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

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

January 8, 2021

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

RE: **Notice of Exempt Modification**
Eversource Site ES-082
36 Lower Road, North Canaan, CT 06018
Latitude: 42-0-52.79 N / Longitude: 73-19-34.78 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains multiple antennas on an existing 198-foot self-support tower located at 36 Lower Road in North Canaan. See Attachment A, Parcel Map and Property Card. The tower and property are owned by Litchfield County Dispatch ("LCD"). LCD has agreed for Eversource to maintain the modified equipment on the tower. Eversource plans to install two 3-foot 8-inch tall omni-directional antennas, to be mounted at 143 feet and 175 feet above ground level ("AGL") and two 7/8-inch diameter coaxial cables. The antennas will be mounted to the existing tower on new 4-foot stand-off mounts. See Attachment B, Mount Analysis. There will be no other changes to the fenced compound, the tower or the existing antennas and equipment on the tower. The tower and existing and proposed equipment are depicted on Attachment C, Construction Drawings, dated November 3, 2020 and Attachment D, Structural Analysis, dated November 3, 2020. The tower was originally approved by the Town of North Canaan in April 1998 and has been under the Council's jurisdiction since April 2, 2002 through TS-CING-100-020402.

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

Please accept this letter as notification, pursuant to Regulations of Connecticut State Agencies ("R.C.S.A.") §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to Charles P. Perotti, First Selectman for the Town of North Canaan; Steven P. Allyn, Chairman of the

Planning & Zoning Commission for the Town of North Canaan; and LCD, the tower owner, via 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 proposed modifications will not require extension of the site boundary.
3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the new antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard as shown in the attached Radio Frequency Emissions Report, dated November 6, 2020 (Attachment F – Power Density Report)[1].
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

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 Charles P. Perotti, First Selectman, Town of North Canaan
Steven P. Allyn, Planning & Zoning Chairman, Town of North Canaan
Litchfield County Dispatch

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

LCD Tower Site

Imagery Date: 4/22/2018 42°00'53.06" N 73°19'34.82" W elev 932 ft eye alt 2153 ft

qPublic.net™ Town of North Canaan, CT

Summary

Parcel ID	15/086-2
Account Number	98102063
Section Plat	
Neighborhood	7 - Commercial
Property Address	Lower Rd 036 North Canaan, CT 06018
Legal Description	CENSUS TRACT: 2602 (Note: Not to be used on legal documents)
Acreage	6.37
Class	901 - BAAX Municipal
Tax District/Area	100 - NORTH CANAAN, CT

Owner

Primary Owner
Litchfield County Dispatch Inc
452 Bantam Rd
Litchfield, CT 06759-0000

Land

Lot Dimensions	Regular Lot: x
Lot Area	6.3700 Acres; 277477 SF

Site Description

Topography	
Public Utilities	
Street or Road	
Zoning	Residential- Agricultural
Legal Acres	6.3700
Legal Sq Ft	277,477

Buildings

Commercial Building	
Primary Use	Storage - Maintenance Bldg
Year Built	1999
Building Type	Storage - Maintenance Bldg:001
Condition	AV - Normal for age
Exterior Material	
Roof Type	4
Roof Material	
Interior Walls	
Predominate Floor Covs	
Stories/Floors	1
Above-Grade Living Area	1804 SF
Attic Type	None
Number of Rooms	1
Basement Type	
Basement Area	SF
Basement Finished Area	SF
Number of Bathrooms	
Central Air	N
Heat Type	0 sf
Porches	
Decks	SF
Garages	
Other Features	Cell Tower-Self Supported General Purpose Bldg Steel Frame General Purpose Bldg Steel Frame General Purpose Bldg Steel Frame

Sales

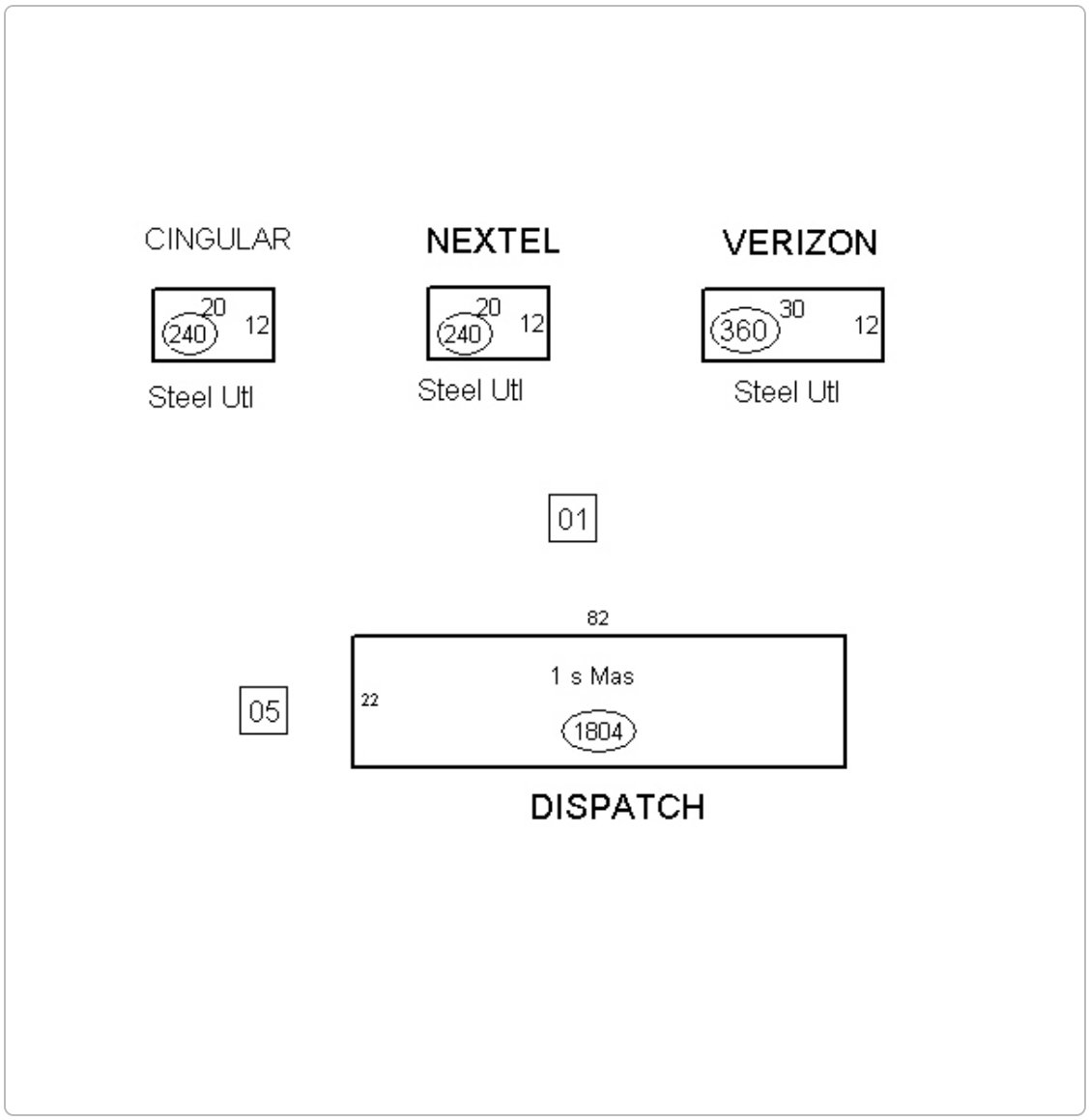
Date	Grantor	Recording	Type	Amount
12/29/1997	FOLEY THOMAS J JR & DOROTHY	Bk:0084 Pg:984		$75,000.00

Valuation

Assessment Year		10/01/2017	10/01/2012	10/01/2007
Reason for Change		2017 Reval	2012 REVAL	2007 Reval
VALUATION	Land	$105,560	$107,920	$126,220
(Market Value)	Improvements	$970,330	$977,310	$956,910
	Total	**$1,075,890**	**$1,085,230**	**$1,083,130**
VALUATION	Land	$73,900	$75,540	$88,350
(Assessed/Use Value)	Improvements	$679,240	$684,130	$669,850
	Total	**$753,140**	**$759,670**	**$758,200**

Photos

Sketches



ATTACHMENT B – MOUNT ANALYSIS

EVERSOURCE ENERGY

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

November 19, 2020

MOUNT EVALUATION LETTER

Site Number: ES-082
Site Name: CHURCHHILL
Site Data: 38 Lower Road
Litchfield, CT 06021
Latitude: 42° 0' 52.79"
Longitude: -73° 19' 34.78"

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

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

Structure Rating (max from all components) =	31.2%

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

This analysis analyzes the worst-case scenario for the proposed Site Pro 1 USF-4U Stand-off Frame. Both 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.

11/19/2020

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
Eversource	1	-	178	175	1	Omni	Telewave	ANT220F2
Eversource	1	-	146	143	1	Omni	Telewave	ANT220F2

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

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 120 mph
WIND SPEED WITH ICE	40 mph with 1.5" radial ice thickness
EXPOSURE CATEGORY	C
RISK CATEGORY	III
TOPO CATEGORY	Flat
CREST HEIGHT	N/A
SPECTRAL RESPONSE FACTORS, Ss & S1	0.173 g & 0.065 g

3. REFERENCES

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

4. ASSUMPTIONS

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

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

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

5. RESULTS SUMMARY

Name	Bending Stress Ratio		Shear Stress Ratio	
Arm: HSS3X3X3/16	19.0%	Pass	2.8%	Pass
Bracing: Pipe 2.0 Std	31.2%	Pass	4.0%	Pass
Mount Pipe: Pipe 3.0 Std	16.5%	Pass	7.1%	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 = 500 lb

Appurtenance Dead Loads	
Name	Weight (lb)
ANT220F2	11

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	CHURCHHILL (ES-082)	Date: 11/18/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/18/2020

Appurtenance Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Basic Wind Speed, V =	120	mph		
Height Above Ground, z =	178	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 =	1.43		$K_e = e^{-0.000032 \cdot zs}$	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 =	0.966		$F_A = q_z G_h (EPA)$	2.6.11.2
Wind Velocity Pressure, q_z =	48.33	psf		
Gust Effect Factor, G_h =	1.00		$F_M = q_z G_h C_f D_p$	2.6.11.2

Appurtenance Wind Loads

Name	Height (ft)	Width (ft)	Depth (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
ANT220F2	3.67	0.23	0.23	1.70	1.29	62.13	1.70	1.29	62.13

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: CHURCHHILL (ES-082)		Date: 11/18/2020
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 11/18/2020

Member Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Basic Wind Speed, V =	120	mph		
Height Above Ground, z =	178	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 =	1.43		$K_e = e^{-0.000032 z_s}$	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 =	0.966		$F_A = q_z G_h (EPA)$	2.6.11.2
Wind Velocity Pressure, q_z =	48.33	psf		
Gust Effect Factor, G_h =	1.00		$F_M = q_z G_h C_f D_p$	2.6.11.2

Member Wind Loads

Name	Depth (ft)	Width (ft)	C_f	D_p (ft)	F_M (lb)
Arm: HSS3X3X3/16	0.25	0.25	2	0.25	24.16
Bracing: Pipe 2.0 Std	0.20		1.2	0.20	11.48
Mount Pipe: Pipe 3.0 Std	0.29		1.2	0.29	16.91

Appurtenance Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	C			
Risk Category =	III		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	178	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} =	9.53	psf		

Appurtenance Ice Dead Loads

Name	Height w/ ice (ft)	Width w/ice (ft)	Depth w/ ice (ft)	V_{ice} (ft^3)	DL_{ice} (lb)
ANT220F2	4.01	0.57	0.57	1.11	61.98

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	CHURCHHILL (ES-082)	Date: 11/18/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/18/2020

Member Ice Dead Loading

Exposure Category =	C		
Risk Category =	III		
Topographic Category =	1		
Height Above Ground, z =	178	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} =	9.53	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: HSS3X3X3/16	0.59	0.59	0.35	0.28	15.68
Bracing: Pipe 2.0 Std	0.54		0.20	0.20	11.02
Mount Pipe: Pipe 3.0 Std	0.63		0.29	0.25	13.82

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	CHURCHHILL (ES-082)	Date: 11/18/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/18/2020

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	40	mph		
Height Above Ground, z =	178	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 =	1.43	psf	$K_e = e^{-0.000032 \cdot zs}$	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 =	0.966		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.370			
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)
ANT220F2	4.01	0.57	0.57	-	1.98	10.63	-	1.98	10.63

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: CHURCHHILL (ES-082)		Date: 11/18/2020
			Verified By: JW
	Title: MOUNT ANALYSIS REPORT		Date: 11/18/2020

Member Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	40	mph		
Height Above Ground, z =	178	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 =	1.43	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 =	0.966		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.370			
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: HSS3X3X3/16	0.59	0.59	2	0.59	6.34
Bracing: Pipe 2.0 Std	0.54		1.2	0.54	3.47
Mount Pipe: Pipe 3.0 Std	0.63		1.2	0.63	4.07

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	CHURCHHILL (ES-082)	Date: 11/18/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/18/2020

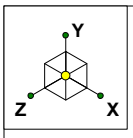
Seismic Loading

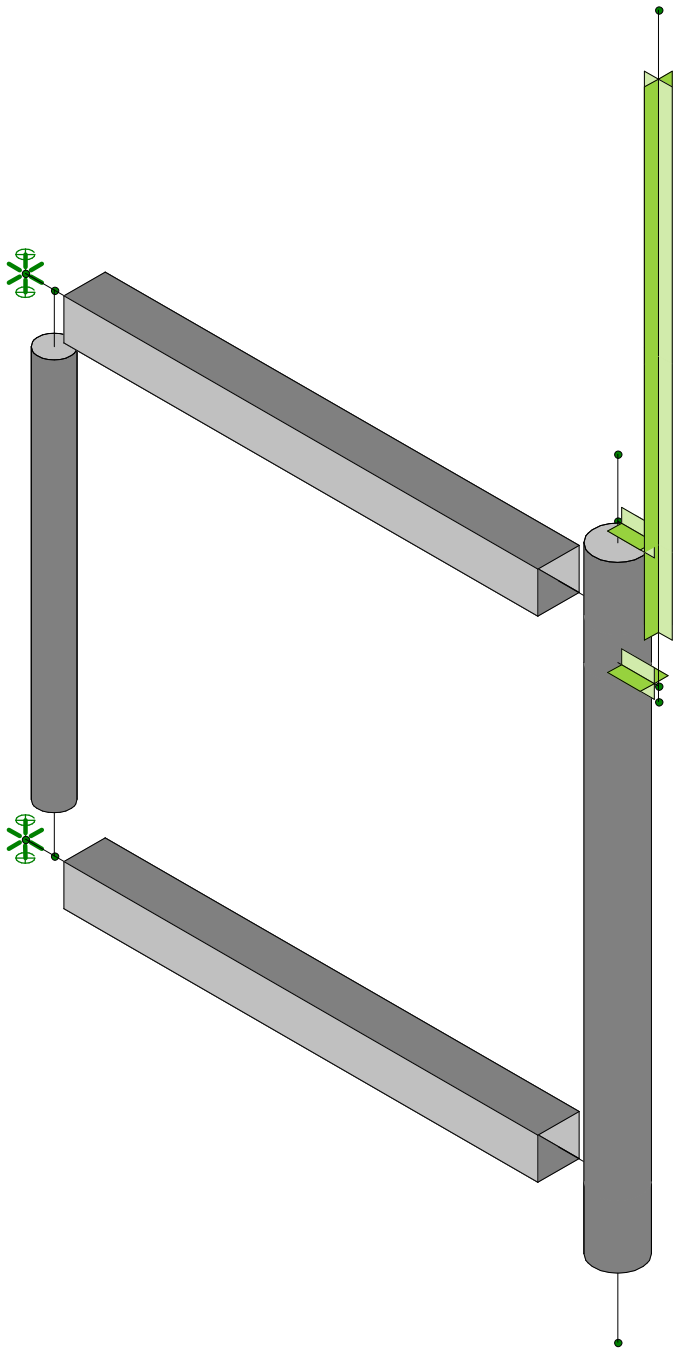
			Equations	TIA-222-H
Site Class =	D			
Spectral Response, S_s =	0.173	g	$S_{D1} = 2/3\ F_v S_1$	2.7.5
Max Spectral Response, S_1 =	0.065	g	$S_{DS} = 2/3\ F_a S_s \geq S_{D1}$	2.7.5
Accel. Site Coefficient, F_a =	1.60			
Vel. Site Coefficient, F_v =	2.40		$C_s = 1/2\ S_{DS}\ I \geq 0.03$	2.7.7.1.1
Design Spec. Response (1 sec), S_{D1} =	0.104			
Design Spec. Response, S_{DS} =	0.185		$E_H = A_s\ C_s\ W$	2.7.7
Importantance Factor, I =	1.25			
Seismic Response Coefficient, C_s =	0.115		$E_V = A_s\ 0.2\ S_{DS}\ W$	2.7.6
Amplification Factor, A_s =	3			

Appurtenance Seismic Loads

Name	Weight (lb)	E_H (lb)	E_V (lb)
ANT220F2	11	3.81	1.22

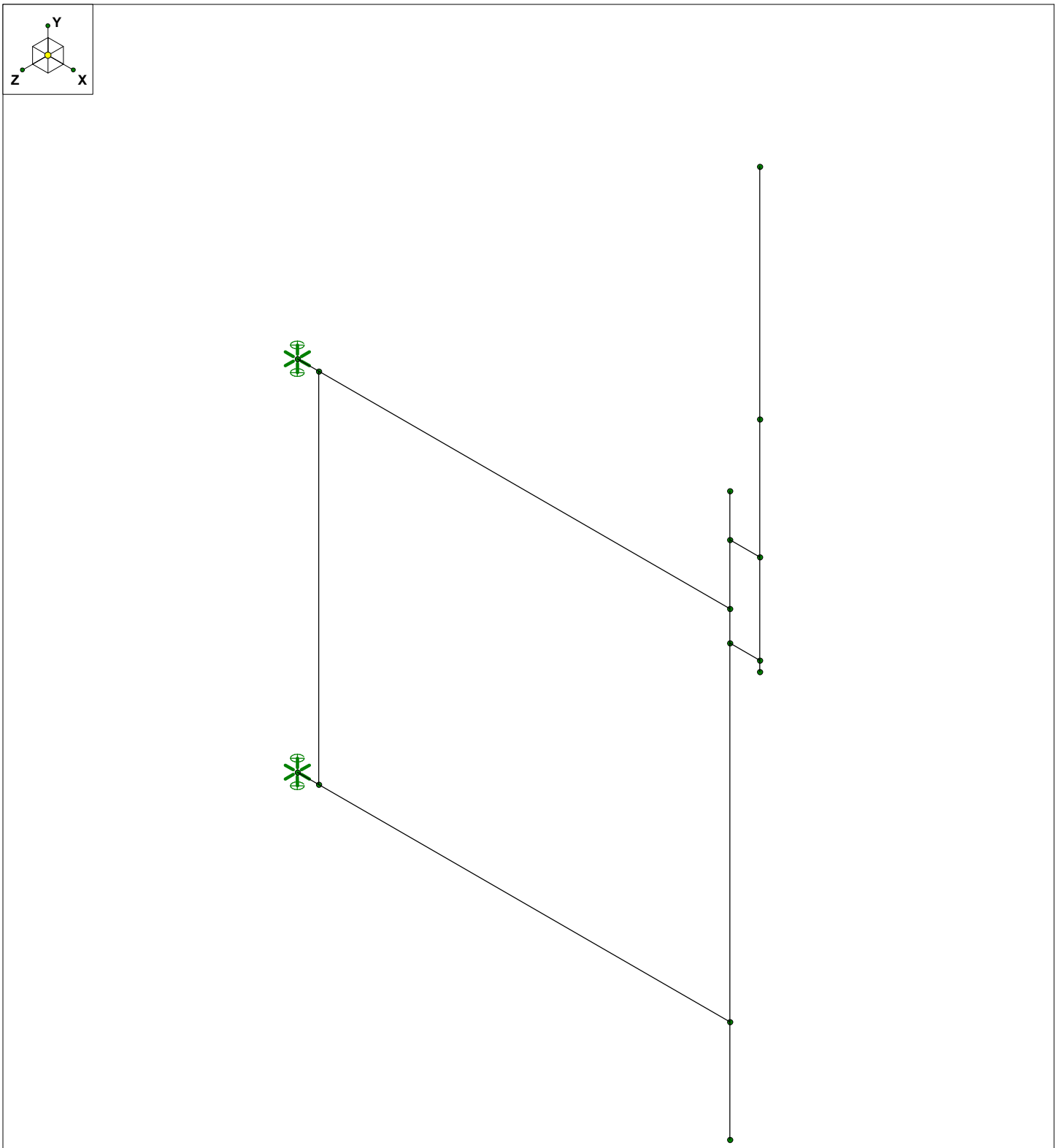
APPENDIX 2:
RISA PRINTOUTS





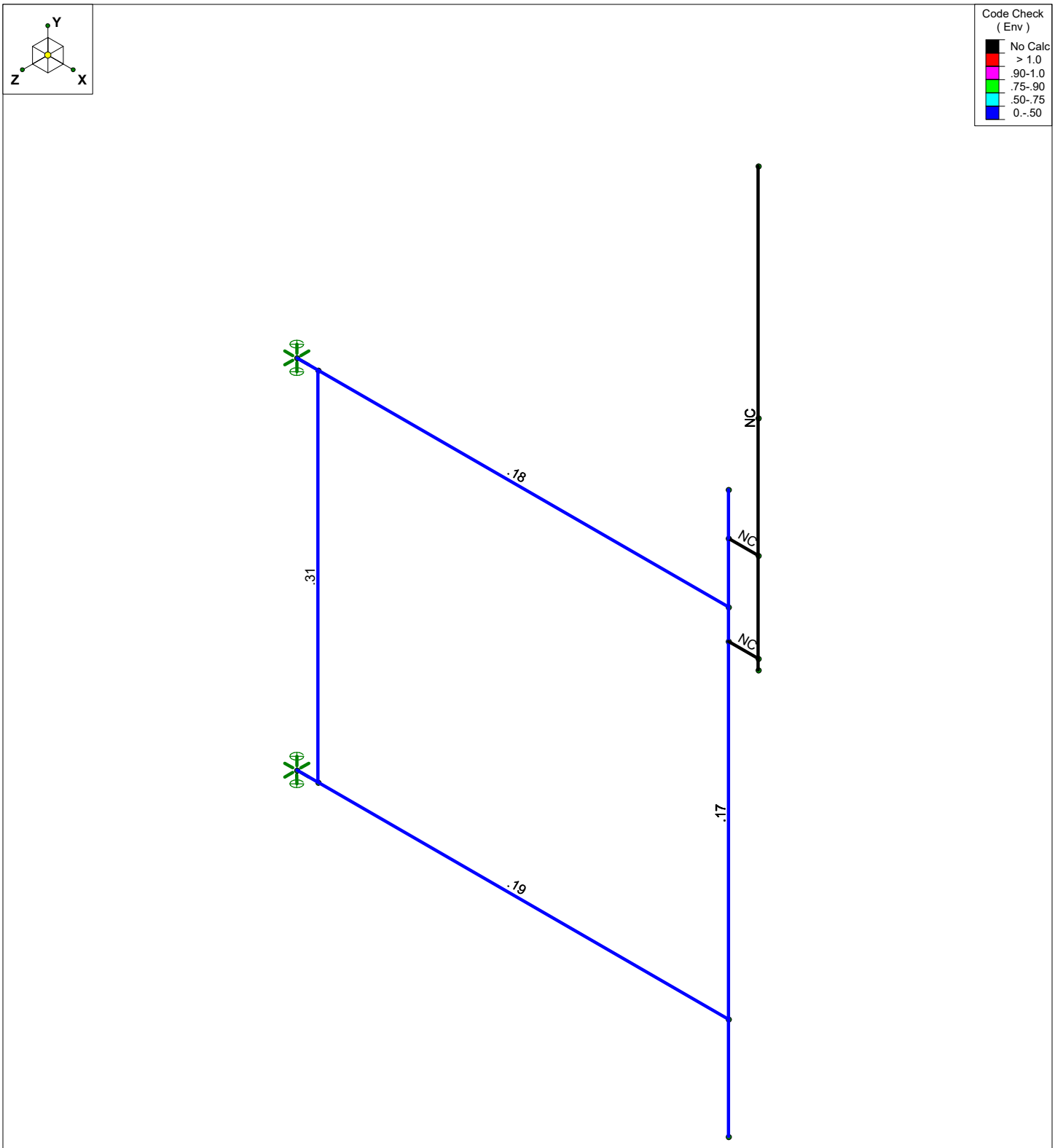
Envelope Only Solution

Black & Veatch	ChurchHill LCD USF-4U Model_175ft	SK - 1
Joohwan Jung		Nov 18, 2020 at 10:29 AM
405025.2021.2200		ChurchHill LCD USF-4U Model_17...



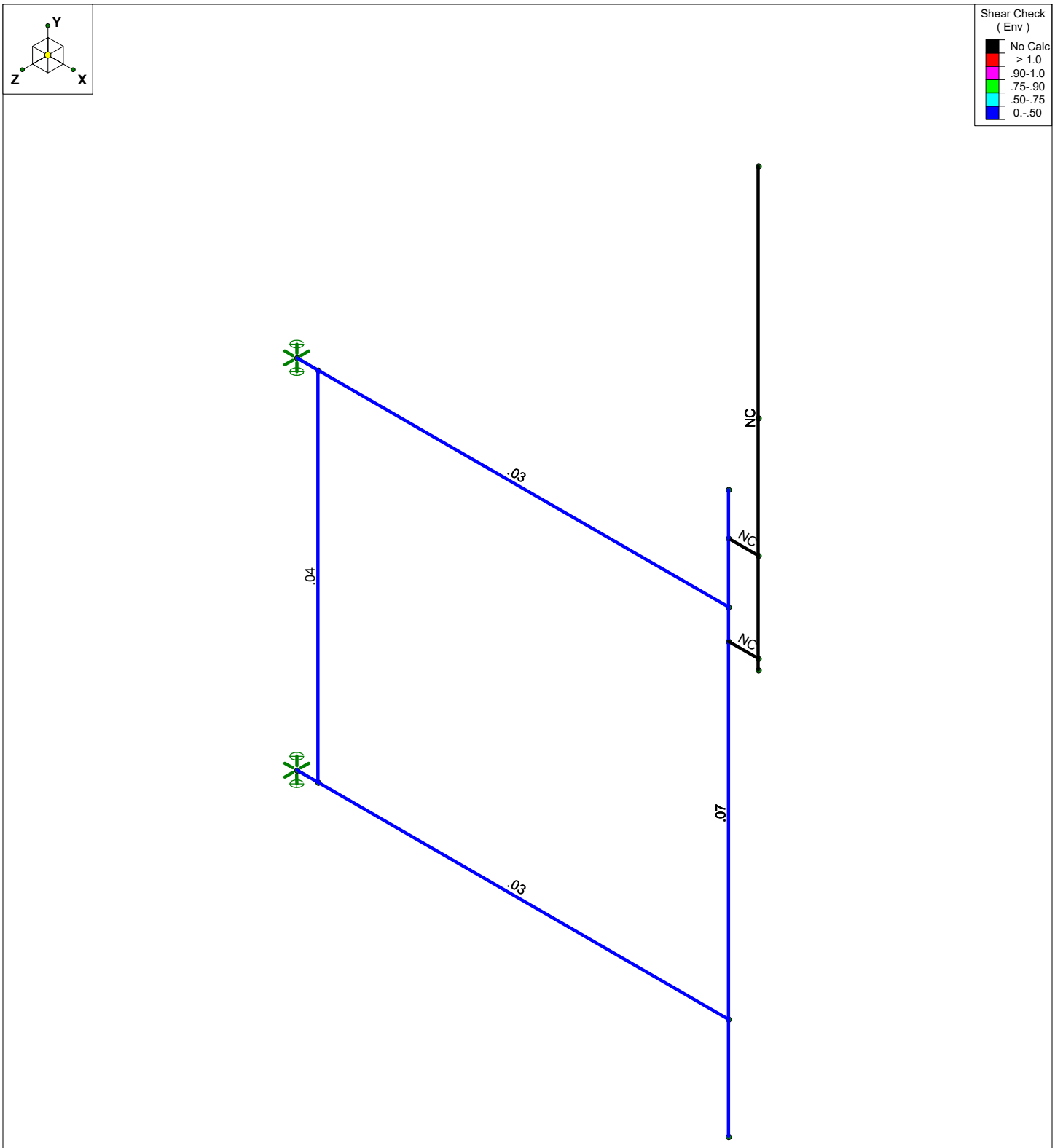
Envelope Only Solution

Black & Veatch	ChurchHill LCD USF-4U Model_175ft	SK - 2
Joohwan Jung		Nov 18, 2020 at 10:29 AM
405025.2021.2200		ChurchHill LCD USF-4U Model_17...



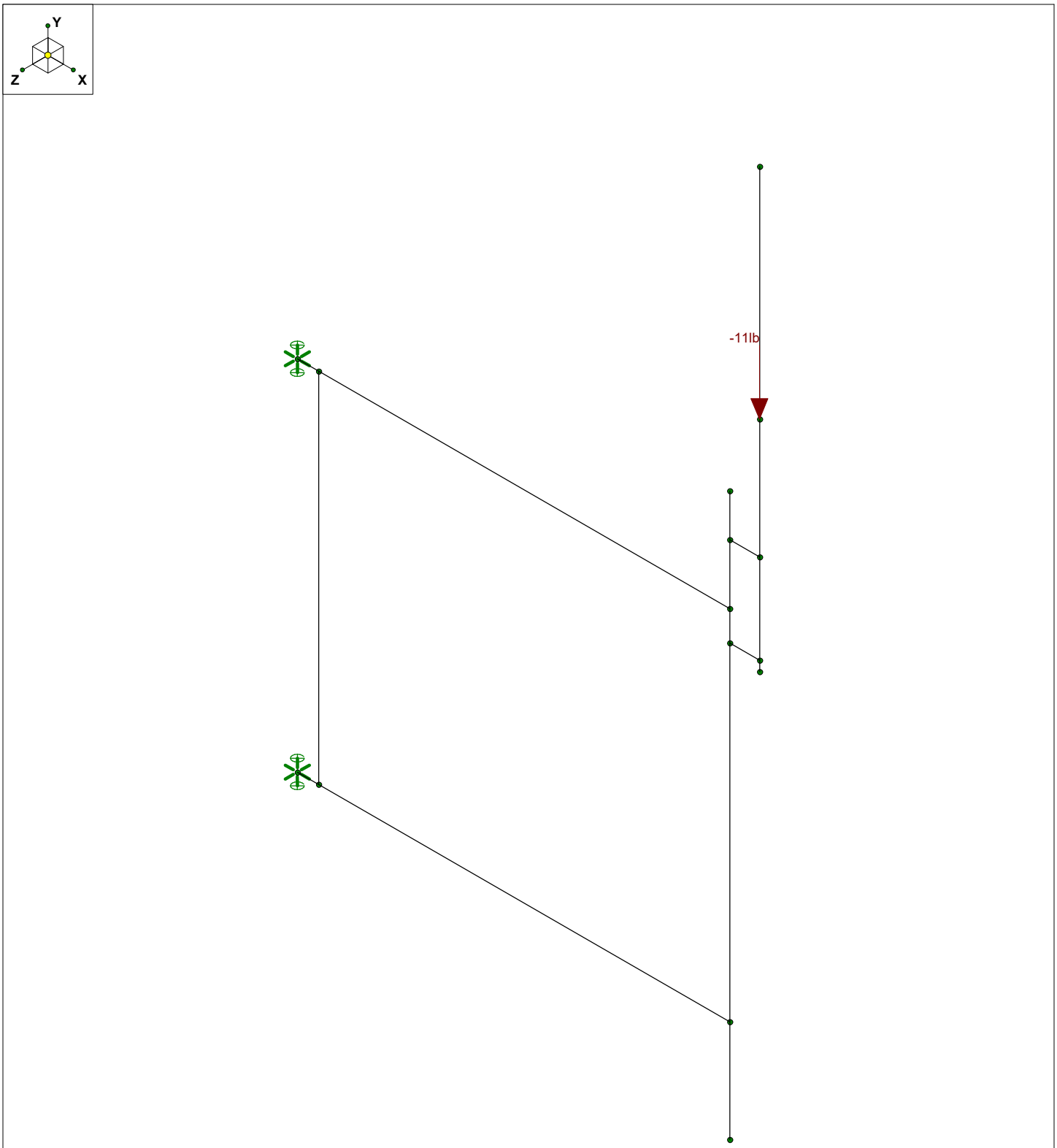
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	ChurchHill LCD USF-4U Model_175ft	SK - 3
Joohwan Jung		Nov 18, 2020 at 10:29 AM
405025.2021.2200		ChurchHill LCD USF-4U Model_17...



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	ChurchHill LCD USF-4U Model_175ft	SK - 4
Joohwan Jung		Nov 18, 2020 at 10:29 AM
405025.2021.2200		ChurchHill LCD USF-4U Model_17...



Loads: BLC 1, DL
Envelope Only Solution

Black & Veatch	ChurchHill LCD USF-4U Model_175ft	SK - 5
Joohwan Jung		Nov 18, 2020 at 10:29 AM
405025.2021.2200		ChurchHill LCD USF-4U Model_17...

