EVERSOURCE ENERGY

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

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

September 10, 2021

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

RE: **Notice of Exempt Modification**
Eversource Site # 15215
20 Barnabas Road, Newtown, CT 06470
Latitude: 41-25-39.5 N / Longitude: 73-20-37.5 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains multiple antennas and equipment at various mounting heights on an existing 180-foot self-support tower located at 20 Barnabas Road in Newtown. See Attachment A, Parcel Map and Property Card. The tower and property are owned by Eversource. Eversource is seeking the Connecticut Siting Council's authorization for the installation of one 19-foot omni-directional antenna mounted at 165 feet above ground level ("AGL") with a four-foot stand-off mount and the removal of two existing omni-directional antennas, one upright and one inverted. See Attachment B, Mount Analysis. There will be no other changes to the area of the fenced compound, the tower, or the existing antennas and other equipment currently mounted on the tower. The tower and existing and proposed equipment on the tower are depicted on Attachment C, Construction Drawings, dated August 17, 2021 and Attachment D, Structural Analysis, dated August 12, 2021. The Connecticut Siting Council approved the self-support tower at this location in Docket No. 144 in November 1991.

The modification is required to eliminate transmitter induced noise issues from antennae previously installed as part of Eversource's program to update their obsolete analog voice radio communications system to a modern digital voice communications system. The transmitter issue manifests as passive intermodulation, or PIM, noise located on the receive frequencies, which limits the system level coverage capability of the site.

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 Daniel Rosenthal, First Selectman for the Town of Newtown and George Benson, Director of Planning for the

Town of Newtown via the United States Postal Service or private carrier. Proof of delivery is attached. See Attachment E, 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 modifications will not require the extension of the site boundary.
3. The modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the 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 Calculated Radio Frequency Emissions Report, dated August 19, 2021 (Attachment F – Power Density Report)[1].
5. The modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, 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 and two copies of this notice and a check in the amount of $625 are 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 Daniel Rosenthal, First Selectman, Town of Newtown
George Benson, Director of Planning, Town of Newtown

Attachments

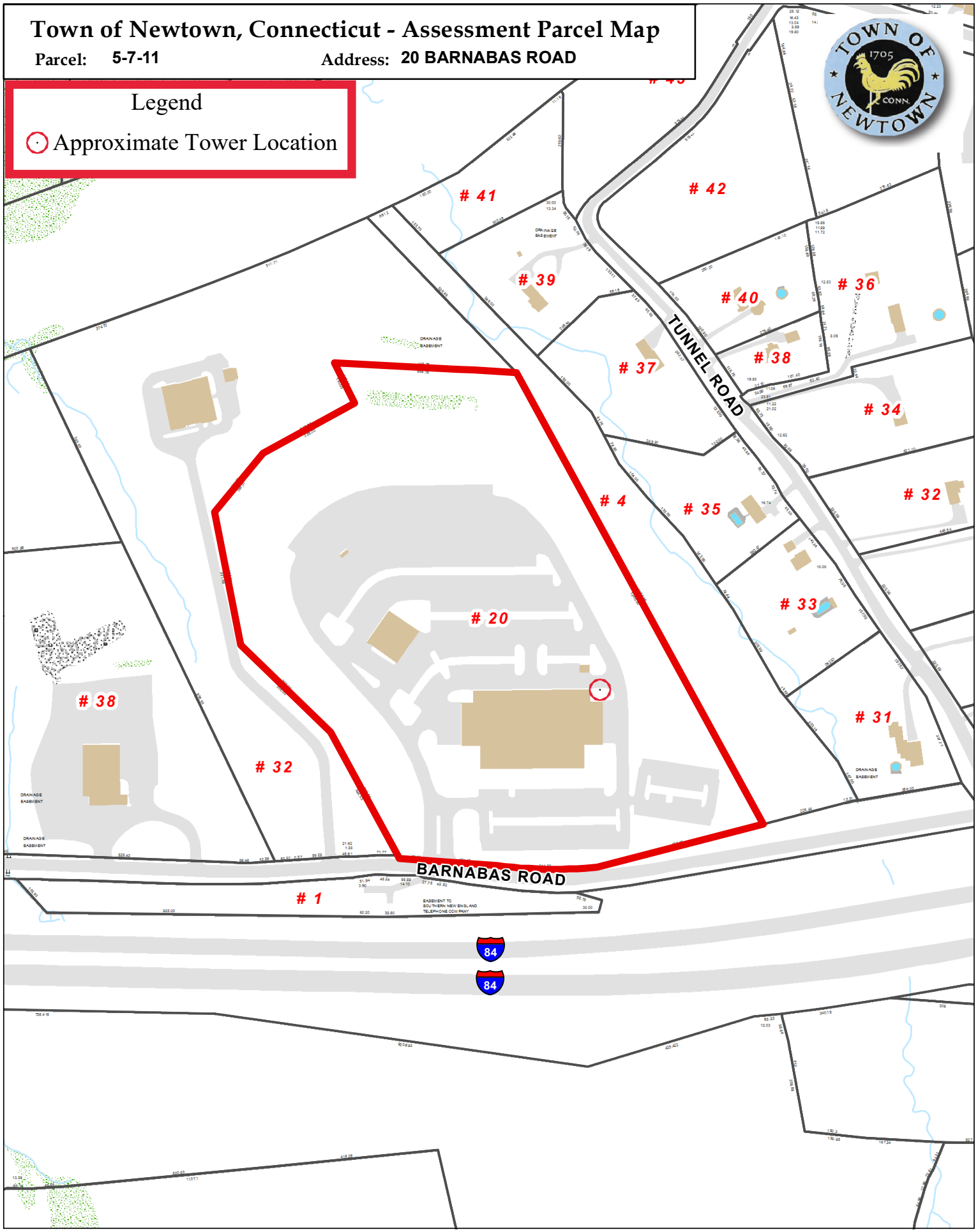
A. Parcel Map and Property Card
B. Mount Analysis
C. Construction Drawings
D. Structural Analysis
E. Proof of Delivery of Notice
F. Power Density Report

[1] Any inactive or 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 Newtown, Connecticut - Assessment Parcel Map

Parcel: 5-7-11 **Address:** 20 BARNABAS ROAD



Approximate Scale:

0 75 150 225 300 Feet

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

Map Produced Oct 2016

Town of Newtown, CT

Property Listing Report

Map Block Lot **5-7-11-1** Account **00696701**

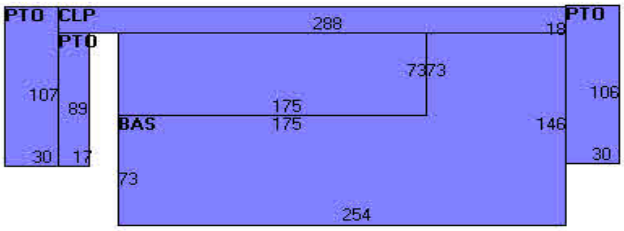
Property Information

Property Location	**20 BARNABAS ROAD**
Owner	**BARNABAS REALTY GROUP GEN PRTSHP**
Co-Owner	**C/O EVERSOURCE**
Mailing Address	**107 SELDEN STREET** **BERLIN CT 06037**
Land Use	**3400 OFFICE**
Land Class	**C**
Zoning Code	**M-1**
Census Tract	
Sub Lot	

Neighborhood	**C090**
Acreage	**23.9**
Utilities	**Well,Septic**
Lot Setting/Desc	
Survey Map	
TC Survey Numbers	

Photo

Sketch



Primary Construction Details

Year Built	**1991**
Stories	**1**
Building Style	**Office**
Building Use	**Comm/Ind**
Building Condition	**B**
Floors	**Carpet**
Total Rooms	

Bedrooms	
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	**Flat**
Roof Cover	**Rolled Compos**

Exterior Walls	**Concr/CinderBk**
Interior Walls	**Drywall/Sheet**
Heating Type	**Hot Water**
Heating Fuel	**Gas**
AC Type	**Central**
Gross Bldg Area	**71702**
Total Living Area	**40066**

Report Created On **3/16/2020**

Town of Newtown, CT

Property Listing Report | Map Block Lot **5-7-11-1** | Account **00696701**

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	4870910	3409640
Extras	13200	9240
Outbuildings	300050	210030
Land	2872800	2010960
Total	8056960	5639870

Outbuilding and Extra Items

Type	Description
Fence	1600 L.F.
Fence	1600 L.F.
Tower	1 UNITS
Tower	1 UNITS
Paving	340000 S.F.
Paving	340000 S.F.
Fence	19200 L.F.
Fence	19200 L.F.
Lights	12 UNITS
Lights	12 UNITS

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Canopy	17596	0
Canopy	17596	0
Patio - Concrete	11418	0
Patio - Concrete	11418	0
Open Porch	168	0
Open Porch	168	0
First Floor	40066	40066
First Floor	40066	40066
Loading Platform	2454	0
Total Area	71702	40066

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
BARNABAS REALTY GROUP GEN PRTSHP	423 /805	9/25/1990	0
BARNABAS REALTY GROUP GEN PRTSHP	423 /805	9/25/1990	0

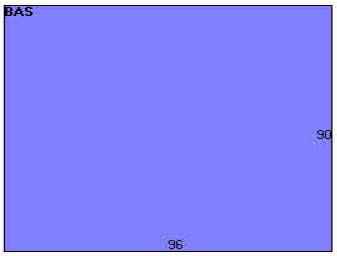
Report Created On **3/16/2020**

Town of Newtown, CT

Property Listing Report | Map Block Lot **5-7-11-1** | Account **00696701**

Photo

Sketch



Primary Construction Details

Year Built	1991
Stories	1
Building Style	Light Indust
Building Use	Comm/Ind
Building Condition	B
Floors	Concr-Finished
Total Rooms	
Bedrooms	
Bathrooms	
Bath Style	
Half Bath	

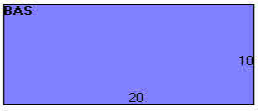
Kitchen Style	
Roof Style	Flat
Roof Cover	Rolled Compos
Exterior Walls	Pre-Fin Metal
Interior Walls	Drywall/Sheet
Heating Type	Susp. Space
Heating Fuel	Gas
AC Type	Central
Gross Bldg Area	
Total Living Area	

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	9216	9216
First Floor	9216	9216
Total Area		

Photo

Sketch



Primary Construction Details

Year Built	1995
Stories	1
Building Style	Light Indust
Building Use	Ind/Comm
Building Condition	B
Floors	Concr-Finished
Total Rooms	
Bedrooms	
Bathrooms	
Bath Style	
Half Bath	

Kitchen Style	
Roof Style	Flat
Roof Cover	Rolled Compos
Exterior Walls	Pre-cast Concr
Interior Walls	Minim/Masonry
Heating Type	Susp. Space
Heating Fuel	Gas
AC Type	Central
Gross Bldg Area	
Total Living Area	

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	200	200
First Floor	200	200
Total Area		

Report Created On **3/16/2020**

ATTACHMENT B – 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

August 23, 2021

MOUNT EVALUATION LETTER

Site Number: ES-066
Site Name: NewtownAWC
Site Data: 20 Barnabas Rd.
Newtown, CT
Latitude: 41° 25’ 39.5”
Longitude: -73° 20’ 37.5”

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 proposed antenna mounting system to be: **SUFFICIENT**

Structure Rating (max from all components) =	60.5%

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

This analysis analyzes the worst-case scenario for the proposed USF-4U 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.

08/23/2021

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
Eversource	1	-	174.5	165	1	Omni	dbspectra	SP2D03P36D-D

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 130 mph
WIND SPEED WITH ICE	50 mph with 1.5" radial ice thickness
EXPOSURE CATEGORY	B
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	49.3%	Pass	22.2%	Pass
Bracing: Pipe 2.0 Std	38.2%	Pass	8.0%	Pass
Mount Pipe 2.0: Pipe 2.0 Std	50.6%	Pass	32.6%	Pass
Mount Pipe 3.0: Pipe 3.0 Std	23.0%	Pass	26.7%	Pass
Stiff-arm: Pipe 2.0 Std	18.5%	Pass	0.9%	Pass
Threaded Rod: SR1.25	60.5%	Pass	21.3%	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)
SP2D03P36D-D	75

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: NewtownAWC (ES-066)		Date: 8/19/2021
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 8/19/2021

Appurtenance Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	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 =	130	mph		
Height Above Ground, z =	174.5	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 =	1.16		$K_e = e^{-0.000032 z_s}$	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 =	0.984		$F_A = q_z G_h (EPA)$	2.6.11.2
Wind Velocity Pressure, q_z =	46.84	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)
SP2D03P36D-D	19.00	0.25	0.25	2.00	8.55	400.47	2.00	8.55	400.47

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: NewtownAWC (ES-066)		Date: 8/19/2021
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 8/19/2021

Member Wind Loading

Exposure Category =	B	
Risk Category =	III	
Topographic Category =	1	
Basic Wind Speed, V =	130	mph
Height Above Ground, z =	174.5	ft
Crest Height, H =	N/A	ft
Velocity Pressure Coefficient, K_z =	1.16	
Topographic Factor, K_{zt} =	1.00	
Wind Directionality Factor, K_d =	0.95	
Shielding Factor, K_a =	0.90	
Ground Elevation Factor, K_e =	0.984	
Wind Velocity Pressure, q_z =	46.84	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
$K_e = e^{-0.000032 \cdot zs}$	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	0.25	0.25	2	0.25	23.42
Bracing: Pipe 2.0 Std	0.20		1.2	0.20	11.12
Mount Pipe 2.0: Pipe 2.0 Std	0.20		1.2	0.20	11.12
Mount Pipe 3.0: Pipe 3.0 Std	0.29		1.2	0.29	16.39
Stiff-arm: Pipe 2.0 Std	0.20		1.2	0.20	11.12
Threaded Rod: SR1.25	0.10		1.2	0.10	5.85

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: NewtownAWC (ES-066)		Date: 8/19/2021
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 8/19/2021

Appurtenance Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	B			
Risk Category =	III		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	174.5	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 =	1.50	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} =	1.18			
Factored Ice Thickness, T_{iz} =	2.04	in	$DL_{ice}=[(H_{ice}*D_{ice}*W_{ice}) - (H*W*D)]*56pcf$	
Grating Ice Dead Load, D_{Gice} =	9.51	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)
SP2D03P36D-D	19.34	0.59	0.59	5.54	309.99

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	NewtownAWC (ES-066)	Date: 8/19/2021
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 8/19/2021

Member Ice Dead Loading

Exposure Category =	B		
Risk Category =	III		
Topographic Category =	1		
Height Above Ground, z =	174.5	ft	
Crest Height, H =	N/A	ft	
Design Ice Thickness, T_i =	1.50	in	
Importance Factor, I =	1.15		
Topographic Factor, K_{zt} =	1.00		
Height Escalation Factor, K_{iz} =	1.18		
Factored Ice Thickness, T_{iz} =	2.04	in	
Grating Ice Dead Load, D_{Gice} =	9.51	psf	

Equations

	TIA-222-H
$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
$K_{iz} = (z/33)^{0.10}$	2.6.10
$T_{iz} = T_i I K_{iz} (K_{zt})^{0.35}$	2.6.10
Aiz = pi*Tiz*(Dc+Tiz)	2.6.10
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	0.59	0.59	0.35	0.28	15.63
Bracing: Pipe 2.0 Std	0.54		0.20	0.20	10.98
Mount Pipe 2.0: Pipe 2.0 Std	0.54		0.20	0.20	10.98
Mount Pipe 3.0: Pipe 3.0 Std	0.63		0.29	0.25	13.79
Stiff-arm: Pipe 2.0 Std	0.54		0.20	0.20	10.98
Threaded Rod: SR1.25	0.44		0.10	0.15	8.18

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	NewtownAWC (ES-066)	Date: 8/19/2021
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 8/19/2021

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	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} =	50	mph		
Height Above Ground, z =	174.5	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 =	1.16	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 =	0.984		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	6.929			
Factored Ice Thickness, T_{iz} =	2.04	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)
SP2D03P36D-D	19.34	0.59	0.59	-	15.73	109.02	-	15.73	109.02

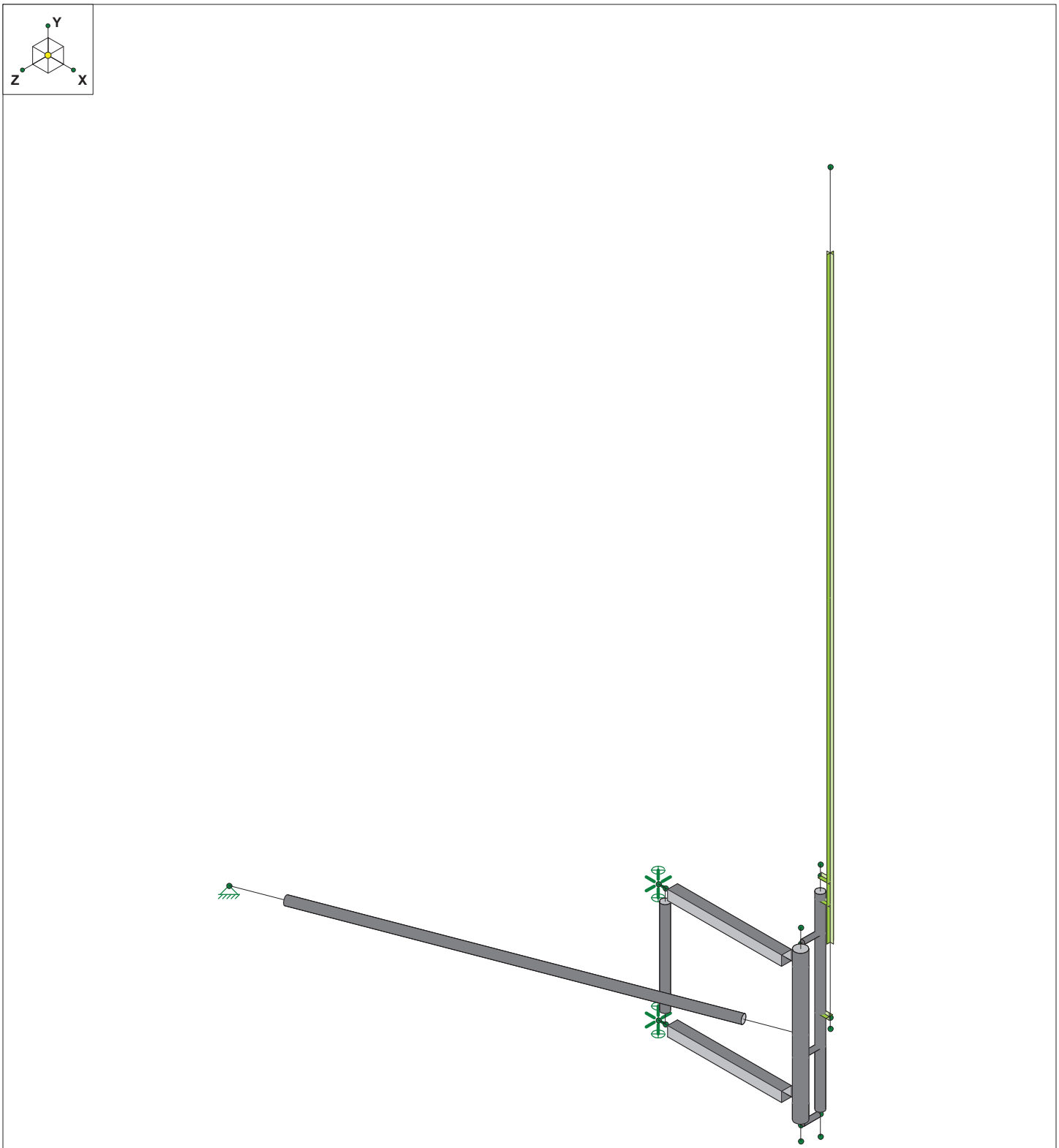
Member Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	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} =	50	mph		
Height Above Ground, z =	174.5	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 =	1.16	psf	$K_e = e^{-0.000032 z^{2.5}}$	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 =	0.984		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	6.929			
Factored Ice Thickness, T_{iz} =	2.04	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

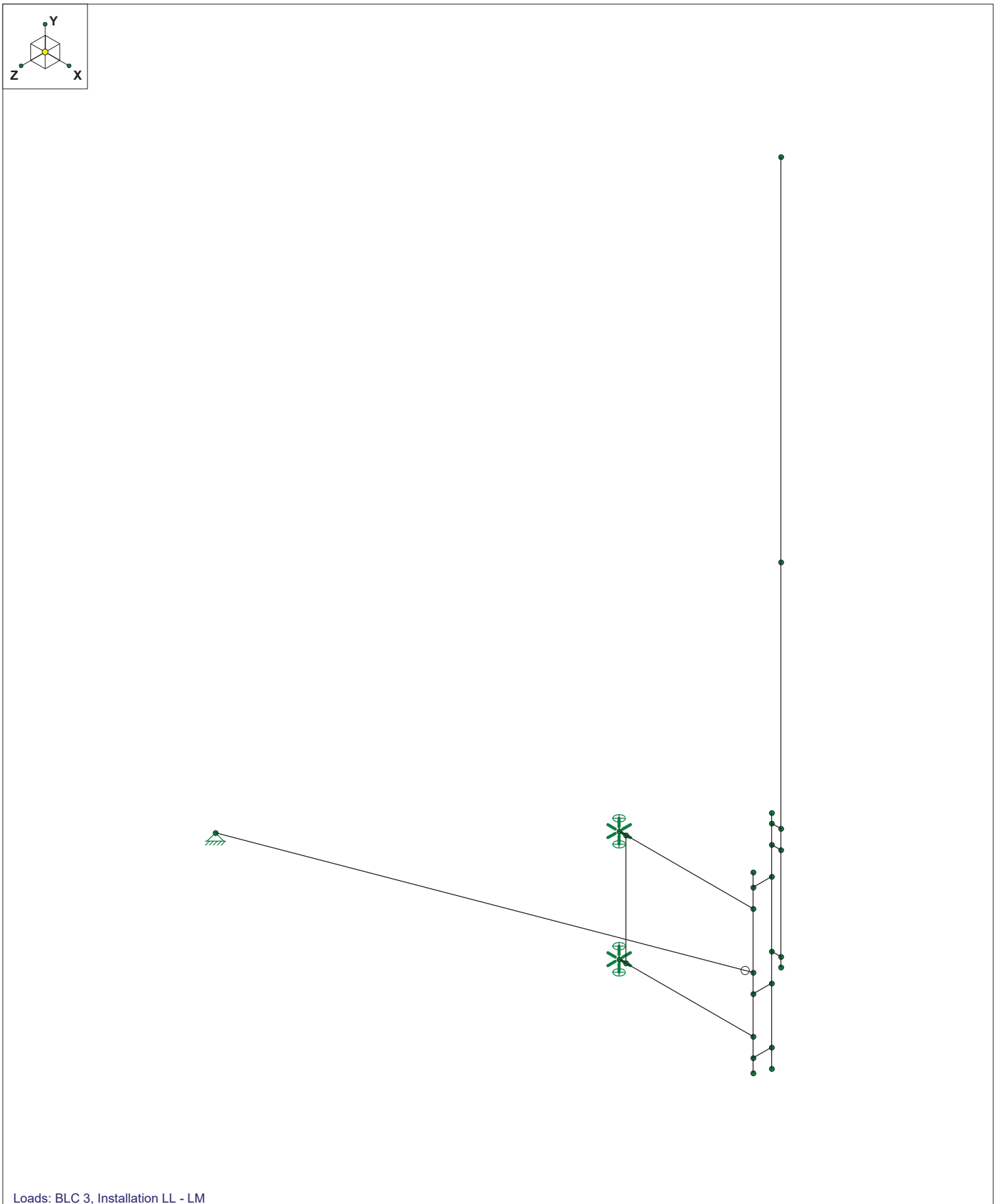
Name	Depth w/ Ice (ft)	Width w/ Ice (ft)	C_f	$D_{p(ice)}$ (ft)	$F_{M(ice)}$ (lb/ft)
Arm: HSS3X3X3	0.59	0.59	2	0.59	8.17
Bracing: Pipe 2.0 Std	0.54		1.2	0.54	4.47
Mount Pipe 2.0: Pipe 2.0 Std	0.54		1.2	0.54	4.47
Mount Pipe 3.0: Pipe 3.0 Std	0.63		1.2	0.63	5.25
Stiff-arm: Pipe 2.0 Std	0.54		1.2	0.54	4.47
Threaded Rod: SR1.25	0.44		1.2	0.44	3.69

