X	1.0000	1	20089.70	33878.90	0.593 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	6132.48	11622.70	0.528 ✔	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	HSS5x0.25	5.01	5.01	35.6 K=1.00	3.4894	-2484.35	143130.00	0.017 [1] ✔
T2	175 - 150	HSS5x0.25	25.03	8.34	59.3 K=1.00	3.4894	-23703.30	121395.00	0.195 [1] ✔
T3	150 - 125	HSS5x0.25	25.03	8.34	59.3 K=1.00	3.4894	-62960.60	121395.00	0.519 [1] ✔
T4	125 - 100	HSS5x.375	25.03	8.34	60.7 K=1.00	5.0994	-100376.00	199288.00	0.504 [1] ✔
T5	100 - 75	HSS5x.375	25.03	8.34	60.7 K=1.00	5.0994	-148536.00	199288.00	0.745 [1] ✔
T6	75 - 50	HSS5x0.5	25.03	8.34	62.1 K=1.00	6.6249	-199711.00	255022.00	0.783 [1] ✔
T7	50 - 25	HSS5x0.5	25.03	4.17	31.1 K=1.00	6.6249	-253118.00	328719.00	0.770 [1] ✔
T8	25 - 0	HSS6.875x0.5	25.03	6.26	33.0 K=1.00	9.3640	-297177.00	459464.00	0.647 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	2L2 1/2x2x3/16x3/8	8.44	7.65	122.6 K=1.00	1.6200	-1844.36	28486.00	0.065 [1] ✔
T2	175 - 150	2L2 1/2x2x3/16x3/8	12.02	11.18	179.1 K=1.00	1.6200	-8836.49	13981.90	0.632 [1] ✔
T3	150 - 125	2L3x2 1/2x1/4x3/8	13.54	12.74	166.2 K=1.00	2.6300	-13717.20	26462.70	0.518 [1] ✔
T4	125 - 100	2L2 1/2x2x3/16x3/8	10.57	9.96	159.6 K=1.00	1.6200	-11193.30	17432.80	0.642 [1] ✔
T5	100 - 75	2L2 1/2x2x3/16x3/8	11.21	10.63	170.4 K=1.00	1.6200	-12656.20	15393.00	0.822 [1] ✔
T6	75 - 50	2L2 1/2x2 1/2x1/4x3/8	11.91	11.34	177.0 K=1.00	2.3800	-13962.80	21744.20	0.642 [1] ✔
T7	50 - 25	2L3x2 1/2x1/4x3/8	12.64	12.09	157.7 K=1.00	2.6300	-15412.10	29266.40	0.527 [1] ✔
T8	25 - 0	2L3x3x5/16x3/8	16.33	15.55	143.9 K=1.00	3.5500	-20439.10	48035.40	0.426 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	175 - 150	L2 1/2x2 1/2x3/16	8.33	7.52	158.3 K=0.87	0.9020	-6013.42	10298.80	0.584 [1] ✔
T3	150 - 125	L3x3x1/4	10.33	9.52	164.9 K=0.85	1.4400	-10472.30	15159.30	0.691 [1] ✔
T4	125 - 100	L2 1/2x2 1/2x3/16	11.00	5.09	122.7 K=0.99	0.9020	-10946.90	17100.70	0.640 [1] ✔
T5	100 - 75	L3x2 1/2x1/4	14.33	10.24	153.2 K=0.94	1.3100	-8358.11	15980.20	0.523 [1] ✔
T6	75 - 50	L3x3x1/4	16.33	7.76	148.5 K=0.94	1.4400	-9791.31	18698.20	0.524 [1] ✔
T7	50 - 25	L3x3x1/4	18.33	8.76	163.9 K=0.92	1.4400	-11367.40	15340.30	0.741 [1] ✔
T8	25 - 0	L4x4x1/4	20.00	9.52	138.0 K=0.96	1.9400	-12277.80	29136.80	0.421 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T7	50 - 25	L3x3x1/4	18.67	13.42	272.0 K=1.00	1.4400	-4497.01	5572.52	0.807 [1] ✔
		KL/R > 200 (C) - 154							

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	L2 1/2x2x3/16	6.60	6.18	153.1 K=0.88	0.8090	-921.91	9882.63	0.093 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T8	25 - 0	L3x3x1/4	5.00	4.71	107.8	1.4400	-5154.04	32906.80	0.157 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
					K=1.13				✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T8	25 - 0	L3x3x1/4	7.85	7.38	149.6 K=1.00	1.4400	-4046.69	18426.40	0.220 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	HSS5x0.25	5.01	5.01	35.6	3.4894	1308.94	157023.00	0.008 [1] ✔
T2	175 - 150	HSS5x0.25	25.03	8.34	59.3	3.4894	19826.00	157023.00	0.126 [1] ✔
T3	150 - 125	HSS5x0.25	25.03	8.34	59.3	3.4894	54451.10	157023.00	0.347 [1] ✔
T4	125 - 100	HSS5x.375	25.03	8.34	60.7	5.0994	87934.30	275369.00	0.319 [1] ✔
T5	100 - 75	HSS5x.375	25.03	8.34	60.7	5.0994	131481.00	275369.00	0.477 [1] ✔
T6	75 - 50	HSS5x0.5	25.03	8.34	62.1	6.6249	176969.00	357745.00	0.495 [1] ✔
T7	50 - 25	HSS5x0.5	25.03	4.17	31.1	6.6249	223458.00	357745.00	0.625 [1] ✔
T8	25 - 0	HSS6.875x0.5	25.03	6.26	33.0	9.3640	260777.00	505655.00	0.516 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	2L2 1/2x2x3/16x3/8	8.44	7.65	119.9	0.9689	1891.76	42147.40	0.045 [1] ✔
T2	175 - 150	2L2 1/2x2x3/16x3/8	12.02	11.18	173.2	0.9689	8863.20	42147.40	0.210 [1] ✔
T3	150 - 125	2L3x2 1/2x1/4x3/8	13.54	12.74	165.2	1.6444	13717.60	71530.30	0.192 [1] ✔
T4	125 - 100	2L2 1/2x2x3/16x3/8	10.57	9.96	154.8	0.9689	11069.70	42147.40	0.263 [1] ✔
T5	100 - 75	2L2 1/2x2x3/16x3/8	11.21	10.63	165.0	0.9689	12496.40	42147.40	0.296 [1] ✔
T6	75 - 50	2L2 1/2x2 1/2x1/4x3/8	11.91	11.34	181.2	1.4569	13720.00	63374.10	0.216 [1] ✔
T7	50 - 25	2L3x2 1/2x1/4x3/8	12.64	12.09	157.0	1.6444	15115.00	71530.30	0.211 [1] ✔
T8	25 - 0	2L3x3x5/16x3/8	16.01	15.23	133.4	2.1352	20089.70	92879.30	0.216 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	175 - 150	L2 1/2x2 1/2x3/16	8.33	7.52	122.1	0.5710	6004.71	24839.90	0.242 [1] ✔
T3	150 - 125	L3x3x1/4	10.33	9.52	128.0	0.9394	10472.30	40862.80	0.256 [1] ✔
T4	125 - 100	L2 1/2x2 1/2x3/16	11.00	5.09	122.4	0.5710	10917.00	24839.90	0.439 [1] ✔
T5	100 - 75	L3x2 1/2x1/4	14.33	10.24	166.6	0.8419	8427.10	36621.60	0.230 [1] ✔
T6	75 - 50	L3x3x1/4	16.33	7.76	154.0	0.9394	9914.48	40862.80	0.243 [1] ✔
T7	50 - 25	L3x3x1/4	18.33	8.76	173.4	0.9394	11506.40	40862.80	0.282 [1] ✔
T8	25 - 0	L4x4x1/4	20.00	9.52	139.9	1.3144	12265.00	57175.30	0.215 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T7	50 - 25	L3x3x1/4	18.00	12.92	226.9	0.9159	4497.01	39843.30	0.113 [1]

