EVERSOURCE ENERGY

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

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

August 23, 2022

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

RE: **Notice of Exempt Modification**
Eversource Site # ES-055 Willimantic
349R Mountain Street, Windham, CT 06280
Latitude: 41-42-10.84 N / Longitude: 72-13-17.01 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains multiple antennas at various mounting heights on an existing 196-foot self-support tower located at 349R Mountain Street in Windham. See Attachment A, Parcel Map and Property Card. The tower and property are owned by SBA Properties Inc., doing business as SBA Communications Corporation ("SBA"). Eversource and SBA have entered into an agreement allowing the modification of Eversource's equipment on the existing tower. See Attachment B, Letter of Authorization. Eversource is seeking the Connecticut Siting Council's authorization for the installation of one 20-foot dipole antenna to be mounted at 153 feet above ground level ("AGL") on a four-foot stand-off mount. See Attachment C, Mount Analysis. Eversource also plans the removal of one 15-foot 8-inch omni-directional antenna and its associated mount. There will be no changes to the area of the fenced compound, the tower or other existing antennas and equipment. The tower and existing and proposed equipment are depicted on Attachment D, Construction Drawings, dated July 21, 2022 and Attachment E, Structural Analysis, dated June 14, 2022. The Connecticut Siting Council approved Eversource's use of the tower at this location in Petition No. 910 in August 2009.

The modification is required to eliminate transmitter induced noise issues from two antennas previously installed as part of Eversource's program to update its obsolete analog voice radio communications system to a modern digital voice communications system (refer to EM-EVER-163-201002, dated October 19, 2020, and EM-EVER-163-220308, dated April 4, 2022). The transmitter issue manifests as passive intermodulation, or PIM, noise located on the receive frequencies, which limits the system level coverage capability of the site.

Please accept this letter as notification, pursuant to Regulations of Connecticut State Agencies ("R.C.S.A.") §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to Tom DeVivo, Mayor of the Town of Windham, Jim Rivers, Town Manager of the Town of Windham, and

Matthew Vertefeuille, Director of Code Enforcement of the Town of Windham, via private carrier. Proof of delivery is attached. See Attachment F, Proof of Delivery of Notice.

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

1. There will be no change to the height of the existing tower.
2. The proposed modifications will not require 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 August 8, 2022. (Attachment G – Power Density Report[1])
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

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

By: _____
Kathleen M. Shanley
Manager – Transmission Siting

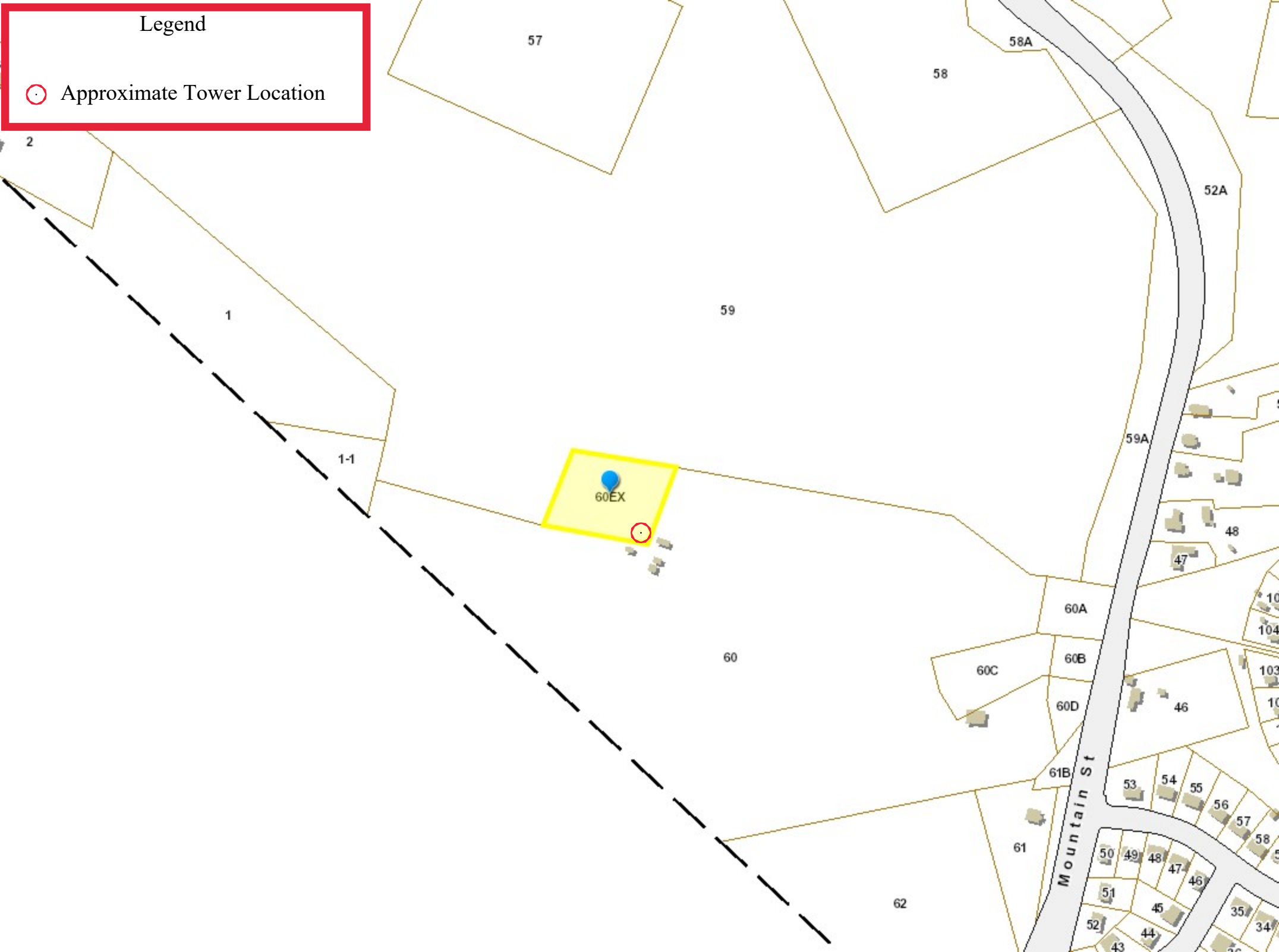
cc: Honorable Tom DeVivo, Mayor, Town of Windham
Jim Rivers, Town Manager, Town of Windham
Matthew Vertefeuille, Director of Code Enforcement
SBA

Attachments

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

[1] Receive-only antennas are not included in the Power Density Report, as they are irrelevant to the % MPE calculations.

ATTACHMENT A – PARCEL MAP AND PROPERTY CARD


Legend
Approximate Tower Location
57
58
58A
52A
2
1
1-1
59
59A
60EX
60
60A
60B
60C
60D
61
61B
62
48
47
46
Mountain St
53
54
55
56
57
58
50
49
48
47
46
51
45
52
44
43
35
34

Property Location: 349R MOUNTAIN ST | **MAP ID:** 3/9 154/ 60/EX / | **Bldg Name:** | **State Use:** 304

Vision ID: 5568 | **Account #** 00004100 | **Bldg #:** 1 of 1 | **Sec #:** 1 of 1 | **Card** 1 of 1 | **Print Date:** 12/05/2018 18:06

CURRENT OWNER	TOPO.	UTILITIES	STRT./ROAD	LOCATION
SBA PROPERTIES INC	2 Above Street	5 Well	3 Unpaved	
8051 CONGRESS AVE	5 Steep	6 Septic		
BOCA RATON, FL 33487		0 None		
Additional Owners:				

SUPPLEMENTAL DATA

Other ID:	3- 9/154/ 60EX	LCI	C
Zoning	R4	ParcelStatus	
Neighborhood	250 - 0	Cost Flag	
Living Units	0	Lot Number	0
Census	8004	A_D	
District No	2		
GIS ID:		ASSOC PID#	

CURRENT ASSESSMENT

Description	Code	Appraised Value	Assessed Value
UTL LAND	4-1	124,400	87,080
UTL BLDG	4-2	29,900	20,930
UTL OUTBL	4-3	17,020	11,920
	Total	171,320	119,930

6163
WINDHAM, CT

VISION

RECORD OF OWNERSHIP

	BK-VOL/PAGE	SALE DATE	q/u	v/i	SALE PRICE	V.C.
SBA PROPERTIES INC	631/ 299	04/10/2001	U	I	108,650	22
NUTMEG BROADCASTING COMPANY	343/ 130	09/10/1990	U	I	0	0
NUTMEG BROADCASTING COMPANY	304/ 277	10/09/1987	Q	I	75,000	
SYNCOM CAPITAL CORPORATION	285/ 647	09/01/1985	U	I	0	
DELTA COMMUNICATIONS CORPORATION	263/ 635	06/01/1980	U	I	0	
DAWSON JEROME & HILDA	241/ 106	04/01/1975	U	I	0	

PREVIOUS ASSESSMENTS (HISTORY)

Yr.	Code	Assessed Value	Yr.	Code	Assessed Value	Yr.	Code	Assessed Value
2017	4-1	87,080	2016	4-1	87,080	2015	300	26,810
2017	4-2	26,810	2016	4-2	26,810	2015	300	87,080
2017	4-3	0	2016	4-3	0			
	Total:	113,890		Total:	113,890		Total:	113,890

EXEMPTIONS

Year	Type	Description	Amount
		Total:	

OTHER ASSESSMENTS

Code	Description	Number	Amount	Comm. Int.

This signature acknowledges a visit by a Data Collector or Assessor

APPRAISED VALUE SUMMARY

Appraised Bldg. Value (Card)	29,900
Appraised XF (B) Value (Bldg)	0
Appraised OB (L) Value (Bldg)	17,020
Appraised Land Value (Bldg)	124,400
Special Land Value	0
Total Appraised Parcel Value	171,320
Valuation Method:	C
Adjustment:	0
Net Total Appraised Parcel Value	**171,320**

ASSESSING NEIGHBORHOOD

NBHD/ SUB	NBHD Name	Street Index Name	Tracing	Batch
0001/A			433	I

NOTES

BUILDING PERMIT RECORD

Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments
34217	03/12/2018	53	Cell Tower/Antennae	15,000		0		
32161	09/13/2016	53	Cell Tower/Antennae	79,651		0		
14063	07/01/2003	BP		6,000	07/10/2003	0	07/10/2003	06-26
13760	05/07/2003	BP		54,000	09/10/2003	0	09/10/2003	34-26
11453	03/13/2002	BP		30,000	09/09/2002	0	09/09/2002	34-26
10561	04/16/2001	BP		2,000	04/17/2001	0	04/17/2001	06-26
3086	03/01/1992	BP		0		0		16 26 #274

VISIT/ CHANGE HISTORY

Date	Type	IS	ID	Cd.	Purpose/Result
10/02/2002			BM	1	ENTRY + SIGN

LAND LINE VALUATION SECTION

B #	Use Code	Use Description	Zone	D	Front	Depth	Units	Unit Price	I. Factor	S.A.	Acre Disc	C. Factor	ST. Idx	Adj.	Notes- Adj	Special Pricing	S Adj Fact	Adj. Unit Price	Land Value
1	304	Public Utility C	R4				1.00 AC	80,000.00	1.0000	0	1.0000	1.00	250	1.00	Topography;		1.00		80,000
1	304	Public Utility C					0.05 AC	1,400.00	1.0000	0	1.0000	1.00		0.00	Topography;		1.00		70
1	304	Public Utility C					1.00 AC	44,330.00	1.0000	0	1.0000	1.00		0.00			1.00		44,330

Total Card Land Units: 2.05 AC | Parcel Total Land Area: 2.05 AC | Total Land Value: 124,400

Property Location: 349R MOUNTAIN ST **MAP ID: 3/9 154/ 60/EX /** **Bldg Name:** **State Use: 304**

Vision ID: 5568 **Account # 00004100** **Bldg #: 1 of 1** **Sec #: 1 of 1** **Card 1 of 1** **Print Date: 12/05/2018 18:06**

CONSTRUCTION DETAIL

Element	Cd.	Ch.	Description
Style	79		Telephone Bldg
Model	94		Commercial
Grade	03		Average
Stories	1.0		
Occupancy	0		
Exterior Wall 1	15		Concrete/mas
Level From	01		01
Level To	01		01
Uncov Parking	0		
Perimeter	68		
Identical Units	1		
Efficiency	0		
1 Bedroom	0		
2 Bedroom	0		
3 Bedroom	0		
AC Type	03		Central
Structure Type	720		720
Bldg Use	304		Public Utility C
Percent Finish	100		
Heating	07		Electr Basebrd
Frame Type	02		Wood Frame
Plumbing	00		None
Local Modifier	2.75		
Partitions	00		None
Wall Height	10		
Size	280		

CONSTRUCTION DETAIL (CONTINUED)

Element	Cd.	Ch.	Description

MIXED USE

Code	Description	Percentage
304	Public Utility C	100

COST/MARKET VALUATION

Adj. Base Rate:	146.29
AYB	1975
Dep Code	A
Remodel Rating	
Year Remodeled	
Dep %	27
Functional Obslnc	
External Obslnc	
Cost Trend Factor	
Condition	
% Complete	
Overall % Cond	73
Apprais Val	29,900
Dep % Ovr	0
Dep Ovr Comment	
Misc Imp Ovr	0
Misc Imp Ovr Comment	
Cost to Cure Ovr	0
Cost to Cure Ovr Comment	

OB-OUTBUILDING & YARD ITEMS(L) / XF-BUILDING EXTRA FEATURES(B)

Code	Description	Sub	Sub Descript	L/B	Units	Unit Price	Yr	Gde	Dp Rt	Cnd	%Cnd	Apr Value
FN3O	CHAIN LINK 6			L	120	16.90	1975				50	1,010
SH1O	SHED FRAME			L	288	15.00	1990				70	3,020
FN3O	CHAIN LINK 6			L	80	16.90	1990				70	950
FN4O	CHAIN LINK 8			L	320	22.25	2002				70	4,980
PC3O	PAVING CONC			L	1,296	6.81	2002				80	7,060

BUILDING SUB-AREA SUMMARY SECTION

Code	Description	Gross Area	Living Area	Eff. Area
BAS	First Floor	280	280	
	Ttl. Gross Liv/Lease Area:	280	280	

ATTACHMENT B – LETTER OF AUTHORIZATION

SBA Communications Corporation
8051 Congress Avenue
Boca Raton, FL 33487-1307

T + 561.995.7670
F + 561.995.7626

sbasite.com

LETTER OF AUTHORIZATION

SBA Site ID: CT06462-A, Mountain Street

Property Located at: 349 Mountain Street, Windham, CT, 06226

THE CITY/COUNTY OF: Windham / Windham/Windham

APPLICATION FOR ZONING/USE/BUILDING PERMIT

This letter authorizes Eversource and its authorized agents to file for all necessary zoning, planning and building permits (local, state and federal) for the purposes of installing, operating and maintaining a telecommunications facility on the existing tower on the property referenced above on behalf of SBA Properties, LLC.

All approval conditions that may be granted to Eversource in connection with above referenced facility relating to this specific application are the sole responsibility of Eversource.

SBA Properties, LLC

Jason Silberstein

Executive VP, Site Leasing

Date: 3/02/2022

ATTACHMENT C – MOUNT ANALYSIS

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

May 26, 2022

MOUNT EVALUATION LETTER

Site Number: 5568
Site Name: WILLIMANTIC
Site Data: 349 Mountain St.
Windham, CT 06280
Latitude: 41° 42’ 10.84”
Longitude: -72° 13’ 17.01”

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) =	85.8%

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

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

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

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

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

Sincerely,
Black & Veatch Corporation

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

05/31/2022

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
Eversource	1	-	163.625	153	1	Dipole	COMPROD	876F-70-2HSMP40DF1/2

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 140 mph
WIND SPEED WITH ICE	50 mph with 1" radial ice thickness
EXPOSURE CATEGORY	B
RISK CATEGORY	III
TOPO CATEGORY	Flat
CREST HEIGHT	N/A

3. REFERENCES

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

4. ASSUMPTIONS

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

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

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

5. RESULTS SUMMARY

Name	Bending Stress Ratio		Shear Stress Ratio	
Arm: HSS3X3X3	85.8%	Pass	35.0%	Pass
Bracing: Pipe 2.0 Std	60.9%	Pass	10.9%	Pass
Mount Pipe: Pipe 3.0 Std	65.6%	Pass	35.1%	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 = 0 lb

Appurtenance Dead Loads	
Name	Weight (lb)
876F-70-2HSMP40DF1/2	130

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: WILLIMANTIC (5568)		Date: 5/26/2022
			Verified By: Josh Riley
	Title: MOUNT ANALYSIS REPORT		Date: 5/26/2022

Appurtenance Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Basic Wind Speed, V =	140	mph		
Height Above Ground, z =	163.625	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 =	1.14		$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factor, K_e =	1.000		$F_A = q_z G_h (EPA)$	2.6.11.2
Wind Velocity Pressure, q_z =	54.22	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)
876F-70-2HSMP40DF1/2	20.00	3.58	0.25	2.00	9.00	488.00	2.00	9.00	488.00

BLACK & VEATCH	Client: Eversource		Computed By: Joohwan Jung
	Site Name: WILLIMANTIC (5568)		Date: 5/26/2022
			Verified By: Josh Riley
	Title: MOUNT ANALYSIS REPORT		Date: 5/26/2022

Member Wind Loading

Exposure Category =	B	
Risk Category =	III	
Topographic Category =	1	
Basic Wind Speed, V =	140	mph
Height Above Ground, z =	163.625	ft
Crest Height, H =	N/A	ft
Velocity Pressure Coefficient, K_z =	1.14	
Topographic Factor, K_{zt} =	1.00	
Wind Directionality Factor, K_d =	0.95	
Shielding Factor, K_a =	0.90	
Ground Elevation Factor, K_e =	1.000	
Wind Velocity Pressure, q_z =	54.22	psf
Gust Effect Factor, G_h =	1.00	

Equations

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

Member Wind Loads

Name	Depth (ft)	Width (ft)	C_f	D_p (ft)	F_M (lb)
Arm: HSS3X3X3	0.25	0.25	2	0.25	27.11
Bracing: Pipe 2.0 Std	0.20		1.2	0.20	12.88
Mount Pipe: Pipe 3.0 Std	0.29		1.2	0.29	18.98

BLACK & VEATCH	Client: Eversource	Computed By: Joohwan Jung	
	Site Name: WILLIMANTIC (5568)	Date: 5/26/2022	
		Verified By: Josh Riley	
	Title: MOUNT ANALYSIS REPORT	Date: 5/26/2022	

Appurtenance Ice Dead Loading

Exposure Category =	B		
Risk Category =	III		
Topographic Category =	1		
Height Above Ground, z =	163.625	ft	
Crest Height, H =	N/A	ft	
Design Ice Thickness, T_i =	1.00	in	
Importance Factor, I =	1.15		
Topographic Factor, K_{zt} =	1.00		
Height Escalation Factor, K_{iz} =	1.17		
Factored Ice Thickness, T_{iz} =	1.35	in	
Grating Ice Dead Load, D_{Gice} =	6.30	psf	

Equations

$K_h = e^{(f \cdot z / H)}$

$K_{zt} = [1 + K_c K_t / K_h]^2$

$K_{iz} = (z/33)^{0.10}$

$T_{iz} = T_i I K_{iz}(K_{zt})^{0.35}$

$DL_{ice}=[(H_{ice}*D_{ice}*W_{ice}) - (H*W*D)]*56pcf$

TIA-222-H

2.6.6.2.1

2.6.6.2.1

2.6.10

2.6.10

Appurtenance Ice Dead Loads

Name	Height w/ ice (ft)	Width w/ice (ft)	Depth w/ ice (ft)	V_{ice} (ft^3)	DL_{ice} (lb)
876F-70-2HSMP40DF1/2	20.22	3.81	0.47	3.31	185.49

BLACK & VEATCH

Client: Eversource | Computed By: Joohwan Jung
Site Name: WILLIMANTIC (5568) | Date: 5/26/2022
Verified By: Josh Riley
Title: MOUNT ANALYSIS REPORT | Date: 5/26/2022

Member Ice Dead Loading

Exposure Category =	B	
Risk Category =	III	
Topographic Category =	1	
Height Above Ground, z =	163.625	ft
Crest Height, H =	N/A	ft
Design Ice Thickness, T_i =	1.00	in
Importance Factor, I =	1.15	
Topographic Factor, K_{zt} =	1.00	
Height Escalation Factor, K_{iz} =	1.17	
Factored Ice Thickness, T_{iz} =	1.35	in
Grating Ice Dead Load, D_{Gice} =	6.30	psf

Equations

	TIA-222-H
$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
$K_{iz} = (z/33)^{0.10}$	2.6.10
$T_{iz} = T_i I K_{iz} (K_{zt})^{0.35}$	2.6.10
Aiz = pi*Tiz*(Dc+Tiz)	2.6.10
DL_{ice}=Aiz*56pcf	

Member Ice Dead Loads

Name	Depth w/ ice (ft)	Width w/ ice (ft)	Dc (ft)	Aiz (ft^2)	DL_{ice} (lb/ft)
Arm: HSS3X3X3	0.47	0.47	0.35	0.16	9.22
Bracing: Pipe 2.0 Std	0.42		0.20	0.11	6.14
Mount Pipe: Pipe 3.0 Std	0.52		0.29	0.14	8.00

BLACK & VEATCH

Client: Eversource | Computed By: Joohwan Jung
Site Name: WILLIMANTIC (5568) | Date: 5/26/2022
Verified By: Josh Riley
Title: MOUNT ANALYSIS REPORT | Date: 5/26/2022

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	50	mph		
Height Above Ground, z =	163.625	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 =	1.14	psf	$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	1.000		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	6.916			
Factored Ice Thickness, T_{iz} =	1.35	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)
876F-70-2HSMP40DF1/2	20.22	3.81	0.47	-	13.97	96.65	-	13.97	96.65

BLACK & VEATCH	Client: Eversource	Computed By: Joohwan Jung	
	Site Name: WILLIMANTIC (5568)	Date: 5/26/2022	
		Verified By: Josh Riley	
	Title: MOUNT ANALYSIS REPORT	Date: 5/26/2022	

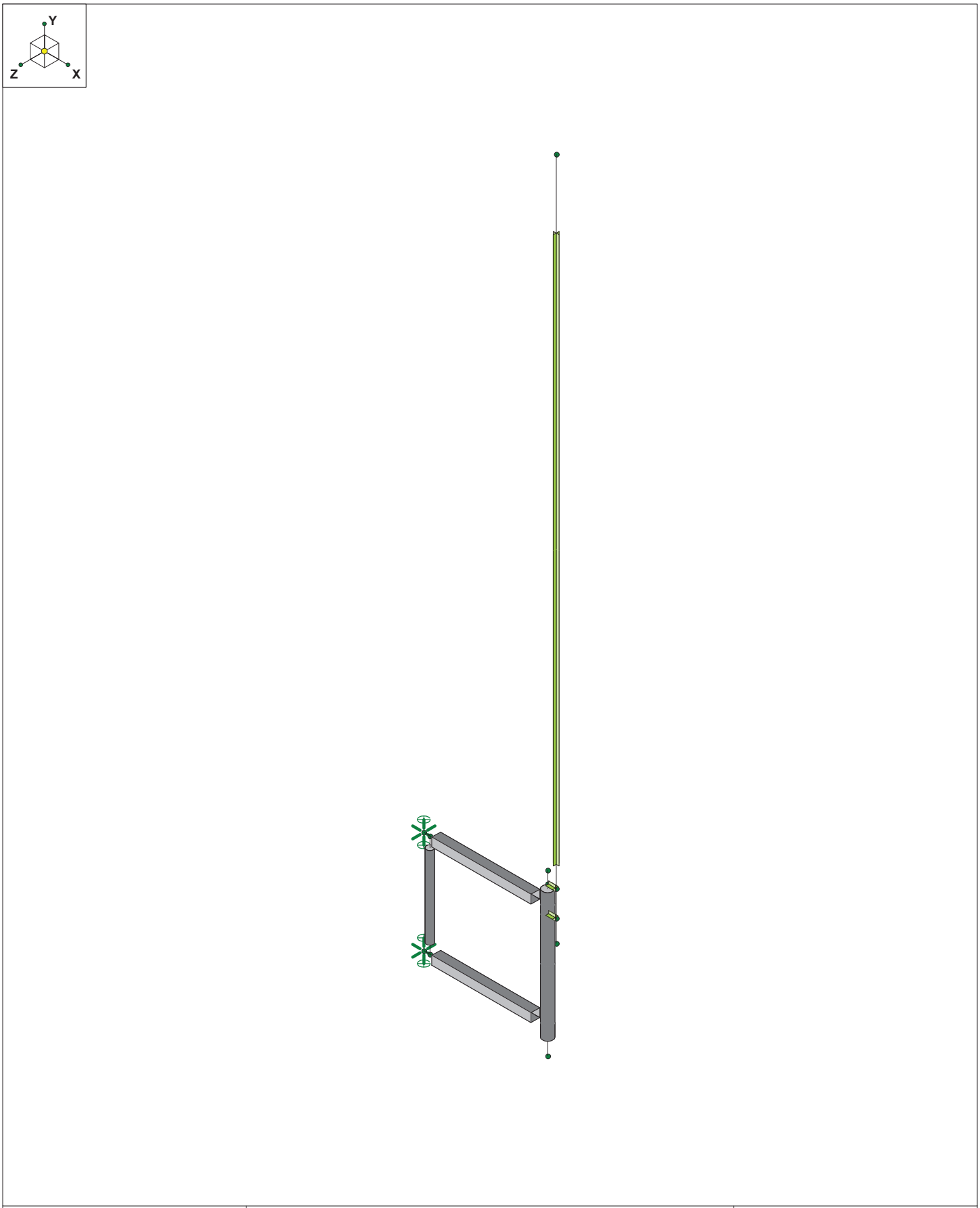
Member Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	50	mph		
Height Above Ground, z =	163.625	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 =	1.14	psf	$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	1.000		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	6.916			
Factored Ice Thickness, T_{iz} =	1.35	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