APPENDIX 2:
RISA PRINTOUTS



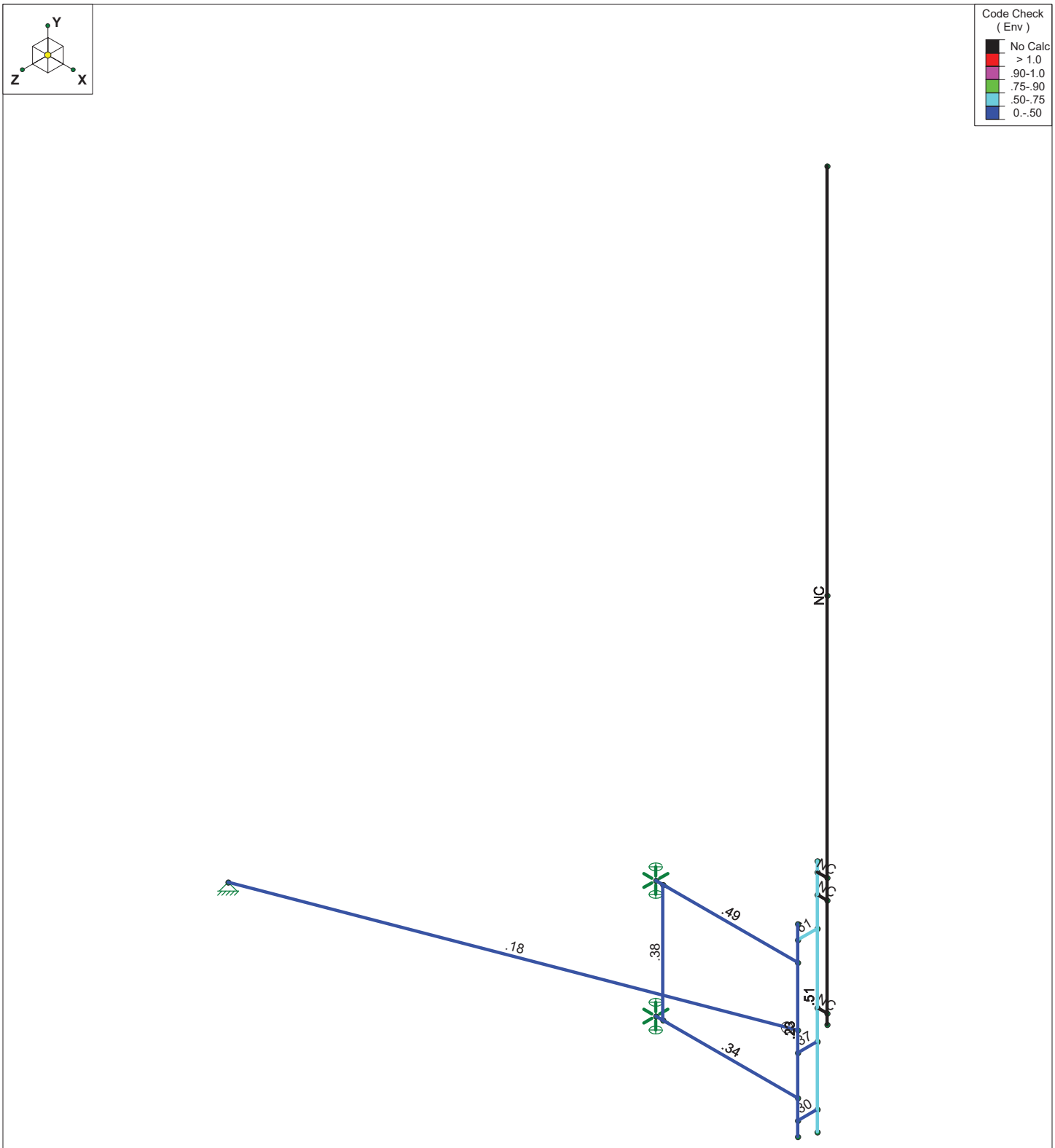
Loads: BLC 3, Installation LL - LM
Envelope Only Solution

Black & Veatch	NewtownAWC Risa Model	SK - 1
Joohwan Jung		Aug 23, 2021 at 8:24 AM
405025.3022.2200		NewtownAWC Risa Model.r3d



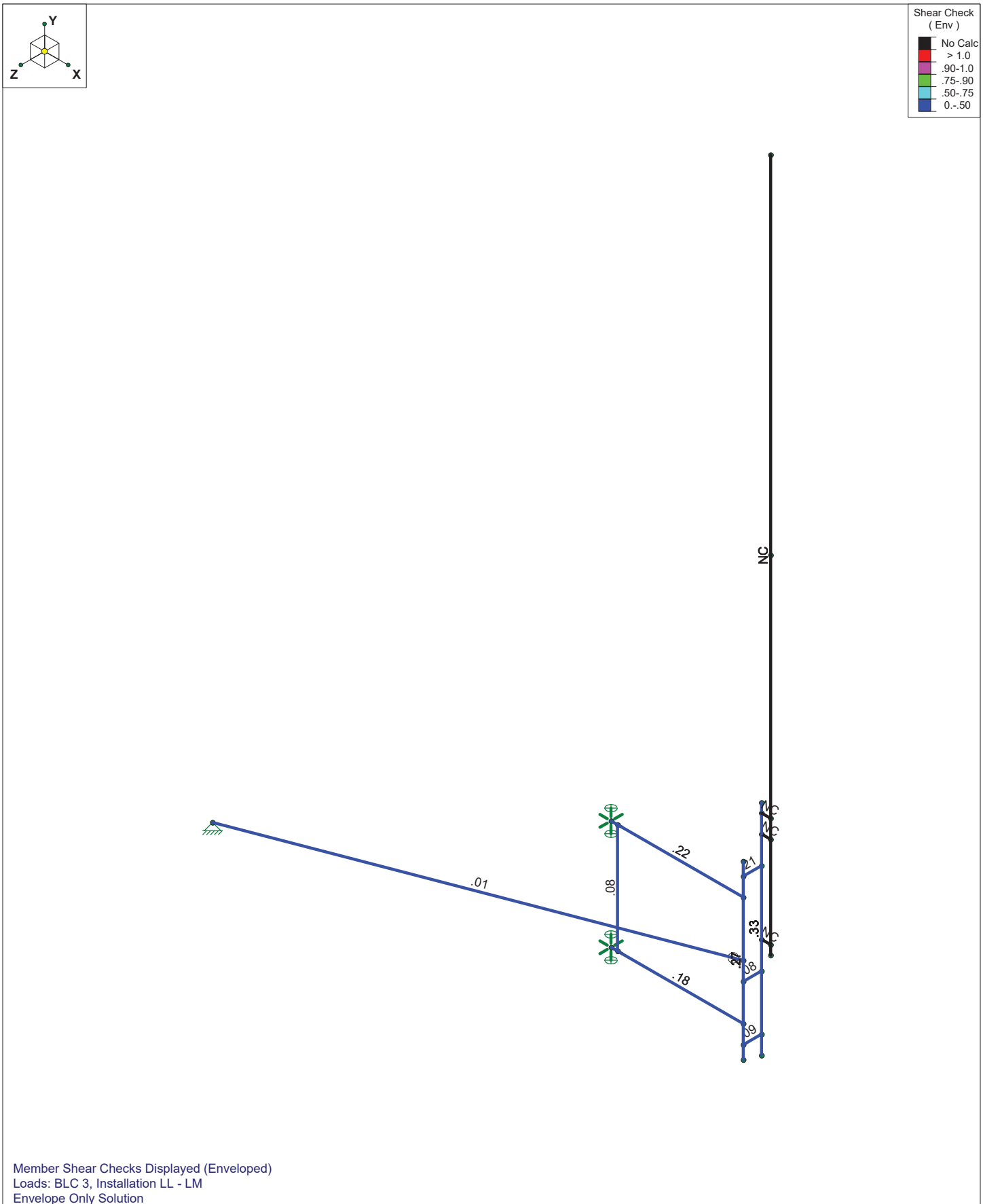
Loads: BLC 3, Installation LL - LM
Envelope Only Solution

Black & Veatch	NewtownAWC Risa Model	SK - 2
Joohwan Jung		Aug 23, 2021 at 8:24 AM
405025.3022.2200		NewtownAWC Risa Model.r3d



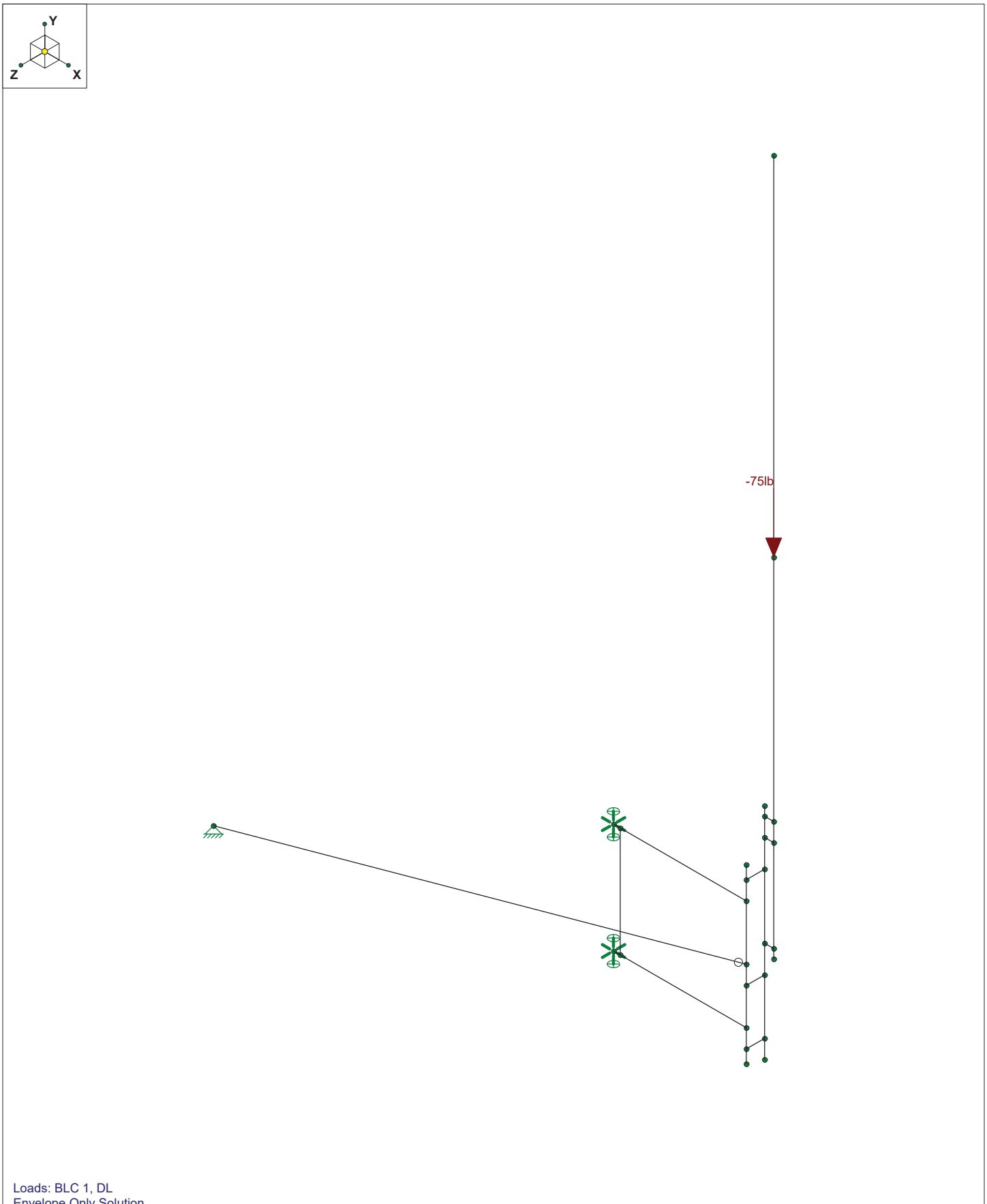
Member Code Checks Displayed (Enveloped)
Loads: BLC 3, Installation LL - LM
Envelope Only Solution

Black & Veatch	NewtownAWC Risa Model	SK - 3
Joohwan Jung		Aug 23, 2021 at 8:24 AM
405025.3022.2200		NewtownAWC Risa Model.r3d



Member Shear Checks Displayed (Enveloped)
Loads: BLC 3, Installation LL - LM
Envelope Only Solution

Black & Veatch	NewtownAWC Risa Model	SK - 4
Joohwan Jung		Aug 23, 2021 at 8:24 AM
405025.3022.2200		NewtownAWC Risa Model.r3d



Loads: BLC 1, DL
Envelope Only Solution

Black & Veatch	NewtownAWC Risa Model	SK - 5
Joohwan Jung		Aug 23, 2021 at 8:24 AM
405025.3022.2200		NewtownAWC Risa Model.r3d

(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/f...	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 Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Arm	HSS3X3X3	Beam	None	A53 Gr.B	Typical	1.89	2.46	2.46	4.03
2	Bracing	PIPE_2.0	Column	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	Mount Pipe 2.0	PIPE_2.0	Column	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
4	Mount Pipe 3.0	PIPE_3.0	Column	None	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
5	Stiff-arm	PIPE_2.0	Beam	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
6	Threaded Rod	SR1.25	Beam	None	A36 Gr.36	Typical	1.227	.12	.12	.24

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	
3	N25	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	None	A53 Gr.B	Typical
2	M2	N3	N4			Arm	Beam	None	A53 Gr.B	Typical
3	M3	N5	N6			Bracing	Column	None	A53 Gr.B	Typical
4	M4	N7	N8			Mount Pipe 3.0	Column	None	A53 Gr.B	Typical
5	M5	N11	N13			Threaded Rod	Beam	None	A36 Gr.36	Typical
6	M6	N10	N12			Threaded Rod	Beam	None	A36 Gr.36	Typical
7	M7	N15	N14			Mount Pipe 2.0	Column	None	A53 Gr.B	Typical
8	M8	N17	N18			RIGID	None	None	RIGID	Typical
9	M9	N21	N24			RIGID	None	None	RIGID	Typical
10	M10	N20	N23			RIGID	None	None	RIGID	Typical
11	M11	N19	N22			RIGID	None	None	RIGID	Typical
12	M12	N9	N25			Stiff-arm	Beam	None	A53 Gr.B	Typical
13	M13	N26	N27			Threaded Rod	Beam	None	A36 Gr.36	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				None
6	M6						Yes				None
7	M7						Yes	** NA **			None
8	M8						Yes	** NA **			None
9	M9						Yes	** NA **			None
10	M10						Yes	** NA **			None
11	M11						Yes	** NA **			None
12	M12	BenPIN					Yes	Default			None
13	M13						Yes				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
5	M5	Threaded R...	6									Lateral
6	M6	Threaded R...	6									Lateral
7	M7	Mount Pipe ...	72									Lateral
8	M12	Stiff-arm	135.43			Lbyy						Lateral
9	M13	Threaded R...	6									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	DL	DL		-1		1				
2	Maintenance LL - LV	LL				1				
3	Installation LL - LM	LL				1				
4	Wind - 0 Deg (X)	WL				1		9		
5	Wind - 30 Deg (X)	WL				1		9		
6	Wind - 60 Deg (X)	WL				1		9		
7	Wind - 90 Deg (X)	WL				1		9		
8	Wind - 120 Deg (X)	WL				1		9		
9	Wind - 150 Deg (X)	WL				1		9		
10	Wind - 180 Deg (X)	WL				1		9		
11	Wind - 210 Deg (X)	WL				1		9		
12	Wind - 240 Deg (X)	WL				1		9		
13	Wind - 270 Deg (X)	WL				1		9		
14	Wind - 300 Deg (X)	WL				1		9		
15	Wind - 330 Deg (X)	WL				1		9		
16	Wind - 0 Deg (Z)	WL				1		9		
17	Wind - 30 Deg (Z)	WL				1		9		
18	Wind - 60 Deg (Z)	WL				1		9		
19	Wind - 90 Deg (Z)	WL				1		9		
20	Wind - 120 Deg (Z)	WL				1		9		
21	Wind - 150 Deg (Z)	WL				1		9		
22	Wind - 180 Deg (Z)	WL				1		9		
23	Wind - 210 Deg (Z)	WL				1		9		
24	Wind - 240 Deg (Z)	WL				1		9		
25	Wind - 270 Deg (Z)	WL				1		9		
26	Wind - 300 Deg (Z)	WL				1		9		
27	Wind - 330 Deg (Z)	WL				1		9		
28	Ice DL	DL				1		9		
29	Ice Wind - 0 Deg (X)	WL				1		9		
30	Ice Wind - 30 Deg (X)	WL				1		9		
31	Ice Wind - 60 Deg (X)	WL				1		9		
32	Ice Wind - 90 Deg (X)	WL				1		9		
33	Ice Wind - 120 Deg (X)	WL				1		9		
34	Ice Wind - 150 Deg (X)	WL				1		9		
35	Ice Wind - 180 Deg (X)	WL				1		9		
36	Ice Wind - 210 Deg (X)	WL				1		9		
37	Ice Wind - 240 Deg (X)	WL				1		9		
38	Ice Wind - 270 Deg (X)	WL				1		9		
39	Ice Wind - 300 Deg (X)	WL				1		9		
40	Ice Wind - 330 Deg (X)	WL				1		9		
41	Ice Wind - 0 Deg (Z)	WL				1		9		
42	Ice Wind - 30 Deg (Z)	WL				1		9		
43	Ice Wind - 60 Deg (Z)	WL				1		9		
44	Ice Wind - 90 Deg (Z)	WL				1		9		
45	Ice Wind - 120 Deg (Z)	WL				1		9		
46	Ice Wind - 150 Deg (Z)	WL				1		9		
47	Ice Wind - 180 Deg (Z)	WL				1		9		
48	Ice Wind - 210 Deg (Z)	WL				1		9		
49	Ice Wind - 240 Deg (Z)	WL				1		9		
50	Ice Wind - 270 Deg (Z)	WL				1		9		
51	Ice Wind - 300 Deg (Z)	WL				1		9		
52	Ice Wind - 330 Deg (Z)	WL				1		9		

Load Combinations

	Description	S...	P...	SR...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	WIND LOAD COMBOS (140 MPH)																							
2	1.2DL + WL (0 DEG)	Yes	Y		1	1.2	4	1	16	1														
3	1.2DL + WL (30 DEG)	Yes	Y		1	1.2	5	1	17	1														
4	1.2DL + WL (60 DEG)	Yes	Y		1	1.2	6	1	18	1														
5	1.2DL + WL (90 DEG)	Yes	Y		1	1.2	7	1	19	1														
6	1.2DL + WL (120 DEG)	Yes	Y		1	1.2	8	1	20	1														
7	1.2DL + WL (150 DEG)	Yes	Y		1	1.2	9	1	21	1														
8	1.2DL + WL (180 DEG)	Yes	Y		1	1.2	10	1	22	1														
9	1.2DL + WL (210 DEG)	Yes	Y		1	1.2	11	1	23	1														
10	1.2DL + WL (240 DEG)	Yes	Y		1	1.2	12	1	24	1														
11	1.2DL + WL (270 DEG)	Yes	Y		1	1.2	13	1	25	1														
12	1.2DL + WL (300 DEG)	Yes	Y		1	1.2	14	1	26	1														
13	1.2DL + WL (330 DEG)	Yes	Y		1	1.2	15	1	27	1														
14																								
15	MOUNT LOAD COMBOS (30 MP...																							
16	1.4DL	Yes	Y		1	1.4																		
17	1.2DL + 1.5LV	Yes	Y		1	1.2	2	1.5																
18	1.2DL + 1.5LM + WL (0 DEG)	Yes	Y		1	1.2	3	1.5	4	.046	16	.046												
19	1.2DL + 1.5LM + WL (30 DEG)	Yes	Y		1	1.2	3	1.5	5	.046	17	.046												
20	1.2DL + 1.5LM + WL (60 DEG)	Yes	Y		1	1.2	3	1.5	6	.046	18	.046												
21	1.2DL + 1.5LM + WL (90 DEG)	Yes	Y		1	1.2	3	1.5	7	.046	19	.046												
22	1.2DL + 1.5LM + WL (120 DEG)	Yes	Y		1	1.2	3	1.5	8	.046	20	.046												
23	1.2DL + 1.5LM + WL (150 DEG)	Yes	Y		1	1.2	3	1.5	9	.046	21	.046												
24	1.2DL + 1.5LM + WL (180 DEG)	Yes	Y		1	1.2	3	1.5	10	.046	22	.046												
25	1.2DL + 1.5LM + WL (210 DEG)	Yes	Y		1	1.2	3	1.5	11	.046	23	.046												
26	1.2DL + 1.5LM + WL (240 DEG)	Yes	Y		1	1.2	3	1.5	12	.046	24	.046												
27	1.2DL + 1.5LM + WL (270 DEG)	Yes	Y		1	1.2	3	1.5	13	.046	25	.046												
28	1.2DL + 1.5LM + WL (300 DEG)	Yes	Y		1	1.2	3	1.5	14	.046	26	.046												
29	1.2DL + 1.5LM + WL (330 DEG)	Yes	Y		1	1.2	3	1.5	15	.046	27	.046												
30																								
31	ICE LOAD COMBOS (2", 50 MPH)																							
32	1.2DL + Ice DL + Ice WL (0 DEG)	Yes	Y		1	1.2	28	1	29	1	41	1												
33	1.2DL + Ice DL + Ice WL (30 DEG)	Yes	Y		1	1.2	28	1	30	1	42	1												
34	1.2DL + Ice DL + Ice WL (60 DEG)	Yes	Y		1	1.2	28	1	31	1	43	1												
35	1.2DL + Ice DL + Ice WL (90 DEG)	Yes	Y		1	1.2	28	1	32	1	44	1												
36	1.2DL + Ice DL + Ice WL (120 DE...	Yes	Y		1	1.2	28	1	33	1	45	1												
37	1.2DL + Ice DL + Ice WL (150 DE...	Yes	Y		1	1.2	28	1	34	1	46	1												
38	1.2DL + Ice DL + Ice WL (180 DE...	Yes	Y		1	1.2	28	1	35	1	47	1												
39	1.2DL + Ice DL + Ice WL (210 DE...	Yes	Y		1	1.2	28	1	36	1	48	1												
40	1.2DL + Ice DL + Ice WL (240 DE...	Yes	Y		1	1.2	28	1	37	1	49	1												
41	1.2DL + Ice DL + Ice WL (270 DE...	Yes	Y		1	1.2	28	1	38	1	50	1												
42	1.2DL + Ice DL + Ice WL (300 DE...	Yes	Y		1	1.2	28	1	39	1	51	1												
43	1.2DL + Ice DL + Ice WL (330 DE...	Yes	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	1676.034	3	613.634	37	1486.203	5	0	43	2463.274	11	0	43
2		min	-2199.343	9	-344.581	13	-1446.493	11	0	2	-2534.719	5	0	2
3	N3	max	1223.012	36	598.882	13	1078.382	11	0	43	1523.96	5	0	43
4		min	-610.113	13	-350.427	7	-1117.843	5	0	2	-1459.933	11	0	2
5	N25	max	1197.79	10	85.834	34	526.101	4	0	43	0	43	0	43
6		min	-1212.324	4	23.109	10	-519.893	10	0	2	0	2	0	2
7	Totals:	max	881.773	2	1001.019	35	881.796	5						

Envelope Joint Reactions (Continued)

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
8		min	-881.772	8	277.753	11	-881.796	11						

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

	Member	Shape	Code Check	Loc[...	LC	Shear...	Loc[...	Dir	LC	phi*Pnc...	phi*Pnt...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M1	HSS3X3X3	.493	0	5	.222	2.266	z	5	55265....	59535	5171.25	5171.25	2...	H1-1b
2	M2	HSS3X3X3	.335	43.5	5	.180	43.5	z	5	55265....	59535	5171.25	5171.25	2...	H1-1b
3	M3	PIPE_2.0	.382	0	5	.080	0		5	28843....	32130	1871.625	1871.625	2...	H1-1b
4	M4	PIPE_3.0	.230	34.7...	5	.267	34.7...		5	57908....	65205	5748.75	5748.75	1...	H3-6
5	M5	SR1.25	.605	0	8	.213	0		3	38996.59	39760....	828.35	828.35	2...	H1-1b
6	M6	SR1.25	.301	0	5	.093	0		6	38996.59	39760....	828.35	828.35	2...	H1-1b
7	M7	PIPE_2.0	.506	39	7	.326	39		9	20866....	32130	1871.625	1871.625	2...	H1-1b
8	M12	PIPE_2.0	.185	67.7...	10	.009	135....		40	7722.847	32130	1871.625	1871.625	1...	H1-1b
9	M13	SR1.25	.365	6	9	.084	6		2	38996.59	39760....	828.35	828.35	2...	H1-1b

APPENDIX 3:
ATTACHMENTS

INSTALLED REPLACEMENT ANTENNA

dbSpectra
Always a Better Value

220 MHz Antenna – Omnidirectional, Low-PIM/Hi-PIP, 2.9 dBd
Models - SP2D03P36D-D

Specifications	
Design Type	True Corporate Feed
Frequency Range	217-220 MHz
Passive Intermodulation – PIM (2 x 20W sources)	-150 dBc, 3rd Order
Bandwidth	3 MHz
Gain - dBd (average over BW)	2.9 dBd
Isolation, min.	34 dB
Configuration	Dual antenna
Beam Tilt (electrical down-tilt)	None (0°)
Vertical Beamwidth (E-Plane)	30°
Impedance -- Ohms	50
VSWR / Return Loss -- dB	1.5 : 1 / 14 dB (min.)
Average Power Rating	500 W (each antenna)
Peak Instantaneous Power	25 kW (each antenna)
Polarization	Vertical
Lightning Protection	Direct Ground
Connector	7/16 DIN female
Equivalent Flat-Plate Area	3.3 sq. ft.
Lateral Wind-load Thrust @100mph	135 lbf.
Wind Speed rating	160 mph (without ice) 136 mph (½" radial ice)
Total Length	19 feet
Mounting Mast Length	35 inches
Mounting Hardware (Included)	DSH3V4N
Top Sway Brace (Recommended if side mounting antennas)	DSH2H3S (order separately)
Mast O.D.	3.5 inches
Radome color	Horizon Blue
Radome O.D.	3.0 inches
Weight, antenna, and hardware	75 lbs. (approx.)
Shipping Weight	105 lbs. (approx.)
Invertibility	Antennas are physically invertible, but the patterns are optimized for upright mount.

Features and Benefits

Antennas from dbSpectra provide long term, trouble-free service in severe environments!

Design is tested to stringent Peak Instantaneous Power (PIP) levels of 25 KW using dbSpectra's 12-channel P25 PIP test bed. High PIP level is demanded by today's digital systems.

True Corporate Feed Array – provides for excellent gain and pattern consistency across a wider frequency range.

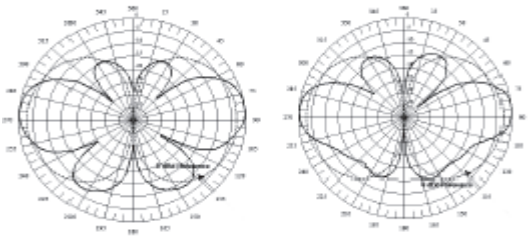
PIM Rated Design – better than -150 dBc.

Sturdy Construction – Heavy-wall fiberglass radome minimizes tip deflection.

Excellent Lightning Protection – heavy internal conductor DC ground.