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

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	L2 1/2x2x3/16	6.60	6.18	123.7	0.8090	885.98	26211.60	0.034 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T8	25 - 0	L3x3x1/4	5.00	4.71	60.8	1.4400	5154.04	46656.00	0.110 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T8	25 - 0	L3x3x1/4	7.70	7.23	93.3	1.4400	4179.01	46656.00	0.090 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	180 - 175	Leg	HSS5x0.25	1	-2484.35	143130.00	1.8	Pass
		Leg	HSS5x0.25	2	-1756.18	143130.00	1.3	Pass
		Leg	HSS5x0.25	3	-682.17	143130.00	1.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T2	175 - 150	Leg	HSS5x0.25	10	-23222.10	121395.00	19.1	Pass
		Leg	HSS5x0.25	11	-23703.30	121395.00	19.5	Pass
		Leg	HSS5x0.25	12	-21831.60	121395.00	18.0	Pass
T3	150 - 125	Leg	HSS5x0.25	31	-62960.60	121395.00	51.9	Pass
		Leg	HSS5x0.25	32	-62899.20	121395.00	51.8	Pass
		Leg	HSS5x0.25	33	-62415.00	121395.00	51.4	Pass
T4	125 - 100	Leg	HSS5x.375	52	-100376.00	199288.00	50.4	Pass
		Leg	HSS5x.375	53	-99763.10	199288.00	50.1	Pass
		Leg	HSS5x.375	54	-100126.00	199288.00	50.2	Pass
T5	100 - 75	Leg	HSS5x.375	82	-148536.00	199288.00	74.5	Pass
		Leg	HSS5x.375	83	-147988.00	199288.00	74.3	Pass
		Leg	HSS5x.375	84	-148097.00	199288.00	74.3	Pass
T6	75 - 50	Leg	HSS5x0.5	112	-199711.00	255022.00	78.3	Pass
		Leg	HSS5x0.5	113	-199303.00	255022.00	78.2	Pass
		Leg	HSS5x0.5	114	-199123.00	255022.00	78.1	Pass
T7	50 - 25	Leg	HSS5x0.5	142	-253118.00	328719.00	77.0	Pass
		Leg	HSS5x0.5	143	-252832.00	328719.00	76.9	Pass
		Leg	HSS5x0.5	144	-252483.00	328719.00	76.8	Pass
T8	25 - 0	Leg	HSS6.875x0.5	181	-297177.00	459464.00	64.7	Pass
		Leg	HSS6.875x0.5	182	-296957.00	459464.00	64.6	Pass
		Leg	HSS6.875x0.5	183	-296473.00	459464.00	64.5	Pass
T1	180 - 175	Diagonal	2L2 1/2x2x3/16x3/8	7	-1844.36	28486.00	6.5 10.5 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	8	-186.01	28486.00	0.7 1.2 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	9	-1829.38	28486.00	6.4 9.9 (b)	Pass
T2	175 - 150	Diagonal	2L2 1/2x2x3/16x3/8	16	-8836.49	13981.90	63.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	17	-6519.75	13981.90	46.6	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	18	-8673.01	13981.90	62.0	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	22	-8093.93	15189.90	53.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	23	-4934.75	15189.90	32.5	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	24	-8163.35	15189.90	53.7	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	28	-5516.86	16496.00	33.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	29	-1712.97	16496.00	10.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	30	-5730.48	16496.00	34.7	Pass
T3	150 - 125	Diagonal	2L3x2 1/2x1/4x3/8	37	-13717.20	26462.70	51.8 54.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	38	-12430.30	26462.70	47.0 49.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	39	-13312.50	26462.70	50.3 52.6 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	43	-13006.80	28676.50	45.4 51.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	44	-11386.30	28676.50	39.7 45.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	45	-12824.50	28676.50	44.7 50.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	49	-10548.70	31102.70	33.9 41.9 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	50	-8760.88	31102.70	28.2 34.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	51	-10637.80	31102.70	34.2 42.0 (b)	Pass
T4	125 - 100	Diagonal	2L2 1/2x2x3/16x3/8	56	-11185.10	17432.80	64.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	57	-11193.30	17432.80	64.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	59	-10675.80	17432.80	61.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	60	-10667.80	17432.80	61.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	62	-10694.00	17432.80	61.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	63	-10696.40	17432.80	61.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	65	-10654.40	18124.40	58.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	2L2 1/2x2x3/16x3/8	66	-10660.80	18124.40	58.8	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	68	-10032.20	18124.40	55.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	69	-10024.30	18124.40	55.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	71	-10220.70	18124.40	56.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	72	-10211.30	18124.40	56.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	74	-10141.50	18830.80	53.9 56.0 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	75	-10170.20	18830.80	54.0 55.9 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	77	-9408.05	18830.80	50.0 51.9 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	78	-9419.57	18830.80	50.0 51.8 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	80	-9779.68	18830.80	51.9 53.9 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	81	-9786.98	18830.80	52.0 53.9 (b)	Pass