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

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

General Material Properties

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

Joint Boundary Conditions

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

Member Primary Data

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

Member Advanced Data

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

Hot Rolled Steel Design Parameters

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

Basic Load Cases

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

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
19	Wind - 90 Deg (Z)	WL				1		4		
20	Wind - 120 Deg (Z)	WL				1		4		
21	Wind - 150 Deg (Z)	WL				1		4		
22	Wind - 180 Deg (Z)	WL				1		4		
23	Wind - 210 Deg (Z)	WL				1		4		
24	Wind - 240 Deg (Z)	WL				1		4		
25	Wind - 270 Deg (Z)	WL				1		4		
26	Wind - 300 Deg (Z)	WL				1		4		
27	Wind - 330 Deg (Z)	WL				1		4		
28	Ice DL	DL				1		4		
29	Ice Wind - 0 Deg (X)	WL				1		4		
30	Ice Wind - 30 Deg (X)	WL				1		4		
31	Ice Wind - 60 Deg (X)	WL				1		4		
32	Ice Wind - 90 Deg (X)	WL				1		4		
33	Ice Wind - 120 Deg (X)	WL				1		4		
34	Ice Wind - 150 Deg (X)	WL				1		4		
35	Ice Wind - 180 Deg (X)	WL				1		4		
36	Ice Wind - 210 Deg (X)	WL				1		4		
37	Ice Wind - 240 Deg (X)	WL				1		4		
38	Ice Wind - 270 Deg (X)	WL				1		4		
39	Ice Wind - 300 Deg (X)	WL				1		4		
40	Ice Wind - 330 Deg (X)	WL				1		4		
41	Ice Wind - 0 Deg (Z)	WL				1		4		
42	Ice Wind - 30 Deg (Z)	WL				1		4		
43	Ice Wind - 60 Deg (Z)	WL				1		4		
44	Ice Wind - 90 Deg (Z)	WL				1		4		
45	Ice Wind - 120 Deg (Z)	WL				1		4		
46	Ice Wind - 150 Deg (Z)	WL				1		4		
47	Ice Wind - 180 Deg (Z)	WL				1		4		
48	Ice Wind - 210 Deg (Z)	WL				1		4		
49	Ice Wind - 240 Deg (Z)	WL				1		4		
50	Ice Wind - 270 Deg (Z)	WL				1		4		
51	Ice Wind - 300 Deg (Z)	WL				1		4		
52	Ice Wind - 330 Deg (Z)	WL				1		4		
53	Lateral Seismic - Eh (X)	ELX	.346			1				
54	Lateral Seismic - Eh (Z)	ELZ			.346	1				
55	Vertical Seismic - Ev (Y)	ELY		-.111		1				

Load Combinations

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

Load Combinations (Continued)

	Description	S...	PDe...	SRSS	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
16	1.4DL	Y...	Y		1	1.4																		
17	1.2DL + 1.5LV	Y...	Y		1	1.2	2	1.5																
18	1.2DL + 1.5LM + WL (0 DEG)	Y...	Y		1	1.2	3	1.5	4	.063	16	.063												
19	1.2DL + 1.5LM + WL (30 DEG)	Y...	Y		1	1.2	3	1.5	5	.063	17	.063												
20	1.2DL + 1.5LM + WL (60 DEG)	Y...	Y		1	1.2	3	1.5	6	.063	18	.063												
21	1.2DL + 1.5LM + WL (90 DEG)	Y...	Y		1	1.2	3	1.5	7	.063	19	.063												
22	1.2DL + 1.5LM + WL (120 DEG)	Y...	Y		1	1.2	3	1.5	8	.063	20	.063												
23	1.2DL + 1.5LM + WL (150 DEG)	Y...	Y		1	1.2	3	1.5	9	.063	21	.063												
24	1.2DL + 1.5LM + WL (180 DEG)	Y...	Y		1	1.2	3	1.5	10	.063	22	.063												
25	1.2DL + 1.5LM + WL (210 DEG)	Y...	Y		1	1.2	3	1.5	11	.063	23	.063												
26	1.2DL + 1.5LM + WL (240 DEG)	Y...	Y		1	1.2	3	1.5	12	.063	24	.063												
27	1.2DL + 1.5LM + WL (270 DEG)	Y...	Y		1	1.2	3	1.5	13	.063	25	.063												
28	1.2DL + 1.5LM + WL (300 DEG)	Y...	Y		1	1.2	3	1.5	14	.063	26	.063												
29	1.2DL + 1.5LM + WL (330 DEG)	Y...	Y		1	1.2	3	1.5	15	.063	27	.063												
30																								
31	ICE LOAD COMBOS (1.5", 40 MPH)																							
32	1.2DL + Ice DL + Ice WL (0 DEG)	Y...	Y		1	1.2	28	1	29	1	41	1												
33	1.2DL + Ice DL + Ice WL (30 DEG)	Y...	Y		1	1.2	28	1	30	1	42	1												
34	1.2DL + Ice DL + Ice WL (60 DEG)	Y...	Y		1	1.2	28	1	31	1	43	1												
35	1.2DL + Ice DL + Ice WL (90 DEG)	Y...	Y		1	1.2	28	1	32	1	44	1												
36	1.2DL + Ice DL + Ice WL (120 DEG)	Y...	Y		1	1.2	28	1	33	1	45	1												
37	1.2DL + Ice DL + Ice WL (150 DEG)	Y...	Y		1	1.2	28	1	34	1	46	1												
38	1.2DL + Ice DL + Ice WL (180 DEG)	Y...	Y		1	1.2	28	1	35	1	47	1												
39	1.2DL + Ice DL + Ice WL (210 DEG)	Y...	Y		1	1.2	28	1	36	1	48	1												
40	1.2DL + Ice DL + Ice WL (240 DEG)	Y...	Y		1	1.2	28	1	37	1	49	1												
41	1.2DL + Ice DL + Ice WL (270 DEG)	Y...	Y		1	1.2	28	1	38	1	50	1												
42	1.2DL + Ice DL + Ice WL (300 DEG)	Y...	Y		1	1.2	28	1	39	1	51	1												
43	1.2DL + Ice DL + Ice WL (330 DEG)	Y...	Y		1	1.2	28	1	40	1	52	1												
44																								
45	SEISMIC LOAD COMBOS																							
46	1.2DL + Ev (Y) + Eh (X)	Y...	Y		1	1.2	55	1	53	1														
47	1.2DL - Ev (Y) + Eh (X)	Y...	Y		1	1.2	55	-1	53	1														
48	1.2DL + Ev (Y) - Eh (X)	Y...	Y		1	1.2	55	1	53	-1														
49	1.2DL - Ev (Y) - Eh (X)	Y...	Y		1	1.2	55	-1	53	-1														
50	1.2DL + Ev (Y) + Eh (Z)	Y...	Y		1	1.2	55	1	54	1														
51	1.2DL - Ev (Y) + Eh (Z)	Y...	Y		1	1.2	55	-1	54	1														
52	1.2DL + Ev (Y) - Eh (Z)	Y...	Y		1	1.2	55	1	54	-1														
53	1.2DL - Ev (Y) - Eh (Z)	Y...	Y		1	1.2	55	-1	54	-1														
54																								

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	138.043	2	464.295	24	237.81	5	0	53	522.955	11	0	53
2		min	-1083.315	24	16.567	2	-237.81	11	0	2	-522.955	5	0	2
3	N3	max	1075.596	18	412.564	18	113.536	5	0	53	329.892	11	0	53
4		min	-13.954	8	19.506	8	-113.536	11	0	2	-329.892	5	0	2
5	Totals:	max	351.348	2	871.457	24	351.346	5						
6		min	-351.348	8	110.238	49	-351.346	11						

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

	Member	Shape	Code Check	Loc[in]	LC	Shear...	Loc[...	Dir	LC	phi*Pn...	phi*Pnt...	phi*Mn...	phi*Mn...	Cb	Eqn
1	M1	HSS3X3X3	.181	43.5	28	.028	0	y	24	55265....	59535	5171.25	5171.25	2...	H1-1b
2	M2	HSS3X3X3	.190	43.5	27	.027	2.266	y	27	55265....	59535	5171.25	5171.25	2...	H1-1b
3	M3	PIPE_2.0	.312	36	18	.040	0		25	28843....	32130	1871.6...	1871.6...	2...	H1-1b

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

	Member	Shape	Code Check	Loc[in]	LC	Shear..	Loc[...	Dir	LC	phi*Pn...	phi*Pnt...	phi*Mn...	phi*Mn...	Cb	Eqn
4	M4	PIPE_3.0	.165	45.906	24	.071	10.5..		26	57908....	65205	5748.75	5748.75	1..	H1-1b

APPENDIX 3:
ATTACHMENTS

TELEWAVE, INC.®

195 - 260 MHz

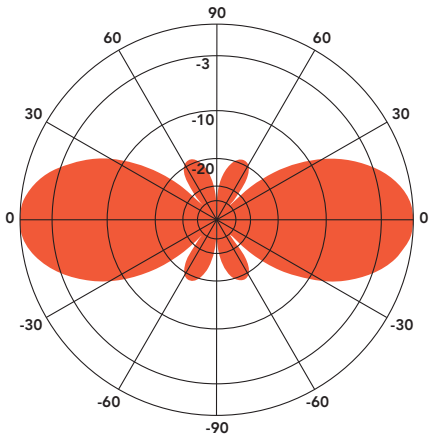
ANT220F2DIN

FIBERGLASS COLLINEAR ANTENNA 2.5 dBd

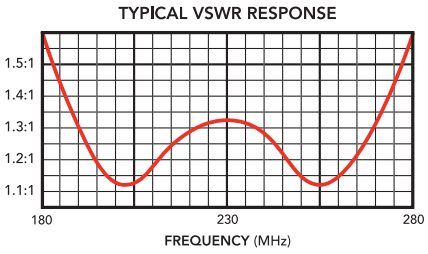
The Telewave ANT220F2 is an extremely rugged collinear antenna, with moderate gain and wide vertical beamwidth. This compact antenna produces 2.5 dBd gain, and is designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, with a path to ground potential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

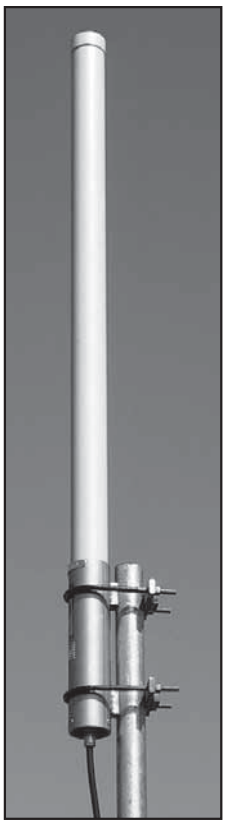
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

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



ANT220F2 - 230 MHz
Vertical Plane
Gain = 2.58 dBd

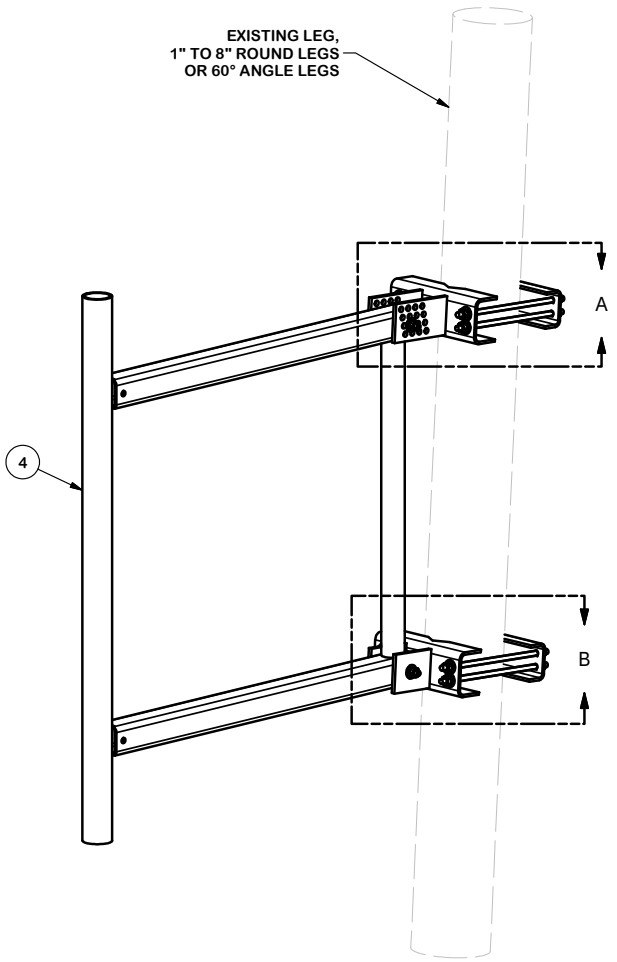


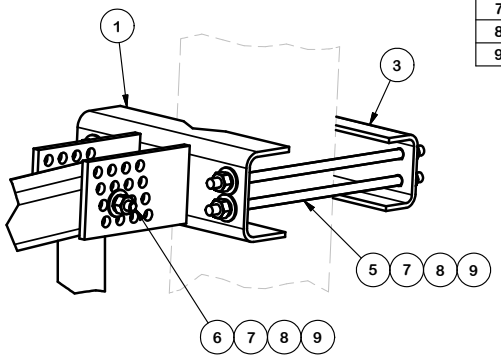


ONE SITE PRO 1 P/N DCP12K CLAMP SET REQUIRED.

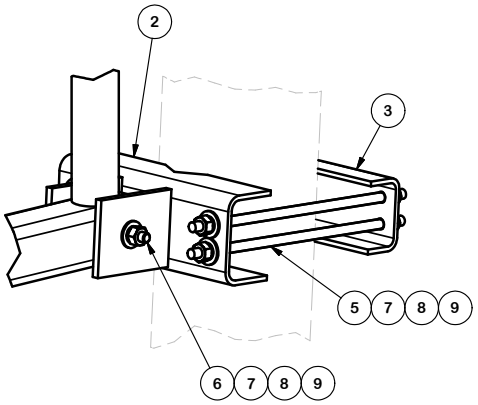
SPECIFICATIONS			
Frequency (continuous)	195-260 MHz	**Dimensions (L x base diam.) in.**	44 x 2.75
Gain	2.5 dBd	**Tower weight (antenna + clamps)**	11 lb.
Power rating (typ.)	500 watts	**Shipping weight**	14 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	200 / 150 MPH
VSWR	1.5:1 or less	**Maximum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

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

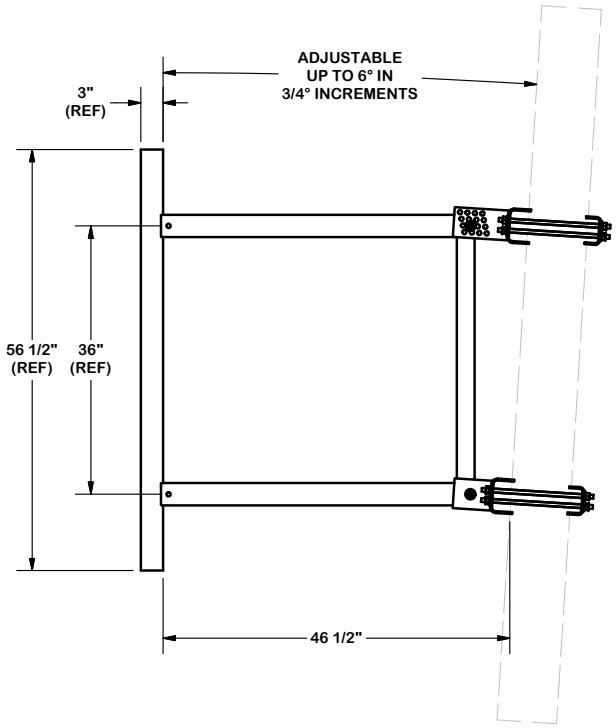




DETAIL A



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

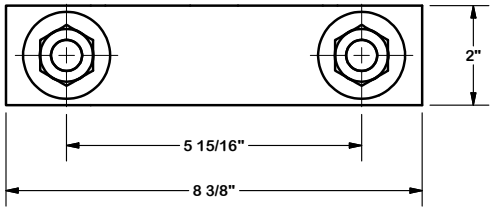
Engineering Support Team: 1-888-753-7446

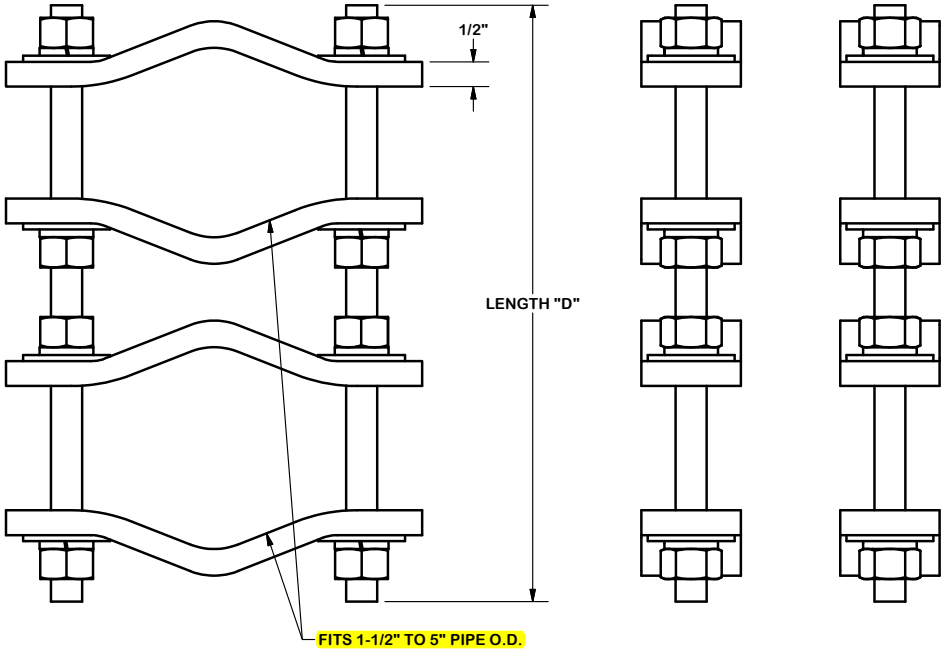
Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Plymouth, IN; Salem, OR; Dallas, TX

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

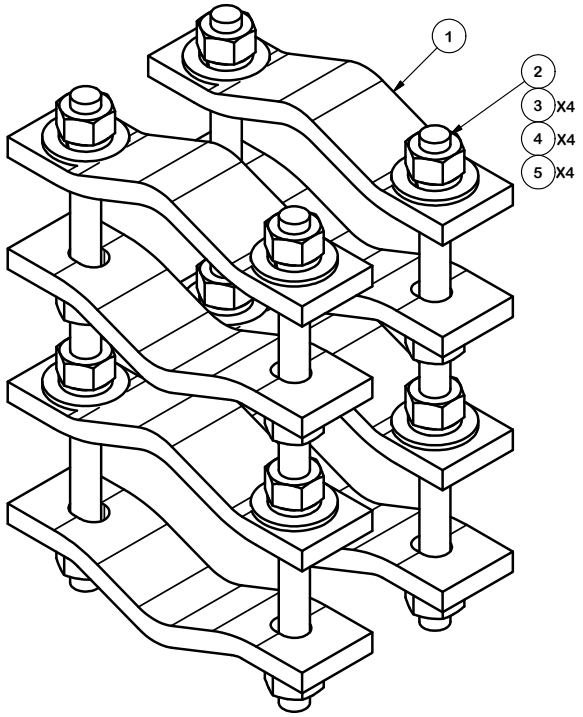
TWO (2) CLAMP SETS REQUIRED, ONE (1) SET PER ANTENNA.





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

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



TOLERANCE NOTES

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

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

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

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

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

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

ATTACHMENT C – CONSTRUCTION DRAWINGS

EVERSOURCE ENERGY

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (2) NEW OMNI/WHIP ANTENNAS, (1) AT THE ELEVATION 179'–4 3/16"± AGL AND (1) AT THE ELEVATION 147'–4 3/16"± AGL
2. RELOCATE BATTERY AT ELEVATION 0'–0"± AGL
3. REMOVE EXISTING 300 AH BATTERIES AND INSTALL 448 AH BATTERIES FROM NEWTOWN AWC

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:	CHURCH HILL LCD
SITE ID NUMBER:	ES–802
SITE ADDRESS:	36 LOWER ROAD NORTH CANAAN, CT 06018
MAP:	15
BLOCK:	86–2
LATITUDE:	42° 0' 52.79" N
LONGITUDE:	73° 19' 34.78" W
ELEVATION:	964'± AMSL
FEMA/FIRM DESIGNATION:	PANEL #0901490014C
ACREAGE:	6.37± AC

CONTACT INFORMATION

APPLICANTS:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
LITCHFIELD COUNTY DISPATCH
452 BANTAM RD
LITCHFIELD, CT 06759

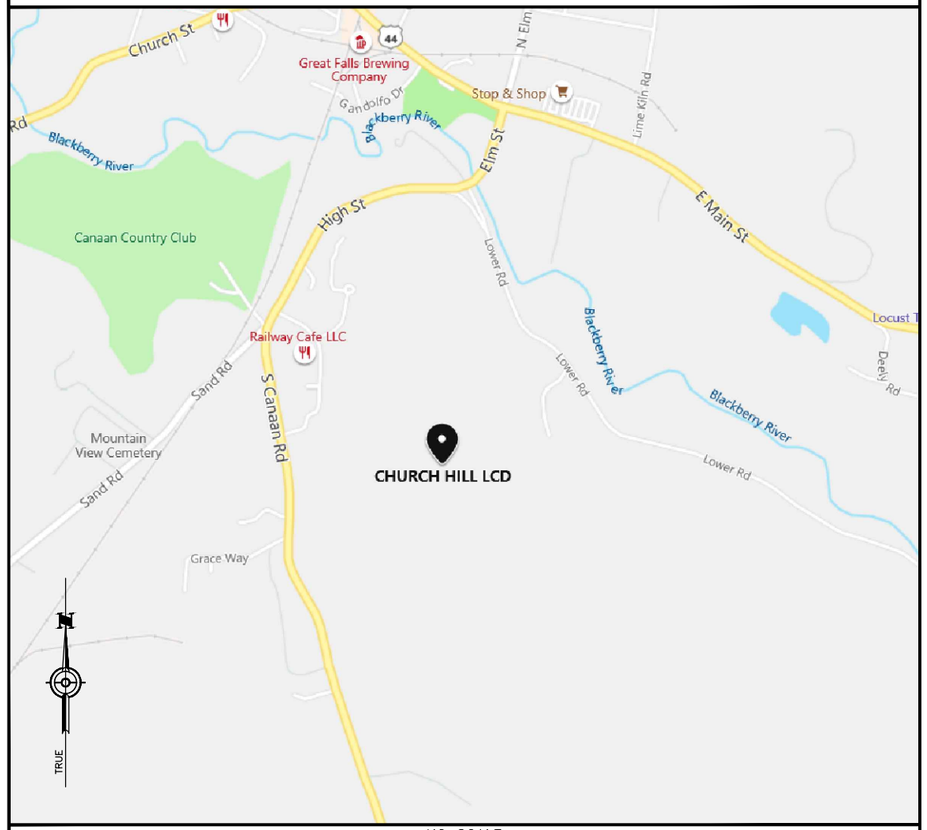
EVERSOURCE ENERGY PROJECT MANAGER:
NIKOLL PRECI
(860) 655–3079

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) 458–2522

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

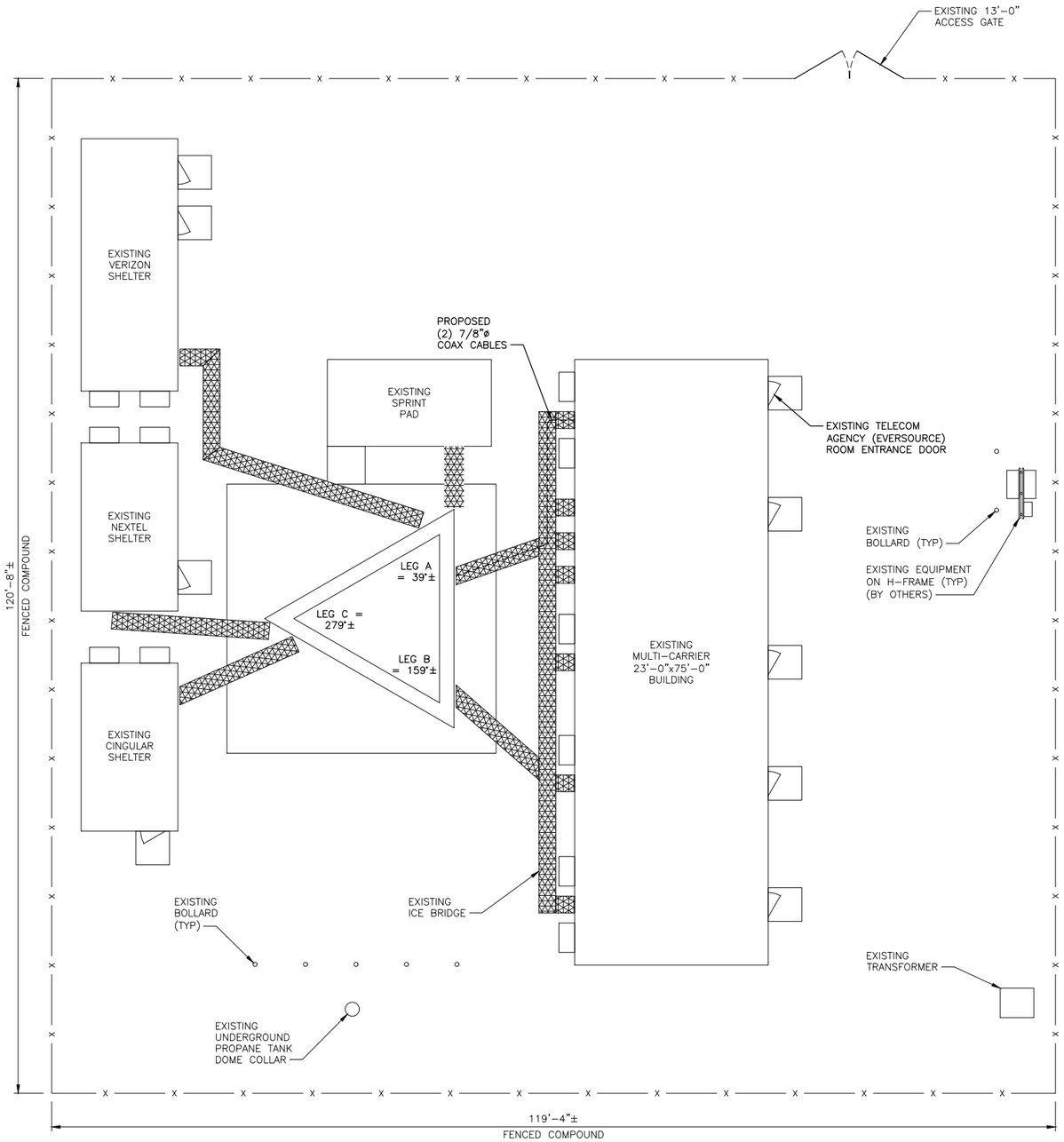
REV	DATE	DESCRIPTION
0	11/03/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
11/03/2020

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



SITE PLAN
NO SCALE

N

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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PROJECT NO:	405025
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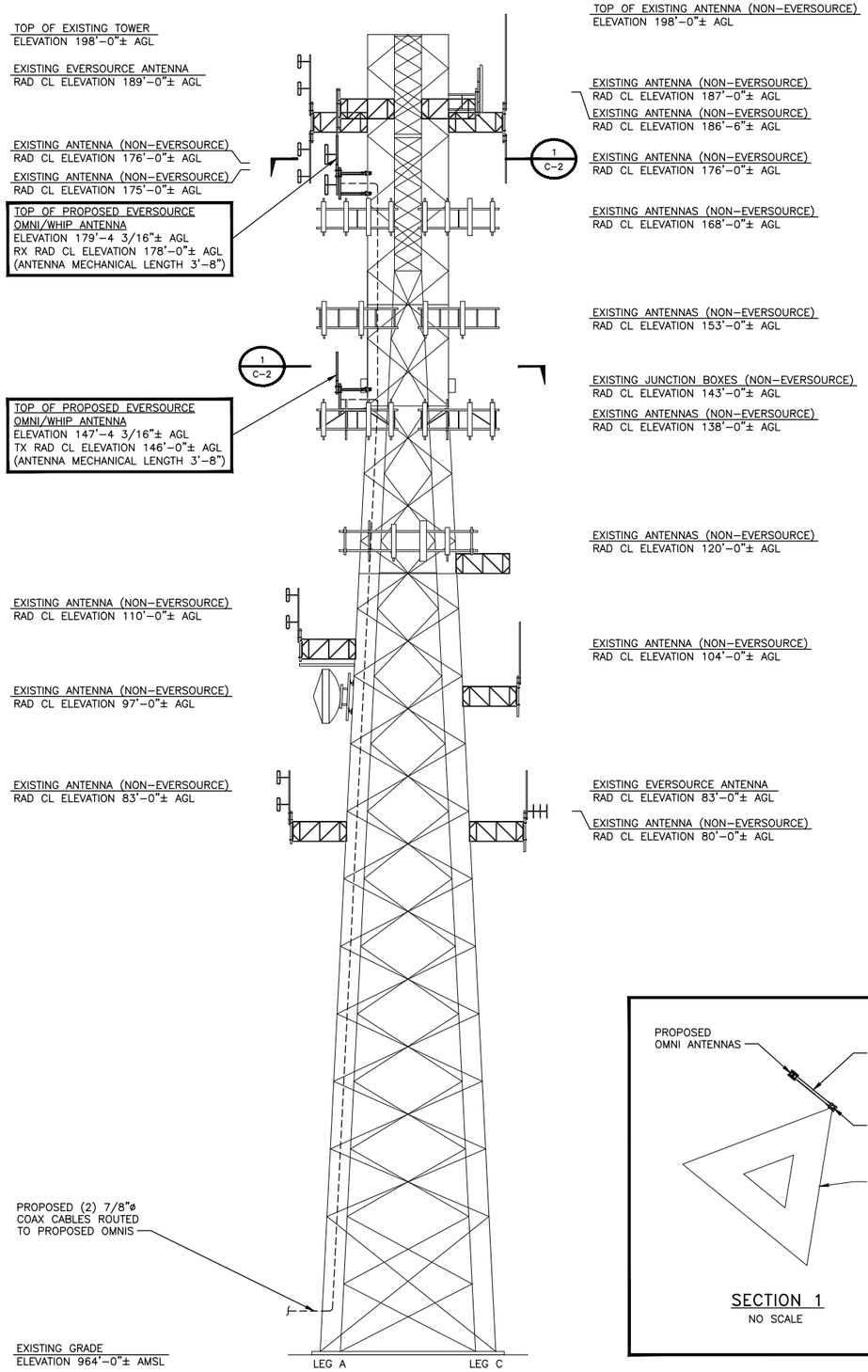
STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
11/03/2020

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-1

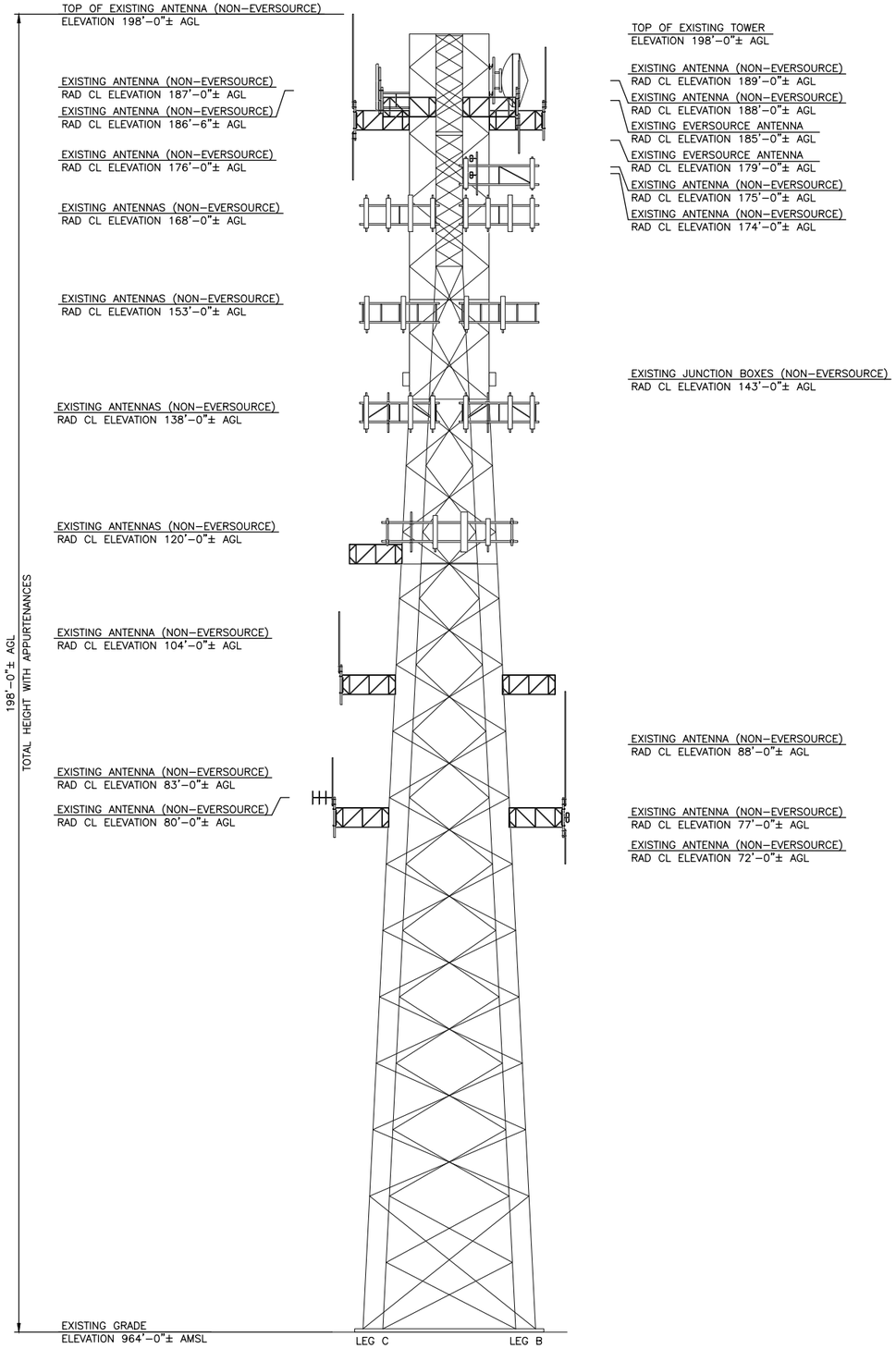


TOWER ELEVATION FACE AC

NO SCALE

SECTION 1

NO SCALE



TOWER ELEVATION FACE CB

NO SCALE

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

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458–2522

PROJECT NO:	405025
DRAWN BY:	TYW
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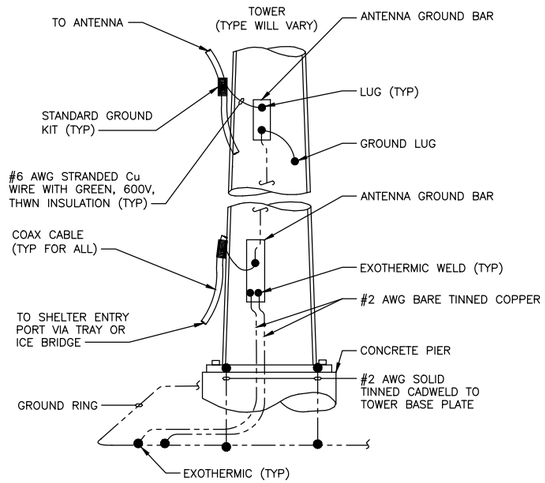
REV	DATE	DESCRIPTION
0	11/03/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
11/03/2020

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

SHEET TITLE
TOWER ELEVATION & ANTENNA EQUIPMENT

SHEET NUMBER
C-2

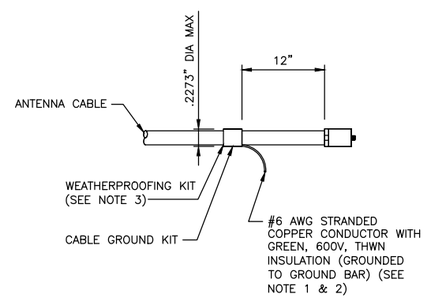


NOTE

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

ANTENNA CABLE GROUNDING

NO SCALE

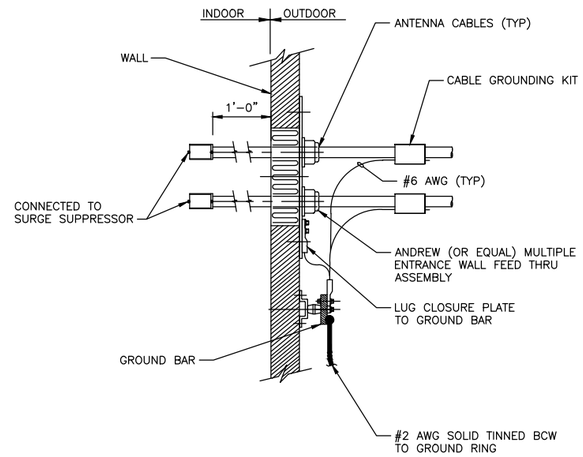


NOTES

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

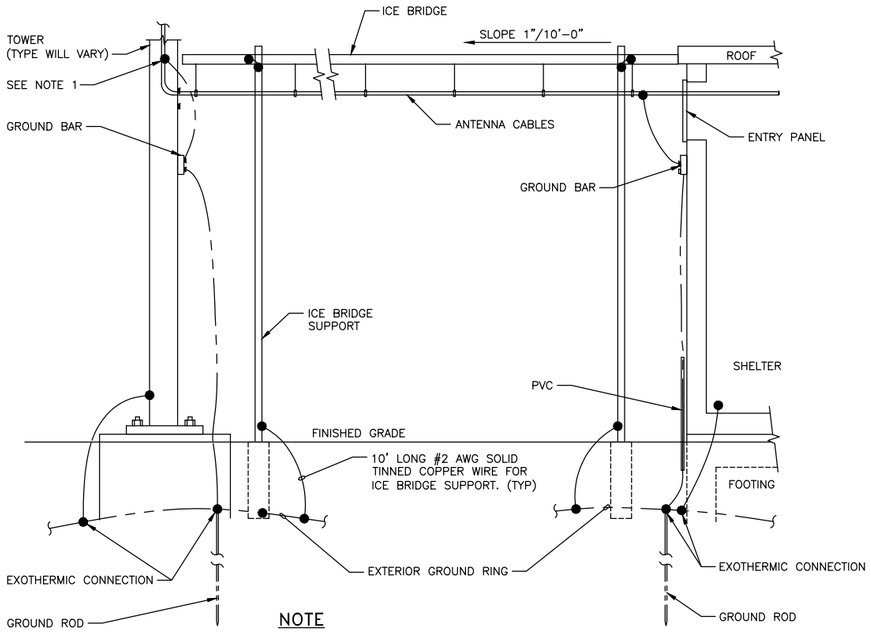
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NO SCALE



CABLE INSTALLATION WITH WALL FEED THRU ASSEMBLY

NO SCALE



NOTE

1. PROVIDE GROUND KIT 6" BEFORE TURN

ICE BRIDGE AND ANTENNA CABLE DETAIL

NO SCALE

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

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-2522

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

REV	DATE	DESCRIPTION
0	11/03/20	ISSUED FOR FILING

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

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 A572, GR 50
PIPE:	ASTM A572, GR 50
ANGLE:	ASTM A36
BOLTS:	ASTM A325
GRATING:	TYPE GW-2 (1"x3/16" BARS)
MISC. MATERIAL:	ASTM A36

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

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

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

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

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

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

SITE GENERAL

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

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

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

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

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

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

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

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

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

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

BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-2522

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

REV	DATE	DESCRIPTION
0	11/03/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
11/03/2020

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

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.