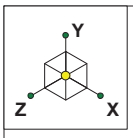
Member Ice Wind Loads

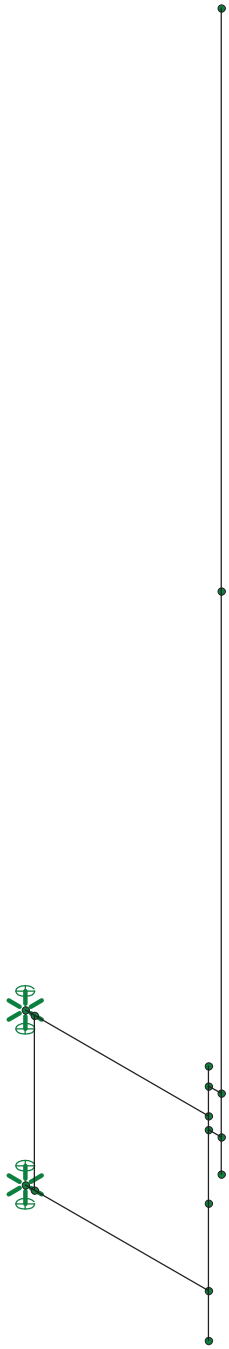
Name	Depth w/ Ice (ft)	Width w/ Ice (ft)	C_f	$D_{p(ice)}$ (ft)	$F_{M(ice)}$ (lb/ft)
Arm: HSS3X3X3	0.47	0.47	2	0.47	6.57
Bracing: Pipe 2.0 Std	0.42		1.2	0.42	3.51
Mount Pipe: Pipe 3.0 Std	0.52		1.2	0.52	4.29

APPENDIX 2:
RISA PRINTOUTS

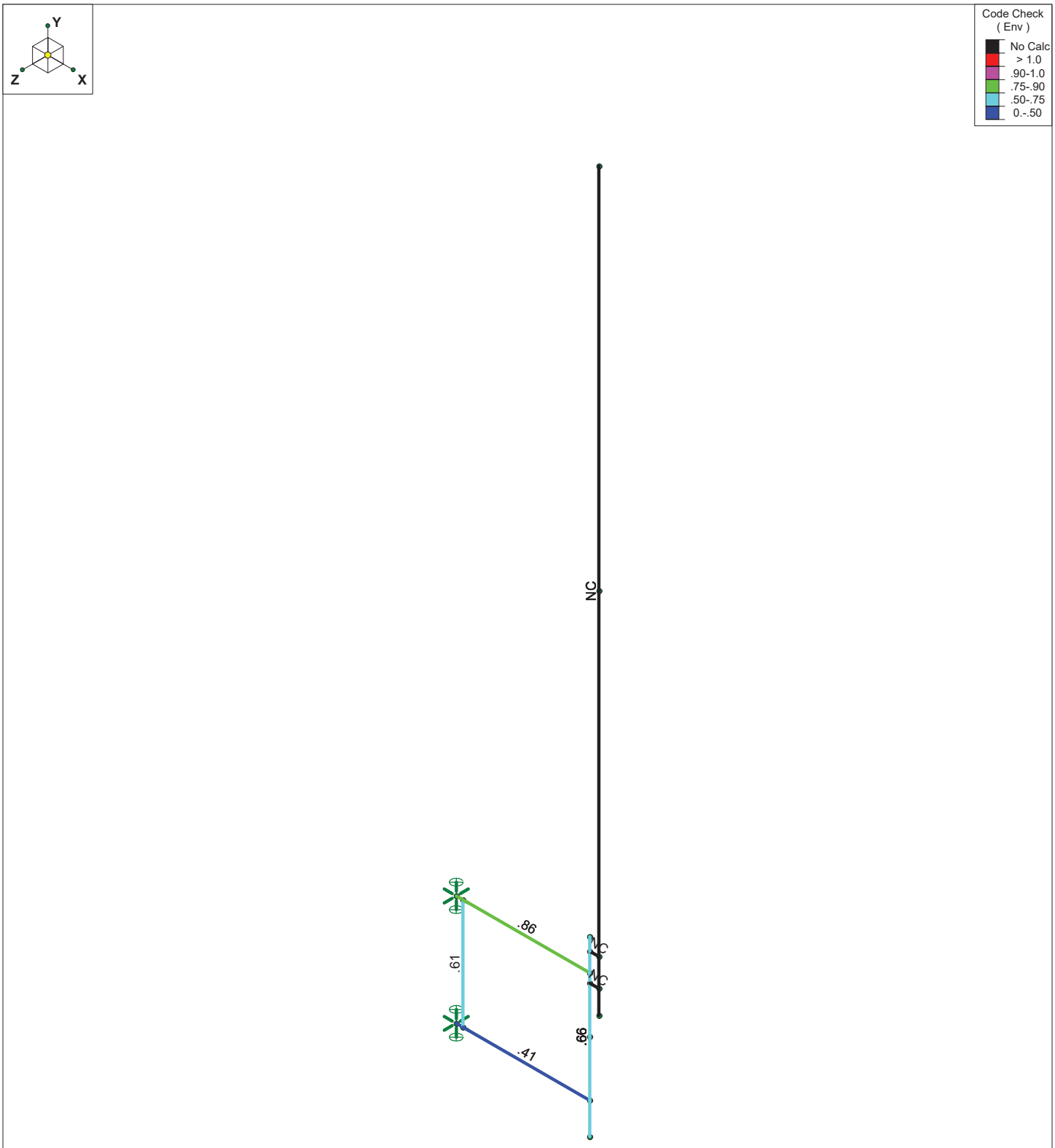


Black & Veatch	Willimantic USF-4U Model	SK - 1
Joohwan Jung		May 26, 2022 at 1:59 PM
405025.2021.2200		Willimantic USF-4U Model.r3d



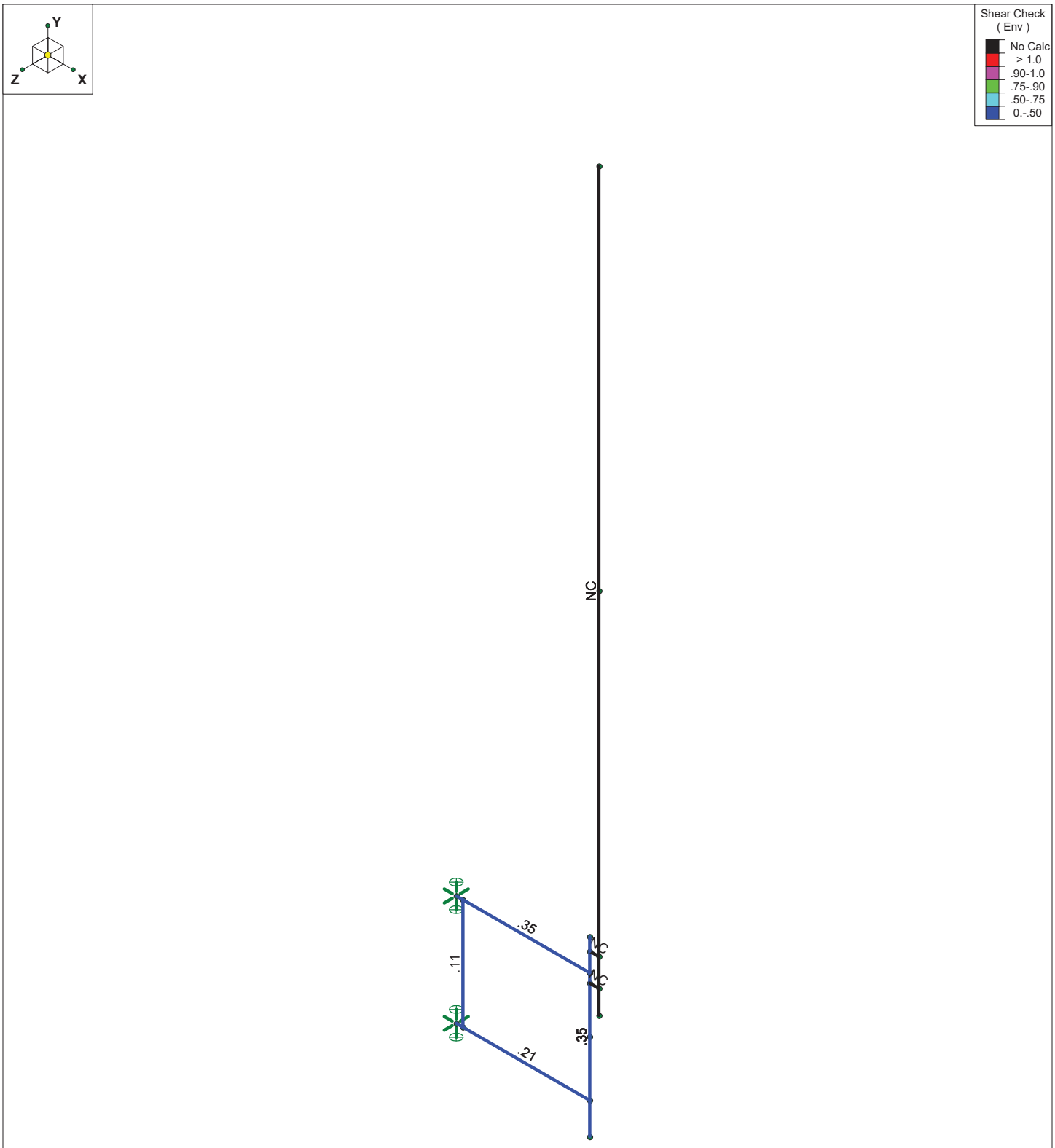


Black & Veatch	Willimantic USF-4U Model	SK - 2
Joohwan Jung		May 26, 2022 at 1:59 PM
405025.2021.2200		Willimantic USF-4U Model.r3d



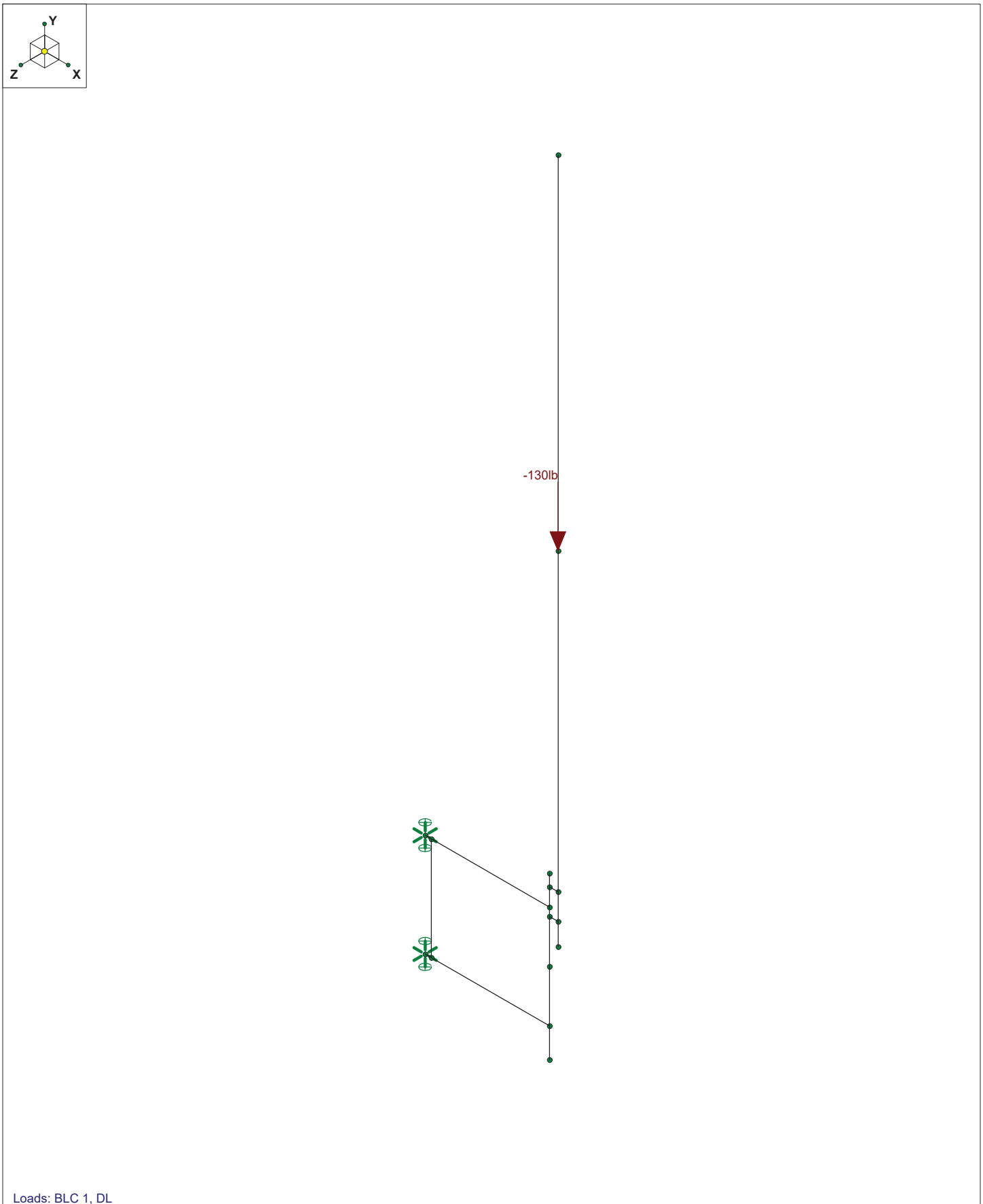
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	Willimantic USF-4U Model	SK - 3
Joohwan Jung		May 26, 2022 at 2:00 PM
405025.2021.2200		Willimantic USF-4U Model.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	Willimantic USF-4U Model	SK - 4
Joohwan Jung		May 26, 2022 at 2:00 PM
405025.2021.2200		Willimantic USF-4U Model.r3d



Loads: BLC 1, DL

Black & Veatch	Willimantic USF-4U Model	SK - 5
Joohwan Jung		May 26, 2022 at 1:59 PM
405025.2021.2200		Willimantic USF-4U Model.r3d

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Arm	HSS3X3X3	Beam	None	A53 Gr.B	Typical	1.89	2.46	2.46	4.03
2	Bracing	PIPE_2.0	Column	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	Mount Pipe	PIPE_3.0	Column	None	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	None	A53 Gr.B	Typical
2	M2	N3	N4			Arm	Beam	None	A53 Gr.B	Typical
3	M3	N5	N6			Bracing	Column	None	A53 Gr.B	Typical
4	M4	N7	N8			Mount Pipe	Column	None	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(P...
1	DL	DL		-1		1				
2	Maintenance LL - LV	LL				1				
3	Installation LL - LM	LL				1				
4	Wind - 0 Deg (X)	WL				1		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(P...
19	Wind - 90 Deg (Z)	WL				1		4		
20	Wind - 120 Deg (Z)	WL				1		4		
21	Wind - 150 Deg (Z)	WL				1		4		
22	Wind - 180 Deg (Z)	WL				1		4		
23	Wind - 210 Deg (Z)	WL				1		4		
24	Wind - 240 Deg (Z)	WL				1		4		
25	Wind - 270 Deg (Z)	WL				1		4		
26	Wind - 300 Deg (Z)	WL				1		4		
27	Wind - 330 Deg (Z)	WL				1		4		
28	Ice DL	DL				1		4		
29	Ice Wind - 0 Deg (X)	WL				1		4		
30	Ice Wind - 30 Deg (X)	WL				1		4		
31	Ice Wind - 60 Deg (X)	WL				1		4		
32	Ice Wind - 90 Deg (X)	WL				1		4		
33	Ice Wind - 120 Deg (X)	WL				1		4		
34	Ice Wind - 150 Deg (X)	WL				1		4		
35	Ice Wind - 180 Deg (X)	WL				1		4		
36	Ice Wind - 210 Deg (X)	WL				1		4		
37	Ice Wind - 240 Deg (X)	WL				1		4		
38	Ice Wind - 270 Deg (X)	WL				1		4		
39	Ice Wind - 300 Deg (X)	WL				1		4		
40	Ice Wind - 330 Deg (X)	WL				1		4		
41	Ice Wind - 0 Deg (Z)	WL				1		4		
42	Ice Wind - 30 Deg (Z)	WL				1		4		
43	Ice Wind - 60 Deg (Z)	WL				1		4		
44	Ice Wind - 90 Deg (Z)	WL				1		4		
45	Ice Wind - 120 Deg (Z)	WL				1		4		
46	Ice Wind - 150 Deg (Z)	WL				1		4		
47	Ice Wind - 180 Deg (Z)	WL				1		4		
48	Ice Wind - 210 Deg (Z)	WL				1		4		
49	Ice Wind - 240 Deg (Z)	WL				1		4		
50	Ice Wind - 270 Deg (Z)	WL				1		4		
51	Ice Wind - 300 Deg (Z)	WL				1		4		
52	Ice Wind - 330 Deg (Z)	WL				1		4		

Load Combinations

	Description	S...	P...	SR...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	WIND LOAD COMBOS (140 MPH)																									
2	1.2DL + WL (0 DEG)	Yes	Y		1	1.2	4	1	16	1																
3	1.2DL + WL (30 DEG)	Yes	Y		1	1.2	5	1	17	1																
4	1.2DL + WL (60 DEG)	Yes	Y		1	1.2	6	1	18	1																
5	1.2DL + WL (90 DEG)	Yes	Y		1	1.2	7	1	19	1																
6	1.2DL + WL (120 DEG)	Yes	Y		1	1.2	8	1	20	1																
7	1.2DL + WL (150 DEG)	Yes	Y		1	1.2	9	1	21	1																
8	1.2DL + WL (180 DEG)	Yes	Y		1	1.2	10	1	22	1																
9	1.2DL + WL (210 DEG)	Yes	Y		1	1.2	11	1	23	1																
10	1.2DL + WL (240 DEG)	Yes	Y		1	1.2	12	1	24	1																
11	1.2DL + WL (270 DEG)	Yes	Y		1	1.2	13	1	25	1																
12	1.2DL + WL (300 DEG)	Yes	Y		1	1.2	14	1	26	1																
13	1.2DL + WL (330 DEG)	Yes	Y		1	1.2	15	1	27	1																
14																										
15	MOUNT LOAD COMBOS (30 MPH)																									
16	1.4DL	Yes	Y		1	1.4																				
17	1.2DL + 1.5LV	Yes	Y		1	1.2	2	1.5																		
18	1.2DL + 1.5LM + WL (0 DEG)	Yes	Y		1	1.2	3	1.5	4	.046	16	.046														

Load Combinations (Continued)

	Description	S...	P...	SR..	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
19	1.2DL + 1.5LM + WL (30 DEG)	Yes	Y		1	1.2	3	1.5	5	.046	17	.046														
20	1.2DL + 1.5LM + WL (60 DEG)	Yes	Y		1	1.2	3	1.5	6	.046	18	.046														
21	1.2DL + 1.5LM + WL (90 DEG)	Yes	Y		1	1.2	3	1.5	7	.046	19	.046														
22	1.2DL + 1.5LM + WL (120 DEG)	Yes	Y		1	1.2	3	1.5	8	.046	20	.046														
23	1.2DL + 1.5LM + WL (150 DEG)	Yes	Y		1	1.2	3	1.5	9	.046	21	.046														
24	1.2DL + 1.5LM + WL (180 DEG)	Yes	Y		1	1.2	3	1.5	10	.046	22	.046														
25	1.2DL + 1.5LM + WL (210 DEG)	Yes	Y		1	1.2	3	1.5	11	.046	23	.046														
26	1.2DL + 1.5LM + WL (240 DEG)	Yes	Y		1	1.2	3	1.5	12	.046	24	.046														
27	1.2DL + 1.5LM + WL (270 DEG)	Yes	Y		1	1.2	3	1.5	13	.046	25	.046														
28	1.2DL + 1.5LM + WL (300 DEG)	Yes	Y		1	1.2	3	1.5	14	.046	26	.046														
29	1.2DL + 1.5LM + WL (330 DEG)	Yes	Y		1	1.2	3	1.5	15	.046	27	.046														
30																										
31	ICE LOAD COMBOS (1", 50 MPH)																									
32	1.2DL + Ice DL + Ice WL (0 DEG)	Yes	Y		1	1.2	28	1	29	1	41	1														
33	1.2DL + Ice DL + Ice WL (30 DEG)	Yes	Y		1	1.2	28	1	30	1	42	1														
34	1.2DL + Ice DL + Ice WL (60 DEG)	Yes	Y		1	1.2	28	1	31	1	43	1														
35	1.2DL + Ice DL + Ice WL (90 DEG)	Yes	Y		1	1.2	28	1	32	1	44	1														
36	1.2DL + Ice DL + Ice WL (120 DEG)	Yes	Y		1	1.2	28	1	33	1	45	1														
37	1.2DL + Ice DL + Ice WL (150 DEG)	Yes	Y		1	1.2	28	1	34	1	46	1														
38	1.2DL + Ice DL + Ice WL (180 DEG)	Yes	Y		1	1.2	28	1	35	1	47	1														
39	1.2DL + Ice DL + Ice WL (210 DEG)	Yes	Y		1	1.2	28	1	36	1	48	1														
40	1.2DL + Ice DL + Ice WL (240 DEG)	Yes	Y		1	1.2	28	1	37	1	49	1														
41	1.2DL + Ice DL + Ice WL (270 DEG)	Yes	Y		1	1.2	28	1	38	1	50	1														
42	1.2DL + Ice DL + Ice WL (300 DEG)	Yes	Y		1	1.2	28	1	39	1	51	1														
43	1.2DL + Ice DL + Ice WL (330 DEG)	Yes	Y		1	1.2	28	1	40	1	52	1														
44																										

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	1852.977	2	1370.544	8	2145.448	5	0	43	3939.198	11	0	43
2		min	-2419.34	8	-1095.428	2	-2145.448	11	0	2	-3939.198	5	0	2
3	N3	max	1606.784	8	1359.675	2	1332.903	11	0	43	1368.688	5	0	43
4		min	-1040.422	2	-1106.311	8	-1332.903	5	0	2	-1368.688	11	0	2
5	Totals:	max	812.555	2	639.233	17	812.544	5						
6		min	-812.556	8	264.234	8	-812.544	11						

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

	Member	Shape	Code Check	Loc[...	LC	Shear...	Loc[...	Dir	LC	phi*Pnc...	phi*Pnt...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M1	HSS3X3X3	.858	2.266	11	.350	2.266	z	11	55265....	59535	5171.25	5171.25	2...	H3-6
2	M2	HSS3X3X3	.408	43.5	10	.208	43.5	z	11	55265....	59535	5171.25	5171.25	2...	H1-1b
3	M3	PIPE_2.0	.609	0	11	.109	0		11	28843....	32130	1871.625	1871.625	2...	H1-1b
4	M4	PIPE_3.0	.656	13.5...	11	.351	13.5...		11	57908....	65205	5748.75	5748.75	1...	H3-6

APPENDIX 3:
ATTACHMENTS

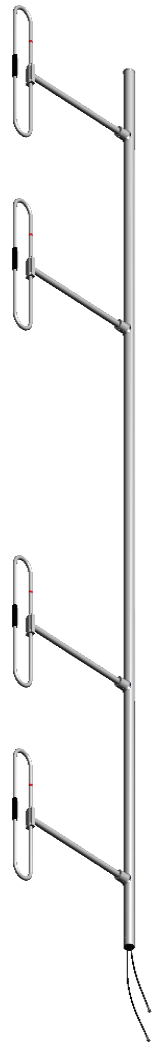
870 SERIES DUAL EXPOSED DIPOLE 215-225 MHz

876F-70-2HSMP40DF1/2

The 876F-70-2HSMP40DF1/2 Dual Exposed Dipole is well suited for multicoupled RF system. It has an extremely rugged design for use in severe environmental conditions. It has internal cabling and a fix dipole-to-mast spacing. This antenna is a special version of the 876F-70 with increased spacing between the two antennas, giving an isolation of 40 dB. It's heavy duty and Low PIM deign. This antenna can be black anodized, please contact technical support for more information.

The ½ wave pattern spacing version offer bidirectional pattern with more than 5 dBd Gain at 220 MHz.

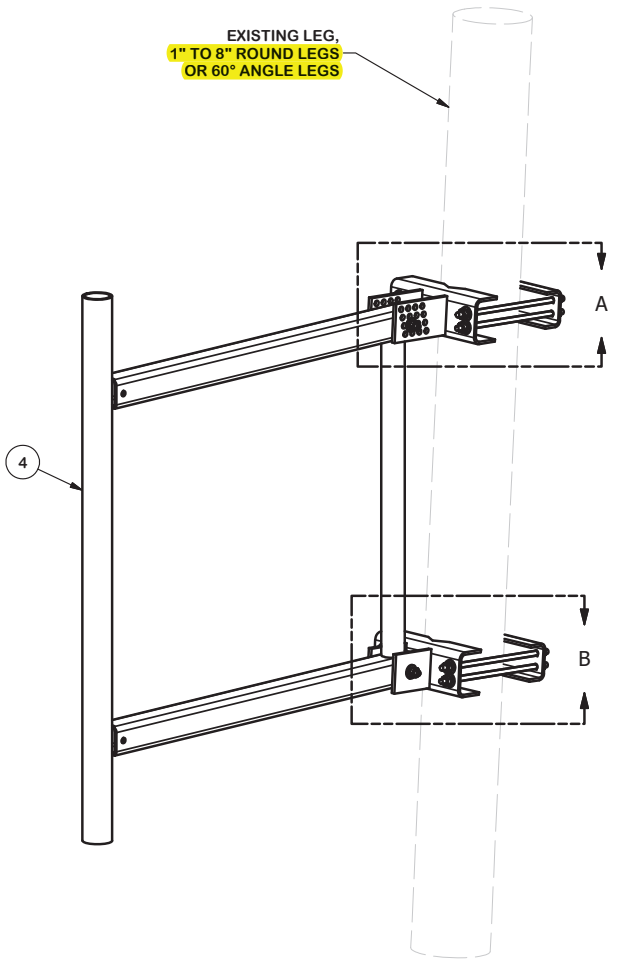
Electrical Specifications	876F-70-2HSMP40DF1/2
Frequency Range, MHz	215-225
Nominal Gain, dBd	5.0 (5.2 @ 220MHz)
Isolation , dB	40
Bandwidth 1.5:1 VSWR, MHz	1.5:1 (10)
Polarization	Vertical
Pattern	Bidirectional
Power Rating, Watts	300
PIM. (2x20W, 3rd ord.), dBc	150
Nominal Impedance, Ohms	50
Lightning Protection	DC Ground
Termination	Dual Feeds Terminating in 7/16 DIN F
Mechanical Specifications	**876F-70-HDWSM-40**
Length, in (mm)	240 (6096)
Width (1/2 Wave Spacing), in (mm)	43 (1092)
Weight, lbs. (kg)	130 (59)
Rated Wind Velocity, No Ice, mph (km/h)	140 (225)
Rated Wind Velocity, 1/2" ice, mph (km/h)	105 (169)
Lateral Thrust @ 100 mph, wind, lbs. (N)	222 (988)
Torsional Moment (N●M)	471 (638)
Projected Area, ft² (m²)	8.5 (0.78)
Mounting Information Mast O.D. (mm)	2.9 (74)

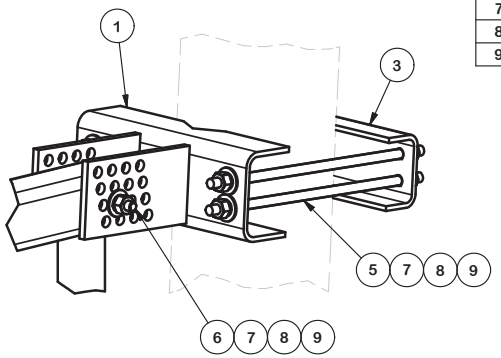


876F-70-2HSMP40DF1/2

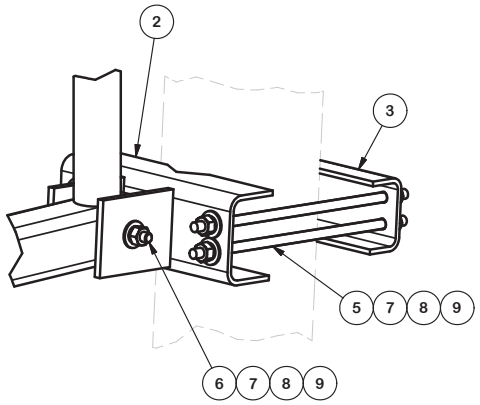
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 3.5"± DIAMETER.