T5	100 - 75	Diagonal	2L2 1/2x2x3/16x3/8	86	-12655.00	15393.00	82.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	87	-12656.20	15393.00	82.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	89	-12178.70	15393.00	79.1	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	90	-12179.90	15393.00	79.1	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	92	-11836.80	15393.00	76.9	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	93	-11834.40	15393.00	76.9	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	95	-12196.50	16022.80	76.1	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	96	-12199.60	16022.80	76.1	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	98	-11706.10	16022.80	73.1	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	99	-11704.60	16022.80	73.0	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	101	-11469.60	16022.80	71.6	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	102	-11468.20	16022.80	71.6	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	104	-11718.90	16673.10	70.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	105	-11723.70	16673.10	70.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	107	-11208.20	16673.10	67.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	108	-11203.80	16673.10	67.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	110	-11090.50	16673.10	66.5	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	111	-11089.50	16673.10	66.5	Pass
T6	75 - 50	Diagonal	2L2 1/2x2 1/2x1/4x3/8	116	-13962.80	21744.20	64.2	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	117	-13958.90	21744.20	64.2	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	119	-13514.20	21744.20	62.2	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	120	-13522.80	21744.20	62.2	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	122	-12898.80	21744.20	59.3	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	123	-12894.10	21744.20	59.3	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	125	-13548.20	22676.70	59.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	126	-13546.40	22676.70	59.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	128	-13092.70	22676.70	57.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	129	-13098.40	22676.70	57.8	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	131	-12578.50	22676.70	55.5	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	132	-12574.50	22676.70	55.5	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	134	-13170.00	23649.30	55.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	135	-13169.60	23649.30	55.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	137	-12701.60	23649.30	53.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	138	-12705.30	23649.30	53.7	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	140	-12260.90	23649.30	51.8	Pass
		Diagonal	2L2 1/2x2 1/2x1/4x3/8	141	-12257.70	23649.30	51.8	Pass
T7	50 - 25	Diagonal	2L3x2 1/2x1/4x3/8	146	-15412.10	29266.40	52.7 59.9 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	147	-15401.90	29266.40	52.6 59.9 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	149	-15056.30	29266.40	51.4 58.6 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	150	-15070.80	29266.40	51.5 58.5 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	2L3x2 1/2x1/4x3/8	152	-14188.30	29266.40	48.5 55.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	153	-14183.90	29266.40	48.5 55.1 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	158	-14873.10	30460.70	48.8 57.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	159	-14864.80	30460.70	48.8 57.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	161	-14447.90	30460.70	47.4 56.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	162	-14462.10	30460.70	47.5 56.1 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	164	-13651.60	30460.70	44.8 53.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	165	-13645.70	30460.70	44.8 53.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	170	-14445.90	31706.70	45.6 56.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	171	-14438.20	31706.70	45.5 56.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	173	-14006.20	31706.70	44.2 54.5 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	174	-14019.10	31706.70	44.2 54.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	176	-13247.20	31706.70	41.8 51.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	177	-13242.00	31706.70	41.8 51.4 (b)	Pass
T8	25 - 0	Diagonal	2L3x3x5/16x3/8	185	-20439.10	48035.40	42.6 58.5 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	188	-20419.40	48035.40	42.5 58.5 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	192	-20078.50	48035.40	41.8 57.5 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	195	-20100.10	48035.40	41.8 57.5 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	199	-18887.30	48035.40	39.3 53.9 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	202	-18885.30	48035.40	39.3 54.0 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	206	-20726.30	49998.30	41.5 59.3 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	209	-20708.10	49998.30	41.4 59.3 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	213	-20346.80	49998.30	40.7 58.2 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	216	-20365.00	49998.30	40.7 58.2 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	220	-19220.00	49998.30	38.4 54.9 (b)	Pass
		Diagonal	2L3x3x5/16x3/8	223	-19220.00	49998.30	38.4 54.9 (b)	Pass
T2	175 - 150	Horizontal	L2 1/2x2 1/2x3/16	13	-2980.91	13468.50	22.1	Pass
		Horizontal	L2 1/2x2 1/2x3/16	14	-908.02	13468.50	6.7	Pass
		Horizontal	L2 1/2x2 1/2x3/16	15	-2507.71	13468.50	18.6	Pass
		Horizontal	L2 1/2x2 1/2x3/16	19	-6013.42	10298.80	58.4	Pass
		Horizontal	L2 1/2x2 1/2x3/16	20	-4081.71	10298.80	39.6	Pass
		Horizontal	L2 1/2x2 1/2x3/16	21	-5939.84	10298.80	57.7	Pass
		Horizontal	L2 1/2x2 1/2x3/16	25	-5064.30	11724.60	43.2	Pass
		Horizontal	L2 1/2x2 1/2x3/16	26	-2445.56	11724.60	20.9	Pass
		Horizontal	L2 1/2x2 1/2x3/16	27	-4659.33	11724.60	39.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T3	150 - 125	Horizontal	L3x3x1/4	34	-7210.61	18748.70	38.5	Pass
		Horizontal	L3x3x1/4	35	-5708.27	18748.70	30.4	Pass
		Horizontal	L3x3x1/4	36	-7160.05	18748.70	38.2	Pass
		Horizontal	L3x3x1/4	40	-10472.30	15159.30	69.1	Pass
		Horizontal	L3x3x1/4	41	-9333.94	15159.30	61.6	Pass