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) 458–2522

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

REV	DATE	DESCRIPTION
0	11/03/20	ISSUED FOR FILING

STATE OF CONNECTICUT · MARK P. STILES · 34358 · LICENSED PROFESSIONAL ENGINEER
11/03/2020

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

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)

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PROJECT NO:	405025
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0	11/03/20	ISSUED FOR FILING

JOSHUA J. RILEY
STATE OF CONNECTICUT
33208
LICENSED PROFESSIONAL ENGINEER
11/03/2020

CHURCH HILL LCD
36 LOWER ROAD
NORTH CANAAN, CT 06018

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-3

REFERENCE CUTSHEETS

TELEWAVE, INC.®

195 - 260 MHz

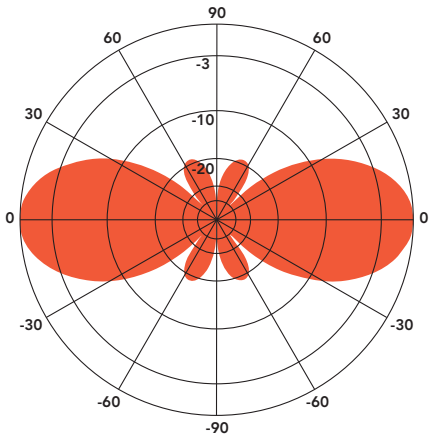
ANT220F2DIN

FIBERGLASS COLLINEAR ANTENNA 2.5 dBd

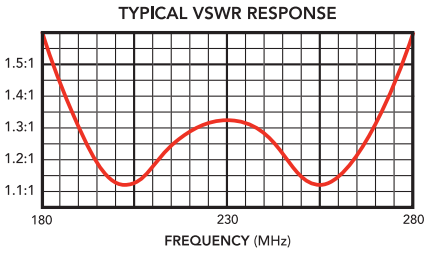
The Telewave ANT220F2 is an extremely rugged collinear antenna, with moderate gain and wide vertical beamwidth. This compact antenna produces 2.5 dBd gain, and is designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, with a path to ground potential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

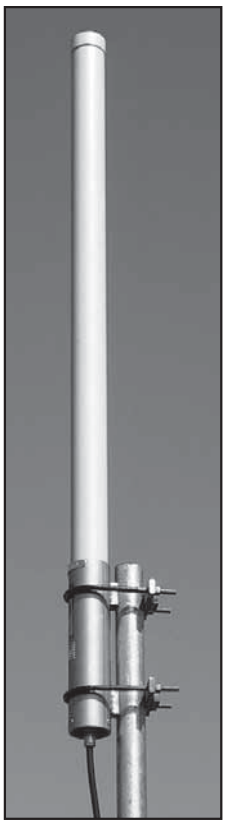
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

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



ANT220F2 - 230 MHz
Vertical Plane
Gain = 2.58 dBd

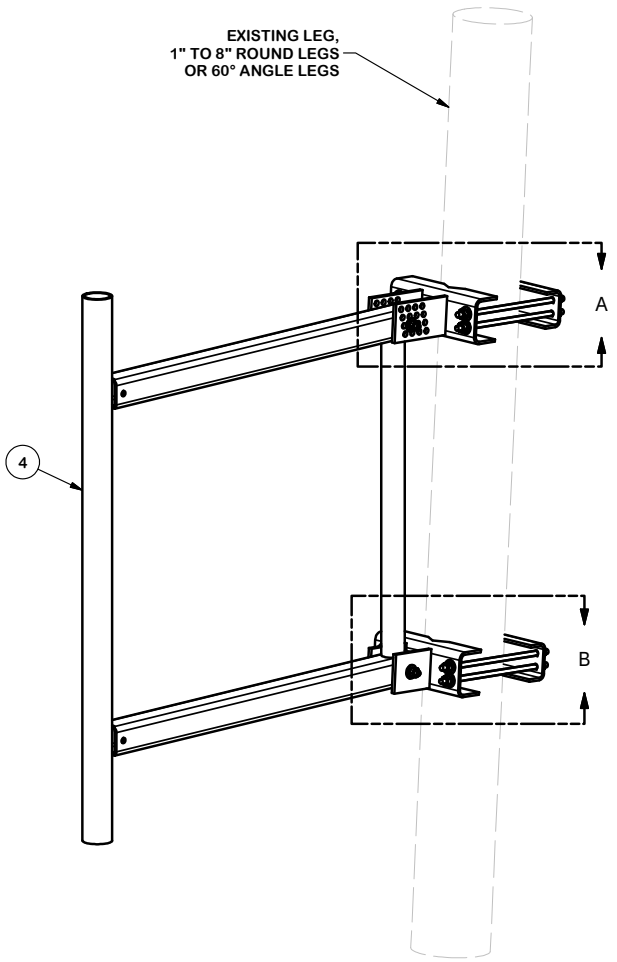


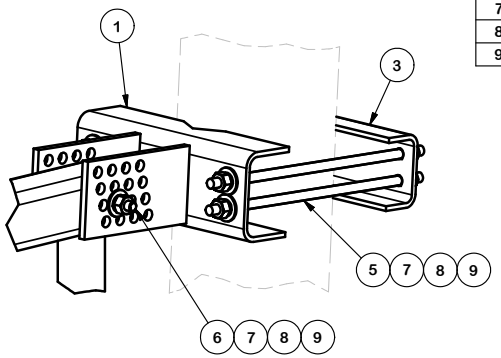


ONE SITE PRO 1 P/N DCP12K CLAMP SET REQUIRED.

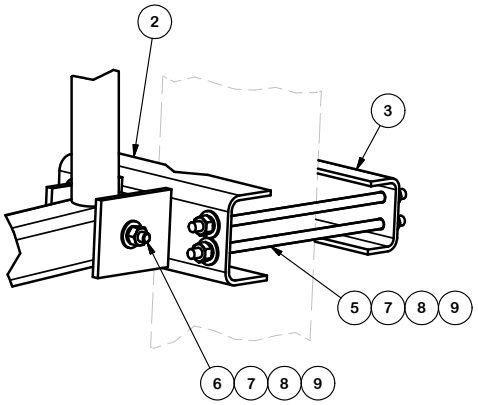
SPECIFICATIONS			
Frequency (continuous)	195-260 MHz	**Dimensions (L x base diam.) in.**	44 x 2.75
Gain	2.5 dBd	**Tower weight (antenna + clamps)**	11 lb.
Power rating (typ.)	500 watts	**Shipping weight**	14 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	200 / 150 MPH
VSWR	1.5:1 or less	**Maximum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

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

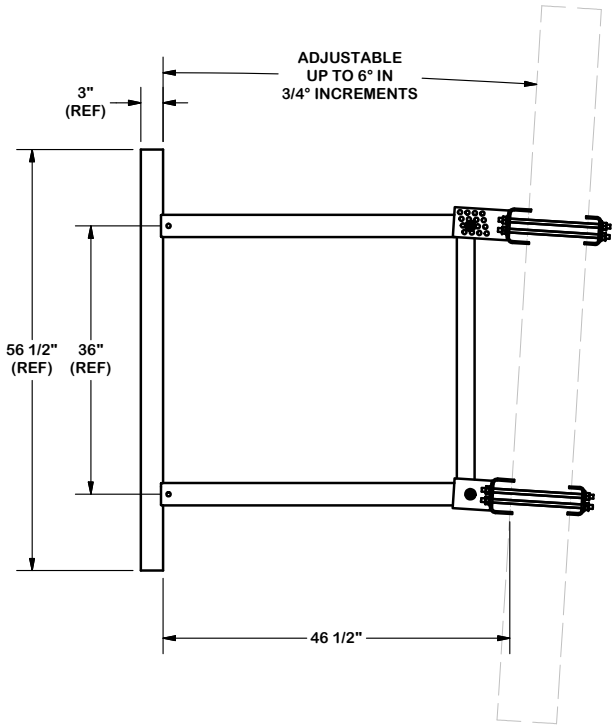




DETAIL A



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

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	RCH 2/4/2011		USF-4U	1 OF 1

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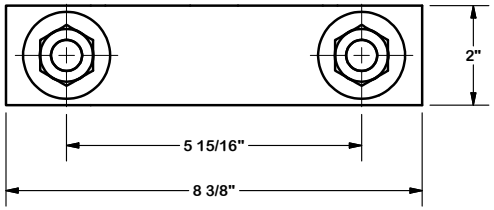
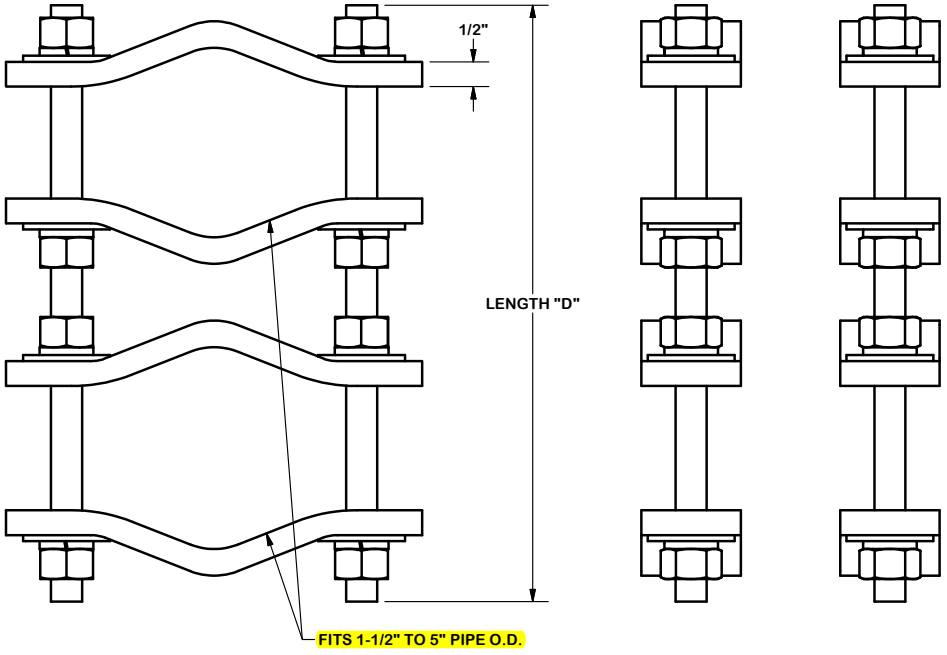
81	01	CUSTOMER	BMC 2/16/2011	USF-4U

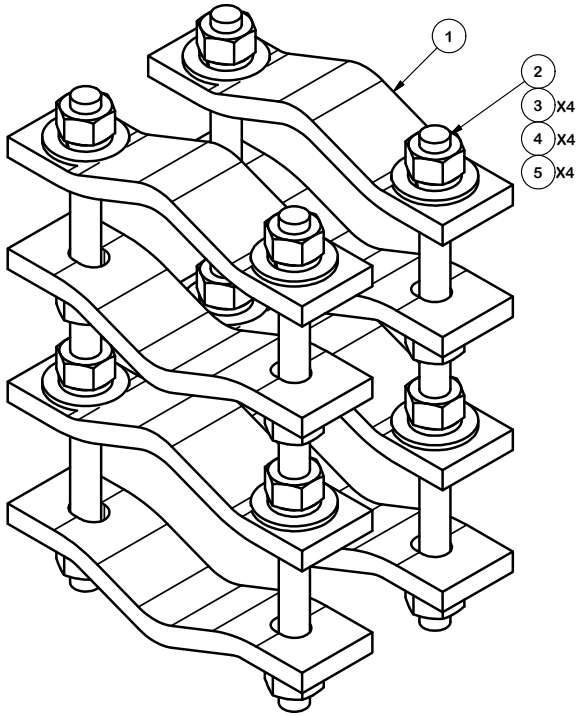
TWO (2) CLAMP SETS REQUIRED, ONE (1) SET PER ANTENNA.





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

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



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

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

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

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

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

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81	01	CUSTOMER	CEK 1/22/2013	DCPxxK

ATTACHMENT D – STRUCTURAL ANALYSIS REPORT

Date: **November 3, 2020**

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-082
	Site Name:	ChurchHill
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	405025
Site Data:	**38 Lower Road, North Canaan, Litchfield, CT** **Latitude *42° 0' 52.79"*, Longitude *-73° 19' 34.78"*** **195 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 – 69.6%**

This analysis utilizes an ultimate 3-second gust wind speed of 120 mph as required by the 2018 Connecticut Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Preechaya Sirisuwan / Robert Hudson II

Respectfully submitted by:

Joshua J. Riley, P.E.
Professional Engineer

11/03/2020

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 195 ft Self Support tower designed by Pirod, Inc.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	III
Wind Speed:	120 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	40 mph
Seismic Ss:	0.173
Seismic S1:	0.065
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration (Outer Tower)

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
175.0	178.0	1	telewave	ANT220F2	1	7/8	-
	175.0	1	site pro1	USF-4U [SO 203-1]			
143.0	146.0	1	telewave	ANT220F2	1	7/8	-
	143.0	1	site pro1	USF-4U [SO 203-1]			

Table 2 - Other Considered Equipment (Outer Tower)

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
188.0	188.0	1	unknown	8 FT DISH	-	-	1, 2
		1	tower mounts	Pipe Mount [PM 602-1]			
185.0	187.0	1	miscl	8' x 1' Panel Antenna w/ Mount Pipe	-	-	1, 2
	185.0	1	tower mounts	Side Arm Mount [SO 308-1]			
184.0	186.5	1	unknown	3" Dia 5' Omni	-	-	1, 2
	184.0	1	tower mounts	Side Arm Mount [SO 306-1]			
182.0	190.0	1	unknown	3" Dia 16' Omni	-	-	1, 2
	189.0	1	unknown	3" Dia 14' Omni			
	187.0	1	unknown	10' 4-Bay Dipole			
	182.0	3	tower mounts	Pirod 6-8' Box Arm (1)			
	176.0	1	antennae	3" Dia 12' Omni			
	175.0	1	sinclair	SC479-HF1LDF			
172.0	174.0	2	unknown	8' x 1' Panel Antenna w/ Mount Pipe	-	-	1, 2
	172.0	2	tower mounts	Side Arm Mount [SO 308-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
	172.0	1	unknown	12”x12”x12” Junction Box			
168.0	173.0	1	unknown	10' 4-Bay Dipole	12	1-5/8	1
	168.0	3	amphenol antel panel antennas	BXA-171085-8CF-EDIN-0 w/ Mount Pipe			
		3	antel	BXA-70080-4CF-2 w/ Mount Pipe			
		2	antel	LPA-80080/4CF w/ Mount Pipe			
		4	antel	LPA-80090/4CF w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 408-3]			
		6	miscl	Diplexer			
153.0	153.0	1	tower mounts	Sector Mount [SM 408-3]	-	-	1, 2
		6	decibel	DB980F90E-M w/Mount Pipe			
		3	alcatel lucent	TD-RRH8x20-25			
		3	alcatel lucent	1900MHZ RRH			
		6	alcatel lucent	800MHZ RRH			
143.0	143.0	3	miscl	12”x12”x6” Junction Box	-	-	1, 2
		1	miscl	Surge Suppression Box			
138.0	138.0	3	unknown	RRU	-	-	1, 2
		3	unknown	TMA			
		1	tower mounts	Sector Mount [SM 408-3]			
		3	kmw communications	AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe			
		6	miscl	Diplexer			
		1	miscl	Surge Suppression Box			
		6	powerwave panel antennas	7770.00 w/ Mount Pipe			
120.0	120.0	4	tower mounts	Sector Mount [15' SM 201-1]	4	1	1
		1	tower mounts	Pipe Mount [PM 602-3]			
		4	miscl	53" x 13" x 6" panel antenna			
		4	miscl	66" x6" x 3" panel antenna			
		4	miscl	87" x23" x 5" panel antenna			
118.0	118.0	1	tower mounts	Pirod 6-8' Box Arm (1)	-	-	1, 2
105.0	110.0	1	unknown	10' 4-Bay Dipole	-	-	1, 2
	105.0	1	tower mounts	Pirod 6-8' Box Arm (1)			
97.0	105.0	1	andrew miscl	MD-S8 (for 8' MW) : Ice Shield	-	-	1, 2
	104.0	1	unknown	3" Dia 14' Omni			
	97.0	1	unknown	8 FT DISH			
		1	tower mounts	Pipe Mount [PM 601-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		2	tower mounts	Pirod 6-8' Box Arm (1)			
78.0	88.0	1	celwave	PD220	-	-	1, 2
	83.0	1	unknown	VHF150			
		1	decibel	DB222			
	80.0	1	antennae	6' Yagi			
	78.0	3	tower mounts	Pirod 6-8' Box Arm (1)			
	77.0	1	unknown	1-Bay Dipole			
	72.0	1	unknown	VHF150			
31.0	31.0	1	unknown	GPS	-	-	1

Note:
1) Existing Equipment.
2) Refer to Table 3 for Feedline Information.

Table 3 - Other Considered Equipment (Inner Tower)

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
188.0	188.0	-	-	-	1	WE65	1
185.0	185.0	-	-	-	1	1-5/8	1
184.0	184.0	-	-	-	1	1-5/8	1
182.0	185.0	1	unknown	3" Dia 6' Omni	1 6	1-5/8 1	1
	182.0	3	tower mounts	Pirod 6-8' Box Arm (1)			
		1	telewave	ANT220D6-9			
	179.0	1	unknown	3" Dia 6' Omni			
172.0	172.0	-	-	-	3	1-5/8	1
168.0	168.0	-	-	-	-	-	1
153.0	153.0	-	-	-	4	1-1/4	1
143.0	143.0	-	-	-	3	7/8	1
138.0	138.0	-	-	-	12	1-5/8	1
120.0	120.0	-	-	-	-	-	1
118.0	118.0	-	-	-	-	-	1
105.0	105.0	-	-	-	1	1	1
97.0	97.0	-	-	-	1 1	WE65 1	1
78.0	78.0	-	-	-	1 2 3	1-5/8 1 7/8	1
31.0	31.0	-	-	-	1	½	1

Note:
1) Existing Equipment

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
TOWER MANUFACTURER DRAWINGS	Pirod Inc.	-	Eversource
TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Pirod Inc.	-	Eversource
TOWER STRUCTURAL ANALYSIS REPORT	URS Corporation	-	Eversource
TOWER STRUCTURAL ANALYSIS REPORT	Centek Engineering	-	Eversource

3.1) Analysis Method

tnxTower (version 8.0.5.0), 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) This analysis was performed under the assumption that all information provide to Black & Veatch is current and correct. This is to include site data, appurtenance loading, tower/foundation detail, and geotechnical data.
4) Tower Loading is based on drone mapping and previous tower analysis.
5) The existing base plate grout was considered in this analysis. Grout must be maintained and inspected periodically and must be replaced if damaged or crack.

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 5 - Section Capacity (Summary) (Outer Tower)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	195 - 190	Leg	Pirod 128334 (5' Section)	2	-0.69	142.49	10.0	Pass
T2	190 - 180	Leg	Pirod 105244	13	-6.35	149.62	26.3	Pass
T3	180 - 160	Leg	Pirod 105216	23	-13.17	149.62	21.8	Pass
T4	160 - 150	Leg	Pirod 105217	38	-35.11	225.60	38.2	Pass
T5	150 - 140	Leg	Pirod 105217	50	-50.88	225.60	22.6	Pass
T6	140 - 120	Leg	Pirod 105218	59	-69.52	315.72	28.2	Pass
T7	120 - 110	Leg	Pirod 105218	76	-99.81	315.72	47.4	Pass
T8	110 - 100	Leg	Pirod 105218	89	-124.15	315.72	39.3	Pass
T9	100 - 80	Leg	Pirod 105219	98	-162.57	419.86	38.7	Pass
T10	80 - 60	Leg	Pirod 105219	113	-201.43	419.86	48.0	Pass
T11	60 - 40	Leg	Pirod 105220	128	-239.47	537.99	44.5	Pass
T12	40 - 20	Leg	Pirod 105220	143	-278.25	537.99	51.7	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T13	20 - 0	Leg	Pirod 112738	158	-297.42	643.80	46.2	Pass
T1	195 - 190	Diagonal	2L2 1/2x2 1/2x3/16x3/8	10	-0.38	40.64	0.9	Pass
T2	190 - 180	Diagonal	L2 1/2x2 1/2x3/16	16	-1.94	9.55	20.4	Pass
T3	180 - 160	Diagonal	L3x3x3/16	25	-5.62	16.72	33.6	Pass
T4	160 - 150	Diagonal	L3x3x5/16	40	-7.19	26.67	27.0	Pass
T5	150 - 140	Diagonal	L3x3x5/16	52	-8.49	26.67	31.8	Pass
T6	140 - 120	Diagonal	L3x3x5/16	67	-8.33	20.74	40.2	Pass
T7	120 - 110	Diagonal	L3 1/2x3 1/2x5/16	82	-10.60	30.17	35.1 36.2 (b)	Pass
T8	110 - 100	Diagonal	L3 1/2x3 1/2x5/16	94	-10.01	27.32	36.6	Pass
T9	100 - 80	Diagonal	L4x4x1/4	102	-11.17	28.11	39.7 43.0 (b)	Pass
T10	80 - 60	Diagonal	L4x4x3/8	117	-11.84	34.09	34.7	Pass
T11	60 - 40	Diagonal	L5x5x3/8	132	-12.11	57.51	21.1 26.3 (b)	Pass
T12	40 - 20	Diagonal	L5x5x3/8	153	-13.88	53.10	26.1 30.0 (b)	Pass
T13	20 - 0	Diagonal	2L3 1/2x3 1/2x5/16x3/8	162	-20.40	39.81	51.2	Pass
T4	160 - 150	Secondary Horizontal	L3x3x5/16	48	-0.71	27.54	2.6 11.4 (b)	Pass
T7	120 - 110	Secondary Horizontal	L3x3x5/16	85	-1.81	18.15	9.9 19.5 (b)	Pass
T1	195 - 190	Top Girt	2L2 1/2x2 1/2x3/16x3/8	5	-0.13	42.45	0.5	Pass
T6	140 - 120	Top Girt	L3 1/2x3 1/2x5/16	63	-0.61	18.54	3.3	Pass
							Summary	
						Leg (T12)	51.7	Pass
						Diagonal (T13)	51.2	Pass
						Secondary Horizontal (T7)	19.5	Pass
						Top Girt (T6)	3.3	Pass
						Bolt Checks	43.0	Pass
						Rating =	51.7	Pass

Table 6 - Section Capacity (Summary) (Inner Tower)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	195 - 180	Leg	1 3/4	2	-2.61	83.33	3.1	Pass
T2	180 - 160	Leg	1 3/4	46	-16.01	83.33	19.2	Pass
T3	160 - 140	Leg	Pirod 105216	103	-26.61	149.62	17.8	Pass
T4	140 - 120	Leg	Pirod 105216	118	-42.70	149.62	28.5	Pass
T5	120 - 110	Leg	Pirod 105217	133	-51.41	225.60	30.8	Pass
T6	110 - 100	Leg	Pirod 105217	147	-62.62	225.60	27.8	Pass
T7	100 - 80	Leg	Pirod 105218	156	-86.01	315.72	27.2	Pass
T8	80 - 60	Leg	Pirod 105219	171	-111.43	419.86	26.5	Pass
T9	60 - 40	Leg	Pirod 105219	186	-138.26	419.86	32.9	Pass
T10	40 - 20	Leg	Pirod 105220	201	-166.29	537.99	30.9	Pass
T11	20 - 0	Leg	Pirod 105220	216	-194.00	537.99	36.1	Pass
T1	195 - 180	Diagonal	3/4	10	-0.78	6.25	12.5	Pass
T2	180 - 160	Diagonal	3/4	55	-1.52	6.25	24.3	Pass
T3	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	106	-2.79	18.45	15.1 24.8 (b)	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	121	-3.60	14.57	24.7 30.4 (b)	Pass
T5	120 - 110	Diagonal	L3x3x3/16	136	-4.43	22.34	19.8 33.4 (b)	Pass
T6	110 - 100	Diagonal	L3x3x3/16	148	-4.08	20.18	20.2 31.0 (b)	Pass
T7	100 - 80	Diagonal	L3x3x5/16	161	-4.89	25.70	19.0 22.7 (b)	Pass
T8	80 - 60	Diagonal	L3x3x5/16	176	-5.62	20.97	26.8	Pass
T9	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	191	-6.52	27.58	23.6 25.2 (b)	Pass
T10	40 - 20	Diagonal	L3 1/2x3 1/2x5/16	206	-7.31	22.81	32.1	Pass
T11	20 - 0	Diagonal	L4x4x1/4	221	-8.64	23.54	36.7 39.4 (b)	Pass
T5	120 - 110	Secondary Horizontal	L3x3x5/16	144	-1.16	43.07	2.7 14.9 (b)	Pass
T1	195 - 180	Top Girt	7/8	4	-0.03	6.51	0.5	Pass
T2	180 - 160	Top Girt	7/8	50	-0.35	6.51	5.4	Pass
T1	195 - 180	Bottom Girt	7/8	8	-0.39	6.51	6.0	Pass
T2	180 - 160	Bottom Girt	7/8	53	-0.25	6.51	3.8	Pass
							Summary	
						Leg (T11)	36.1	Pass
						Diagonal (T11)	39.4	Pass
						Secondary Horizontal (T5)	14.9	Pass
						Top Girt (T2)	5.4	Pass
						Bottom Girt (T1)	6.0	Pass
						Bolt Checks	39.4	Pass
						Rating =	39.4	Pass

Table 7 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods (Outer Tower)	0	65.5	Pass
	Anchor Rods (Inner Tower)		32.9	Pass
1, 2	Base Foundation (Compared w/ Design Loads)	0	69.6	Pass

Structure Rating (max from all components) =	69.6%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed. Rating per TIA-222-H Section 15.5.
2) Foundation capacity determined by comparing analysis reactions to original design reactions.

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 ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °	Check*
T1	195 - 190	2.9299	43	0.12	0.01	OK
T2	190 - 180	2.807	43	0.12	0.01	OK
T3	180 - 160	2.5565	43	0.12	0.01	OK
T4	160 - 150	2.0572	43	0.11	0.01	OK
T5	150 - 140	1.8196	43	0.11	0.01	OK
T6	140 - 120	1.5937	43	0.1	0.01	OK

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

1) Maximum Rotation = 4 Degrees

2) Maximum Deflection = 0.03 * Tower Height = 70 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?
188	8 FT DISH	0.12	0.01	8	10	10 dB	0.664	Not Exceeded
97	8 FT DISH	0.07	0.01	8	10	10 dB	0.664	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*
	ft	*in*		°	°	
T1	195 - 190	11.5993	43	0.46	0.05	0.463
T2	190 - 180	11.1219	43	0.46	0.04	0.462
T3	180 - 160	10.1482	43	0.46	0.04	0.462
T4	160 - 150	8.2028	43	0.44	0.04	0.442
T5	150 - 140	7.269	43	0.42	0.04	0.422
T6	140 - 120	6.3757	43	0.4	0.04	0.402

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

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature ft*
ft			*in*	°	°	
188	8 FT DISH	43	10.929	0.46	0.04	39043.000
97	8 FT DISH	43	3.116	0.28	0.03	23708.000

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load*	*Tilt*	*Twist*	*Check**
	ft	*in*	*Comb.*	°	°	
T1	195 - 180	3.022	39	0.1417	0.0396	OK
T2	180 - 160	2.576	39	0.1409	0.0379	OK
T3	160 - 140	1.997	39	0.1256	0.0282	OK
T4	140 - 120	1.497	39	0.1073	0.0168	OK
T5	120 - 110	1.081	39	0.0851	0.0107	OK
T6	110 - 100	0.905	39	0.0765	0.0088	OK

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

1) Maximum Rotation = 4 Degrees

2) Maximum Deflection = 0.03 * Tower Height = 70 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?

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °	Combined Max
T1	195 - 180	12.178	3	0.5682	0.1586	0.590
T2	180 - 160	10.377	3	0.5651	0.1516	0.585
T3	160 - 140	8.04	3	0.5058	0.1127	0.518
T4	140 - 120	6.025	3	0.4324	0.0671	0.438
T5	120 - 110	4.348	3	0.3429	0.043	0.346
T6	110 - 100	3.639	3	0.3082	0.0353	0.310

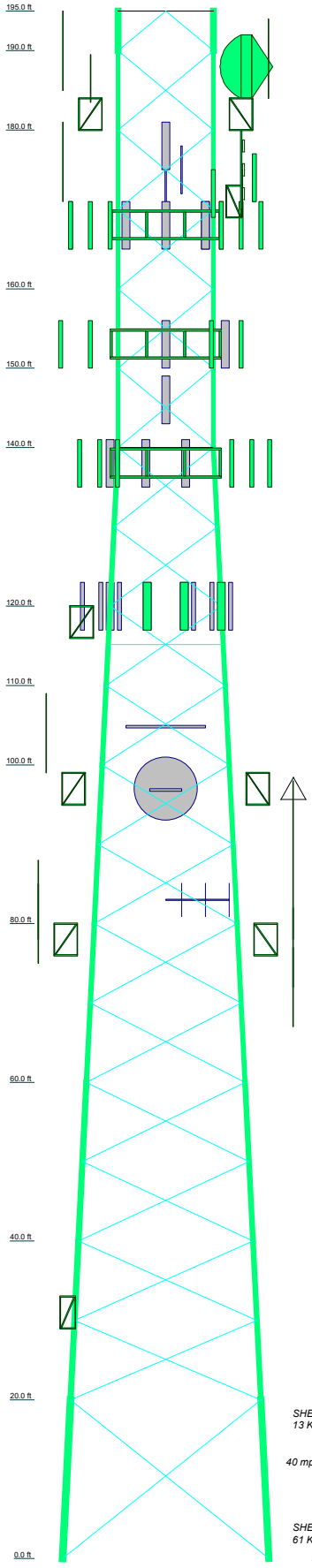
Critical Deflections of Tower at the MW Dish Elevations - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

APPENDIX A

OUTTER TNXTOWER OUTPUT

Section	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	Pirod 112738	Pirod 105220	Pirod 105219	Pirod 105218	Pirod 105217	Pirod 105216	Pirod 105244	A
Leg Grade	A572-50							
Diagonals	2L3 1/2x3 1/2x5/16x3/8	L5x5x3/8	L4x4x3/8	L4x4x1/4	L3 1/2x3 1/2x5/16	L3x3x3/16	L2 1/2x2 1/2x3/16	B
Diagonal Grade	A36							
Top Girts	N.A.					L3 1/2x3 1/2x5/16		B
Sec. Horizontals	N.A.				L3x3x5/16	L3x3x5/16	N.A.	
Face Width (ft)	24	22	20	18	16	15	14	12
# Panels @ (ft)	1 @ 20	7.3	7.0	5.5	4.5	2.0	2.2	3.8	1.5	1.8	2.2	1.1	1 @ 5
Weight (K)	47.3	7.4											1.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Pipe Mount [PM 601-1]	192	site pro1 USF-4U [SO 203-1]	143
Pipe Mount [PM 601-1]	192	6'x2" Mount Pipe	138
Pipe Mount [PM 601-1]	192	6'x2" Mount Pipe	138
Lightning Rod 5/8"x4'	192	6'x2" Mount Pipe	138
Lightning Rod 5/8"x4'	192	6'x2" Mount Pipe	138
Lightning Rod 5/8"x4'	192	6'x2" Mount Pipe	138
Pipe Mount [PM 602-1]	188	7770.00 w/ Mount Pipe	138
(2) 8' Horizontal HSS 2" x 2" Tube	188	7770.00 w/ Mount Pipe	138
8 FT DISH	188	7770.00 w/ Mount Pipe	138
8' x 1' Panel Antenna w/ Mount Pipe	185	AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe	138
Side Arm Mount [SO 308-1]	185	AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe	138
3" Dia 5' Omni	184	AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe	138
Side Arm Mount [SO 306-1]	184	7770.00 w/ Mount Pipe	138
Pirod 6-8' Box Arm (1)	182	7770.00 w/ Mount Pipe	138
Pirod 6-8' Box Arm (1)	182	7770.00 w/ Mount Pipe	138
8'x2" Mount Pipe	182	TMA	138
8'x2" Mount Pipe	182	TMA	138
8'x2" Mount Pipe	182	TMA	138
16'x3" Mount Pipe	182	(2) Diplexer	138
10' 4-Bay Dipole	182	(2) Diplexer	138
SC479-HF1LDF	182	(2) Diplexer	138
3" Dia 14' Omni	182	RRU	138
3" Dia 16' Omni	182	RRU	138
3" Dia 12' Omni	182	RRU	138
Pirod 6-8' Box Arm (1)	182	Sector Mount [SM 408-3]	138
ANT220F2	175	Sector Mount [15' SM 201-1]	120
site pro1 USF-4U [SO 203-1]	175	Sector Mount [15' SM 201-1]	120
(2) 8' x 1' Panel Antenna w/ Mount Pipe	172	Sector Mount [15' SM 201-1]	120
12"x12"x12" Junction Box	172	Pipe Mount [PM 602-3]	120
(2) Side Arm Mount [SO 308-1]	172	66" x6" x 3" panel antenna	120
(2) LPA-80090/4CF w/ Mount Pipe	168	66" x6" x 3" panel antenna	120
(2) LPA-80080/4CF w/ Mount Pipe	168	66" x6" x 3" panel antenna	120
(2) LPA-80090/4CF w/ Mount Pipe	168	66" x6" x 3" panel antenna	120
BXA-70080-4CF-2 w/ Mount Pipe	168	53" x 13" x 6" panel antenna	120
BXA-70080-4CF-2 w/ Mount Pipe	168	53" x 13" x 6" panel antenna	120
BXA-70080-4CF-2 w/ Mount Pipe	168	53" x 13" x 6" panel antenna	120
BXA-171085-8CF-EDIN-0 w/ Mount Pipe	168	53" x 13" x 6" panel antenna	120
BXA-171085-8CF-EDIN-0 w/ Mount Pipe	168	87" x23" x 5" panel antenna	120
BXA-171085-8CF-EDIN-0 w/ Mount Pipe	168	87" x23" x 5" panel antenna	120
10' 4-Bay Dipole	168	87" x23" x 5" panel antenna	120
(2) Diplexer	168	87" x23" x 5" panel antenna	120
(2) Diplexer	168	Sector Mount [15' SM 201-1]	120
(2) Diplexer	168	Pirod 6-8' Box Arm (1)	118
Sector Mount [SM 408-3]	168	10' 4-Bay Dipole	105
DB980F90E-M w/Mount Pipe	153	Pirod 6-8' Box Arm (1)	105
DB980F90E-M w/Mount Pipe	153	8' Horizontal HSS 2" x 2" Tube	97
DB980F90E-M w/Mount Pipe	153	6'x1": Ice Shield	97
DB980F90E-M w/Mount Pipe	153	Pirod 6-8' Box Arm (1)	97
DB980F90E-M w/Mount Pipe	153	Pirod 6-8' Box Arm (1)	97
DB980F90E-M w/Mount Pipe	153	3" Dia 14' Omni	97
(2) 800MHZ RRH	153	MD-S8 (for 8' MW) : Ice Shield	97
(2) 800MHZ RRH	153	Pipe Mount [PM 601-1]	97
(2) 800MHZ RRH	153	8 FT DISH	97
1900MHz RRH	153	Pirod 6-8' Box Arm (1)	78
1900MHz RRH	153	8'x2" Mount Pipe	78
1900MHz RRH	153	8'x2" Mount Pipe	78
TD-RRHBx20-25	153	8'x2" Mount Pipe	78
TD-RRHBx20-25	153	DB222	78
TD-RRHBx20-25	153	PD220	78
8' Horizontal HSS 2" x 2" Tube	153	VHF150	78
8' Horizontal HSS 2" x 2" Tube	153	VHF150	78
8' Horizontal HSS 2" x 2" Tube	153	6' Yagi	78
Sector Mount [SM 408-3]	153	1- Bay Dipole Antenna	78
ANT220F2	143	Pirod 6-8' Box Arm (1)	78
12"x12"x6" Junction Box	143	Pirod 6-8' Box Arm (1)	78
12"x12"x6" Junction Box	143	(2) Side Arm Mount [SO 304-1]	31
12"x12"x6" Junction Box	143	GPS	31
Surge Suppression Box	143		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 128334 (5' Section)	B	2L2 1/2x2 1/2x3/16x3/8