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

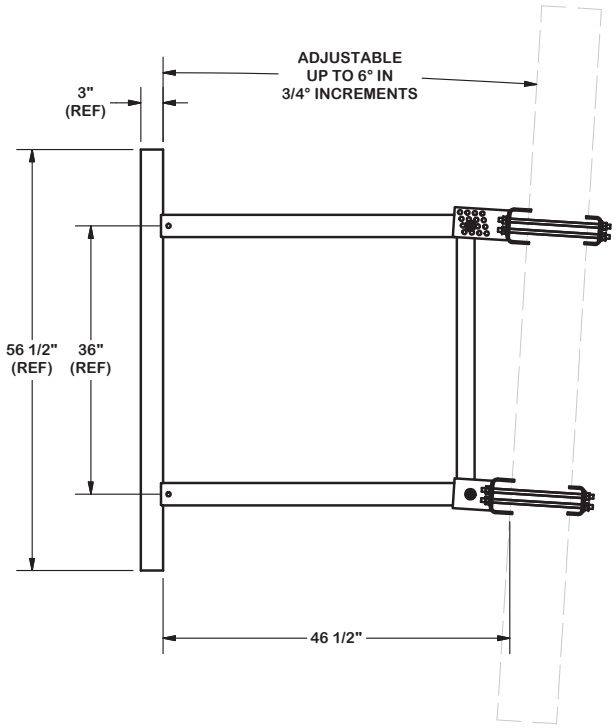




DETAIL A



DETAIL B



TOLERANCE NOTES

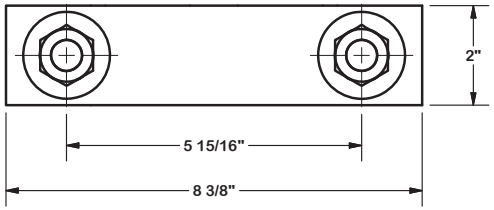
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

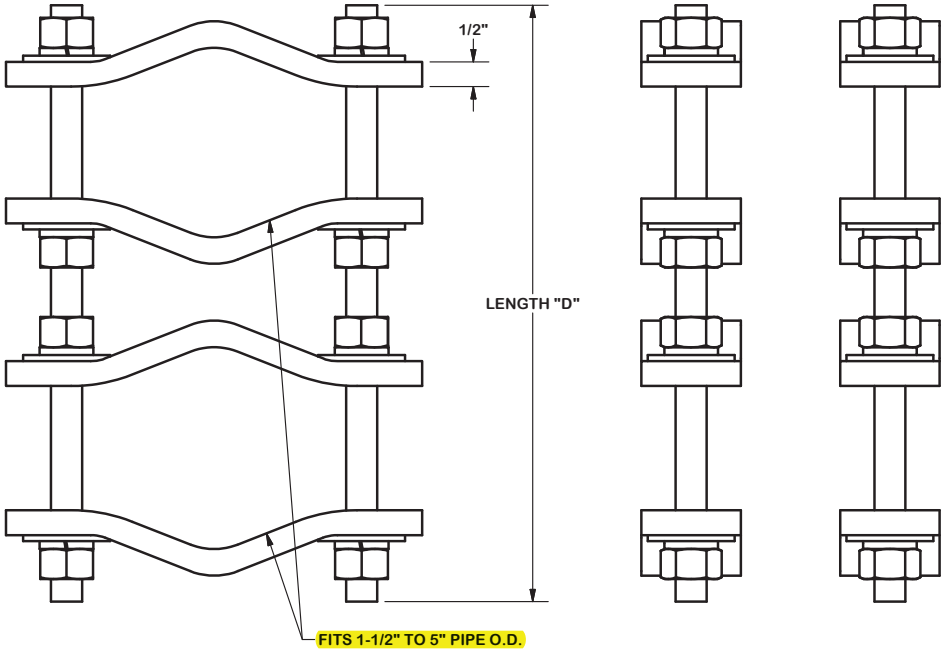
DESCRIPTION: 48" ULTIMATE UNIVERSAL STANDOFF FRAME

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

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

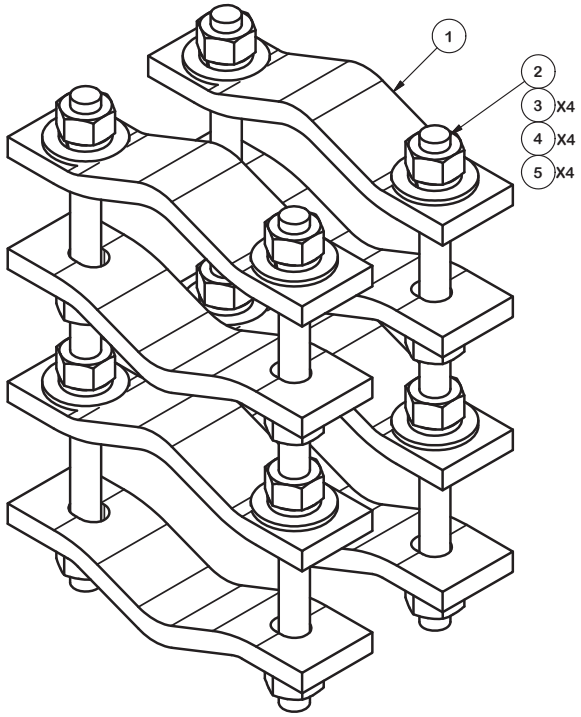
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 2/16/2011	USF-4U





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

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



TOLERANCE NOTES

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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 D – CONSTRUCTION DRAWINGS

EVERSOURCE ENERGY

WILLIMANTIC (CT06462-A)
349 MOUNTAIN ST
WINDHAM, CT 06280

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (1) NEW DIPOLE ANTENNA AT ELEVATION 173'–7"± AGL INSTEAD OF (1) OMNI/WHIP ANTENNA AT ELEVATION 169'–0"± AGL
2. INSTALL (1) NEW RACK WITH DMR EQUIPMENT IN EXISTING SHELTER

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:	WILLIMANTIC (CT06462–A)
SITE ID NUMBER:	#5568
SITE ADDRESS:	349 MOUNTAIN ST WINDHAM, CT 06280
MAP:	03
BLOCK:	154
LOT:	60
ZONE:	R4
LATITUDE:	41° 42' 10.84" N
LONGITUDE:	72° 13' 17.01" W
ELEVATION:	525'± AMSL
FEMA/FIRM DESIGNATION:	X
ACREAGE:	2.05± AC (BOOK: 0631, PAGE: 0299)

CONTACT INFORMATION

APPLICANTS:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
SBA PROPERTIES INC
8051 CONGRESS AVE
BOCA RATON, FL 33487

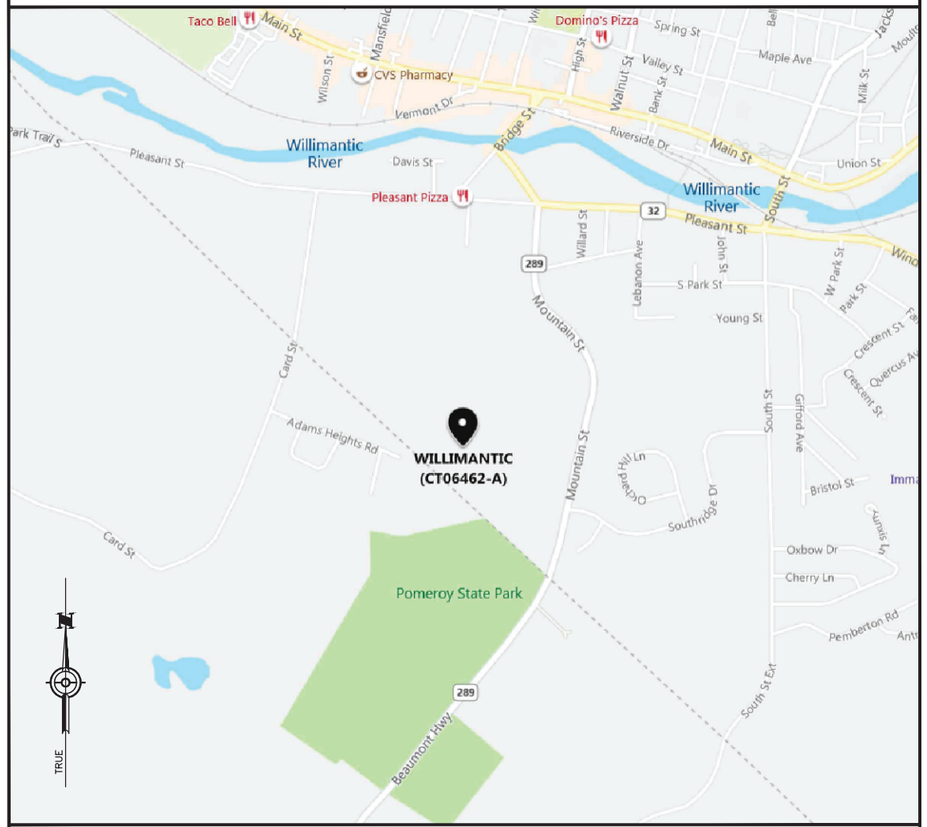
EVERSOURCE ENERGY
PROJECT MANAGER:
NIKOLL PRECI
(860) 655–3079

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:	TH

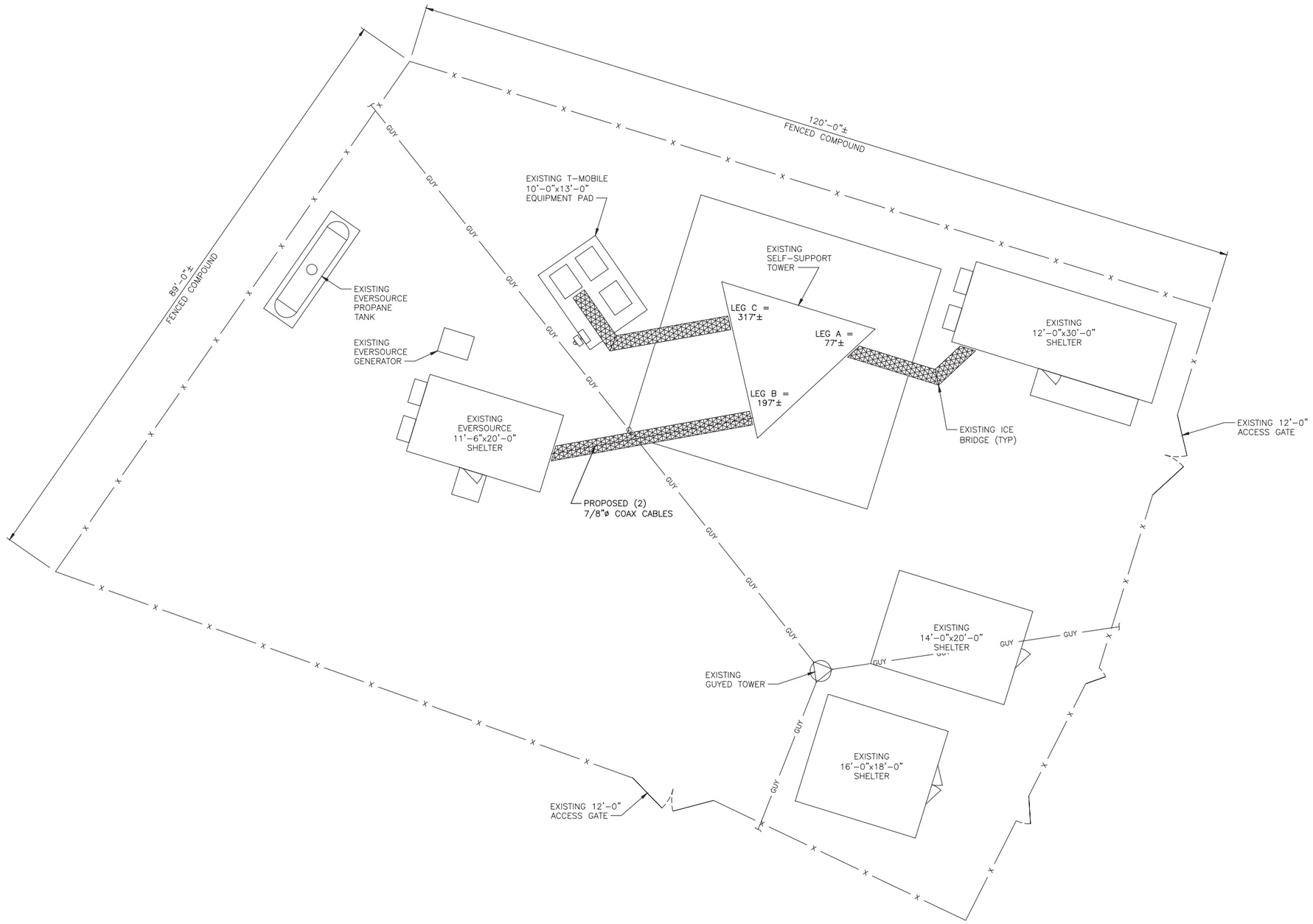
REV	DATE	DESCRIPTION
2	05/23/22	ISSUED FOR FILING
1	12/10/21	ISSUED FOR FILING
0	06/18/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
07/21/2022
Digitally signed by Riley, Joshua J
Date: 2022.07.21 17:11:56 -05'00'

WILLIMANTIC (CT06462–A)
349 MOUNTAIN ST
WINDHAM, CT 06280

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



SITE PLAN
NO SCALE

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

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

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

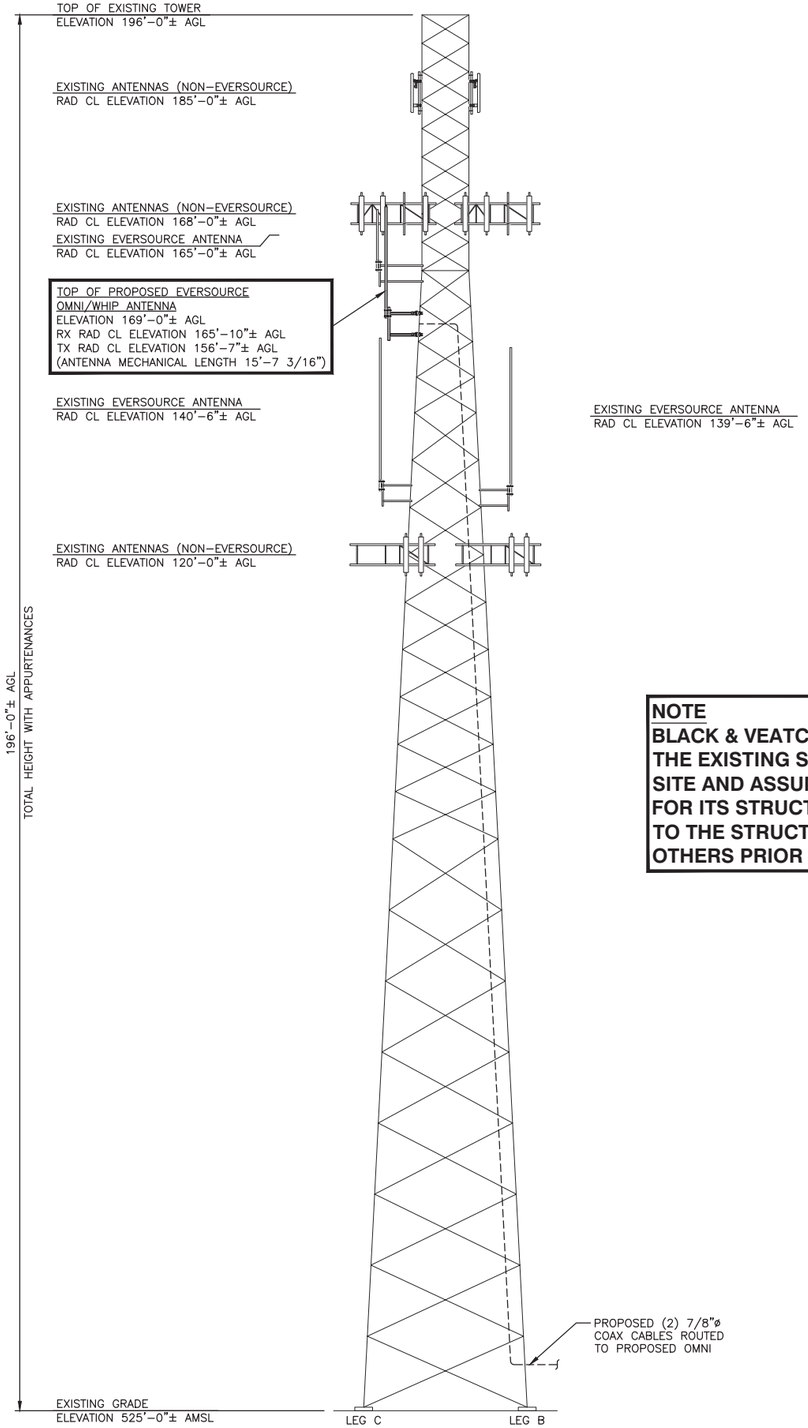
REV	DATE	DESCRIPTION
2	05/23/22	ISSUED FOR FILING
1	12/10/21	ISSUED FOR FILING
0	06/18/20	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
07/21/2022

WILLIMANTIC (CT06462-A)
349 MOUNTAIN ST
WINDHAM, CT 06280

SHEET TITLE
SITE PLAN

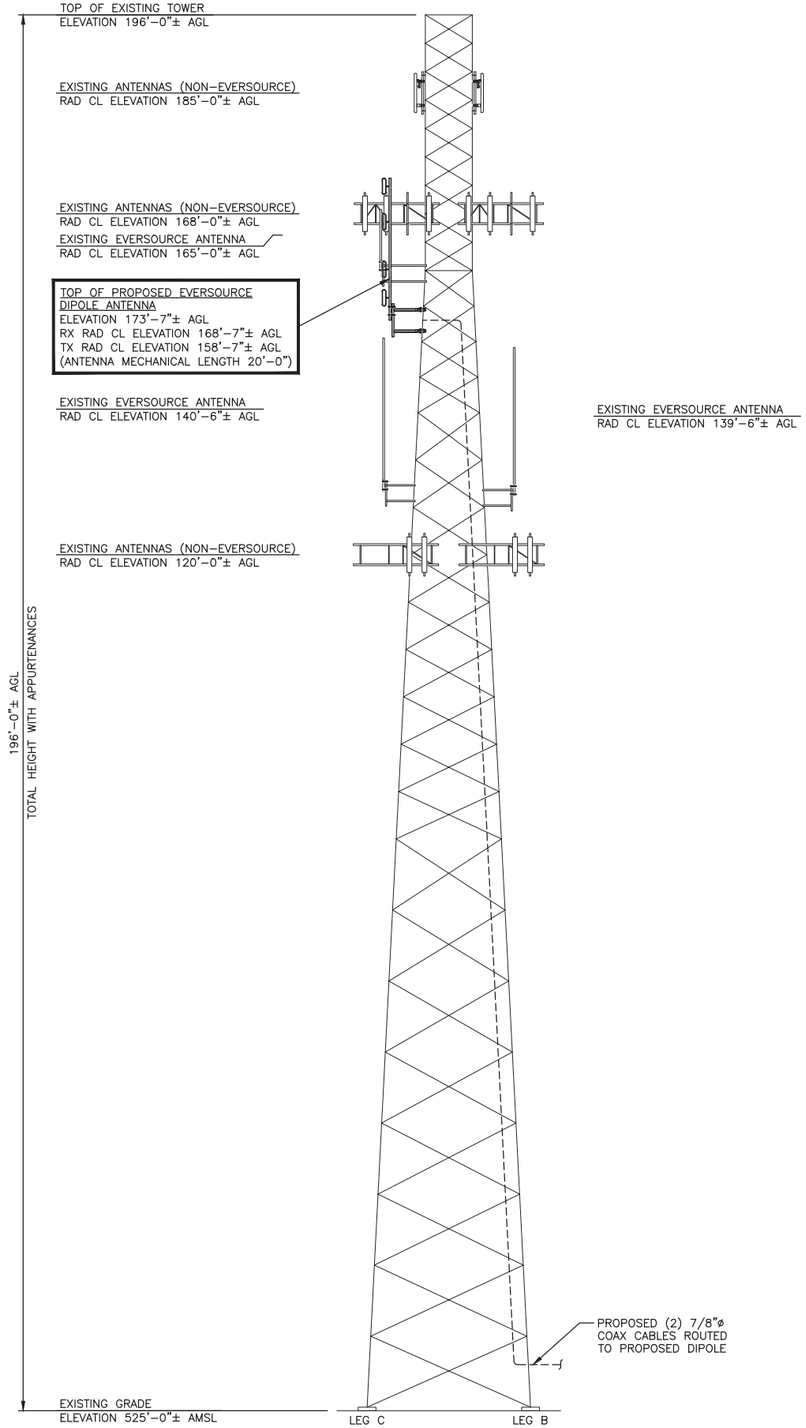
SHEET NUMBER
C-1



CSC SUBMITTED INSTALLATION CONFIGURATION

NO SCALE

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



CURRENT INSTALLATION CONFIGURATION

NO SCALE

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

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

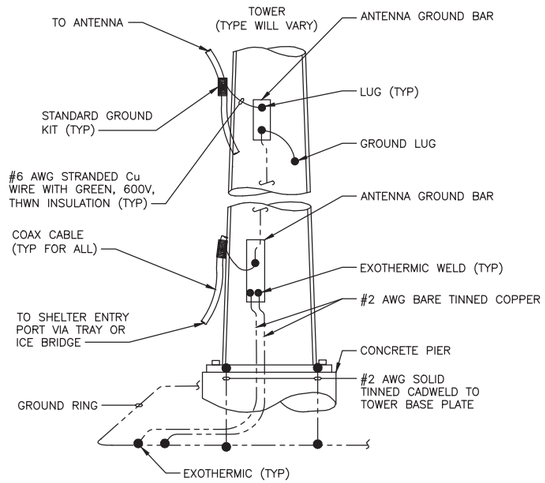
PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	TH

REV	DATE	DESCRIPTION
2	05/23/22	ISSUED FOR FILING
1	12/10/21	ISSUED FOR FILING
0	06/18/20	ISSUED FOR FILING

WILLIMANTIC (CT06462-A)
349 MOUNTAIN ST
WINDHAM, CT 06280

SHEET TITLE
TOWER ELEVATION & ANTENNA EQUIPMENT

SHEET NUMBER
C-2

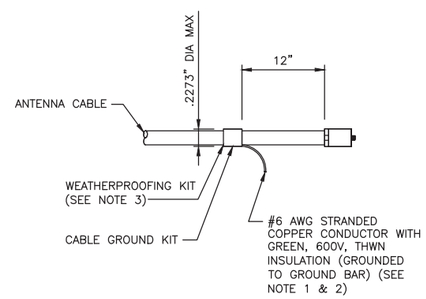


NOTE

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

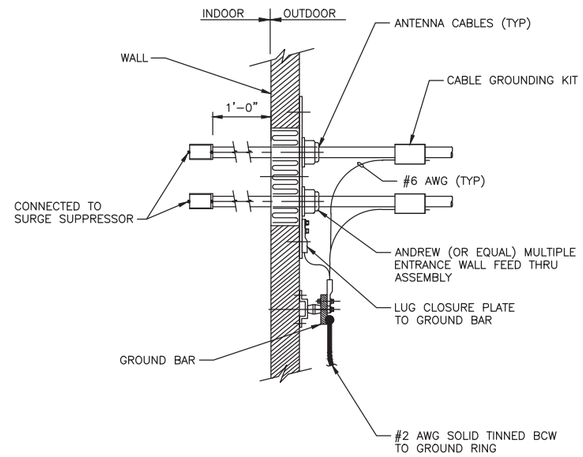


NOTES

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.