		Horizontal	L3x3x1/4	42	-10218.60	15159.30	67.4	Pass
		Horizontal	L3x3x1/4	46	-8995.37	16811.20	53.5	Pass
		Horizontal	L3x3x1/4	47	-7693.87	16811.20	45.8	Pass
		Horizontal	L3x3x1/4	48	-8931.04	16811.20	53.1	Pass
T4	125 - 100	Horizontal	L2 1/2x2 1/2x3/16	55	-6829.90	14163.40	48.2	Pass
		Horizontal	L2 1/2x2 1/2x3/16	58	-6519.23	14163.40	46.0	Pass
		Horizontal	L2 1/2x2 1/2x3/16	61	-6525.32	14163.40	46.1	Pass
		Horizontal	L2 1/2x2 1/2x3/16	64	-6328.79	15549.40	40.7 44.3 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	67	-5948.74	15549.40	38.3 41.7 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	70	-6063.18	15549.40	39.0 42.5 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	73	-10946.90	17100.70	64.0 75.9 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	76	-10018.70	17100.70	58.6 69.6 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	79	-10559.80	17100.70	61.8 73.4 (b)	Pass
T5	100 - 75	Horizontal	L3x2 1/2x1/4	85	-8358.11	15980.20	52.3	Pass
		Horizontal	L3x2 1/2x1/4	88	-8039.24	15980.20	50.3	Pass
		Horizontal	L3x2 1/2x1/4	91	-7808.54	15980.20	48.9	Pass
		Horizontal	L3x2 1/2x1/4	94	-7853.39	17329.20	45.3	Pass
		Horizontal	L3x2 1/2x1/4	97	-7533.21	17329.20	43.5	Pass
		Horizontal	L3x2 1/2x1/4	100	-7378.51	17329.20	42.6	Pass
		Horizontal	L3x2 1/2x1/4	103	-7350.39	18856.60	39.0	Pass
		Horizontal	L3x2 1/2x1/4	106	-7021.05	18856.60	37.2	Pass
		Horizontal	L3x2 1/2x1/4	109	-6947.23	18856.60	36.8	Pass
T6	75 - 50	Horizontal	L3x3x1/4	115	-9791.31	18698.20	52.4	Pass
		Horizontal	L3x3x1/4	118	-9476.48	18698.20	50.7	Pass
		Horizontal	L3x3x1/4	121	-9030.73	18698.20	48.3	Pass
		Horizontal	L3x3x1/4	124	-9315.18	20065.80	46.4	Pass
		Horizontal	L3x3x1/4	127	-8999.92	20065.80	44.9	Pass
		Horizontal	L3x3x1/4	130	-8635.79	20065.80	43.0	Pass
		Horizontal	L3x3x1/4	133	-8875.34	21589.10	41.1 43.6 (b)	Pass
		Horizontal	L3x3x1/4	136	-8556.39	21589.10	39.6 42.1 (b)	Pass
		Horizontal	L3x3x1/4	139	-8251.92	21589.10	38.2 40.6 (b)	Pass
T7	50 - 25	Horizontal	L3x3x1/4	145	-11367.40	15340.30	74.1	Pass
		Horizontal	L3x3x1/4	148	-11110.50	15340.30	72.4	Pass
		Horizontal	L3x3x1/4	151	-10447.70	15340.30	68.1	Pass
		Horizontal	L3x3x1/4	157	-10793.70	16351.40	66.0	Pass
		Horizontal	L3x3x1/4	160	-10489.10	16351.40	64.1	Pass
		Horizontal	L3x3x1/4	163	-9890.06	16351.40	60.5	Pass
		Horizontal	L3x3x1/4	169	-10310.00	17465.80	59.0	Pass
		Horizontal	L3x3x1/4	172	-9998.99	17465.80	57.2	Pass
		Horizontal	L3x3x1/4	175	-9437.16	17465.80	54.0	Pass
T8	25 - 0	Horizontal	L4x4x1/4	184	-12277.80	29136.80	42.1 52.8 (b)	Pass
		Horizontal	L4x4x1/4	191	-12052.00	29136.80	41.4 51.8 (b)	Pass
		Horizontal	L4x4x1/4	198	-11247.40	29136.80	38.6 48.4 (b)	Pass
		Horizontal	L4x4x1/4	205	-12122.90	31725.00	38.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
							52.2 (b)	
		Horizontal	L4x4x1/4	212	-11890.20	31725.00	37.5	Pass
							51.2 (b)	
		Horizontal	L4x4x1/4	219	-11148.00	31725.00	35.1	Pass
							48.0 (b)	
T7	50 - 25	Secondary Horizontal	L3x3x1/4	154	-4497.01	5572.52	80.7	Pass
		Secondary Horizontal	L3x3x1/4	155	-4487.85	5572.52	80.5	Pass
		Secondary Horizontal	L3x3x1/4	156	-4490.80	5572.52	80.6	Pass
		Secondary Horizontal	L3x3x1/4	166	-4497.01	6012.29	74.8	Pass
		Secondary Horizontal	L3x3x1/4	167	-4487.85	6012.29	74.6	Pass
		Secondary Horizontal	L3x3x1/4	168	-4490.80	6012.29	74.7	Pass
		Secondary Horizontal	L3x3x1/4	178	-4497.01	6506.26	69.1	Pass
		Secondary Horizontal	L3x3x1/4	179	-4487.85	6506.26	69.0	Pass
		Secondary Horizontal	L3x3x1/4	180	-4490.80	6506.26	69.0	Pass
T1	180 - 175	Top Girt	L2 1/2x2x3/16	4	-921.91	9882.63	9.3	Pass
		Top Girt	L2 1/2x2x3/16	5	-324.14	9882.63	3.3	Pass
		Top Girt	L2 1/2x2x3/16	6	-669.53	9882.63	6.8	Pass
T8	25 - 0	Redund Horz 1 Bracing	L3x3x1/4	186	-5154.04	32906.80	15.7	Pass
		Redund Horz 1 Bracing	L3x3x1/4	189	-5150.21	32906.80	15.7	Pass
		Redund Horz 1 Bracing	L3x3x1/4	193	-5150.21	32906.80	15.7	Pass
		Redund Horz 1 Bracing	L3x3x1/4	196	-5141.84	32906.80	15.6	Pass
		Redund Horz 1 Bracing	L3x3x1/4	200	-5141.84	32906.80	15.6	Pass
		Redund Horz 1 Bracing	L3x3x1/4	203	-5154.04	32906.80	15.7	Pass
		Redund Horz 1 Bracing	L3x3x1/4	207	-5154.04	33786.60	15.3	Pass
		Redund Horz 1 Bracing	L3x3x1/4	210	-5150.21	33786.60	15.2	Pass
		Redund Horz 1 Bracing	L3x3x1/4	214	-5150.21	33786.60	15.2	Pass
		Redund Horz 1 Bracing	L3x3x1/4	217	-5141.84	33786.60	15.2	Pass
		Redund Horz 1 Bracing	L3x3x1/4	221	-5141.84	33786.60	15.2	Pass
		Redund Horz 1 Bracing	L3x3x1/4	224	-5154.04	33786.60	15.3	Pass
T8	25 - 0	Redund Diag 1 Bracing	L3x3x1/4	187	-4046.69	18426.40	22.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	190	-4043.68	18426.40	21.9	Pass
		Redund Diag 1 Bracing	L3x3x1/4	194	-4043.68	18426.40	21.9	Pass
		Redund Diag 1 Bracing	L3x3x1/4	197	-4037.11	18426.40	21.9	Pass
		Redund Diag 1 Bracing	L3x3x1/4	201	-4037.11	18426.40	21.9	Pass
		Redund Diag 1 Bracing	L3x3x1/4	204	-4046.69	18426.40	22.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	208	-4179.01	19192.00	21.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	211	-4175.91	19192.00	21.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	215	-4175.91	19192.00	21.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	218	-4169.12	19192.00	21.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Redund Diag 1 Bracing	L3x3x1/4	222	-4169.12	19192.00	21.7	Pass
		Redund Diag 1 Bracing	L3x3x1/4	225	-4179.01	19192.00	21.8	Pass
							Summary	
						Leg (T6)	78.3	Pass
						Diagonal (T5)	82.2	Pass
						Horizontal (T4)	75.9	Pass
						Secondary Horizontal (T7)	80.7	Pass
						Top Girt (T1)	9.3	Pass
						Redund Horz 1 Bracing (T8)	15.7	Pass
						Redund Diag 1 Bracing (T8)	22.0	Pass
						Bolt Checks	75.9	Pass
						RATING =	**82.2**	**Pass**