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 40 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: 51.7%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 321 K
SHEAR: 43 K

UPLIFT: -260 K
SHEAR: 35 K

AXIAL 209 K
SHEAR 13 K *MOMENT 1618 kip-ft*
TORQUE 7 kip-ft
40 mph WIND - 1.5000 in ICE

AXIAL 80 K
SHEAR 61 K *MOMENT 6621 kip-ft*
TORQUE 53 kip-ft
REACTIONS - 120 mph WIND

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Overland Park, KS 66211
Phone: (913) 458-6909
FAX:

Job: ES-082 ChurchHill (Outer Tower)
Project: 405025
Client: Eversource | Drawn by: Robert Hudson II | App'd:
Code: TIA-222-H | Date: 06/09/20 | Scale: NTS
Path: | Dwg No. E-1

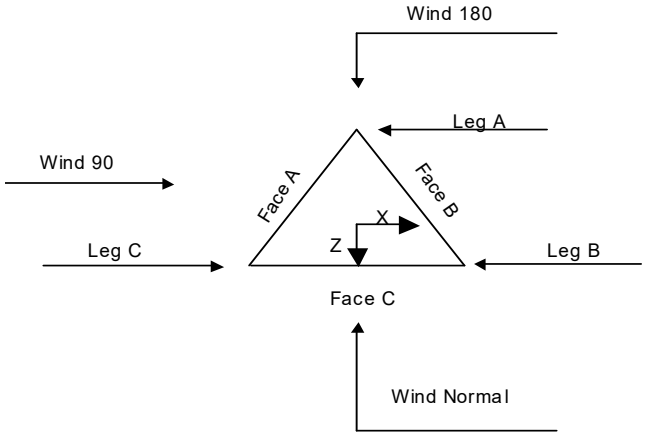
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 12.00 ft at the top and 26.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower base elevation above sea level: 964.00 ft.
- Basic wind speed of 120 mph.
- Risk Category III.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 40 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- 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	195.00-190.00			12.00	1	5.00
T2	190.00-180.00			12.00	1	10.00
T3	180.00-160.00			12.00	1	20.00
T4	160.00-150.00			12.00	1	10.00
T5	150.00-140.00			12.00	1	10.00
T6	140.00-120.00			12.00	1	20.00
T7	120.00-110.00			14.00	1	10.00
T8	110.00-100.00			15.00	1	10.00
T9	100.00-80.00			16.00	1	20.00
T10	80.00-60.00			18.00	1	20.00
T11	60.00-40.00			20.00	1	20.00
T12	40.00-20.00			22.00	1	20.00
T13	20.00-0.00			24.00	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	195.00-190.00	5.00	K Brace Down	No	Yes	0.0000	0.0000
T2	190.00-180.00	10.00	X Brace	No	No	0.0000	0.0000
T3	180.00-160.00	10.00	X Brace	No	No	0.0000	0.0000
T4	160.00-150.00	10.00	X Brace	No	Yes	0.0000	0.0000
T5	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T6	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T7	120.00-110.00	10.00	X Brace	No	Yes	0.0000	0.0000
T8	110.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T9	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T10	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T11	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T12	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T13	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 195.00-190.00	Truss Leg	Pirod 128334 (5' Section)	A572-50 (50 ksi)	Double Angle	2L2 1/2x2 1/2x3/16x3/8	A36 (36 ksi)
T2 190.00-180.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 180.00-160.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 160.00-150.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T5 150.00-140.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T6 140.00-120.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 120.00-110.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T8 110.00-100.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 100.00-80.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T10 80.00-60.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L4x4x3/8	A36 (36 ksi)
T11 60.00-40.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L5x5x3/8	A36 (36 ksi)
T12 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L5x5x3/8	A36 (36 ksi)
T13 20.00-0.00	Truss Leg	Pirod 112738	A572-50 (50 ksi)	Double Angle	2L3 1/2x3 1/2x5/16x3/8	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
T6 140.00-120.00	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 195.00-190.00	None	Flat Bar		A36 (36 ksi)	Double Angle	2L2 1/2x2 1/2x3/16x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 160.00-150.00	Single Angle	L3x3x5/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T7 120.00-110.00	Single Angle	L3x3x5/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 195.00-190.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	Mid-Pt	Mid-Pt	36.0000
T2 190.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T3 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T4 160.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T5 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T6 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T7 120.00-110.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T8 110.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T9 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T10 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T11 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T12 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	36.0000	36.0000	36.0000
T13 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1.05	1.05	Mid-Pt	0.0000	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 195.00-190.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 190.00-180.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 160.00-150.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 150.00-	Yes	Yes	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
140.00				1	1	1	1	1	1	1
T6 140.00-120.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T7 120.00-110.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T8 110.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T9 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T10 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T11 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T12 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T13 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	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
T1 195.00-190.00	1	0.5	0.85	1	0.5	0.85
T2 190.00-180.00	1	0.5	0.85	1	0.5	0.85
T3 180.00-160.00	1	0.5	0.85	1	0.5	0.85
T4 160.00-150.00	1	0.5	0.85	1	0.5	0.85
T5 150.00-140.00	1	0.5	0.85	1	0.5	0.85
T6 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T7 120.00-110.00	1	0.5	0.85	1	0.5	0.85
T8 110.00-100.00	1	0.5	0.85	1	0.5	0.85
T9 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T10 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T11 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T12 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T13 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 195.00-190.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 190.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 160.00-150.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 150.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 120.00-110.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 110.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T13 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 195.00-190.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	1	0.6250 A325N	0
T2 190.00-180.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 180.00-160.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 160.00-150.00	Flange	1.0000 A325N	0	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T5 150.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 120.00-110.00	Flange	1.0000 A325N	0	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T8 110.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 100.00-80.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 80.00-60.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 20.00-0.00	Flange	2.0000 A687	0	1.0000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	1.0000 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
Safety Line 3/8	A	No	No	Ar (CaAa)	195.00 - 6.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
Safety Line 3/8	B	No	No	Ar (CaAa)	195.00 - 6.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
Safety Line 3/8	C	No	No	Ar (CaAa)	195.00 - 6.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
T-Bracket (Af)	A	No	No	Af (CaAa)	168.00 - 6.00	-5.0000	0.45	1	1	3.0000	3.0000		8.40
T-Bracket (Af)	B	No	No	Af (CaAa)	190.00 - 180.00	-5.0000	0.45	1	1	3.0000	3.0000		8.40
T-Bracket (Af)	C	No	No	Af (CaAa)	120.00 - 6.00	-5.0000	0.45	1	1	1.5000	1.5000		4.20
***													
LDF7-50A(1-5/8)	A	No	No	Ar (CaAa)	168.00 - 6.00	-5.0000	0.45	12	6	0.5000	1.9800		0.82
***													
LDF2-2R(1)	C	No	No	Ar (CaAa)	120.00 - 6.00	-5.0000	0.45	4	4	0.5000	0.9860		0.30
***													
LCF78-50JA(7/8)	A	No	No	Ar (CaAa)	143.00 - 6.00	-5.0000	0.42	2	2	0.5000	1.0900		0.32
LCF78-50JA(7/8)	A	No	No	Ar (CaAa)	175.00 - 143.00	-5.0000	0.42	1	1	0.5000	1.0900		0.32
***													

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
***								

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	195.00-190.00	A	0.000	0.000	0.188	0.000	0.00
		B	0.000	0.000	0.188	0.000	0.00
		C	0.000	0.000	0.188	0.000	0.00
T2	190.00-180.00	A	0.000	0.000	0.375	0.000	0.00
		B	0.000	0.000	5.375	0.000	0.09
		C	0.000	0.000	0.375	0.000	0.00
T3	180.00-160.00	A	0.000	0.000	25.393	0.000	0.16
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	0.750	0.000	0.00
T4	160.00-150.00	A	0.000	0.000	30.225	0.000	0.19
		B	0.000	0.000	0.375	0.000	0.00
		C	0.000	0.000	0.375	0.000	0.00
T5	150.00-140.00	A	0.000	0.000	30.552	0.000	0.19
		B	0.000	0.000	0.375	0.000	0.00

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
		C	0.000	0.000	0.375	0.000	0.00
T6	140.00-120.00	A	0.000	0.000	62.630	0.000	0.38
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	0.750	0.000	0.00
T7	120.00-110.00	A	0.000	0.000	31.315	0.000	0.19
		B	0.000	0.000	0.375	0.000	0.00
		C	0.000	0.000	6.819	0.000	0.06
T8	110.00-100.00	A	0.000	0.000	31.315	0.000	0.19
		B	0.000	0.000	0.375	0.000	0.00
		C	0.000	0.000	6.819	0.000	0.06
T9	100.00-80.00	A	0.000	0.000	62.630	0.000	0.38
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	13.638	0.000	0.11
T10	80.00-60.00	A	0.000	0.000	62.630	0.000	0.38
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	13.638	0.000	0.11
T11	60.00-40.00	A	0.000	0.000	62.630	0.000	0.38
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	13.638	0.000	0.11
T12	40.00-20.00	A	0.000	0.000	62.630	0.000	0.38
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	13.638	0.000	0.11
T13	20.00-0.00	A	0.000	0.000	43.841	0.000	0.27
		B	0.000	0.000	0.525	0.000	0.00
		C	0.000	0.000	9.547	0.000	0.08

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	195.00-190.00	A	2.058	0.000	0.000	2.245	0.000	0.03
		B		0.000	0.000	2.245	0.000	0.03
		C		0.000	0.000	2.245	0.000	0.03
T2	190.00-180.00	A	2.050	0.000	0.000	4.474	0.000	0.06
		B		0.000	0.000	12.188	0.000	0.30
		C		0.000	0.000	4.474	0.000	0.06
T3	180.00-160.00	A	2.032	0.000	0.000	44.182	0.000	0.87
		B		0.000	0.000	8.879	0.000	0.12
		C		0.000	0.000	8.879	0.000	0.12
T4	160.00-150.00	A	2.014	0.000	0.000	43.884	0.000	0.91
		B		0.000	0.000	4.402	0.000	0.06
		C		0.000	0.000	4.402	0.000	0.06
T5	150.00-140.00	A	2.000	0.000	0.000	45.381	0.000	0.91
		B		0.000	0.000	4.375	0.000	0.06
		C		0.000	0.000	4.375	0.000	0.06
T6	140.00-120.00	A	1.978	0.000	0.000	97.864	0.000	1.85
		B		0.000	0.000	8.664	0.000	0.12
		C		0.000	0.000	8.664	0.000	0.12
T7	120.00-110.00	A	1.954	0.000	0.000	48.671	0.000	0.92
		B		0.000	0.000	4.284	0.000	0.06
		C		0.000	0.000	23.888	0.000	0.36
T8	110.00-100.00	A	1.937	0.000	0.000	48.480	0.000	0.91
		B		0.000	0.000	4.248	0.000	0.06
		C		0.000	0.000	23.757	0.000	0.36
T9	100.00-80.00	A	1.907	0.000	0.000	96.319	0.000	1.79
		B		0.000	0.000	8.378	0.000	0.11
		C		0.000	0.000	47.078	0.000	0.70
T10	80.00-60.00	A	1.860	0.000	0.000	95.295	0.000	1.76
		B		0.000	0.000	8.189	0.000	0.11
		C		0.000	0.000	46.380	0.000	0.68
T11	60.00-40.00	A	1.798	0.000	0.000	93.966	0.000	1.71
		B		0.000	0.000	7.943	0.000	0.10
		C		0.000	0.000	45.474	0.000	0.65
T12	40.00-20.00	A	1.709	0.000	0.000	92.032	0.000	1.63
		B		0.000	0.000	7.585	0.000	0.09

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
		C		0.000	0.000	44.157	0.000	0.61
T13	20.00-0.00	A	1.531	0.000	0.000	61.738	0.000	1.05
		B		0.000	0.000	4.811	0.000	0.05
		C		0.000	0.000	29.082	0.000	0.38

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	195.00-190.00	0.0000	0.0000	0.0000	0.0000
T2	190.00-180.00	3.5750	2.3466	3.1233	1.9593
T3	180.00-160.00	0.0561	-8.7939	0.0371	-6.6959
T4	160.00-150.00	0.1198	-15.9602	0.0918	-11.4175
T5	150.00-140.00	0.1323	-17.8912	0.1049	-13.5516
T6	140.00-120.00	0.0611	-17.9666	0.0408	-14.3264
T7	120.00-110.00	-3.9844	-15.7743	-5.9442	-11.3874
T8	110.00-100.00	-4.7147	-18.2903	-7.1715	-13.6173
T9	100.00-80.00	-4.6603	-18.0813	-7.4821	-14.2123
T10	80.00-60.00	-4.9922	-19.2700	-8.0576	-15.2925
T11	60.00-40.00	-4.7010	-18.2724	-8.1426	-15.5818
T12	40.00-20.00	-4.9196	-19.0778	-8.5167	-16.3973
T13	20.00-0.00	-5.0860	-18.9902	-7.2584	-13.8821

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Safety Line 3/8	190.00 - 195.00	0.6000	0.4401
T1	2	Safety Line 3/8	190.00 - 195.00	0.6000	0.4401
T1	3	Safety Line 3/8	190.00 - 195.00	0.6000	0.4401
T2	1	Safety Line 3/8	180.00 - 190.00	0.6000	0.5815
T2	2	Safety Line 3/8	180.00 - 190.00	0.6000	0.5815
T2	3	Safety Line 3/8	180.00 - 190.00	0.6000	0.5815
T2	5	T-Bracket (Af)	180.00 - 190.00	0.6000	0.5815
T3	1	Safety Line 3/8	160.00 - 180.00	0.6000	0.5655
T3	2	Safety Line 3/8	160.00 - 180.00	0.6000	0.5655
T3	3	Safety Line 3/8	160.00 - 180.00	0.6000	0.5655
T3	4	T-Bracket (Af)	160.00 - 168.00	0.6000	0.5655
T3	8	LDF7-50A(1-5/8)	160.00 - 168.00	0.6000	0.5655
T3	13	LCF78-50JA(7/8)	160.00 - 175.00	0.6000	0.5655
T4	1	Safety Line 3/8	150.00 - 160.00	0.6000	0.5151
T4	2	Safety Line 3/8	150.00 - 160.00	0.6000	0.5151

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	3	Safety Line 3/8	150.00 - 160.00	0.6000	0.5151
T4	4	T-Bracket (Af)	150.00 - 160.00	0.6000	0.5151
T4	8	LDF7-50A(1-5/8)	150.00 - 160.00	0.6000	0.5151
T4	13	LCF78-50JA(7/8)	150.00 - 160.00	0.6000	0.5151
T5	1	Safety Line 3/8	140.00 - 150.00	0.6000	0.5652
T5	2	Safety Line 3/8	140.00 - 150.00	0.6000	0.5652
T5	3	Safety Line 3/8	140.00 - 150.00	0.6000	0.5652
T5	4	T-Bracket (Af)	140.00 - 150.00	0.6000	0.5652
T5	8	LDF7-50A(1-5/8)	140.00 - 150.00	0.6000	0.5652
T5	12	LCF78-50JA(7/8)	140.00 - 143.00	0.6000	0.5652
T5	13	LCF78-50JA(7/8)	143.00 - 150.00	0.6000	0.5652
T6	1	Safety Line 3/8	120.00 - 140.00	0.6000	0.5629
T6	2	Safety Line 3/8	120.00 - 140.00	0.6000	0.5629
T6	3	Safety Line 3/8	120.00 - 140.00	0.6000	0.5629
T6	4	T-Bracket (Af)	120.00 - 140.00	0.6000	0.5629
T6	8	LDF7-50A(1-5/8)	120.00 - 140.00	0.6000	0.5629
T6	12	LCF78-50JA(7/8)	120.00 - 140.00	0.6000	0.5629
T7	1	Safety Line 3/8	110.00 - 120.00	0.6000	0.5595
T7	2	Safety Line 3/8	110.00 - 120.00	0.6000	0.5595
T7	3	Safety Line 3/8	110.00 - 120.00	0.6000	0.5595
T7	4	T-Bracket (Af)	110.00 - 120.00	0.6000	0.5595
T7	6	T-Bracket (Af)	110.00 - 120.00	0.6000	0.5595
T7	8	LDF7-50A(1-5/8)	110.00 - 120.00	0.6000	0.5595
T7	10	LDF2-2R(1)	110.00 - 120.00	0.6000	0.5595
T7	12	LCF78-50JA(7/8)	110.00 - 120.00	0.6000	0.5595
T8	1	Safety Line 3/8	100.00 - 110.00	0.6000	0.6000
T8	2	Safety Line 3/8	100.00 - 110.00	0.6000	0.6000
T8	3	Safety Line 3/8	100.00 - 110.00	0.6000	0.6000
T8	4	T-Bracket (Af)	100.00 - 110.00	0.6000	0.6000
T8	6	T-Bracket (Af)	100.00 - 110.00	0.6000	0.6000
T8	8	LDF7-50A(1-5/8)	100.00 - 110.00	0.6000	0.6000
T8	10	LDF2-2R(1)	100.00 - 110.00	0.6000	0.6000
T8	12	LCF78-50JA(7/8)	100.00 - 110.00	0.6000	0.6000
T9	1	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T9	2	Safety Line 3/8	80.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	3	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T9	4	T-Bracket (Af)	80.00 - 100.00	0.6000	0.6000
T9	6	T-Bracket (Af)	80.00 - 100.00	0.6000	0.6000
T9	8	LDF7-50A(1-5/8)	80.00 - 100.00	0.6000	0.6000
T9	10	LDF2-2R(1)	80.00 - 100.00	0.6000	0.6000
T9	12	LCF78-50JA(7/8)	80.00 - 100.00	0.6000	0.6000
T10	1	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T10	2	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T10	3	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T10	4	T-Bracket (Af)	60.00 - 80.00	0.6000	0.6000
T10	6	T-Bracket (Af)	60.00 - 80.00	0.6000	0.6000
T10	8	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T10	10	LDF2-2R(1)	60.00 - 80.00	0.6000	0.6000
T10	12	LCF78-50JA(7/8)	60.00 - 80.00	0.6000	0.6000
T11	1	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T11	2	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T11	3	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T11	4	T-Bracket (Af)	40.00 - 60.00	0.6000	0.6000
T11	6	T-Bracket (Af)	40.00 - 60.00	0.6000	0.6000
T11	8	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T11	10	LDF2-2R(1)	40.00 - 60.00	0.6000	0.6000
T11	12	LCF78-50JA(7/8)	40.00 - 60.00	0.6000	0.6000
T12	1	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T12	2	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T12	3	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T12	4	T-Bracket (Af)	20.00 - 40.00	0.6000	0.6000
T12	6	T-Bracket (Af)	20.00 - 40.00	0.6000	0.6000
T12	8	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T12	10	LDF2-2R(1)	20.00 - 40.00	0.6000	0.6000
T12	12	LCF78-50JA(7/8)	20.00 - 40.00	0.6000	0.6000
T13	1	Safety Line 3/8	6.00 - 20.00	0.6000	0.6000
T13	2	Safety Line 3/8	6.00 - 20.00	0.6000	0.6000
T13	3	Safety Line 3/8	6.00 - 20.00	0.6000	0.6000
T13	4	T-Bracket (Af)	6.00 - 20.00	0.6000	0.6000
T13	6	T-Bracket (Af)	6.00 - 20.00	0.6000	0.6000
T13	8	LDF7-50A(1-5/8)	6.00 - 20.00	0.6000	0.6000
T13	10	LDF2-2R(1)	6.00 - 20.00	0.6000	0.6000
T13	12	LCF78-50JA(7/8)	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe Mount [PM 601-1]	A	From Leg	0.50 0.00 0.00	0.00	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
Pipe Mount [PM 601-1]	B	From Leg	0.50 0.00 0.00	0.00	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
Pipe Mount [PM 601-1]	C	From Leg	0.50 0.00 0.00	0.00	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
Lightning Rod 5/8"x4'	A	From Leg	0.50 0.00 5.00	0.00	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.25 0.66 0.97 1.49	0.25 0.66 0.97 1.49	0.00 0.01 0.01 0.03
Lightning Rod 5/8"x4'	B	From Leg	0.50 0.00 5.00	0.00	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.25 0.66 0.97 1.49	0.25 0.66 0.97 1.49	0.00 0.01 0.01 0.03
Lightning Rod 5/8"x4'	C	From Leg	0.50 0.00 5.00	0.00	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.25 0.66 0.97 1.49	0.25 0.66 0.97 1.49	0.00 0.01 0.01 0.03
***									
Pipe Mount [PM 602-1]	A	From Leg	0.50 0.00 0.00	0.00	188.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.78 3.21 3.64 4.54	2.78 3.21 3.64 4.54	0.09 0.11 0.14 0.21
(2) 8' Horizontal HSS 2" x 2" Tube	A	From Leg	0.00 0.00 0.00	0.00	188.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.67 3.49 4.31 5.97	0.01 0.04 0.08 0.19	0.04 0.06 0.08 0.14
***									
Side Arm Mount [SO 308-1]	C	From Leg	3.00 0.00 0.00	0.00	185.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.41 0.81 1.23 2.09	3.06 5.10 7.20 11.96	0.05 0.08 0.12 0.25
8' x 1' Panel Antenna w/ Mount Pipe	C	From Leg	6.00 0.00 2.00	0.00	185.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.47 12.08 12.71 13.95	8.70 10.11 11.38 13.58	0.73 0.81 0.91 1.12
****									
Side Arm Mount [SO 306-1]	C	From Leg	2.00 0.00 0.00	0.00	184.00	No Ice 1/2" Ice	0.41 0.81 1.23	2.26 3.83 5.48	0.04 0.06 0.09

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
						1" Ice	2.08	9.37	0.19
						2" Ice			
3" Dia 5' Omni	C	From Leg	4.00	0.00	184.00	No Ice	1.50	1.50	0.01
			0.00			1/2"	2.01	2.01	0.02
			2.50			Ice	2.53	2.53	0.03
						1" Ice	3.34	3.34	0.07
						2" Ice			
***									
Pirod 6-8' Box Arm (1)	A	From Leg	4.00	0.00	182.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
Pirod 6-8' Box Arm (1)	B	From Leg	4.00	0.00	182.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
Pirod 6-8' Box Arm (1)	C	From Leg	4.00	0.00	182.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
8'x2" Mount Pipe	A	From Leg	8.00	0.00	182.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8'x2" Mount Pipe	B	From Leg	8.00	0.00	182.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8'x2" Mount Pipe	C	From Leg	8.00	0.00	182.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
16'x3" Mount Pipe	B	From Leg	8.00	0.00	182.00	No Ice	5.60	5.60	0.16
			0.00			1/2"	7.25	7.25	0.20
			0.00			Ice	8.92	8.92	0.25
						1" Ice	11.13	11.13	0.39
						2" Ice			
10' 4-Bay Dipole	A	From Leg	8.00	0.00	182.00	No Ice	2.00	2.00	0.03
			0.00			1/2"	3.00	3.00	0.05
			5.00			Ice	4.00	4.00	0.07
						1" Ice	6.00	6.00	0.12
						2" Ice			
SC479-HF1LDF	A	From Leg	8.00	0.00	182.00	No Ice	4.79	4.79	0.03
			0.00			1/2"	6.54	6.54	0.07
			-7.00			Ice	8.04	8.04	0.11
						1" Ice	10.81	10.81	0.23
						2" Ice			
3" Dia 14' Omni	B	From Leg	8.00	0.00	182.00	No Ice	4.20	4.20	0.02
			0.00			1/2"	5.64	5.64	0.05
			7.00			Ice	7.10	7.10	0.09
						1" Ice	9.35	9.35	0.20
						2" Ice			
3" Dia 16' Omni	C	From Leg	8.00	0.00	182.00	No Ice	4.80	4.80	0.03
			0.00			1/2"	6.44	6.44	0.06
			8.00			Ice	8.11	8.11	0.11
						1" Ice	10.69	10.69	0.23
						2" Ice			
3" Dia 12' Omni	C	From Leg	8.00	0.00	182.00	No Ice	3.60	3.60	0.02
			0.00			1/2"	4.83	4.83	0.05

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
			-6.00			Ice	6.08	6.08	0.08
						1" Ice	8.02	8.02	0.17
						2" Ice			
***									
site pro1 USF-4U [SO 203-1]	A	From Leg	1.50 0.00 0.00	0.00	175.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.78 2.24 2.75 3.89	3.79 4.47 5.21 6.78	0.13 0.15 0.19 0.29
ANT220F2	A	From Leg	3.00 0.00 3.00	0.00	175.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.03 1.29 1.56 2.13	1.03 1.29 1.56 2.13	0.01 0.02 0.03 0.06
***									
(2) Side Arm Mount [SO 308-1]	B	From Leg	3.00 0.00 0.00	0.00	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.41 0.81 1.23 2.09	3.06 5.10 7.20 11.96	0.05 0.08 0.12 0.25
(2) 8' x 1' Panel Antenna w/ Mount Pipe	B	From Leg	6.00 0.00 2.00	0.00	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.47 12.08 12.71 13.95	8.70 10.11 11.38 13.58	0.73 0.81 0.91 1.12
12"x12"x12" Junction Box	B	From Leg	0.00 0.00 0.00	0.00	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.20 1.34 1.48 1.79	1.20 1.34 1.48 1.79	0.03 0.05 0.06 0.11
***									
Sector Mount [SM 408-3]	C	None		0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	22.38 33.31 44.35 67.76	22.38 33.31 44.35 67.76	1.02 1.46 2.06 3.75
(2) LPA-80090/4CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	5.21 5.82 6.44 7.74	0.03 0.07 0.11 0.22
(2) LPA-80080/4CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
(2) LPA-80090/4CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	5.21 5.82 6.44 7.74	0.03 0.07 0.11 0.22
BXA-70080-4CF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.81 4.17 4.54 5.31	3.97 4.58 5.19 6.46	0.03 0.07 0.11 0.22
BXA-70080-4CF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.81 4.17 4.54 5.31	3.97 4.58 5.19 6.46	0.03 0.07 0.11 0.22
BXA-70080-4CF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice	3.81 4.17 4.54 5.31	3.97 4.58 5.19 6.46	0.03 0.07 0.11 0.22

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			
BXA-171085-8CF-EDIN-0 w/ Mount Pipe	A	From Leg	4.00 5.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.16 3.53 3.90 4.66	3.33 3.94 4.56 5.86	0.04 0.07 0.10 0.20
BXA-171085-8CF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00 5.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.16 3.53 3.90 4.66	3.33 3.94 4.56 5.86	0.04 0.07 0.10 0.20
BXA-171085-8CF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00 5.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.16 3.53 3.90 4.66	3.33 3.94 4.56 5.86	0.04 0.07 0.10 0.20
10' 4-Bay Dipole	B	From Leg	4.00 0.00 7.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.00 3.00 4.00 6.00	2.00 3.00 4.00 6.00	0.03 0.05 0.07 0.12
(2) Diplexer	A	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.29 0.36 0.44 0.62	0.10 0.14 0.19 0.32	0.01 0.01 0.01 0.02
(2) Diplexer	B	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.29 0.36 0.44 0.62	0.10 0.14 0.19 0.32	0.01 0.01 0.01 0.02
(2) Diplexer	C	From Leg	4.00 0.00 0.00	0.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.29 0.36 0.44 0.62	0.10 0.14 0.19 0.32	0.01 0.01 0.01 0.02
***									
Sector Mount [SM 408-3]	C	None		0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	22.38 33.31 44.35 67.76	22.38 33.31 44.35 67.76	1.02 1.46 2.06 3.75
DB980F90E-M w/Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.37 4.96 5.47 6.52	3.95 5.04 5.85 7.49	0.03 0.07 0.12 0.23
DB980F90E-M w/Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.37 4.96 5.47 6.52	3.95 5.04 5.85 7.49	0.03 0.07 0.12 0.23
DB980F90E-M w/Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.37 4.96 5.47 6.52	3.95 5.04 5.85 7.49	0.03 0.07 0.12 0.23
DB980F90E-M w/Mount Pipe	A	From Leg	4.00 7.50 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.37 4.96 5.47 6.52	3.95 5.04 5.85 7.49	0.03 0.07 0.12 0.23
DB980F90E-M w/Mount Pipe	B	From Leg	4.00 7.50 0.00	0.00	153.00	No Ice 1/2" Ice Ice	4.37 4.96 5.47	3.95 5.04 5.85	0.03 0.07 0.12

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
						1" Ice	6.52	7.49	0.23
						2" Ice			
DB980F90E-M w/Mount Pipe	C	From Leg	4.00 7.50 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.37 4.96 5.47 6.52	3.95 5.04 5.85 7.49	0.03 0.07 0.12 0.23
(2) 800MHZ RRH	A	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" 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
(2) 800MHZ RRH	B	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" 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
(2) 800MHZ RRH	C	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" 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
1900MHz RRH	A	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.49 2.70 2.91 3.35	3.26 3.48 3.72 4.21	0.04 0.08 0.11 0.19
1900MHz RRH	B	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.49 2.70 2.91 3.35	3.26 3.48 3.72 4.21	0.04 0.08 0.11 0.19
1900MHz RRH	C	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.49 2.70 2.91 3.35	3.26 3.48 3.72 4.21	0.04 0.08 0.11 0.19
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8x20-25	C	From Leg	4.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
8' Horizontal HSS 2" x 2" Tube	A	From Leg	0.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.67 3.49 4.31 5.97	0.01 0.04 0.08 0.19	0.04 0.06 0.08 0.14
8' Horizontal HSS 2" x 2" Tube	B	From Leg	0.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.67 3.49 4.31 5.97	0.01 0.04 0.08 0.19	0.04 0.06 0.08 0.14
8' Horizontal HSS 2" x 2" Tube	C	From Leg	0.00 0.00 0.00	0.00	153.00	No Ice 1/2" Ice Ice	2.67 3.49 4.31	0.01 0.04 0.08	0.04 0.06 0.08

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
						1" Ice 2" Ice	5.97	0.19	0.14
***									
site pro1 USF-4U [SO 203-1]	A	From Leg	0.00 0.00 0.00	0.00	143.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.78 2.24 2.75 3.89	3.79 4.47 5.21 6.78	0.13 0.15 0.19 0.29
ANT220F2	A	From Leg	0.00 0.00 3.00	0.00	143.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.03 1.29 1.56 2.13	1.03 1.29 1.56 2.13	0.01 0.02 0.03 0.06
***									
12"x12"x6" Junction Box	A	From Leg	0.00 0.00 0.00	0.00	143.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.20 1.34 1.48 1.79	0.60 0.70 0.81 1.06	0.05 0.06 0.07 0.10
12"x12"x6" Junction Box	B	From Leg	0.00 0.00 0.00	0.00	143.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.20 1.34 1.48 1.79	0.60 0.70 0.81 1.06	0.05 0.06 0.07 0.10
12"x12"x6" Junction Box	C	From Leg	0.00 0.00 0.00	0.00	143.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.20 1.34 1.48 1.79	0.60 0.70 0.81 1.06	0.05 0.06 0.07 0.10
Surge Suppression Box	C	From Leg	4.00 0.00 0.00	0.00	143.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.81 4.06 4.32 4.85	0.78 0.90 1.03 1.32	0.03 0.05 0.08 0.15
***									
Sector Mount [SM 408-3]	C	None		0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	22.38 33.31 44.35 67.76	22.38 33.31 44.35 67.76	1.02 1.46 2.06 3.75
6'x2" Mount Pipe	B	From Leg	4.00 2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6'x2" Mount Pipe	C	From Leg	4.00 2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6'x2" Mount Pipe	A	From Leg	4.00 -7.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6'x2" Mount Pipe	B	From Leg	4.00 -7.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6'x2" Mount Pipe	C	From Leg	4.00 -7.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09

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
7770.00 w/ Mount Pipe	A	From Leg	4.00 -2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.11 0.16 0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00 -2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.11 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00 -2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.11 0.16 0.29
AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe	A	From Leg	4.00 -7.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.23 5.62 6.01 6.83	4.02 4.63 5.26 6.53	0.05 0.10 0.15 0.27
AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe	B	From Leg	4.00 -7.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.23 5.62 6.01 6.83	4.02 4.63 5.26 6.53	0.05 0.10 0.15 0.27
AM-X-CD-14-65-00T-RET_TIA w/ Mount Pipe	C	From Leg	4.00 -7.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.23 5.62 6.01 6.83	4.02 4.63 5.26 6.53	0.05 0.10 0.15 0.27
7770.00 w/ Mount Pipe	A	From Leg	4.00 2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.11 0.16 0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00 2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.11 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00 2.50 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.11 0.16 0.29
TMA	A	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.27 1.57	0.41 0.51 0.62 0.85	0.01 0.02 0.03 0.05
TMA	B	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.27 1.57	0.41 0.51 0.62 0.85	0.01 0.02 0.03 0.05
TMA	C	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.27 1.57	0.41 0.51 0.62 0.85	0.01 0.02 0.03 0.05
(2) Diplexer	A	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.29 0.36 0.44 0.62	0.10 0.14 0.19 0.32	0.01 0.01 0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) Diplexer	B	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.29 0.36 0.44 0.62	0.10 0.14 0.19 0.32	0.01 0.01 0.01 0.02
(2) Diplexer	C	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.29 0.36 0.44 0.62	0.10 0.14 0.19 0.32	0.01 0.01 0.01 0.02
RRU	A	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.71 2.92 3.14 3.60	0.96 1.11 1.28 1.62	0.04 0.06 0.08 0.13
RRU	B	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.71 2.92 3.14 3.60	0.96 1.11 1.28 1.62	0.04 0.06 0.08 0.13
RRU	C	From Leg	4.00 0.00 0.00	0.00	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.71 2.92 3.14 3.60	0.96 1.11 1.28 1.62	0.04 0.06 0.08 0.13
***									
Sector Mount [15' SM 201-1]	A	From Face	0.00 0.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.32 28.30 35.16 48.83	6.19 9.35 12.61 19.44	0.45 0.64 0.87 1.52
Sector Mount [15' SM 201-1]	B	From Face	0.00 0.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.32 28.30 35.16 48.83	6.19 9.35 12.61 19.44	0.45 0.64 0.87 1.52
Sector Mount [15' SM 201-1]	C	From Face	0.00 0.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.32 28.30 35.16 48.83	6.19 9.35 12.61 19.44	0.45 0.64 0.87 1.52
Sector Mount [15' SM 201-1]	A	From Leg	0.00 0.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	21.32 28.30 35.16 48.83	6.19 9.35 12.61 19.44	0.45 0.64 0.87 1.52
Pipe Mount [PM 602-3]	C	None		0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.67 7.70 8.74 10.90	6.67 7.70 8.74 10.90	0.28 0.34 0.42 0.63
66" x6" x 3" panel antenna	A	From Face	4.00 2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.22 4.63 5.05 5.91	2.61 3.01 3.41 4.24	0.01 0.03 0.06 0.13
66" x6" x 3" panel antenna	B	From Face	4.00 2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.22 4.63 5.05 5.91	2.61 3.01 3.41 4.24	0.01 0.03 0.06 0.13
66" x6" x 3" panel antenna	C	From Face	4.00 2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice	4.22 4.63 5.05 5.91	2.61 3.01 3.41 4.24	0.01 0.03 0.06 0.13