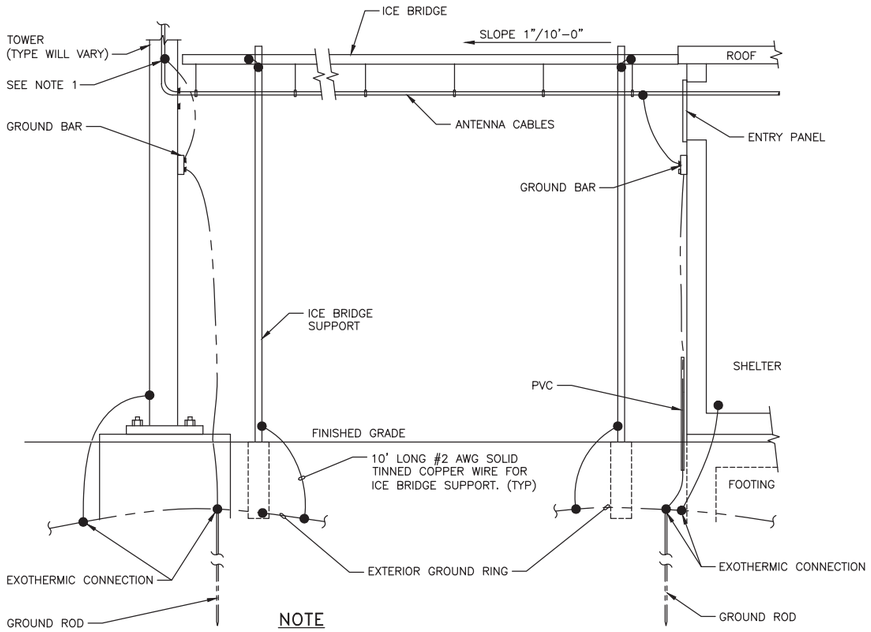
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

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:	TH

REV	DATE	DESCRIPTION
2	05/23/22	ISSUED FOR FILING
1	12/10/21	ISSUED FOR FILING
0	06/18/20	ISSUED FOR FILING

WILLIMANTIC (CT06462-A)
349 MOUNTAIN ST
WINDHAM, CT 06280

SHEET TITLE

GROUNDING DETAILS

SHEET NUMBER

G-1

DESIGN BASIS

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

GENERAL CONDITIONS

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

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

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

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

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

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

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

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

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

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

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

THERMAL & MOISTURE PROTECTION

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

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

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

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

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

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

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

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

SUBMITTALS

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

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

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

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

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

STEEL

1. MATERIAL:

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

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

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

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

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

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

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

SITE GENERAL

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

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

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

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

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

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

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

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

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

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BLACK & VEATCH
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PHONE: (913) 458-2522

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

REV	DATE	DESCRIPTION
2	05/23/22	ISSUED FOR FILING
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STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
07/21/2022

WILLIMANTIC (CT06462-A)
349 MOUNTAIN ST
WINDHAM, CT 06280

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.

GROUNDING

1. #6 THWN SHALL BE STRANDED #6 COPPER WITH GREEN THWN INSULATION SUITABLE FOR WET INSTALLATIONS.
2. #2 THWN SHALL BE STRANDED #2 COPPER WITH THWN INSULATION SUITABLE FOR WET INSTALLATIONS.
3. #2 BARE TINNED SHALL BE SOLID COPPER TINNED. ALL BURIED WIRE SHALL MEET THIS CRITERIA.
4. ALL LUGS SHALL BE 2–HOLE, LONG BARREL, TINNED SOLID COPPER UNLESS OTHERWISE SPECIFIED, LUGS SHALL BE THOMAS AND BETTS SERIES 548##BE OR EQUIVALENT (IE #2 THWN – 54856BE, #2 SOLID – 54856BE, AND #6 THWN – 54852BE).
5. ALL HARDWARE, BOLTS, NUTS, AND WASHERS SHALL BE 18–8 STAINLESS STEEL. EVERY CONNECTION SHALL BE BOLT–FLAT WASHER–BUSS–LUG–FLAT WASHER–BELLEVILLE WASHER–NUT IN THAT EXACT ORDER. BACK–TO–BACK LUGGING, BOLT–FLAT WASHER–LUG–BUSS–LUG–FLAT WASHER–BELLEVILLE WASHER–NUT, IN THAT EXACT ORDER, IS ACCEPTED WHERE NECESSARY TO CONNECT MANY LUGS TO A BUSS BAR. STACKING OF LUGS, BUSS–LUG–LUG, IS NOT ACCEPTABLE.
6. WHERE CONNECTIONS ARE MADE TO STEEL OR DISSIMILAR METALS, A THOMAS AND BETTS DRAGON TOOTH WASHER MODEL DTWXXX SHALL BE USED BETWEEN THE LUG AND THE STEEL, BOLT–FLAT WASHER–STEEL–DRAGON TOOTH WASHER–LUG–FLAT WASHER–BELEVILE WASHER–NUT.
7. ALL CONNECTIONS, INTERIOR AND EXTERIOR, SHALL BE MADE WITH THOMAS AND BETTS KPOR–SHIELD. COAT ALL WIRES BEFORE LUGGING AND COAT ALL SURFACES BEFORE CONNECTING.
8. THE MINIMUM BEND RADIUS SHALL BE 8 INCHES FOR #6 WIRE AND SMALLER AND 12 INCHES FOR WIRE LARGER THAN #6.
9. ALL CONNECTIONS TO THE GROUND RING SHALL BE EXOTHERMIC WELD.
10. BOND THE FENCE TO THE GROUND RING AT EACH CORNER, AND AT EACH GATE POST WITH #2 SOLID TINNED WIRE. EXOTHERMIC WELD BOTH ENDS.
11. GROUND KITS SHALL BE SOLID COPPER STRAP WITH #6 WIRE 2–HOLE COMPRESSION CRIMPED LUGS AND SHALL BE SEALED ACCORDING TO MANUFACTURER INSTRUCTIONS.
12. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL BE USED.
13. GROUND BARS SHALL BE FURNISHED AND INSTALLED WITH PRE–DRILLED HOLE DIAMETERS AND SPACINGS. GROUND BARS SHALL NEITHER BE FIELD FABRICATED NOR NEW HOLES DRILLED. GROUND LUGS SHALL MATCH THE SPACING ON THE BAR. HARDWARE DIAMETER SHALL BE MINIMUM 3.8 INCH.
14. MGB GROUND CONNECTION SHALL BE EXOTHERMIC WELDED TO THE GROUND SYSTEM.
15. ALL CABLE TRAY AND/OR PLATFORM STEEL SHALL BE BONDED TOGETHER WITH JUMPERS (#6 IN EQUIPMENT ROOM, #2 ELSEWHERE AND HOMERUN).

ANTENNA & CABLE NOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL TRANSMISSION CABLES, JUMPERS, CONNECTORS, GROUNDING STRAPS, ANTENNAS, MOUNTS AND HARDWARE. ALL MATERIALS SHALL BE INSPECTED BY THE CONTRACTOR FOR DAMAGE UPON DELIVERY. JUMPERS SHALL BE SUPPLIED AT ANTENNAS AND EQUIPMENT INSIDE SHELTER COORDINATE LENGTH OF JUMP CABLES WITH EVERSOURCE. COORDINATE AND VERIFY ALL OF THE MATERIALS TO BE PROVIDED WITH EVERSOURCE PRIOR TO SUBMITTING BID AND ORDERING MATERIALS.
2. AFTER INSTALLATION, THE TRANSMISSION LINE SYSTEM SHALL BE PIM/SWEEP TESTED FOR PROPER INSTALLATION AND DAMAGE WITH ANTENNAS CONNECTED. CONTRACTOR TO OBTAIN LATEST TESTING PROCEDURES FROM EVERSOURCE PRIOR TO BIDDING.
3. ANTENNA CABLES SHALL BE COLOR CODED AT THE FOLLOWING LOCATIONS:
   – AT THE ANTENNAS.
   – AT THE WAVEGUIDE ENTRY PLATE ON BOTH SIDES OF THE EQUIPMENT SHELTER WALL.
   – JUMPER CABLES AT THE EQUIPMENT ENTER.
4. SYSTEM INSTALLATION:
   THE CONTRACTOR SHALL INSTALL ALL CABLES AND ANTENNAS TO THE MANUFACTURER'S SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR THE PROCUREMENT AND INSTALLATION OF THE FOLLOWING:
   – ALL CONNECTORS, ASSOCIATED CABLE MOUNTING, AND GROUNDING HARDWARE.
   – WALL MOUNTS, STANDOFFS, AND ASSOCIATED HARDWARE.
   – 1/2 INCH HELIAX ANTENNA JUMPERS OF APPROPRIATE LENGTHS.
5. MINIMUM BENDING RADIUS FOR COAXIAL CABLES:
   – 7/8 INCH, RMIN = 15 INCHES
   – 1 5/8 INCH, RMIN = 25 INCHES
6. CABLE SHALL BE INSTALLED WITH A MINIMUM NUMBER OF BENDS WHERE POSSIBLE. CABLE SHALL NOT BE LEFT UNTERMINATED AND SHALL BE SEALED IMMEDIATELY AFTER BEING INSTALLED.
7. ALL CABLE CONNECTIONS OUTSIDE SHALL BE COVERED WITH WATERPROOF SPLICING KIT.
8. CONTRACTOR SHALL VERIFY EXACT LENGTH AND DIRECTION OF TRAVEL IN FIELD PRIOR TO CONSTRUCTION.
9. CABLE SHALL BE FURNISHED WITHOUT SPLICES AND WITH CONNECTORS AT EACH END.

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STATE OF CONNECTICUT · MARK P. STILES · 24359 · LICENSED PROFESSIONAL ENGINEER
07/21/2022

WILLIMANTIC (CT06462–A)
349 MOUNTAIN ST
WINDHAM, CT 06280

SHEET TITLE
NOTES
& SPECIFICATIONS

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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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& SPECIFICATIONS

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REFERENCE CUTSHEETS

PROPOSED REPLACEMENT ANTENNA

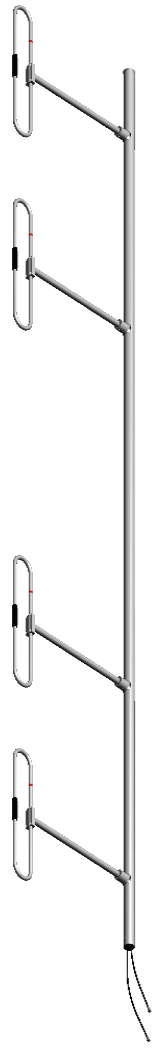
870 SERIES DUAL EXPOSED DIPOLE 215-225 MHz

876F-70-2HSMP40DF1/2

The 876F-70-2HSMP40DF1/2 Dual Exposed Dipole is well suited for multicoupled RF system. It has an extremely rugged design for use in severe environmental conditions. It has internal cabling and a fix dipole-to-mast spacing. This antenna is a special version of the 876F-70 with increased spacing between the two antennas, giving an isolation of 40 dB. It's heavy duty and Low PIM deign. This antenna can be black anodized, please contact technical support for more information.

The ½ wave pattern spacing version offer bidirectional pattern with more than 5 dBd Gain at 220 MHz.

Electrical Specifications	876F-70-2HSMP40DF1/2
Frequency Range, MHz	215-225
Nominal Gain, dBd	5.0 (5.2 @ 220MHz)
Isolation , dB	40
Bandwidth 1.5:1 VSWR, MHz	1.5:1 (10)
Polarization	Vertical
Pattern	Bidirectional
Power Rating, Watts	300
PIM. (2x20W, 3rd ord.), dBc	150
Nominal Impedance, Ohms	50
Lightning Protection	DC Ground
Termination	Dual Feeds Terminating in 7/16 DIN F
Mechanical Specifications	**876F-70-HDWSM-40**
Length, in (mm)	240 (6096)
Width (1/2 Wave Spacing), in (mm)	43 (1092)
Weight, lbs. (kg)	130 (59)
Rated Wind Velocity, No Ice, mph (km/h)	140 (225)
Rated Wind Velocity, 1/2" ice, mph (km/h)	105 (169)
Lateral Thrust @ 100 mph, wind, lbs. (N)	222 (988)
Torsional Moment (N●M)	471 (638)
Projected Area, ft² (m²)	8.5 (0.78)
Mounting Information Mast O.D. (mm)	2.9 (74)



876F-70-2HSMP40DF1/2

COMPROD Simplifying RF Solutions

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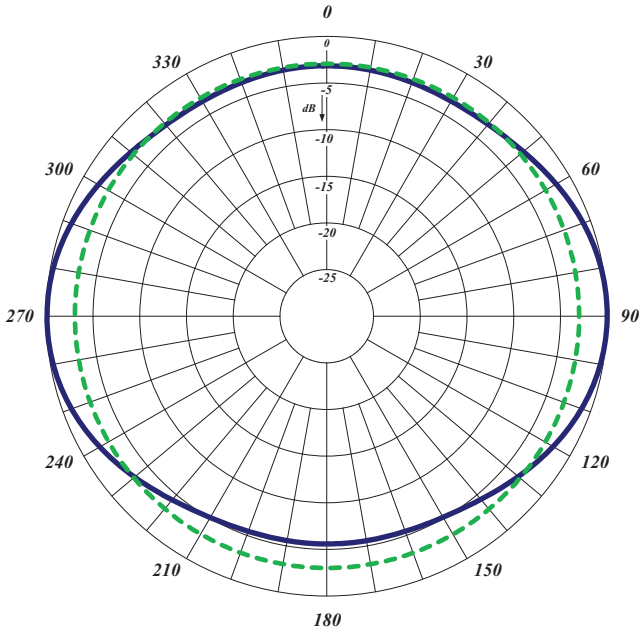
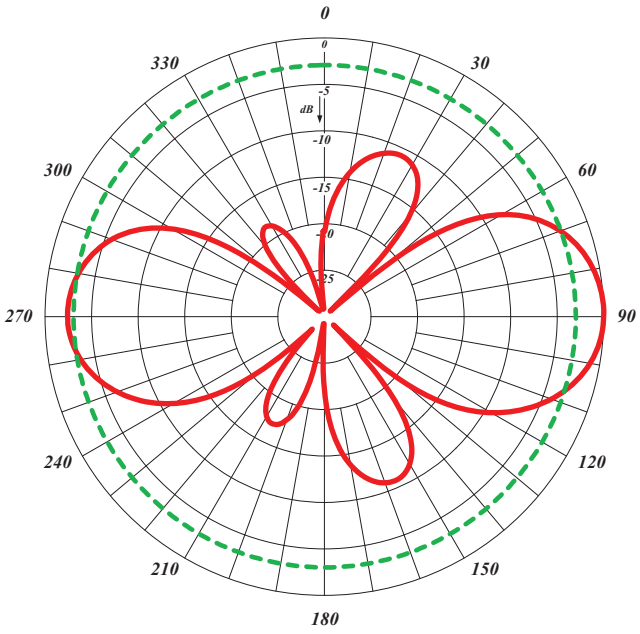
870 SERIES DUAL EXPOSED DIPOLE 215-225 MHz

876F-70-2HSMP40DF1/2



876F-70-2HSMP40DF1/2: Horizontal Radiation pattern



876F-70-2HSMP40DF1/2: Vertical Radiation pattern

CURRENTLY INSTALLED ANTENNA, TO BE REMOVED AND REPLACED

dbSpectra
Always a Better Value

220 MHz Antenna – Omnidirectional, Low-PIM/Hi-PIP, Unity Gain
Models - SP2D00P36D-D

Specifications	
Design Type	True Corporate Feed
Frequency Range	217-220 MHz
Passive Intermodulation – PIM (2 x 20W sources)	-150 dBc, 3rd Order
Bandwidth	3 MHz
Gain - dBd (average over BW)	0 dBd
Isolation, min.	40 dB
Configuration	Dual antenna
Beam Tilt (electrical down-tilt)	None (0°)
Vertical Beamwidth (E-Plane)	60°
Impedance -- Ohms	50
VSWR / Return Loss -- dB	1.5 : 1 / 14 dB (min.)
Average Power Rating	500 W (each antenna)
Peak Instantaneous Power	25 kW (each antenna)
Polarization	Vertical
Lightning Protection	Direct Ground
Connector	7/16 DIN female
Equivalent Flat-Plate Area	2.59 sq. ft.
Lateral Wind-load Thrust @100mph	109 lbf.
Wind Speed rating	160 mph (without ice) 136 mph (½" radial ice)
Total Length	15.6 feet
Mounting Mast Length	35 inches
Mounting Hardware (Included)	DSH3V4N
Top Sway Brace (Recommended if side mounting antennas)	DSH2H3S (order separately)
Mast O.D.	3.5 inches
Radome color	Horizon Blue
Radome O.D.	3.0 inches
Weight, antenna, and hardware	45 lbs. (approx.)
Shipping Weight	80 lbs. (approx.)
Invertibility	Antennas are physically invertible, but the patterns are optimized for upright mount.

Features and Benefits

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

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

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

PIM Rated Design – better than -150 dBc.

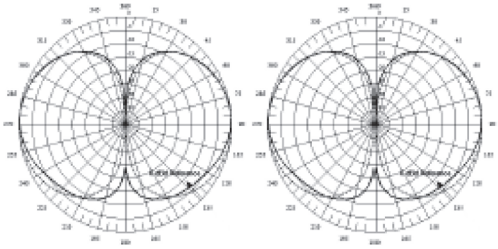
Sturdy Construction – Heavy-wall fiberglass radome minimizes tip deflection.

Excellent Lightning Protection – heavy internal conductor DC ground.

Radiation Pattern

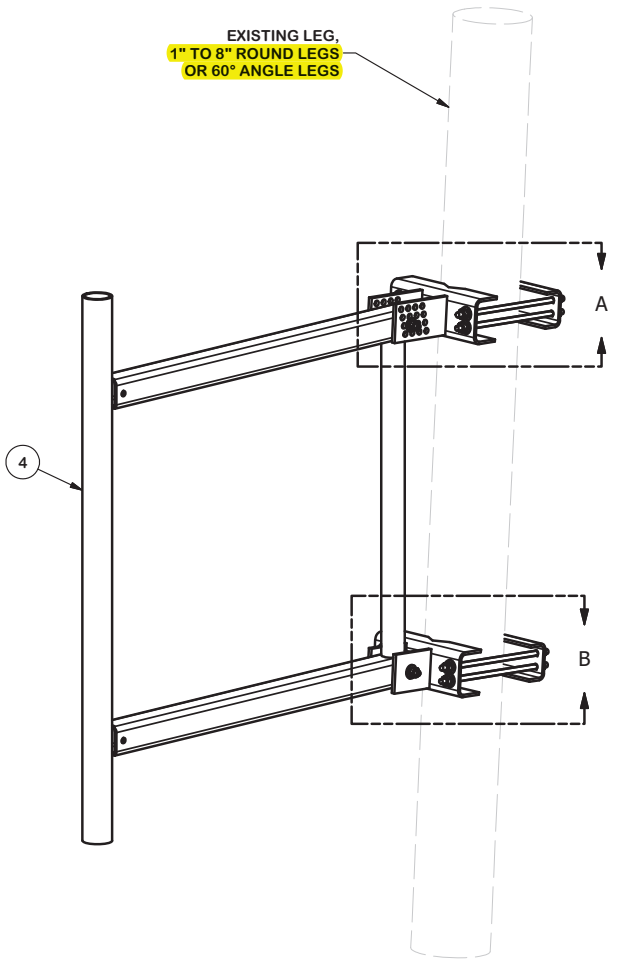
Vertical (No-Tilt)

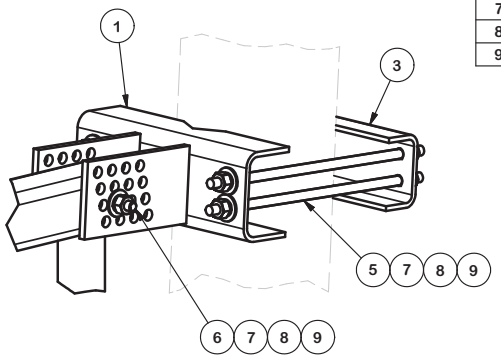
Top **Bottom**



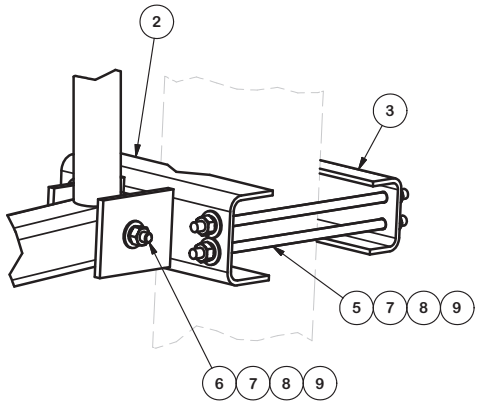
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 3.5"± DIAMETER.

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





DETAIL A



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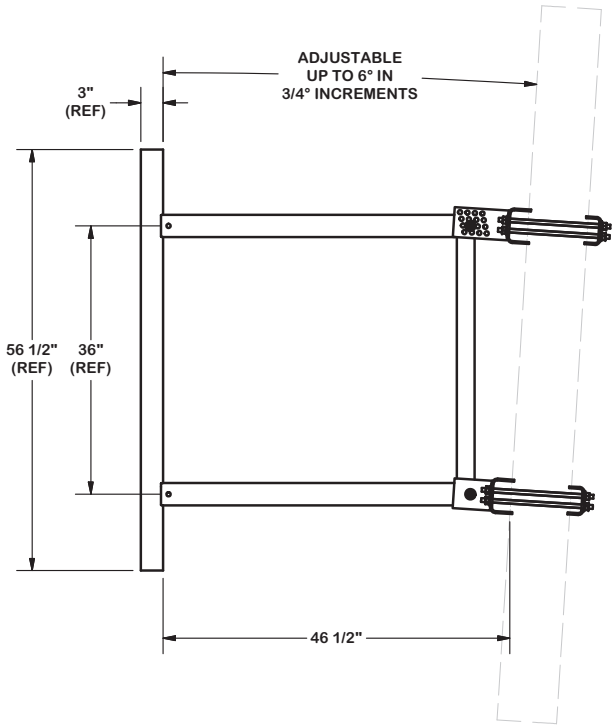


TOLERANCE NOTES

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

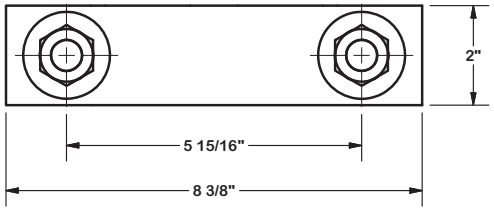
Engineering Support Team: 1-888-753-7446

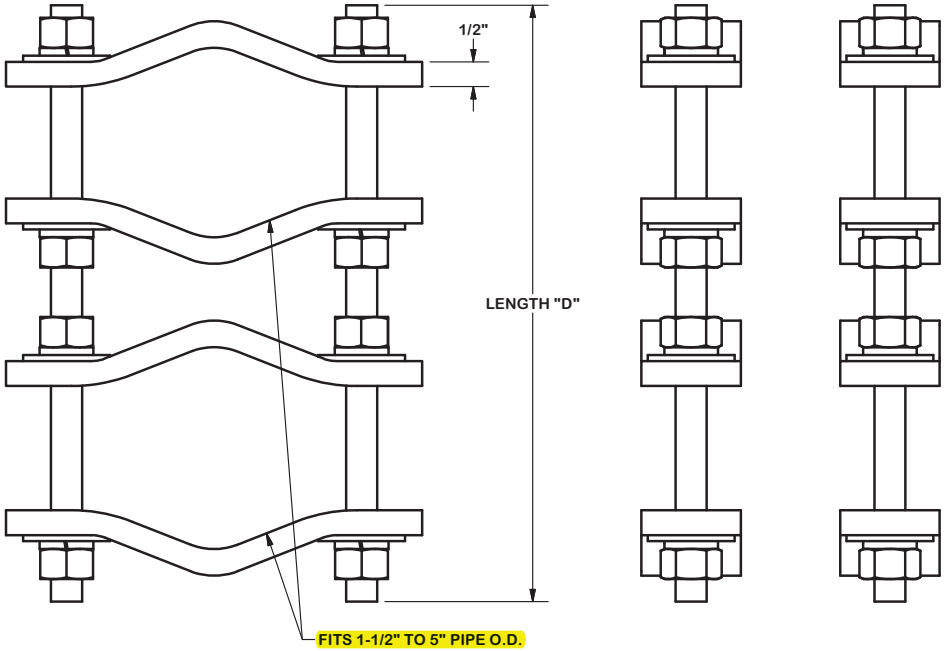
Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Plymouth, IN; Salem, OR; Dallas, TX

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

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

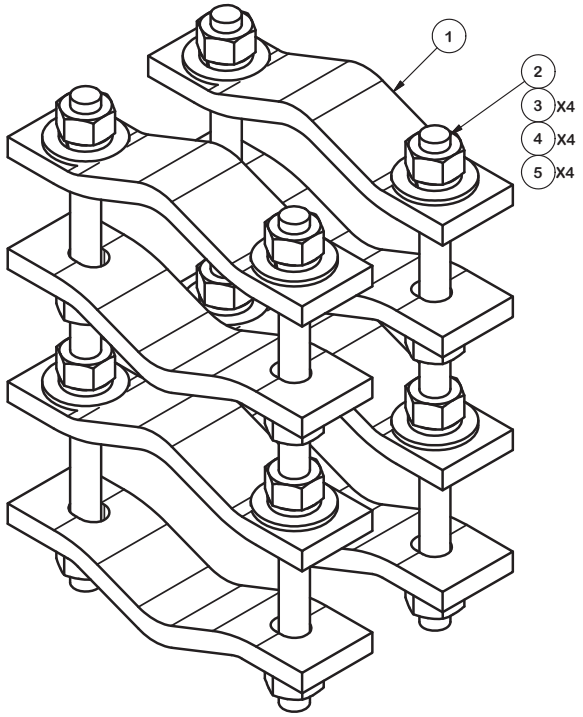
PAGE 1 OF 1





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

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



TOLERANCE NOTES

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

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

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

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

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

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

ATTACHMENT E – STRUCTURAL ANALYSIS

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

Structural Analysis Report

Existing 196 ft Rohn Self Supporting Tower

Customer Name: SBA Communications Corp

Customer Site Number: CT06462-A-2

Customer Site Name: Mountain Street

Carrier Name: Connecticut Light & Power (App#: 186494, V2)

Carrier Site ID / Name: ES-055 / Willimantic

Site Location: 349 Mountain Street

Windham, Connecticut

Windham County

Latitude: 41.703011

Longitude: -72.221391

Analysis Result:

Max Structural Usage: 56.0% [Pass]

Max Foundation Usage: 46.0% [Pass]

Additional Usage Caused by New Mount/Mount Modification: N/A

Report Prepared By: Sital Shrestha

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

Structural Analysis Report

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Longitude: -72.221391

Analysis Result:

Max Structural Usage: 56.0% [Pass]

Max Foundation Usage: 46.0% [Pass]

Additional Usage Caused by New Mount/Mount Modification: N/A

Report Prepared By: Sital Shrestha

Introduction

The purpose of this report is to summarize the analysis results on the 196 ft Rohn Self Supporting Tower to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