Radiation Pattern

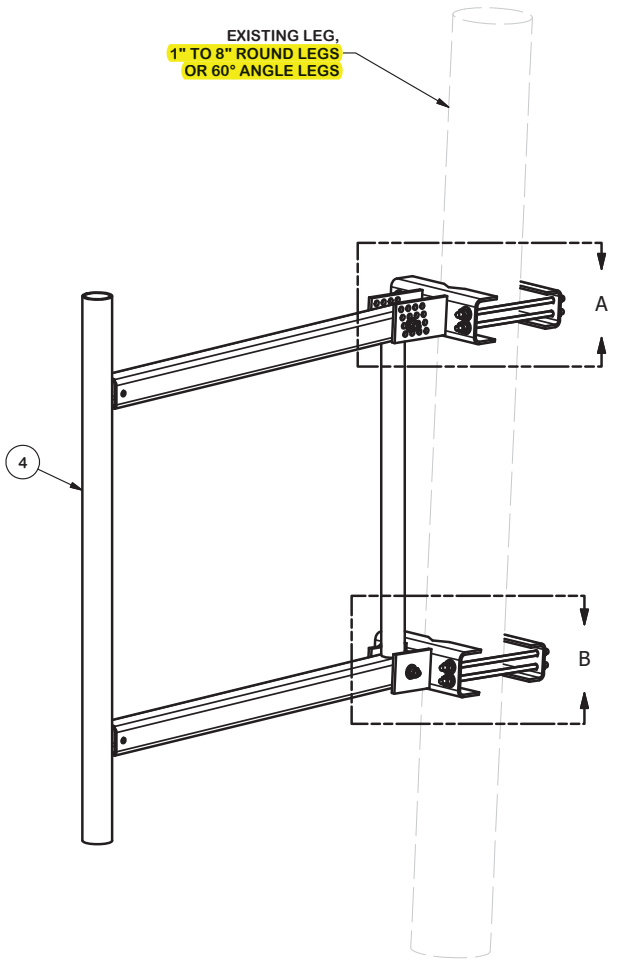
Vertical (No-Tilt)

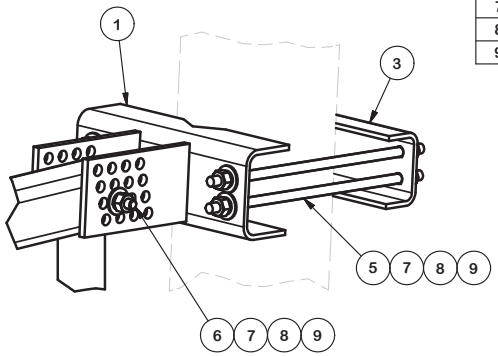


Top **Bottom**

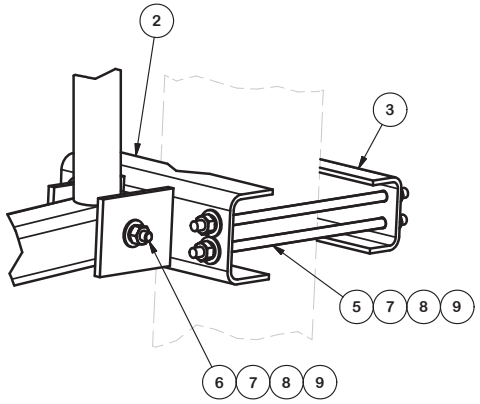
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 2.875" ± DIAMETER.

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

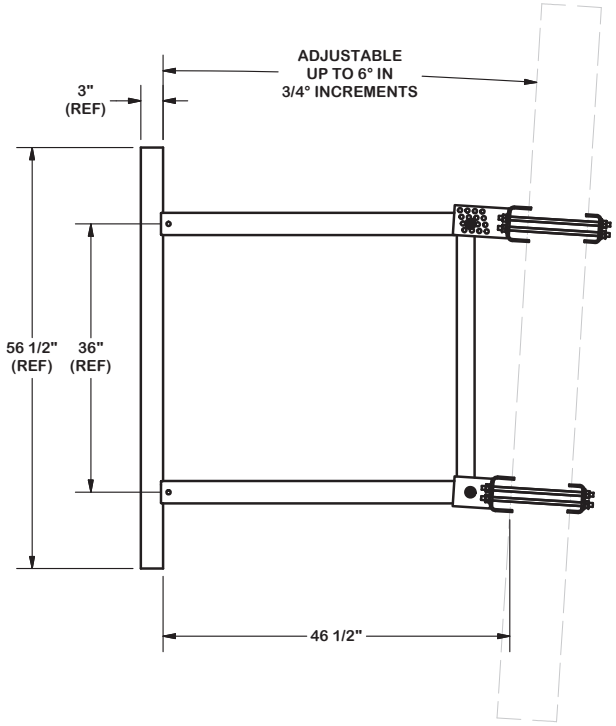




DETAIL A



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

TIEBACK SPECIFICATIONS:
(1) SITE PRO 1 SPTB-NP
(1) SITE PRO 1 P2150 (2.375" O.D. X 12.5' LONG SCHEDULE 40 GALVANIZED PIPE)

Products (http://www.sitepro1.com/store/cart.php) > TOWER STEEL (http://www.sitepro1.com/store/cart.php?m=product_list&c=53) > Tower Components (http://www.sitepro1.com/store/cart.php?m=product_list&c=58)

2-3/8" Sliding Pipe Tie-Back Hardware, No Pipe

Qty: 1

Add to Cart

SKU: SPTB-NP
Size: See Description

My Cart

Checkout (https://www.sitepro1.com/store/cart.php?m=checkout)

Total: $0.00

No items in your cart
Your cart is currently empty. As you add items, they will appear in your cart.

Quick Navigation

Description

- **SPTB-NP**
- **Universal Sliding Pipe Tie-Back Assemblies**
- **2-3/8" Sliding Pipe Tie-Back Hardware, No Pipe**
- **Weight 48 lb**

- **VIEW ALL TOWER COMPONENTS (https://www.sitepro1.com/store/cart.php?m=product_list&c=58)**
- **VIEW ALL TOWER STEEL (https://www.sitepro1.com/store/cart.php?m=product_list&c=53)**
- **VIEW COMPLETE PRODUCT CATALOG (https://www.sitepro1.com/store/cart.php?m=product_list)**

Need Assistance?

Our support team is available from 8:30 AM - 8:00 PM ET to assist you.

888-438-7761 (tel:888-438-7761)

888-753-7446 (tel:888-753-7446)

SP1Support@Valmont.com (mailto:SP1Support@Valmont.com)

Go Back (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwjXj5e3y-_nAhUK26wKHaL1A80QFjAAegQIBBAB&url=https%3A%2F

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SP1 Connection (https://www.sitepro1.com/connection/)
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Company

About Us (https://www.sitepro1.com/company-htm/)
Leadership Letter (https://www.sitepro1.com/letter-htm/)
Customer Service (https://www.sitepro1.com/customer-service)
Customer Testimonials (https://www.sitepro1.com/testimonials-htm/)
Tower Facilities (https://www.sitepro1.com/galleries/)
Holiday Schedule (https://www.sitepro1.com/holiday-schedule-htm/)

ATTACHMENT C – CONSTRUCTION DRAWINGS

EVERSOURCE ENERGY

NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (1) NEW OMNI/WHIP ANTENNA AT ELEVATION 184'–0"± AGL INSTEAD OF (2) OMNI/WHIP ANTENNAS, (1) AT ELEVATION 180'–0"± AGL AND (1) AT ELEVATION 165'–0" AGL
2. INSTALL (1) NEW RACK WITH NEW DMR EQUIPMENT IN EXISTING TELECOM ROOM
3. INSTALL 336 AH BATTERIES IN EXISTING BATTERY RACK
4. INSTALL NEW RACK WITH CHARGER AND DISTRIBUTION PANEL AND 336 AH BATTERIES
5. RELOCATE 448AH BATTERIES TO CHURCH HILL

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:	NEWTOWN AWC
SITE ID NUMBER:	#15215
SITE ADDRESS:	20 BARNABAS RD NEWTOWN, CT 06470
MAP:	5
BLOCK:	7
LOT:	11
LATITUDE:	41° 25' 39.5" N
LONGITUDE:	73° 20' 37.5" W
ELEVATION:	457'± AMSL
FEMA/FIRM DESIGNATION:	X

CONTACT INFORMATION

APPLICANTS:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

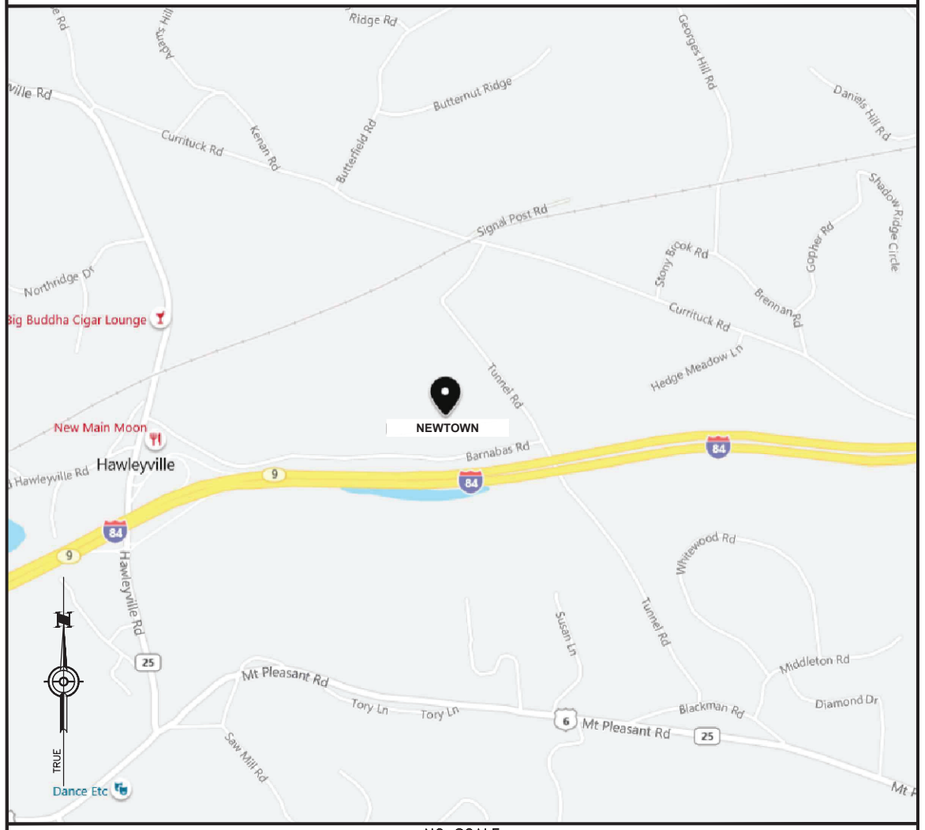
EVERSOURCE ENERGY
PROJECT MANAGER:
NIKOLL PRECI
(860) 655–3079

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:	403093
DRAWN BY:	TYW
CHECKED BY:	THM

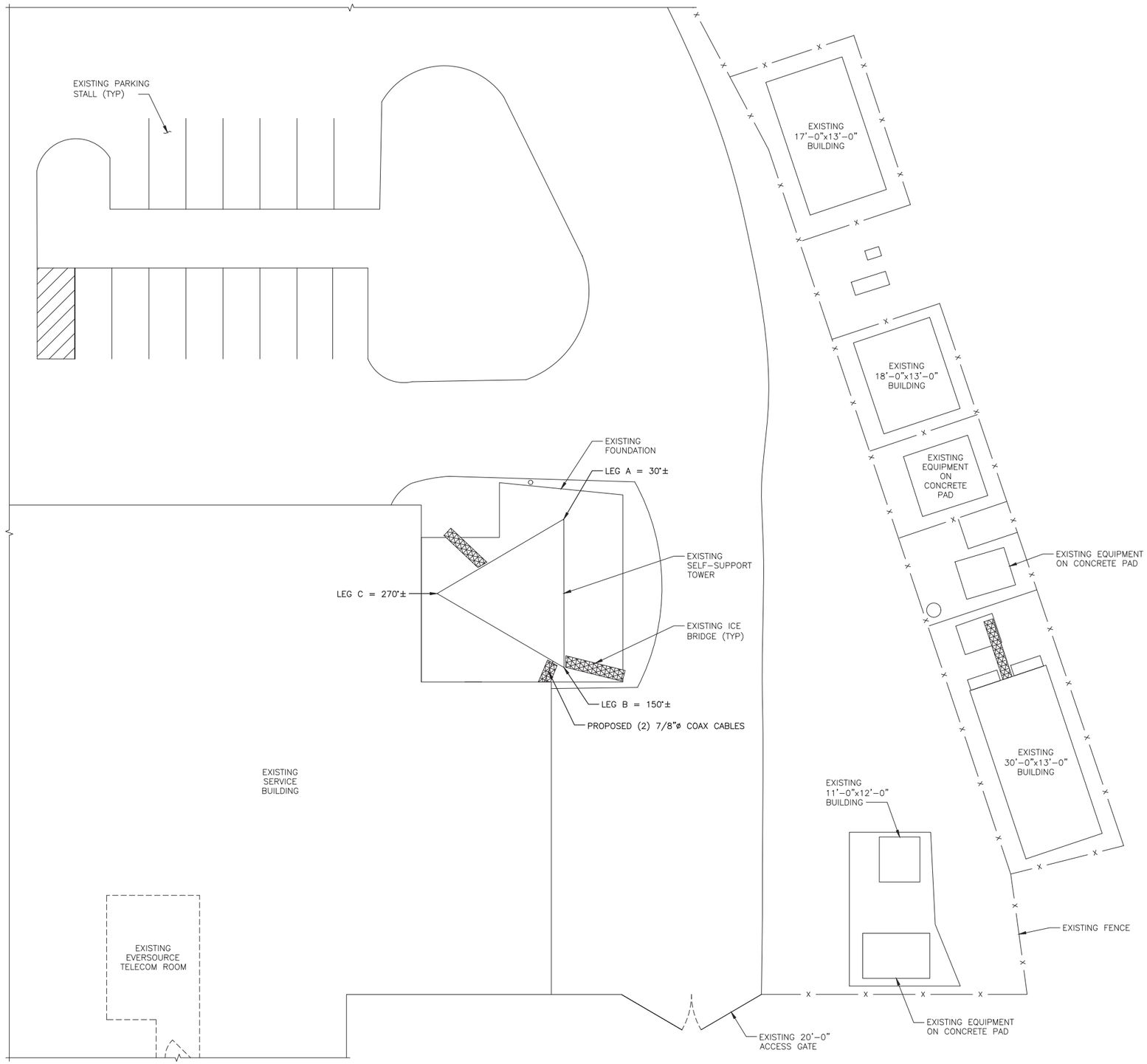
REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	03/26/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
08/17/2021

NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

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
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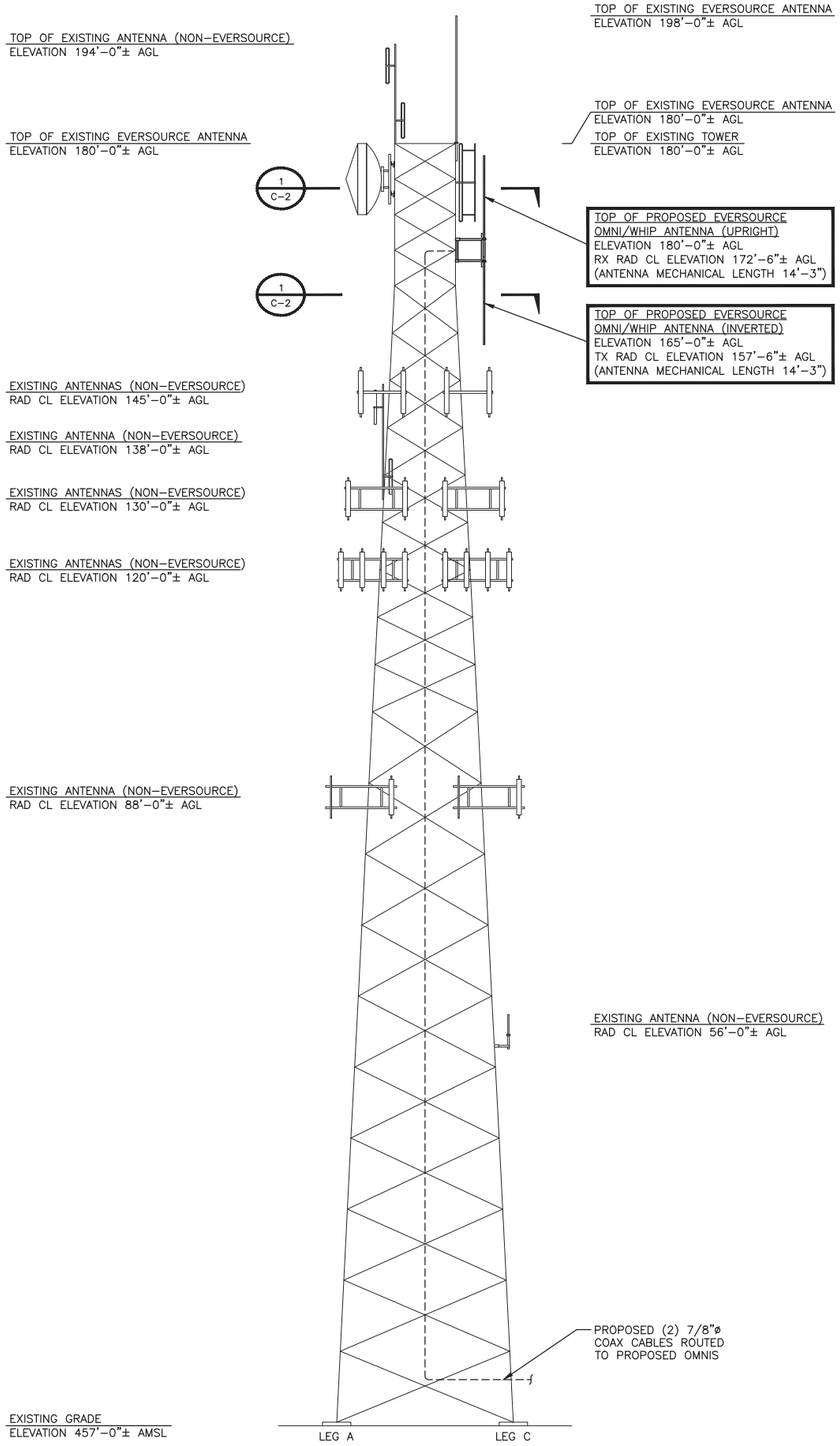
08/17/2021

NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

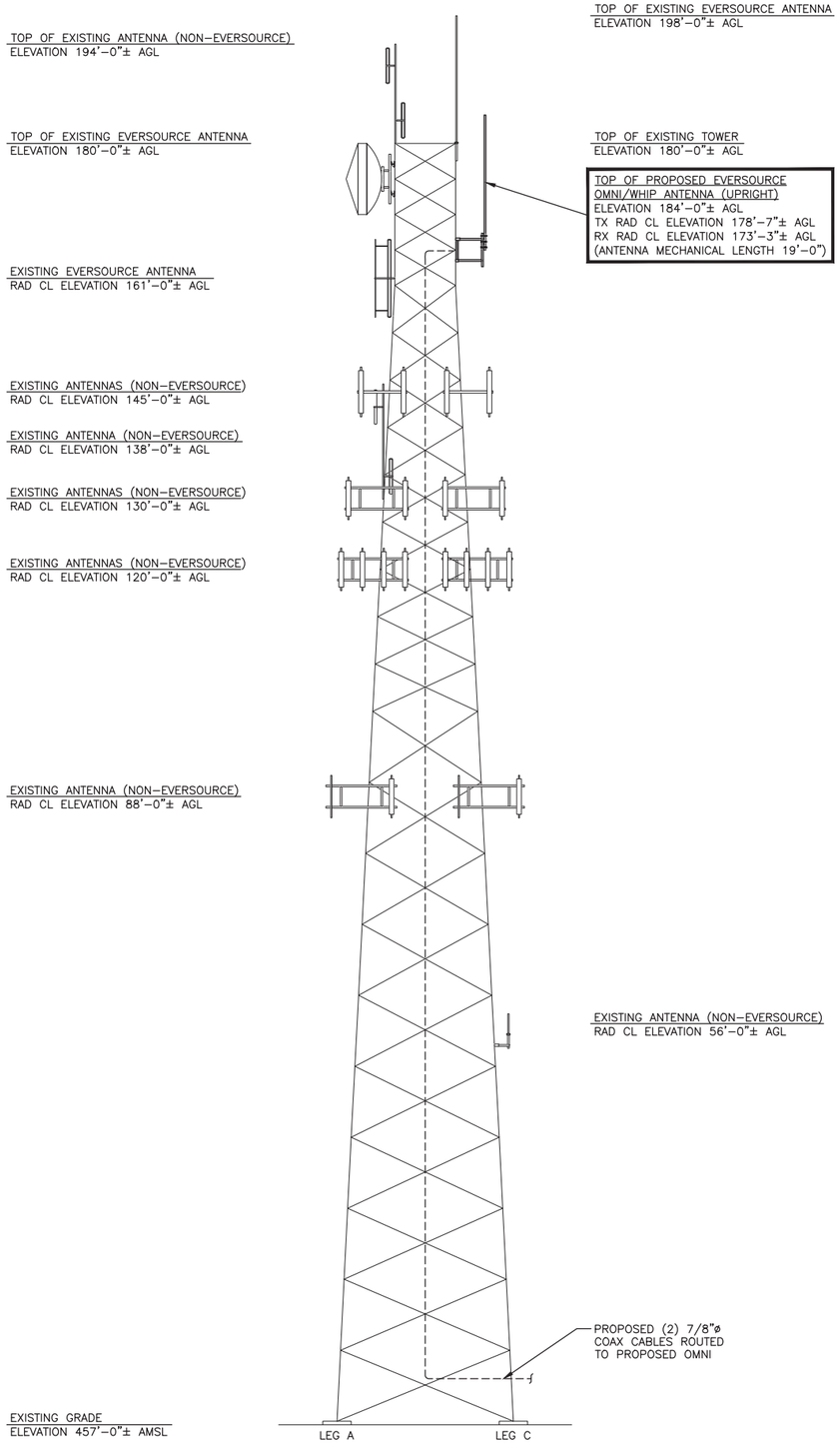
SHEET TITLE
SITE PLAN

SHEET NUMBER
C-1



CSC SUBMITTED INSTALLATION CONFIGURATION

NO SCALE



CURRENT INSTALLATION CONFIGURATION

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:		403093
DRAWN BY:		TYW
CHECKED BY:		THM

REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	03/26/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED
PROFESSIONAL ENGINEER
08/17/2021

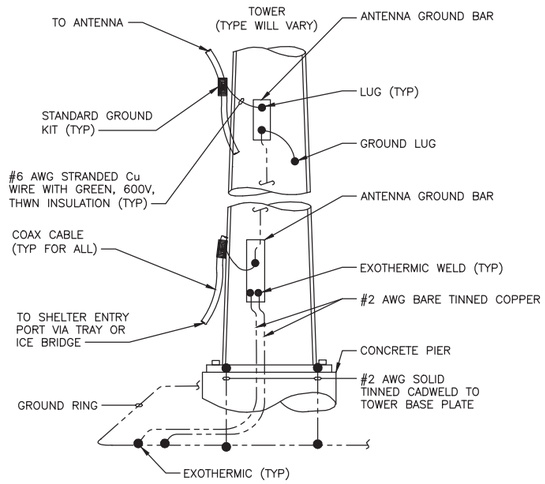
NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

SHEET TITLE

TOWER
ELEVATION

SHEET NUMBER

C-2

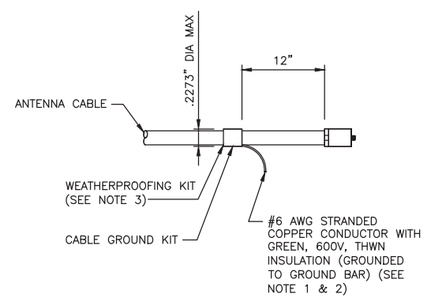


NOTE

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

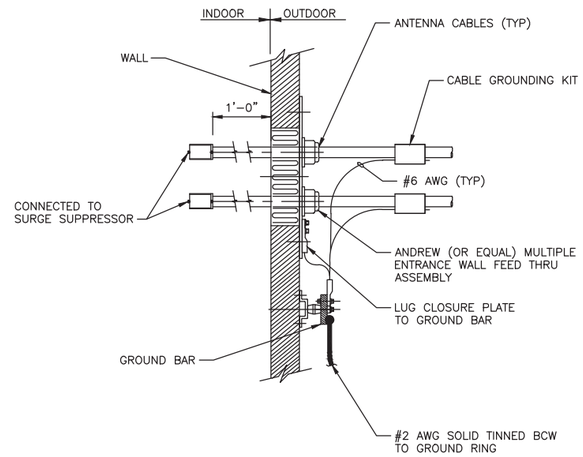


NOTES

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.