ANCHOR BOLT ANALYSIS

ANCHOR BOLT ANALYSIS

Input Data

Tower Reactions:

Uplift:	Uplift := 286·kips	*user input*
Shear:	Shear := 35.0·kips	*user input*
Compression:	Compression := 326·kips	*user input*

Anchor Bolt Data:

Use ASTM A36 (stated within Stainless Design Calculations; Page 4.1; dated November 10, 1993.

Number of Anchor Bolts = N	N := 6	*user input*	
Bolt Ultimate Strength:	F_u := 58·ksi	*user input*	
Bolt Yield Strength:	Fy := 36·ksi	*user input*	
Bolt Modulus:	E := 29000·ksi	*user input*	
Thickness of Anchor Bolts	D := 1.5in	*user input*	
Threads per Inch:	n := 6	*user input*	
Coefficient of Friction:	μ := 0.55	*user input*	(for baseplate with grout ASCE 10-15)
Length from top of pier to bottom of leveling nut:	L_{ar} := 0in	*user input*	
Bolt Modulus:	E := 29000·ksi	*user input*	

Anchor Bolt Section Properties:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 1.77 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_n = 1.41 \cdot in^2$$

Net Diameter:

$$D_n := D - \frac{0.9743 in}{n} \qquad D_n = 1.34 \cdot in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.33 \cdot in$$

Plastic Section Modulus of Bolt:

$$Z_x := \frac{D_n^3}{6} \qquad Z_x = 0.4 \cdot in^3$$

Forces:

Tension Force:

$$T_u := \frac{Uplift}{N}$$

$T_u = 47.67 \cdot kip$ $\quad T_{ub} := T_u$

Compression Force:

$$P_{uc} := \frac{Compression}{N}$$

$P_{uc} = 54.33 \cdot kip$ $\quad P_{ucb} := P_{uc}$

Shear Force:

$$V_u := \frac{Shear}{N}$$

$V_u = 5.83 \cdot kip$ $\quad V_{ub} := V_u$

Resistance Factor for Flexure (TIA-222-H 4.9.9):

$\phi_f := 0.9$

Resistance Factor for Anchor Bolt (Compression) (TIA-222-H 4.9.9):

$\phi_c := 1.00$

Resistance Factor for Tension (TIA-222-H 4.9.9):

$\phi_t := 0.75$

Resistance Factor for Shear (TIA-222-H 4.9.9):

$\phi_v := 0.75$

TIA-222-H 4.9.9 Calculate Equation Variables Strength Design:

Design Tensile Strength, Rnt:

$$R_{nt} := F_u \cdot A_n$$

$$R_{nt} = 81.5 \cdot ft \cdot kip$$

$$\phi_t \cdot R_{nt} = 61.13 \cdot ft \cdot kip$$

Design Compression Strength, Rnc:

$$R_{nc} := Fy \cdot A_n$$

$$R_{nc} = 50.59 \cdot ft \cdot kip$$

$$\phi_c \cdot R_{nc} = 50.59 \cdot ft \cdot kip$$

Design Shear Strength (Tension), Rnv:

$$R_{nv} := 0.5 \cdot F_u \cdot A_g$$

$$R_{nv} = 51.25 \cdot ft \cdot kip$$

$$\phi_v \cdot R_{nv} = 38.44 \cdot ft \cdot kip$$

Design Shear Strength (Compression), Rnvc:

$$R_{nvc} := 0.6 \cdot Fy \cdot \frac{A_n}{2}$$

$$R_{nvc} = 15.18 \cdot ft \cdot kip$$

$$\phi_c \cdot R_{nvc} = 15.18 \cdot ft \cdot kip$$

NOTE: Per TIA-222-H The determination of capacity formulas are based on the exising constructed condition of exposed anchor rod from the top of the foundation to the bottom of the (base) leveling nut., Therefore the following equations next page), reflects for this tower site, the first formula shall be applied:

lar = 3" - 1.75" (nut height) = 1.25" < 1.75" Bolt Diameter

TIA-222-H 4.9.9 Combined Shear and Tension:

$$\left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})}\right]^2 + \left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})}\right]^2 \le 1$$

$$\left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})}\right]^2 + \left(\frac{V_{ub}}{\phi_v \cdot R_{nv}}\right)^2 = 0.63$$

TIA-222-H 4.9.9 Combined Shear and Compression:

$$\left[\frac{P_{ucb}}{(\phi_c \cdot R_{nc})}\right] + \left(\frac{V_{ub}}{\phi_c \cdot R_{nvc}}\right)^2 \le 1$$

$$\left[\frac{P_{ucb}}{(\phi_c \cdot R_{nc})}\right] + \left(\frac{V_{ub}}{\phi_c \cdot R_{nvc}}\right)^2 = 1.22$$

NOTE: Larger ratio number shown above Governs design Capacity.

$$57000 * \sqrt{3000psi} = 3122018.578psi \div 1000 = 3122\ ksi\ [ACI\ 318-14; Sect.\ 19.2.2.1.b]$$

Area of Grout Under Baseplate (Plan view):

Diameter of baseplate = 15" (bolt Circle) + 2.5 to plate edge (assumed) = 17.5"

$$Ac.grout = \frac{\pi}{4}(17.5\ in^2) = 240.5\ in^2$$

Subtract Area of Bolts (Steel):

$$As.bolt = 6 * \frac{\pi}{4}(1.5\ in)^2 = 10.6\ in^2 \rightarrow 240.5 - 10.6 = 229.89 in^2$$

Transform Concrete to Steel:

$$\frac{E_s}{E_c} = \frac{29000ksi}{3122ksi} = 9.29 \rightarrow \frac{229.89in^2}{9.29} = 24.75in^2$$

By Visual inspection when considering the additional equivalent steel calculated above, it can be determined that the existing anchor bolts and existing grout acting in compression will have the capacity to handle the design load as calculated within this Mathcad sheet.