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			
66" x6" x 3" panel antenna	A	From Leg	4.00 2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.22 4.63 5.05 5.91	2.61 3.01 3.41 4.24	0.01 0.03 0.06 0.13
53" x 13" x 6" panel antenna	A	From Face	4.00 -7.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.08 6.44 6.80 7.55	3.23 3.57 3.91 4.60	0.11 0.12 0.15 0.20
53" x 13" x 6" panel antenna	B	From Face	4.00 -7.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.08 6.44 6.80 7.55	3.23 3.57 3.91 4.60	0.11 0.12 0.15 0.20
53" x 13" x 6" panel antenna	C	From Face	4.00 -7.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.08 6.44 6.80 7.55	3.23 3.57 3.91 4.60	0.11 0.12 0.15 0.20
53" x 13" x 6" panel antenna	A	From Leg	4.00 -7.00 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.08 6.44 6.80 7.55	3.23 3.57 3.91 4.60	0.11 0.12 0.15 0.20
87" x23" x 5" panel antenna	A	From Face	4.00 -2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.47 18.06 18.66 19.88	5.28 5.80 6.34 7.43	0.10 0.14 0.19 0.29
87" x23" x 5" panel antenna	B	From Face	4.00 -2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.47 18.06 18.66 19.88	5.28 5.80 6.34 7.43	0.10 0.14 0.19 0.29
87" x23" x 5" panel antenna	C	From Face	4.00 -2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.47 18.06 18.66 19.88	5.28 5.80 6.34 7.43	0.10 0.14 0.19 0.29
87" x23" x 5" panel antenna	A	From Leg	4.00 -2.33 0.00	0.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.47 18.06 18.66 19.88	5.28 5.80 6.34 7.43	0.10 0.14 0.19 0.29
***									
Pirod 6-8' Box Arm (1)	C	From Leg	4.00 0.00 0.00	0.00	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.50 9.87 15.24 25.98	4.50 9.87 15.24 25.98	0.21 0.28 0.34 0.46
***									
Pirod 6-8' Box Arm (1)	A	From Leg	4.00 0.00 0.00	0.00	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.50 9.87 15.24 25.98	4.50 9.87 15.24 25.98	0.21 0.28 0.34 0.46
10' 4-Bay Dipole	A	From Leg	8.00 0.00 5.00	0.00	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.00 3.00 4.00 6.00	2.00 3.00 4.00 6.00	0.03 0.05 0.07 0.12
***									
Pipe Mount [PM 601-1]	A	From Leg	4.00	0.00	97.00	No Ice	1.32	1.32	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
			0.00			1/2"	1.58	1.58	0.08
			0.00			Ice	1.84	1.84	0.09
						1" Ice	2.40	2.40	0.13
						2" Ice			
8' Horizontal HSS 2" x 2" Tube	A	From Leg	2.00	0.00	97.00	No Ice	2.67	0.01	0.04
			0.00			1/2"	3.49	0.04	0.06
			0.00			Ice	4.31	0.08	0.08
						1" Ice	5.97	0.19	0.14
						2" Ice			
6'x1': Ice Shield	A	From Leg	0.00	0.00	97.00	No Ice	0.80	0.80	0.13
			0.00			1/2"	1.08	1.08	0.21
			0.00			Ice	1.37	1.37	0.30
						1" Ice	1.97	1.97	0.50
						2" Ice			
Pirod 6-8' Box Arm (1)	B	From Leg	4.00	0.00	97.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
Pirod 6-8' Box Arm (1)	C	From Leg	4.00	0.00	97.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
3" Dia 14' Omni	C	From Leg	8.00	0.00	97.00	No Ice	4.20	4.20	0.02
			0.00			1/2"	5.64	5.64	0.05
			7.00			Ice	7.10	7.10	0.09
						1" Ice	9.35	9.35	0.20
						2" Ice			
MD-S8 (for 8' MW) : Ice Shield	A	From Leg	0.00	0.00	97.00	No Ice	3.80	2.40	0.57
			0.00			1/2"	4.46	2.83	0.74
			8.00			Ice	5.13	3.26	0.91
						1" Ice	6.48	4.15	1.26
						2" Ice			
***									
Pirod 6-8' Box Arm (1)	A	From Leg	4.00	0.00	78.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
Pirod 6-8' Box Arm (1)	B	From Leg	4.00	0.00	78.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
Pirod 6-8' Box Arm (1)	C	From Leg	4.00	0.00	78.00	No Ice	4.50	4.50	0.21
			0.00			1/2"	9.87	9.87	0.28
			0.00			Ice	15.24	15.24	0.34
						1" Ice	25.98	25.98	0.46
						2" Ice			
8'x2" Mount Pipe	A	From Leg	8.00	0.00	78.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8'x2" Mount Pipe	B	From Leg	8.00	0.00	78.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8'x2" Mount Pipe	C	From Leg	8.00	0.00	78.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			

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
DB222	A	From Leg	8.00 0.00 5.00	0.00	78.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.60 2.88 4.16 6.72	1.60 2.88 4.16 6.72	0.02 0.02 0.03 0.04
PD220	B	From Leg	8.00 0.00 10.00	0.00	78.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.56 7.13 10.70 17.84	3.56 7.13 10.70 17.84	0.02 0.05 0.07 0.12
VHF150	B	From Leg	8.00 0.00 -6.00	0.00	78.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.59 2.80 3.01 3.43	1.63 1.81 1.99 2.35	0.03 0.04 0.06 0.08
VHF150	C	From Leg	8.00 0.00 5.00	0.00	78.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.59 2.80 3.01 3.43	1.63 1.81 1.99 2.35	0.03 0.04 0.06 0.08
6' Yagi	C	From Leg	8.00 0.00 2.00	0.00	78.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.00 5.00 7.00 11.00	3.00 5.00 7.00 11.00	0.01 0.02 0.02 0.03
1- Bay Dipole Antenna ***	B	From Leg	8.00 0.00 -1.00	0.00	78.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.58 2.68 3.80 6.04	5.98 10.20 14.40 22.90	0.04 0.05 0.06 0.09
(2) Side Arm Mount [SO 304-1]	C	From Leg	1.00 0.00 0.00	0.00	31.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.50 0.73 1.29	0.88 1.26 1.67 2.58	0.02 0.03 0.05 0.09
GPS	C	From Leg	2.00 0.00 0.00	0.00	31.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.50 2.00 3.00	1.00 1.50 2.00 3.00	0.01 0.01 0.02 0.03

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
8 FT DISH ***	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.00		188.00	8.00	No Ice 1/2" Ice 1" Ice 2" Ice	50.30 51.29 52.28 54.27	0.25 0.51 0.78 1.30
8 FT DISH ***	A	Paraboloid w/Radome	From Leg	4.00 0.00 0.00	0.00		97.00	8.00	No Ice 1/2" Ice 1" Ice 2" Ice	50.30 51.29 52.28 54.27	0.25 0.51 0.78 1.30

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
Pirod 128334 (5' Section)	738.9415	1913.4925	0.82	0.57	10.2631	26.5763	3.6816
Pirod 105244	1026.8606	3293.8773	0.56	0.80	7.1310	22.8741	3.6816
Pirod 105216	1998.0891	6757.5767	0.51	1.50	6.9378	23.4638	3.6816
Pirod 105217	2130.7479	6813.0579	0.62	1.50	7.3984	23.6565	5.3014
Pirod 105217	2130.7479	6801.2263	0.62	1.48	7.3984	23.6154	5.3014
Pirod 105218	2263.4687	6854.0229	0.75	1.48	7.8593	23.7987	7.2158
Pirod 105218	2263.4687	6832.7109	0.75	1.45	7.8593	23.7247	7.2158
Pirod 105218	2263.4687	6817.0653	0.75	1.43	7.8593	23.6704	7.2158
Pirod 105219	2441.8688	6862.8768	0.94	1.45	8.4787	23.8294	9.4248
Pirod 105219	2441.8688	6821.0373	0.94	1.39	8.4787	23.6842	9.4248
Pirod 105220	2578.8005	6838.6418	1.12	1.34	8.9542	23.7453	11.9282
Pirod 105220	2578.8005	6759.4803	1.12	1.24	8.9542	23.4704	11.9282
Pirod 112738	3292.7185	8802.7061	1.51	1.30	11.4331	30.5650	14.7262

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

Comb. No.	Description
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	195 - 190	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	35	-0.70	-0.33	-0.02
			Max. Mx	22	-0.35	-1.07	0.19
			Max. My	20	-0.36	-0.16	0.28
			Max. Vy	22	0.34	-1.07	0.19
			Max. Vx	12	0.16	-0.15	-0.19
		Diagonal	Max Tension	11	0.04	0.00	0.00
			Max. Compression	38	-0.40	0.00	0.00
			Max. Mx	26	-0.24	0.15	0.00
			Max. Vy	26	-0.08	0.00	0.00
		Top Girt	Max Tension	10	0.18	-0.02	-0.00
			Max. Compression	23	-0.14	0.00	0.00
			Max. Mx	37	0.02	-0.11	0.00
			Max. My	10	0.18	-0.02	-0.00
			Max. Vy	37	0.10	-0.11	0.00
			Max. Vx	10	-0.00	0.00	0.00
T2	190 - 180	Leg	Max Tension	23	0.86	-1.02	0.19
			Max. Compression	35	-6.35	0.72	0.06
			Max. Mx	22	0.71	-1.07	0.19
			Max. My	25	-2.05	0.15	-1.76
			Max. Vy	22	-0.82	-1.07	0.19
			Max. Vx	24	-0.92	0.19	1.09
		Diagonal	Max Tension	20	1.88	0.00	0.00
			Max. Compression	18	-1.94	0.00	0.00
			Max. Mx	38	0.43	0.11	0.00
			Max. My	18	-1.89	0.02	0.00
			Max. Vy	38	-0.07	0.11	0.00
			Max. Vx	18	-0.00	0.00	0.00
T3	180 - 160	Leg	Max Tension	15	12.67	-0.88	0.14
			Max. Compression	10	-21.59	1.13	0.00
			Max. Mx	10	-21.59	1.13	0.00
			Max. My	16	-5.70	0.07	1.49
			Max. Vy	6	-0.74	-0.91	-0.08
			Max. Vx	16	-0.75	-0.16	0.86
		Diagonal	Max Tension	21	5.43	0.00	0.00
			Max. Compression	20	-5.62	0.00	0.00
			Max. Mx	31	0.79	0.13	-0.00
			Max. My	16	-3.44	0.02	0.01
			Max. Vy	31	-0.08	0.13	-0.00
			Max. Vx	16	-0.00	0.04	0.01
T4	160 - 150	Leg	Max Tension	15	22.69	-0.95	0.17
			Max. Compression	10	-35.11	-0.93	0.07
			Max. Mx	10	-34.18	2.95	-0.04
			Max. My	8	-3.89	-0.56	2.49
			Max. Vy	10	1.34	2.95	-0.04
			Max. Vx	8	-0.97	-0.56	2.49
		Diagonal	Max Tension	21	7.03	0.04	0.01
			Max. Compression	20	-7.19	0.00	0.00
			Max. Mx	30	1.60	0.14	0.00
			Max. My	18	-6.86	0.03	0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	30	-0.09	0.14	0.00
			Max. Vx	18	0.00	0.03	0.01
		Secondary Horizontal	Max Tension	10	1.06	0.02	-0.01
			Max. Compression	9	-0.71	0.03	0.00
			Max. Mx	29	0.42	0.10	-0.00
			Max. My	10	1.06	0.02	-0.01
			Max. Vy	29	0.09	0.10	-0.00
			Max. Vx	10	-0.00	0.02	-0.01
T5	150 - 140	Leg	Max Tension	23	36.71	-0.15	-0.02
			Max. Compression	10	-50.88	3.49	0.24
			Max. Mx	10	-50.88	3.49	0.24
			Max. My	8	-3.95	-0.56	2.49
			Max. Vy	10	-0.65	3.49	0.24
			Max. Vx	8	0.42	-0.56	2.49
		Diagonal	Max Tension	25	8.07	0.00	0.00
			Max. Compression	24	-8.49	0.00	0.00
			Max. Mx	31	0.79	0.16	0.00
			Max. My	16	-6.28	0.03	0.01
			Max. Vy	31	-0.09	0.16	0.00
			Max. Vx	16	-0.00	0.07	0.01
T6	140 - 120	Leg	Max Tension	23	67.20	-1.77	-0.08
			Max. Compression	10	-86.54	0.69	-0.10
			Max. Mx	10	-68.33	3.49	0.24
			Max. My	12	-7.92	-0.38	-3.47
			Max. Vy	10	1.00	3.49	0.24
			Max. Vx	21	0.63	-0.29	-3.39
		Diagonal	Max Tension	24	8.29	0.00	0.00
			Max. Compression	24	-8.33	0.00	0.00
			Max. Mx	29	1.45	0.17	0.02
			Max. My	28	1.48	0.17	-0.02
			Max. Vy	29	0.10	0.17	0.02
			Max. Vx	28	0.01	0.00	0.00
		Top Girt	Max Tension	14	0.78	0.00	0.00
			Max. Compression	11	-0.61	0.00	0.00
			Max. Mx	26	0.46	-0.46	0.00
			Max. My	26	0.47	0.00	0.01
			Max. Vy	26	0.15	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
T7	120 - 110	Leg	Max Tension	23	82.65	-0.61	0.09
			Max. Compression	10	-104.11	-0.20	0.14
			Max. Mx	10	-103.91	6.09	-0.02
			Max. My	21	-8.10	-0.34	-3.25
			Max. Vy	10	1.29	6.09	-0.02
			Max. Vx	21	-1.65	0.01	-0.82
		Diagonal	Max Tension	25	9.99	0.09	-0.00
			Max. Compression	24	-10.60	0.00	0.00
			Max. Mx	31	1.12	0.21	0.03
			Max. My	27	-2.93	0.18	-0.03
			Max. Vy	29	0.12	0.21	0.02
			Max. Vx	27	-0.01	0.00	0.00
		Secondary Horizontal	Max Tension	10	1.81	0.04	0.00
			Max. Compression	10	-1.81	0.00	0.00
			Max. Mx	37	-0.12	0.14	0.02
			Max. My	38	-0.14	0.14	0.02
			Max. Vy	37	-0.10	0.14	0.02
			Max. Vx	38	-0.01	0.00	0.00
T8	110 - 100	Leg	Max Tension	23	99.67	-0.62	-0.15
			Max. Compression	10	-124.15	3.08	0.18
			Max. Mx	10	-124.15	3.08	0.18
			Max. My	21	-8.63	-0.34	-3.25
			Max. Vy	10	-0.50	3.08	0.18
			Max. Vx	20	-0.37	-0.46	-3.24
		Diagonal	Max Tension	24	9.98	0.00	0.00
			Max. Compression	24	-10.01	0.00	0.00
			Max. Mx	27	1.86	0.24	-0.03
			Max. My	31	-2.30	0.21	0.03
			Max. Vy	29	0.13	0.24	-0.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	31	-0.01	0.00	0.00
T9	100 - 80	Leg	Max Tension	23	132.96	-2.33	-0.13
			Max. Compression	10	-162.57	3.95	0.25
			Max. Mx	10	-162.57	3.95	0.25
			Max. My	21	-11.71	0.02	-3.48
			Max. Vy	14	-0.74	-2.79	-0.04
			Max. Vx	19	-0.74	-1.45	-2.12
		Diagonal	Max Tension	12	11.02	0.00	0.00
			Max. Compression	12	-11.17	0.00	0.00
			Max. Mx	27	1.87	0.30	0.04
			Max. My	36	-1.46	0.28	-0.04
			Max. Vy	37	0.15	0.30	-0.04
			Max. Vx	36	0.01	0.00	0.00
T10	80 - 60	Leg	Max Tension	23	165.07	-2.31	-0.01
			Max. Compression	10	-201.43	3.51	0.19
			Max. Mx	10	-181.39	3.95	0.25
			Max. My	21	-11.95	0.02	-3.48
			Max. Vy	6	-0.54	-3.55	0.13
			Max. Vx	16	0.47	0.02	3.13
		Diagonal	Max Tension	12	11.76	0.00	0.00
			Max. Compression	12	-11.84	0.00	0.00
			Max. Mx	27	2.15	0.42	0.05
			Max. My	31	1.42	0.40	0.05
			Max. Vy	37	0.18	0.41	0.05
			Max. Vx	31	-0.01	0.00	0.00
T11	60 - 40	Leg	Max Tension	23	195.84	-2.72	-0.04
			Max. Compression	10	-239.47	1.50	0.08
			Max. Mx	22	176.42	-3.54	-0.21
			Max. My	24	-17.20	-0.91	5.59
			Max. Vy	10	0.34	3.48	0.02
			Max. Vx	21	0.51	-0.66	-5.48
		Diagonal	Max Tension	12	12.36	0.00	0.00
			Max. Compression	12	-12.32	0.00	0.00
			Max. Mx	27	2.10	0.60	0.07
			Max. My	37	-3.12	0.54	-0.07
			Max. Vy	37	0.24	0.58	0.07
			Max. Vx	37	0.01	0.00	0.00
T12	40 - 20	Leg	Max Tension	23	226.27	-3.31	0.06
			Max. Compression	10	-278.25	3.55	0.38
			Max. Mx	22	220.03	-6.36	-0.45
			Max. My	24	-20.38	-1.61	14.79
			Max. Vy	33	-0.89	-4.37	0.01
			Max. Vx	21	2.02	-1.18	-14.73
		Diagonal	Max Tension	10	14.10	0.00	0.00
			Max. Compression	10	-13.88	0.00	0.00
			Max. Mx	38	-2.07	0.72	-0.08
			Max. My	38	-4.53	0.65	-0.09
			Max. Vy	38	0.26	0.72	-0.08
			Max. Vx	38	0.01	0.00	0.00
T13	20 - 0	Leg	Max Tension	23	242.87	-5.97	-0.43
			Max. Compression	10	-297.42	0.00	-0.00
			Max. Mx	22	237.21	-6.36	-0.45
			Max. My	24	-19.60	-1.61	14.79
			Max. Vy	14	-0.63	-6.22	-0.06
			Max. Vx	21	-1.05	-1.18	-14.73
		Diagonal	Max Tension	23	17.14	0.00	0.00
			Max. Compression	10	-20.40	0.00	0.00
			Max. Mx	38	5.48	-0.89	-0.13
			Max. My	36	5.54	-0.89	0.14
			Max. Vy	38	-0.28	-0.89	-0.13
			Max. Vx	36	-0.02	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	308.46	35.42	-21.29
	Max. H_x	18	308.46	35.42	-21.29
	Max. H_z	7	-241.62	-27.93	16.82
	Min. Vert	7	-241.62	-27.93	16.82
	Min. H_x	7	-241.62	-27.93	16.82
	Min. H_z	18	308.46	35.42	-21.29
Leg B	Max. Vert	10	320.64	-36.73	-22.61
	Max. H_x	23	-260.04	29.77	18.46
	Max. H_z	23	-260.04	29.77	18.46
	Min. Vert	23	-260.04	29.77	18.46
	Min. H_x	10	320.64	-36.73	-22.61
	Min. H_z	10	320.64	-36.73	-22.61
Leg A	Max. Vert	2	316.43	-0.05	42.17
	Max. H_x	20	27.18	1.46	3.14
	Max. H_z	2	316.43	-0.05	42.17
	Min. Vert	15	-248.84	0.02	-33.78
	Min. H_x	11	-129.18	-1.60	-17.87
	Min. H_z	15	-248.84	0.02	-33.78

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	66.85	0.00	0.00	-25.20	-3.09	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	80.22	-0.14	-58.95	-6522.83	27.14	-1.32
0.9 Dead+1.0 Wind 0 deg - No Ice	60.17	-0.14	-58.95	-6515.27	28.07	-1.32
1.2 Dead+1.0 Wind 30 deg - No Ice	80.22	26.41	-47.29	-5284.92	-2908.86	-14.09
0.9 Dead+1.0 Wind 30 deg - No Ice	60.17	26.41	-47.29	-5277.36	-2907.94	-14.09
1.2 Dead+1.0 Wind 60 deg - No Ice	80.22	45.61	-26.99	-3035.05	-5056.68	-28.91
0.9 Dead+1.0 Wind 60 deg - No Ice	60.17	45.61	-26.99	-3027.49	-5055.75	-28.91
1.2 Dead+1.0 Wind 90 deg - No Ice	80.22	55.66	0.18	-9.73	-6160.72	-51.69
0.9 Dead+1.0 Wind 90 deg - No Ice	60.17	55.66	0.18	-2.17	-6159.79	-51.69
1.2 Dead+1.0 Wind 120 deg - No Ice	80.22	52.13	30.87	3352.76	-5705.74	-52.96
0.9 Dead+1.0 Wind 120 deg - No Ice	60.17	52.13	30.87	3360.32	-5704.81	-52.96
1.2 Dead+1.0 Wind 150 deg - No Ice	80.22	28.41	50.33	5519.82	-3132.31	-26.13
0.9 Dead+1.0 Wind 150 deg - No Ice	60.17	28.41	50.33	5527.38	-3131.38	-26.13
1.2 Dead+1.0 Wind 180 deg - No Ice	80.22	-0.13	54.88	6047.06	15.98	1.20
0.9 Dead+1.0 Wind 180 deg - No Ice	60.17	-0.13	54.88	6054.62	16.91	1.20
1.2 Dead+1.0 Wind 210 deg - No Ice	80.22	-27.06	47.44	5215.96	3003.91	15.00
0.9 Dead+1.0 Wind 210 deg - No Ice	60.17	-27.06	47.44	5223.52	3004.83	15.00
1.2 Dead+1.0 Wind 240 deg - No Ice	80.22	-49.76	29.35	3192.08	5481.71	30.29
0.9 Dead+1.0 Wind 240 deg - No Ice	60.17	-49.76	29.35	3199.64	5482.63	30.29
1.2 Dead+1.0 Wind 270 deg - No Ice	80.22	-56.18	0.24	-9.78	6251.09	52.05
0.9 Dead+1.0 Wind 270 deg - No Ice	60.17	-56.18	0.24	-2.22	6252.01	52.05

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 300 deg - No Ice	80.22	-48.81	-28.69	-3227.70	5422.32	51.70
0.9 Dead+1.0 Wind 300 deg - No Ice	60.17	-48.81	-28.69	-3220.14	5423.24	51.70
1.2 Dead+1.0 Wind 330 deg - No Ice	80.22	-28.45	-50.38	-5626.29	3153.03	24.86
0.9 Dead+1.0 Wind 330 deg - No Ice	60.17	-28.45	-50.38	-5618.73	3153.96	24.86
1.2 Dead+1.0 Ice+1.0 Temp	209.43	0.00	0.00	-127.14	12.04	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	209.43	0.00	-13.15	-1617.91	13.80	-2.25
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	209.43	6.18	-11.02	-1382.82	-686.47	-3.78
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	209.43	10.67	-6.33	-849.74	-1198.38	-5.17
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	209.43	12.63	0.00	-126.61	-1419.00	-7.22
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	209.43	11.31	6.70	630.37	-1261.96	-6.47
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	209.43	6.38	11.35	1159.90	-708.67	-1.98
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	209.43	-0.04	12.80	1326.74	16.28	2.23
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	209.43	-6.26	11.04	1127.51	722.72	3.89
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	209.43	-11.05	6.55	615.05	1263.03	5.33
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	209.43	-12.69	0.05	-122.81	1454.70	7.26
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	209.43	-11.03	-6.50	-868.86	1264.06	6.32
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	209.43	-6.39	-11.36	-1419.67	736.10	1.83
Dead+Wind 0 deg - Service	66.85	-0.03	-14.74	-1648.35	4.62	-0.33
Dead+Wind 30 deg - Service	66.85	6.60	-11.82	-1338.87	-729.38	-3.52
Dead+Wind 60 deg - Service	66.85	11.40	-6.75	-776.40	-1266.33	-7.23
Dead+Wind 90 deg - Service	66.85	13.92	0.05	-20.07	-1542.34	-12.92
Dead+Wind 120 deg - Service	66.85	13.03	7.72	820.55	-1428.60	-13.24
Dead+Wind 150 deg - Service	66.85	7.10	12.58	1362.31	-785.24	-6.53
Dead+Wind 180 deg - Service	66.85	-0.03	13.72	1494.12	1.84	0.30
Dead+Wind 210 deg - Service	66.85	-6.76	11.86	1286.35	748.82	3.75
Dead+Wind 240 deg - Service	66.85	-12.44	7.34	780.38	1368.27	7.57
Dead+Wind 270 deg - Service	66.85	-14.05	0.06	-20.09	1560.61	13.01
Dead+Wind 300 deg - Service	66.85	-12.20	-7.17	-824.57	1353.42	12.92
Dead+Wind 330 deg - Service	66.85	-7.11	-12.60	-1424.21	786.10	6.22

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	-66.85	0.00	-0.00	66.85	-0.00	0.000%
2	-0.14	-80.22	-58.95	0.14	80.22	58.95	0.000%
3	-0.14	-60.17	-58.95	0.14	60.17	58.95	0.000%
4	26.41	-80.22	-47.29	-26.41	80.22	47.29	0.000%
5	26.41	-60.17	-47.29	-26.41	60.17	47.29	0.000%
6	45.61	-80.22	-26.99	-45.61	80.22	26.99	0.000%
7	45.61	-60.17	-26.99	-45.61	60.17	26.99	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
8	55.66	-80.22	0.18	-55.66	80.22	-0.18	0.000%
9	55.66	-60.17	0.18	-55.66	60.17	-0.18	0.000%
10	52.13	-80.22	30.87	-52.13	80.22	-30.87	0.000%
11	52.13	-60.17	30.87	-52.13	60.17	-30.87	0.000%
12	28.41	-80.22	50.33	-28.41	80.22	-50.33	0.000%
13	28.41	-60.17	50.33	-28.41	60.17	-50.33	0.000%
14	-0.13	-80.22	54.88	0.13	80.22	-54.88	0.000%
15	-0.13	-60.17	54.88	0.13	60.17	-54.88	0.000%
16	-27.06	-80.22	47.44	27.06	80.22	-47.44	0.000%
17	-27.06	-60.17	47.44	27.06	60.17	-47.44	0.000%
18	-49.76	-80.22	29.35	49.76	80.22	-29.35	0.000%
19	-49.76	-60.17	29.35	49.76	60.17	-29.35	0.000%
20	-56.18	-80.22	0.24	56.18	80.22	-0.24	0.000%
21	-56.18	-60.17	0.24	56.18	60.17	-0.24	0.000%
22	-48.81	-80.22	-28.69	48.81	80.22	28.69	0.000%
23	-48.81	-60.17	-28.69	48.81	60.17	28.69	0.000%
24	-28.45	-80.22	-50.38	28.45	80.22	50.38	0.000%
25	-28.45	-60.17	-50.38	28.45	60.17	50.38	0.000%
26	0.00	-209.43	0.00	-0.00	209.43	-0.00	0.000%
27	0.00	-209.43	-13.15	-0.00	209.43	13.15	0.000%
28	6.18	-209.43	-11.02	-6.18	209.43	11.02	0.000%
29	10.67	-209.43	-6.33	-10.67	209.43	6.33	0.000%
30	12.63	-209.43	0.00	-12.63	209.43	-0.00	0.000%
31	11.31	-209.43	6.70	-11.31	209.43	-6.70	0.000%
32	6.38	-209.43	11.35	-6.38	209.43	-11.35	0.000%
33	-0.04	-209.43	12.80	0.04	209.43	-12.80	0.000%
34	-6.26	-209.43	11.04	6.26	209.43	-11.04	0.000%
35	-11.05	-209.43	6.55	11.05	209.43	-6.55	0.000%
36	-12.69	-209.43	0.05	12.69	209.43	-0.05	0.000%
37	-11.03	-209.43	-6.50	11.03	209.43	6.50	0.000%
38	-6.39	-209.43	-11.36	6.39	209.43	11.36	0.000%
39	-0.03	-66.85	-14.74	0.03	66.85	14.74	0.000%
40	6.60	-66.85	-11.82	-6.60	66.85	11.82	0.000%
41	11.40	-66.85	-6.75	-11.40	66.85	6.75	0.000%
42	13.92	-66.85	0.05	-13.92	66.85	-0.05	0.000%
43	13.03	-66.85	7.72	-13.03	66.85	-7.72	0.000%
44	7.10	-66.85	12.58	-7.10	66.85	-12.58	0.000%
45	-0.03	-66.85	13.72	0.03	66.85	-13.72	0.000%
46	-6.76	-66.85	11.86	6.76	66.85	-11.86	0.000%
47	-12.44	-66.85	7.34	12.44	66.85	-7.34	0.000%
48	-14.05	-66.85	0.06	14.05	66.85	-0.06	0.000%
49	-12.20	-66.85	-7.17	12.20	66.85	7.17	0.000%
50	-7.11	-66.85	-12.60	7.11	66.85	12.60	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 190	2.9299	43	0.12	0.01
T2	190 - 180	2.8070	43	0.12	0.01
T3	180 - 160	2.5565	43	0.12	0.01
T4	160 - 150	2.0572	43	0.11	0.01
T5	150 - 140	1.8196	43	0.11	0.01
T6	140 - 120	1.5937	43	0.10	0.01
T7	120 - 110	1.1804	43	0.09	0.01
T8	110 - 100	0.9942	43	0.08	0.01
T9	100 - 80	0.8250	43	0.07	0.01
T10	80 - 60	0.5287	43	0.06	0.01
T11	60 - 40	0.3021	43	0.04	0.00
T12	40 - 20	0.1412	43	0.03	0.00
T13	20 - 0	0.0367	43	0.01	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	Pipe Mount [PM 601-1]	43	2.8563	0.12	0.01	156403
188.00	8 FT DISH	43	2.7574	0.12	0.01	154610
185.00	Side Arm Mount [SO 308-1]	43	2.6824	0.12	0.01	216516
184.00	Side Arm Mount [SO 306-1]	43	2.6573	0.12	0.01	251411
182.00	Pirod 6-8' Box Arm (1)	43	2.6070	0.12	0.01	347056
175.00	site pro1 USF-4U [SO 203-1]	43	2.4303	0.12	0.01	579817
172.00	(2) Side Arm Mount [SO 308-1]	43	2.3547	0.12	0.01	321752
168.00	Sector Mount [SM 408-3]	43	2.2544	0.11	0.01	201922
153.00	Sector Mount [SM 408-3]	43	1.8897	0.11	0.01	107407
143.00	site pro1 USF-4U [SO 203-1]	43	1.6602	0.10	0.01	95270
138.00	Sector Mount [SM 408-3]	43	1.5500	0.10	0.01	91783
120.00	Sector Mount [15' SM 201-1]	43	1.1804	0.09	0.01	89352
118.00	Pirod 6-8' Box Arm (1)	43	1.1419	0.09	0.01	84013
105.00	Pirod 6-8' Box Arm (1)	43	0.9077	0.08	0.01	77720
97.00	8 FT DISH	43	0.7769	0.07	0.01	94106
78.00	Pirod 6-8' Box Arm (1)	43	0.5028	0.06	0.01	63853
31.00	(2) Side Arm Mount [SO 304-1]	43	0.0859	0.02	0.00	73102

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 190	11.6073	10	0.46	0.05
T2	190 - 180	11.1289	10	0.46	0.04
T3	180 - 160	10.1534	10	0.46	0.04
T4	160 - 150	8.2044	10	0.44	0.04
T5	150 - 140	7.2696	10	0.42	0.04
T6	140 - 120	6.3757	11	0.40	0.04
T7	120 - 110	4.7310	11	0.35	0.04
T8	110 - 100	3.9868	11	0.32	0.04
T9	100 - 80	3.3091	11	0.29	0.03
T10	80 - 60	2.1214	11	0.23	0.02
T11	60 - 40	1.2120	11	0.17	0.02
T12	40 - 20	0.5664	11	0.11	0.01
T13	20 - 0	0.1469	11	0.05	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	Pipe Mount [PM 601-1]	10	11.3209	0.46	0.05	39276
188.00	8 FT DISH	10	10.9357	0.46	0.04	39018
185.00	Side Arm Mount [SO 308-1]	10	10.6437	0.46	0.04	55633
184.00	Side Arm Mount [SO 306-1]	10	10.5459	0.46	0.04	67372
182.00	Pirod 6-8' Box Arm (1)	10	10.3499	0.46	0.04	104574
175.00	site pro1 USF-4U [SO 203-1]	10	9.6618	0.46	0.04	220598
172.00	(2) Side Arm Mount [SO 308-1]	10	9.3672	0.45	0.04	107896
168.00	Sector Mount [SM 408-3]	10	8.9762	0.45	0.04	63587
153.00	Sector Mount [SM 408-3]	10	7.5461	0.43	0.04	31011
143.00	site pro1 USF-4U [SO 203-1]	10	6.6391	0.41	0.04	26265
138.00	Sector Mount [SM 408-3]	11	6.2026	0.39	0.04	24994
120.00	Sector Mount [15' SM 201-1]	11	4.7310	0.35	0.04	23118
118.00	Pirod 6-8' Box Arm (1)	11	4.5774	0.34	0.04	21616
105.00	Pirod 6-8' Box Arm (1)	11	3.6403	0.30	0.04	19662
97.00	8 FT DISH	11	3.1163	0.28	0.03	23696

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
78.00	Pirod 6-8' Box Arm (1)	11	2.0173	0.22	0.02	16067
31.00	(2) Side Arm Mount [SO 304-1]	11	0.3444	0.08	0.01	18288

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	195	Leg	A325N	1.0000	6	0.04	54.52	0.001	1	Bolt Tension
		Diagonal	A325N	1.0000	1	0.38	41.76	0.009	1	Member Bearing
T2	190	Leg	A325N	1.0000	6	0.35	54.52	0.006	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	1.88	12.70	0.148	1.05	Member Block Shear
T3	180	Leg	A325N	1.0000	6	2.11	54.52	0.039	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	5.43	15.76	0.345	1.05	Member Block Shear
T4	160	Diagonal	A325N	1.0000	1	7.03	26.27	0.268	1.05	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	1.06	8.84	0.120	1.05	Bolt Shear
T5	150	Leg	A325N	1.0000	6	6.12	54.52	0.112	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	8.07	26.27	0.307	1.05	Member Block Shear
T6	140	Leg	A325N	1.0000	6	11.20	54.52	0.205	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	8.29	26.27	0.315	1.05	Member Block Shear
		Top Girt	A325N	1.0000	1	0.78	26.27	0.030	1.05	Member Block Shear
T7	120	Diagonal	A325N	1.0000	1	9.99	26.27	0.380	1.05	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	1.81	8.84	0.204	1.05	Bolt Shear
T8	110	Leg	A325N	1.0000	6	16.61	54.52	0.305	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	9.98	26.27	0.380	1.05	Member Block Shear
T9	100	Leg	A325N	1.2500	6	22.16	87.22	0.254	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	11.02	24.40	0.452	1.05	Member Block Shear
T10	80	Leg	A325N	1.2500	6	27.51	87.22	0.315	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	11.76	36.60	0.321	1.05	Member Block Shear
T11	60	Leg	A325N	1.2500	6	32.64	87.22	0.374	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	12.36	44.75	0.276	1.05	Member Block Shear
T12	40	Leg	A325N	1.2500	6	37.71	87.22	0.432	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	14.10	44.75	0.315	1.05	Member Block Shear
T13	20	Diagonal	A325N	1.0000	2	8.57	38.92	0.220	1.05	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 190	Pirod 128334 (5' Section)	5.00	5.00	45.4 K=1.00	3.6816	-0.69	142.49	0.005 *1
T2	190 - 180	Pirod 105244	10.00	10.00	45.4 K=1.00	3.6816	-6.35	142.49	0.045 1
T3	180 - 160	Pirod 105216	20.00	10.00	45.4 K=1.00	3.6816	-21.59	142.49	0.152 1
T4	160 - 150	Pirod 105217	10.00	5.00	37.8 K=1.00	5.3014	-35.11	214.86	0.163 1
T5	150 - 140	Pirod 105217	10.00	10.00	37.8 K=1.00	5.3014	-50.88	214.86	0.237 1
T6	140 - 120	Pirod 105218	20.03	10.02	32.4 K=1.00	7.2158	-86.54	300.68	0.288 1
T7	120 - 110	Pirod 105218	10.02	5.18	32.4 K=1.00	7.2158	-104.11	300.68	0.346 1
T8	110 - 100	Pirod 105218	10.02	10.02	32.4 K=1.00	7.2158	-124.15	300.68	0.413 1
T9	100 - 80	Pirod 105219	20.03	10.02	28.4 K=1.00	9.4248	-162.57	399.87	0.407 1
T10	80 - 60	Pirod 105219	20.03	10.02	28.4 K=1.00	9.4248	-201.43	399.87	0.504 1
T11	60 - 40	Pirod 105220	20.03	10.02	25.2 K=1.00	11.928 2	-239.47	512.38	0.467 1
T12	40 - 20	Pirod 105220	20.03	10.02	25.2 K=1.00	11.928 2	-278.25	512.38	0.543 1
T13	20 - 0	Pirod 112738	20.03	20.03	32.6 K=1.00	14.726 2	-297.42	613.14	0.485 1