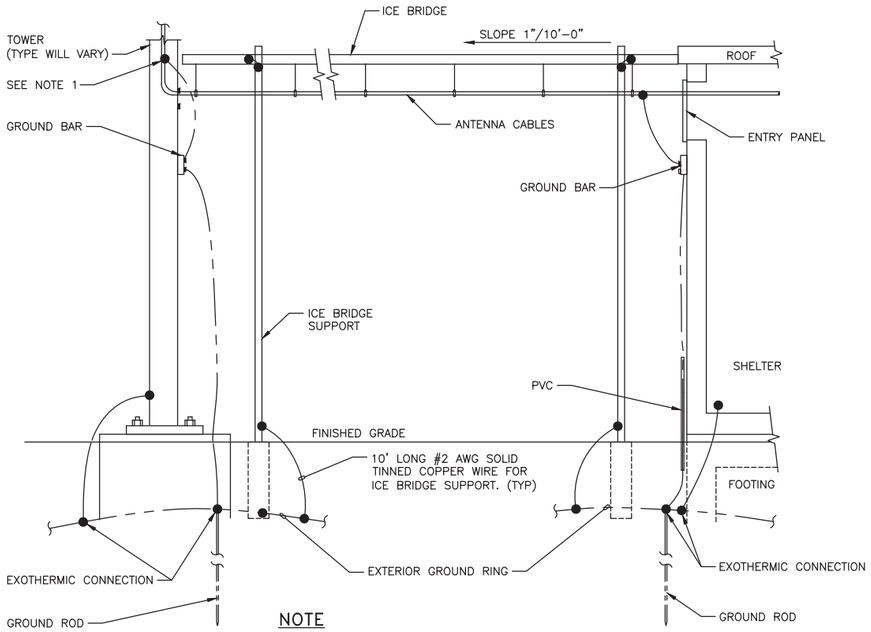
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

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:	403093
DRAWN BY:	TYW
CHECKED BY:	THM

REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	03/26/20	ISSUED FOR FILING

STATE OF CONNECTICUT · MARK P. STILES · 24358 · LICENSED PROFESSIONAL ENGINEER
08/17/21

NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

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
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
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BLACK & VEATCH
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PHONE: (913) 458-3595

PROJECT NO:	403093
DRAWN BY:	TYW
CHECKED BY:	THM

REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	03/26/20	ISSUED FOR FILING

NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

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. 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).
4. 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.
5. 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.
6. 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.
7. THE MINIMUM BEND RADIUS SHALL BE 8 INCHES FOR #6 WIRE AND SMALLER AND 12 INCHES FOR WIRE LARGER THAN #6.
8. BOND THE FENCE TO THE GROUND RING AT EACH CORNER, AND AT EACH GATE POST WITH #2 SOLID TINNED WIRE. EXOTHERMIC WELD BOTH ENDS.
9. GROUND KITS SHALL BE SOLID COPPER STRAP WITH #6 WIRE 2–HOLE COMPRESSION CRIMPED LUGS AND SHALL BE SEALED ACCORDING TO MANUFACTURER INSTRUCTIONS.
10. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL BE USED.
11. 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.

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.

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STATE OF CONNECTICUT · MARK P. STILES · 24358 · LICENSED PROFESSIONAL ENGINEER
08/17/21

NEWTOWN AWC
20 BARNABAS RD
NEWTOWN, CT 06470

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

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NEWTOWN AWC
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SHEET TITLE

NOTES
& SPECIFICATIONS

SHEET NUMBER

N-3

INSTALLED REPLACEMENT ANTENNA

dbSpectra
Always a Better Value

220 MHz Antenna – Omnidirectional, Low-PIM/Hi-PIP, 2.9 dBd
Models - SP2D03P36D-D

Specifications	
Design Type	True Corporate Feed
Frequency Range	217-220 MHz
Passive Intermodulation – PIM (2 x 20W sources)	-150 dBc, 3rd Order
Bandwidth	3 MHz
Gain - dBd (average over BW)	2.9 dBd
Isolation, min.	34 dB
Configuration	Dual antenna
Beam Tilt (electrical down-tilt)	None (0°)
Vertical Beamwidth (E-Plane)	30°
Impedance -- Ohms	50
VSWR / Return Loss -- dB	1.5 : 1 / 14 dB (min.)
Average Power Rating	500 W (each antenna)
Peak Instantaneous Power	25 kW (each antenna)
Polarization	Vertical
Lightning Protection	Direct Ground
Connector	7/16 DIN female
Equivalent Flat-Plate Area	3.3 sq. ft.
Lateral Wind-load Thrust @100mph	135 lbf.
Wind Speed rating	160 mph (without ice) 136 mph (½" radial ice)
Total Length	19 feet
Mounting Mast Length	35 inches
Mounting Hardware (Included)	DSH3V4N
Top Sway Brace (Recommended if side mounting antennas)	DSH2H3S (order separately)
Mast O.D.	3.5 inches
Radome color	Horizon Blue
Radome O.D.	3.0 inches
Weight, antenna, and hardware	75 lbs. (approx.)
Shipping Weight	105 lbs. (approx.)
Invertibility	Antennas are physically invertible, but the patterns are optimized for upright mount.

Features and Benefits

Antennas from dbSpectra provide long term, trouble-free service in severe environments!

Design is tested to stringent Peak Instantaneous Power (PIP) levels of 25 KW using dbSpectra's 12-channel P25 PIP test bed. High PIP level is demanded by today's digital systems.

True Corporate Feed Array – provides for excellent gain and pattern consistency across a wider frequency range.

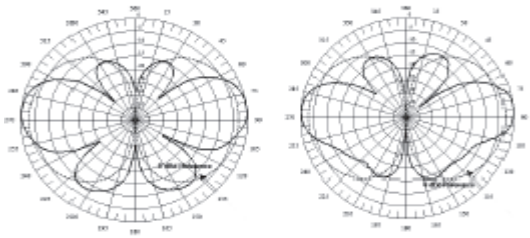
PIM Rated Design – better than -150 dBc.

Sturdy Construction – Heavy-wall fiberglass radome minimizes tip deflection.

Excellent Lightning Protection – heavy internal conductor DC ground.

Radiation Pattern

Vertical (No-Tilt)



Top **Bottom**

TELEWAVE, INC.

216 - 225 MHz

ORIGINAL PROPOSED ANTENNA, REMOVED AND REPLACED

ANT220F6

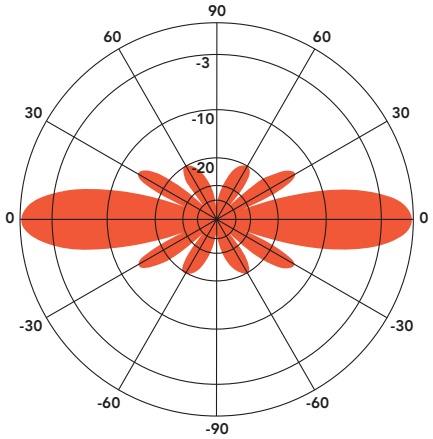
FIBERGLASS COLLINEAR ANTENNA 6 dBd

The Telewave ANT220F6 is an extremely rugged, medium-gain, fiberglass collinear antenna, designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, connected at DC ground potential for lightning impulse protection. The ANT220F6 is an excellent choice for wireless PTC systems in urban or rural areas.

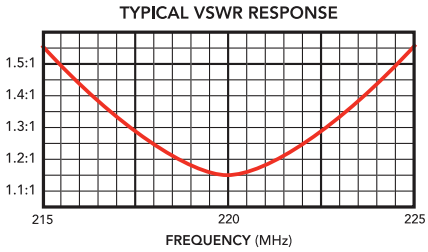
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

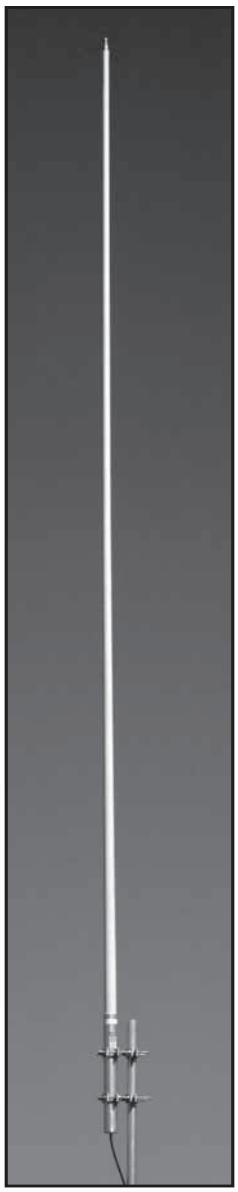
The ANT220F6 includes an ANTC482 dual clamp set for mounting to a 1.5" to 3.5" O.D. support pipe, and a 24" removable RG-213 N-Male jumper. Stand-off and top mounts are also available.

NOTE: THIS ANTENNA IS SHIPPED VIA TRUCK FREIGHT ONLY



ANT220F6 - 221 MHz
Vertical Plane
Gain = 6.11 dBd





Mast OD

SPECIFICATIONS			
Frequency (continuous)	216-225 MHz	**Dimensions (L x base diam.) in.**	171 x 2.75
Gain	6 dBd	**Tower weight (antenna + clamps)**	35 lb.
Power rating (typ.)	500 watts	**Shipping weight**	50 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	150 / 125 MPH
VSWR	1.5:1 or less	**Maximum exposed area**	3.1 ft.²
Pattern	Omnidirectional	**Lateral thrust at 100 MPH**	122 lb.
Vertical beamwidth	20°	**Bending moment at top clamp**	494 ft. lb.
Termination	Recessed N Female 7-16 DIN-F opt.	**(100 MPH, 40 PSF flat plate equiv.)**	

TELEWAVE, INC.®

ORIGINAL PROPOSED ANTENNA, REMOVED AND REPLACED

ANT220F6-I w/DIN CONNECTOR to be used for the inverted antenna.

216 - 225 MHz

ANT220F6

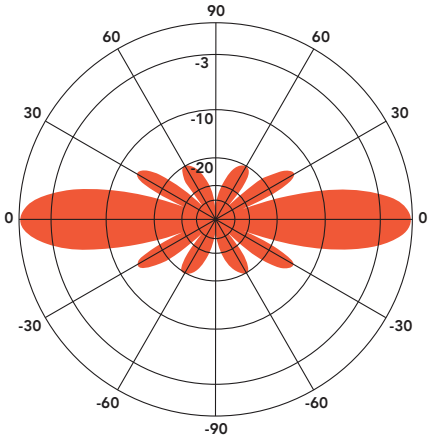
FIBERGLASS COLLINEAR ANTENNA 6 dBd

The Telewave ANT220F6 is an extremely rugged, medium-gain, fiberglass collinear antenna, designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, connected at DC ground potential for lightning impulse protection. The ANT220F6 is an excellent choice for wireless PTC systems in urban or rural areas.

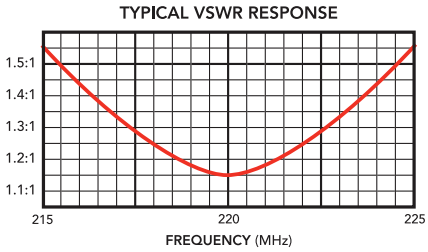
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

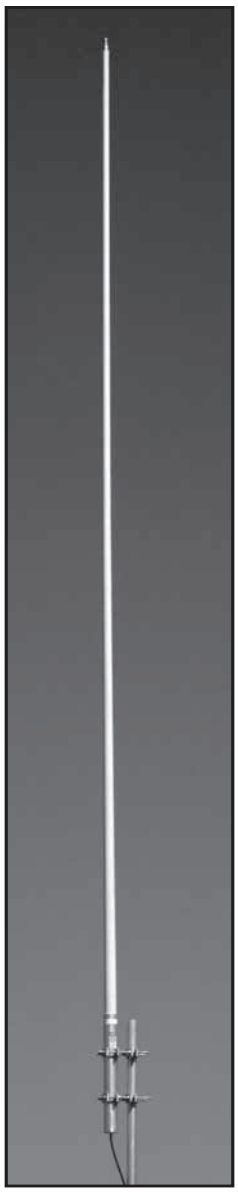
The ANT220F6 includes an ANTC482 dual clamp set for mounting to a 1.5" to 3.5" O.D. support pipe, and a 24" removable RG-213 N-Male jumper. Stand-off and top mounts are also available.

NOTE: THIS ANTENNA IS SHIPPED VIA TRUCK FREIGHT ONLY



ANT220F6 - 221 MHz
Vertical Plane
Gain = 6.11 dBd



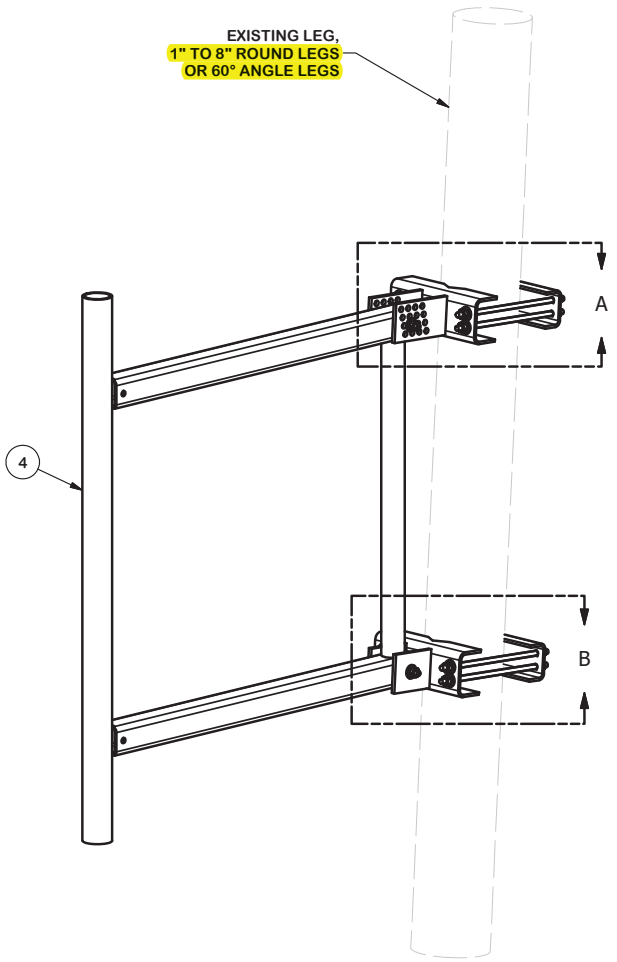


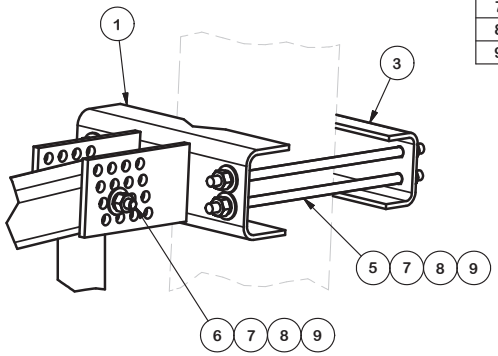
Mast OD

SPECIFICATIONS			
Frequency (continuous)	216-225 MHz	**Dimensions (L x base diam.) in.**	171 x 2.75
Gain	6 dBd	**Tower weight (antenna + clamps)**	35 lb.
Power rating (typ.)	500 watts	**Shipping weight**	50 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	150 / 125 MPH
VSWR	1.5:1 or less	**Maximum exposed area**	3.1 ft.²
Pattern	Omnidirectional	**Lateral thrust at 100 MPH**	122 lb.
Vertical beamwidth	20°	**Bending moment at top clamp**	494 ft. lb.
Termination	Recessed N Female 7-16 DIN-F opt.	**(100 MPH, 40 PSF flat plate equiv.)**	

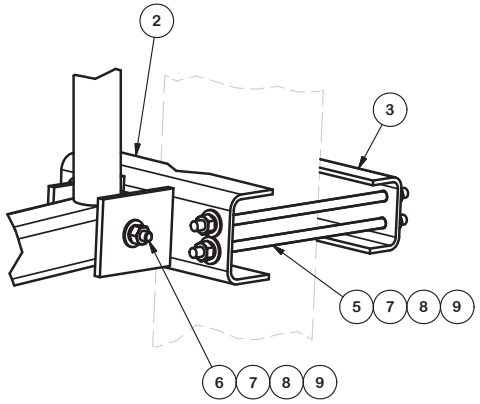
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 2.875" ± DIAMETER.

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

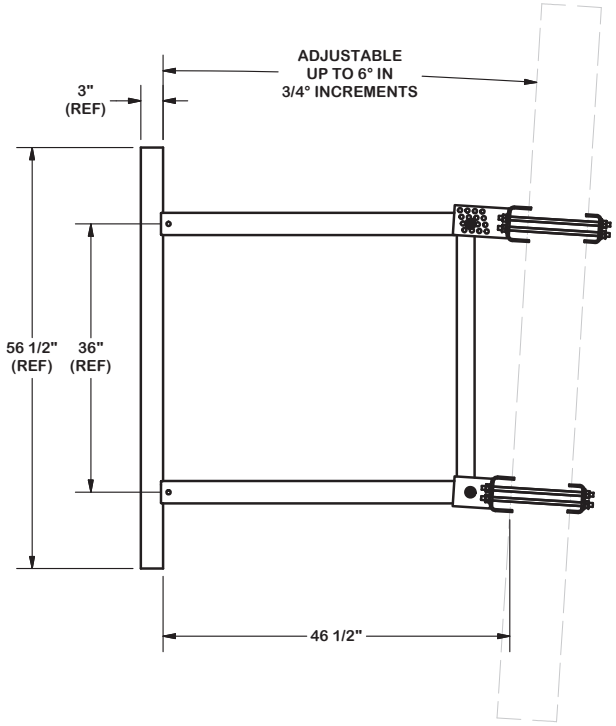




DETAIL A



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

TIEBACK SPECIFICATIONS:
(1) SITE PRO 1 SPTB-NP
(1) SITE PRO 1 P2150 (2.375" O.D. X 12.5' LONG SCHEDULE 40 GALVANIZED PIPE)

Products (http://www.sitepro1.com/store/cart.php) > TOWER STEEL (http://www.sitepro1.com/store/cart.php?m=product_list&c=53) > Tower Components (http://www.sitepro1.com/store/cart.php?m=product_list&c=58)

2-3/8" Sliding Pipe Tie-Back Hardware, No Pipe

Qty: 1

Add to Cart

SKU: SPTB-NP
Size: See Description

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Checkout (https://www.sitepro1.com/store/cart.php?m=checkout)

Total: $0.00

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Your cart is currently empty. As you add items, they will appear in your cart.

Quick Navigation

Description

- **SPTB-NP**
- **Universal Sliding Pipe Tie-Back Assemblies**
- **2-3/8" Sliding Pipe Tie-Back Hardware, No Pipe**
- **Weight 48 lb**

- **VIEW ALL TOWER COMPONENTS (https://www.sitepro1.com/store/cart.php?m=product_list&c=58)**
- **VIEW ALL TOWER STEEL (https://www.sitepro1.com/store/cart.php?m=product_list&c=53)**
- **VIEW COMPLETE PRODUCT CATALOG (https://www.sitepro1.com/store/cart.php?m=product_list)**

Need Assistance?

Our support team is available from 8:30 AM - 8:00 PM ET to assist you.

888-438-7761 (tel:888-438-7761)

888-753-7446 (tel:888-753-7446)

SP1Support@Valmont.com (mailto:SP1Support@Valmont.com)

Go Back (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwjXj5e3y-_nAhUK26wKHaL1A80QFjAAegQIBBAB&url=https%3A%2F

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Tower Facilities (https://www.sitepro1.com/galleries/)
Holiday Schedule (https://www.sitepro1.com/holiday-schedule-htm/)

ATTACHMENT D – STRUCTURAL ANALYSIS REPORT

Date: **August 12, 2021**

Black & Veatch Corp.
6800 W. 115th St., Suite 2292
Overland Park, KS 66211
(913) 458-2522

Subject:	**Structural Analysis Report**	
Eversource Designation:	**Site Number:**	ES-066
	Site Name:	NewtownAWC
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	405025
Site Data:	**20 Barnabas Rd, Newtown, Fairfield County, CT** **Latitude *41° 25' 39.5"*, Longitude *-73° 20' 37.5"*** **180 Foot - Self Support Tower**	

Black & Veatch Corp. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC1: Proposed Equipment Configuration **Sufficient Capacity – 95.3%**

This analysis utilizes an ultimate 3-second gust wind speed of 130 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Robert Hudson II / Christopher Giannotti

Respectfully submitted by:

Joshua J. Riley, P.E.
Professional Engineer

08/12/2021

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by Rohn.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	III
Wind Speed:	130 mph ultimate
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Seismic Ss:	0.207
Seismic S1:	0.066
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
165.0	174.5	1	dbspectra	SP2D03P36D-D	2	7/8	-
	165.0	1	site pro 1	USF-4U w/ Tieback [4' SO 203-1 + Vert. Pipe Support]			

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
180.0	192.5	1	antennae	10' Dipole	2 1	7/8 1/2	1
	190.5	1	antennae	15' Omni			
	189.0	1	antennae	20' Omni			
	180.0	1	mount pipes	5'x2" Mount Pipe			
		1	mount pipes	5'x4" Mount Pipe			
177.0	177.0	1	dishes	6' Microwave Dish w/ Radome	1	EW63	1
		1	miscl	8' HSS4x4x3/8 Horizontal Mount			
		1	mount pipes	6'x2" Horizontal Pipe			
		1	mount pipes	6'x4" Mount Pipe			
161.0	163.0	1	antennae	12' Dipole	1	1/2	1,2
	161.0	1	mount pipes	2'x2" Mount Pipe			
157.0	161.0	1	antennae	5' Omni	2	7/8	1
	157.0	1	miscl	18"x18"x6" Junction Box			
		1	tower mounts	Side Arm Mount [SO 305-1]			
	153.0	1	antennae	5' Omni			
145.0	146.0	3	commscope	LNX-6512DS-T4M w/ Mount Pipe	12	1 5/8	

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
	145.0	3	ericsson	AIR 21 B2A/B4P w/ Mount Pipe			1
		3	mount pipes	5'x4" Horizontal Mount Pipe			
		3	rfscelwave	ATM1900D-1A20			
133.0	138.0	1	antennae	10' Dipole	1	7/8	1
	133.0	1	tower mounts	Side Arm Mount [SO 203-1]			
130.0	132.0	3	ericsson	RRUS 11	6 2 1	1 5/8 1 1/2 3" Conduit	1
	131.0	1	raycap	DC6-48-60-18-8F			
	130.0	3	kathrein	800 10121 w/ Mount Pipe			
		6	powerwave tech	LGP21401			
		3	powerwave tech	P65-16-XLH-RR w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 405-3]			
120.0	123.0	2	rfs celwave	DB-T1-6Z-8AB-0Z	2	1 5/8	1
	122.0	3	alcatel lucent	RRH2X40-AWS			
		3	alcatel lucent	RRH2x40 700			
	121.0	6	amphenol	BXA-171063-12CF-EDIN-X w/ Mount Pipe			
		6	amphenol	BXA-70063-6CF-EDIN-X w/ Mount Pipe			
	120.0	1	tower mounts	Pipe Mount [PM 601-3]			
		1	tower mounts	Sector Mount [SM 502-3]			
88.0	88.0	3	alcatel lucent	1900MHz RRH	3	1 1/4	1
		3	alcatel lucent	800MHz RRH			
		1	powerwave tech	P40-16-XLPP-RR w/ Mount Pipe			
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 502-3]			
56.0	56.0	1	gps	GPS_A	1	1/2	1
		1	mount pipes	3'x2" Horizontal Mount Pipe			

Notes:
1) Existing Equipment
2) Relocated from 174’ to make room for proposed antenna and its mount.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
GEOTECHNICAL REPORT	Dr. Clarence Welti, P.E., P.C., dated 10/19/2011	-	Eversource
TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Northeast Utilities Service Co., dated 3/01/1991	-	Eversource
TOWER STRUCTURAL MODIFICATION DRAWINGS	Centek Engineering, dated 11/18/2011	-	Eversource
TOWER STRUCTURAL MODIFICATION ANALYSIS REPORT	Centek Engineering, dated 11/29/2011	-	Eversource
TOWER STRUCTURAL MODIFICATION ANALYSIS REPORT	Centek Engineering, dated 4/09/2014	-	Eversource
TOWER STRUCTURAL MODIFICATION ANALYSIS REPORT	Centek Engineering, dated 11/10/2014	-	Eversource
TOWER STRUCTURAL ANALYSIS REPORT	AECOM, dated 2/16/2017	-	Eversource
TOWER STRUCTURAL MODIFICATION ANALYSIS REPORT	All-Points, dated 10/25/2018	-	Eversource

3.1) Analysis Method

tnxTower (version 8.1.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) The existing base plate grout was considered in this analysis. Grout must be maintained and inspected periodically and must be replaced if damaged or cracked.
4) Existing tower loading is based on 2018 drone mapping photos and the 2018 Structural Modification Analysis Report prepared by All-Points.
5) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, appurtenance loading, tower/foundation details, and geotechnical data.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 160	Leg	P2.5x0.203	1	-7.13	60.05	11.9	Pass
T2	160 - 140	Leg	P2.5x.276	33	-18.69	61.44	30.4	Pass
T3	140 - 120	Leg	P3x0.216	54	-35.21	74.43	47.3	Pass
T4	120 - 100	Leg	P4x0.337	75	-61.40	167.90	36.6	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	100 - 80	Leg	P5x0.258	96	-86.26	150.57	57.3	Pass
T6	80 - 60	Leg	P5x0.375	111	-114.83	211.28	54.4	Pass
T7	60 - 40	Leg	P5x0.375	126	-143.43	211.26	67.9	Pass
T8	40 - 20	Leg	P6x0.432	141	-172.06	318.94	53.9	Pass
T9	20 - 0	Leg	P6x0.432	156	-200.84	318.94	63.0	Pass
T1	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	7	-1.60	6.88	23.2 23.5 (b)	Pass
T2	160 - 140	Diagonal	L2x2x1/8	38	-2.24	4.33	51.7	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	59	-3.93	9.58	41.0 59.6 (b)	Pass
T4	120 - 100	Diagonal	L2 1/2x2 1/2x1/4	80	-5.62	9.78	57.5 64.3 (b)	Pass
T5	100 - 80	Diagonal	L3x3x3/8	101	-7.49	17.04	44.0 52.4 (b)	Pass
T6	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	116	-8.07	16.01	50.4 84.4 (b)	Pass
T7	60 - 40	Diagonal	L3 1/2x3 1/2x3/8	129	-8.52	19.37	44.0 59.8 (b)	Pass
T8	40 - 20	Diagonal	L4x4x3/8	144	-9.47	25.38	37.3 64.9 (b)	Pass
T9	20 - 0	Diagonal	L4x4x3/8	159	-10.42	21.97	47.4 95.3 (b)	Pass
T1	180 - 160	Top Girt	L2 1/2x2 1/2x3/16	6	-0.17	7.01	2.4	Pass
							Summary	
						Leg (T7)	67.9	Pass
						Diagonal (T9)	95.3	Pass
						Top Girt (T1)	2.4	Pass
						Bolt Checks	95.3	Pass
						Rating =	95.3	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	66.7	Pass
1	Base Foundation	0	35.0	Pass
	Base Foundation Soil Interaction		76.9	Pass

Structure Rating (max from all components) =	95.3%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load*	*Tilt*	*Twist*	*Check**
	ft	*in*	*Comb.*	°	°	
T1	180 - 160	2.408	39	0.1092	0.02	OK
T2	160 - 140	1.948	39	0.106	0.0188	OK
T3	140 - 120	1.506	39	0.0968	0.0133	OK
T4	120 - 100	1.118	39	0.0814	0.0098	OK
T5	100 - 80	0.779	39	0.0698	0.0069	OK
T6	80 - 60	0.506	39	0.0538	0.0054	OK

*Limit State Deformation (TIA-222-H Section 2.8.2)

1) Maximum Rotation = 4 Degrees

2) Maximum Deflection = 0.03 * Tower Height = 65 in.