Combined Shear and Tension/Compression Check:

$$\text{ShearAndTensionCheck} := \text{if}\left[\max\left[\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})}\right]^2, 0\right] \le 1, \text{"OK"}, \text{"NO GOOD"}\right]$$

ShearAndTensionCheck = "OK"

FOUNDATION ANALYSIS

AECOM

Job	180' Stainless Tower - Litchfield, CT	Project No.	EVS-013 Rev. 1 (b.1)	Sheet	1 of 2
Description	Evaluation of Drilled Pier Caisson	Computed by	CMC	Date	11/06/20
	Proposed Inventory - S. Analysis	Checked by		Date	

3 SIDED SELF SUPPORTING TOWER FOUNDATION DRILLED PIER

Compression:	$DownLoad := 326 \cdot kips$	$\gamma c := 150 pcf$	Concrete unit weight
Uplift:	$uplift := 286 \cdot kips$	$\gamma w := 62.4 pcf$	Water unit weight
Depth Neglected for Skin Friction at the top	$Depthunbond := 4 \cdot ft$	$\gamma s := 120 pcf$	Soil unit weight
Drill Caisson length	$CasissonLength := 23 \cdot ft$	$Pier\phi := 3.5 \cdot ft$	Pier diameter
Water Table Below grade:	$Wd := 17 \cdot ft$ Per BL Companies Report 9.13.2000	$hg := 1.0 \cdot ft$	Height of Pier Above grade
Ave allowable Shear at Depth of 4' to 17'	$f1 := (3000 psf) \cdot 2.0$	$SoilBearingCapacity := (24 ksf) \cdot 2.0$	
Ave allowable Shear at Depth of 10' to 23'	$f2 := (3000 psf) \cdot 2.0$	Allowable Bearing Pressure at Depth 22' x 2 for Ultimate Bearing Capacity (TIA-222-H)	

Calculation Notes:

1. Use of the "2.0" value from Allowable to Ultimate for soil bearing and shear friction (skin friction) comes from TIA-222-H Section 9.7 (Design Strength)
2. Strength Design reduction factors are applied as indicated below based on the TIA-222-H Section 9.

Loading:

$$TotalDownLoad := DownLoad + 1.2 \cdot \left[\pi \cdot \frac{Pier\phi^2}{4} \cdot (CasissonLength \cdot \gamma c) \right]$$

$$TotalDownLoad = 365.83 \cdot kips$$

$$Pierweight := 0.9 \cdot \left[\pi \cdot \frac{Pier\phi^2}{4} \cdot [(Wd + hg) \cdot \gamma c + (CasissonLength - Wd - hg) \cdot (\gamma c - \gamma w)] \right]$$

$$Pierweight = 27.17 \cdot kips$$

$$Soilshear := \pi \cdot Pier\phi \cdot [f1 \cdot (Wd - Depthunbond) + f2 \cdot (CasissonLength - Wd - hg)]$$

NOTE: Value prior to reduction factor of 0.75 (see following)

$$Soilshear = 1187.52 \cdot kips$$

AECOM

Job	180' Stainless Tower - Litchfield, CT	Project No.	EVS-013 Rev. 1 (b.1)	Sheet	2 of 2
Description	Evaluation of Drilled Pier Caisson	Computed by	CMC	Date	11/06/20
	Proposed Inventory - S. Analysis	Checked by		Date	

Compression Capacity:

$$TotalDownLoadCapacity := 0.75 \cdot Soilshear + 0.75 SoilBearingCapacity \cdot \left(\pi \cdot \frac{Pier\phi^2}{4} \right)$$

Reduction Factor per TIA-222-H
Section 9.7.1
Bearing --> 0.75
Friction --> 0.75

$$TotalDownLoadCapacity = 1237 \cdot kips$$

$$CheckDownLoadCapacity := if(TotalDownLoad < TotalDownLoadCapacity, "OK", "No Good")$$

$$CheckDownLoadCapacity = "OK"$$

Tension Capacity:

$$\frac{TotalDownLoad}{TotalDownLoadCapacity} = 29.57 \cdot \%$$

$$TotalUpLiftCapacity := 0.75 Soilshear + 0.75 Pierweight$$

$$TotalUpLiftCapacity = 911.02 \cdot kips$$

$$CheckUpLiftCapacity := if(uplift < TotalUpLiftCapacity, "OK", "No Good")$$

$$CheckUpLiftCapacity = "OK"$$

$$\frac{uplift}{TotalUpLiftCapacity} = 31.39 \cdot \%$$

Check Cone Failure

$$ConeFailureCapacity := \frac{[(CasissonLength - hg) \cdot \tan(30 \cdot deg) \cdot 2 + Pier\phi]^2 \cdot \pi}{4} \cdot \frac{CasissonLength - hg}{3} \cdot (90 pcf)$$

NOTE: "90 pcf" is the appoximate average of submerged soil (6 ft) and dry soil (17 ft) considered in uplifting failure cone.

$$ConeFailureCapacity = 433.04 \cdot kips$$

Reduction Factor per TIA-222-H
Section 9.4.1
Cone failure/pull-out --> 0.75

$$CheckConeFailureCapacity := if(uplift < ConeFailureCapacity, "Okay", "No Good")$$

$$CheckConeFailureCapacity = "Okay"$$

$$\frac{uplift}{0.75 ConeFailureCapacity} = 88.1 \cdot \%$$

About AECOM

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

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

ATTACHMENT F – PROOF OF DELIVERY OF NOTICE

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ATTACHMENT G - POWER DENSITY REPORT

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
603-644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions Report

ES-077 – Litchfield Troop L CSP

452 Bantam Road

Litchfield, CT 06759

November 19, 2020

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource installation on the tower at 452 Bantam Road in Litchfield, CT. Eversource is proposing to install two omnidirectional antennas – one transmit antenna, one receive-only antenna – as part of its 220 MHz communications system.

This report considers the proposed antenna configuration as detailed by Eversource along with % MPE (Maximum Permissible Exposure) measurements around the existing tower to determine FCC compliance of the facility.

Figure 1: View of ES-077 Litchfield

Site Address	452 Bantam Road
Latitude	41° 44' 10.24" N
Longitude	73° 13' 5.04" W
Site Elevation AMSL	743’
Survey Engineer	Marc Salas
Survey Date/Time	8/24/2020; 12:00 PM – 12:45 PM

Table 1: Survey Information

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached “FCC Limits for Maximum Permissible Exposure (MPE)” in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. Power Density Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65, and Connecticut Siting Council recommendations:

$$\text{Power Density} = \left(\frac{1.6^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2}\right) \text{X Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and full power, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not consider actual terrain elevations which could attenuate the signal. As a result, the calculated power density and corresponding % MPE levels reported below are much higher than the actual levels will be from the final installation.

4. Proposed Antenna Configuration

Table 2 below lists the technical details of the proposed Eversource installation. These parameters are applied to the above calculation methods in order to calculate the % MPE values of the proposed equipment. Any receive only antennas are not included in the % MPE calculations and are therefore not listed in the table below.