Sources of Information

Tower Drawings	ROHN Industries, Inc. Dated 09-27-2001. Drawing No C011214. Eng. File No 49204TT. Previous structural report prepared by FDH Velocitel. Dated 05-10-2017. Project No 17QEIQ1400.
Foundation Drawing	ROHN Industries, Inc. Dated 08-31-2001. Drawing No A012046-1. Eng. File No 49204TT.
Geotechnical Report	BL Companies. Dated 12-01-2000. Project No 00C672-C.
Modification Drawings	N/A

Analysis Criteria

The comprehensive analysis was performed in accordance with the requirements and stipulations of the TIA-222-H**.** In accordance with this standard, the structure was analyzed using **TESTowers,** a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

Wind Speed Used in the Analysis:	121.0 mph (3-Sec. Gust) (Ultimate wind speed)
Wind Speed with Ice:	50 mph (3-Sec. Gust) with 1" radial ice concurrent
Service Load Wind Speed:	60 mph + 0" Radial ice
Standard/Codes:	TIA-222-H / 2015 IBC / 2018 Connecticut State Building Code
Exposure Category:	B
Risk Category:	II
Topographic Category:	1
Crest Height:	0 ft
Seismic Parameters:	S_S = 0.192, S_1 = 0.055

This structural analysis is based upon the tower being classified as a Risk Category II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

Items	Elevation (ft.)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
1	185.0	3	Antel BXA-80080/4CF - Panel	Direct	(3) 1 5/8"	Verizon
2		6	Rfs Celwave FD9R6004/2C-3L Diplexers			
3	169.0	3	Ericsson AIR21-6449 B41 - Panel	(3) 10' T Frames	(9) 1 5/8" Coax (2) 1 5/8" Hybrid	Verizon/T-Mobile (A-11)1
4		3	RFS APXVAARR24_43-U-NA20 - Panel			
5		3	Ericsson AIR32 KRD901146-1 - Panel			
6		3	72" x 12" x 6" Panel			
7		3	Ericsson KRY11271 TMA's			
8		3	Commscope SDX192 6Q-43 Diplexers			
9		3	Ericsson 4449 B71 + B85 RRU's			
10		3	Ericsson 4415 B25 RRU's			
-	167.0	1	Commscope DB586-Y -Omni	(1) Sidearm (Commscope S-200)	(8) 7/8" Coax (1) 1/2" Coax	Connecticut Light & Power
-	166.5	1	RFS 458-2-Omni	(1) Sidearm (Commscope S-400)		
-	165.0	1	RFS BA1312-0- Omni	(1) Sidearm (Commscope S-400)		
-	164.0	1	Powerwave LGP104- TMA			
-	161.2	1	dbSpectra SP2D00P36D-D-Omni	(1) Sidearm (Site Pro USF-4U)		
-	140.4	1	RFS 220-3AN- Omni	(1) Sidearm (Commscope S-600)		
-	139.5	1	RFS 220-7N- Omni	(1) Sidearm (Wireless Solutions WS-S400)		
-	137.0	1	Kreco CO-36A- Omni	(1) Sidearm (Commscope S-600)		
19	120.0	2	Commscope sbnhh-1d45b - Panel	(3) 10' T-Frames	(8) 1 5/8" (2) 1 5/8" Fiber	Verizon
20		4	Commscope SBNHH-1D65B - Panel			
21		3	Samsung MT6407-77A - Panel			
22		3	Samsung B2/B66A RRH-BR049 (RFV01U-D1A) RRU's			
23		3	Samsung B5/B13 RRH-BR04C (RFV01U-D2A) RRU's			
24		2	Rfs Celwave DB-T1-6Z-8AB-0Z Junction Box			
25	107.0	3	JMA Wireless MX08FRO665-21- Panel	(3) Commscope MTC3975083	(1) 1.60" Hybrid	Dish Wireless
26		3	Fujitsu TA08025-B605- RRH			
27		3	Fujitsu TA08025-B604- RRH			
28		1	Raycap RDIDC-9181-PF-48- OVP			

1 Verizon has a separate lease under (A-09).

Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

Items	Elevation (ft)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
11	164'-170'	1	Commscope DB586-Y -Omni	(1) Commscope S-400 @ 161' (1) Commscope S-400 @ 159.9' (1) Commscope S-200 @164' (1) Wireless Solutions WS-S400 @130' (2) Commscope S-600 @ 130' (1) Site Pro USF-4U @ 152'	(8) 7/8" Coax (1) 1/2" Coax	Connecticut Light & Power
12	159.9'-173.2'	1	RFS 458-2- Omni			
13	161'-169'	1	RFS BA1312-0- Omni			
14	164'	1	Powerwave LGP104- TMA			
15	163.6'	1	Comprod 876F-70-2HSMP40DF1/2- Dipole			
16	130'-150.7'	1	RFS 220-3AN- Omni			
17	130'-149'	1	RFS 220-7N- Omni			
18	131'-143'	1	Kreco CO-36A- Omni			

See the attached coax layout for the line placement considered in the analysis.

Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

Tower Component	Legs	Diagonals	Horizontals	Anchor Bolts
Max. Usage:	**55.8%**	**56.0%**	**3.2%**	**37.0%**
Pass/Fail	**Pass**	**Pass**	**Pass**	**Pass**

Foundations

	Compression (Kips)	Uplift (Kips)	Shear (Kips)
Analysis Reactions	248.2	206.7	26.8

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

Service Load Condition (Rigidity):

Operational characteristics of the tower are found to be within the limits prescribed by TIA-222 for the installed antennas. The maximum twist/sway at the elevation of the proposed equipment is 0.1589 degrees under the operational wind speed as specified in the Analysis Criteria.

Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the TIA-222 Standard under the design basic wind speed as specified in the Analysis Criteria.

Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The structural analysis was performance based upon the evidence available at the time of this report. All information provided by the client is considered to be accurate.

3. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the ANSI/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

4. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

5. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

6. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

Structure: CT06462-A-2-SBA

Site Name:	Mountain Street			**Code:**	TIA-222-H	6/14/2022
Type:	Self Support	**Base Shape:**	Triangle	**Basic WS:**	121.00	
Height:	196.00 (ft)	**Base Width:**	23.00	**Basic Ice WS:**	50.00	
Base Elev:	0.00 (ft)	**Top Width:**	6.60	**Operational WS:**	60.00	Page: 1

IES Tower Engineering Solutions

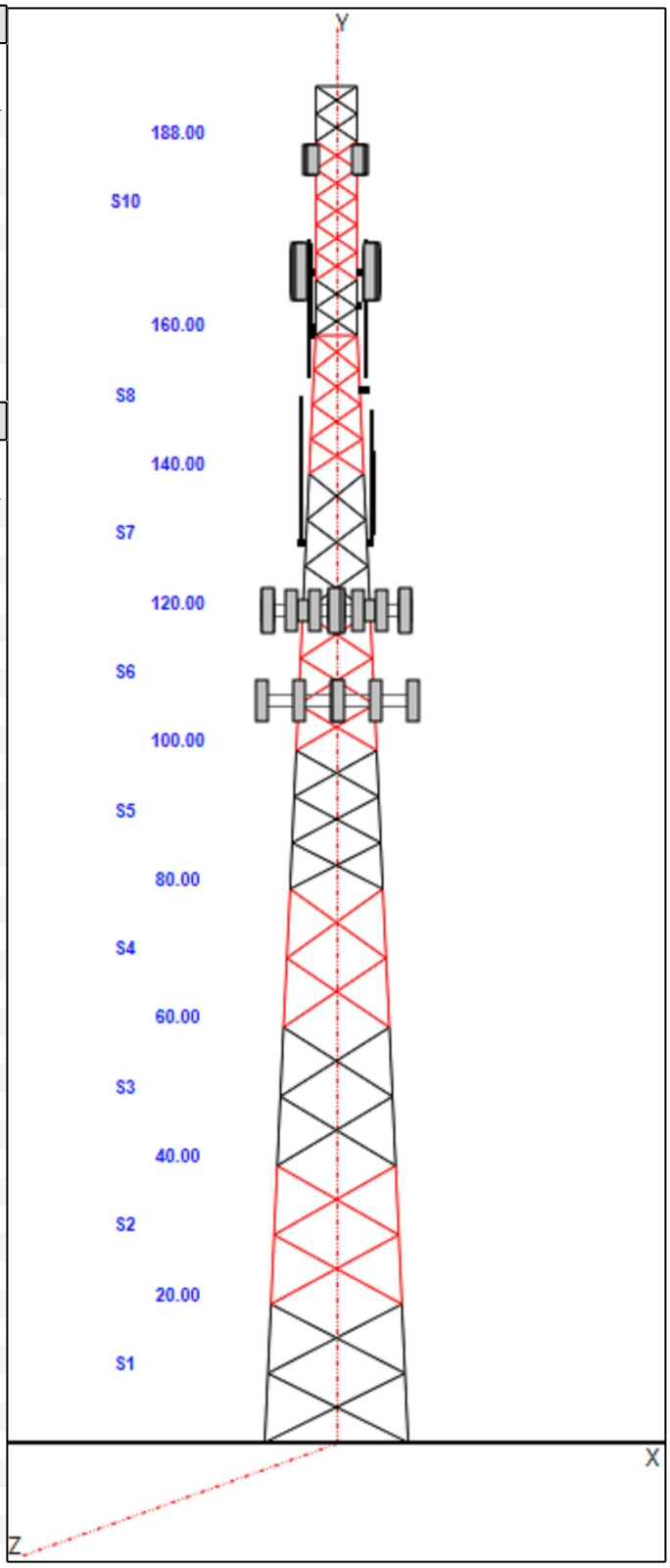
Section Properties

Sect	Leg Members	Diagonal Members	Horizontal Members
1	PX 8" DIA PIPE	SAE 4X4X0.25	
2	PSP ROHN 8 EHS	SAE 4X4X0.25	
3	PSP ROHN 8 EHS	SAE 3.5X3.5X0.25	
4	PX 6" DIA PIPE	SAE 3.5X3.5X0.25	
5	PSP ROHN 6 EHS	SAE 3X3X0.25	
6	PX 5" DIA PIPE	SAE 2.5X2.5X0.25	
7	PX 4" DIA PIPE	SAE 2.5X2.5X0.25	
8	PX 3" DIA PIPE	SAE 2X2X0.1875	SAE 1.75X1.75X0.1875
9-10	PST 3" DIA PIPE	SAE 2X2X0.25	
11	PST 3" DIA PIPE	SAE 1.75X1.75X0.1875	SAE 1.75X1.75X0.1875

Discrete Appurtenances

Attach Elev (ft)	Force Elev (ft)	Qty	Description
185.00	185.00	3	Antel BXA-80080/4CF
185.00	185.00	6	Rfs Celwave FD9R6004/2C-3L Diplexers
169.00	169.00	3	Ericsson AIR21-6449 B41
169.00	169.00	3	RFS APXVAARR24_43-U-NA20
169.00	169.00	3	Ericsson AIR32 KRD901146-1
169.00	169.00	3	72" x 12" x 6" Panel
169.00	169.00	3	Ericsson KRY11271 TMA's
169.00	169.00	3	Commscope SDX192 6Q-43 Diplexers
169.00	169.00	3	Ericsson 4449 B71 + B85 RRU's
169.00	169.00	3	Ericsson 4415 B25 RRU's
169.00	169.00	3	10' T Frames
164.81	167.00	1	Commscope DB586-Y Omni
164.81	164.00	1	Powerwave LGP104 TMA
164.00	164.00	1	Sidearm (Commscope/Andrew S-200)
161.00	161.00	1	Sidearm (Commscope S-400)
160.67	165.00	1	RFS BA1312-0 Omni
159.90	159.90	1	Sidearm (Commscope S-400)
159.85	166.50	1	RFS 458-2 Omni
153.60	163.60	1	876F-70-2HSMP40DF1/2
152.00	152.00	1	Sidearm (Site Pro USF-4U)
131.00	137.00	1	Kreco CO-36A Omni
130.07	140.40	1	RFS 220-3AN Omni
130.00	139.50	1	RFS 220-7N Omni
130.00	130.00	1	4' Sidearm (Wireless Solutions WS-S400)
130.00	130.00	1	6' Sidearm (Commscope/Andrew S-600)
130.00	130.00	1	6' Sidearm (Commscope S-600)
120.00	120.00	2	Commscope sbnhh-1d45b
120.00	120.00	4	Commscope SBNHH-1D65B
120.00	120.00	3	Samsung MT6407-77A
120.00	120.00	3	Samsung B2/B66A RRH-BR049 (RFV01U-D1A)
120.00	120.00	3	Samsung B5/B13 RRH-BR04C (RFV01U-D2A)
120.00	120.00	2	Rfs Celwave DB-T1-6Z-8AB-0Z Junction Box
120.00	120.00	3	10' T-Frames
107.00	107.00	3	MX08FRO665-21
107.00	107.00	3	TA08025-B604
107.00	107.00	3	TA08025-B605
107.00	107.00	1	RDIDC-9181-OF-48
107.00	107.00	1	(3) MTC3975083

Linear Appurtenances



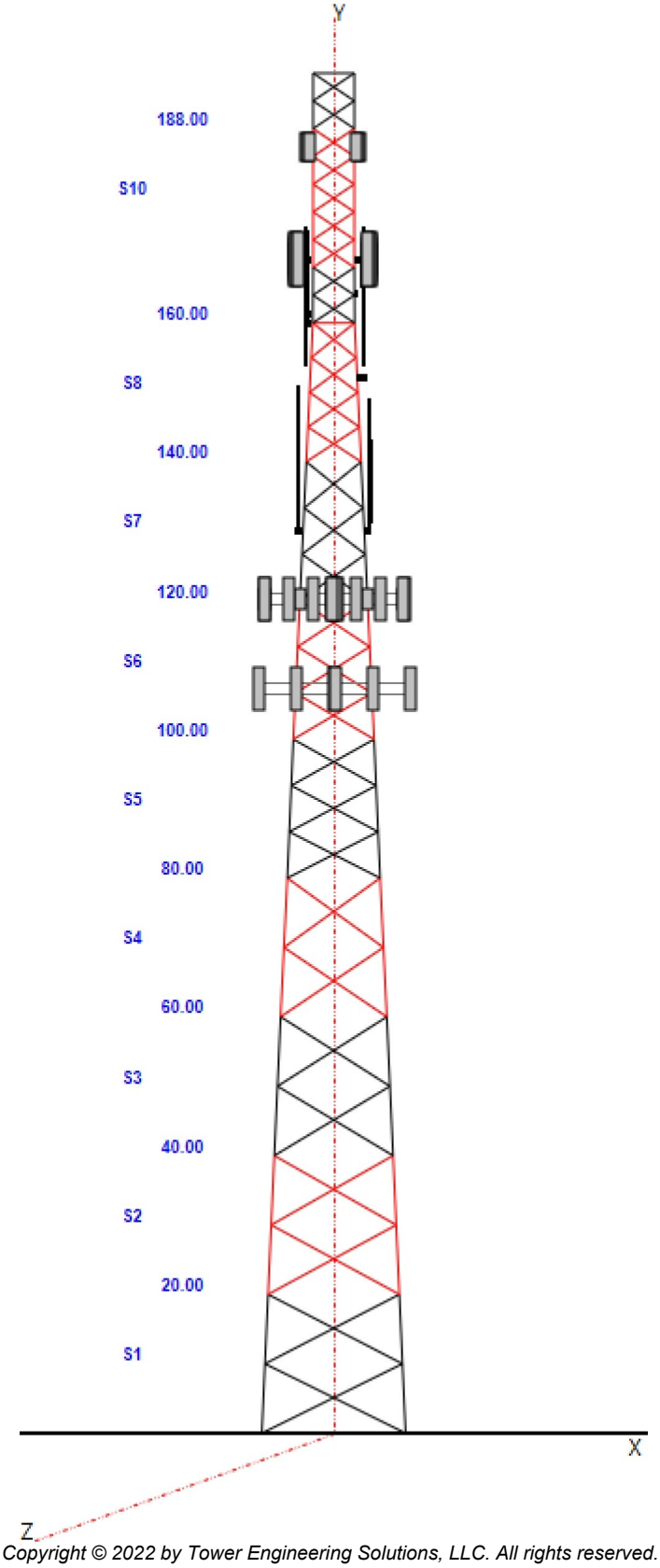
Elev From (ft)	Elev To (ft)	Qty	Description
1.00	196.00	1	Safety Climb
3.00	196.00	0	Step bolts (ladder)
3.00	196.00	0	Step bolts (ladder)
3.00	196.00	0	Step bolts (ladder)
0.00	185.00	1	W/G Ladder (VZW)
3.00	185.00	3	1 5/8" Coax
0.00	169.00	1	W/G Ladder (TMO)
3.00	169.00	9	1 5/8" Coax
3.00	169.00	2	1 5/8" Hybrid
0.00	160.00	1	W/G Ladder (CLP)
3.00	160.00	1	1/2" Coax
3.00	160.00	8	7/8" Coax
3.00	120.00	8	1 5/8" Coax
3.00	120.00	2	1 5/8" Fiber
1.00	107.00	1	1.6" Hybrid

Base Reactions

Leg			Overturning		
Max Uplift:	-206.74	(kips	Moment:	4618.96	(ft-kips)
Max Down:	248.23	(kips	Total Down:	49.03	(kips)
Max Shear:	26.79	(kips	Total Shear:	43.88	(kips)

Structure: CT06462-A-2-SBA

Site Name:	Mountain Street			**Code:**	TIA-222-H	6/14/2022
Type:	Self Support	**Base Shape:**	Triangle	**Basic WS:**	121.00	
Height:	196.00 (ft)	**Base Width:**	23.00	**Basic Ice WS:**	50.00	
Base Elev:	0.00 (ft)	**Top Width:**	6.60	**Operational WS:**	60.00	Page: 3

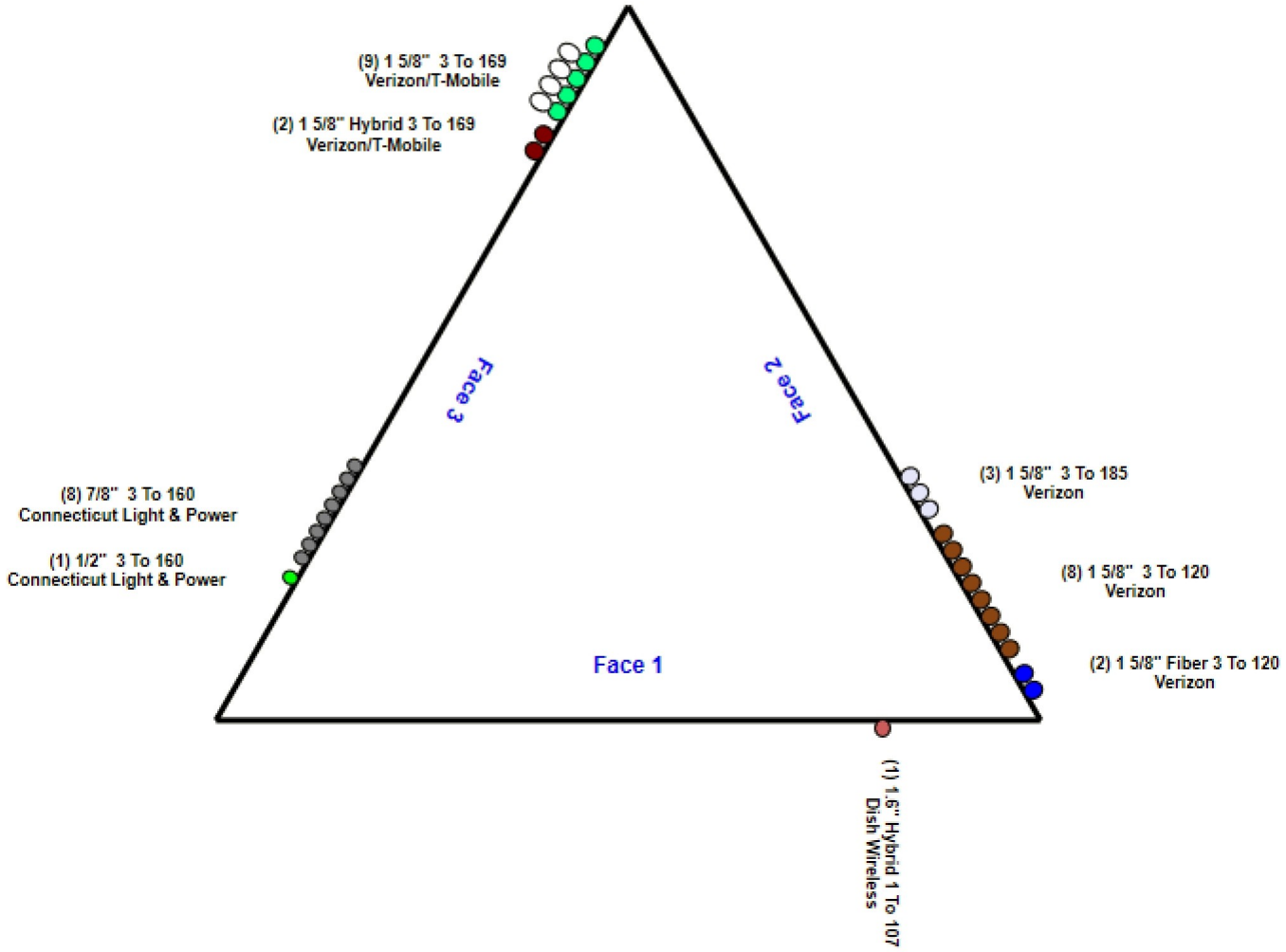


Structure: CT06462-A-2-SBA - Coax Line Placement

Type: Self Support
Site Name: Mountain Street
Height: 196.00 (ft)

6/14/2022

Tower Engineering Solutions



Loading Summary

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 5	

Tower Engineering Solutions

Discrete Appurtenances Properties

Attach Elev (ft)	Description	Qty	No Ice Weight (lb)	No Ice CaAa (sf)	Ice Weight (lb)	Ice CaAa (sf)	Len (in)	Width (in)	Depth (in)	Ka	Orientation Factor	Vert Ecc (ft)
185.00	Antel BXA-80080/4CF	3	14.30	4.800	87.68	6.070	48.200	11.200	5.900	1.00	1.00	0.000
185.00	Rfs Celwave FD9R6004/2C-3L	6	3.10	0.310	8.54	0.569	6.500	5.800	1.500	1.00	0.60	0.000
169.00	Ericsson AIR21-6449 B41	3	103.00	22.840	195.23	25.425	88.000	33.000	20.000	0.80	0.82	0.000
169.00	RFS APXVAARR24_43-U-NA20	3	128.00	20.240	405.88	21.503	95.900	24.000	8.700	0.80	0.72	0.000
169.00	Ericsson AIR32 KRD901146-1	3	132.20	6.050	242.46	6.768	56.000	12.000	8.700	0.80	0.67	0.000
169.00	72" x 12" x 6" Panel	3	45.00	8.130	156.02	10.008	72.000	12.000	6.000	0.80	0.79	0.000
169.00	Ericsson KRY11271 TMA's	3	11.00	1.140	20.59	2.000	13.230	10.340	6.300	0.80	0.60	0.000
169.00	Commscope SDX192 6Q-43	3	6.50	0.240	17.55	0.256	6.930	4.170	2.910	0.80	0.60	0.000
169.00	Ericsson 4449 B71 + B85 RRU's	3	75.00	1.950	125.69	2.335	17.900	13.100	10.600	0.80	0.67	0.000
169.00	Ericsson 4415 B25 RRU's	3	46.00	1.840	79.29	2.221	16.500	13.400	5.900	0.80	0.67	0.000
169.00	10' T Frames	3	500.00	15.000	734.78	23.804	0.000	0.000	0.000	0.75	0.75	0.000
164.81	Commscope DB586-Y Omni	1	8.25	1.010	39.42	1.657	52.560	2.500	2.500	1.00	1.00	2.190
164.81	Powerwave LGP104 TMA	1	7.00	0.230	12.73	0.386	7.000	4.000	1.200	1.00	1.00	-0.810
164.00	Sidearm (Commscope/Andrew	1	21.90	2.630	51.46	6.645	10.000	0.000	0.000	1.00	1.00	0.000
161.00	Sidearm (Commscope S-400)	1	41.00	3.500	95.90	8.829	10.000	0.000	0.000	1.00	1.00	0.000
160.67	RFS BA1312-0 Omni	1	4.40	1.730	55.43	3.804	104.000	2.000	2.000	1.00	1.00	4.330
159.90	Sidearm (Commscope S-400)	1	41.00	3.500	95.86	8.795	10.000	0.000	0.000	1.00	1.00	0.000
159.85	RFS 458-2 Omni	1	22.00	3.720	58.09	6.679	159.600	2.800	2.800	1.00	1.00	6.650
153.60	876F-70-2HSMP40DF1/2	1	60.00	7.520	207.83	15.443	240.000	3.000	3.000	1.00	1.00	10.00
152.00	Sidearm (Site Pro USF-4U)	1	165.00	5.150	329.55	9.688	20.000	0.000	0.000	1.00	1.00	0.000
131.00	Kreco CO-36A Omni	1	12.00	0.750	29.94	1.339	144.000	0.620	0.620	1.00	1.00	6.000
130.07	RFS 220-3AN Omni	1	24.00	5.680	119.09	10.490	248.400	2.750	2.750	1.00	1.00	10.33
130.00	RFS 220-7N Omni	1	22.00	5.320	157.72	9.776	228.000	2.800	2.800	1.00	1.00	9.500
130.00	4' Sidearm (Wireless Solutions	1	41.00	3.500	95.12	8.753	10.000	0.000	0.000	1.00	1.00	0.000
130.00	6' Sidearm (Commscope/Andrew	1	54.00	5.150	107.09	9.623	15.000	0.000	0.000	1.00	1.00	0.000
130.00	6' Sidearm (Commscope S-600)	1	54.00	5.150	125.23	12.831	15.000	0.000	0.000	1.00	1.00	0.000
120.00	Commscope sbnhh-1d45b	2	96.00	14.770	328.32	15.789	76.800	22.300	12.200	0.80	0.80	0.000
120.00	Commscope SBNHH-1D65B	4	50.71	8.050	171.98	8.865	72.000	11.850	7.100	0.80	0.83	0.000
120.00	Samsung MT6407-77A	3	87.10	4.700	169.00	5.385	35.120	16.060	5.510	0.80	0.70	0.000
120.00	Samsung B2/B66A RRH-BR049	3	84.40	1.880	129.75	2.229	15.000	15.000	10.000	0.80	0.67	0.000
120.00	Samsung B5/B13 RRH-BR04C	3	70.30	1.880	111.17	2.229	15.000	15.000	8.100	0.80	0.67	0.000
120.00	Rfs Celwave DB-T1-6Z-8AB-0Z	2	44.00	4.800	131.14	5.351	24.000	24.000	10.000	0.80	0.67	0.000
120.00	10' T-Frames	3	500.00	17.000	838.38	31.317	0.000	0.000	0.000	0.75	0.75	0.000
107.00	MX08FRO665-21	3	64.50	12.490	252.49	13.437	72.000	20.000	8.000	0.80	0.74	0.000
107.00	TA08025-B604	3	63.90	1.960	96.62	2.323	15.800	15.000	7.900	0.80	0.67	0.000
107.00	TA08025-B605	3	75.00	1.960	108.80	2.323	15.800	15.000	9.100	0.80	0.67	0.000
107.00	RDIDC-9181-OF-48	1	21.90	2.010	56.31	2.377	16.600	14.600	8.500	0.80	1.00	0.000
107.00	(3) MTC3975083	1	1242.0	28.050	2026.51	50.830	0.000	0.000	0.000	0.75	1.00	0.000
	Totals:	**82**	**8,361.49**		**16,635.55**						**Number of Appurtenances :**	**38**