* DL controls
1 P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T1	195 - 190	0.5	1.48	121.0	165.67	0.1963	0.34	3.39	0.100
T2	190 - 180	0.5	1.48	121.0	165.67	0.1963	0.94	3.39	0.276
T3	180 - 160	0.5	1.48	121.0	165.67	0.1963	0.75	3.29	0.229
T4	160 - 150	0.5	1.47	120.0	238.57	0.1963	1.34	3.34	0.401
T5	150 - 140	0.5	1.47	120.0	238.57	0.1963	0.66	3.34	0.197
T6	140 - 120	0.5	1.46	119.0	324.71	0.1963	1.00	3.38	0.296
T7	120 - 110	0.5	1.46	119.0	324.71	0.1963	1.68	3.38	0.497
T8	110 - 100	0.5	1.46	119.0	324.71	0.1963	0.51	3.38	0.152
T9	100 - 80	0.625	1.45	94.4	424.12	0.3068	0.84	6.96	0.121
T10	80 - 60	0.625	1.45	94.4	424.12	0.3068	0.54	6.96	0.078
T11	60 - 40	0.625	1.43	93.6	536.77	0.3068	0.53	7.01	0.077
T12	40 - 20	0.625	1.43	93.6	536.77	0.3068	2.05	7.01	0.292
T13	20 - 0	0.75	1.73	93.9	662.68	0.4418	1.06	14.36	0.074

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	195 - 190	2L2 1/2x2 1/2x3/16x3/8	7.81	6.74	106.7 K=1.00	1.8000	-0.38	40.64	0.009 *1
T2	190 - 180	2L 'a' > 38.6104 in - 10 L2 1/2x2 1/2x3/16	15.62	6.95	168.5 K=1.00	0.9020	-1.94	9.09	0.214 1
T3	180 - 160	L3x3x3/16	15.62	6.95	140.0 K=1.00	1.0900	-5.62	15.93	0.353 1

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	160 - 150	L3x3x5/16	15.62	6.95	141.6 K=1.00	1.7800	-7.19	25.40	0.283 [1]
T5	150 - 140	L3x3x5/16	15.62	6.95	141.6 K=1.00	1.7800	-8.49	25.40	0.334 [1]
T6	140 - 120	L3x3x5/16	16.80	7.88	160.6 K=1.00	1.7800	-8.33	19.76	0.422 [1]
T7	120 - 110	L3 1/2x3 1/2x5/16	17.62	8.30	144.3 K=1.00	2.0900	-10.60	28.74	0.369 [1]
T8	110 - 100	L3 1/2x3 1/2x5/16	18.45	8.72	151.6 K=1.00	2.0900	-10.01	26.02	0.385 [1]
T9	100 - 80	L4x4x1/4	20.16	9.54	144.0 K=1.00	1.9400	-11.17	26.77	0.417 [1]
T10	80 - 60	L4x4x3/8	21.92	10.43	158.8 K=1.00	2.8600	-11.84	32.46	0.365 [1]
T11	60 - 40	L5x5x3/8	23.71	11.33	137.3 K=1.00	3.6100	-12.11	54.77	0.221 [1]
T12	40 - 20	L5x5x3/8	24.62	11.79	142.9 K=1.00	3.6100	-13.88	50.57	0.274 [1]
T13	20 - 0	2L3 1/2x3 1/2x5/16x3/8 2L 'a' > 82.2703 in - 162	32.02	15.40	176.8 K=1.00	4.1800	-20.40	37.92	0.538 [1]

* DL controls
[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	160 - 150	L3x3x5/16	12.00	10.71	139.4 K=1.00	1.7800	-0.71	26.23	0.027 [1]
T7	120 - 110	L3x3x5/16	14.48	13.19	171.7 K=1.00	1.7800	-1.81	17.28	0.104 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 190	2L2 1/2x2 1/2x3/16x3/8	12.00	8.25	107.2 K=1.00	1.8000	-0.14	40.43	0.003 [1]
T6	140 - 120	2L 'a' > 31.4942 in - 6 L3 1/2x3 1/2x5/16	12.00	10.58	184.1 K=1.00	2.0900	-0.61	17.66	0.035 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	190 - 180	Pirod 105244	10.00	10.00	45.4	3.6816	0.86	165.67	0.005 [1]
T3	180 - 160	Pirod 105216	20.00	10.00	45.4	3.6816	12.67	165.67	0.077 [1]
T4	160 - 150	Pirod 105217	10.00	5.00	37.8	5.3014	22.69	238.57	0.095 [1]
T5	150 - 140	Pirod 105217	10.00	10.00	37.8	5.3014	36.71	238.57	0.154 [1]
T6	140 - 120	Pirod 105218	20.03	10.02	32.4	7.2158	67.20	324.71	0.207 [1]
T7	120 - 110	Pirod 105218	10.02	4.84	32.4	7.2158	82.65	324.71	0.255 [1]
T8	110 - 100	Pirod 105218	10.02	10.02	32.4	7.2158	99.67	324.71	0.307 [1]
T9	100 - 80	Pirod 105219	20.03	10.02	28.4	9.4248	132.96	424.12	0.314 [1]
T10	80 - 60	Pirod 105219	20.03	10.02	28.4	9.4248	165.07	424.12	0.389 [1]
T11	60 - 40	Pirod 105220	20.03	10.02	25.2	11.9282	195.84	536.77	0.365 [1]
T12	40 - 20	Pirod 105220	20.03	10.02	25.2	11.9282	226.27	536.77	0.422 [1]
T13	20 - 0	Pirod 112738	20.03	20.03	32.6	14.7262	242.87	662.68	0.366 [1]

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T1	195 - 190	0.5	1.48	121.0	165.67	0.1963	0.34	3.39	0.100
T2	190 - 180	0.5	1.48	121.0	165.67	0.1963	0.94	3.39	0.276
T3	180 - 160	0.5	1.48	121.0	165.67	0.1963	0.75	3.29	0.229
T4	160 - 150	0.5	1.47	120.0	238.57	0.1963	1.34	3.34	0.401
T5	150 - 140	0.5	1.47	120.0	238.57	0.1963	0.66	3.34	0.197
T6	140 - 120	0.5	1.46	119.0	324.71	0.1963	1.00	3.38	0.296
T7	120 - 110	0.5	1.46	119.0	324.71	0.1963	1.68	3.38	0.497
T8	110 - 100	0.5	1.46	119.0	324.71	0.1963	0.51	3.38	0.152
T9	100 - 80	0.625	1.45	94.4	424.12	0.3068	0.84	6.96	0.121
T10	80 - 60	0.625	1.45	94.4	424.12	0.3068	0.54	6.96	0.078
T11	60 - 40	0.625	1.43	93.6	536.77	0.3068	0.53	7.01	0.077
T12	40 - 20	0.625	1.43	93.6	536.77	0.3068	2.05	7.01	0.292
T13	20 - 0	0.75	1.73	93.9	662.68	0.4418	1.06	14.36	0.074

Diagonal 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	195 - 190	2L2 1/2x2 1/2x3/16x3/8 2L 'a' > 38.6104 in - 10	7.81	6.74	110.4	1.0336	0.04	44.96	0.001 [1]
T2	190 - 180	L2 1/2x2 1/2x3/16	15.62	6.95	110.4	0.5183	1.88	22.55	0.084 [1]
T3	180 - 160	L3x3x3/16	15.62	6.95	91.5	0.6593	5.43	28.68	0.189 [1]
T4	160 - 150	L3x3x5/16	15.62	6.95	93.2	1.0713	7.03	46.60	0.151 [1]
T5	150 - 140	L3x3x5/16	15.62	6.95	93.2	1.0713	8.07	46.60	0.173 [1]
T6	140 - 120	L3x3x5/16	16.80	7.88	105.3	1.0713	8.29	46.60	0.178 [1]
T7	120 - 110	L3 1/2x3 1/2x5/16	17.62	8.30	94.5	1.3038	9.99	56.72	0.176 [1]
T8	110 - 100	L3 1/2x3 1/2x5/16	18.45	8.72	99.2	1.3038	9.98	56.72	0.176 [1]
T9	100 - 80	L4x4x1/4	20.16	9.54	94.0	1.1972	11.02	52.08	0.212 [1]
T10	80 - 60	L4x4x3/8	21.03	9.99	99.9	1.7583	11.76	76.49	0.154 [1]
T11	60 - 40	L5x5x3/8	23.71	11.33	89.1	2.3208	12.36	100.95	0.122 [1]
T12	40 - 20	L5x5x3/8	25.54	12.25	96.1	2.3208	14.10	100.95	0.140 [1]
T13	20 - 0	2L3 1/2x3 1/2x5/16x3/8 2L 'a' > 82.2703 in - 162	32.02	15.40	174.3	2.6077	17.14	113.43	0.151 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	160 - 150	L3x3x5/16	12.00	10.71	143.2	1.1885	1.06	51.70	0.020 [1]
T7	120 - 110	L3x3x5/16	14.48	13.19	175.5	1.1885	1.81	51.70	0.035 [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	195 - 190	2L2 1/2x2 1/2x3/16x3/8	12.00	8.25	84.8	1.8000	0.18	58.32	0.003 [1]
T6	140 - 120	2L 'a' > 31.4942 in - 6 L3 1/2x3 1/2x5/16	12.00	10.58	122.2	1.3038	0.78	56.72	0.014 [1]

[1] P_u / ϕP_n controls

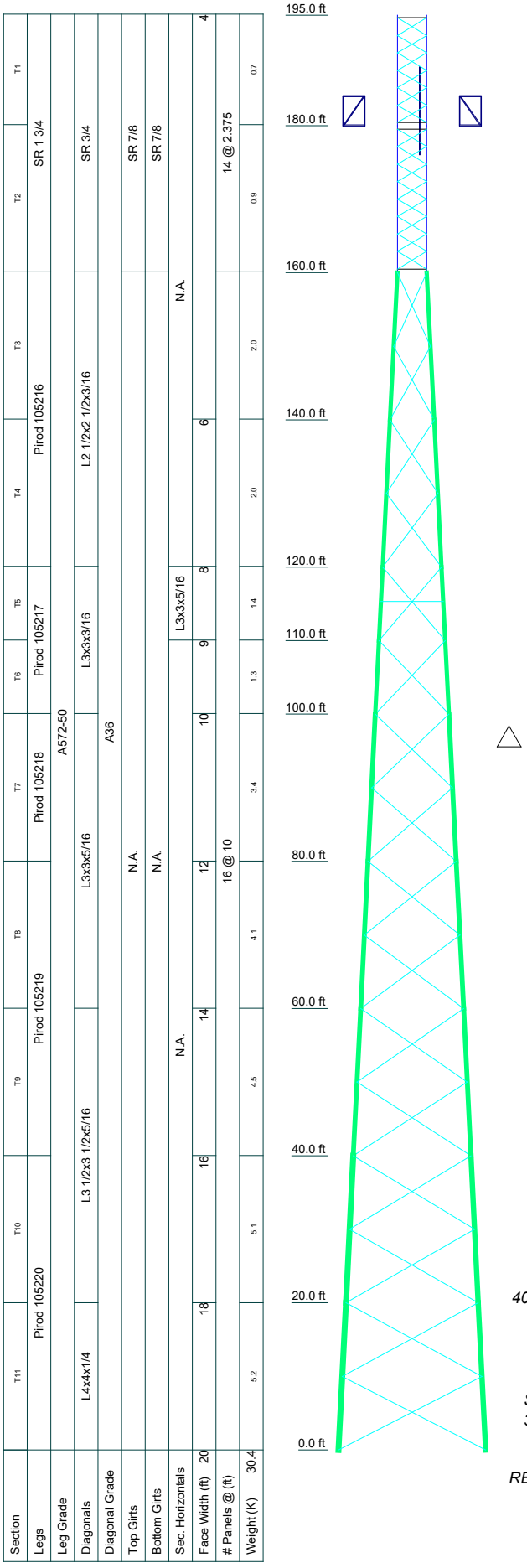
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	195 - 190	Leg	Pirod 128334 (5' Section)	2	-0.69	142.49	10.0	Pass
T2	190 - 180	Leg	Pirod 105244	13	-6.35	149.62	26.3	Pass
T3	180 - 160	Leg	Pirod 105216	23	-13.17	149.62	21.8	Pass
T4	160 - 150	Leg	Pirod 105217	38	-35.11	225.60	38.2	Pass
T5	150 - 140	Leg	Pirod 105217	50	-50.88	225.60	22.6	Pass
T6	140 - 120	Leg	Pirod 105218	59	-69.52	315.72	28.2	Pass
T7	120 - 110	Leg	Pirod 105218	76	-99.81	315.72	47.4	Pass
T8	110 - 100	Leg	Pirod 105218	89	-124.15	315.72	39.3	Pass
T9	100 - 80	Leg	Pirod 105219	98	-162.57	419.86	38.7	Pass
T10	80 - 60	Leg	Pirod 105219	113	-201.43	419.86	48.0	Pass
T11	60 - 40	Leg	Pirod 105220	128	-239.47	537.99	44.5	Pass
T12	40 - 20	Leg	Pirod 105220	143	-278.25	537.99	51.7	Pass
T13	20 - 0	Leg	Pirod 112738	158	-297.42	643.80	46.2	Pass
T1	195 - 190	Diagonal	2L2 1/2x2 1/2x3/16x3/8	10	-0.38	40.64	0.9	Pass
T2	190 - 180	Diagonal	L2 1/2x2 1/2x3/16	16	-1.94	9.55	20.4	Pass
T3	180 - 160	Diagonal	L3x3x3/16	25	-5.62	16.72	33.6	Pass
T4	160 - 150	Diagonal	L3x3x5/16	40	-7.19	26.67	27.0	Pass
T5	150 - 140	Diagonal	L3x3x5/16	52	-8.49	26.67	31.8	Pass
T6	140 - 120	Diagonal	L3x3x5/16	67	-8.33	20.74	40.2	Pass
T7	120 - 110	Diagonal	L3 1/2x3 1/2x5/16	82	-10.60	30.17	35.1 36.2 (b)	Pass
T8	110 - 100	Diagonal	L3 1/2x3 1/2x5/16	94	-10.01	27.32	36.6	Pass
T9	100 - 80	Diagonal	L4x4x1/4	102	-11.17	28.11	39.7 43.0 (b)	Pass
T10	80 - 60	Diagonal	L4x4x3/8	117	-11.84	34.09	34.7	Pass
T11	60 - 40	Diagonal	L5x5x3/8	132	-12.11	57.51	21.1 26.3 (b)	Pass
T12	40 - 20	Diagonal	L5x5x3/8	153	-13.88	53.10	26.1 30.0 (b)	Pass
T13	20 - 0	Diagonal	2L3 1/2x3 1/2x5/16x3/8	162	-20.40	39.81	51.2	Pass
T4	160 - 150	Secondary Horizontal	L3x3x5/16	48	-0.71	27.54	2.6 11.4 (b)	Pass
T7	120 - 110	Secondary Horizontal	L3x3x5/16	85	-1.81	18.15	9.9 19.5 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	195 - 190	Top Girt	2L2 1/2x2 1/2x3/16x3/8	5	-0.13	42.45	0.5	Pass
T6	140 - 120	Top Girt	L3 1/2x3 1/2x5/16	63	-0.61	18.54	3.3	Pass
							Summary	
						Leg (T12)	51.7	Pass
						Diagonal (T13)	51.2	Pass
						Secondary Horizontal (T7)	19.5	Pass
						Top Girt (T6)	3.3	Pass
						Bolt Checks	43.0	Pass
						RATING =	**51.7**	**Pass**

APPENDIX B

INNER TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Pirod 6-8' Box Arm (1)	182	8'x2" Mount Pipe	182
Pirod 6-8' Box Arm (1)	182	ANT220D6-9	182
Pirod 6-8' Box Arm (1)	182	3" Dia 6' Omni	182
8'x2" Mount Pipe	182	3" Dia 6' Omni	182

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 40 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: 39.4%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 201 K
SHEAR: 24 K

UPLIFT: -166 K
SHEAR: 21 K

AXIAL 138 K
SHEAR 9 K
MOMENT 816 kip-ft
TORQUE 5 kip-ft
40 mph WIND - 1.5000 in ICE

AXIAL 47 K
SHEAR 38 K
MOMENT 3217 kip-ft
TORQUE 18 kip-ft
REACTIONS - 120 mph WIND

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FAX:

Job:	***ES-082 ChurchHill (Inner Tower)***		
Project:	***405025***		
Client: Eversource	Drawn by: Robert Hudson II		App'd:
Code: TIA-222-H	Date: 04/29/20		Scale: NTS
Path:			Dwg No. E-1

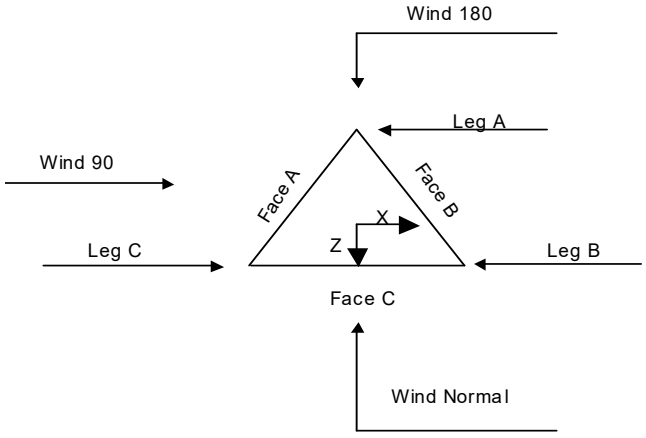
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 20.00 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: 964.00 ft.
- Basic wind speed of 120 mph.
- Risk Category III.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 40 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- 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	195.00-180.00			4.00	1	15.00
T2	180.00-160.00			4.00	1	20.00
T3	160.00-140.00			4.00	1	20.00
T4	140.00-120.00			6.00	1	20.00
T5	120.00-110.00			8.00	1	10.00
T6	110.00-100.00			9.00	1	10.00
T7	100.00-80.00			10.00	1	20.00
T8	80.00-60.00			12.00	1	20.00
T9	60.00-40.00			14.00	1	20.00
T10	40.00-20.00			16.00	1	20.00
T11	20.00-0.00			18.00	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	195.00-180.00	2.38	X Brace	No	No	4.5000	4.5000
T2	180.00-160.00	2.38	X Brace	No	No	6.0000	6.0000
T3	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T5	120.00-110.00	10.00	X Brace	No	Yes	0.0000	0.0000
T6	110.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T7	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T11	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 195.00-180.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 180.00-160.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T3 160.00-140.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 140.00-120.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 120.00-110.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T6 110.00-100.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T7 100.00-80.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T8 80.00-60.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T9 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T10 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T11 20.00-0.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L4x4x1/4	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 195.00-180.00	Solid Round	7/8	A36 (36 ksi)	Solid Round	7/8	A36 (36 ksi)
T2 180.00-160.00	Solid Round	7/8	A36 (36 ksi)	Solid Round	7/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T5 120.00-110.00	Equal Angle	L3x3x5/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 195.00-	0.00	0.0000	A36	1	1	1	Mid-Pt	Mid-Pt	36.0000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
180.00			(36 ksi)						
T2 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T5 120.00-110.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T6 110.00-100.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T7 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T8 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T9 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T10 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T11 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 195.00-180.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 120.00-110.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 110.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T11 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)*

Truss-Leg K Factors	
Truss-Legs Used As Leg Members	Truss-Legs Used As Inner Members

Tower Elevation ft	Leg Panels	X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals	Z Brace Diagonals
T3 160.00-140.00	1	0.5	0.85	1	0.5	0.85
T4 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T5 120.00-110.00	1	0.5	0.85	1	0.5	0.85
T6 110.00-100.00	1	0.5	0.85	1	0.5	0.85
T7 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T8 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T9 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T10 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T11 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 195.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 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
T3 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
T4 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
T5 120.00-110.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 110.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 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
T8 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
T9 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
T10 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
T11 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 195.00-180.00	Flange	0.6250 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0

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.
T2 180.00-160.00	Flange	1.0000 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 160.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-110.00	Flange	1.0000 A325N	0	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T6 110.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 100.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 80.00-60.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 20.00-0.00	Flange	1.2500 A325N	0	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 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
T-Bracket (Af)	A	No	No	Af (CaAa)	195.00 - 6.00	-10.0000	0.4	1	1	1.5000	1.5000		8.40
LDF6-50A(1-1/4)	A	No	No	Ar (CaAa)	153.00 - 6.00	-10.0000	0.4	4	4	0.5000	1.5500		0.60
LDF2-2R(1)	A	No	No	Ar (CaAa)	105.00 - 6.00	-10.0000	0.43	1	1	0.5000	0.9860		0.30
WE65(ELLIPTICAL)	A	No	No	Ar (CaAa)	97.00 - 6.00	-10.0000	0.43	1	1	0.5000	2.0300		0.53
AVA5-50(7/8) **	A	No	No	Ar (CaAa)	78.00 - 6.00	-12.0000	0.4	1	1	0.5000	1.1020		0.30
T-Bracket (Af)	B	No	No	Af (CaAa)	195.00 - 6.00	-10.0000	0.4	1	1	1.5000	1.5000		8.40
WE65(ELLIPTICAL)	B	No	No	Ar (CaAa)	188.00 - 6.00	-10.0000	0.43	1	1	0.5000	2.0300		0.53
LDF7-50A(1-5/8)	B	No	No	Ar (CaAa)	185.00 - 184.00	-10.0000	0.4	1	1	0.5000	1.9800		0.82
LDF7-50A(1-5/8)	B	No	No	Ar (CaAa)	184.00 - 182.00	-10.0000	0.4	2	2	0.5000	1.9800		0.82
LDF7-50A(1-5/8)	B	No	No	Ar (CaAa)	182.00 - 6.00	-12.0000	0.4	3	3	0.5000	1.9800		0.82
LDF2-2R(1)	B	No	No	Ar (CaAa)	182.00 - 6.00	-10.0000	0.43	6	2	0.5000	0.9860		0.30
LDF7-50A(1-5/8)	B	No	No	Ar (CaAa)	172.00 - 6.00	-12.000	0.4	3	3	1.9800	1.9800		0.82

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A(1-5/8)	B	No	No	Ar (CaAa)	78.00 - 6.00	0 - 10.0000	0.4	1	1	0.5000	1.9800		0.82
LDF2-2R(1)	B	No	No	Ar (CaAa)	78.00 - 6.00	0 - 10.0000	0.43	1	1	0.5000	0.9860		0.30
AVA5-50(7/8)	B	No	No	Ar (CaAa)	78.00 - 6.00	0 - 12.0000	0.4	1	1	0.5000	1.1020		0.30
**													
T-Bracket (Af)	C	No	No	Af (CaAa)	195.00 - 6.00	- 10.0000	0.4	1	1	1.5000	1.5000		8.40
AVA5-50(7/8)	C	No	No	Ar (CaAa)	143.00 - 6.00	- 9.0000	0.42	3	2	0.5000	1.1020		0.30
LDF7-50A(1-5/8)	C	No	No	Ar (CaAa)	138.00 - 6.00	- 10.0000	0.4	12	8	0.5000	1.9800		0.82
LDF2-2R(1)	C	No	No	Ar (CaAa)	97.00 - 6.00	- 9.0000	0.4	1	1	0.5000	0.9860		0.30
LDF7-50A(1-5/8)	C	No	No	Ar (CaAa)	78.00 - 6.00	- 10.0000	0.4	1	1	0.5000	1.9800		0.82
AVA5-50(7/8)	C	No	No	Ar (CaAa)	78.00 - 6.00	- 9.0000	0.42	1	1	0.5000	1.1020		0.30
LDF4-50A(1/2)	C	No	No	Ar (CaAa)	32.00 - 6.00	- 9.0000	0.4	1	1	0.5000	0.6250		0.15

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	195.00-180.00	A	0.000	0.000	3.750	0.000	0.13
		B	0.000	0.000	8.666	0.000	0.14
		C	0.000	0.000	3.750	0.000	0.13
T2	180.00-160.00	A	0.000	0.000	5.000	0.000	0.17
		B	0.000	0.000	39.900	0.000	0.29
		C	0.000	0.000	5.000	0.000	0.17
T3	160.00-140.00	A	0.000	0.000	13.060	0.000	0.20
		B	0.000	0.000	44.652	0.000	0.31
		C	0.000	0.000	5.992	0.000	0.17
T4	140.00-120.00	A	0.000	0.000	17.400	0.000	0.22
		B	0.000	0.000	44.652	0.000	0.31
		C	0.000	0.000	54.380	0.000	0.36
T5	120.00-110.00	A	0.000	0.000	8.700	0.000	0.11
		B	0.000	0.000	22.326	0.000	0.16
		C	0.000	0.000	29.566	0.000	0.19
T6	110.00-100.00	A	0.000	0.000	9.193	0.000	0.11
		B	0.000	0.000	22.326	0.000	0.16
		C	0.000	0.000	29.566	0.000	0.19
T7	100.00-80.00	A	0.000	0.000	22.823	0.000	0.23
		B	0.000	0.000	44.652	0.000	0.31
		C	0.000	0.000	60.808	0.000	0.39
T8	80.00-60.00	A	0.000	0.000	25.416	0.000	0.24
		B	0.000	0.000	51.974	0.000	0.34
		C	0.000	0.000	66.652	0.000	0.41
T9	60.00-40.00	A	0.000	0.000	25.636	0.000	0.24
		B	0.000	0.000	52.788	0.000	0.34
		C	0.000	0.000	67.268	0.000	0.41
T10	40.00-20.00	A	0.000	0.000	25.636	0.000	0.24
		B	0.000	0.000	52.788	0.000	0.34
		C	0.000	0.000	68.018	0.000	0.41

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T11	20.00-0.00	A	0.000	0.000	17.945	0.000	0.17
		B	0.000	0.000	36.952	0.000	0.24
		C	0.000	0.000	47.963	0.000	0.29

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	195.00-180.00	A	2.052	0.000	0.000	9.907	0.000	0.29
		B		0.000	0.000	23.551	0.000	0.50
		C		0.000	0.000	9.907	0.000	0.29
T2	180.00-160.00	A	2.032	0.000	0.000	13.129	0.000	0.38
		B		0.000	0.000	105.402	0.000	1.74
		C		0.000	0.000	13.129	0.000	0.38
T3	160.00-140.00	A	2.007	0.000	0.000	34.101	0.000	0.67
		B		0.000	0.000	119.901	0.000	1.94
		C		0.000	0.000	16.591	0.000	0.42
T4	140.00-120.00	A	1.978	0.000	0.000	45.145	0.000	0.81
		B		0.000	0.000	119.092	0.000	1.92
		C		0.000	0.000	92.198	0.000	1.70
T5	120.00-110.00	A	1.954	0.000	0.000	22.444	0.000	0.40
		B		0.000	0.000	59.204	0.000	0.95
		C		0.000	0.000	48.985	0.000	0.90
T6	110.00-100.00	A	1.937	0.000	0.000	24.779	0.000	0.43
		B		0.000	0.000	58.953	0.000	0.94
		C		0.000	0.000	48.830	0.000	0.89
T7	100.00-80.00	A	1.907	0.000	0.000	63.919	0.000	1.09
		B		0.000	0.000	117.065	0.000	1.85
		C		0.000	0.000	105.303	0.000	1.88
T8	80.00-60.00	A	1.860	0.000	0.000	73.469	0.000	1.22
		B		0.000	0.000	143.131	0.000	2.22
		C		0.000	0.000	124.665	0.000	2.16
T9	60.00-40.00	A	1.798	0.000	0.000	73.041	0.000	1.18
		B		0.000	0.000	143.695	0.000	2.19
		C		0.000	0.000	124.957	0.000	2.12
T10	40.00-20.00	A	1.709	0.000	0.000	71.015	0.000	1.12
		B		0.000	0.000	140.086	0.000	2.07
		C		0.000	0.000	127.172	0.000	2.08
T11	20.00-0.00	A	1.531	0.000	0.000	46.900	0.000	0.70
		B		0.000	0.000	93.052	0.000	1.30
		C		0.000	0.000	87.126	0.000	1.34

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	195.00-180.00	1.4835	2.0229	0.7953	1.0794
T2	180.00-160.00	4.8482	6.8637	2.8718	4.2695
T3	160.00-140.00	3.9548	3.2580	1.5107	1.4298
T4	140.00-120.00	-3.9395	3.8010	-0.6275	3.0528
T5	120.00-110.00	-4.5356	3.8952	-0.8944	3.4484
T6	110.00-100.00	-5.0950	4.1370	-1.0089	3.8532
T7	100.00-80.00	-5.6140	3.1996	-1.7623	2.8149
T8	80.00-60.00	-5.4481	4.4994	-1.0381	4.8460
T9	60.00-40.00	-5.6129	4.8506	-0.9835	5.4339
T10	40.00-20.00	-6.1310	5.2831	-1.7846	6.2463
T11	20.00-0.00	-4.9493	4.2238	-1.9935	5.3739

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	T-Bracket (Af)	180.00 - 195.00	0.6000	0.4118
T1	7	T-Bracket (Af)	180.00 - 195.00	0.6000	0.4118
T1	8	WE65(ELLIPTICAL)	180.00 - 188.00	0.6000	0.4118
T1	9	LDF7-50A(1-5/8)	184.00 - 185.00	0.6000	0.4118
T1	10	LDF7-50A(1-5/8)	182.00 - 184.00	0.6000	0.4118
T1	11	LDF7-50A(1-5/8)	180.00 - 182.00	0.6000	0.4118
T1	12	LDF2-2R(1)	180.00 - 182.00	0.6000	0.4118
T1	18	T-Bracket (Af)	180.00 - 195.00	0.6000	0.4118
T2	1	T-Bracket (Af)	160.00 - 180.00	0.6000	0.4277
T2	7	T-Bracket (Af)	160.00 - 180.00	0.6000	0.4277
T2	8	WE65(ELLIPTICAL)	160.00 - 180.00	0.6000	0.4277
T2	11	LDF7-50A(1-5/8)	160.00 - 180.00	0.6000	0.4277
T2	12	LDF2-2R(1)	160.00 - 180.00	0.6000	0.4277
T2	13	LDF7-50A(1-5/8)	160.00 - 172.00	0.6000	0.4277
T2	18	T-Bracket (Af)	160.00 - 180.00	0.6000	0.4277
T3	1	T-Bracket (Af)	140.00 - 160.00	0.6000	0.2313
T3	2	LDF6-50A(1-1/4)	140.00 - 153.00	0.6000	0.2313
T3	7	T-Bracket (Af)	140.00 - 160.00	0.6000	0.2313
T3	8	WE65(ELLIPTICAL)	140.00 - 160.00	0.6000	0.2313
T3	11	LDF7-50A(1-5/8)	140.00 - 160.00	0.6000	0.2313
T3	12	LDF2-2R(1)	140.00 - 160.00	0.6000	0.2313
T3	13	LDF7-50A(1-5/8)	140.00 - 160.00	0.6000	0.2313
T3	18	T-Bracket (Af)	140.00 - 160.00	0.6000	0.2313
T3	19	AVA5-50(7/8)	140.00 - 143.00	0.6000	0.2313
T4	1	T-Bracket (Af)	120.00 - 140.00	0.6000	0.4028
T4	2	LDF6-50A(1-1/4)	120.00 - 140.00	0.6000	0.4028
T4	7	T-Bracket (Af)	120.00 - 140.00	0.6000	0.4028
T4	8	WE65(ELLIPTICAL)	120.00 - 140.00	0.6000	0.4028
T4	11	LDF7-50A(1-5/8)	120.00 - 140.00	0.6000	0.4028
T4	12	LDF2-2R(1)	120.00 - 140.00	0.6000	0.4028
T4	13	LDF7-50A(1-5/8)	120.00 - 140.00	0.6000	0.4028
T4	18	T-Bracket (Af)	120.00 - 140.00	0.6000	0.4028

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	19	AVA5-50(7/8)	120.00 - 140.00	0.6000	0.4028
T4	20	LDF7-50A(1-5/8)	120.00 - 138.00	0.6000	0.4028
T5	1	T-Bracket (Af)	110.00 - 120.00	0.6000	0.4251
T5	2	LDF6-50A(1-1/4)	110.00 - 120.00	0.6000	0.4251
T5	7	T-Bracket (Af)	110.00 - 120.00	0.6000	0.4251
T5	8	WE65(ELLIPTICAL)	110.00 - 120.00	0.6000	0.4251
T5	11	LDF7-50A(1-5/8)	110.00 - 120.00	0.6000	0.4251
T5	12	LDF2-2R(1)	110.00 - 120.00	0.6000	0.4251
T5	13	LDF7-50A(1-5/8)	110.00 - 120.00	0.6000	0.4251
T5	18	T-Bracket (Af)	110.00 - 120.00	0.6000	0.4251
T5	19	AVA5-50(7/8)	110.00 - 120.00	0.6000	0.4251
T5	20	LDF7-50A(1-5/8)	110.00 - 120.00	0.6000	0.4251
T6	1	T-Bracket (Af)	100.00 - 110.00	0.6000	0.5109
T6	2	LDF6-50A(1-1/4)	100.00 - 110.00	0.6000	0.5109
T6	3	LDF2-2R(1)	100.00 - 105.00	0.6000	0.5109
T6	7	T-Bracket (Af)	100.00 - 110.00	0.6000	0.5109
T6	8	WE65(ELLIPTICAL)	100.00 - 110.00	0.6000	0.5109
T6	11	LDF7-50A(1-5/8)	100.00 - 110.00	0.6000	0.5109
T6	12	LDF2-2R(1)	100.00 - 110.00	0.6000	0.5109
T6	13	LDF7-50A(1-5/8)	100.00 - 110.00	0.6000	0.5109
T6	18	T-Bracket (Af)	100.00 - 110.00	0.6000	0.5109
T6	19	AVA5-50(7/8)	100.00 - 110.00	0.6000	0.5109
T6	20	LDF7-50A(1-5/8)	100.00 - 110.00	0.6000	0.5109
T7	1	T-Bracket (Af)	80.00 - 100.00	0.6000	0.5583
T7	2	LDF6-50A(1-1/4)	80.00 - 100.00	0.6000	0.5583
T7	3	LDF2-2R(1)	80.00 - 100.00	0.6000	0.5583
T7	4	WE65(ELLIPTICAL)	80.00 - 97.00	0.6000	0.5583
T7	7	T-Bracket (Af)	80.00 - 100.00	0.6000	0.5583
T7	8	WE65(ELLIPTICAL)	80.00 - 100.00	0.6000	0.5583
T7	11	LDF7-50A(1-5/8)	80.00 - 100.00	0.6000	0.5583
T7	12	LDF2-2R(1)	80.00 - 100.00	0.6000	0.5583
T7	13	LDF7-50A(1-5/8)	80.00 - 100.00	0.6000	0.5583
T7	18	T-Bracket (Af)	80.00 - 100.00	0.6000	0.5583
T7	19	AVA5-50(7/8)	80.00 - 100.00	0.6000	0.5583
T7	20	LDF7-50A(1-5/8)	80.00 -	0.6000	0.5583