Critical Deflections of Tower at the MW Dish Elevations - Service Wind

Elevation (ft)	*MW Dish*	*Tilt (°)*	*Twist (°)*	*Diameter, D (ft)*	*Frequency, α (GHz)*	*Decibel Points*	*Deformation Limit (θ)**	*Deformation Limit Exceeded?*
177	6' Microwave Dish w/ Radome	0.1054	0.008	6	10	10 dB	0.885	Not Exceeded

*Limit per TIA-222-H Annex D

Maximum Tower Deflections - Design Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*	*Combined Max*	*Check**
	ft	*in*		°	°		
T1	180 - 160	6.602	39	0.2963	0.0235	0.297	OK
T2	160 - 140	5.355	39	0.2871	0.024	0.288	OK
T3	140 - 120	4.151	39	0.2637	0.0244	0.265	OK
T4	120 - 100	3.092	39	0.2229	0.0204	0.224	OK
T5	100 - 80	2.159	39	0.1919	0.0154	0.193	OK
T6	80 - 60	1.409	39	0.1485	0.0123	0.149	OK

*Up to 0.5 degree is considered acceptable per SUB090 Section 7

Critical Deflections of Tower at the MW Dish Elevations - Design Wind

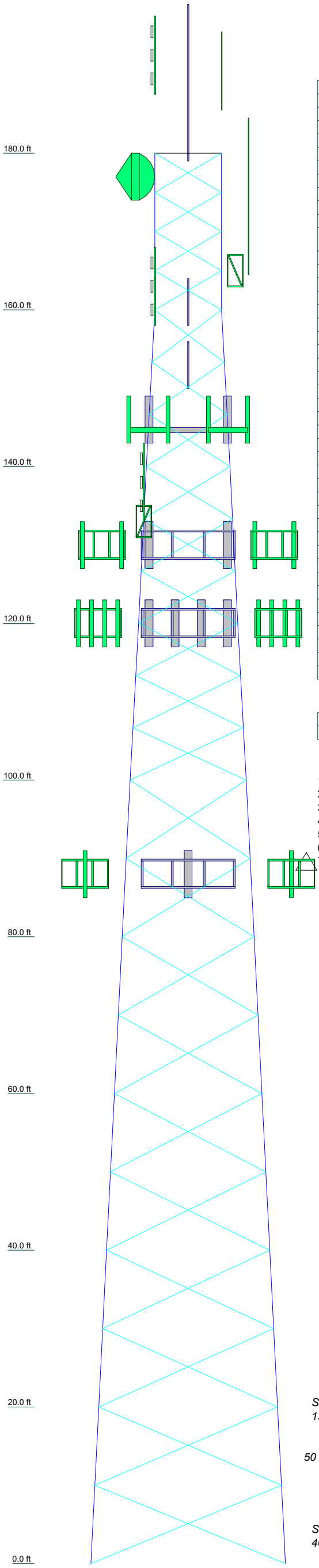
Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
177	6' Microwave Dish w/ Radome	39	6.414	0.2952	0.0227	751331.000

APPENDIX A

TNXTOWER OUTPUT

	T1	T2	T3	T4	T5	T6	T7	T8	T9
Section	P2.5x0.203	P2.5x.276	P3x0.216	P4x0.337	P5x0.258	P5x0.375		P6x0.432	
Legs	L1 3/4x1 3/4x3/16	L2x2x1/8	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x1/4	L3x3x3/8	L3 1/2x3 1/2x1/4	L3 1/2x3 1/2x3/8	L4x4x3/8	
Leg Grade	A572-50								
Diagonals	L2 1/2x2 1/2x3/16		L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x1/4	L3x3x3/8	L3 1/2x3 1/2x1/4	L3 1/2x3 1/2x3/8	L4x4x3/8	
Diagonal Grade	A36								
Top Girts	N.A.								
Face Width (ft)	8.56		10.6	12.68	14.77	16.77	18.77	20.86	22.86
# Panels @ (ft)	4 @ 5	0.8	9 @ 6.66667	2.1	2.6	2.8	10 @ 10	4.8	5.0
Weight (K)	1.0	0.8	1.3	2.1	2.6	2.8	3.7	4.8	5.0

24.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2" Dia 20' Omni	180	2'x2" Mount Pipe	130
2" Dia 15' Omni	180	2'x2" Mount Pipe	130
5'x4" Mount Pipe	180	2'x2" Mount Pipe	130
BA40-41-DIN (4 diploes (2 bays) 11.5' dipole)	180	Sector Mount [SM 405-3]	130
5'x2" Mount Pipe	180	P65-16-XLH-RR w/ Mount Pipe	130
8' HSS4x4x3/8 Horizontal Mount	177	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	120
6'x2" Horizontal Pipe	177	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	120
6'x4" Mount Pipe	177	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	120
6' Microwave Dish w/ Radome	177	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	120
SP2D03P36D-D	165	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	120
USF-4U w/ Tieback [4' SO 203-1 + Vert. Pipe Support]	165	RRH2X40-AWS	120
		RRH2X40-AWS	120
2'x2" Mount Pipe	161	RRH2X40-AWS	120
12' Dipole	161	RRH2x40 700	120
2" Dia 5' Omni	157	RRH2x40 700	120
18"x18"x6" Junction Box	157	RRH2x40 700	120
Side Arm Mount [SO 305-1]	157	(2) DB-T1-6Z-8AB-0Z	120
2" Dia 5' Omni	157	Sector Mount [SM 502-3]	120
LNX-6512DS-T4M_TIA w/ Mount Pipe	145	Pipe Mount [PM 601-3]	120
LNX-6512DS-T4M_TIA w/ Mount Pipe	145	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	120
AIR 21 B2A/B4P w/ Mount Pipe	145	P40-16-XLPP-RR w/ Mount Pipe	88
AIR 21 B2A/B4P w/ Mount Pipe	145	APXVSPP18-C-A20_TIA w/ Mount Pipe	88
AIR 21 B2A/B4P w/ Mount Pipe	145	800MHZ RRH	88
ATM1900D-1A20	145	800MHZ RRH	88
ATM1900D-1A20	145	800MHZ RRH	88
ATM1900D-1A20	145	1900MHz RRH	88
5'x4" Horizontal Mount Pipe	145	1900MHz RRH	88
5'x4" Horizontal Mount Pipe	145	1900MHz RRH	88
5'x4" Horizontal Mount Pipe	145	Sector Mount [SM 502-3]	88
LNX-6512DS-T4M_TIA w/ Mount Pipe	145	APXVSPP18-C-A20_TIA w/ Mount Pipe	88
Side Arm Mount [SO 203-1]	133	3'x2" Horizontal Pipe	56
BA40-41-DIN (4 diploes (2 bays) 11.5' dipole)	133	GPS_A	56
P65-16-XLH-RR w/ Mount Pipe	130	L3 1/2x3 1/2x1/4	55
P65-16-XLH-RR w/ Mount Pipe	130	L3 1/2x3 1/2x1/4	55
800 10121_TIA w/ Mount Pipe	130	L3 1/2x3 1/2x1/4	55
800 10121_TIA w/ Mount Pipe	130	L3 1/2x3 1/2x1/4	45
800 10121_TIA w/ Mount Pipe	130	L3 1/2x3 1/2x1/4	45
(2) LGP21401 : TMA	130	L3 1/2x3 1/2x1/4	45
(2) LGP21401 : TMA	130	L3 1/2x3 1/2x1/4	45
(2) LGP21401 : TMA	130	L4x4x1/4	15
RRUS 11	130	L4x4x1/4	15
RRUS 11	130	L4x4x1/4	15
RRUS 11	130	L4x4x1/4	5
DC6-48-60-18-8F	130	L4x4x1/4	5
		L4x4x1/4	5

MATERIAL STRENGTH

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

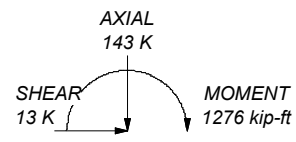
TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-H Standard.
2. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 95.3%

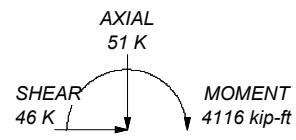
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 208 K
SHEAR: 28 K

UPLIFT: -168 K
SHEAR: 23 K



TORQUE 9 kip-ft
50 mph WIND - 1.5000 in ICE



TORQUE 31 kip-ft
REACTIONS - 130 mph WIND

BLACK & VEATCH
Building a world of difference.
Black & Veatch Corp.
6800 W. 115th St., Suite 2292
Overland Park, KS 66211
Phone: (913) 458-6909
FAX: (913) 458-8136

Job: ***ES-066 NewtownAWC***			
Project: ***405025 (NewtownAWC)***			
Client: Eversource	Drawn by: Josh Riley	App'd:	
Code: TIA-222-H	Date: 08/12/21	Scale: NTS	
Path:		Dwg No. E-1	

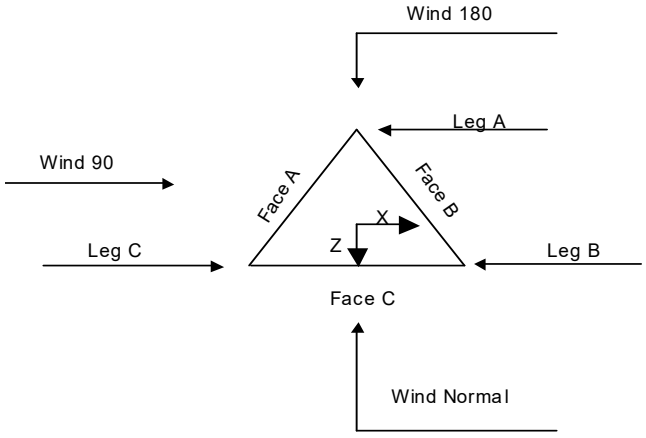
Tower Input Data

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 8.56 ft at the top and 24.86 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower base elevation above sea level: 457.00 ft.
- Basic wind speed of 130 mph.
- Risk Category III.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- 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	180.00-160.00			8.56	1	20.00
T2	160.00-140.00			8.56	1	20.00
T3	140.00-120.00			10.60	1	20.00
T4	120.00-100.00			12.68	1	20.00
T5	100.00-80.00			14.77	1	20.00
T6	80.00-60.00			16.77	1	20.00
T7	60.00-40.00			18.77	1	20.00
T8	40.00-20.00			20.86	1	20.00
T9	20.00-0.00			22.86	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation*	*Diagonal Spacing*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset*	*Bottom Girt Offset*
	ft	*ft*				*in*	*in*
T1	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T2	160.00-140.00	6.67	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	P2.5x0.203	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 160.00-140.00	Pipe	P2.5x.276	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T3 140.00-120.00	Pipe	P3x0.216	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 120.00-100.00	Pipe	P4x0.337	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T5 100.00-80.00	Pipe	P5x0.258	A572-50 (50 ksi)	Equal Angle	L3x3x3/8	A36 (36 ksi)
T6 80.00-60.00	Pipe	P5x0.375	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T7 60.00-40.00	Pipe	P5x0.375	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T8 40.00-20.00	Pipe	P6x0.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T9 20.00-0.00	Pipe	P6x0.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T8 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T9 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

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

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg 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 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal Net Width Deduct in	Redundant Horizontal U	Redundant Diagonal Net Width Deduct in	Redundant Diagonal U	Redundant Sub-Diagonal Net Width Deduct in	Redundant Sub-Diagonal U	Redundant Sub-Horizontal Net Width Deduct in	Redundant Sub-Horizontal U	Redundant Vertical Net Width Deduct in	Redundant Vertical U	Redundant Hip Net Width Deduct in	Redundant Hip U	Redundant Hip Diagonal Net Width Deduct in	Redundant Hip Diagonal U
T1 180.00-160.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 160.00-140.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T3 140.00-120.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 120.00-100.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-80.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-60.00	0.0000	0.75	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 60.00-40.00	0.0000	0.75	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 40.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 20.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-80.00	Flange	1.0000 A325N	4	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-60.00	Flange	1.0000 A325N	4	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 60.00-40.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 40.00-20.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 20.00-0.00	Flange	1.0000 A325N	0	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	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
Feedline Ladder (Af)	B	No	No	Af (CaAa)	180.00 - 15.00	0.0000	-0.45	1	1	2.5000	2.5000		8.40
LDF5-50A(7/8)	B	No	No	Ar (CaAa)	157.00 - 0.00	0.0000	-0.46	3	3	0.5000	1.0300		0.33
LDF5-50A(7/8)	B	No	No	Ar (CaAa)	180.00 - 157.00	0.0000	-0.46	1	1	0.5000	1.0300		0.33
EW63(ELLIPTICAL)	B	No	No	Ar (CaAa)	177.00 - 0.00	0.0000	-0.43	1	1	0.5000	2.0100		0.51
LDF4-50A(1/2)	B	No	No	Ar (CaAa)	174.00 - 0.00	0.0000	-0.45	2	2	0.5000	0.6250		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
LDF4-50A(1/2)	B	No	No	Ar (CaAa)	180.00 - 174.00	0.0000	-0.45	1	1	0.5000	0.6250		0.15
LDF5-50A(7/8)	C	No	No	Ar (CaAa)	133.00 - 0.00	0.0000	0.5	2	2	0.5000	1.0300		0.33
LDF5-50A(7/8) *	C	No	No	Ar (CaAa)	180.00 - 133.00	0.0000	0.5	1	1	0.5000	1.0300		0.33
Feedline Ladder (Af)	A	No	No	Af (CaAa)	145.00 - 10.00	0.0000	0.45	1	1	1.5000	1.5000		8.40
LDF7-50A(1-5/8) *	A	No	No	Ar (CaAa)	145.00 - 0.00	0.0000	0.45	12	6	0.5000	1.9800		0.82
Feedline Ladder (Af)	C	No	No	Af (CaAa)	130.00 - 0.00	0.0000	0	1	1	3.0000	3.0000		8.40
LDF7-50A(1-5/8)	C	No	No	Ar (CaAa)	130.00 - 0.00	0.0000	0	6	3	0.5000	1.9800		0.82
3" Flexible Conduit	C	No	No	Ar (CaAa)	130.00 - 0.00	0.0000	0.03	1	1	3.0000	3.0000		0.30
MLC Hybrid 6Power/12Fiber(1 1/2) *	C	No	No	Ar (CaAa)	130.00 - 0.00	0.0000	0.03	2	2	0.5000	1.5000		0.98
Feedline Ladder (Af)	A	No	No	Af (CaAa)	107.00 - 0.00	0.0000	-0.45	1	1	3.0000	3.0000		8.40
LDF7-50A(1-5/8) *	A	No	No	Ar (CaAa)	120.00 - 0.00	0.0000	-0.45	2	2	0.5000	1.9800		0.82
Feedline Ladder (Af)	C	No	No	Af (CaAa)	95.00 - 0.00	0.0000	-0.45	1	1	3.0000	3.0000		8.40
MLE Hybrid 3Power/6Fiber RL 2(1-1/4) *	C	No	No	Ar (CaAa)	88.00 - 0.00	0.0000	-0.45	3	3	0.5000	1.2500		0.68
LDF4-50A(1/2) **	C	No	No	Ar (CaAa)	56.00 - 0.00	0.0000	-0.46	1	1	0.5000	0.6250		0.15
Proposed** LDF5-50A(7/8)	B	No	No	Ar (CaAa)	165.00 - 0.00	0.0000	-0.4	2	2	0.5000	1.0300		0.33

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	16.965	0.000	0.19
		C	0.000	0.000	2.060	0.000	0.01
T2	160.00-140.00	A	0.000	0.000	13.130	0.000	0.09
		B	0.000	0.000	24.535	0.000	0.22
		C	0.000	0.000	2.060	0.000	0.01
T3	140.00-120.00	A	0.000	0.000	52.520	0.000	0.36
		B	0.000	0.000	25.153	0.000	0.22
		C	0.000	0.000	26.279	0.000	0.17
T4	120.00-100.00	A	0.000	0.000	63.940	0.000	0.46
		B	0.000	0.000	25.153	0.000	0.22
		C	0.000	0.000	49.880	0.000	0.32
T5	100.00-80.00	A	0.000	0.000	70.440	0.000	0.57
		B	0.000	0.000	25.153	0.000	0.22
		C	0.000	0.000	60.380	0.000	0.47
T6	80.00-60.00	A	0.000	0.000	70.440	0.000	0.57
		B	0.000	0.000	25.153	0.000	0.22
		C	0.000	0.000	67.380	0.000	0.53

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T7	60.00-40.00	A	0.000	0.000	70.440	0.000	0.57
		B	0.000	0.000	25.153	0.000	0.22
		C	0.000	0.000	68.380	0.000	0.54
T8	40.00-20.00	A	0.000	0.000	70.440	0.000	0.57
		B	0.000	0.000	25.153	0.000	0.22
		C	0.000	0.000	68.630	0.000	0.54
T9	20.00-0.00	A	0.000	0.000	67.940	0.000	0.48
		B	0.000	0.000	18.903	0.000	0.09
		C	0.000	0.000	68.630	0.000	0.54

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	2.032	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	57.630	0.000	1.00
		C		0.000	0.000	10.189	0.000	0.16
T2	160.00-140.00	A	2.007	0.000	0.000	15.915	0.000	0.36
		B		0.000	0.000	89.419	0.000	1.30
		C		0.000	0.000	10.088	0.000	0.16
T3	140.00-120.00	A	1.978	0.000	0.000	63.355	0.000	1.43
		B		0.000	0.000	90.661	0.000	1.29
		C		0.000	0.000	61.502	0.000	0.99
T4	120.00-100.00	A	1.946	0.000	0.000	94.753	0.000	1.88
		B		0.000	0.000	89.713	0.000	1.27
		C		0.000	0.000	108.916	0.000	1.78
T5	100.00-80.00	A	1.907	0.000	0.000	105.477	0.000	2.14
		B		0.000	0.000	88.595	0.000	1.24
		C		0.000	0.000	130.965	0.000	2.21
T6	80.00-60.00	A	1.860	0.000	0.000	104.456	0.000	2.10
		B		0.000	0.000	87.227	0.000	1.20
		C		0.000	0.000	148.411	0.000	2.44
T7	60.00-40.00	A	1.798	0.000	0.000	103.128	0.000	2.04
		B		0.000	0.000	85.449	0.000	1.15
		C		0.000	0.000	152.714	0.000	2.45
T8	40.00-20.00	A	1.709	0.000	0.000	101.198	0.000	1.97
		B		0.000	0.000	82.864	0.000	1.09
		C		0.000	0.000	150.479	0.000	2.35
T9	20.00-0.00	A	1.531	0.000	0.000	91.809	0.000	1.66
		B		0.000	0.000	66.894	0.000	0.70
		C		0.000	0.000	142.699	0.000	2.12

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	-0.4878	-7.7217	-1.5102	-11.7519
T2	160.00-140.00	-0.5254	-17.1075	-1.4202	-20.8435
T3	140.00-120.00	-1.5488	-20.0937	-2.6840	-21.8084
T4	120.00-100.00	-5.1031	-14.1185	-7.1893	-14.6108
T5	100.00-80.00	-4.0876	-12.4574	-5.7168	-12.3477
T6	80.00-60.00	-1.8741	-11.7443	-2.7117	-11.4486
T7	60.00-40.00	-1.5875	-12.2430	-1.4102	-11.2949
T8	40.00-20.00	-1.4649	-12.1121	-1.0795	-11.4644
T9	20.00-0.00	-1.6275	-9.6518	-1.2253	-7.7627

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.6000
T1	3	LDF5-50A(7/8)	160.00 - 180.00	0.6000	0.6000
T1	10	EW63(ELLIPTICAL)	160.00 - 177.00	0.6000	0.6000
T1	11	LDF4-50A(1/2)	160.00 - 174.00	0.6000	0.6000
T1	12	LDF4-50A(1/2)	174.00 - 180.00	0.6000	0.6000
T1	14	LDF5-50A(7/8)	160.00 - 180.00	0.6000	0.6000
T1	32	LDF5-50A(7/8)	160.00 - 165.00	0.6000	0.6000
T2	1	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T2	2	LDF5-50A(7/8)	140.00 - 157.00	0.6000	0.6000
T2	3	LDF5-50A(7/8)	157.00 - 160.00	0.6000	0.6000
T2	10	EW63(ELLIPTICAL)	140.00 - 160.00	0.6000	0.6000
T2	11	LDF4-50A(1/2)	140.00 - 160.00	0.6000	0.6000
T2	14	LDF5-50A(7/8)	140.00 - 160.00	0.6000	0.6000
T2	16	Feedline Ladder (Af)	140.00 - 145.00	0.6000	0.6000
T2	17	LDF7-50A(1-5/8)	140.00 - 145.00	0.6000	0.6000
T2	32	LDF5-50A(7/8)	140.00 - 160.00	0.6000	0.6000
T3	1	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	2	LDF5-50A(7/8)	120.00 - 140.00	0.6000	0.6000
T3	10	EW63(ELLIPTICAL)	120.00 - 140.00	0.6000	0.6000
T3	11	LDF4-50A(1/2)	120.00 - 140.00	0.6000	0.6000
T3	13	LDF5-50A(7/8)	120.00 - 133.00	0.6000	0.6000
T3	14	LDF5-50A(7/8)	133.00 - 140.00	0.6000	0.6000
T3	16	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	17	LDF7-50A(1-5/8)	120.00 - 140.00	0.6000	0.6000
T3	19	Feedline Ladder (Af)	120.00 - 130.00	0.6000	0.6000
T3	20	LDF7-50A(1-5/8)	120.00 - 130.00	0.6000	0.6000
T3	21	3" Flexible Conduit	120.00 - 130.00	0.6000	0.6000
T3	22	MLC Hybrid 6Power/12Fiber(1 1/2)	120.00 - 130.00	0.6000	0.6000
T3	32	LDF5-50A(7/8)	120.00 - 140.00	0.6000	0.6000
T4	1	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	2	LDF5-50A(7/8)	100.00 - 120.00	0.6000	0.6000
T4	10	EW63(ELLIPTICAL)	100.00 - 120.00	0.6000	0.6000
T4	11	LDF4-50A(1/2)	100.00 - 120.00	0.6000	0.6000