Loading Summary

Structure:	CT06462-A-2-SBA		**Code:**	TIA-222-H	6/14/2022
Site Name:	Mountain Street		**Exposure:**	B	
Height:	196.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	0.85	**Topography:** 1	**Struct Class:**	II	Page: 6

Tower Engineering Solutions

Linear Appurtenances Properties

Elev. From (ft)	Elev. To (ft)	Description	Qty	Width (in)	Weight (lb/ft)	Pct In Block	Spread On Faces	Bundling Arrangement	Cluster Dia (in)	Out of Zone	Spacing (in)	Orientation Factor	Ka Override
1.00	196.00	Safety Climb	1	0.38	0.27	100.00	1	Individual NR		N	1.00	1.00	
3.00	196.00	Step bolts (ladder)		0.63	1.04	100.00	3	Individual NR		N	1.00	1.00	
3.00	196.00	Step bolts (ladder)		0.63	1.04	100.00	1	Individual NR		N	1.00	1.00	
3.00	196.00	Step bolts (ladder)		0.63	1.04	100.00	2	Individual NR		N	1.00	1.00	
0.00	185.00	W/G Ladder (VZW)	1	2.00	6.00	100.00	2	Individual NR		N	1.00	1.00	
3.00	185.00	1 5/8" Coax	3	1.98	1.04	100.00	2	Individual IR		N	0.50	0.64	
0.00	169.00	W/G Ladder (TMO)	1	2.50	6.00	100.00	3	Individual NR		N	1.00	1.00	
3.00	169.00	1 5/8" Coax	9	1.98	1.04	50.00	3	Block		N	0.50	1.00	
3.00	169.00	1 5/8" Hybrid	2	2.00	1.10	100.00	3	Individual IR		N	0.50	1.00	
0.00	160.00	W/G Ladder (CLP)	1	3.00	6.00	100.00	3	Individual NR		N	1.00	1.00	
3.00	160.00	1/2" Coax	1	0.65	0.16	100.00	3	Individual IR		N	1.00	1.00	
3.00	160.00	7/8" Coax	8	1.11	0.52	100.00	3	Individual IR		N	0.50	1.00	
3.00	120.00	1 5/8" Coax	8	1.98	1.04	100.00	2	Individual IR		N	0.50	0.42	
3.00	120.00	1 5/8" Fiber	2	1.98	1.04	100.00	2	Individual IR		N	0.50	0.76	
1.00	107.00	1.6" Hybrid	1	1.60	1.82	100.00	1	Individual NR		N	1.00	1.00	

Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 7	

Tower Engineering Solutions

Load Case: 1.2D + 1.0W Normal Wind — 1.2D + 1.0W 121 mph Wind at Normal To Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.20

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	22.30	31.267	28.80	0.00	0.13	2.84	1.00	1.00	0.00	43.67	88.12	0.00	6,508.6	0.0	2349.60	1260.18	3,609.78
2	30.0	22.32	28.860	28.80	0.00	0.14	2.81	1.00	1.00	0.00	41.35	101.08	0.00	5,699.0	0.0	2205.88	1448.40	3,654.28
3	50.0	25.83	23.184	28.80	0.00	0.14	2.81	1.00	1.00	0.00	35.08	101.08	0.00	5,293.3	0.0	2166.27	1676.00	3,842.27
4	70.0	28.43	21.246	22.13	0.00	0.13	2.84	1.00	1.00	0.00	31.63	101.08	0.00	4,819.4	0.0	2171.13	1845.12	4,016.25
5	90.0	30.55	22.280	22.12	0.00	0.15	2.76	1.00	1.00	0.00	32.63	101.08	0.00	4,465.4	0.0	2336.98	1982.48	4,319.46
6	110.0	32.35	16.430	18.58	0.00	0.14	2.80	1.00	1.00	0.00	25.69	99.34	0.00	3,864.7	0.0	1979.23	2065.14	4,044.38
7	130.0	33.93	14.331	15.03	0.00	0.14	2.79	1.00	1.00	0.00	22.39	65.41	0.00	3,024.9	0.0	1803.83	1461.38	3,265.21
8	150.0	35.35	12.808	11.69	0.00	0.15	2.76	1.00	1.00	0.00	19.44	65.41	0.00	2,332.0	0.0	1613.38	1522.36	3,135.74
9	164.0	36.26	4.976	4.67	0.00	0.17	2.69	1.00	1.00	0.00	7.64	17.81	0.00	833.3	0.0	632.37	439.28	1,071.66
10	178.0	37.12	12.376	11.67	0.00	0.17	2.68	1.00	1.00	0.00	19.03	13.41	0.00	1,645.7	0.0	1611.60	310.22	1,921.82
11	192.0	37.93	5.252	4.67	0.00	0.18	2.66	1.00	1.00	0.00	7.92	0.25	0.00	506.9	0.0	680.23	5.80	686.04
														38,993.3	**0.0**			**33,566.89**

Load Case: 1.2D + 1.0W 60° Wind — 1.2D + 1.0W 121 mph Wind at 60° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.20

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	22.30	31.267	28.80	0.00	0.13	2.84	0.80	1.00	0.00	37.42	88.12	0.00	6,508.6	0.0	2013.18	1260.18	3,273.36
2	30.0	22.32	28.860	28.80	0.00	0.14	2.81	0.80	1.00	0.00	35.58	101.08	0.00	5,699.0	0.0	1897.97	1448.40	3,346.36
3	50.0	25.83	23.184	28.80	0.00	0.14	2.81	0.80	1.00	0.00	30.44	101.08	0.00	5,293.3	0.0	1879.96	1676.00	3,555.95
4	70.0	28.43	21.246	22.13	0.00	0.13	2.84	0.80	1.00	0.00	27.38	101.08	0.00	4,819.4	0.0	1879.45	1845.12	3,724.57
5	90.0	30.55	22.280	22.12	0.00	0.15	2.76	0.80	1.00	0.00	28.18	101.08	0.00	4,465.4	0.0	2017.89	1982.48	4,000.36
6	110.0	32.35	16.430	18.58	0.00	0.14	2.80	0.80	1.00	0.00	22.40	99.34	0.00	3,864.7	0.0	1726.05	2065.14	3,791.20
7	130.0	33.93	14.331	15.03	0.00	0.14	2.79	0.80	1.00	0.00	19.53	65.41	0.00	3,024.9	0.0	1572.97	1461.38	3,034.35
8	150.0	35.35	12.808	11.69	0.00	0.15	2.76	0.80	1.00	0.00	16.88	65.41	0.00	2,332.0	0.0	1400.83	1522.36	2,923.19
9	164.0	36.26	4.976	4.67	0.00	0.17	2.69	0.80	1.00	0.00	6.64	17.81	0.00	833.3	0.0	549.98	439.28	989.26
10	178.0	37.12	12.376	11.67	0.00	0.17	2.68	0.80	1.00	0.00	16.56	13.41	0.00	1,645.7	0.0	1402.00	310.22	1,712.21
11	192.0	37.93	5.252	4.67	0.00	0.18	2.66	0.80	1.00	0.00	6.87	0.25	0.00	506.9	0.0	589.99	5.80	595.80
														38,993.3	**0.0**			**30,946.62**

Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 8	

Tower Engineering Solutions

Load Case: 1.2D + 1.0W 90° Wind — 1.2D + 1.0W 121 mph Wind at 90° From Face

Wind Load Factor: 1.00
Dead Load Factor: 1.20
Ice Dead Load Factor: 0.00
Wind Importance Factor: 1.00
Ice Importance Factor: 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	22.30	31.267	28.80	0.00	0.13	2.84	0.85	1.00	0.00	38.98	88.12	0.00	6,508.6	0.0	2097.28	1260.18	3,357.47
2	30.0	22.32	28.860	28.80	0.00	0.14	2.81	0.85	1.00	0.00	37.02	101.08	0.00	5,699.0	0.0	1974.94	1448.40	3,423.34
3	50.0	25.83	23.184	28.80	0.00	0.14	2.81	0.85	1.00	0.00	31.60	101.08	0.00	5,293.3	0.0	1951.54	1676.00	3,627.53
4	70.0	28.43	21.246	22.13	0.00	0.13	2.84	0.85	1.00	0.00	28.44	101.08	0.00	4,819.4	0.0	1952.37	1845.12	3,797.49
5	90.0	30.55	22.280	22.12	0.00	0.15	2.76	0.85	1.00	0.00	29.29	101.08	0.00	4,465.4	0.0	2097.66	1982.48	4,080.14
6	110.0	32.35	16.430	18.58	0.00	0.14	2.80	0.85	1.00	0.00	23.22	99.34	0.00	3,864.7	0.0	1789.35	2065.14	3,854.49
7	130.0	33.93	14.331	15.03	0.00	0.14	2.79	0.85	1.00	0.00	20.25	65.41	0.00	3,024.9	0.0	1630.69	1461.38	3,092.06
8	150.0	35.35	12.808	11.69	0.00	0.15	2.76	0.85	1.00	0.00	17.52	65.41	0.00	2,332.0	0.0	1453.97	1522.36	2,976.33
9	164.0	36.26	4.976	4.67	0.00	0.17	2.69	0.85	1.00	0.00	6.89	17.81	0.00	833.3	0.0	570.57	439.28	1,009.86
10	178.0	37.12	12.376	11.67	0.00	0.17	2.68	0.85	1.00	0.00	17.18	13.41	0.00	1,645.7	0.0	1454.40	310.22	1,764.62
11	192.0	37.93	5.252	4.67	0.00	0.18	2.66	0.85	1.00	0.00	7.13	0.25	0.00	506.9	0.0	612.55	5.80	618.36
														38,993.3	**0.0**			**31,601.69**

Load Case: 0.9D + 1.0W Normal Wind — 0.9D + 1.0W 121 mph Wind at Normal To Face

Wind Load Factor: 1.00
Dead Load Factor: 0.90
Ice Dead Load Factor: 0.00
Wind Importance Factor: 1.00
Ice Importance Factor: 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	22.30	31.267	28.80	0.00	0.13	2.84	1.00	1.00	0.00	43.67	88.12	0.00	4,881.5	0.0	2349.60	1260.18	3,609.78
2	30.0	22.32	28.860	28.80	0.00	0.14	2.81	1.00	1.00	0.00	41.35	101.08	0.00	4,274.3	0.0	2205.88	1448.40	3,654.28
3	50.0	25.83	23.184	28.80	0.00	0.14	2.81	1.00	1.00	0.00	35.08	101.08	0.00	3,970.0	0.0	2166.27	1676.00	3,842.27
4	70.0	28.43	21.246	22.13	0.00	0.13	2.84	1.00	1.00	0.00	31.63	101.08	0.00	3,614.5	0.0	2171.13	1845.12	4,016.25
5	90.0	30.55	22.280	22.12	0.00	0.15	2.76	1.00	1.00	0.00	32.63	101.08	0.00	3,349.0	0.0	2336.98	1982.48	4,319.46
6	110.0	32.35	16.430	18.58	0.00	0.14	2.80	1.00	1.00	0.00	25.69	99.34	0.00	2,898.6	0.0	1979.23	2065.14	4,044.38
7	130.0	33.93	14.331	15.03	0.00	0.14	2.79	1.00	1.00	0.00	22.39	65.41	0.00	2,268.6	0.0	1803.83	1461.38	3,265.21
8	150.0	35.35	12.808	11.69	0.00	0.15	2.76	1.00	1.00	0.00	19.44	65.41	0.00	1,749.0	0.0	1613.38	1522.36	3,135.74
9	164.0	36.26	4.976	4.67	0.00	0.17	2.69	1.00	1.00	0.00	7.64	17.81	0.00	625.0	0.0	632.37	439.28	1,071.66
10	178.0	37.12	12.376	11.67	0.00	0.17	2.68	1.00	1.00	0.00	19.03	13.41	0.00	1,234.3	0.0	1611.60	310.22	1,921.82
11	192.0	37.93	5.252	4.67	0.00	0.18	2.66	1.00	1.00	0.00	7.92	0.25	0.00	380.2	0.0	680.23	5.80	686.04
														29,245.0	**0.0**			**33,566.89**

Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 9	

Tower Engineering Solutions

Load Case: 0.9D + 1.0W 60° Wind — 0.9D + 1.0W 121 mph Wind at 60° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 0.90

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	22.30	31.267	28.80	0.00	0.13	2.84	0.80	1.00	0.00	37.42	88.12	0.00	4,881.5	0.0	2013.18	1260.18	3,273.36
2	30.0	22.32	28.860	28.80	0.00	0.14	2.81	0.80	1.00	0.00	35.58	101.08	0.00	4,274.3	0.0	1897.97	1448.40	3,346.36
3	50.0	25.83	23.184	28.80	0.00	0.14	2.81	0.80	1.00	0.00	30.44	101.08	0.00	3,970.0	0.0	1879.96	1676.00	3,555.95
4	70.0	28.43	21.246	22.13	0.00	0.13	2.84	0.80	1.00	0.00	27.38	101.08	0.00	3,614.5	0.0	1879.45	1845.12	3,724.57
5	90.0	30.55	22.280	22.12	0.00	0.15	2.76	0.80	1.00	0.00	28.18	101.08	0.00	3,349.0	0.0	2017.89	1982.48	4,000.36
6	110.0	32.35	16.430	18.58	0.00	0.14	2.80	0.80	1.00	0.00	22.40	99.34	0.00	2,898.6	0.0	1726.05	2065.14	3,791.20
7	130.0	33.93	14.331	15.03	0.00	0.14	2.79	0.80	1.00	0.00	19.53	65.41	0.00	2,268.6	0.0	1572.97	1461.38	3,034.35
8	150.0	35.35	12.808	11.69	0.00	0.15	2.76	0.80	1.00	0.00	16.88	65.41	0.00	1,749.0	0.0	1400.83	1522.36	2,923.19
9	164.0	36.26	4.976	4.67	0.00	0.17	2.69	0.80	1.00	0.00	6.64	17.81	0.00	625.0	0.0	549.98	439.28	989.26
10	178.0	37.12	12.376	11.67	0.00	0.17	2.68	0.80	1.00	0.00	16.56	13.41	0.00	1,234.3	0.0	1402.00	310.22	1,712.21
11	192.0	37.93	5.252	4.67	0.00	0.18	2.66	0.80	1.00	0.00	6.87	0.25	0.00	380.2	0.0	589.99	5.80	595.80
														29,245.0	**0.0**			**30,946.62**

Load Case: 0.9D + 1.0W 90° Wind — 0.9D + 1.0W 121 mph Wind at 90° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 0.90

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	22.30	31.267	28.80	0.00	0.13	2.84	0.85	1.00	0.00	38.98	88.12	0.00	4,881.5	0.0	2097.28	1260.18	3,357.47
2	30.0	22.32	28.860	28.80	0.00	0.14	2.81	0.85	1.00	0.00	37.02	101.08	0.00	4,274.3	0.0	1974.94	1448.40	3,423.34
3	50.0	25.83	23.184	28.80	0.00	0.14	2.81	0.85	1.00	0.00	31.60	101.08	0.00	3,970.0	0.0	1951.54	1676.00	3,627.53
4	70.0	28.43	21.246	22.13	0.00	0.13	2.84	0.85	1.00	0.00	28.44	101.08	0.00	3,614.5	0.0	1952.37	1845.12	3,797.49
5	90.0	30.55	22.280	22.12	0.00	0.15	2.76	0.85	1.00	0.00	29.29	101.08	0.00	3,349.0	0.0	2097.66	1982.48	4,080.14
6	110.0	32.35	16.430	18.58	0.00	0.14	2.80	0.85	1.00	0.00	23.22	99.34	0.00	2,898.6	0.0	1789.35	2065.14	3,854.49
7	130.0	33.93	14.331	15.03	0.00	0.14	2.79	0.85	1.00	0.00	20.25	65.41	0.00	2,268.6	0.0	1630.69	1461.38	3,092.06
8	150.0	35.35	12.808	11.69	0.00	0.15	2.76	0.85	1.00	0.00	17.52	65.41	0.00	1,749.0	0.0	1453.97	1522.36	2,976.33
9	164.0	36.26	4.976	4.67	0.00	0.17	2.69	0.85	1.00	0.00	6.89	17.81	0.00	625.0	0.0	570.57	439.28	1,009.86
10	178.0	37.12	12.376	11.67	0.00	0.17	2.68	0.85	1.00	0.00	17.18	13.41	0.00	1,234.3	0.0	1454.40	310.22	1,764.62
11	192.0	37.93	5.252	4.67	0.00	0.18	2.66	0.85	1.00	0.00	7.13	0.25	0.00	380.2	0.0	612.55	5.80	618.36
														29,245.0	**0.0**			**31,601.69**

Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 10	

Tower Engineering Solutions

Load Case: 1.2D + 1.0Di + 1.0Wi Normal Wind — 1.2D + 1.0Di + 1.0Wi 50 mph Wind at Normal From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.20

Ice Dead Load Factor: 1.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	3.81	31.267	49.02	20.23	0.18	2.68	1.00	1.00	0.89	59.24	118.47	14.50	10,641.	4132.8	513.83	326.39	840.21
2	30.0	3.81	28.860	50.18	21.38	0.19	2.63	1.00	1.00	0.99	57.60	139.19	16.51	10,425.	4726.3	491.16	378.36	869.52
3	50.0	4.41	23.184	50.07	21.27	0.19	2.62	1.00	1.00	1.04	51.90	140.40	17.37	9,893.0	4599.7	508.99	443.67	952.66
4	70.0	4.86	21.246	42.84	20.72	0.19	2.62	1.00	1.00	1.08	45.80	141.23	17.97	9,268.9	4449.5	495.52	493.64	989.15
5	90.0	5.22	22.280	46.53	24.41	0.24	2.48	1.00	1.00	1.11	49.34	141.87	18.43	9,201.3	4735.9	543.07	526.67	1,069.74
6	110.0	5.52	16.430	41.48	22.90	0.23	2.50	1.00	1.00	1.13	40.51	140.66	16.36	8,098.5	4233.8	474.69	543.91	1,018.60
7	130.0	5.79	14.331	36.28	21.26	0.24	2.45	1.00	1.00	1.15	35.51	92.86	15.29	6,312.3	3287.5	429.30	455.81	885.11
8	150.0	6.04	12.808	35.04	23.35	0.29	2.32	1.00	1.00	1.16	33.70	89.25	19.39	5,524.3	3192.3	401.03	467.46	868.50
9	164.0	6.19	4.976	13.87	9.20	0.33	2.22	1.00	1.00	1.17	13.42	23.51	4.70	1,899.8	1066.5	156.71	119.00	275.72
10	178.0	6.34	12.376	34.78	23.11	0.33	2.21	1.00	1.00	1.18	33.58	18.61	7.50	3,752.8	2107.1	400.41	97.63	498.04
11	192.0	6.48	5.252	15.29	10.63	0.36	2.14	1.00	1.00	1.19	14.75	0.25	1.59	1,289.9	783.0	174.03	7.75	181.78
														76,307.7	**37314.4**			**8,449.04**

Load Case: 1.2D + 1.0Di + 1.0Wi 60° Wind — 1.2D + 1.0Di + 1.0Wi 50 mph Wind at 60° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.20

Ice Dead Load Factor: 1.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	3.81	31.267	49.02	20.23	0.18	2.68	0.80	1.00	0.89	52.99	118.47	14.50	10,641.	4132.8	459.59	326.39	785.97
2	30.0	3.81	28.860	50.18	21.38	0.19	2.63	0.80	1.00	0.99	51.82	139.19	16.51	10,425.	4726.3	441.94	378.36	820.30
3	50.0	4.41	23.184	50.07	21.27	0.19	2.62	0.80	1.00	1.04	47.26	140.40	17.37	9,893.0	4599.7	463.51	443.67	907.18
4	70.0	4.86	21.246	42.84	20.72	0.19	2.62	0.80	1.00	1.08	41.55	141.23	17.97	9,268.9	4449.5	449.55	493.64	943.18
5	90.0	5.22	22.280	46.53	24.41	0.24	2.48	0.80	1.00	1.11	44.88	141.87	18.43	9,201.3	4735.9	494.02	526.67	1,020.69
6	110.0	5.52	16.430	41.48	22.90	0.23	2.50	0.80	1.00	1.13	37.23	140.66	16.36	8,098.5	4233.8	436.19	543.91	980.10
7	130.0	5.79	14.331	36.28	21.26	0.24	2.45	0.80	1.00	1.15	32.64	92.86	15.29	6,312.3	3287.5	394.65	455.81	850.46
8	150.0	6.04	12.808	35.04	23.35	0.29	2.32	0.80	1.00	1.16	31.14	89.25	19.39	5,524.3	3192.3	370.55	467.46	838.02
9	164.0	6.19	4.976	13.87	9.20	0.33	2.22	0.80	1.00	1.17	12.42	23.51	4.70	1,899.8	1066.5	145.09	119.00	264.09
10	178.0	6.34	12.376	34.78	23.11	0.33	2.21	0.80	1.00	1.18	31.11	18.61	7.50	3,752.8	2107.1	370.90	97.63	468.53
11	192.0	6.48	5.252	15.29	10.63	0.36	2.14	0.80	1.00	1.19	13.69	0.25	1.59	1,289.9	783.0	161.63	7.75	169.39
														76,307.7	**37314.4**			**8,047.91**

Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 11	

Tower Engineering Solutions

Load Case: 1.2D + 1.0Di + 1.0Wi 90° Wind — 1.2D + 1.0Di + 1.0Wi 50 mph Wind at 90° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.20

Ice Dead Load Factor: 1.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	3.81	31.267	49.02	20.23	0.18	2.68	0.85	1.00	0.89	54.55	118.47	14.50	10,641.	4132.8	473.15	326.39	799.53
2	30.0	3.81	28.860	50.18	21.38	0.19	2.63	0.85	1.00	0.99	53.27	139.19	16.51	10,425.	4726.3	454.24	378.36	832.61
3	50.0	4.41	23.184	50.07	21.27	0.19	2.62	0.85	1.00	1.04	48.42	140.40	17.37	9,893.0	4599.7	474.88	443.67	918.55
4	70.0	4.86	21.246	42.84	20.72	0.19	2.62	0.85	1.00	1.08	42.62	141.23	17.97	9,268.9	4449.5	461.04	493.64	954.67
5	90.0	5.22	22.280	46.53	24.41	0.24	2.48	0.85	1.00	1.11	46.00	141.87	18.43	9,201.3	4735.9	506.28	526.67	1,032.95
6	110.0	5.52	16.430	41.48	22.90	0.23	2.50	0.85	1.00	1.13	38.05	140.66	16.36	8,098.5	4233.8	445.82	543.91	989.73
7	130.0	5.79	14.331	36.28	21.26	0.24	2.45	0.85	1.00	1.15	33.36	92.86	15.29	6,312.3	3287.5	403.31	455.81	859.12
8	150.0	6.04	12.808	35.04	23.35	0.29	2.32	0.85	1.00	1.16	31.78	89.25	19.39	5,524.3	3192.3	378.17	467.46	845.64
9	164.0	6.19	4.976	13.87	9.20	0.33	2.22	0.85	1.00	1.17	12.67	23.51	4.70	1,899.8	1066.5	148.00	119.00	267.00
10	178.0	6.34	12.376	34.78	23.11	0.33	2.21	0.85	1.00	1.18	31.73	18.61	7.50	3,752.8	2107.1	378.28	97.63	475.91
11	192.0	6.48	5.252	15.29	10.63	0.36	2.14	0.85	1.00	1.19	13.96	0.25	1.59	1,289.9	783.0	164.73	7.75	172.49
														76,307.7	**37314.4**			**8,148.20**

Load Case: 1.0D + 1.0W Normal Wind — 1.0D + 1.0W 60 mph Wind at Normal To Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.00

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	5.48	31.267	28.80	0.00	0.13	2.84	1.00	1.00	0.00	47.57	88.12	0.00	5,423.9	0.0	629.21	309.86	939.07
2	30.0	5.49	28.860	28.80	0.00	0.14	2.81	1.00	1.00	0.00	45.17	101.08	0.00	4,749.2	0.0	592.56	356.14	948.70
3	50.0	6.35	23.184	28.80	0.00	0.14	2.81	1.00	1.00	0.00	39.50	101.08	0.00	4,411.1	0.0	599.72	412.10	1,011.82
4	70.0	6.99	21.246	22.13	0.00	0.13	2.84	1.00	1.00	0.00	33.77	101.08	0.00	4,016.1	0.0	569.94	453.69	1,023.62
5	90.0	7.51	22.280	22.12	0.00	0.15	2.76	1.00	1.00	0.00	34.84	101.08	0.00	3,721.1	0.0	613.49	487.46	1,100.95
6	110.0	7.96	16.430	18.58	0.00	0.14	2.80	1.00	1.00	0.00	26.96	99.34	0.00	3,220.6	0.0	510.73	507.79	1,018.52
7	130.0	8.34	14.331	15.03	0.00	0.14	2.79	1.00	1.00	0.00	22.85	65.41	0.00	2,520.7	0.0	452.57	359.33	811.90
8	150.0	8.69	12.808	11.69	0.00	0.15	2.76	1.00	1.00	0.00	19.44	65.41	0.00	1,943.4	0.0	396.71	374.33	771.03
9	164.0	8.92	4.976	4.67	0.00	0.17	2.69	1.00	1.00	0.00	7.64	17.81	0.00	694.4	0.0	155.49	108.01	263.50
10	178.0	9.13	12.376	11.67	0.00	0.17	2.68	1.00	1.00	0.00	19.03	13.41	0.00	1,371.4	0.0	396.27	76.28	472.55
11	192.0	9.33	5.252	4.67	0.00	0.18	2.66	1.00	1.00	0.00	7.92	0.25	0.00	422.4	0.0	167.26	1.43	168.69
														32,494.4	**0.0**			**8,530.34**

Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 12	

Tower Engineering Solutions

Load Case: 1.0D + 1.0W 60° Wind — 1.0D + 1.0W 60 mph Wind at 60° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.00

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	5.48	31.267	28.80	0.00	0.13	2.84	0.80	1.00	0.00	41.31	88.12	0.00	5,423.9	0.0	546.49	309.86	856.35
2	30.0	5.49	28.860	28.80	0.00	0.14	2.81	0.80	1.00	0.00	39.40	101.08	0.00	4,749.2	0.0	516.85	356.14	872.99
3	50.0	6.35	23.184	28.80	0.00	0.14	2.81	0.80	1.00	0.00	34.86	101.08	0.00	4,411.1	0.0	529.31	412.10	941.42
4	70.0	6.99	21.246	22.13	0.00	0.13	2.84	0.80	1.00	0.00	29.52	101.08	0.00	4,016.1	0.0	498.22	453.69	951.90
5	90.0	7.51	22.280	22.12	0.00	0.15	2.76	0.80	1.00	0.00	30.39	101.08	0.00	3,721.1	0.0	535.03	487.46	1,022.49
6	110.0	7.96	16.430	18.58	0.00	0.14	2.80	0.80	1.00	0.00	23.67	99.34	0.00	3,220.6	0.0	448.48	507.79	956.26
7	130.0	8.34	14.331	15.03	0.00	0.14	2.79	0.80	1.00	0.00	19.98	65.41	0.00	2,520.7	0.0	395.80	359.33	755.13
8	150.0	8.69	12.808	11.69	0.00	0.15	2.76	0.80	1.00	0.00	16.88	65.41	0.00	1,943.4	0.0	344.44	374.33	718.77
9	164.0	8.92	4.976	4.67	0.00	0.17	2.69	0.80	1.00	0.00	6.64	17.81	0.00	694.4	0.0	135.23	108.01	243.24
10	178.0	9.13	12.376	11.67	0.00	0.17	2.68	0.80	1.00	0.00	16.56	13.41	0.00	1,371.4	0.0	344.73	76.28	421.01
11	192.0	9.33	5.252	4.67	0.00	0.18	2.66	0.80	1.00	0.00	6.87	0.25	0.00	422.4	0.0	145.07	1.43	146.50
														32,494.4	**0.0**			**7,886.06**

Load Case: 1.0D + 1.0W 90° Wind — 1.0D + 1.0W 60 mph Wind at 90° From Face

Wind Load Factor: 1.00 — **Wind Importance Factor:** 1.00

Dead Load Factor: 1.00

Ice Dead Load Factor: 0.00 — **Ice Importance Factor:** 1.00

Sect Seq	Wind Height (ft)	qz (psf)	Total Flat Area (sqft)	Total Round Area (sqft)	Ice Round Area (sqft)	Sol Ratio	Cf	Df	Dr	Ice Thick (in)	Eff Area (sqft)	Linear Area (sqft)	Ice Linear Area (sqft)	Total Weight (lb)	Weight Ice (lb)	Struct Force (lb)	Linear Force (lb)	Total Force (lb)
1	10.0	5.48	31.267	28.80	0.00	0.13	2.84	0.85	1.00	0.00	42.88	88.12	0.00	5,423.9	0.0	567.17	309.86	877.03
2	30.0	5.49	28.860	28.80	0.00	0.14	2.81	0.85	1.00	0.00	40.85	101.08	0.00	4,749.2	0.0	535.77	356.14	891.91
3	50.0	6.35	23.184	28.80	0.00	0.14	2.81	0.85	1.00	0.00	36.02	101.08	0.00	4,411.1	0.0	546.91	412.10	959.02
4	70.0	6.99	21.246	22.13	0.00	0.13	2.84	0.85	1.00	0.00	30.58	101.08	0.00	4,016.1	0.0	516.15	453.69	969.83
5	90.0	7.51	22.280	22.12	0.00	0.15	2.76	0.85	1.00	0.00	31.50	101.08	0.00	3,721.1	0.0	554.64	487.46	1,042.10
6	110.0	7.96	16.430	18.58	0.00	0.14	2.80	0.85	1.00	0.00	24.49	99.34	0.00	3,220.6	0.0	464.04	507.79	971.83
7	130.0	8.34	14.331	15.03	0.00	0.14	2.79	0.85	1.00	0.00	20.70	65.41	0.00	2,520.7	0.0	409.99	359.33	769.32
8	150.0	8.69	12.808	11.69	0.00	0.15	2.76	0.85	1.00	0.00	17.52	65.41	0.00	1,943.4	0.0	357.51	374.33	731.83
9	164.0	8.92	4.976	4.67	0.00	0.17	2.69	0.85	1.00	0.00	6.89	17.81	0.00	694.4	0.0	140.30	108.01	248.31
10	178.0	9.13	12.376	11.67	0.00	0.17	2.68	0.85	1.00	0.00	17.18	13.41	0.00	1,371.4	0.0	357.61	76.28	433.89
11	192.0	9.33	5.252	4.67	0.00	0.18	2.66	0.85	1.00	0.00	7.13	0.25	0.00	422.4	0.0	150.62	1.43	152.04
														32,494.4	**0.0**			**8,047.13**

Force/Stress Compression Summary

Structure:	CT06462-A-2-SBA	**Code:**	EIA/TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 13	

Tower Engineering Solutions

LEG MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	Fy (ksi)	Mem Cap (kips)	Leg Use %	Controls
1	20	PX - 8" DIA PIPE	-241.73	1.2D + 1.0W Normal Wind	10.02	100	100	100	41.77	50.00	505.44	47.8	Member X
2	40	PSP - ROHN 8 EHS	-215.81	1.2D + 1.0W Normal Wind	10.02	100	100	100	41.17	50.00	386.42	55.8	Member X
3	60	PSP - ROHN 8 EHS	-187.65	1.2D + 1.0W Normal Wind	10.02	100	100	100	41.17	50.00	386.42	48.6	Member X
4	80	PX - 6" DIA PIPE	-159.05	1.2D + 1.0W Normal Wind	10.02	100	100	100	54.90	50.00	303.24	52.5	Member X
5	100	PSP - ROHN 6 EHS	-131.83	1.2D + 1.0W Normal Wind	6.68	100	100	100	36.01	50.00	274.76	48.0	Member X
6	120	PX - 5" DIA PIPE	-100.29	1.2D + 1.0W Normal Wind	6.68	100	100	100	43.56	50.00	239.34	41.9	Member X
7	140	PX - 4" DIA PIPE	-69.34	1.2D + 1.0W Normal Wind	6.68	100	100	100	54.15	50.00	160.15	43.3	Member X
8	160	PX - 3" DIA PIPE	-45.63	1.2D + 1.0W Normal Wind	5.01	100	100	100	52.73	50.00	110.90	41.1	Member X
9	168	PST - 3" DIA PIPE	-19.37	1.2D + 1.0W Normal Wind	4.00	100	100	100	41.38	50.00	88.54	21.9	Member X
10	188	PST - 3" DIA PIPE	-7.98	1.2D + 1.0W Normal Wind	4.00	100	100	100	41.38	50.00	88.54	9.0	Member X
11	196	PST - 3" DIA PIPE	-0.65	1.2D + 1.0W Normal Wind	4.00	100	100	100	41.38	50.00	88.54	0.7	Member X

Splices

Sect	Top Elev	Top Splice Load Case	Top Force (kips)	Top Cap (kips)	Top Use %	Top Bolt Type	Top Num Bolts	Bottom Splice Load Case	Bottom Force (kips)	Bottom Cap (kips)	Bottom Use %	Bottom Bolt Type	Bottom Num Bolts
1	20	1.2D + 1.0W Normal Wind	222.61	0.00	0.0			1.2D + 1.0W Normal Wind	248.62	0.00			
2	40	1.2D + 1.0W Normal Wind	194.89	0.00	0.0			1.2D + 1.0W Normal Wind	222.61	0.00		1 A325	8
3	60	1.2D + 1.0W Normal Wind	166.07	0.00	0.0			1.2D + 1.0W Normal Wind	194.89	0.00		1 A325	8
4	80	1.2D + 1.0W Normal Wind	137.15	0.00	0.0			1.2D + 1.0W Normal Wind	166.07	0.00		1 A325	8
5	100	1.2D + 1.0W Normal Wind	105.35	0.00	0.0			1.2D + 1.0W Normal Wind	137.15	0.00		1 A325	6
6	120	1.2D + 1.0W Normal Wind	74.79	0.00	0.0			1.2D + 1.0W Normal Wind	105.35	0.00		1 A325	6
7	140	1.2D + 1.0W Normal Wind	48.68	0.00	0.0			1.2D + 1.0W Normal Wind	74.79	0.00		1 A325	4
8	160	1.2D + 1.0W Normal Wind	22.45	0.00	0.0			1.2D + 1.0W Normal Wind	48.68	0.00		7/8 A325	4
9	168	1.2D + 1.0W Normal Wind	10.74	0.00	0.0			1.2D + 1.0W Normal Wind	22.45	0.00		7/8 A325	4
10	188	1.2D + 1.0W Normal Wind	0.99	0.00	0.0			1.2D + 1.0W Normal Wind	10.74	0.00		7/8 A325	4
11	196	1.2D + 1.0Di + 1.0Wi 60° Wind	0.21	0.00	0.0			1.2D + 1.0W Normal Wind	0.99	0.00		3/4 A325	4

HORIZONTAL MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	Fy (ksi)	Mem Cap (kips)	Num Bolts	Num Holes	Shear Cap (kips)	Bear Cap (kips)	Use %	Controls
1	20										0.00	0	0				
2	40										0.00	0	0				
3	60										0.00	0	0				
4	80										0.00	0	0				
5	100										0.00	0	0				
6	120										0.00	0	0				
7	140										0.00	0	0				
8	160	SAE - 1.75X1.75X0.187	-0.29	1.2D + 1.0W 90° Wind	6.69	50	50	50	118.51	36.00	12.46	1	1	13.81	13.05	2.3	Member Z
9	168										0.00	0	0				
10	188										0.00	0	0				
11	196	SAE - 1.75X1.75X0.187	-0.01	0.9D + 1.0W 60° Wind	6.60	100	100	100	230.90	36.00	3.33	1	1	13.81	13.05	0.3	Member Z

DIAGONAL MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	Fy (ksi)	Mem Cap (kips)	Num Bolts	Num Holes	Shear Cap (kips)	Bear Cap (kips)	Use %	Controls
1	20	SAE - 4X4X0.25	-7.90	1.2D + 1.0W 90° Wind	24.62	50	50	50	185.84	36.00	16.08	1	1	19.87	20.8	49.1	Member Z
2	40	SAE - 4X4X0.25	-8.18	1.2D + 1.0W 90° Wind	22.81	50	50	50	172.16	36.00	18.73	1	1	19.87	20.8	43.7	Member Z
3	60	SAE - 3.5X3.5X0.25	-7.82	1.2D + 1.0W 90° Wind	21.03	50	50	50	181.81	36.00	14.63	1	1	19.87	20.8	53.4	Member Z

Force/Stress Compression Summary

Structure:	CT06462-A-2-SBA	**Code:**	EIA/TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 14	

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DIAGONAL MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	Fy (ksi)	Mem Cap (kips)	Num Bolts	Num Holes	Shear Cap (kips)	Bear Cap (kips)	Use %	Controls
4	80	SAE - 3.5X3.5X0.25	-7.16	1.2D + 1.0W 90° Wind	19.26	50	50	50	166.49	36.00	17.45	1	1	19.87	20.8	41.0	Member Z
5	100	SAE - 3X3X0.25	-6.55	1.2D + 1.0W 90° Wind	15.99	50	50	50	162.02	36.00	15.70	1	1	19.87	20.8	41.7	Member Z
6	120	SAE - 2.5X2.5X0.25	-5.85	1.2D + 1.0W 90° Wind	14.23	50	50	50	173.91	36.00	11.26	1	1	19.87	20.8	51.9	Member Z
7	140	SAE - 2.5X2.5X0.25	-4.05	1.2D + 1.0W Normal Wind	12.43	50	50	50	151.85	36.00	14.77	1	1	13.81	17.4	29.4	Bolt Shear
8	160	SAE - 2X2X0.1875	-3.15	1.2D + 1.0W 90° Wind	9.86	50	50	50	150.21	36.00	9.01	1	1	13.81	13.0	35.0	Member Z
9	168	SAE - 2X2X0.25	-3.25	1.2D + 1.0W 90° Wind	7.78	50	50	50	119.49	36.00	18.65	1	1	13.81	17.4	23.6	Bolt Shear
10	188	SAE - 2X2X0.25	-1.36	1.2D + 1.0W Normal Wind	7.72	50	50	50	118.82	36.00	18.82	1	1	13.81	17.4	9.9	Bolt Shear
11	196	SAE - 1.75X1.75X0.187	-0.23	1.2D + 1.0W 90° Wind	7.72	50	50	50	135.00	36.00	9.74	1	1	13.81	13.0	2.4	Member Z

Force/Stress Tension Summary

Structure:	CT06462-A-2-SBA	**Code:**	EIA/TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 15	

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LEG MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Fy (ksi)	Mem Cap (kips)	Leg Use %	Controls
1	20	PX - 8" DIA PIPE	202.01	0.9D + 1.0W 60° Wind	50	574.20	35.2	Member
2	40	PSP - ROHN 8 EHS	180.09	0.9D + 1.0W 60° Wind	50	437.40	41.2	Member
3	60	PSP - ROHN 8 EHS	156.74	0.9D + 1.0W 60° Wind	50	437.40	35.8	Member
4	80	PX - 6" DIA PIPE	132.60	0.9D + 1.0W 60° Wind	50	378.00	35.1	Member
5	100	PSP - ROHN 6 EHS	109.43	0.9D + 1.0W 60° Wind	50	302.09	36.2	Member
6	120	PX - 5" DIA PIPE	81.76	0.9D + 1.0W 60° Wind	50	274.95	29.7	Member
7	140	PX - 4" DIA PIPE	57.37	0.9D + 1.0W 60° Wind	50	198.45	28.9	Member
8	160	PX - 3" DIA PIPE	37.04	0.9D + 1.0W 60° Wind	50	135.90	27.3	Member
9	168	PST - 3" DIA PIPE	14.14	0.9D + 1.0W 60° Wind	50	100.35	14.1	Member
10	188	PST - 3" DIA PIPE	5.96	0.9D + 1.0W 60° Wind	50	100.35	5.9	Member
11	196	PST - 3" DIA PIPE	0.30	0.9D + 1.0W 60° Wind	50	100.35	0.3	Member

Splices

		Top Splice					Bottom Splice				
Sect	Top Elev	Load Case	Force (kips)	Cap (kips)	Use %	Bolt Type	Num Bolts	Load Case	Force (kips)	Cap (kips)	Use %	Bolt Type	Num Bolts
1	20	0.9D + 1.0W 60° Wind	185.12	0.00	0.0			0.9D + 1.0W 60° Wind	208.2	0.00			
2	40	0.9D + 1.0W 60° Wind	161.85	0.00	0.0			0.9D + 1.0W 60° Wind	185.1	424.08	43.7	1 A325	8
3	60	0.9D + 1.0W 60° Wind	137.71	0.00	0.0			0.9D + 1.0W 60° Wind	161.8	424.08	38.2	1 A325	8
4	80	0.9D + 1.0W 60° Wind	113.07	0.00	0.0			0.9D + 1.0W 60° Wind	137.7	424.08	32.5	1 A325	8
5	100	0.9D + 1.0W 60° Wind	85.76	0.00	0.0			0.9D + 1.0W 60° Wind	113.0	318.06	35.6	1 A325	6
6	120	0.9D + 1.0W 60° Wind	59.91	0.00	0.0			0.9D + 1.0W 60° Wind	85.76	318.06	27.0	1 A325	6
7	140	0.9D + 1.0W 60° Wind	39.41	0.00	0.0			0.9D + 1.0W 60° Wind	59.91	212.04	28.3	1 A325	4
8	160	0.9D + 1.0W 60° Wind	16.62	0.00	0.0			0.9D + 1.0W 60° Wind	39.41	166.24	23.7	7/8 A325	4
9	168	0.9D + 1.0W 60° Wind	6.18	0.00	0.0			0.9D + 1.0W 60° Wind	16.62	166.24	10.0	7/8 A325	4
10	188	0.9D + 1.0W 60° Wind	0.42	0.00	0.0			0.9D + 1.0W 60° Wind	6.18	166.24	3.7	7/8 A325	4
11	196		0.00	0.00	0.0			0.9D + 1.0W 60° Wind	0.42	120.40	0.3	3/4 A325	4

HORIZONTAL MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Fy (ksi)	Mem Cap (kips)	Num Bolts	Num Holes	Shear Cap (kips)	Bear Cap (kips)	B.S. Cap (kips)	Use %	Controls
1	20	-			36	0.00	0	0					
2	40	-			36	0.00	0	0					
3	60	-			36	0.00	0	0					
4	80	-			36	0.00	0	0					
5	100	-			36	0.00	0	0					
6	120	-			36	0.00	0	0					
7	140	-			36	0.00	0	0					
8	160	SAE - 1.75X1.75X0.1875	0.24	0.9D + 1.0W 90° Wind	36	20.09	1	1	13.81	9.79	7.50	3.2	Blck Shear
9	168	-			36	0.00	0	0					
10	188	-			36	0.00	0	0					
11	196	SAE - 1.75X1.75X0.1875	0.02	1.2D + 1.0W Normal Wi	36	20.09	1	1	13.81	9.79	7.50	0.3	Blck Shear

DIAGONAL MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Fy (ksi)	Mem Cap (kips)	Num Bolts	Num Holes	Shear Cap (kips)	Bear Cap (kips)	B.S. Cap (kips)	Use %	Controls
1	20	SAE - 4X4X0.25	8.04	1.2D + 1.0W 90° Wind	36	62.86	1	1	19.87	14.35	16.62	56.0	Bolt Bear
2	40	SAE - 4X4X0.25	8.01	0.9D + 1.0W 90° Wind	36	62.86	1	1	19.87	14.35	16.62	55.8	Bolt Bear
3	60	SAE - 3.5X3.5X0.25	7.68	0.9D + 1.0W 90° Wind	36	54.76	1	1	19.87	14.35	16.62	53.5	Bolt Bear
4	80	SAE - 3.5X3.5X0.25	7.11	1.2D + 1.0W 90° Wind	36	54.76	1	1	19.87	14.35	16.62	49.5	Bolt Bear

Force/Stress Tension Summary

Structure:	CT06462-A-2-SBA	**Code:**	EIA/TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 16	

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DIAGONAL MEMBERS

Sect	Top Elev	Member	Force (kips)	Load Case	Fy (ksi)	Mem Cap (kips)	Num Bolts	Num Holes	Shear Cap (kips)	Bear Cap (kips)	B.S. Cap (kips)	Use %	Controls
5	100	SAE - 3X3X0.25	6.49	1.2D + 1.0W 90° Wind	36	46.66	1	1	19.87	14.35	13.90	46.7	Blck Shear
6	120	SAE - 2.5X2.5X0.25	5.80	1.2D + 1.0W 90° Wind	36	38.56	1	1	19.87	14.35	12.54	46.3	Blck Shear
7	140	SAE - 2.5X2.5X0.25	4.04	0.9D + 1.0W 90° Wind	36	38.56	1	1	13.81	13.05	12.71	31.8	Blck Shear
8	160	SAE - 2X2X0.1875	3.26	1.2D + 1.0W 90° Wind	36	23.00	1	1	13.81	9.79	7.50	43.5	Blck Shear
9	168	SAE - 2X2X0.25	3.29	1.2D + 1.0W 90° Wind	36	30.46	1	1	13.81	13.05	9.99	32.9	Blck Shear
10	188	SAE - 2X2X0.25	1.25	0.9D + 1.0W 60° Wind	36	30.46	1	1	13.81	13.05	9.99	12.5	Blck Shear
11	196	SAE - 1.75X1.75X0.1875	0.24	1.2D + 1.0W 90° Wind	36	20.09	1	1	13.81	9.79	7.50	3.2	Blck Shear

Seismic Section Forces

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 17	

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Load Case: 1.2D + 1.0Ev + 1.0Eh

Dead Load Factor	1.20	**Sds**	0.204	**Ss**	0.1920	**Fa**	1.6000	**Ke**	1.0696	**TL**	6.0000
Seismic Load Factor	1.00	**Sd1**	0.088	**S1**	0.0550	**Fv**	2.4000	**Kg**	0.0000	**Cs**	0.0459
Seismic Importance Factor	1.00	**W1**	19.94	**R**	3.0000	**Vs**	1.8756	**T**	0.6393	**f1**	1.5643

Sect #	Elev (ft)	Wz (lb)	Lateral Fsz (lbs)	Vertical Ev (lbs)
1	10.00	5423.8	24.39	222.27
2	30.00	4749.1	68.52	194.62
3	50.00	4411.0	109.35	180.77
4	70.00	4016.1	141.76	164.58
5	90.00	3721.1	170.95	152.49
6	110.00	7802.9	467.79	319.77
7	130.00	2727.7	181.72	111.78
8	150.00	2231.3	170.84	91.44
9	164.00	777.00	60.81	31.84
10	178.00	4573.0	442.00	187.40
11	192.00	422.41	37.51	17.31

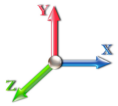
Load Case: 0.9D + 1.0Ev + 1.0Eh

Dead Load Factor	0.90	**Sds**	0.204	**Ss**	0.1920	**Fa**	1.6000	**Ke**	1.0696	**TL**	6.0000
Seismic Load Factor	1.00	**Sd1**	0.088	**S1**	0.0550	**Fv**	2.4000	**Kg**	0.0000	**Cs**	0.0459
Seismic Importance Factor	1.00	**W1**	19.94	**R**	3.0000	**Vs**	1.8756	**T**	0.6393	**f1**	1.5643

Sect #	Elev (ft)	Wz (lb)	Lateral Fsz (lbs)	Vertical Ev (lbs)
1	10.00	5423.8	24.39	222.27
2	30.00	4749.1	68.52	194.62
3	50.00	4411.0	109.35	180.77
4	70.00	4016.1	141.76	164.58
5	90.00	3721.1	170.95	152.49
6	110.00	7802.9	467.79	319.77
7	130.00	2727.7	181.72	111.78
8	150.00	2231.3	170.84	91.44
9	164.00	777.00	60.81	31.84
10	178.00	4573.0	442.00	187.40
11	192.00	422.41	37.51	17.31

Support Forces Summary

Structure:	CT06462-A-2-SBA	**Code:**	TIA-222-H	6/14/2022	
Site Name:	Mountain Street	**Exposure:**	B		
Height:	196.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	0.85 **Topography:** 1	**Struct Class:**	II	Page: 18	



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Load Case	Node	FX (kips)	FY (kips)	FZ (kips)	(-) = Uplift (+) = Down
1.2D + 1.0W Normal Wind	1	0.00	248.23	-26.79	
	1a	8.76	-99.63	-8.55	
	1b	-8.76	-99.58	-8.54	
1.2D + 1.0W 60° Wind	1	-2.79	126.21	-13.20	
	1a	-12.78	125.66	4.23	
	1b	-20.15	-202.84	-11.66	
1.2D + 1.0W 90° Wind	1	-3.32	16.35	-1.06	
	1a	-20.16	208.65	9.82	
	1b	-18.43	-175.97	-8.76	
0.9D + 1.0W Normal Wind	1	0.00	243.94	-26.52	
	1a	8.99	-103.60	-8.68	
	1b	-8.99	-103.56	-8.68	
0.9D + 1.0W 60° Wind	1	-2.80	122.02	-12.92	
	1a	-12.55	121.49	4.09	
	1b	-20.38	-206.74	-11.80	
0.9D + 1.0W 90° Wind	1	-3.33	12.26	-0.79	
	1a	-19.92	204.39	9.68	
	1b	-18.66	-179.88	-8.89	
1.2D + 1.0Di + 1.0Wi Normal Wind	1	0.00	88.90	-5.04	
	1a	3.64	1.29	-2.94	
	1b	-3.64	1.36	-2.93	
1.2D + 1.0Di + 1.0Wi 60° Wind	1	-0.70	58.79	-1.71	
	1a	-1.81	58.62	0.26	
	1b	-6.59	-25.86	-3.81	
1.2D + 1.0Di + 1.0Wi 90° Wind	1	-0.82	30.50	1.40	
	1a	-3.68	79.70	1.67	
	1b	-6.11	-18.64	-3.07	
1.2D + 1.0Ev + 1.0Eh	1	0.00	28.53	5.12	
	1a	5.86	11.09	-3.48	
	1b	-5.86	11.09	-3.48	
0.9D + 1.0Ev + 1.0Eh	1	0.00	24.43	5.40	
	1a	6.10	7.01	-3.62	
	1b	-6.10	7.01	-3.62	
1.0D + 1.0W Normal Wind	1	0.00	71.17	-7.37	
	1a	1.64	-15.18	-1.83	
	1b	-1.64	-15.14	-1.83	
1.0D + 1.0W 60° Wind	1	-0.72	40.91	-3.95	
	1a	-3.78	40.76	1.36	
	1b	-4.50	-40.81	-2.61	
1.0D + 1.0W 90° Wind	1	-0.85	13.62	-0.90	
	1a	-5.63	61.36	2.78	
	1b	-4.07	-34.12	-1.87	

Max Reactions

Leg			Overturning		
Max Uplift:	-206.74	(kips)	Moment:	4618.96	(ft-kips)
Max Down:	248.23	(kips)	Total Down:	49.03	(kips)
Max Shear:	26.79	(kips)	Total Shear:	43.88	(kips)

Max Reactions

Leg			Overturning		
Max Uplift:	-206.74	(kips)	Moment:	4618.96	(ft-kips)
Max Down:	248.23	(kips)	Total Down:	49.03	(kips)
Max Shear:	26.79	(kips)	Total Shear:	43.88	(kips)