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	21	LDF2-2R(1)	100.00 80.00 - 97.00	0.6000	0.5583
T8	1	T-Bracket (Af)	60.00 - 80.00	0.6000	0.6000
T8	2	LDF6-50A(1-1/4)	60.00 - 80.00	0.6000	0.6000
T8	3	LDF2-2R(1)	60.00 - 80.00	0.6000	0.6000
T8	4	WE65(ELLIPTICAL)	60.00 - 80.00	0.6000	0.6000
T8	5	AVA5-50(7/8)	60.00 - 78.00	0.6000	0.6000
T8	7	T-Bracket (Af)	60.00 - 80.00	0.6000	0.6000
T8	8	WE65(ELLIPTICAL)	60.00 - 80.00	0.6000	0.6000
T8	11	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T8	12	LDF2-2R(1)	60.00 - 80.00	0.6000	0.6000
T8	13	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T8	14	LDF7-50A(1-5/8)	60.00 - 78.00	0.6000	0.6000
T8	15	LDF2-2R(1)	60.00 - 78.00	0.6000	0.6000
T8	16	AVA5-50(7/8)	60.00 - 78.00	0.6000	0.6000
T8	18	T-Bracket (Af)	60.00 - 80.00	0.6000	0.6000
T8	19	AVA5-50(7/8)	60.00 - 80.00	0.6000	0.6000
T8	20	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T8	21	LDF2-2R(1)	60.00 - 80.00	0.6000	0.6000
T8	22	LDF7-50A(1-5/8)	60.00 - 78.00	0.6000	0.6000
T8	23	AVA5-50(7/8)	60.00 - 78.00	0.6000	0.6000
T9	1	T-Bracket (Af)	40.00 - 60.00	0.6000	0.6000
T9	2	LDF6-50A(1-1/4)	40.00 - 60.00	0.6000	0.6000
T9	3	LDF2-2R(1)	40.00 - 60.00	0.6000	0.6000
T9	4	WE65(ELLIPTICAL)	40.00 - 60.00	0.6000	0.6000
T9	5	AVA5-50(7/8)	40.00 - 60.00	0.6000	0.6000
T9	7	T-Bracket (Af)	40.00 - 60.00	0.6000	0.6000
T9	8	WE65(ELLIPTICAL)	40.00 - 60.00	0.6000	0.6000
T9	11	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T9	12	LDF2-2R(1)	40.00 - 60.00	0.6000	0.6000
T9	13	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T9	14	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T9	15	LDF2-2R(1)	40.00 - 60.00	0.6000	0.6000
T9	16	AVA5-50(7/8)	40.00 - 60.00	0.6000	0.6000
T9	18	T-Bracket (Af)	40.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	19	AVA5-50(7/8)	40.00 - 60.00	0.6000	0.6000
T9	20	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T9	21	LDF2-2R(1)	40.00 - 60.00	0.6000	0.6000
T9	22	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T9	23	AVA5-50(7/8)	40.00 - 60.00	0.6000	0.6000
T10	1	T-Bracket (Af)	20.00 - 40.00	0.6000	0.6000
T10	2	LDF6-50A(1-1/4)	20.00 - 40.00	0.6000	0.6000
T10	3	LDF2-2R(1)	20.00 - 40.00	0.6000	0.6000
T10	4	WE65(ELLIPTICAL)	20.00 - 40.00	0.6000	0.6000
T10	5	AVA5-50(7/8)	20.00 - 40.00	0.6000	0.6000
T10	7	T-Bracket (Af)	20.00 - 40.00	0.6000	0.6000
T10	8	WE65(ELLIPTICAL)	20.00 - 40.00	0.6000	0.6000
T10	11	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	12	LDF2-2R(1)	20.00 - 40.00	0.6000	0.6000
T10	13	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	14	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	15	LDF2-2R(1)	20.00 - 40.00	0.6000	0.6000
T10	16	AVA5-50(7/8)	20.00 - 40.00	0.6000	0.6000
T10	18	T-Bracket (Af)	20.00 - 40.00	0.6000	0.6000
T10	19	AVA5-50(7/8)	20.00 - 40.00	0.6000	0.6000
T10	20	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	21	LDF2-2R(1)	20.00 - 40.00	0.6000	0.6000
T10	22	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	23	AVA5-50(7/8)	20.00 - 40.00	0.6000	0.6000
T10	24	LDF4-50A(1/2)	20.00 - 32.00	0.6000	0.6000
T11	1	T-Bracket (Af)	6.00 - 20.00	0.6000	0.6000
T11	2	LDF6-50A(1-1/4)	6.00 - 20.00	0.6000	0.6000
T11	3	LDF2-2R(1)	6.00 - 20.00	0.6000	0.6000
T11	4	WE65(ELLIPTICAL)	6.00 - 20.00	0.6000	0.6000
T11	5	AVA5-50(7/8)	6.00 - 20.00	0.6000	0.6000
T11	7	T-Bracket (Af)	6.00 - 20.00	0.6000	0.6000
T11	8	WE65(ELLIPTICAL)	6.00 - 20.00	0.6000	0.6000
T11	11	LDF7-50A(1-5/8)	6.00 - 20.00	0.6000	0.6000
T11	12	LDF2-2R(1)	6.00 - 20.00	0.6000	0.6000
T11	13	LDF7-50A(1-5/8)	6.00 - 20.00	0.6000	0.6000
T11	14	LDF7-50A(1-5/8)	6.00 - 20.00	0.6000	0.6000
T11	15	LDF2-2R(1)	6.00 - 20.00	0.6000	0.6000
T11	16	AVA5-50(7/8)	6.00 - 20.00	0.6000	0.6000
T11	18	T-Bracket (Af)	6.00 - 20.00	0.6000	0.6000
T11	19	AVA5-50(7/8)	6.00 - 20.00	0.6000	0.6000
T11	20	LDF7-50A(1-5/8)	6.00 - 20.00	0.6000	0.6000
T11	21	LDF2-2R(1)	6.00 - 20.00	0.6000	0.6000
T11	22	LDF7-50A(1-5/8)	6.00 - 20.00	0.6000	0.6000
T11	23	AVA5-50(7/8)	6.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	24	LDF4-50A(1/2)	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pirod 6-8' Box Arm (1)	A	From Face	8.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.50 9.87 15.24 25.98	4.50 9.87 15.24 25.98	0.21 0.28 0.34 0.46
Pirod 6-8' Box Arm (1)	B	From Face	8.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.50 9.87 15.24 25.98	4.50 9.87 15.24 25.98	0.21 0.28 0.34 0.46
Pirod 6-8' Box Arm (1)	C	From Face	8.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.50 9.87 15.24 25.98	4.50 9.87 15.24 25.98	0.21 0.28 0.34 0.46
8'x2" Mount Pipe	A	From Face	8.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8'x2" Mount Pipe	B	From Face	8.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
ANT220D6-9	C	From Face	8.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.30 4.43 5.58 7.11	3.30 4.43 5.58 7.11	0.04 0.06 0.09 0.18
3" Dia 6' Omni	B	From Face	0.00 0.00 3.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.80 2.42 3.04 4.01	1.80 2.42 3.04 4.01	0.01 0.02 0.04 0.09
3" Dia 6' Omni	B	From Face	0.00 0.00 -3.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.80 2.42 3.04 4.01	1.80 2.42 3.04 4.01	0.01 0.02 0.04 0.09
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Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
Pirod 105216	1998.0891	6735.2308	0.51	1.47	6.9378	23.3862	3.6816
Pirod 105216	1998.0891	6710.0229	0.51	1.43	6.9378	23.2987	3.6816
Pirod 105217	2130.7479	6760.7109	0.62	1.43	7.3984	23.4747	5.3014
Pirod 105217	2130.7479	6745.0653	0.62	1.41	7.3984	23.4204	5.3014
Pirod 105218	2263.4687	6790.8768	0.75	1.40	7.8593	23.5794	7.2158
Pirod 105219	2441.8688	6821.0373	0.94	1.39	8.4787	23.6842	9.4248
Pirod 105219	2441.8688	6766.6418	0.94	1.32	8.4787	23.4953	9.4248
Pirod 105220	2578.8005	6759.4803	1.12	1.24	8.9542	23.4704	11.9282
Pirod 105220	2578.8005	6602.3322	1.12	1.05	8.9542	22.9248	11.9282

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	195 - 180	Leg	Max Tension	15	1.68	0.01	0.24
			Max. Compression	31	-3.04	0.00	0.00
			Max. Mx	20	0.60	-0.25	0.00
			Max. My	14	1.51	0.01	0.24
			Max. Vy	8	0.63	0.01	0.00
			Max. Vx	2	-0.61	-0.00	-0.01
		Diagonal	Max Tension	6	0.77	0.00	0.00
			Max. Compression	18	-0.78	0.00	0.00
			Max. Mx	27	0.10	-0.01	0.00
			Max. My	20	0.77	-0.00	-0.00
			Max. Vy	27	0.01	-0.01	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Top Girt	Max Tension	7	0.01	0.00	0.00
			Max. Compression	27	-0.03	0.00	0.00
			Max. Mx	26	-0.02	0.02	0.00
			Max. Vy	26	0.02	0.00	0.00
		Bottom Girt	Max Tension	6	0.41	0.00	0.00
			Max. Compression	19	-0.39	0.00	0.00
			Max. Mx	26	0.03	0.02	0.00
			Max. Vy	26	0.02	0.00	0.00
T2	180 - 160	Leg	Max Tension	7	14.88	0.11	-0.04
			Max. Compression	18	-17.20	0.57	-0.22
			Max. Mx	18	-17.20	0.57	-0.22
			Max. My	2	-16.93	0.05	0.60
			Max. Vy	20	-1.37	0.57	-0.07
			Max. Vx	2	-1.41	0.05	0.60
		Diagonal	Max Tension	21	1.50	0.00	0.00
			Max. Compression	20	-1.52	0.00	0.00
			Max. Mx	31	0.40	-0.01	-0.00
			Max. My	18	-0.87	-0.00	-0.00
			Max. Vy	31	0.01	-0.01	-0.00
			Max. Vx	18	-0.00	0.00	0.00
		Top Girt	Max Tension	19	0.35	0.00	0.00
			Max. Compression	6	-0.35	0.00	0.00
			Max. Mx	26	-0.01	0.02	0.00
			Max. Vy	26	0.02	0.00	0.00
		Bottom Girt	Max Tension	6	0.26	0.00	0.00
			Max. Compression	19	-0.25	0.00	0.00
			Max. Mx	26	0.02	0.02	0.00
			Max. Vy	26	0.02	0.00	0.00
T3	160 - 140	Leg	Max Tension	7	22.73	-1.29	-0.07
			Max. Compression	18	-26.61	1.65	0.05
			Max. Mx	18	-26.61	1.65	0.05
			Max. My	16	-2.06	-0.11	2.03
			Max. Vy	22	0.19	-1.30	0.02
			Max. Vx	16	-0.31	-0.11	2.03
		Diagonal	Max Tension	20	2.78	0.00	0.00
			Max. Compression	20	-2.79	0.00	0.00
			Max. Mx	31	0.56	0.05	0.01
			Max. My	6	-1.56	-0.01	-0.01
			Max. Vy	33	0.03	0.04	-0.01
			Max. Vx	30	0.00	0.00	0.00
T4	140 - 120	Leg	Max Tension	7	36.40	-1.65	-0.04
			Max. Compression	18	-42.70	0.67	0.08
			Max. Mx	6	35.64	-1.68	-0.04
			Max. My	16	-3.12	-0.09	2.04
			Max. Vy	6	-0.21	-1.68	-0.04
			Max. Vx	12	0.24	-0.10	-1.96
		Diagonal	Max Tension	21	3.40	0.00	0.00
			Max. Compression	18	-3.60	0.00	0.00
			Max. Mx	31	0.44	0.06	0.01
			Max. My	34	0.51	0.06	0.01
			Max. Vy	33	0.04	0.06	-0.01
			Max. Vx	34	-0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T5	120 - 110	Leg	Max Tension	15	44.08	-0.75	-0.00
			Max. Compression	18	-51.41	-0.04	0.01
			Max. Mx	18	-51.28	5.34	-0.05
			Max. My	16	-4.06	-0.23	2.13
			Max. Vy	18	1.08	5.34	-0.05
			Max. Vx	16	-0.46	-0.23	2.13
		Diagonal	Max Tension	21	4.09	0.03	0.01
			Max. Compression	18	-4.43	0.00	0.00
			Max. Mx	31	0.23	0.08	0.01
			Max. My	18	1.53	0.05	0.01
			Max. Vy	33	0.05	0.08	-0.00
			Max. Vx	35	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	8	1.39	0.01	-0.01
			Max. Compression	9	-1.16	0.01	0.01
			Max. Mx	35	0.49	0.05	0.02
			Max. My	32	0.01	0.05	0.02
			Max. Vy	35	-0.06	0.05	0.02
			Max. Vx	32	0.01	0.00	0.00
T6	110 - 100	Leg	Max Tension	15	53.51	-0.34	-0.00
			Max. Compression	2	-62.62	2.74	0.05
			Max. Mx	2	-62.62	2.74	0.05
			Max. My	16	-4.80	0.03	2.51
			Max. Vy	2	-0.40	2.74	0.05
			Max. Vx	24	-0.20	0.02	2.42
		Diagonal	Max Tension	9	3.80	0.00	0.00
			Max. Compression	18	-4.08	0.00	0.00
			Max. Mx	31	0.39	0.09	-0.01
			Max. My	29	-1.00	0.07	-0.01
			Max. Vy	33	0.06	0.09	-0.01
			Max. Vx	29	0.00	0.00	0.00
T7	100 - 80	Leg	Max Tension	15	73.08	-1.91	-0.03
			Max. Compression	2	-86.01	2.09	0.02
			Max. Mx	2	-74.14	2.74	0.05
			Max. My	16	-5.28	0.03	2.51
			Max. Vy	3	0.21	2.74	0.05
			Max. Vx	12	-0.22	0.02	-2.43
		Diagonal	Max Tension	8	4.65	0.00	0.00
			Max. Compression	2	-4.89	0.00	0.00
			Max. Mx	33	0.63	0.13	-0.02
			Max. My	35	0.41	0.13	0.02
			Max. Vy	33	0.08	0.13	-0.02
			Max. Vx	35	-0.00	0.00	0.00
T8	80 - 60	Leg	Max Tension	15	93.96	-2.18	-0.02
			Max. Compression	2	-111.43	2.61	0.04
			Max. Mx	3	-109.38	2.61	0.04
			Max. My	16	-8.52	-0.02	2.47
			Max. Vy	14	0.18	-2.54	-0.04
			Max. Vx	12	0.22	-0.02	-2.43
		Diagonal	Max Tension	8	5.41	0.00	0.00
			Max. Compression	2	-5.62	0.00	0.00
			Max. Mx	33	0.79	0.16	-0.02
			Max. My	35	-1.55	0.15	0.02
			Max. Vy	33	0.09	0.16	-0.02
			Max. Vx	35	-0.01	0.00	0.00
T9	60 - 40	Leg	Max Tension	15	115.86	-2.28	-0.02
			Max. Compression	2	-138.26	2.43	0.01
			Max. Mx	3	-122.05	2.61	0.04
			Max. My	16	-9.62	-0.06	2.51
			Max. Vy	6	-0.16	-2.42	-0.07
			Max. Vx	12	-0.17	-0.06	-2.45
		Diagonal	Max Tension	8	6.27	0.00	0.00
			Max. Compression	2	-6.52	0.00	0.00
			Max. Mx	33	0.96	0.23	-0.03
			Max. My	35	0.78	0.22	0.03
			Max. Vy	33	0.12	0.23	-0.03
			Max. Vx	35	-0.01	0.00	0.00
T10	40 - 20	Leg	Max Tension	15	138.43	-2.61	-0.02
			Max. Compression	2	-166.29	2.60	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	33	-0.34	-5.60	0.00
			Max. My	16	-11.26	-0.01	2.39
			Max. Vy	29	0.76	-5.56	-0.03
			Max. Vx	12	-0.20	-0.06	-2.24
		Diagonal	Max Tension	8	6.99	0.00	0.00
			Max. Compression	2	-7.31	0.00	0.00
			Max. Mx	33	1.87	0.26	-0.03
			Max. My	35	-1.07	0.24	0.03
			Max. Vy	33	0.13	0.26	-0.03
			Max. Vx	35	-0.01	0.00	0.00
T11	20 - 0	Leg	Max Tension	15	160.68	-2.76	-0.01
			Max. Compression	2	-194.00	0.00	0.00
			Max. Mx	35	-83.08	8.09	-0.06
			Max. My	16	-14.73	-0.29	4.48
			Max. Vy	29	-1.29	-5.56	-0.03
			Max. Vx	16	0.56	-0.29	4.48
		Diagonal	Max Tension	15	7.85	0.00	0.00
			Max. Compression	2	-8.64	0.00	0.00
			Max. Mx	33	-1.04	0.31	-0.03
			Max. My	35	4.54	0.23	0.04
			Max. Vy	33	0.13	0.31	-0.03
			Max. Vx	35	-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	190.74	19.73	-10.79
	Max. H_x	18	190.74	19.73	-10.79
	Max. H_z	5	-140.98	-14.67	9.56
	Min. Vert	7	-154.60	-16.69	9.05
	Min. H_x	7	-154.60	-16.69	9.05
	Min. H_z	18	190.74	19.73	-10.79
Leg B	Max. Vert	10	190.83	-19.68	-11.03
	Max. H_x	23	-155.14	16.65	9.29
	Max. H_z	23	-155.14	16.65	9.29
	Min. Vert	23	-155.14	16.65	9.29
	Min. H_x	10	190.83	-19.68	-11.03
	Min. H_z	10	190.83	-19.68	-11.03
Leg A	Max. Vert	2	201.34	-0.36	24.04
	Max. H_x	21	11.47	1.87	0.98
	Max. H_z	2	201.34	-0.36	24.04
	Min. Vert	15	-166.48	0.35	-20.56
	Min. H_x	8	15.30	-1.88	1.31
	Min. H_z	15	-166.48	0.35	-20.56

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	39.25	0.00	0.00	5.82	2.13	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	47.10	0.00	-38.02	-3215.38	2.55	-12.22
0.9 Dead+1.0 Wind 0 deg - No Ice	35.32	0.00	-38.02	-3217.13	1.91	-12.22
1.2 Dead+1.0 Wind 30 deg - No Ice	47.10	17.80	-30.83	-2643.06	-1527.45	8.84
0.9 Dead+1.0 Wind 30 deg - No Ice	35.32	17.80	-30.83	-2644.80	-1528.09	8.84

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 60 deg - No Ice	47.10	28.82	-16.64	-1436.02	-2496.80	17.87
0.9 Dead+1.0 Wind 60 deg - No Ice	35.32	28.82	-16.64	-1437.76	-2497.44	17.87
1.2 Dead+1.0 Wind 90 deg - No Ice	47.10	33.47	0.00	6.99	-2903.33	11.98
0.9 Dead+1.0 Wind 90 deg - No Ice	35.32	33.47	0.00	5.24	-2903.96	11.98
1.2 Dead+1.0 Wind 120 deg - No Ice	47.10	30.72	17.74	1523.06	-2623.37	9.81
0.9 Dead+1.0 Wind 120 deg - No Ice	35.32	30.72	17.74	1521.32	-2624.01	9.81
1.2 Dead+1.0 Wind 150 deg - No Ice	47.10	17.49	30.30	2592.05	-1489.93	17.99
0.9 Dead+1.0 Wind 150 deg - No Ice	35.32	17.49	30.30	2590.30	-1490.57	17.99
1.2 Dead+1.0 Wind 180 deg - No Ice	47.10	-0.00	35.96	3089.29	2.55	12.22
0.9 Dead+1.0 Wind 180 deg - No Ice	35.32	-0.00	35.96	3087.54	1.91	12.22
1.2 Dead+1.0 Wind 210 deg - No Ice	47.10	-17.80	30.83	2657.03	1532.56	-8.84
0.9 Dead+1.0 Wind 210 deg - No Ice	35.32	-17.80	30.83	2655.28	1531.92	-8.84
1.2 Dead+1.0 Wind 240 deg - No Ice	47.10	-30.60	17.66	1520.02	2623.20	-17.87
0.9 Dead+1.0 Wind 240 deg - No Ice	35.32	-30.60	17.66	1518.27	2622.57	-17.87
1.2 Dead+1.0 Wind 270 deg - No Ice	47.10	-33.47	-0.00	6.99	2908.43	-11.98
0.9 Dead+1.0 Wind 270 deg - No Ice	35.32	-33.47	-0.00	5.24	2907.79	-11.98
1.2 Dead+1.0 Wind 300 deg - No Ice	47.10	-28.94	-16.71	-1439.06	2507.17	-9.81
0.9 Dead+1.0 Wind 300 deg - No Ice	35.32	-28.94	-16.71	-1440.80	2506.54	-9.81
1.2 Dead+1.0 Wind 330 deg - No Ice	47.10	-17.49	-30.30	-2578.07	1495.04	-17.99
0.9 Dead+1.0 Wind 330 deg - No Ice	35.32	-17.49	-30.30	-2579.82	1494.40	-17.99
1.2 Dead+1.0 Ice+1.0 Temp	138.34	-0.00	-0.00	44.06	-3.43	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	138.34	-0.00	-8.53	-737.38	-3.43	-0.47
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	138.34	4.22	-7.32	-630.41	-392.83	3.03
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	138.34	7.22	-4.17	-342.27	-672.58	4.58
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	138.34	8.27	-0.00	44.06	-769.71	2.75
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	138.34	7.23	4.18	428.52	-669.32	1.32
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	138.34	4.15	7.18	705.31	-385.20	1.69
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	138.34	-0.00	8.36	814.00	-3.43	0.47
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	138.34	-4.22	7.32	718.54	385.98	-3.03
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	138.34	-7.37	4.25	436.15	675.69	-4.58
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	138.34	-8.27	-0.00	44.06	762.85	-2.75
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	138.34	-7.08	-4.09	-334.64	652.51	-1.32
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	138.34	-4.15	-7.18	-617.19	378.35	-1.69
Dead+Wind 0 deg - Service	39.25	0.00	-9.50	-799.77	2.13	-3.06
Dead+Wind 30 deg - Service	39.25	4.45	-7.71	-656.69	-380.37	2.21
Dead+Wind 60 deg - Service	39.25	7.20	-4.16	-354.93	-622.71	4.47
Dead+Wind 90 deg - Service	39.25	8.37	0.00	5.82	-724.34	3.00

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+Wind 120 deg - Service	39.25	7.68	4.43	384.84	-654.35	2.45
Dead+Wind 150 deg - Service	39.25	4.37	7.57	652.09	-370.99	4.50
Dead+Wind 180 deg - Service	39.25	0.00	8.99	776.40	2.13	3.06
Dead+Wind 210 deg - Service	39.25	-4.45	7.71	668.33	384.63	-2.21
Dead+Wind 240 deg - Service	39.25	-7.65	4.42	384.08	657.29	-4.47
Dead+Wind 270 deg - Service	39.25	-8.37	0.00	5.82	728.60	-3.00
Dead+Wind 300 deg - Service	39.25	-7.23	-4.18	-355.69	628.28	-2.45
Dead+Wind 330 deg - Service	39.25	-4.37	-7.57	-640.44	375.25	-4.50

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	-39.25	0.00	0.00	39.25	0.00	0.000%
2	0.00	-47.10	-38.02	-0.00	47.10	38.02	0.000%
3	0.00	-35.32	-38.02	-0.00	35.32	38.02	0.000%
4	17.80	-47.10	-30.83	-17.80	47.10	30.83	0.000%
5	17.80	-35.32	-30.83	-17.80	35.32	30.83	0.000%
6	28.82	-47.10	-16.64	-28.82	47.10	16.64	0.000%
7	28.82	-35.32	-16.64	-28.82	35.32	16.64	0.000%
8	33.47	-47.10	0.00	-33.47	47.10	-0.00	0.000%
9	33.47	-35.32	0.00	-33.47	35.32	-0.00	0.000%
10	30.72	-47.10	17.74	-30.72	47.10	-17.74	0.000%
11	30.72	-35.32	17.74	-30.72	35.32	-17.74	0.000%
12	17.49	-47.10	30.30	-17.49	47.10	-30.30	0.000%
13	17.49	-35.32	30.30	-17.49	35.32	-30.30	0.000%
14	0.00	-47.10	35.96	0.00	47.10	-35.96	0.000%
15	0.00	-35.32	35.96	0.00	35.32	-35.96	0.000%
16	-17.80	-47.10	30.83	17.80	47.10	-30.83	0.000%
17	-17.80	-35.32	30.83	17.80	35.32	-30.83	0.000%
18	-30.60	-47.10	17.66	30.60	47.10	-17.66	0.000%
19	-30.60	-35.32	17.66	30.60	35.32	-17.66	0.000%
20	-33.47	-47.10	0.00	33.47	47.10	0.00	0.000%
21	-33.47	-35.32	0.00	33.47	35.32	0.00	0.000%
22	-28.94	-47.10	-16.71	28.94	47.10	16.71	0.000%
23	-28.94	-35.32	-16.71	28.94	35.32	16.71	0.000%
24	-17.49	-47.10	-30.30	17.49	47.10	30.30	0.000%
25	-17.49	-35.32	-30.30	17.49	35.32	30.30	0.000%
26	0.00	-138.34	0.00	0.00	138.34	0.00	0.000%
27	0.00	-138.34	-8.53	0.00	138.34	8.53	0.000%
28	4.22	-138.34	-7.32	-4.22	138.34	7.32	0.000%
29	7.22	-138.34	-4.17	-7.22	138.34	4.17	0.000%
30	8.27	-138.34	0.00	-8.27	138.34	0.00	0.000%
31	7.23	-138.34	4.18	-7.23	138.34	-4.18	0.000%
32	4.15	-138.34	7.18	-4.15	138.34	-7.18	0.000%
33	0.00	-138.34	8.36	0.00	138.34	-8.36	0.000%
34	-4.22	-138.34	7.32	4.22	138.34	-7.32	0.000%
35	-7.37	-138.34	4.25	7.37	138.34	-4.25	0.000%
36	-8.27	-138.34	0.00	8.27	138.34	0.00	0.000%
37	-7.08	-138.34	-4.09	7.08	138.34	4.09	0.000%
38	-4.15	-138.34	-7.18	4.15	138.34	7.18	0.000%
39	0.00	-39.25	-9.50	0.00	39.25	9.50	0.000%
40	4.45	-39.25	-7.71	-4.45	39.25	7.71	0.000%
41	7.20	-39.25	-4.16	-7.20	39.25	4.16	0.000%
42	8.37	-39.25	0.00	-8.37	39.25	0.00	0.000%
43	7.68	-39.25	4.43	-7.68	39.25	-4.43	0.000%
44	4.37	-39.25	7.57	-4.37	39.25	-7.57	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
45	0.00	-39.25	8.99	0.00	39.25	-8.99	0.000%
46	-4.45	-39.25	7.71	4.45	39.25	-7.71	0.000%
47	-7.65	-39.25	4.42	7.65	39.25	-4.42	0.000%
48	-8.37	-39.25	0.00	8.37	39.25	0.00	0.000%
49	-7.23	-39.25	-4.18	7.23	39.25	4.18	0.000%
50	-4.37	-39.25	-7.57	4.37	39.25	7.57	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 180	3.022	39	0.1417	0.0396
T2	180 - 160	2.576	39	0.1409	0.0379
T3	160 - 140	1.997	39	0.1256	0.0282
T4	140 - 120	1.497	39	0.1073	0.0168
T5	120 - 110	1.081	39	0.0851	0.0107
T6	110 - 100	0.905	39	0.0765	0.0088
T7	100 - 80	0.747	39	0.0671	0.0072
T8	80 - 60	0.487	39	0.0516	0.0054
T9	60 - 40	0.285	39	0.0386	0.0039
T10	40 - 20	0.139	39	0.0243	0.0026
T11	20 - 0	0.046	39	0.0124	0.0013

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.00	Pirod 6-8' Box Arm (1)	39	2.635	0.1416	0.0384	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 180	12.178	3	0.5682	0.1586
T2	180 - 160	10.377	3	0.5651	0.1516
T3	160 - 140	8.040	3	0.5058	0.1127
T4	140 - 120	6.025	3	0.4324	0.0671
T5	120 - 110	4.348	3	0.3429	0.0430
T6	110 - 100	3.639	3	0.3082	0.0353
T7	100 - 80	3.004	3	0.2700	0.0288
T8	80 - 60	1.960	3	0.2077	0.0217
T9	60 - 40	1.146	3	0.1552	0.0155
T10	40 - 20	0.560	3	0.0980	0.0103
T11	20 - 0	0.184	3	0.0501	0.0052

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.00	Pirod 6-8' Box Arm (1)	3	10.617	0.5675	0.1536	743141

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	195	Leg	A325N	0.6250	4	0.42	20.34	0.021	1.05	Bolt Tension
T2	180	Leg	A325N	1.0000	6	2.48	54.52	0.045	1.05	Bolt Tension
T3	160	Leg	A325N	1.0000	6	3.79	54.52	0.069	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	2.78	10.66	0.260	1.05	Member Block Shear
T4	140	Leg	A325N	1.0000	6	6.07	54.52	0.111	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	3.40	10.66	0.319	1.05	Member Block Shear
T5	120	Diagonal	A325N	1.0000	1	4.09	11.68	0.350	1.05	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	1.39	8.84	0.157	1.05	Bolt Shear
T6	110	Leg	A325N	1.0000	6	8.92	54.52	0.164	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	3.80	11.68	0.325	1.05	Member Block Shear
T7	100	Leg	A325N	1.0000	6	12.18	54.52	0.223	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	4.65	19.47	0.239	1.05	Member Block Shear
T8	80	Leg	A325N	1.2500	6	15.66	87.22	0.180	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	5.41	20.30	0.266	1.05	Member Block Shear
T9	60	Leg	A325N	1.2500	6	19.31	87.22	0.221	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	6.27	23.70	0.264	1.05	Member Block Shear
T10	40	Leg	A325N	1.2500	6	23.07	87.22	0.265	1.05	Bolt Tension
		Diagonal	A325N	1.2500	1	6.99	23.70	0.295	1.05	Member Block Shear
T11	20	Diagonal	A325N	1.2500	1	7.85	18.96	0.414	1.05	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	1 3/4	15.00	2.38	65.1 K=1.00	2.4053	-2.61	79.36	0.033 [1]
T2	180 - 160	1 3/4	20.00	2.38	65.1 K=1.00	2.4053	-16.01	79.36	0.202 [1]
T3	160 - 140	Pirod 105216	20.03	10.02	45.4 K=1.00	3.6816	-26.61	142.49	0.187 [1]
T4	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	3.6816	-42.70	142.49	0.300 [1]
T5	120 - 110	Pirod 105217	10.02	5.30	37.8 K=1.00	5.3014	-51.41	214.86	0.239 [1]
T6	110 - 100	Pirod 105217	10.02	10.02	37.8 K=1.00	5.3014	-62.62	214.86	0.291 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	100 - 80	Pirod 105218	20.03	10.02	32.4 K=1.00	7.2158	-86.01	300.68	0.286 [1]
T8	80 - 60	Pirod 105219	20.03	10.02	28.4 K=1.00	9.4248	-111.43	399.87	0.279 [1]
T9	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	9.4248	-138.26	399.87	0.346 [1]
T10	40 - 20	Pirod 105220	20.03	10.02	25.2 K=1.00	11.928 2	-166.29	512.38	0.325 [1]
T11	20 - 0	Pirod 105220	20.03	10.02	25.2 K=1.00	11.928 2	-194.00	512.38	0.379 [1]

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T3	160 - 140	0.5	1.48	121.0	165.67	0.1963	0.31	3.29	0.096
T4	140 - 120	0.5	1.48	121.0	165.67	0.1963	0.24	3.29	0.073
T5	120 - 110	0.5	1.47	120.0	238.57	0.1963	1.08	3.34	0.323
T6	110 - 100	0.5	1.47	120.0	238.57	0.1963	0.40	3.34	0.120
T7	100 - 80	0.5	1.46	119.0	324.71	0.1963	0.23	3.38	0.070
T8	80 - 60	0.625	1.45	94.4	424.12	0.3068	0.22	6.96	0.032
T9	60 - 40	0.625	1.45	94.4	424.12	0.3068	0.18	6.96	0.026
T10	40 - 20	0.625	1.43	93.6	536.77	0.3068	0.76	7.01	0.109
T11	20 - 0	0.625	1.43	93.6	536.77	0.3068	1.29	7.01	0.184

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	195 - 180	3/4	4.65	2.24	129.1 K=0.90	0.4418	-0.78	5.95	0.131 [1]
T2	180 - 160	3/4	4.65	2.24	129.1 K=0.90	0.4418	-1.52	5.95	0.255 [1]
T3	160 - 140	L2 1/2x2 1/2x3/16	11.42	4.98	120.8 K=1.00	0.9020	-2.79	17.58	0.159 [1]
T4	140 - 120	L2 1/2x2 1/2x3/16	12.50	5.63	136.4 K=1.00	0.9020	-3.60	13.87	0.259 [1]
T5	120 - 110	L3x3x3/16	13.13	5.97	120.2 K=1.00	1.0900	-4.43	21.27	0.208 [1]
T6	110 - 100	L3x3x3/16	13.80	6.33	127.4 K=1.00	1.0900	-4.08	19.22	0.212 [1]
T7	100 - 80	L3x3x5/16	15.24	7.08	144.3 K=1.00	1.7800	-4.89	24.47	0.200 [1]
T8	80 - 60	L3x3x5/16	16.80	7.84	159.7 K=1.00	1.7800	-5.62	19.97	0.282 [1]
T9	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.68	150.9 K=1.00	2.0900	-6.52	26.27	0.248 [1]
T10	40 - 20	L3 1/2x3 1/2x5/16	20.16	9.54	165.9 K=1.00	2.0900	-7.31	21.73	0.337 [1]
T11	20 - 0	L4x4x1/4	21.92	10.43	157.4 K=1.00	1.9400	-8.64	22.41	0.385 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	120 - 110	L3x3x5/16	8.47	7.22	107.0 K=1.14	1.7800	-1.16	41.02	0.028 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	7/8	4.00	3.85	148.0 K=0.70	0.6013	-0.03	6.20	0.005 [1]
T2	180 - 160	7/8	4.00	3.85	148.0 K=0.70	0.6013	-0.35	6.20	0.057 [1]

[1] P_u / ϕP_n controls

Bottom Girt 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	195 - 180	7/8	4.00	3.85	148.0 K=0.70	0.6013	-0.39	6.20	0.063 [1]
T2	180 - 160	7/8	4.00	3.85	148.0 K=0.70	0.6013	-0.25	6.20	0.040 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	1 3/4	15.00	0.38	10.3	2.4053	1.68	108.24	0.016 [1]
T2	180 - 160	1 3/4	20.00	0.50	13.7	2.4053	14.88	108.24	0.137 [1]
T3	160 - 140	Pirod 105216	20.03	10.02	45.4	3.6816	22.73	165.67	0.137 [1]
T4	140 - 120	Pirod 105216	20.03	10.02	45.4	3.6816	36.40	165.67	0.220 [1]
T5	120 - 110	Pirod 105217	10.02	4.71	37.8	5.3014	44.08	238.57	0.185 [1]
T6	110 - 100	Pirod 105217	10.02	10.02	37.8	5.3014	53.51	238.57	0.224 [1]
T7	100 - 80	Pirod 105218	20.03	10.02	32.4	7.2158	73.08	324.71	0.225 [1]
T8	80 - 60	Pirod 105219	20.03	10.02	28.4	9.4248	93.96	424.12	0.222 [1]
T9	60 - 40	Pirod 105219	20.03	10.02	28.4	9.4248	115.86	424.12	0.273 [1]
T10	40 - 20	Pirod 105220	20.03	10.02	25.2	11.928 2	138.43	536.77	0.258 [1]
T11	20 - 0	Pirod 105220	20.03	10.02	25.2	11.928 2	160.68	536.77	0.299 [1]

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T3	160 - 140	0.5	1.48	121.0	165.67	0.1963	0.31	3.29	0.096
T4	140 - 120	0.5	1.48	121.0	165.67	0.1963	0.24	3.29	0.073
T5	120 - 110	0.5	1.47	120.0	238.57	0.1963	1.08	3.34	0.323
T6	110 - 100	0.5	1.47	120.0	238.57	0.1963	0.40	3.34	0.120
T7	100 - 80	0.5	1.46	119.0	324.71	0.1963	0.23	3.38	0.070
T8	80 - 60	0.625	1.45	94.4	424.12	0.3068	0.22	6.96	0.032
T9	60 - 40	0.625	1.45	94.4	424.12	0.3068	0.18	6.96	0.026
T10	40 - 20	0.625	1.43	93.6	536.77	0.3068	0.76	7.01	0.109
T11	20 - 0	0.625	1.43	93.6	536.77	0.3068	1.29	7.01	0.184

Diagonal 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	195 - 180	3/4	4.65	2.24	143.4	0.4418	0.77	14.31	0.054 [1]
T2	180 - 160	3/4	4.65	2.24	143.4	0.4418	1.50	14.31	0.105 [1]
T3	160 - 140	L2 1/2x2 1/2x3/16	11.42	4.98	80.1	0.5183	2.78	22.55	0.123 [1]
T4	140 - 120	L2 1/2x2 1/2x3/16	12.50	5.63	90.0	0.5183	3.40	22.55	0.151 [1]
T5	120 - 110	L3x3x3/16	13.13	5.97	79.0	0.6593	4.09	28.68	0.143 [1]
T6	110 - 100	L3x3x3/16	13.80	6.33	83.5	0.6593	3.80	28.68	0.132 [1]
T7	100 - 80	L3x3x5/16	15.24	7.08	94.9	1.0713	4.65	46.60	0.100 [1]
T8	80 - 60	L3x3x5/16	16.80	7.84	105.3	1.0127	5.41	44.05	0.123 [1]
T9	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.68	99.2	1.2452	6.27	54.17	0.116 [1]
T10	40 - 20	L3 1/2x3 1/2x5/16	20.16	9.54	108.8	1.2452	6.99	54.17	0.129 [1]
T11	20 - 0	L4x4x1/4	21.92	10.43	102.5	1.1972	7.85	52.08	0.151 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	120 - 110	L3x3x5/16	8.47	7.22	97.2	1.1885	1.39	51.70	0.027 [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	195 - 180	7/8	4.00	3.85	211.4	0.6013	0.01	19.48	0.001 [1]
T2	180 - 160	7/8	4.00	3.85	211.4	0.6013	0.35	19.48	0.018 [1]