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
T4	13	LDF5-50A(7/8)	100.00 - 120.00	0.6000	0.6000
T4	16	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	17	LDF7-50A(1-5/8)	100.00 - 120.00	0.6000	0.6000
T4	19	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	20	LDF7-50A(1-5/8)	100.00 - 120.00	0.6000	0.6000
T4	21	3" Flexible Conduit	100.00 - 120.00	0.6000	0.6000
T4	22	MLC Hybrid 6Power/12Fiber(1 1/2)	100.00 - 120.00	0.6000	0.6000
T4	24	Feedline Ladder (Af)	100.00 - 107.00	0.6000	0.6000
T4	25	LDF7-50A(1-5/8)	100.00 - 120.00	0.6000	0.6000
T4	32	LDF5-50A(7/8)	100.00 - 120.00	0.6000	0.6000
T5	1	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	2	LDF5-50A(7/8)	80.00 - 100.00	0.6000	0.6000
T5	10	EW63(ELLIPTICAL)	80.00 - 100.00	0.6000	0.6000
T5	11	LDF4-50A(1/2)	80.00 - 100.00	0.6000	0.6000
T5	13	LDF5-50A(7/8)	80.00 - 100.00	0.6000	0.6000
T5	16	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	17	LDF7-50A(1-5/8)	80.00 - 100.00	0.6000	0.6000
T5	19	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	20	LDF7-50A(1-5/8)	80.00 - 100.00	0.6000	0.6000
T5	21	3" Flexible Conduit	80.00 - 100.00	0.6000	0.6000
T5	22	MLC Hybrid 6Power/12Fiber(1 1/2)	80.00 - 100.00	0.6000	0.6000
T5	24	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	25	LDF7-50A(1-5/8)	80.00 - 100.00	0.6000	0.6000
T5	27	Feedline Ladder (Af)	80.00 - 95.00	0.6000	0.6000
T5	28	MLE Hybrid 3Power/6Fiber RL 2(1-1/4)	80.00 - 88.00	0.6000	0.6000
T5	32	LDF5-50A(7/8)	80.00 - 100.00	0.6000	0.6000
T6	1	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	2	LDF5-50A(7/8)	60.00 - 80.00	0.6000	0.6000
T6	10	EW63(ELLIPTICAL)	60.00 - 80.00	0.6000	0.6000
T6	11	LDF4-50A(1/2)	60.00 - 80.00	0.6000	0.6000
T6	13	LDF5-50A(7/8)	60.00 - 80.00	0.6000	0.6000
T6	16	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	17	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T6	19	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
T6	20	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T6	21	3" Flexible Conduit	60.00 - 80.00	0.6000	0.6000
T6	22	MLC Hybrid 6Power/12Fiber(1 1/2)	60.00 - 80.00	0.6000	0.6000
T6	24	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	25	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T6	27	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	28	MLE Hybrid 3Power/6Fiber RL 2(1-1/4)	60.00 - 80.00	0.6000	0.6000
T6	32	LDF5-50A(7/8)	60.00 - 80.00	0.6000	0.6000
T7	1	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	2	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T7	10	EW63(ELLIPTICAL)	40.00 - 60.00	0.6000	0.6000
T7	11	LDF4-50A(1/2)	40.00 - 60.00	0.6000	0.6000
T7	13	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T7	16	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	17	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T7	19	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	20	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T7	21	3" Flexible Conduit	40.00 - 60.00	0.6000	0.6000
T7	22	MLC Hybrid 6Power/12Fiber(1 1/2)	40.00 - 60.00	0.6000	0.6000
T7	24	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	25	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T7	27	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	28	MLE Hybrid 3Power/6Fiber RL 2(1-1/4)	40.00 - 60.00	0.6000	0.6000
T7	30	LDF4-50A(1/2)	40.00 - 56.00	0.6000	0.6000
T7	32	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T8	1	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	2	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T8	10	EW63(ELLIPTICAL)	20.00 - 40.00	0.6000	0.6000
T8	11	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T8	13	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T8	16	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	17	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T8	19	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	20	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	21	3" Flexible Conduit	20.00 - 40.00	0.6000	0.6000
T8	22	MLC Hybrid 6Power/12Fiber(1 1/2)	20.00 - 40.00	0.6000	0.6000
T8	24	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	25	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T8	27	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	28	MLE Hybrid 3Power/6Fiber RL 2(1-1/4)	20.00 - 40.00	0.6000	0.6000
T8	30	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T8	32	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T9	1	Feedline Ladder (Af)	15.00 - 20.00	0.6000	0.6000
T9	2	LDF5-50A(7/8)	0.00 - 20.00	0.6000	0.6000
T9	10	EW63(ELLIPTICAL)	0.00 - 20.00	0.6000	0.6000
T9	11	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T9	13	LDF5-50A(7/8)	0.00 - 20.00	0.6000	0.6000
T9	16	Feedline Ladder (Af)	10.00 - 20.00	0.6000	0.6000
T9	17	LDF7-50A(1-5/8)	0.00 - 20.00	0.6000	0.6000
T9	19	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T9	20	LDF7-50A(1-5/8)	0.00 - 20.00	0.6000	0.6000
T9	21	3" Flexible Conduit	0.00 - 20.00	0.6000	0.6000
T9	22	MLC Hybrid 6Power/12Fiber(1 1/2)	0.00 - 20.00	0.6000	0.6000
T9	24	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T9	25	LDF7-50A(1-5/8)	0.00 - 20.00	0.6000	0.6000
T9	27	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T9	28	MLE Hybrid 3Power/6Fiber RL 2(1-1/4)	0.00 - 20.00	0.6000	0.6000
T9	30	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T9	32	LDF5-50A(7/8)	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
180									
2" Dia 20' Omni	A	From Leg	0.00 0.00 9.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.00 6.03 8.07 12.20	4.00 6.03 8.07 12.20	0.02 0.05 0.10 0.22
2" Dia 15' Omni	B	From Leg	0.00 0.00 10.50	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.00 4.53 6.07 9.20	3.00 4.53 6.07 9.20	0.02 0.04 0.08 0.17
5'x4" Mount Pipe	B	From Leg	0.00 0.00 2.50	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.45 2.08 2.40 3.07	1.45 2.08 2.40 3.07	0.05 0.07 0.09 0.14

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
BA40-41-DIN (4 diploes (2 bays) 11.5' dipole)	C	From Leg	0.00 0.00 12.50	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 9.24 13.08 20.76	5.40 9.24 13.08 20.76	0.03 0.04 0.05 0.07
5'x2" Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.19 1.50 1.81 2.46	1.19 1.50 1.81 2.46	0.02 0.03 0.04 0.08
177									
8' HSS4x4x3/8 Horizontal Mount	C	From Leg	0.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.67 3.37 4.07 5.47	0.04 0.59 1.13 2.23	0.17 0.22 0.26 0.35
6'x2" Horizontal Pipe	C	From Leg	0.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	0.01 0.04 0.07 0.13	0.02 0.03 0.05 0.09
6'x4" Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.81 2.62 3.00 3.78	1.81 2.62 3.00 3.78	0.06 0.08 0.11 0.17
174									
12' Dipole	C	From Leg	0.00 0.00 2.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.20 4.62 7.04 11.88	2.20 4.62 7.04 11.88	0.02 0.02 0.03 0.04
2'x2" Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.34 0.47 0.61 0.92	0.34 0.47 0.61 0.92	0.01 0.01 0.02 0.03
****									
SP2D03P36D-D	B	From Leg	4.00 0.00 9.50	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.46 8.59 10.54 14.50	6.46 8.59 10.54 14.50	0.08 0.12 0.18 0.34
USF-4U w/ Tieback [4' SO 203-1 + Vert. Pipe Support]	B	From Leg	2.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.96 3.76 4.63 6.57	5.64 6.73 7.91 10.43	0.18 0.22 0.28 0.43
157									
2" Dia 5' Omni	A	From Leg	0.00 0.00 4.00	0.0000	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.51 2.03 3.06	1.00 1.51 2.03 3.06	0.01 0.01 0.02 0.04
2" Dia 5' Omni	A	From Leg	0.00 0.00 -4.00	0.0000	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.51 2.03 3.06	1.00 1.51 2.03 3.06	0.01 0.01 0.02 0.04
18"x18"x6" Junction Box	A	From Leg	0.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.33 3.56 3.79 4.25	1.03 1.17 1.31 1.59	0.06 0.08 0.10 0.15

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *K*
Side Arm Mount [SO 305-1]	A	From Leg	0.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.94 1.48 2.02 3.10	1.41 2.17 2.93 4.45	0.03 0.04 0.06 0.08
145									
LNX-6512DS-T4M_TIA w/ Mount Pipe	A	From Leg	0.00 0.00 1.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.33 5.72 6.12 6.94	4.53 5.15 5.77 7.07	0.05 0.10 0.15 0.28
LNX-6512DS-T4M_TIA w/ Mount Pipe	B	From Leg	0.00 0.00 1.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.33 5.72 6.12 6.94	4.53 5.15 5.77 7.07	0.05 0.10 0.15 0.28
LNX-6512DS-T4M_TIA w/ Mount Pipe	C	From Leg	0.00 0.00 1.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.33 5.72 6.12 6.94	4.53 5.15 5.77 7.07	0.05 0.10 0.15 0.28
AIR 21 B2A/B4P w/ Mount Pipe	A	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.14 3.45 3.76 4.42	2.58 2.88 3.18 3.82	0.10 0.15 0.21 0.36
AIR 21 B2A/B4P w/ Mount Pipe	B	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.14 3.45 3.76 4.42	2.58 2.88 3.18 3.82	0.10 0.15 0.21 0.36
AIR 21 B2A/B4P w/ Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.14 3.45 3.76 4.42	2.58 2.88 3.18 3.82	0.10 0.15 0.21 0.36
ATM1900D-1A20	A	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.73 0.84 0.96 1.21	0.25 0.32 0.40 0.58	0.01 0.01 0.02 0.04
ATM1900D-1A20	B	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.73 0.84 0.96 1.21	0.25 0.32 0.40 0.58	0.01 0.01 0.02 0.04
ATM1900D-1A20	C	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.73 0.84 0.96 1.21	0.25 0.32 0.40 0.58	0.01 0.01 0.02 0.04
5'x4" Horizontal Mount Pipe	A	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.33 1.69 2.07 2.84	0.16 0.21 0.28 0.43	0.05 0.15 0.27 0.51
5'x4" Horizontal Mount Pipe	B	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.33 1.69 2.07 2.84	0.16 0.21 0.28 0.43	0.05 0.15 0.27 0.51
5'x4" Horizontal Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice 1" Ice	1.33 1.69 2.07 2.84	0.16 0.21 0.28 0.43	0.05 0.15 0.27 0.51

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
						2" Ice			
133									
BA40-41-DIN (4 diploes (2 bays) 11.5' dipole)	C	From Leg	0.00 0.00 5.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 9.24 13.08 20.76	5.40 9.24 13.08 20.76	0.03 0.04 0.05 0.07
Side Arm Mount [SO 203-1]	C	From Leg	0.00 0.00 0.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.96 4.10 5.24 7.52	3.36 4.68 6.00 8.64	0.13 0.15 0.18 0.24
130									
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.37 8.93 9.46 10.53	6.36 7.54 8.43 10.24	0.08 0.14 0.22 0.39
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.37 8.93 9.46 10.53	6.36 7.54 8.43 10.24	0.08 0.14 0.22 0.39
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.37 8.93 9.46 10.53	6.36 7.54 8.43 10.24	0.08 0.14 0.22 0.39
800 10121_TIA w/ Mount Pipe	A	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 5.82 6.25 7.12	4.61 5.36 6.06 7.49	0.07 0.12 0.17 0.30
800 10121_TIA w/ Mount Pipe	B	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 5.82 6.25 7.12	4.61 5.36 6.06 7.49	0.07 0.12 0.17 0.30
800 10121_TIA w/ Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 5.82 6.25 7.12	4.61 5.36 6.06 7.49	0.07 0.12 0.17 0.30
(2) LGP21401 : TMA	A	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401 : TMA	B	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401 : TMA	C	From Leg	0.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
RRUS 11	A	From Leg	0.00 0.00 2.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.78 2.99 3.21 3.66	1.19 1.33 1.49 1.83	0.05 0.07 0.10 0.15
RRUS 11	B	From Leg	0.00 0.00	0.0000	130.00	No Ice	2.78 2.99	1.19 1.33	0.05 0.07

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
			2.00			1/2" Ice	3.21	1.49	0.10
						1" Ice	3.66	1.83	0.15
						2" Ice			
RRUS 11	C	From Leg	0.00	0.0000	130.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			2.00			1" Ice	3.21	1.49	0.10
						2" Ice	3.66	1.83	0.15
DC6-48-60-18-8F	C	From Leg	0.00	0.0000	130.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			1.00			1" Ice	1.64	1.64	0.06
						2" Ice	2.04	2.04	0.11
2'x2" Mount Pipe	A	From Leg	0.00	0.0000	130.00	No Ice	0.34	0.34	0.01
			0.00			1/2" Ice	0.47	0.47	0.01
			2.00			1" Ice	0.61	0.61	0.02
						2" Ice	0.92	0.92	0.03
2'x2" Mount Pipe	B	From Leg	0.00	0.0000	130.00	No Ice	0.34	0.34	0.01
			0.00			1/2" Ice	0.47	0.47	0.01
			2.00			1" Ice	0.61	0.61	0.02
						2" Ice	0.92	0.92	0.03
2'x2" Mount Pipe	C	From Leg	0.00	0.0000	130.00	No Ice	0.34	0.34	0.01
			0.00			1/2" Ice	0.47	0.47	0.01
			2.00			1" Ice	0.61	0.61	0.02
						2" Ice	0.92	0.92	0.03
Sector Mount [SM 405-3]	C	None		0.0000	130.00	No Ice	18.73	18.73	0.86
						1/2" Ice	27.19	27.19	1.26
						1" Ice	35.65	35.65	1.66
						2" Ice	52.57	52.57	2.47
120									
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	A	From Leg	0.00	0.0000	120.00	No Ice	7.40	5.39	0.06
			0.00			1/2" Ice	8.14	6.10	0.11
			1.00			1" Ice	8.90	6.83	0.18
						2" Ice	10.46	8.34	0.34
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	B	From Leg	0.00	0.0000	120.00	No Ice	7.40	5.39	0.06
			0.00			1/2" Ice	8.14	6.10	0.11
			1.00			1" Ice	8.90	6.83	0.18
						2" Ice	10.46	8.34	0.34
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	C	From Leg	0.00	0.0000	120.00	No Ice	7.40	5.39	0.06
			0.00			1/2" Ice	8.14	6.10	0.11
			1.00			1" Ice	8.90	6.83	0.18
						2" Ice	10.46	8.34	0.34
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	0.00	0.0000	120.00	No Ice	5.04	5.30	0.04
			0.00			1/2" Ice	5.59	6.47	0.08
			1.00			1" Ice	6.11	7.36	0.14
						2" Ice	7.18	9.16	0.27
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	0.00	0.0000	120.00	No Ice	5.04	5.30	0.04
			0.00			1/2" Ice	5.59	6.47	0.08
			1.00			1" Ice	6.11	7.36	0.14
						2" Ice	7.18	9.16	0.27
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	0.00	0.0000	120.00	No Ice	5.04	5.30	0.04
			0.00			1/2" Ice	5.59	6.47	0.08
			1.00			1" Ice	6.11	7.36	0.14
						2" Ice	7.18	9.16	0.27

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
RRH2X40-AWS	A	From Leg	0.00 0.00 2.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.16 2.36 2.57 3.00	1.42 1.59 1.77 2.14	0.04 0.06 0.08 0.13
RRH2X40-AWS	B	From Leg	0.00 0.00 2.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.16 2.36 2.57 3.00	1.42 1.59 1.77 2.14	0.04 0.06 0.08 0.13
RRH2X40-AWS	C	From Leg	0.00 0.00 2.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.16 2.36 2.57 3.00	1.42 1.59 1.77 2.14	0.04 0.06 0.08 0.13
RRH2x40 700	A	From Leg	0.00 0.00 2.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.70	1.03 1.17 1.31 1.62	0.05 0.07 0.09 0.13
RRH2x40 700	B	From Leg	0.00 0.00 2.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.70	1.03 1.17 1.31 1.62	0.05 0.07 0.09 0.13
RRH2x40 700	C	From Leg	0.00 0.00 2.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.96 2.14 2.32 2.70	1.03 1.17 1.31 1.62	0.05 0.07 0.09 0.13
(2) DB-T1-6Z-8AB-0Z	C	From Leg	0.00 0.00 3.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.80 5.07 5.35 5.93	2.00 2.19 2.39 2.81	0.04 0.08 0.12 0.21
Sector Mount [SM 502-3]	C	None		0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	33.02 47.36 61.70 90.38	33.02 47.36 61.70 90.38	1.67 2.22 2.77 3.88
Pipe Mount [PM 601-3]	C	None		0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.39 5.48 6.57 8.75	4.39 5.48 6.57 8.75	0.20 0.24 0.28 0.36
88 APXVSPP18-C-A20_TIA w/ Mount Pipe	A	From Leg	0.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.26 8.82 9.35 10.42	7.47 8.66 9.56 11.39	0.10 0.17 0.24 0.43
P40-16-XLPP-RR w/ Mount Pipe	B	From Leg	0.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.24 8.70 9.16 10.09	4.83 5.57 6.27 7.67	0.08 0.15 0.22 0.38
APXVSPP18-C-A20_TIA w/ Mount Pipe	C	From Leg	0.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.26 8.82 9.35 10.42	7.47 8.66 9.56 11.39	0.10 0.17 0.24 0.43
800MHZ RRH	A	From Leg	0.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51 2.92	1.77 1.95 2.13 2.51	0.05 0.07 0.10 0.16

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
						2" Ice			
800MHZ RRH	B	From Leg	0.00	0.0000	88.00	No Ice	2.13	1.77	0.05
			0.00			1/2"	2.32	1.95	0.07
			0.00			Ice	2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
800MHZ RRH	C	From Leg	0.00	0.0000	88.00	No Ice	2.13	1.77	0.05
			0.00			1/2"	2.32	1.95	0.07
			0.00			Ice	2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
1900MHz RRH	A	From Leg	0.00	0.0000	88.00	No Ice	2.49	3.26	0.04
			0.00			1/2"	2.70	3.48	0.08
			0.00			Ice	2.91	3.72	0.11
						1" Ice	3.35	4.21	0.19
						2" Ice			
1900MHz RRH	B	From Leg	0.00	0.0000	88.00	No Ice	2.49	3.26	0.04
			0.00			1/2"	2.70	3.48	0.08
			0.00			Ice	2.91	3.72	0.11
						1" Ice	3.35	4.21	0.19
						2" Ice			
1900MHz RRH	C	From Leg	0.00	0.0000	88.00	No Ice	2.49	3.26	0.04
			0.00			1/2"	2.70	3.48	0.08
			0.00			Ice	2.91	3.72	0.11
						1" Ice	3.35	4.21	0.19
						2" Ice			
Sector Mount [SM 502-3]	C	None		0.0000	88.00	No Ice	33.02	33.02	1.67
						1/2"	47.36	47.36	2.22
						Ice	61.70	61.70	2.77
						1" Ice	90.38	90.38	3.88
						2" Ice			
56									
GPS_A	B	From Leg	0.00	0.0000	56.00	No Ice	0.26	0.26	0.00
			0.00			1/2"	0.32	0.32	0.00
			0.00			Ice	0.39	0.39	0.01
						1" Ice	0.56	0.56	0.02
						2" Ice			
3'x2" Horizontal Pipe	B	From Leg	0.00	0.0000	56.00	No Ice	0.58	0.01	0.01
			0.00			1/2"	0.77	0.04	0.02
			0.00			Ice	0.97	0.07	0.02
						1" Ice	1.42	0.13	0.05
						2" Ice			
Ineffective Sec Hztl									
L3 1/2x3 1/2x1/4	A	From Face	0.00	0.0000	55.00	No Ice	5.93	0.00	0.12
			0.00			1/2"	7.65	0.00	0.18
			0.00			Ice	9.38	0.00	0.24
						1" Ice	12.83	0.00	0.37
						2" Ice			
L3 1/2x3 1/2x1/4	B	From Face	0.00	0.0000	55.00	No Ice	5.93	0.00	0.12
			0.00			1/2"	7.65	0.00	0.18
			0.00			Ice	9.38	0.00	0.24
						1" Ice	12.83	0.00	0.37
						2" Ice			
L3 1/2x3 1/2x1/4	C	From Face	0.00	0.0000	55.00	No Ice	5.93	0.00	0.12
			0.00			1/2"	7.65	0.00	0.18
			0.00			Ice	9.38	0.00	0.24
						1" Ice	12.83	0.00	0.37
						2" Ice			
*									
L3 1/2x3 1/2x1/4	A	From Face	0.00	0.0000	45.00	No Ice	5.93	0.00	0.12
			0.00			1/2"	7.65	0.00	0.18
			0.00			Ice	9.38	0.00	0.24
						1" Ice	12.83	0.00	0.37
						2" Ice			
L3 1/2x3 1/2x1/4	B	From Face	0.00	0.0000	45.00	No Ice	5.93	0.00	0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	7.65	0.00	0.18
			0.00			1" Ice	9.38	0.00	0.24
						2" Ice	12.83	0.00	0.37
L3 1/2x3 1/2x1/4	C	From Face	0.00	0.0000	45.00	No Ice	5.93	0.00	0.12
			0.00			1/2" Ice	7.65	0.00	0.18
			0.00			1" Ice	9.38	0.00	0.24
						2" Ice	12.83	0.00	0.37
*									
L4x4x1/4	A	From Face	0.00	0.0000	15.00	No Ice	8.17	0.00	0.16
			0.00			1/2" Ice	10.18	0.00	0.25
			0.00			1" Ice	12.19	0.00	0.33
						2" Ice	16.22	0.00	0.50
L4x4x1/4	B	From Face	0.00	0.0000	15.00	No Ice	8.17	0.00	0.16
			0.00			1/2" Ice	10.18	0.00	0.25
			0.00			1" Ice	12.19	0.00	0.33
						2" Ice	16.22	0.00	0.50
L4x4x1/4	C	From Face	0.00	0.0000	15.00	No Ice	8.17	0.00	0.16
			0.00			1/2" Ice	10.18	0.00	0.25
			0.00			1" Ice	12.19	0.00	0.33
						2" Ice	16.22	0.00	0.50
*									
L4x4x1/4	A	From Face	0.00	0.0000	5.00	No Ice	8.17	0.00	0.16
			0.00			1/2" Ice	10.18	0.00	0.25
			0.00			1" Ice	12.19	0.00	0.33
						2" Ice	16.22	0.00	0.50
L4x4x1/4	B	From Face	0.00	0.0000	5.00	No Ice	8.17	0.00	0.16
			0.00			1/2" Ice	10.18	0.00	0.25
			0.00			1" Ice	12.19	0.00	0.33
						2" Ice	16.22	0.00	0.50
L4x4x1/4	C	From Face	0.00	0.0000	5.00	No Ice	8.17	0.00	0.16
			0.00			1/2" Ice	10.18	0.00	0.25
			0.00			1" Ice	12.19	0.00	0.33
						2" Ice	16.22	0.00	0.50

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
6' Microwave Dish w/ Radome	C	Paraboloid w/Radome	From Leg	0.00	-35.6000		177.00	6.00	No Ice	28.27	0.25
				0.00					1/2" Ice	29.07	0.40
				0.00					1" Ice	29.86	0.55
									2" Ice	31.44	0.85

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
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 K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	7	5.71	-0.06	0.09
			Max. Compression	18	-7.13	0.07	-0.10
			Max. Mx	4	-1.02	0.35	0.17
			Max. My	3	-0.09	0.04	-0.49
			Max. Vy	8	-0.30	0.00	0.00
			Max. Vx	2	-0.40	0.04	0.29
		Diagonal	Max Tension	9	1.53	0.00	0.00
			Max. Compression	18	-1.60	0.00	0.00
			Max. Mx	36	0.08	0.04	0.00
			Max. My	23	-0.72	0.00	0.00
			Max. Vy	36	-0.04	0.04	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	23	-0.00	0.00	0.00
		Top Girt	Max Tension	11	0.08	0.00	0.00
			Max. Compression	37	-0.17	0.00	0.00
			Max. Mx	26	-0.12	-0.16	0.00
			Max. Vy	26	0.08	0.00	0.00
T2	160 - 140	Leg	Max Tension	7	15.34	-0.20	0.02
			Max. Compression	2	-18.69	0.06	0.00
			Max. Mx	19	-17.13	0.20	-0.02
			Max. My	9	-2.04	-0.01	0.24
			Max. Vy	14	-0.25	-0.20	-0.00
			Max. Vx	21	-0.24	-0.00	-0.12
		Diagonal	Max Tension	4	2.21	0.00	0.00
			Max. Compression	4	-2.24	0.00	0.00
			Max. Mx	28	0.18	0.06	0.01
			Max. My	28	-0.82	0.05	0.01
			Max. Vy	28	0.05	0.06	0.01
			Max. Vx	28	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	7	28.08	-0.41	0.03
			Max. Compression	2	-35.21	0.04	0.00
			Max. Mx	14	21.05	0.78	-0.02
			Max. My	21	-2.00	-0.03	0.75
			Max. Vy	6	-0.48	-0.44	0.03
			Max. Vx	12	-0.49	-0.01	-0.26
		Diagonal	Max Tension	4	3.88	0.00	0.00
			Max. Compression	4	-3.93	0.00	0.00
			Max. Mx	38	0.49	0.10	-0.01
			Max. My	36	0.81	0.10	-0.01
			Max. Vy	38	0.07	0.10	0.01
			Max. Vx	36	0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	7	49.02	-0.18	0.02
			Max. Compression	2	-61.40	0.22	0.03
			Max. Mx	31	-33.14	0.23	0.00
			Max. My	9	-4.85	-0.02	0.46
			Max. Vy	6	-1.25	0.01	0.03
			Max. Vx	8	1.12	0.02	-0.19
		Diagonal	Max Tension	4	5.58	0.00	0.00
			Max. Compression	4	-5.62	0.00	0.00
			Max. Mx	38	0.72	0.13	-0.02
			Max. My	28	-1.45	0.12	0.02
			Max. Vy	38	0.08	0.13	-0.02
			Max. Vx	28	-0.00	0.00	0.00
T5	100 - 80	Leg	Max Tension	7	69.29	-0.76	0.05
			Max. Compression	2	-86.26	0.55	0.02
			Max. Mx	22	66.06	-0.77	-0.05
			Max. My	9	-6.40	-0.05	0.81
			Max. Vy	22	-0.65	-0.77	-0.05
			Max. Vx	9	0.65	-0.05	0.81
		Diagonal	Max Tension	4	7.36	0.00	0.00
			Max. Compression	4	-7.49	0.00	0.00
			Max. Mx	27	2.07	0.24	-0.03
			Max. My	35	1.39	0.23	-0.03
			Max. Vy	37	0.12	0.24	0.03
			Max. Vx	35	0.01	0.00	0.00
T6	80 - 60	Leg	Max Tension	7	92.74	-0.26	0.03
			Max. Compression	2	-114.83	0.58	0.01
			Max. Mx	33	-1.66	-0.63	-0.01
			Max. My	20	-8.32	-0.01	-0.56
			Max. Vy	33	0.13	-0.63	-0.01
			Max. Vx	21	-0.14	-0.01	-0.56
		Diagonal	Max Tension	4	7.91	0.00	0.00
			Max. Compression	4	-8.07	0.00	0.00
			Max. Mx	37	1.39	0.27	-0.03
			Max. My	29	-2.15	0.25	0.04
			Max. Vy	37	0.13	0.27	0.03
			Max. Vx	29	-0.01	0.00	0.00
T7	60 - 40	Leg	Max Tension	7	115.69	-0.39	0.02
			Max. Compression	2	-143.43	0.59	0.01
			Max. Mx	33	-0.46	-1.17	-0.00
			Max. My	9	-10.13	-0.06	0.57