Operator	Antenna Model	TX Freq. (MHz)	Ant Gain (dBd)	Power ERP (Watts)	Number of Channels	Vertical Beamwidth	Length (ft)	Antenna Centerline Height (ft)
Eversource	Telewave ANT220F2	217	2.5	124	4	38°	4.25	114

Table 2: Eversource Antenna Configuration (Proposed)[1] [2]

[1] Transmit power assumes 0 dB of cable loss.

[2] Transmit antenna height listed for the proposed antenna is based on the Aecom Structural Analysis Report dated October 27, 2020.

5. Measurement Procedure

Frequencies from 300 KHz to 50 GHz were measured using the Narda Probe EA 5091, E-Field, shaped, FCC probe in conjunction with the NBM550 survey meter. The EA 5091 probe is “shaped” such that in a mixed signal environment (i.e.: more than one frequency band is used in a particular location), it accurately measures the percent of MPE.

From FCC OET Bulletin No. 65 - Edition 97-01 – “A useful characteristic of broadband probes used in multiple-frequency RF environments is a frequency-dependent response that corresponds to the variation in MPE limits with frequency. Broadband probes having such a "shaped" response permit direct assessment of compliance at sites where RF fields result from antennas transmitting over a wide range of frequencies. Such probes can express the composite RF field as a percentage of the applicable MPEs”.

Probe Description - As suggested in FCC OET Bulletin No. 65 - Edition 97-01, the response of the measurement instrument should be essentially isotropic, (i.e., independent of orientation or rotation angle of the probe). For this reason, the Narda EA 5091 probe was used for these measurements.

Sampling Description - At each measurement location, a spatially averaged measurement is collected over the height of an average human body. The NBM550 survey meter performs a time average measurement while the user slowly moves the probe over a distance range of 20 cm to 200 cm (about 6 feet) above ground level. The results recorded at each measurement location include average values over the spatial distance.

Instrumentation Information - A summary of specifications for the equipment used is provided in the table below.

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 01265			
Calibration Date	January 2019			
Calibration Interval	24 Months			
Meter	NBM550, Serial# F-0147			
Calibration Date	March 2020			
Calibration Interval	24 Months			
Probe Specifications	**Frequency Range**	**Field Measured**	**Standard**	**Measurement Range**
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.2 – 600 % of Standard

Table 3: Instrumentation Information

Instrument Measurement Uncertainty - The total measurement uncertainty of the NARDA measurement probe and meter is no greater than ±3 dB (0.5% to 6%), ±1 dB (6% to 100%), ±2 dB (100% to 600%). The factors which contribute to this include the probe’s frequency response deviation, calibration uncertainty, ellipse ratio, and isotropic response[3]. Every effort is taken to reduce the overall uncertainty during measurement collection including pointing the probe directly at the likely highest source of emissions.

[3] For further details, please refer to Narda Safety Test Solutions NBM550 Probe Specifications, pg. 64
http://www.narda-sts.us/pdf_files/DataSheets/NBM-Probes_DataSheet.pdf

6. Surveyed and Calculated % MPE Results

Measured and calculated results and a description of each survey location are detailed in the table below. Measurements were recorded on August 24, 2020 between 12:00 PM and 12:45 PM. The calculated % MPE contribution from the proposed equipment was then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna pattern of the antenna model specified by Eversource to determine the "Off Beam Loss" factor shown in the power density formula from Section 3. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Table 4 below lists 14 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was 8.70% (Average Uncontrolled / General Population MPE) and was recorded at Location 7 near the CT State Police (CSP) building entrance. The highest composite (measured + calculated) % MPE value is calculated to be 9.46% (Average Uncontrolled / General Population) and is also calculated to occur at Location 7.

Meas. Location	Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Composite % MPE (Uncontrolled / General)
1	Compound access gate	41.73632	-73.21813	54	2.40%	0.09%	2.49%
2	South of compound in parking lot	41.73604	-73.21817	54	3.43%	0.08%	3.51%
3	Sidewalk south of CSP building	41.73580	-73.21766	178	4.85%	0.64%	5.49%
4	SW in large parking lot	41.73533	-73.21748	351	5.83%	0.54%	6.37%
5	SE in large parking lot	41.73542	-73.21721	365	6.42%	0.52%	6.94%
6	Center of memorial	41.73605	-73.21723	239	8.34%	0.77%	9.10%
7	**CSP building entrance**	**41.73616**	**-73.21740**	**189**	**8.70%**	**0.76%**	**9.46%**
8	Along CSP building access road	41.73674	-73.21640	504	8.32%	0.29%	8.61%
9	Car lot south of CSP building	41.73593	-73.21591	602	7.03%	0.22%	7.25%
10	South end of Harris Road	41.73459	-73.21403	1248	7.67%	0.06%	7.72%
11	Intersection of Ongley Road and Harris Road	41.73648	-73.21410	1094	6.60%	0.07%	6.67%
12	North end of Harris Road	41.73917	-73.21412	1539	6.08%	0.04%	6.11%
13	Litchfield Inn parking lot	41.73774	-73.21762	587	5.95%	0.24%	6.18%
14	In front of Toyota dealer	41.73614	-73.21562	674	7.23%	0.18%	7.41%

Table 4: Measured and Calculated % MPE Results [4]

[4] Due to measurement uncertainty at low levels (See Table 3), any readings outside the measurement range of the probe (< 1.00 % FCC General Population/Uncontrolled MPE) are noted as such.

Figures 2 and 3 below are aerial views[5] of the tower location and the surrounding area, along with the measurement locations listed in Table 4.