[1] P_u / ϕP_n controls

Bottom 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	195 - 180	7/8	4.00	3.85	211.4	0.6013	0.41	19.48	0.021 [1]
T2	180 - 160	7/8	4.00	3.85	211.4	0.6013	0.26	19.48	0.013 [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	195 - 180	Leg	1 3/4	2	-2.61	83.33	3.1	Pass
T2	180 - 160	Leg	1 3/4	46	-16.01	83.33	19.2	Pass
T3	160 - 140	Leg	Pirod 105216	103	-26.61	149.62	17.8	Pass
T4	140 - 120	Leg	Pirod 105216	118	-42.70	149.62	28.5	Pass
T5	120 - 110	Leg	Pirod 105217	133	-51.41	225.60	30.8	Pass
T6	110 - 100	Leg	Pirod 105217	147	-62.62	225.60	27.8	Pass
T7	100 - 80	Leg	Pirod 105218	156	-86.01	315.72	27.2	Pass
T8	80 - 60	Leg	Pirod 105219	171	-111.43	419.86	26.5	Pass
T9	60 - 40	Leg	Pirod 105219	186	-138.26	419.86	32.9	Pass
T10	40 - 20	Leg	Pirod 105220	201	-166.29	537.99	30.9	Pass
T11	20 - 0	Leg	Pirod 105220	216	-194.00	537.99	36.1	Pass
T1	195 - 180	Diagonal	3/4	10	-0.78	6.25	12.5	Pass
T2	180 - 160	Diagonal	3/4	55	-1.52	6.25	24.3	Pass
T3	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	106	-2.79	18.45	15.1 24.8 (b)	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	121	-3.60	14.57	24.7 30.4 (b)	Pass
T5	120 - 110	Diagonal	L3x3x3/16	136	-4.43	22.34	19.8 33.4 (b)	Pass
T6	110 - 100	Diagonal	L3x3x3/16	148	-4.08	20.18	20.2 31.0 (b)	Pass
T7	100 - 80	Diagonal	L3x3x5/16	161	-4.89	25.70	19.0 22.7 (b)	Pass
T8	80 - 60	Diagonal	L3x3x5/16	176	-5.62	20.97	26.8	Pass
T9	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	191	-6.52	27.58	23.6 25.2 (b)	Pass
T10	40 - 20	Diagonal	L3 1/2x3 1/2x5/16	206	-7.31	22.81	32.1	Pass
T11	20 - 0	Diagonal	L4x4x1/4	221	-8.64	23.54	36.7 39.4 (b)	Pass
T5	120 - 110	Secondary Horizontal	L3x3x5/16	144	-1.16	43.07	2.7 14.9 (b)	Pass
T1	195 - 180	Top Girt	7/8	4	-0.03	6.51	0.5	Pass
T2	180 - 160	Top Girt	7/8	50	-0.35	6.51	5.4	Pass
T1	195 - 180	Bottom Girt	7/8	8	-0.39	6.51	6.0	Pass
T2	180 - 160	Bottom Girt	7/8	53	-0.25	6.51	3.8	Pass
							Summary	
							Leg (T11) 36.1	Pass
							Diagonal (T11) 39.4	Pass
							Secondary Horizontal (T5) 14.9	Pass
							Top Girt (T2) 5.4	Pass
							Bottom Girt (T1) 6.0	Pass
							Bolt Checks 39.4	Pass
							RATING = 39.4	**Pass**

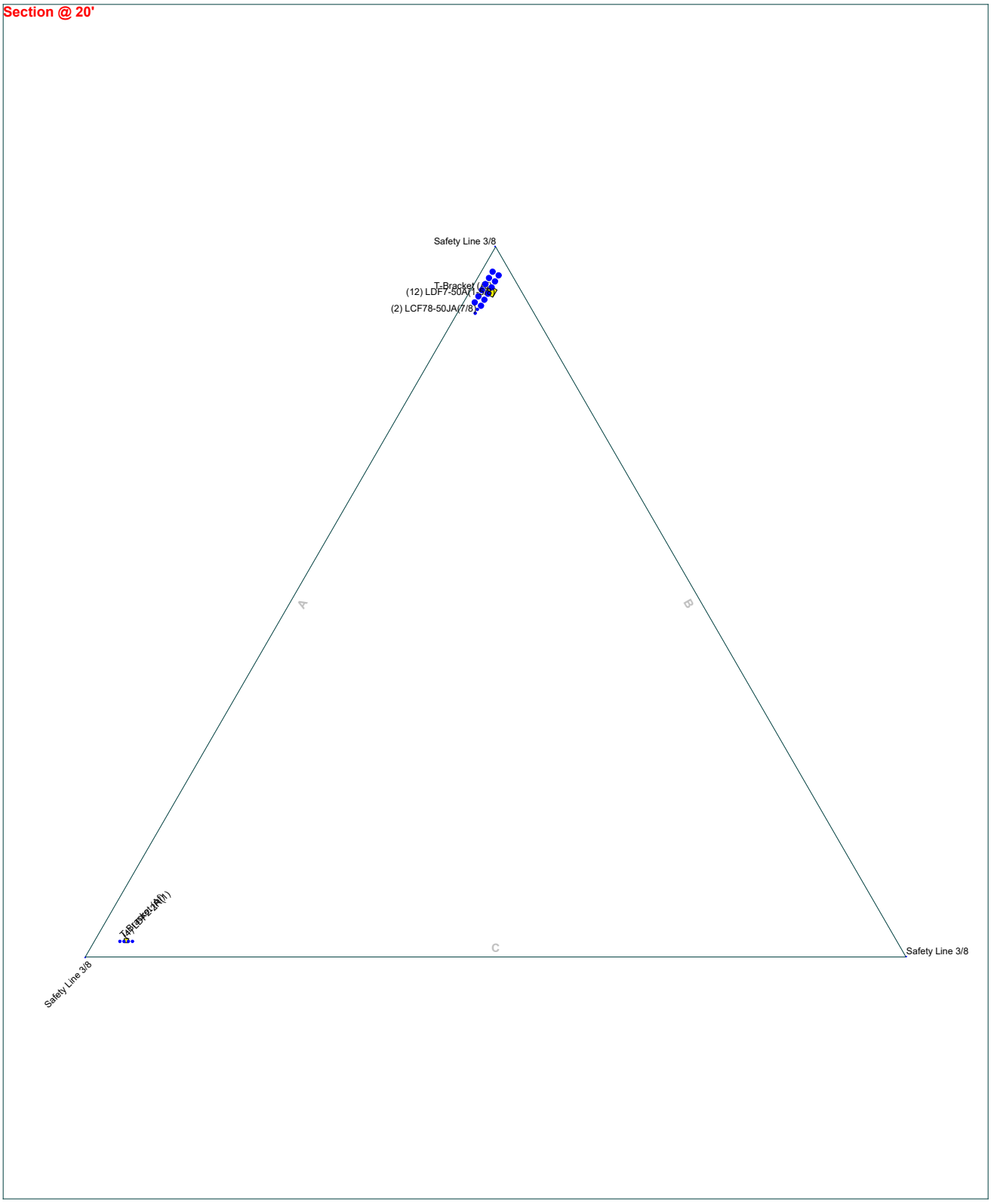
APPENDIX C

BASE LEVEL DRAWING

Feed Line Plan
20'

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

Section @ 20'

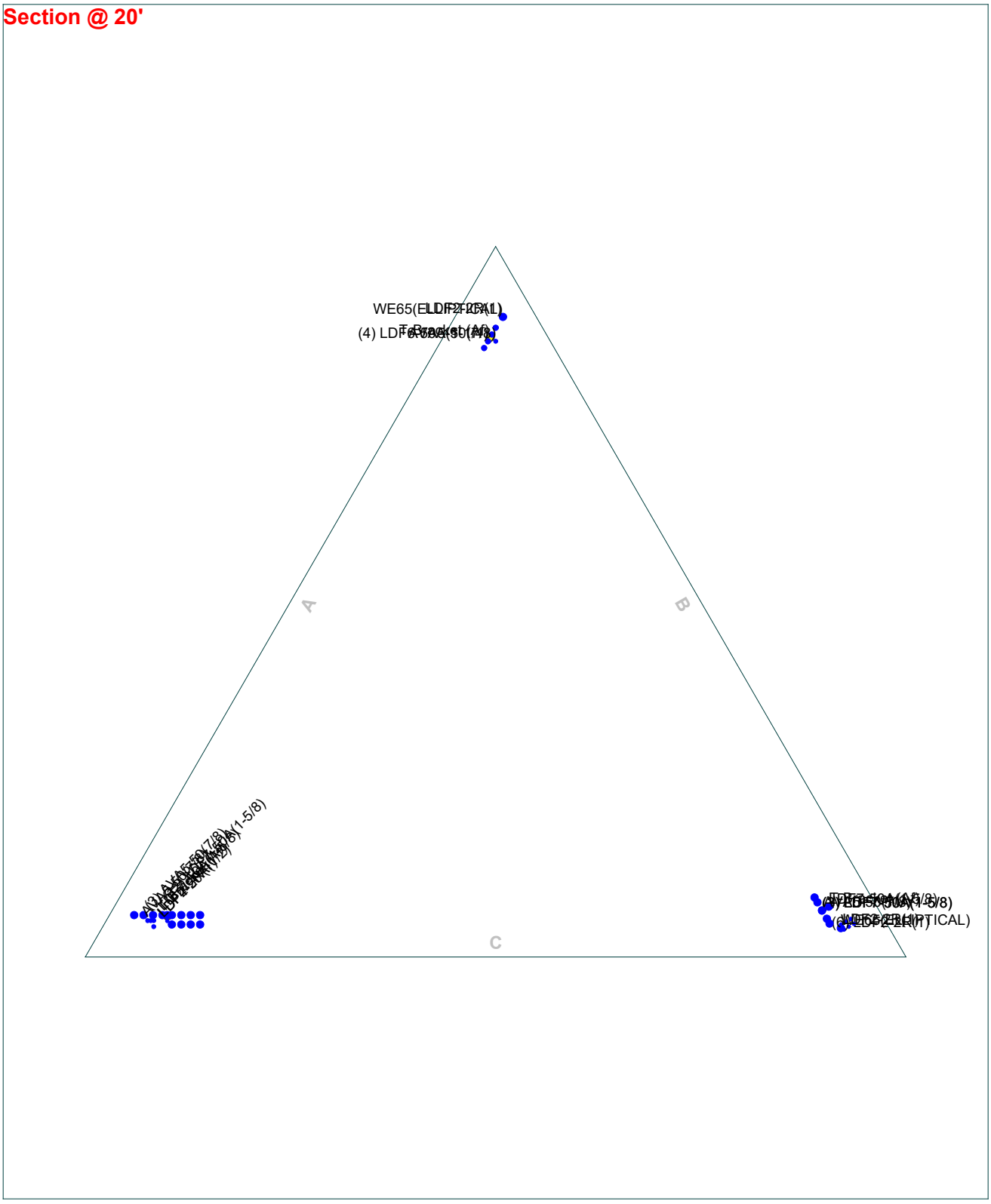


BLACK & VEATCH Building a world of difference.	Black & Veatch Corp. 6800 W. 115th St., Suite 2292 Overland Park, KS 66211 Phone: (913) 458-6909 FAX:	Job: ES-082 ChurchHill (Outer Tower)	
		Project: 405025	
		Client: Eversource	Drawn by: Robert Hudson II / App'd:
		Code: TIA-222-H	Date: 04/29/20 / Scale: NTS
		Path:	Dwg No. E-7

Feed Line Plan
20'

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

Section @ 20'



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Overland Park, KS 66211
Phone: (913) 458-6909
FAX:

Job:	***ES-082 ChurchHill (Inner Tower)***		
Project:	***405025***		
Client: Eversource	Drawn by: Robert Hudson II		App'd:
Code: TIA-222-H	Date: 04/29/20		Scale: NTS
Path:			Dwg No. E-7

APPENDIX D

ADDITIONAL CALCULATIONS

Eversource #: ES-082
Site Name: ChurchHill (Outer)

Designed By: PSN
Checked By: RAH
Date: 6/9/2020

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References

ANCHOR ROD ANALYSIS

Project Information

Site Name:ChurchHill (Outer)

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 := 321·kip	Axial_U := 260·kip
Shear_C := 43·kip	Shear_U := 35·kip

Anchor Rod Data

Diameter of Anchor Rod: D := 2·in

Number of Anchor Rods: N := 6

Length from top of concrete to bottom of anchor rod leveling nut: lar := 9.125·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

Threads per Inch: n = 4.5 (Thread selection invalid if n = 0)

Rod Ultimate Strength: Fu = 125·ksi

Rod Yield Strength: Fy = 105·ksi

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

$$Z := \frac{1}{6}\cdot\left(D - \frac{0.9743\,in}{n}\right)^3 = 0.945\cdot in^3$$

Radius of Gyration:

$$r := \left(\frac{1}{4}\right)\cdot\left(D - \frac{0.9743\,in}{n}\right) = 0.446\cdot in$$

Net Area of Anchor Rod:

$$An := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\,in}{n}\right)^2 = 2.498\cdot in^2$$

TIA-222-G/H Section 4.9.6.1

Nominal Unthreaded Area of Anchor Rod:

$$Ab := \frac{\pi}{4}\cdot(D)^2 = 3.142\cdot in^2$$

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

Eversource #: ES-082
Site Name: ChurchHill (Outer)

Designed By: PSN
Checked By: RAH
Date: 6/9/2020

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Anchor Rod Design Capacities

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

$Rnt := Fu \cdot An = 312.278 \cdot kip$

$\phi t = 0.75$

$\phi Rnt := \phi t \cdot Rnt = 234.208 \cdot kip$

Design Compression Strength:

$Rnc := Fy \cdot An = 262.313 \cdot kip$

$\phi c = 1$

$\phi Rnc := \phi c \cdot Rnc = 262.313 \cdot kip$

Design Buckling Strength: TIA-222-H Section 4.5.4.2

$K_0 := 1.2$

$Fcr = 95.713 \cdot ksi$

$Fe = 474.559 \cdot ksi$

$Rnb := Fcr \cdot An = 239.112 \cdot kip$

$\phi c = 1$

$\phi Rnb := \phi c \cdot Rnb = 239.112 \cdot kip$

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

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

$Rnv = 196.35 \cdot kip$

$Rnvc := 0.6 \cdot Fy \cdot 0.5 \cdot An = 78.694 \cdot kip$ TIA-222-H Section 4.9.9

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

$\phi Rnv := \phi v \cdot Rnv = 147.262 \cdot kip \qquad \phi Rnvc := \phi c \cdot Rnvc = 78.694 \cdot kip$

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

$Rmn := Fy \cdot Z = 99.277 \cdot kip \cdot in$

$\phi f = 0.9$

$\phi Rmn := \phi f \cdot Rmn = 89.349 \cdot kip \cdot in$

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Anchor Rod Loading Demands

Tension Demand:

$$Put := \frac{Axial\_U}{N} = 43.333 \cdot kip$$

Compression Demand:

$$Puc := \frac{Axial\_C}{N} = 53.5 \cdot kip$$

Shear Demand:

$$Vut := \frac{Shear\_U}{N} = 5.833 \cdot kip$$

$$Vuc := \frac{Shear\_C}{N} = 7.167 \cdot kip$$

Moment Demand:

$$Mut := 0.65 \cdot lar \cdot Vut = 34.599 \cdot kip \cdot in$$

$$Muc := 0.65 \cdot lar \cdot Vuc = 42.507 \cdot kip \cdot in$$

Anchor Rod Interaction Check

TIA-222-G Section 4.9.9

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

$$SR\_g = 0.23$$

Anchor Rod Interaction Check

TIA-222-H Section 4.9.9

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

$SR\_Pt = 0.329$

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

$SR\_Pc = 0.688$

$$SR := \begin{cases} SR\_g & \text{if } TIA = \text{"Rev-G"} \\ \max(SR\_Pt, SR\_Pc) & \text{if } TIA = \text{"Rev-H"} \wedge S15 = \text{"No"} \\ \frac{\max(SR\_Pt, SR\_Pc)}{1.05} & \text{if } TIA = \text{"Rev-H"} \wedge S15 = \text{"Yes"} \end{cases} = 0.655$$

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

Eversource #: ES-082
Site Name: ChurchHill (Outer)

Designed By: PSN
Checked By: RAH
Date: 6/9/2020

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Anchor Rod Results

Axial Tension Demand:	$Put = 43.333 \cdot kip$
Axial Tension Capacity:	$\phi Rnt = 234.208 \cdot kip$
Axial Compression Demand:	$Puc = 53.5 \cdot kip$
Axial Compression Capacity:	$\phi Rnc = 262.313 \cdot kip$
Shear Tension Demand:	$Vut = 5.833 \cdot kip$
Tension Shear Capacity:	$\phi Rnv = 147.262 \cdot kip$
Shear Compression Demand:	$Vuc = 7.167 \cdot kip$
Compresison Shear Capacity:	$\phi R_{nvc} = 78.694 \cdot kip$
Moment Tension Demand:	$M_{ut} = 34.599 \cdot kip \cdot in$
Moment Compression Demand:	$M_{uc} = 42.507 \cdot kip \cdot in$
Moment Capacity:	$\phi R_{mn} = 89.349 \cdot kip \cdot in$

Governing Stress Ratio

$SR = 65.523 \cdot \%$

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

Eversource #: ES-082
Site Name: ChurchHill (Inner)

Designed By: PSN
Checked By:
Date: 4/29/2020

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References

ANCHOR ROD ANALYSIS

Project Information

Site Name:ChurchHill (Inner)

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 := 201·kip	Axial_U := 166·kip
Shear_C := 24·kip	Shear_U := 21·kip

Anchor Rod Data

Diameter of Anchor Rod: D := 1.25·in

Number of Anchor Rods: N := 6

Length from top of concrete to bottom of anchor rod leveling nut: lar := 2.75·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

Threads per Inch: n = 7 (Thread selection invalid if n = 0)

Rod Ultimate Strength: Fu = 125·ksi

Rod Yield Strength: Fy = 105·ksi

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

$$Z := \frac{1}{6}\cdot\left(D - \frac{0.9743\,in}{n}\right)^3 = 0.228\cdot in^3$$

Radius of Gyration:

$$r := \left(\frac{1}{4}\right)\cdot\left(D - \frac{0.9743\,in}{n}\right) = 0.278\cdot in$$

Net Area of Anchor Rod:

$$An := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\,in}{n}\right)^2 = 0.969\cdot in^2$$

TIA-222-G/H Section 4.9.6.1

Nominal Unthreaded Area of Anchor Rod:

$$Ab := \frac{\pi}{4}\cdot(D)^2 = 1.227\cdot in^2$$

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

Anchor Rod Design Capacities

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

$Rnt := Fu \cdot An = 121.139 \cdot kip$

$\phi t = 0.75$

$\phi Rnt := \phi t \cdot Rnt = 90.854 \cdot kip$

Design Compression Strength:

$Rnc := Fy \cdot An = 101.756 \cdot kip$

$\phi c = 1$

$\phi Rnc := \phi c \cdot Rnc = 101.756 \cdot kip$

Design Buckling Strength: TIA-222-H Section 4.5.4.2

$K_0 := 1.2$

$Fcr = 102.748 \cdot ksi$

$Fe = 2.027 \times 10^3 \cdot ksi$

$Rnb := Fcr \cdot An = 99.574 \cdot kip$

$\phi c = 1$

$\phi Rnb := \phi c \cdot Rnb = 99.574 \cdot kip$

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

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

$Rnv = 76.699 \cdot kip$

$Rnvc := 0.6 \cdot Fy \cdot 0.5 \cdot An = 30.527 \cdot kip$ TIA-222-H Section 4.9.9

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

$\phi Rnv := \phi v \cdot Rnv = 57.524 \cdot kip \qquad \phi Rnvc := \phi c \cdot Rnvc = 30.527 \cdot kip$

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

$Rmn := Fy \cdot Z = 23.986 \cdot kip \cdot in$

$\phi f = 0.9$

$\phi Rmn := \phi f \cdot Rmn = 21.588 \cdot kip \cdot in$

Anchor Rod Loading Demands

Tension Demand:

$$Put := \frac{Axial\_U}{N} = 27.667 \cdot kip$$

Compression Demand:

$$Puc := \frac{Axial\_C}{N} = 33.5 \cdot kip$$

Shear Demand:

$$Vut := \frac{Shear\_U}{N} = 3.5 \cdot kip$$

$$Vuc := \frac{Shear\_C}{N} = 4 \cdot kip$$

Moment Demand:

$$Mut := 0.65 \cdot lar \cdot Vut = 6.256 \cdot kip \cdot in$$

$$Muc := 0.65 \cdot lar \cdot Vuc = 7.15 \cdot kip \cdot in$$

Anchor Rod Interaction Check TIA-222-G Section 4.9.9

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

$$SR\_g = 0.375$$

Anchor Rod Interaction Check

TIA-222-H Section 4.9.9

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

$SR\_Pt = 0.096$

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

$SR\_Pc = 0.346$

$$SR := \begin{cases} SR\_g & \text{if } TIA = \text{"Rev-G"} \\ \max(SR\_Pt, SR\_Pc) & \text{if } TIA = \text{"Rev-H"} \wedge S15 = \text{"No"} \\ \frac{\max(SR\_Pt, SR\_Pc)}{1.05} & \text{if } TIA = \text{"Rev-H"} \wedge S15 = \text{"Yes"} \end{cases} = 0.33$$

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

Eversource #: ES-082
Site Name: ChurchHill (Inner)

Designed By: PSN
Checked By:
Date: 4/29/2020

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Anchor Rod Results

Axial Tension Demand:	$Put = 27.667 \cdot kip$
Axial Tension Capacity:	$\phi Rnt = 90.854 \cdot kip$
Axial Compression Demand:	$Puc = 33.5 \cdot kip$
Axial Compression Capacity:	$\phi Rnc = 101.756 \cdot kip$
Shear Tension Demand:	$Vut = 3.5 \cdot kip$
Tension Shear Capacity:	$\phi Rnv = 57.524 \cdot kip$
Shear Compression Demand:	$Vuc = 4 \cdot kip$
Compresison Shear Capacity:	$\phi R_{nvc} = 30.527 \cdot kip$
Moment Tension Demand:	$M_{ut} = 6.256 \cdot kip \cdot in$
Moment Compression Demand:	$M_{uc} = 7.15 \cdot kip \cdot in$
Moment Capacity:	$\phi R_{mn} = 21.588 \cdot kip \cdot in$

Governing Stress Ratio

$SR = 32.989 \cdot \%$

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

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6800 W. 115th St., Suite 2292
Overland Park, KS 66211
Phone: (913) 458-6909

Client:	Eversource	***Design:***	PSN
Project:	405025	***Date:***	6/9/2020
Site:	ChurchHill	***Verify:***	RAH
Title:	Foundation Design Reaction Comparison	***Date:***	6/9/2020
		Code:	TIA-222-H

Template Version 1.8

FOUNDATION ANALYSIS:

Original Tower Design Reactions:

Unit Base Foundation:

Shear:	125.8	Kip
Overturning moment:	13459.5	Kip-ft

TnxTower Reactions:

Unit Base Foundation:

Shear:	99.0	Kip
Overturning moment:	9838.0	Kip-ft

Stress Ratio:

Unit Base Foundation:

Shear:	**74.9%**
Overturning moment:	**69.6%**

Note: Ratings per TIA-222-H Section 15.5.

Conclusion:

When the calculated reactions are compared to the original design reactions, the existing foundation is considered to have been designed and constructed with adequate capacity to support the existing and proposed loads.

Controlling Foundation Stress Ratio: **69.6%**

Note: Although the stress ratio for shear is greater than the stress ratio for overturning moment, the moment reaction is the governing criteria for a SST Unit Base foundation.

ATTACHMENT E – PROOF OF DELIVERY OF NOTICE

Ref: ES-082 CHURCH HI Date: 07Jan21
Dep: BL GRAPHICS Wgt: 1.65 LBS

DV: 0.00

SHIPPING:	0.00
SPECIAL:	0.00
HANDLING:	0.00
TOTAL:	0.00

Svcs: PRIORITY OVERNIGHT
TRCK: 9151 3347 0065

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 07JAN21
ACTWGT: 1.65 LB MAN
CAD: 0765627/CAFE3407

BILL THIRD PARTY

TO **HONORABLE CHARLES P. PEROTTI**
TOWN OF NORTH CANAAN
100 PEASE STREET

CANAAN CT 06018

REF: ES-082 CHURCH HILL

DEPT: BL GRAPHICS

56DC1/1136/05A2

FedEx Express

J2010191106011v

TRK# 0201 **9151 3347 0065**

FRI - 08 JAN 12:00P
PRIORITY OVERNIGHT

00 HFDA

06018
CT-US **BDL**

Part # 156148-434 Rit EXP 09/21

Ref: ES-082 CHURCH HI Date: 07Jan21
Dep: BL GRAPHICS Wgt: 1.65 LBS
DV: 0.00

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT
TRCK: 9151 3347 0054

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 07JAN21
ACTWGT: 1.65 LB MAN
CAD: 0765627/CAFE3407

BILL THIRD PARTY

TO **STEVEN P. ALLYN,P&Z CHAIRMAN**
TOWN OF NORTH CANAAN
100 PEASE STREET

CANAAN CT 06018

REF: ES-082 CHURCH HILL

DEPT: BL GRAPHICS

56DC1/1136/0582

FedEx Express

J2010191106011ev

TRK# 0201 **9151 3347 0054**

FRI - 08 JAN 12:00P
PRIORITY OVERNIGHT

00 HFDA

06018
CT-US **BDL**

Part # 150148-434 RIT EXP 09/21 ee

Ref: ES-082 CHURCH HI Date: 07Jan21
Dep: BL GRAPHICS Wgt: 1.65 LBS

DV: 0.00

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT
TRCK: 9151 3346 9955

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 07JAN21
ACTWGT: 1.65 LB MAN
CAD: 0765627/CAFE3407

BILL THIRD PARTY

TO **LITCHFIELD COUNTY DISPATCH**
C/O EMERGENCY MED SERVICES
111 WATER STREET

TORRINGTON CT 06790

REF: ES-082 CHURCH HILL

DEPT: BL GRAPHICS

FedEx Express

J2010191010601un

TRK# 0201 **9151 3346 9955**

FRI - 08 JAN 10:30A
PRIORITY OVERNIGHT

00 HFDA

06790
CT-US **BDL**

Part # 156745-434 RIT EXP 09/21 **

Ref: ES-082 CHURCH HI Date: 07Jan21
Dep: BL GRAPHICS Wgt: 1.65 LBS

DV: 0.00

SHIPPING:	0.00
SPECIAL:	0.00
HANDLING:	0.00
TOTAL:	0.00

Svcs: PRIORITY OVERNIGHT
TRCK: 9151 3346 9966

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 07JAN21
ACTWGT: 1.65 LB MAN
CAD: 0765627/CAFE3407

BILL THIRD PARTY

TO

CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE

NEW BRITAIN CT 06051
REF: ES-082 CHURCH HILL

DEPT: BL GRAPHICS

56DC1/1136/05A2

FedEx Express

J2010191106DTuv

TRK# 0201 **9151 3346 9966**

FRI - 08 JAN 10:30A
PRIORITY OVERNIGHT

00 BDLA

06051
CT-US **BDL**

Part # 158148-434 RIT EXP 03/21 **

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

ES-082 – Church Hill LCD

36 Lower Road

North Canaan, CT 06018

November 6, 2020

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource installation on the tower located at 36 Lower Road in North Canaan, CT. Eversource is proposing to install two omnidirectional antennas as part of its 220 MHz communications system – one for transmit and one for receive only.

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

Figure 1: View of ES-082 Church Hill LCD

Site Address	38 Lower Road, North Canaan, CT
Latitude	42° 0' 52.79" N
Longitude	73° 19' 34.78" W
Site Elevation AMSL	964’
Survey Engineer	Marc Salas
Survey Date/Time	6/17/2020; 9:30 AM – 10:30 AM

Table 1: Survey Information

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

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

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

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

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

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

3. Power Density Calculation Methods

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

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

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

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

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

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

4. Proposed Antenna Configuration

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

Operator	Antenna Model	TX Freq. (MHz)	Ant Gain (dBd)	Power ERP (Watts)	Number of Channels	Vertical Beamwidth	Length (ft)	Antenna Centerline Height (ft)
Eversource	Telewave ANT220F2	217	2.5	124	4	38°	3.7	146

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

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

[2] Antenna height listed for the proposed 217 MHz transmit antenna is based on the Black & Veatch Structural Analysis Report dated November 3, 2020.

5. Measurement Procedure

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

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

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

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

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

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 01116			
Calibration Date	May 2020			
Calibration Interval	24 Months			
Meter	NBM550, Serial# E-1069			
Calibration Date	May 2020			
Calibration Interval	24 Months			
Probe Specifications	**Frequency Range**	**Field Measured**	**Standard**	**Measurement Range**
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.2 – 600 % of Standard

Table 3: Instrumentation Information

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

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

6. Surveyed and Calculated % MPE Results

Measured and calculated results and a description of each survey location are detailed in the table below. Measurements were recorded on June 17, 2020 between 9:30 AM and 10:30 AM. The calculated % MPE contribution from the proposed equipment was then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna pattern of the antenna model specified by Eversource (or a similar antenna) to determine the "Off Beam Loss" factor shown in the power density formula from Section 4. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Table 4 below lists 18 measurements recorded in the vicinity of the site. The highest spatially averaged measurement was 3.67% (Average Uncontrolled / General Population MPE) and was recorded along the access road (Location 15). The highest composite (measured + calculated) % MPE value is calculated to be 3.75% (Average Uncontrolled / General Population) and is also calculated to occur at Location 15.

Meas. Location	Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Composite % MPE (Uncontrolled / General)
1	Compound Access Gate	42.01484	-73.32605	100	<1.00%	0.03%	<1.03%
2	North Edge of Compound	42.01484	-73.32617	78	<1.00%	0.04%	<1.04%
3	Northeast Corner of Compound	42.01483	-73.32594	122	<1.00%	0.01%	<1.01%
4	East Edge of Compound	42.01467	-73.32597	98	<1.00%	0.03%	<1.03%
5	Southeast Corner of Compound	42.01449	-73.32598	116	<1.00%	0.01%	<1.01%
6	South Edge of Compound	42.01447	-73.32623	78	<1.00%	0.05%	<1.05%
7	Southwest Corner of Compound	42.01449	-73.32650	78	<1.00%	0.05%	<1.05%
8	West Edge of Compound	42.01468	-73.32648	40	<1.00%	0.05%	<1.05%
9	Northwest Corner of Compound	42.01485	-73.32644	72	<1.00%	0.04%	<1.04%
10	Along Access Road	42.01513	-73.32600	194	2.54%	0.14%	2.67%
11	Along Access Road	42.01558	-73.32590	352	<1.00%	0.27%	<1.27%
12	Along Access Road	42.01555	-73.32552	391	<1.00%	0.20%	<1.20%
13	Along Access Road	42.01465	-73.32540	253	1.66%	0.07%	1.73%
14	Along Access Road	42.01375	-73.32496	501	1.13%	0.11%	1.24%
15	**Along Access Road**	**42.01468**	**-73.32431**	**547**	**3.67%**	**0.07%**	**3.75%**
16	Along Access Road	42.01548	-73.32374	764	<1.00%	0.06%	<1.06%
17	Access Road Gate	42.01502	-73.32314	875	2.82%	0.04%	2.86%
18	Intersection of Access Road and Lower Road	42.01717	-73.32189	1515	<1.00%	0.03%	<1.03%

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

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

Figure 2 below is an aerial view[5] of the rooftop location and the surrounding area, along with the measurement locations listed in Table 4.

Figure 2: Measurement Points

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

7. Conclusion

A number of accessible areas around the tower and access road at 36 Lower Road in North Canaan, CT were surveyed and found to be well within the mandated General Population/Uncontrolled limits for Maximum Permissible Exposure, as delineated in the Federal Communications Commission's Radio Frequency exposure rules published in 47 CFR 1.1307(b)(1)-(b)(3).

The highest spatially averaged % MPE measurement of all surveyed points based on the 1997 FCC standard for exposure to the general population is 3.67% MPE. This measurement was recorded at Location 15 along the access road.

The highest composite (measured + calculated) power density is **3.75% of the FCC General Population MPE limit** with the proposed Eversource equipment is also calculated to occur at Location 15.

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

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

8. Statement of Certification

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

Marc Salas — November 5, 2020

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

Keith Vellante — November 6, 2020

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

Attachment A: References

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

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

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

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

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

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

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

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

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

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

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

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

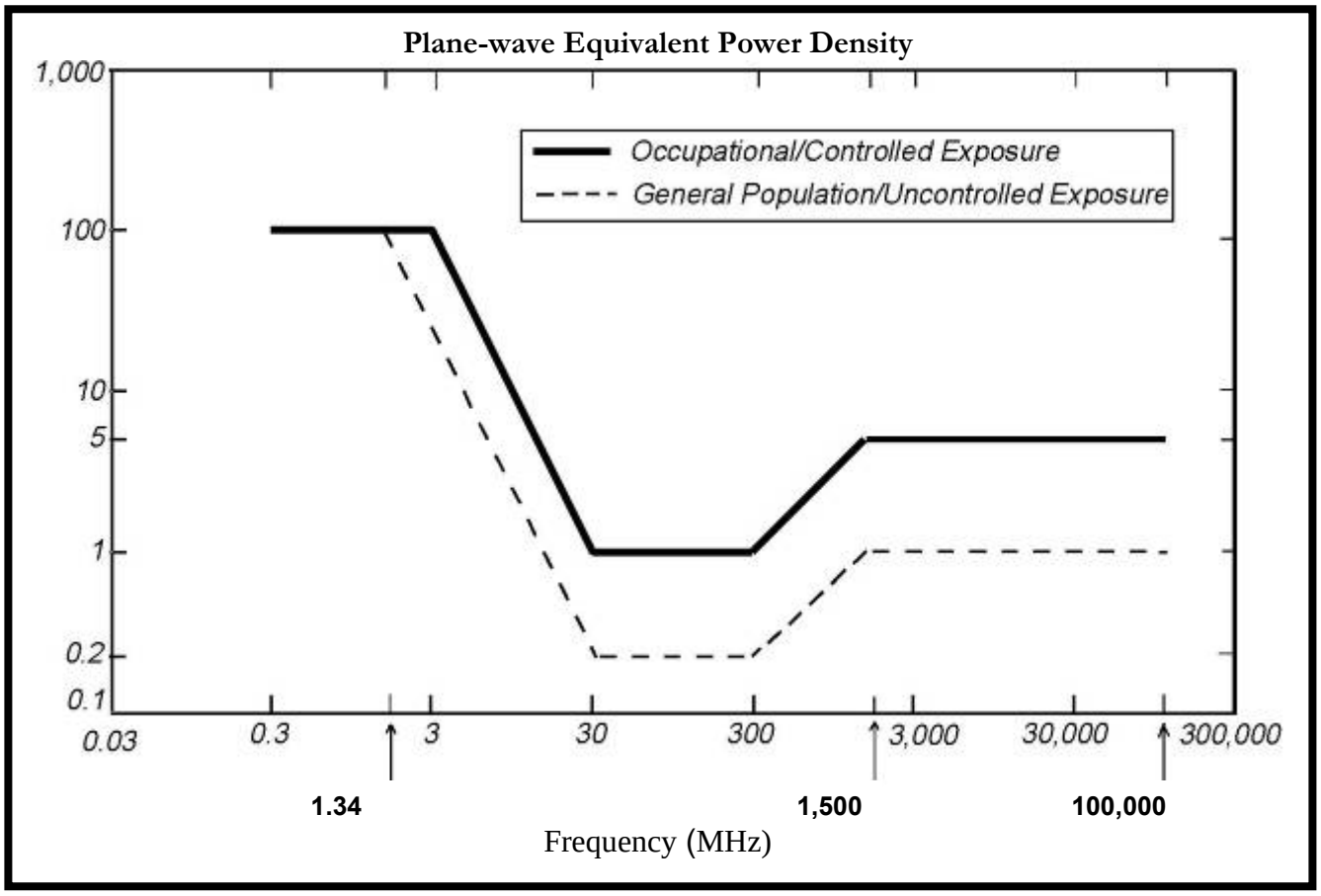

Figure 3: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

217 MHz

Manufacturer:	Telewave
Model #:	ANT220F2
Frequency Band:	195 - 260 MHz
Gain:	2.5 dBd
Vertical Beamwidth:	38°
Horizontal Beamwidth:	360°
Polarization:	Vertical-Polarization
Length:	3.7’