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	33	0.22	-1.17	-0.00
			Max. Vx	9	0.15	-0.06	0.57
		Diagonal	Max Tension	4	8.41	0.00	0.00
			Max. Compression	10	-8.52	0.00	0.00
			Max. Mx	37	1.09	0.38	-0.04
			Max. My	36	2.34	0.35	-0.05
			Max. Vy	37	0.16	0.35	0.05
			Max. Vx	36	0.01	0.00	0.00
T8	40 - 20	Leg	Max Tension	23	139.16	-0.47	-0.03
			Max. Compression	2	-172.06	0.74	0.00
			Max. Mx	37	6.92	-2.42	-0.01
			Max. My	9	-12.02	-0.06	0.76
			Max. Vy	33	0.44	-2.41	-0.00
			Max. Vx	9	0.17	-0.06	0.76
		Diagonal	Max Tension	12	9.12	0.00	0.00
			Max. Compression	10	-9.47	0.00	0.00
			Max. Mx	37	0.72	0.52	-0.06
			Max. My	30	3.13	0.41	0.06
			Max. Vy	37	0.19	0.52	-0.06
			Max. Vx	30	-0.01	0.00	0.00
T9	20 - 0	Leg	Max Tension	23	162.23	-0.67	-0.03
			Max. Compression	2	-200.84	0.00	-0.00
			Max. Mx	37	10.59	-2.42	-0.01
			Max. My	9	-14.67	-0.08	1.27
			Max. Vy	33	-0.49	-2.41	-0.00
			Max. Vx	9	0.25	-0.08	1.27
		Diagonal	Max Tension	12	9.82	0.00	0.00
			Max. Compression	10	-10.42	0.00	0.00
			Max. Mx	37	-0.15	0.60	-0.06
			Max. My	36	4.88	0.39	-0.07
			Max. Vy	37	0.20	0.60	-0.06
			Max. Vx	36	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	204.46	23.11	-13.83
	Max. H_x	18	204.46	23.11	-13.83
	Max. H_z	7	-165.46	-19.38	11.68
	Min. Vert	7	-165.46	-19.38	11.68
	Min. H_x	7	-165.46	-19.38	11.68
	Min. H_z	18	204.46	23.11	-13.83
Leg B	Max. Vert	10	208.08	-23.84	-14.33
	Max. H_x	23	-167.85	19.99	12.08
	Max. H_z	23	-167.85	19.99	12.08
	Min. Vert	23	-167.85	19.99	12.08
	Min. H_x	10	208.08	-23.84	-14.33
	Min. H_z	10	208.08	-23.84	-14.33
Leg A	Max. Vert	2	208.01	-0.24	27.31
	Max. H_x	21	12.75	4.50	1.13
	Max. H_z	2	208.01	-0.24	27.31
	Min. Vert	15	-162.91	0.23	-22.61
	Min. H_x	8	19.91	-4.54	1.74
	Min. H_z	15	-162.91	0.23	-22.61

Tower Mast Reaction Summary

Load Combination	*Vertical*	*Shear$_x$*	*Shear$_z$*	*Overturning Moment, M$_x$*	*Overturning Moment, M$_z$*	*Torque*
	K	*K*	*K*	*kip-ft*	*kip-ft*	*kip-ft*
Dead Only	42.67	0.00	-0.00	-13.35	4.85	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	51.20	0.14	-44.61	-4110.88	-18.45	-10.17
0.9 Dead+1.0 Wind 0 deg - No Ice	38.40	0.14	-44.61	-4106.87	-19.90	-10.17
1.2 Dead+1.0 Wind 30 deg - No Ice	51.20	20.92	-36.05	-3364.73	-1943.14	-10.39
0.9 Dead+1.0 Wind 30 deg - No Ice	38.40	20.92	-36.05	-3360.73	-1944.60	-10.39
1.2 Dead+1.0 Wind 60 deg - No Ice	51.20	35.60	-20.65	-1947.56	-3307.88	-18.63
0.9 Dead+1.0 Wind 60 deg - No Ice	38.40	35.60	-20.65	-1943.56	-3309.33	-18.63
1.2 Dead+1.0 Wind 90 deg - No Ice	51.20	42.66	-0.26	-61.20	-3920.70	-30.78
0.9 Dead+1.0 Wind 90 deg - No Ice	38.40	42.66	-0.26	-57.20	-3922.15	-30.78
1.2 Dead+1.0 Wind 120 deg - No Ice	51.20	39.60	22.63	2017.05	-3583.96	-20.91
0.9 Dead+1.0 Wind 120 deg - No Ice	38.40	39.60	22.63	2021.06	-3585.41	-20.91
1.2 Dead+1.0 Wind 150 deg - No Ice	51.20	21.30	36.96	3342.96	-1924.18	1.74
0.9 Dead+1.0 Wind 150 deg - No Ice	38.40	21.30	36.96	3346.96	-1925.64	1.74
1.2 Dead+1.0 Wind 180 deg - No Ice	51.20	-0.14	41.22	3778.96	29.37	9.99
0.9 Dead+1.0 Wind 180 deg - No Ice	38.40	-0.14	41.22	3782.97	27.91	9.99
1.2 Dead+1.0 Wind 210 deg - No Ice	51.20	-20.84	35.88	3301.82	1940.77	9.54
0.9 Dead+1.0 Wind 210 deg - No Ice	38.40	-20.84	35.88	3305.83	1939.32	9.54
1.2 Dead+1.0 Wind 240 deg - No Ice	51.20	-38.06	22.05	2014.61	3495.55	17.56
0.9 Dead+1.0 Wind 240 deg - No Ice	38.40	-38.06	22.05	2018.62	3494.10	17.56
1.2 Dead+1.0 Wind 270 deg - No Ice	51.20	-42.45	0.08	-2.84	3894.75	29.72
0.9 Dead+1.0 Wind 270 deg - No Ice	38.40	-42.45	0.08	1.17	3893.30	29.72
1.2 Dead+1.0 Wind 300 deg - No Ice	51.20	-36.81	-21.31	-1966.03	3359.56	20.26
0.9 Dead+1.0 Wind 300 deg - No Ice	38.40	-36.81	-21.31	-1962.02	3358.11	20.26
1.2 Dead+1.0 Wind 330 deg - No Ice	51.20	-21.36	-37.27	-3430.07	1947.22	-2.18
0.9 Dead+1.0 Wind 330 deg - No Ice	38.40	-21.36	-37.27	-3426.07	1945.76	-2.18
1.2 Dead+1.0 Ice+1.0 Temp	143.32	-0.00	-0.00	-69.16	24.87	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	143.32	0.03	-12.63	-1275.96	20.16	-3.65
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	143.32	6.16	-10.63	-1094.14	-570.34	-5.47
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	143.32	10.59	-6.13	-663.30	-999.08	-8.22
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	143.32	12.39	-0.05	-77.27	-1164.54	-8.94
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	143.32	11.01	6.31	527.96	-1022.04	-4.84
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	143.32	6.17	10.69	949.18	-561.57	0.70
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	143.32	-0.03	12.19	1099.06	29.46	3.62
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	143.32	-6.15	10.60	950.80	617.80	5.33
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	143.32	-10.90	6.30	536.02	1068.64	8.04

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	143.32	-12.35	0.02	-66.25	1208.17	8.77
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	143.32	-10.65	-6.16	-657.85	1042.22	4.74
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	143.32	-6.18	-10.74	-1096.45	613.17	-0.77
Dead+Wind 0 deg - Service	42.67	0.03	-9.64	-894.26	-0.32	-2.17
Dead+Wind 30 deg - Service	42.67	4.53	-7.80	-734.16	-414.63	-2.20
Dead+Wind 60 deg - Service	42.67	7.70	-4.47	-429.12	-708.51	-3.95
Dead+Wind 90 deg - Service	42.67	9.22	-0.05	-22.98	-840.20	-6.53
Dead+Wind 120 deg - Service	42.67	8.56	4.89	424.05	-767.32	-4.43
Dead+Wind 150 deg - Service	42.67	4.61	7.99	709.65	-410.59	0.38
Dead+Wind 180 deg - Service	42.67	-0.03	8.92	803.68	9.86	2.13
Dead+Wind 210 deg - Service	42.67	-4.51	7.76	700.88	421.34	2.02
Dead+Wind 240 deg - Service	42.67	-8.23	4.77	423.53	755.70	3.72
Dead+Wind 270 deg - Service	42.67	-9.18	0.02	-10.54	841.89	6.31
Dead+Wind 300 deg - Service	42.67	-7.96	-4.61	-433.06	726.73	4.30
Dead+Wind 330 deg - Service	42.67	-4.62	-8.06	-748.08	422.72	-0.47

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX	PY	PZ	PX	PY	PZ	
	K	K	K	K	K	K	
1	0.00	-42.67	0.00	0.00	42.67	0.00	0.000%
2	0.14	-51.20	-44.61	-0.14	51.20	44.61	0.000%
3	0.14	-38.40	-44.61	-0.14	38.40	44.61	0.000%
4	20.92	-51.20	-36.05	-20.92	51.20	36.05	0.000%
5	20.92	-38.40	-36.05	-20.92	38.40	36.05	0.000%
6	35.60	-51.20	-20.65	-35.60	51.20	20.65	0.000%
7	35.60	-38.40	-20.65	-35.60	38.40	20.65	0.000%
8	42.66	-51.20	-0.26	-42.66	51.20	0.26	0.000%
9	42.66	-38.40	-0.26	-42.66	38.40	0.26	0.000%
10	39.60	-51.20	22.63	-39.60	51.20	-22.63	0.000%
11	39.60	-38.40	22.63	-39.60	38.40	-22.63	0.000%
12	21.30	-51.20	36.96	-21.30	51.20	-36.96	0.000%
13	21.30	-38.40	36.96	-21.30	38.40	-36.96	0.000%
14	-0.14	-51.20	41.22	0.14	51.20	-41.22	0.000%
15	-0.14	-38.40	41.22	0.14	38.40	-41.22	0.000%
16	-20.84	-51.20	35.88	20.84	51.20	-35.88	0.000%
17	-20.84	-38.40	35.88	20.84	38.40	-35.88	0.000%
18	-38.06	-51.20	22.05	38.06	51.20	-22.05	0.000%
19	-38.06	-38.40	22.05	38.06	38.40	-22.05	0.000%
20	-42.45	-51.20	0.08	42.45	51.20	-0.08	0.000%
21	-42.45	-38.40	0.08	42.45	38.40	-0.08	0.000%
22	-36.81	-51.20	-21.31	36.81	51.20	21.31	0.000%
23	-36.81	-38.40	-21.31	36.81	38.40	21.31	0.000%
24	-21.36	-51.20	-37.27	21.36	51.20	37.27	0.000%
25	-21.36	-38.40	-37.27	21.36	38.40	37.27	0.000%
26	0.00	-143.32	0.00	0.00	143.32	0.00	0.000%
27	0.03	-143.32	-12.63	-0.03	143.32	12.63	0.000%
28	6.16	-143.32	-10.63	-6.16	143.32	10.63	0.000%
29	10.59	-143.32	-6.13	-10.59	143.32	6.13	0.000%
30	12.39	-143.32	-0.05	-12.39	143.32	0.05	0.000%
31	11.01	-143.32	6.31	-11.01	143.32	-6.31	0.000%
32	6.17	-143.32	10.69	-6.17	143.32	-10.69	0.000%
33	-0.03	-143.32	12.19	0.03	143.32	-12.19	0.000%
34	-6.15	-143.32	10.60	6.15	143.32	-10.60	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
35	-10.90	-143.32	6.30	10.90	143.32	-6.30	0.000%
36	-12.35	-143.32	0.02	12.35	143.32	-0.02	0.000%
37	-10.65	-143.32	-6.16	10.65	143.32	6.16	0.000%
38	-6.18	-143.32	-10.74	6.18	143.32	10.74	0.000%
39	0.03	-42.67	-9.64	-0.03	42.67	9.64	0.000%
40	4.53	-42.67	-7.80	-4.53	42.67	7.80	0.000%
41	7.70	-42.67	-4.47	-7.70	42.67	4.47	0.000%
42	9.22	-42.67	-0.05	-9.22	42.67	0.05	0.000%
43	8.56	-42.67	4.89	-8.56	42.67	-4.89	0.000%
44	4.61	-42.67	7.99	-4.61	42.67	-7.99	0.000%
45	-0.03	-42.67	8.92	0.03	42.67	-8.92	0.000%
46	-4.51	-42.67	7.76	4.51	42.67	-7.76	0.000%
47	-8.23	-42.67	4.77	8.23	42.67	-4.77	0.000%
48	-9.18	-42.67	0.02	9.18	42.67	-0.02	0.000%
49	-7.96	-42.67	-4.61	7.96	42.67	4.61	0.000%
50	-4.62	-42.67	-8.06	4.62	42.67	8.06	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	2.364	39	0.1057	0.0083
T2	160 - 140	1.919	39	0.1029	0.0085
T3	140 - 120	1.487	39	0.0947	0.0086
T4	120 - 100	1.107	39	0.0801	0.0072
T5	100 - 80	0.772	39	0.0689	0.0054
T6	80 - 60	0.503	39	0.0532	0.0043
T7	60 - 40	0.288	39	0.0401	0.0029
T8	40 - 20	0.137	39	0.0249	0.0018
T9	20 - 0	0.043	43	0.0129	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	2" Dia 20' Omni	39	2.364	0.1057	0.0083	Inf
177.00	6' Microwave Dish w/ Radome	39	2.297	0.1054	0.0080	Inf
165.00	SP2D03P36D-D	39	2.030	0.1039	0.0082	518649
161.00	12' Dipole	39	1.941	0.1031	0.0084	384374
157.00	2" Dia 5' Omni	39	1.852	0.1021	0.0086	244077
145.00	LNX-6512DS-T4M_TIA w/ Mount Pipe	39	1.591	0.0976	0.0087	92888
133.00	BA40-41-DIN (4 diploes (2 bays) 11.5' dipole)	39	1.348	0.0897	0.0083	86666
130.00	P65-16-XLH-RR w/ Mount Pipe	39	1.291	0.0874	0.0080	95710
120.00	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	39	1.107	0.0801	0.0072	133028
88.00	APXVSPP18-C-A20_TIA w/ Mount Pipe	39	0.604	0.0596	0.0048	83226
56.00	GPS_A	39	0.253	0.0372	0.0026	70775
55.00	L3 1/2x3 1/2x1/4	39	0.245	0.0364	0.0026	71814
45.00	L3 1/2x3 1/2x1/4	39	0.169	0.0286	0.0021	84405
15.00	L4x4x1/4	43	0.029	0.0099	0.0007	101505
5.00	L4x4x1/4	43	0.008	0.0034	0.0002	304515

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	10.853	2	0.4874	0.0398
T2	160 - 140	8.802	2	0.4720	0.0406
T3	140 - 120	6.824	2	0.4334	0.0408
T4	120 - 100	5.081	2	0.3664	0.0341
T5	100 - 80	3.548	2	0.3154	0.0257
T6	80 - 60	2.314	2	0.2440	0.0205
T7	60 - 40	1.328	11	0.1839	0.0135
T8	40 - 20	0.636	11	0.1145	0.0086
T9	20 - 0	0.203	11	0.0593	0.0043

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	2" Dia 20' Omni	2	10.853	0.4874	0.0398	492016
177.00	6' Microwave Dish w/ Radome	2	10.545	0.4856	0.0384	492016
165.00	SP2D03P36D-D	2	9.313	0.4771	0.0396	164005
161.00	12' Dipole	2	8.904	0.4731	0.0404	115600
157.00	2" Dia 5' Omni	2	8.497	0.4683	0.0410	62560
145.00	LNX-6512DS-T4M_TIA w/ Mount Pipe	2	7.300	0.4466	0.0414	20027
133.00	BA40-41-DIN (4 diploes (2 bays) 11.5' dipole)	2	6.187	0.4105	0.0391	19050
130.00	P65-16-XLH-RR w/ Mount Pipe	2	5.924	0.3999	0.0381	21102
120.00	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	2	5.081	0.3664	0.0341	29696
88.00	APXVSPP18-C-A20_TIA w/ Mount Pipe	2	2.775	0.2731	0.0225	18209
56.00	GPS_A	11	1.167	0.1705	0.0123	15398
55.00	L3 1/2x3 1/2x1/4	11	1.128	0.1670	0.0121	15626
45.00	L3 1/2x3 1/2x1/4	11	0.784	0.1313	0.0097	18401
15.00	L4x4x1/4	11	0.136	0.0453	0.0032	22115
5.00	L4x4x1/4	11	0.039	0.0154	0.0011	66344

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.6250	4	1.43	20.34	0.070	1.05	Bolt Tension
		Diagonal	A325N	0.5000	1	1.53	6.20	0.247	1.05	Member Bearing
		Top Girt	A325N	0.5000	1	0.17	8.84	0.019	1.05	Bolt Shear
T2	160	Leg	A325N	0.7500	4	3.84	30.10	0.127	1.05	Bolt Tension
		Diagonal	A325N	0.5000	1	2.21	4.13	0.534	1.05	Member Bearing
T3	140	Leg	A325N	0.8750	4	7.02	41.56	0.169	1.05	Bolt Tension
		Diagonal	A325N	0.5000	1	3.88	6.20	0.626	1.05	Member Bearing
T4	120	Leg	A325N	1.0000	4	12.25	54.52	0.225	1.05	Bolt Tension
		Diagonal	A325N	0.5000	1	5.58	8.27	0.675	1.05	Member Bearing
T5	100	Leg	A325N	1.0000	4	17.32	54.52	0.318	1.05	Bolt Tension
		Diagonal	A325N	0.7500	1	7.36	13.39	0.550	1.05	Member Bearing
T6	80	Leg	A325N	1.0000	4	23.18	54.52	0.425	1.05	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.7500	1	7.91	8.93	0.886	1.05	Member Bearing
T7	60	Leg	A325N	1.0000	6	19.28	54.52	0.354	1.05	Bolt Tension
		Diagonal	A325N	0.7500	1	8.41	13.39	0.628	1.05	Member Bearing
T8	40	Leg	A325N	1.0000	6	23.19	54.52	0.425	1.05	Bolt Tension
		Diagonal	A325N	0.7500	1	9.12	13.39	0.681	1.05	Member Bearing
T9	20	Diagonal	A325N	0.8750	1	9.82	9.81	1.000	1.05	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x0.203	20.00	5.00	63.3 K=1.00	1.7040	-7.13	57.19	0.125 [1]
T2	160 - 140	P2.5x.276	20.03	6.68	86.7 K=1.00	2.2535	-18.69	58.51	0.319 [1]
T3	140 - 120	P3x0.216	20.04	6.68	68.9 K=1.00	2.2285	-35.21	70.89	0.497 [1]
T4	120 - 100	P4x0.337	20.04	6.68	54.3 K=1.00	4.4074	-61.40	159.90	0.384 [1]
T5	100 - 80	P5x0.258	20.03	10.02	64.0 K=1.00	4.2999	-86.26	143.40	0.602 [1]
T6	80 - 60	P5x0.375	20.03	10.02	65.4 K=1.00	6.1114	-114.83	201.22	0.571 [1]
T7	60 - 40	P5x0.375	20.04	10.02	65.4 K=1.00	6.1114	-143.43	201.20	0.713 [1]
T8	40 - 20	P6x0.432	20.03	10.02	54.8 K=1.00	8.4049	-172.06	303.75	0.566 [1]
T9	20 - 0	P6x0.432	20.03	10.02	54.8 K=1.00	8.4049	-200.84	303.75	0.661 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 3/4x1 3/4x3/16	9.91	4.71	164.7 K=1.00	0.6211	-1.60	6.55	0.244 [1]
T2	160 - 140	L2x2x1/8	12.24	6.07	183.4 K=1.00	0.4844	-2.24	4.12	0.542 [1]
T3	140 - 120	L2 1/2x2 1/2x3/16	14.02	6.94	168.2 K=1.00	0.9020	-3.93	9.13	0.430 [1]
T4	120 - 100	L2 1/2x2 1/2x1/4	15.89	7.83	191.3 K=1.00	1.1900	-5.62	9.31	0.604 [1]
T5	100 - 80	L3x3x3/8	19.10	9.44	192.9 K=1.00	2.1100	-7.49	16.23	0.462 [1]
T6	80 - 60	L3 1/2x3 1/2x1/4	20.83	10.30	178.1 K=1.00	1.6900	-8.07	15.25	0.529 [1]

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T7	60 - 40	L3 1/2x3 1/2x3/8	22.67	11.23	196.2 K=1.00	2.4800	-8.52	18.45	0.462 [1]
T8	40 - 20	L4x4x3/8	24.50	12.08	184.0 K=1.00	2.8600	-9.47	24.17	0.392 [1]
T9	20 - 0	L4x4x3/8	26.33	12.99	197.8 K=1.00	2.8600	-10.42	20.93	0.498 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	L2 1/2x2 1/2x3/16	8.56	8.11	196.7 K=1.00	0.9020	-0.17	6.68	0.026 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	P2.5x0.203	20.00	5.00	63.3	1.7040	5.73	76.68	0.075 [1]
T2	160 - 140	P2.5x.276	20.03	6.68	86.7	2.2535	15.34	101.41	0.151 [1]
T3	140 - 120	P3x0.216	20.04	6.68	68.9	2.2285	28.08	100.28	0.280 [1]
T4	120 - 100	P4x0.337	20.04	6.68	54.3	4.4074	49.02	198.34	0.247 [1]
T5	100 - 80	P5x0.258	20.03	10.02	64.0	4.2999	69.29	193.49	0.358 [1]
T6	80 - 60	P5x0.375	20.03	10.02	65.4	6.1114	92.74	275.01	0.337 [1]
T7	60 - 40	P5x0.375	20.04	10.02	65.4	6.1114	115.69	275.01	0.421 [1]
T8	40 - 20	P6x0.432	20.03	10.02	54.8	8.4049	139.16	378.22	0.368 [1]
T9	20 - 0	P6x0.432	20.03	10.02	54.8	8.4049	162.22	378.22	0.429 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	L1 3/4x1 3/4x3/16	9.91	4.71	107.7	0.3779	1.53	16.44	0.093 [1]
T2	160 - 140	L2x2x1/8	12.24	6.07	118.4	0.3047	2.21	13.25	0.167 [1]
T3	140 - 120	L2 1/2x2 1/2x3/16	14.02	6.94	108.6	0.5886	3.88	25.60	0.152 [1]
T4	120 - 100	L2 1/2x2 1/2x1/4	15.89	7.83	123.7	0.7753	5.58	33.73	0.166 [1]
T5	100 - 80	L3x3x3/8	19.10	9.44	125.8	1.3364	7.36	58.13	0.127 [1]
T6	80 - 60	L3 1/2x3 1/2x1/4	20.83	10.30	114.9	1.1034	7.91	48.00	0.165 [1]
T7	60 - 40	L3 1/2x3 1/2x3/8	22.67	11.23	127.5	1.6139	8.41	70.20	0.120 [1]
T8	40 - 20	L4x4x3/8	24.50	12.08	119.2	1.8989	9.12	82.60	0.110 [1]
T9	20 - 0	L4x4x3/8	26.33	12.99	128.2	1.8637	9.82	81.07	0.121 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2 1/2x2 1/2x3/16	8.56	8.11	128.3	0.5886	0.08	25.60	0.003 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	P2.5x0.203	1	-7.13	60.05	11.9	Pass
T2	160 - 140	Leg	P2.5x.276	33	-18.69	61.44	30.4	Pass
T3	140 - 120	Leg	P3x0.216	54	-35.21	74.43	47.3	Pass
T4	120 - 100	Leg	P4x0.337	75	-61.40	167.90	36.6	Pass
T5	100 - 80	Leg	P5x0.258	96	-86.26	150.57	57.3	Pass
T6	80 - 60	Leg	P5x0.375	111	-114.83	211.28	54.4	Pass
T7	60 - 40	Leg	P5x0.375	126	-143.43	211.26	67.9	Pass
T8	40 - 20	Leg	P6x0.432	141	-172.06	318.94	53.9	Pass
T9	20 - 0	Leg	P6x0.432	156	-200.84	318.94	63.0	Pass
T1	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	7	-1.60	6.88	23.2	Pass
							23.5 (b)	
T2	160 - 140	Diagonal	L2x2x1/8	38	-2.24	4.33	51.7	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	59	-3.93	9.58	41.0	Pass
							59.6 (b)	
T4	120 - 100	Diagonal	L2 1/2x2 1/2x1/4	80	-5.62	9.78	57.5	Pass
							64.3 (b)	
T5	100 - 80	Diagonal	L3x3x3/8	101	-7.49	17.04	44.0	Pass
							52.4 (b)	
T6	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	116	-8.07	16.01	50.4	Pass
							84.4 (b)	
T7	60 - 40	Diagonal	L3 1/2x3 1/2x3/8	129	-8.52	19.37	44.0	Pass
							59.8 (b)	
T8	40 - 20	Diagonal	L4x4x3/8	144	-9.47	25.38	37.3	Pass
							64.9 (b)	
T9	20 - 0	Diagonal	L4x4x3/8	159	-10.42	21.97	47.4	Pass
							95.3 (b)	
T1	180 - 160	Top Girt	L2 1/2x2 1/2x3/16	6	-0.17	7.01	2.4	Pass
							Summary	
							Leg (T7) 67.9	Pass
							Diagonal (T9) 95.3	Pass
							Top Girt (T1) 2.4	Pass
							Bolt Checks 95.3	Pass
							RATING = **95.3**	**Pass**