Figure 2: Measurement Points – Zoom In

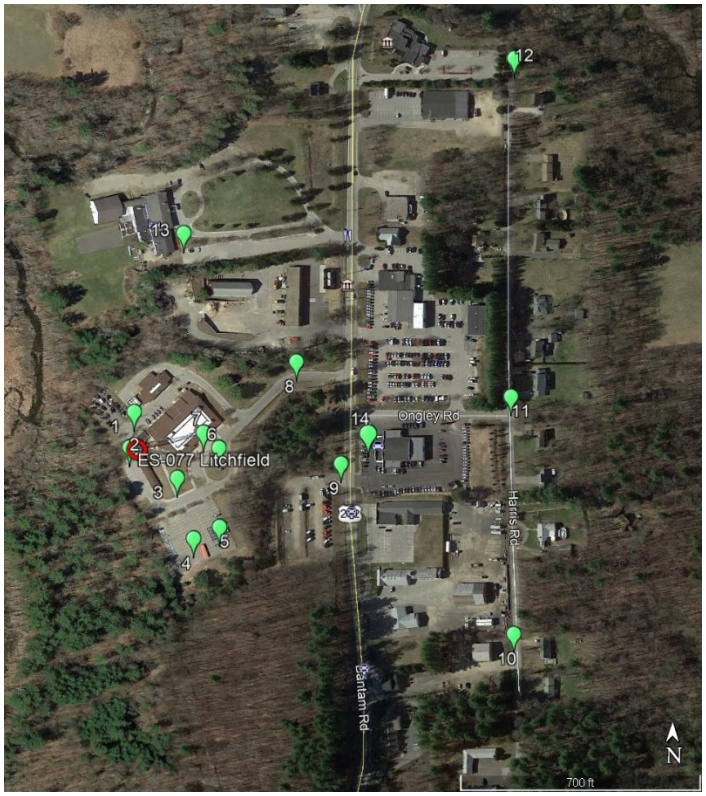


Figure 3: All Measurement Points

[5] Map showing location of telecommunications facility and the surrounding area. *Google Earth*, https://earth.google.com/web/.

7. Conclusion

A number of accessible areas around the tower at 452 Bantam Road in Litchfield, CT were surveyed and found to be well within the mandated General Population/Uncontrolled limits for Maximum Permissible Exposure, as delineated in the Federal Communications Commission's Radio Frequency exposure rules published in 47 CFR 1.1307(b)(1)-(b)(3).

The highest spatially averaged % MPE measurement of all surveyed points based on the 1997 FCC standard for exposure to the general population is 8.70% MPE. This measurement was recorded at Location 7 by the main entrance to the CT State Police building.

The highest composite (measured + calculated) power density is **9.46% of the FCC General Population MPE limit** with the proposed Eversource equipment is also calculated to occur at Location 7.

The above analysis concludes that RF exposure at ground level around the tower, both currently and with the proposed antenna installation, will be below the maximum power density limits as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

As noted previously, the calculated % MPE levels are more conservative (higher) than the actual levels will be from the finished installation.

8. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in FCC OET Bulletin 65 Edition 97-01, IEEE Std. C95.1, and IEEE Std. C95.3.

Marc Salas — November 19, 2020

Report Prepared By: Marc Salas
RF Engineer
C Squared Systems, LLC
Date

Keith Vellante — November 23, 2020

Reviewed/Approved By: Keith Vellante
Director of RF Services
C Squared Systems, LLC
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[6]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[7]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 5: FCC Limits for Maximum Permissible Exposure (MPE)

[6] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

[7] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

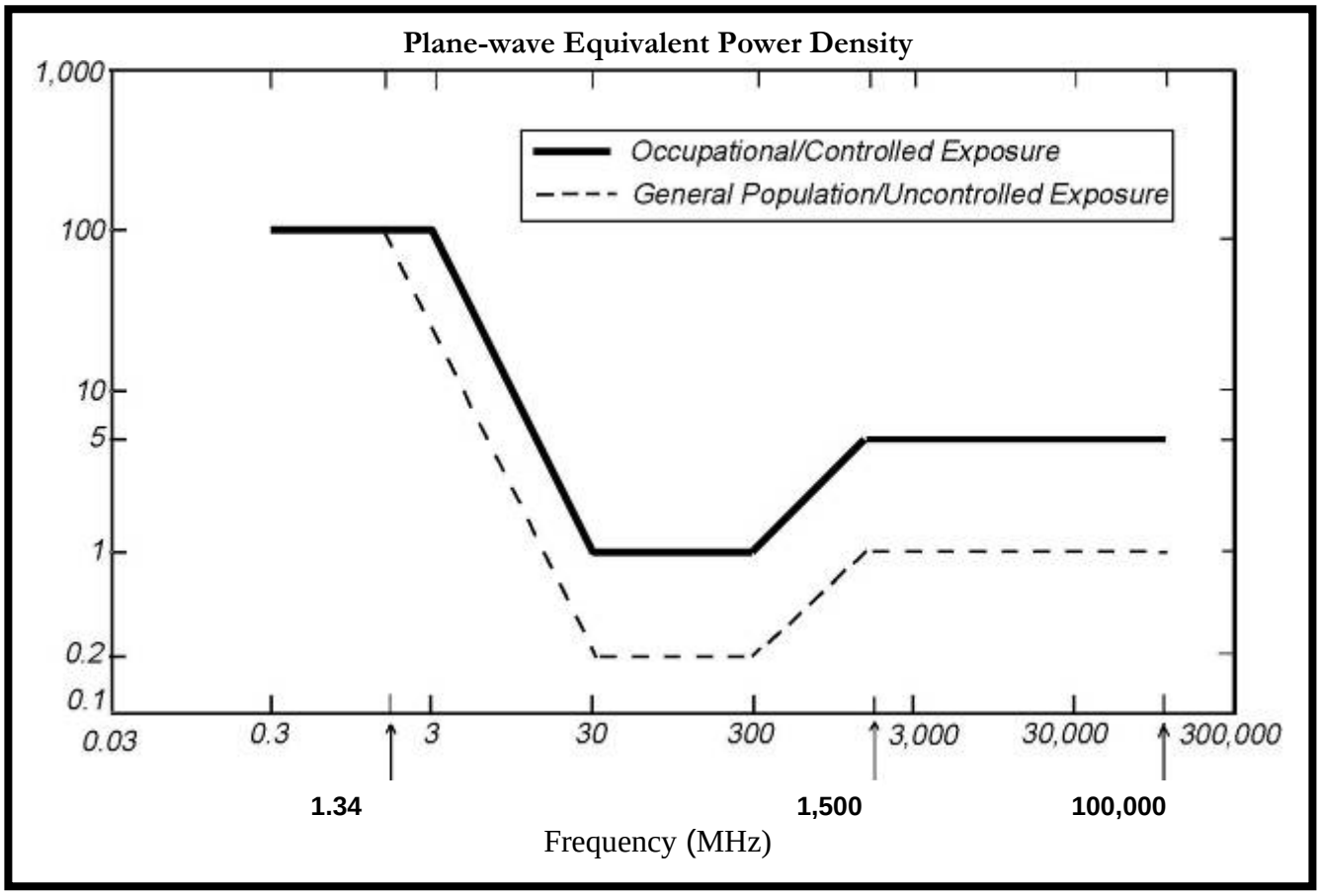


Figure 4: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

217 MHz

Manufacturer:	Telewave
Model #:	ANT220F2
Frequency Band:	195 - 260 MHz
Gain:	2.5 dBd
Vertical Beamwidth:	38°
Horizontal Beamwidth:	360°
Polarization:	Vertical-Polarization
Length:	4.25’