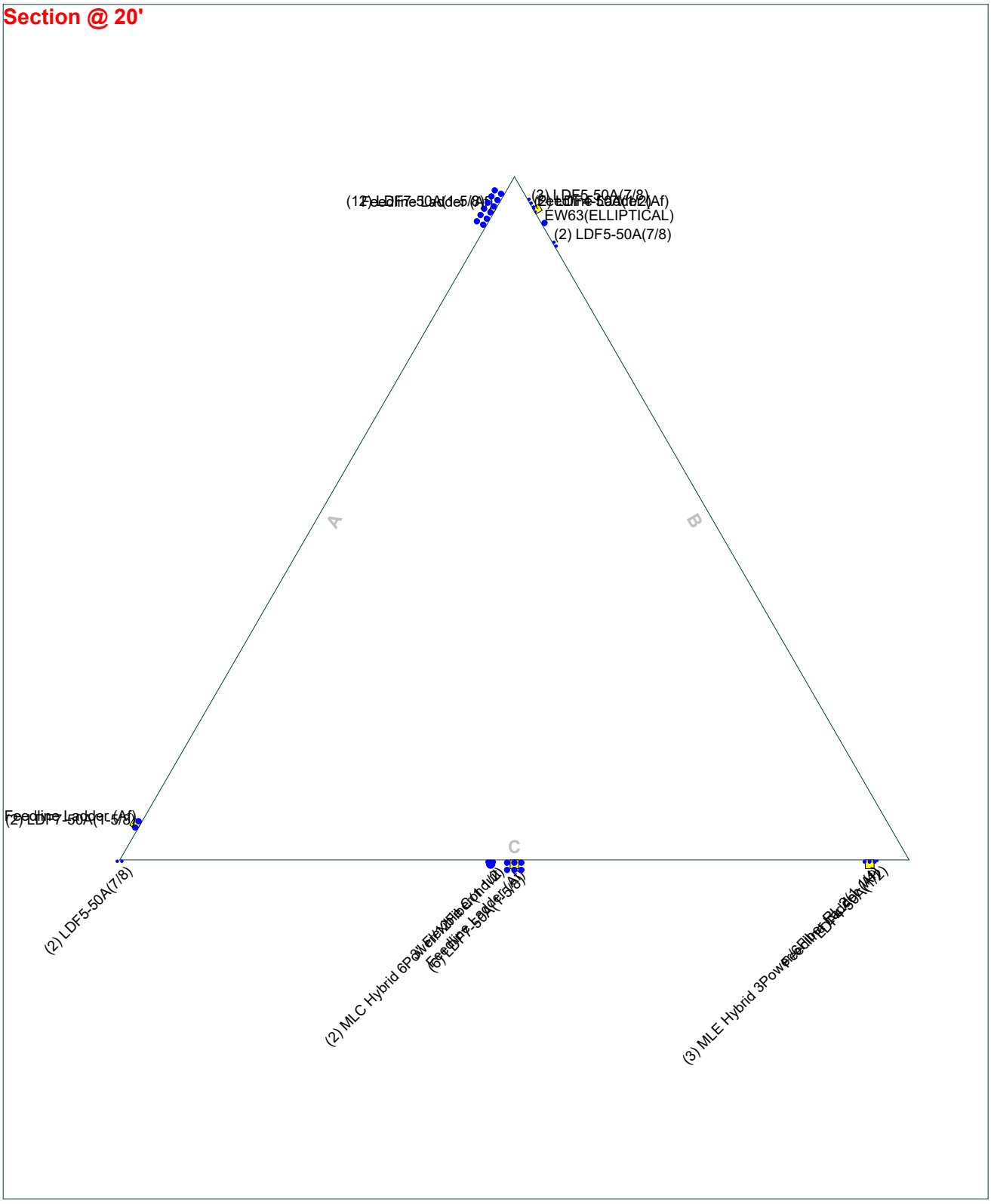
APPENDIX B

BASE LEVEL DRAWING

Feed Line Plan
20'

Round Flat App In Face App Out Face

Section @ 20'



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Job: ***ES-066 NewtownAWC***			
Project: ***405025 (NewtownAWC)***			
Client: Eversource	Drawn by: Josh Riley	App'd:	
Code: TIA-222-H	Date: 08/12/21	Scale: NTS	
Path:		Dwg No. E-7	

APPENDIX C

ADDITIONAL CALCULATIONS

Eversource #: ES-066
Site Name: NewtownAWC

Designed By: RHN
Checked By:
Date: 8/12/2021

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References

ANCHOR ROD ANALYSIS

Project Information

Site Name:ES-066 NewtownAWC

TIA Revision: Rev-G / Rev-H

TIA-222-G 105% Allowable? No / Yes

Apply TIA-222-H Section 15.5? No / Yes

Max Leg Reactions

Compression	*Uplift*
Axial_C := 208·kip	Axial_U := 168·kip
Shear_C := 28·kip	Shear_U := 23·kip

Anchor Rod Data

Diameter of Anchor Rod: D := 1·in

Number of Anchor Rods: N := 6

Length from top of concrete to bottom of anchor rod leveling nut: lar := 0.001·in

Threads in Shear Plane?: Yes / No

Thread Series: Coarse / Fine / 8-Thread

Consider Base Plate Grout? Yes / No

Grout Factor η: 0.90 / 0.70 / 0.55 / 0.50

Anchor Rod Grade: F1554-105, A687, A354-BC, A354-BD, A449, A572-42, A572-50, A572-55, A572-60, A572-65, A588-42, A588-46, A588-50, A36M-42, A36M-45, A36M-50, A36M-55, A500-50, A514-GR100, A53-B-35, A53-B-42, A607-60, A607-65, S-128, S-22

Threads per Inch: n = 8 (Thread selection invalid if n = 0)

Rod Ultimate Strength: Fu = 120·ksi

Rod Yield Strength: Fy = 92·ksi

Anchor Rod Plastic Section Modulus: (based on tension root diameter)

$$Z := \frac{1}{6}\cdot\left(D - \frac{0.9743\,in}{n}\right)^3 = 0.113\cdot in^3$$

Radius of Gyration:

$$r := \left(\frac{1}{4}\right)\cdot\left(D - \frac{0.9743\,in}{n}\right) = 0.22\cdot in$$

Net Area of Anchor Rod:

$$An := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\,in}{n}\right)^2 = 0.606\cdot in^2$$

TIA-222-G/H Section 4.9.6.1

Nominal Unthreaded Area of Anchor Rod:

$$Ab := \frac{\pi}{4}\cdot(D)^2 = 0.785\cdot in^2$$

Eversource #: ES-066
Site Name: NewtownAWC

Designed By: RHN
Checked By:
Date: 8/12/2021

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Anchor Rod Design Capacities

Design Tension Strength: TIA-222-G/H Section 4.9.6.1

$Rnt := Fu \cdot An = 72.689 \cdot kip$

$\phi t = 0.75$

$\phi Rnt := \phi t \cdot Rnt = 54.517 \cdot kip$

Design Compression Strength:

$Rnc := Fy \cdot An = 55.728 \cdot kip$

$\phi c = 1$

$\phi Rnc := \phi c \cdot Rnc = 55.728 \cdot kip$

Design Buckling Strength: TIA-222-H Section 4.5.4.2

$K_0 := 1.2$

$Fcr = 92 \cdot ksi$

$Fe = 9.581 \times 10^{9} \cdot ksi$

$Rnb := Fcr \cdot An = 55.728 \cdot kip$

$\phi c = 1$

$\phi Rnb := \phi c \cdot Rnb = 55.728 \cdot kip$

Design Shear Strength: TIA-222-G/H Section 4.9.6.3

$$Rnv := \begin{cases} 0.55 \cdot Fu \cdot Ab & \text{if Thread\_Type} = \text{"No"} \wedge \text{TIA} = \text{"Rev-G"} \\ 0.45 \cdot Fu \cdot Ab & \text{if Thread\_Type} = \text{"Yes"} \wedge \text{TIA} = \text{"Rev-G"} \\ 0.625 \cdot Fu \cdot Ab & \text{if Thread\_Type} = \text{"No"} \wedge \text{TIA} = \text{"Rev-H"} \\ 0.5 \cdot Fu \cdot Ab & \text{if Thread\_Type} = \text{"Yes"} \wedge \text{TIA} = \text{"Rev-H"} \end{cases}$$

$Rnv = 47.124 \cdot kip$

$Rnvc := 0.6 \cdot Fy \cdot 0.5 \cdot An = 16.719 \cdot kip$ TIA-222-H Section 4.9.9

$\phi v = 0.75 \qquad \phi c = 1$

$\phi Rnv := \phi v \cdot Rnv = 35.343 \cdot kip \qquad \phi Rnvc := \phi c \cdot Rnvc = 16.719 \cdot kip$

Design Flexural Strength: TIA-222-G/H Section 4.7.1

$Rmn := Fy \cdot Z = 10.386 \cdot kip \cdot in$

$\phi f = 0.9$

$\phi Rmn := \phi f \cdot Rmn = 9.347 \cdot kip \cdot in$

Anchor Rod Loading Demands

Tension Demand:

$$Put := \frac{Axial\_U}{N} = 28 \cdot kip$$

Compression Demand:

$$Puc := \frac{Axial\_C}{N} = 34.667 \cdot kip$$

Shear Demand:

$$Vut := \frac{Shear\_U}{N} = 3.833 \cdot kip$$

$$Vuc := \frac{Shear\_C}{N} = 4.667 \cdot kip$$

Moment Demand:

$$Mut := 0.65 \cdot lar \cdot Vut = 2.492 \times 10^{-3} \cdot kip \cdot in$$

$$Muc := 0.65 \cdot lar \cdot Vuc = 3.033 \times 10^{-3} \cdot kip \cdot in$$

Anchor Rod Interaction Check

TIA-222-G Section 4.9.9

$$SR\_g := \begin{cases} \dfrac{Put + \dfrac{Vut}{\eta}}{\phi Rnt} & \text{if } \eta > 0.50 \\ \dfrac{Put + \dfrac{Vut}{\eta}}{\phi Rnt} & \text{if } \eta = 0.50 \wedge lar \le D \wedge Put > Puc \\ \dfrac{Puc + \dfrac{Vuc}{\eta}}{\phi Rnt} & \text{if } \eta = 0.50 \wedge lar \le D \wedge Put < Puc \\ \left(\dfrac{Vut}{\phi Rnv}\right)^2 + \left(\dfrac{Put}{\phi Rnt} + \dfrac{Mut}{\phi Rmn}\right)^2 & \text{if } \eta = 0.5 \wedge lar > D \wedge Put > Puc \\ \left(\dfrac{Vuc}{\phi Rnv}\right)^2 + \left(\dfrac{Puc}{\phi Rnt} + \dfrac{Muc}{\phi Rmn}\right)^2 & \text{if } \eta = 0.5 \wedge lar > D \wedge Put < Puc \end{cases}$$

$$SR\_g = 0.592$$

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Anchor Rod Interaction Check

TIA-222-H Section 4.9.9

$$SR\_Pt := \begin{cases} \left(\frac{Put}{\phi Rnt}\right)^2 + \left(\frac{Vut}{\phi Rnv}\right)^2 & \text{if } lar \le D \\ \left(\frac{Put}{\phi Rnt}\right)^2 + \left(\frac{Vut}{\phi Rnv}\right)^2 & \text{if } D < lar \le 3\cdot in \wedge Grout = \text{"Yes"} \\ \left(\frac{Put}{\phi Rnt} + \frac{Mut}{\phi Rmn}\right)^2 + \left(\frac{Vut}{\phi Rnv}\right)^2 & \text{if } 3\cdot in < lar \wedge Grout = \text{"Yes"} \\ \left(\frac{Put}{\phi Rnt} + \frac{Mut}{\phi Rmn}\right)^2 + \left(\frac{Vut}{\phi Rnv}\right)^2 & \text{if } D < lar \wedge Grout = \text{"No"} \end{cases}$$

$SR\_Pt = 0.276$

$$SR\_Pc := \begin{cases} \left(\frac{Puc}{\phi Rnc}\right) + \left(\frac{Vuc}{\phi Rnvc}\right)^2 & \text{if } lar \le D \\ \left(\frac{Puc}{\phi Rnc}\right) + \left(\frac{Vuc}{\phi Rnvc}\right)^2 & \text{if } D < lar \le 3\cdot in \wedge Grout = \text{"Yes"} \\ \left(\frac{Puc}{\phi Rnc} + \frac{Muc}{\phi Rmn}\right) + \left(\frac{Vuc}{\phi Rnvc}\right)^2 & \text{if } 3\cdot in < lar \wedge Grout = \text{"Yes"} \\ \left(\frac{Puc}{\phi Rnc} + \frac{Muc}{\phi Rmn}\right) + \left(\frac{Vuc}{\phi Rnvc}\right)^2 & \text{if } D < lar \le 4\cdot D \wedge Grout = \text{"No"} \\ \left(\frac{Puc}{\phi Rnb} + \frac{Muc}{\phi Rmn}\right) + \left(\frac{Vuc}{\phi Rnvc}\right)^2 & \text{if } lar > 4\cdot D \wedge Grout = \text{"No"} \end{cases}$$

$SR\_Pc = 0.7$

$$SR := \begin{cases} SR\_g & \text{if } TIA = \text{"Rev-G"} \\ \max(SR\_Pt, SR\_Pc) & \text{if } TIA = \text{"Rev-H"} \wedge S15 = \text{"No"} \\ \frac{\max(SR\_Pt, SR\_Pc)}{1.05} & \text{if } TIA = \text{"Rev-H"} \wedge S15 = \text{"Yes"} \end{cases} = 0.667$$

$$Check_{SR} := \begin{cases} \text{"Passing"} & \text{if } SR \le 1.00 \wedge TIA = \text{"Rev-G"} \wedge S105 = \text{"Yes"} \\ \text{"Acceptable"} & \text{if } 1.00 < SR \le 1.05 \wedge TIA = \text{"Rev-G"} \wedge S105 = \text{"Yes"} \\ \text{"Failing"} & \text{if } SR > 1.05 \wedge TIA = \text{"Rev-G"} \wedge S105 = \text{"Yes"} \\ \text{"Passing"} & \text{if } SR \le 1.00 \wedge TIA = \text{"Rev-G"} \wedge S105 = \text{"No"} \\ \text{"Failing"} & \text{if } SR > 1.00 \wedge TIA = \text{"Rev-G"} \wedge S105 = \text{"No"} \\ \text{"Passing"} & \text{if } SR \le 1.0 \wedge TIA = \text{"Rev-H"} \\ \text{"Failing"} & \text{if } SR > 1.0 \wedge TIA = \text{"Rev-H"} \end{cases} = \text{"Passing"}$$

Eversource #: ES-066
Site Name: NewtownAWC

Designed By: RHN
Checked By:
Date: 8/12/2021

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Anchor Rod Results

Axial Tension Demand:	$Put = 28 \cdot kip$
Axial Tension Capacity:	$\phi Rnt = 54.517 \cdot kip$
Axial Compression Demand:	$Puc = 34.667 \cdot kip$
Axial Compression Capacity:	$\phi Rnc = 55.728 \cdot kip$
Shear Tension Demand:	$Vut = 3.833 \cdot kip$
Tension Shear Capacity:	$\phi Rnv = 35.343 \cdot kip$
Shear Compression Demand:	$Vuc = 4.667 \cdot kip$
Compresison Shear Capacity:	$\phi R_{nvc} = 16.719 \cdot kip$
Moment Tension Demand:	$M_{ut} = \text{"Moment Not Considered"} \cdot kip \cdot in$
Moment Compression Demand:	$M_{uc} = \text{"Moment Not Considered"} \cdot kip \cdot in$
Moment Capacity:	$\phi R_{mn} = \text{"Moment Not Considered"} \cdot kip \cdot in$

Governing Stress Ratio

$SR = 66.665 \cdot \%$

$Check_{SR} = \text{"Passing"}$

Pier and Pad Foundation

Site Name:	NewtownAWC
TIA-222 Revision:	H
Tower Type:	Self Support

Top & Bot. Pad Rein. Different?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions		
Compression, P_{comp}:	208	kips
Compression Shear, Vu_comp:	28	kips
Uplift, P_{uplift}:	168	kips
Uplift Shear, V_{u_uplift}:	23	kips
Tower Height, **H**:	180	ft
Base Face Width, **BW**:	24.86	ft
BP Dist. Above Fdn, bp_{dist}:	4	in

Pier Properties		
Pier Shape:	Square	
Pier Diameter, **dpier**:	2.5	ft
Ext. Above Grade, **E**:	0.5	ft
Pier Rebar Size, **Sc**:	7	
Pier Rebar Quantity, **mc**:	24	
Pier Tie/Spiral Size, **St**:	3	
Pier Tie/Spiral Quantity, **mt**:	3	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	2	in

Pad Properties		
Depth, **D**:	9.5	ft
Pad Width, **W**:	10	ft
Pad Thickness, **T**:	2	ft
Pad Rebar Size (Bottom), **Sp**:	6	
Pad Rebar Quantity (Bottom), **mp**:	19	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3.5	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	125	pcf
Ultimate Net Bearing, Qnet:	12.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:	34	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.6	
Neglected Depth, **N**:	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<--Toggle between Gross and Net

Foundation Analysis Checks				
	Capacity	**Demand**	**Rating***	**Check**
Uplift (kips)	207.98	168.00	**76.9%**	**Pass**
Lateral (Sliding) (kips)	75.09	23.00	**29.2%**	**Pass**
Bearing Pressure (ksf)	9.89	3.58	**34.5%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	766.98	224.00	**27.8%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	552.10	184.00	**31.7%**	**Pass**
Pier Compression (kip)	1819.30	217.00	**11.4%**	**Pass**
*Pad Flexure (kip*ft)*	721.27	147.63	**19.5%**	**Pass**
Pad Shear - 1-way (kips)	211.65	43.96	**19.8%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.177	0.053	**28.7%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	1230.68	134.40	**10.4%**	**Pass**
Pad Shear - 2-way (Uplift) (ksi)	0.177	0.065	**35.0%**	**Pass**
*Flexural 2-way (Tension) (kip*ft)*	1230.68	110.40	**8.5%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**76.9%**
Structural Rating*:	**35.0%**

ATTACHMENT E – 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.
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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.

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ATTACHMENT F - POWER DENSITY REPORT

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

Calculated Radio Frequency Emissions Report

EVERSOURCE ENERGY

ES-066

20 Barnabas Road

Newtown, CT 06470

August 19, 2021

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 to be located at 20 Barnabas Road in Newtown, CT.

Eversource has recently installed one omnidirectional antenna for both transmit and receive purposes as part of its 220 MHz communications system. The original proposal consisted of two omnidirectional antennas – separate transmit and receive antennas. This report provides an updated analysis based on the current installation as reflected in the update site plans[1].

This report considers the existing antenna configuration as provided by Eversource along with power density information of the other existing antennas to calculate the cumulative % MPE (Maximum Permissible Exposure) of the facility at ground level.

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.

[1] Stamped Black & Veatch site drawings dated 8/13/2021 (Rev. 1).

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. Calculated % MPE Results

Table 1 below outlines the power density information for the site. The proposed Eversource omnidirectional antenna has a relatively narrow vertical beamwidth of 30°; therefore, the majority of the RF power is focused out towards the horizon. Please refer to Attachment C for the vertical pattern of the proposed Eversource antenna. Likewise, the other transmit antennas exhibit similar directionality of varying vertical beamwidths. Therefore, the calculated results in Table 1 include a nominal 3dB off-beam pattern loss for the Eversource half-wave dipole (44.34 MHz), 10 dB off-beam pattern loss for the omnidirectional and panel antennas and 30 dB off-beam pattern loss for the highly directional microwave dish to account for the lower relative gain below the antennas. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the facility. Any inactive or receive-only antennas are not included in the table, as they are irrelevant in terms of the % MPE calculations.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
6755 MHz system		*6755*			*0.0000*	*1.0000*	*0.00%*
37.48, 37.74, 48.34, 154.46375 MHz systems					*0.0096*	*1.0000*	*0.10%*
T-Mobile	145	1900	2	953	0.0035	1.0000	0.35%
T-Mobile	145	2100	4	477	0.0036	1.0000	0.36%
Sprint	88	1900	2	693	0.0074	1.0000	0.74%
Sprint	88	850	1	390	0.0021	0.5667	0.37%
AT&T	130	850	2	419	0.0020	0.5667	0.35%
AT&T	130	850	2	885	0.0041	0.5667	0.73%
AT&T	130	850	2	553	0.0026	0.5667	0.46%
AT&T	130	1900	4	1469	0.0137	1.0000	1.37%
AT&T	130	700	2	745	0.0035	0.4667	0.75%
Verizon	121	1970	15	432	0.0176	1.0000	1.76%
Verizon	121	869	9	400	0.0098	0.5793	1.69%
Verizon	121	2145	1	1750	0.0048	1.0000	0.48%
Verizon	121	698	1	828	0.0023	0.4653	0.48%
Town of Newtown	192.5	150	1	200	0.0002	0.2000	0.10%
Eversource	190.5	44.34	1	370	0.0020	0.2000	0.98%
Eversource	189	154.46375	1	990	0.0011	0.2000	0.53%
Eversource	177	5945.2	1	9772	0.0001	1.0000	0.01%
Eversource	176	37.48	1	370	0.0005	0.2000	0.23%
Eversource	153	900	1	240	0.0004	0.6000	0.07%
Eversource	178.5	217	4	124	0.0006	0.2000	0.30%
						Total	**12.11%**

Table 1: Proposed Tower % MPE [2] [3] [4]

The CT Siting Council power density database reflects miscellaneous entries, which are assumed to be for the existing Eversource and Town of Newtown installation (based on an FCC license assigned to the Town for this location). These entries are shown as grey in the table above and should be replaced by the green shaded entries, which are based upon updated operating parameters provided by Eversource as part of this project and FCC license information for the Town of Newtown (WPQZ382). The blue entry reflects the parameters of the proposed Eversource transmit antenna. Therefore, the total % MPE calculated does not include the grey entries.

[2] The power density information for carriers other than Eversource was taken directly from the CSC database dated 07/16/2021. Please note that % MPE values listed are rounded to two decimal points and the total % MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total value reflected in the table.

[3] The existing antenna heights listed are in reference to Black & Veatch Structural Analysis Report dated 08/12/2021. The new Eversource 220 MHz antenna height is based on the stamped Black & Veatch site drawings dated 8/13/2021 (Rev. 1).

[4] Operating parameters for the existing antennas listed for Eversource are in reference to an antenna inventory dated December 23, 2019. In cases when the transmitter and receiver antennas cannot be distinguished from each other for the same frequency, then the antenna with the lowest center line has been chosen for this analysis as the worst-case scenario.

5. Conclusion

The above analysis concludes that RF exposure at ground level with the new Eversource 220 MHz antenna installation will be below the maximum power density limits as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods discussed herein, the highest expected percent of Maximum Permissible Exposure at ground level with the installation is **12.11% of the FCC General Population/Uncontrolled limit**.

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

6. 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.

Keith Vellante — August 19, 2021

Report Prepared By: Keith Vellante
Director – 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[5]

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[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)
0.3-1.34	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 2: FCC Limits for Maximum Permissible Exposure (MPE)

[5] 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

[6] 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

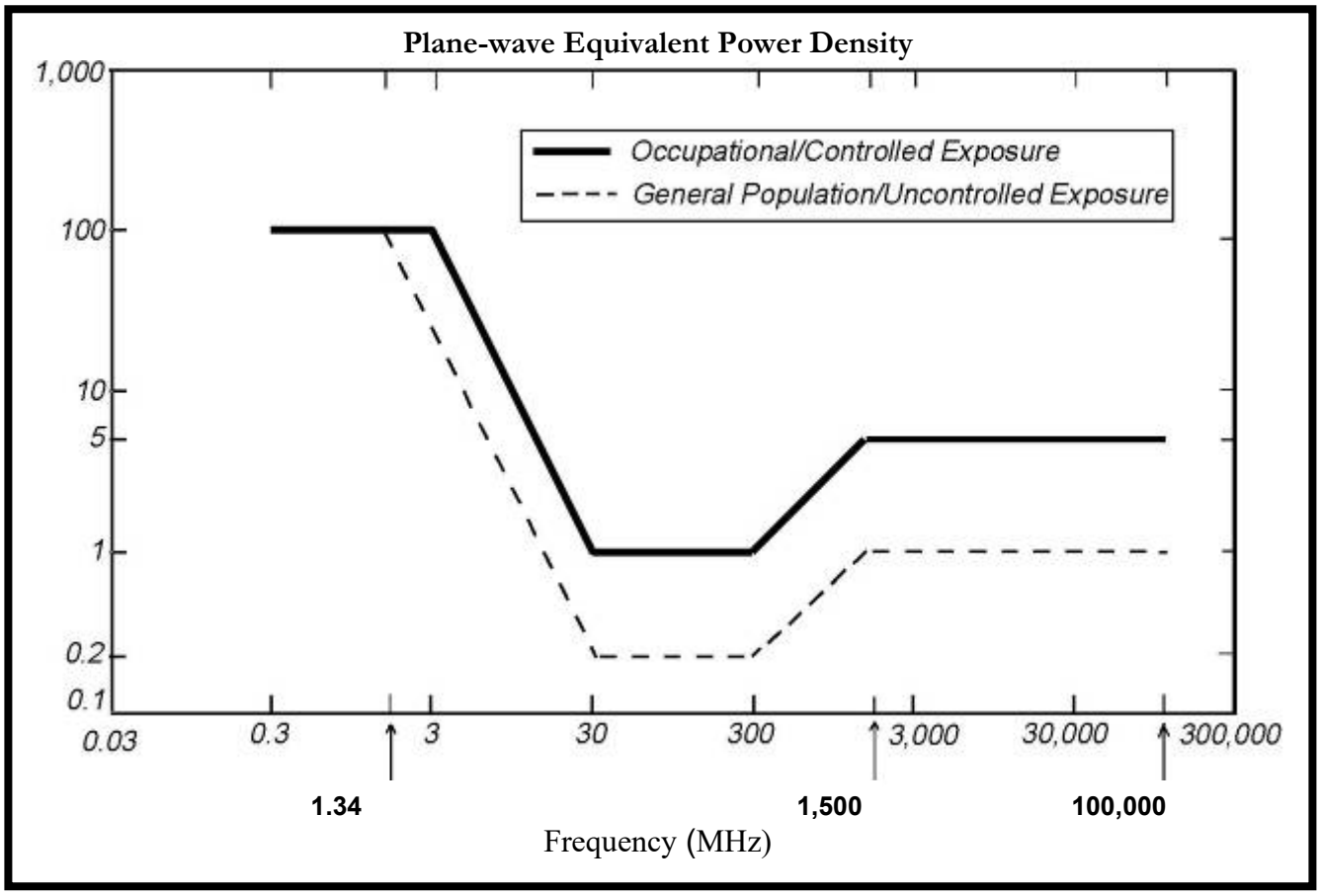

Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheets and Electrical Patterns

217 MHz	
Manufacturer:	dbSpectra
Model #:	SP2D00P36D-D
Frequency Band:	217-220 MHz
Gain:	0 dBd
Vertical Beamwidth:	60°
Horizontal Beamwidth:	360°
Polarization:	Vertical
Length:	15.6’