Anchor Bolts

Bolt Size (in.):	1.00	Number Bolts:	10	Type:	UnGrouted
Yield Strength (Ksi):	109.00	Tensile Strength (Ksi):	125.00		
		Length:	0.85		

Interaction Ratios:

Tensile: **0.37** Compression: **0.33**

Max Usages

Max Leg: 55.8% (1.2D + 1.0W Normal Wind - Sect 2)
Max Diag: 56.0% (1.2D + 1.0W 90° Wind - Sect 1)
Max Horiz: 3.2% (0.9D + 1.0W 90° Wind - Sect 8)

Max Deflection, Twist and Sway

Load Case	Elevation (ft)	Deflection (ft)	Twist (deg)	Sway (deg)
0.9D + 1.0Ev + 1.0Eh - Normal To Face	106.67	0.0198	-0.0010	0.0209
	120.00	0.0247	-0.0011	0.0231
	126.67	0.0274	-0.0012	0.0250
	133.33	0.0303	-0.0013	0.0270
	150.00	0.0388	-0.0014	0.0322
	155.00	0.0416	-0.0015	0.0345
	160.00	0.0424	0.0000	0.0357
	164.00	0.0471	0.0015	0.0369
	168.00	0.0498	-0.0014	0.0386
	184.00	0.0607	-0.0012	0.0397
0.9D + 1.0W 121 mph Wind at 60° From Face	106.67	0.3315	-0.1226	0.3599
	120.00	0.4202	-0.1566	0.4024
	126.67	0.4685	-0.1929	0.4267
	133.33	0.5196	-0.2258	0.4491
	150.00	0.6629	0.1404	0.5373
	155.00	0.7102	-0.3276	0.5318
	160.00	0.7592	-0.3390	0.5318
	164.00	0.7976	0.0768	0.5805
	168.00	0.8401	-0.3376	0.5842
	184.00	1.0039	-0.3341	0.5931

0.9D + 1.0W 121 mph Wind at 90° From Face	106.67	0.3352	-0.1666	0.3629
	120.00	0.4251	-0.2135	0.4086
	126.67	0.4733	-0.2635	0.4296
	133.33	0.5253	-0.3092	0.4508
	150.00	0.6698	0.0963	0.5440
	155.00	0.7181	-0.4569	0.5109
	160.00	0.7679	-0.4750	0.5057
	164.00	0.8068	0.1586	0.5789
	168.00	0.8498	-0.4751	0.5902
	184.00	1.0151	-0.4728	0.6003
0.9D + 1.0W 121 mph Wind at Normal To Face	106.67	0.3500	-0.0657	0.3847
	120.00	0.4438	-0.0902	0.4252
	126.67	0.4949	-0.1146	0.4992
	133.33	0.5491	0.0397	0.5294
	150.00	0.7008	0.0797	0.5565
	155.00	0.7514	-0.1735	0.6437
	160.00	0.8032	0.0016	0.6472
	164.00	0.8457	-0.1724	0.6270
	168.00	0.8898	-0.1710	0.6230
	184.00	1.0645	-0.1681	0.6326
1.0D + 1.0W 60 mph Wind at 60° From Face	106.67	0.0820	-0.0295	0.0887
	120.00	0.1038	-0.0378	0.0990
	126.67	0.1156	-0.0466	0.1047
	133.33	0.1282	-0.0546	0.1105
	150.00	0.1633	0.0262	0.1314
	155.00	0.1750	-0.0763	0.1306
	160.00	0.1870	-0.0779	0.1305
	164.00	0.1964	0.0101	0.1423
	168.00	0.2068	-0.0739	0.1434
	184.00	0.2469	-0.0680	0.1451
1.0D + 1.0W 60 mph Wind at 90° From Face	106.67	0.0829	-0.0353	0.0895
	120.00	0.1051	-0.0451	0.1003
	126.67	0.1169	-0.0557	0.1055
	133.33	0.1297	-0.0652	0.1110
	150.00	0.1650	0.0195	0.1332
	155.00	0.1769	-0.0915	0.1256
	160.00	0.1891	-0.0934	0.1245
	164.00	0.1987	0.0302	0.1419
	168.00	0.2092	-0.0886	0.1450
	184.00	0.2496	-0.0814	0.1469
1.0D + 1.0W 60 mph Wind at Normal To Face	106.67	0.0867	-0.0144	0.0947
	120.00	0.1098	-0.0199	0.1047
	126.67	0.1224	-0.0254	0.1226
	133.33	0.1357	0.0081	0.1299
	150.00	0.1728	0.0168	0.1363
	155.00	0.1854	-0.0362	0.1578
	160.00	0.1980	0.0004	0.1589
	164.00	0.2084	-0.0344	0.1538
	168.00	0.2192	-0.0333	0.1529
	184.00	0.2621	-0.0306	0.1551
1.2D + 1.0Di + 1.0Wi 50 mph Wind at 60° From Face	106.67	0.0867	-0.0376	0.0932
	120.00	0.1094	-0.0483	0.1040
	126.67	0.1217	-0.0599	0.1098
	133.33	0.1349	-0.0702	0.1161
	150.00	0.1715	0.0370	0.1372
	155.00	0.1834	-0.0996	0.1348
	160.00	0.1950	-0.1015	0.1341
	164.00	0.2048	0.0104	0.1475
	168.00	0.2163	-0.0962	0.1499
	184.00	0.2582	-0.0886	0.1513

1.2D + 1.0Di + 1.0Wi 50 mph Wind at 90° From Face	106.67	0.0869	-0.0450	0.0935
	120.00	0.1098	-0.0578	0.1048
	126.67	0.1221	-0.0716	0.1102
	133.33	0.1354	-0.0841	0.1155
	150.00	0.1721	0.0255	0.1385
	155.00	0.1840	-0.1196	0.1261
	160.00	0.1964	-0.1220	0.1251
	164.00	0.2057	0.0392	0.1461
	168.00	0.2171	-0.1156	0.1504
	184.00	0.2591	-0.1062	0.1521
1.2D + 1.0Di + 1.0Wi 50 mph Wind at Normal From Face	106.67	0.0889	-0.0207	0.0979
	120.00	0.1126	-0.0282	0.1081
	126.67	0.1255	-0.0357	0.1293
	133.33	0.1391	0.0140	0.1364
	150.00	0.1775	0.0273	0.1390
	155.00	0.1901	-0.0530	0.1669
	160.00	0.2022	0.0005	0.1652
	164.00	0.2138	-0.0508	0.1570
	168.00	0.2248	-0.0493	0.1565
	184.00	0.2687	-0.0453	0.1588
1.2D + 1.0Ev + 1.0Eh - Normal To Face	106.67	0.0198	-0.0010	0.0209
	120.00	0.0247	-0.0011	0.0231
	126.67	0.0274	-0.0012	0.0251
	133.33	0.0304	-0.0013	0.0271
	150.00	0.0388	-0.0014	0.0322
	155.00	0.0416	-0.0015	0.0347
	160.00	0.0424	0.0000	0.0358
	164.00	0.0472	0.0015	0.0369
	168.00	0.0499	-0.0014	0.0387
	184.00	0.0608	-0.0012	0.0398
1.2D + 1.0W 121 mph Wind at 60° From Face	106.67	0.3318	-0.1226	0.3604
	120.00	0.4207	-0.1566	0.4029
	126.67	0.4691	-0.1929	0.4272
	133.33	0.5202	-0.2258	0.4498
	150.00	0.6637	0.1404	0.5379
	155.00	0.7110	-0.3276	0.5325
	160.00	0.7602	-0.3390	0.5326
	164.00	0.7986	0.0769	0.5814
	168.00	0.8412	-0.3376	0.5849
	184.00	1.0052	-0.3341	0.5939
1.2D + 1.0W 121 mph Wind at 90° From Face	106.67	0.3355	-0.1666	0.3635
	120.00	0.4256	-0.2135	0.4091
	126.67	0.4738	-0.2636	0.4301
	133.33	0.5259	-0.3093	0.4515
	150.00	0.6706	0.0964	0.5446
	155.00	0.7189	-0.4570	0.5118
	160.00	0.7688	-0.4751	0.5065
	164.00	0.8078	0.1586	0.5798
	168.00	0.8508	-0.4752	0.5913
	184.00	1.0164	-0.4730	0.6012
1.2D + 1.0W 121 mph Wind at Normal To Face	106.67	0.3504	-0.0656	0.3852
	120.00	0.4444	-0.0902	0.4259
	126.67	0.4955	-0.1146	0.4998
	133.33	0.5498	0.0397	0.5300
	150.00	0.7017	0.0797	0.5573
	155.00	0.7524	-0.1734	0.6447
	160.00	0.8042	0.0016	0.6482
	164.00	0.8468	-0.1723	0.6280
	168.00	0.8910	-0.1709	0.6238
	184.00	1.0660	-0.1681	0.6336

Mat Foundation Design for Self Supporting Tower

			Date 6/14/2022
Customer Name:	SBA Communications Corp	TIA Standard:	TIA-222-H
Site Name:		Structure Height (Ft.):	196
Site Nmber:	CT06462-A-2-SBA	Engineer Name:	J. Tibbetts
Engr. Number:	130376	Engineer Login ID:	

Foundation Info Obtained from: Drawings/Calculations

Analysis or Design? Analysis

Number of Tower Legs: 3 Legs

Base Reactions (Factored):

(1). Individual Leg:

Axial Load (Kips):	248.2	Uplift Force (Kips):	206.7
Shear Force (Kips):	26.8		

(2). Tower Base:

Total Vertical Load (Kips):	49.0	Total Shear Force (Kips):	43.9
Moment (Kips-ft):	4619.0		

Foundation Geometries:

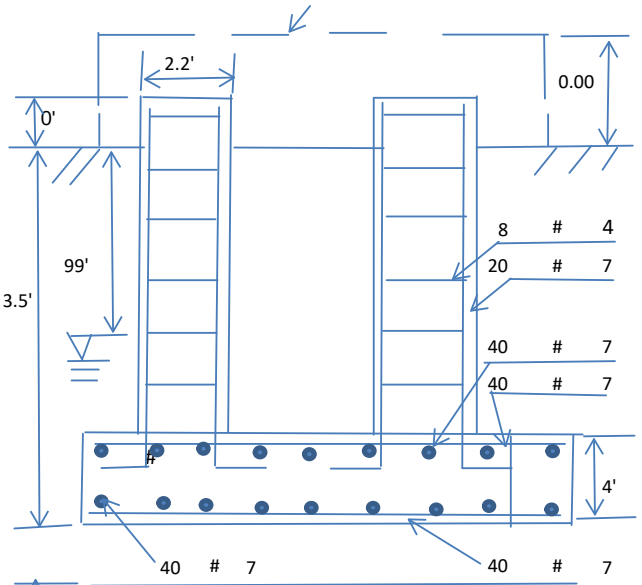
Leg distance (Center-to-Center ft.):		23.0	Mods required -Yes/No ?:	No	
Diameter of Pier (ft.):	Round	2.2	Pier Height A. G. (ft.):	0.00	
Tower center to mat center (ft):		0	Depth of Base BG (ft.):	3.5	
Length of Pad (ft.):		36	Width of Pad (ft.):	36	
Thickness of Pad (ft):		4.00			

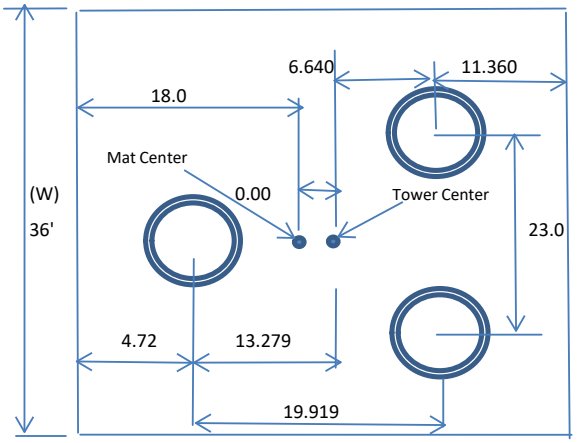
Material Properties and Reabr Info:

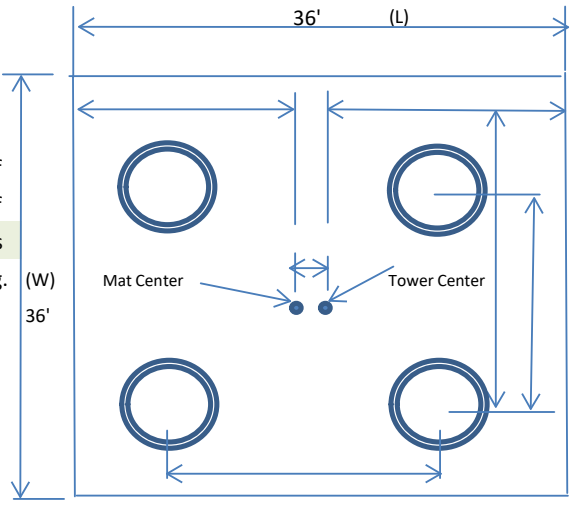
Concrete Strength (psi):	3000	Steel Elastic Modulus:	29000	ksi
Vertical bar yield (ksi)	60	Tie steel yield (ksi):	60	
Vertical Rebar Size #:	7	Tie / Stirrup Size #:	4	
Qty. of Vertical Rebars:	20	Tie Spacing (in):	6.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	7	
Concrete Cover (in.):	3	Unit Weight of Concrete:	150.0	pcf
Rebar at the bottom of the concrete pad:				
Qty. of Rebar in Pad (L):	40	Qty. of Rebar in Pad (W):	40	
Rebar at the top of the concrete pad:				
Qty. of Rebar in Pad (L):	40	Qty. of Rebar in Pad (W):	40	

Soil Design Parameters:

Soil Unit Weight (pcf):	120.0	Soil Buoyant Weight:	50.0	Pcf
Water Table B.G.S. (ft):	99.0	Unit Weight of Water:	62.4	pcf
Ultimate Bearing Pressure (psf):	4000	Consider ties in concrete shear strength:		Yes
Consider Soil Lateral Resistance ?	Yes	Enter soil C (psf) or Phi (deg.):	30.0	Deg.
		Depth to ignor lateral resistance	1.0	Ft.







Apply 1.35 for e/w per G/H: 1.35

Foundation Analysis and Design:	Uplift Strength Reduction Factor:	0.75	Compression Strength Reduction Factor:	0.75			
Total Dry Soil Volume (cu. Ft.):		2.57	Total Dry Soil Weight (Kips):	0.31			
Total Buoyant Soil Volume (cu. Ft.):		0.00	Total Buoyant Soil Weight (Kips):	0.00			
Total Effective Soil Weight (Kips):		0.31	Weight from the Concrete Block at Top (K):	0.00			
Total Dry Concrete Volume (cu. Ft.):		5184.08	Total Dry Concrete Weight (Kips):	777.61			
Total Buoyant Concrete Volume (cu. Ft.):		0.00	Total Buoyant Concrete Weight (Kips):	0.00			
Total Effective Concrete Weight (Kips):		777.61	Total Vertical Load on Base (Kips):	826.95			
Check Soil Capacities:						Load/ Capacity Ratio	
Calculated Maxium Net Soil Pressure under the base (psf):		1210.26	<	Allowable Factored Soil Bearing (psf):	3000	0.40	OK!
Allowable Foundation Overturning Resistance (kips-ft.):		13484.8	>	Design Factored Momont (kips-ft):	4795	0.36	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):		2.81	OK!				
Check the capacities of Reinforceing Concrete:							
Strength reduction factor (Flexure and axial tension):		0.90	Strength reduction factor (Shear):		0.75		
Strength reduction factor (Axial compresion):		0.65	Wind Load Factor on Concrete Design:		1.00		
(1) Concrete Pier:						Load/ Capacity Ratio	
	Vertical Steel Rebar Area (sq. in./each):	0.60		Tie / Stirrup Area (sq. in./each):	0.20		
	Calculated Moment Capacity (Mn,Kips-Ft):	363.9	>	Design Factored Moment (Mu, Kips-Ft)	0.2	0.00	OK!
	Calculated Shear Capacity (Kips):	69.3	>	Design Factored Shear (Kips):	26.8	0.39	OK!
	Calculated Tension Capacity (Tn, Kips):	648.0	>	Design Factored Tension (Tu Kips):	206.7	0.32	OK!
	Calculated Compression Capacity (Pn, Kips):	709.9	>	Design Factored Axial Load (Pu Kips):	248.2	0.35	OK!
	Moment & Tension Strength Combination:	0.00	OK!	Check Tie Spacing (Design/Req'd):	0.57		
	Pier Reinforcement Ratio:	0.022	Reinforcement Ratio is satisfied per ACI				
(2).Concrete Pad:							
	One-Way Design Shear Capacity (L or W Direction, Kips):	1581.6	>	One-Way Factored Shear (L/W-Dir Kips	399.0	0.25	OK!
	One-Way Design Shear Capacity (Diagonal Dir., Kips):	1332.7	>	One-Way Factored Shear (Dia. Dir, Kips	358.9	0.27	OK!
	Lower Steel Pad Reinforcement Ratio (L or W-Direct.):	0.0012		Lower Steel Reinf. Ratio (Dia. Dir.):	0.0011		
	Lower Steel Pad Moment Capacity (L or W-Dir. Kips-ft):	4742.2	>	Moment at Bottom (L-Direct. K-Ft):	2161.3	0.46	OK!
	Lower Steel Pad Moment Capacity (Dia. Direction,K-ft):	4597.7	>	Moment at Bottom (Dia. Dir. K-Ft):	623.1	0.14	OK!
	Upper Steel Pad Reinforcement Ratio (L or W -Direction):	0.0012		Upper Steel Reinf. Ratio (Dia. Dir.):	0.0011		
	Upper Steel Pad Moment Capacity (L or W-Dir., Kips-ft):	4742.2	>	Moment at the top (L-Dir Kips-Ft):	1015.1	0.21	OK!
	Upper Steel Pad Moment Capacity (Dia. Direction, K-ft):	4597.7	>	Moment at the top (Dia. Dir., K-Ft):	628.9	0.14	OK!
	Punching Failure Capacity From Down Load (Kips):	1632.4	>	Punch. Failure Factored Shear (K):	248.2	0.15	OK!
	Punching Failure Capacity From Uplift (Kips):	1474.3	>	Punch. Failure Factored Shear (K):	206.7	0.14	OK!
(3). Check Max. eccentricity of Loading:							
	The maximum eccentricity of Loading:	5.80	ft.	Allowable eccentricity (0.45 W, ft.):	16.2		OK!

ATTACHMENT F – PROOF OF DELIVERY OF NOTICE

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

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

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ATTACHMENT G - POWER DENSITY REPORT

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

Calculated Radio Frequency Emissions Report

ES-055 – Willimantic

349 Mountain Road

Windham, CT 06280

August 8, 2022

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List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the Eversource installation on the self-support tower at 349 Mountain Street in Windham, CT. Eversource is proposing to replace a recently installed omnidirectional antenna for both transmit and receive purposes as part of its 220 MHz communications system.

This report considers the proposed updated antenna configuration as detailed by Eversource along with % MPE (Maximum Permissible Exposure) measurements around the existing tower taken prior to the modifications to determine FCC compliance of the facility. Please note that there is a guyed tower within the same compound (see below), which would contribute to the % MPE measurements recorded during the field survey.

In order to account for any configuration changes by others since the field measurements were recorded in June 2020, application materials posted on the CT Siting Council website for the subject site were reviewed. That research indicates that in August 2021 Verizon had completed modifications to their equipment and the power density information for that installation as detailed in its Notice of Exempt Modification filing dated August 4, 2021 (EM-VER-163-210805) is considered in this analysis. Please note that this updated Verizon configuration was also included in Eversource's most recent filing for this site in March 2022 (EM-EVER-163-220308). Additionally, on May 13, 2022, Dish Wireless LLC received approval to add their equipment as detailed in its Tower Share Application dated April 11, 2022 (TS-DISH-163-220419). The power density information for DISH as provided in that application is also considered here for completeness.

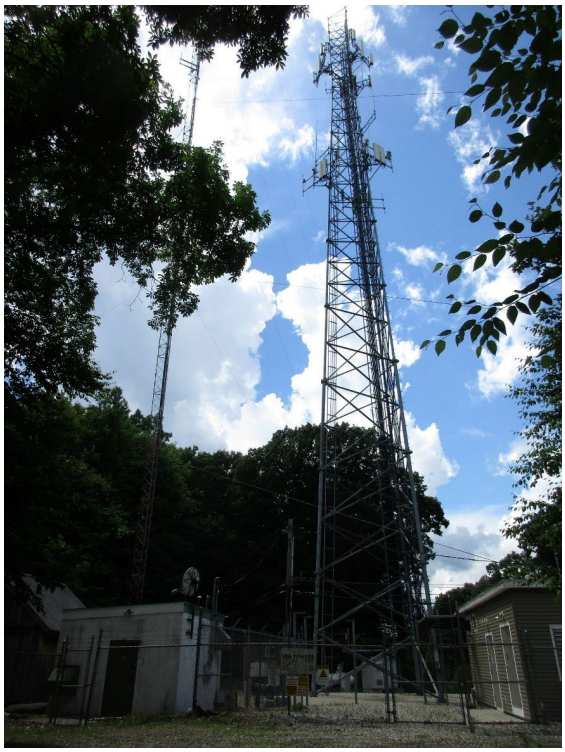

Figure 1: View of ES-055 Willimantic

Site Address	349 Mountain Street
Latitude	41° 42' 10.84" N
Longitude	73° 13' 17.01" W
Site Elevation AMSL	525'
Survey Engineer	Marc Salas
Survey Date/Time	6/29/2020; 1:30 PM – 2:15 PM

Table 1: Survey Information

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

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

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

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

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

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

3. Power Density Calculation Methods

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

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

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

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

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

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

4. Installed 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 Eversource equipment. Any receive only antennas are not included in the % MPE calculations and are therefore not listed in the table below.

Operator	Antenna Model	TX Freq. (MHz)	Ant Gain (dBd)	Power ERP (Watts)	Number of Channels	Vertical Beamwidth	Length (ft)	Antenna Centerline Height (ft)
Eversource	Comprod 876F-70-2HSMP40DF1/2	217	5.0	124	4	32°	20	158.5

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

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

[2] Transmit antenna height listed is based on the Tower Engineering Solutions Structural Analysis Report dated June 14, 2022 and the site drawings prepared by Black & Veatch dated May 23, 2022 (Rev. 2).

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# 0116			
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 29, 2020 between 1:30 PM and 2:15 PM. The net change of Verizon's % MPE from its most recent petition (13.70%)[4] compared to Verizon's % MPE (10.00%) as listed in the CT Siting Council power density database at the time of the measurements was included as part of the "Composite % MPE" column. To account for the approved DISH installation, the maximum % MPE as detailed in its Tower Share Application (2.32%)[5] was also included as part of the overall "Composite % MPE" column.

The calculated values for the proposed Eversource 220 MHz equipment incorporate the antenna pattern of the antenna model specified by Eversource to determine the "Off Beam Loss" factor shown in the power density formula from Section 3. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Table 4 below lists 16 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was 5.71% (Average Uncontrolled / General Population MPE) and was recorded at Location 11 by the mailbox for 875 Mountain Street. The highest composite (measured + calculated) % MPE value is calculated to be 11.78% (Average Uncontrolled / General Population) and is also calculated to occur at Location 11.

Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Calculated Verizon % MPE change from EM-VER-163-210805	Max. Calculated Dish Wireless % MPE from TS-DISH-163-220419	Composite % MPE (Uncontrolled / General)
Double swing gate on east side of fenced compound	41.70297	-72.22119	56	1.86%	0.28%	3.70%	2.32%	8.16%
Single swing on east side of fenced compound near wood framed shelter	41.70285	-72.22124	72	2.58%	0.26%			8.86%
Double swing gate on south side of fenced compound	41.70282	-72.22148	74	2.31%	0.26%			8.59%
Near the NE corner of the fenced compound	41.70310	-72.22131	40	< 1.00%	0.29%			< 7.31%
Near the NW corner of the fenced compound	41.70318	-72.22157	80	< 1.00%	0.25%			< 7.27%
NE of compound, along power line access way	41.70308	-72.22095	121	1.19%	0.14%			7.35%
Along gravel access road	41.70283	-72.22066	208	< 1.00%	0.06%			< 7.08%
Along gravel access road	41.70271	-72.22025	328	< 1.00%	0.19%			< 7.21%
Along gravel access road at bend	41.70261	-72.21965	495	< 1.00%	0.20%			< 7.22%
At tower access road gate	41.70199	-72.21879	801	< 1.00%	0.10%			< 7.12%
By mailbox for 875 Mountain Street	**41.70191**	**-72.21744**	**1149**	**5.71%**	**0.05%**			**11.78%**
By stop sign on Southridge Drive at Mountain Street intersection	41.70127	-72.21729	1284	5.12%	0.04%			11.18%
Spring View Lane, end of cul-de-sac	41.69999	-72.21718	1593	3.45%	0.03%			9.50%
SW corner of Orchard Hill Lane split	41.70165	-72.21337	2244	3.82%	0.02%			9.86%
By stop sign on Young Street at Lebanon Avenue intersection	41.70667	-72.21476	2246	3.01%	0.02%			9.05%
Adam Heights Road, at dead end	41.70277	-72.22406	735	1.52%	0.12%			7.66%

Table 4: Measured and Calculated % MPE Results [6]

[4] Connecticut Siting Council Notice of Exempt Modification, 349R Mountain Street, Windham (Willimantic), CT dated August 4, 2021 https://portal.ct.gov/-/media/CSC/2_EMS-medialibrary/Windham_Willimantic/MountainSt/Verizon/em-ver-163-210805_filing_349R-Mountain-Street-Windham-Willimantic-CT-with-Attachments.pdf

[5] Connecticut Siting Council Town Share Application, 349R Mountain Street, Windham (Willimantic), CT dated April 11, 2022 https://portal.ct.gov/-/media/CSC/2_EMS-medialibrary/Windham_Willimantic/MountainSt/DISH/TS-DISH-163-220419_filing_MOUNTAIN-STREET-WINDHAM.pdf

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

Figures 2 and 3 below are aerial views[7] of the tower location and the surrounding area, along with the measurement locations listed in Table 4.

Figure 2: Measurement Points – Zoom In

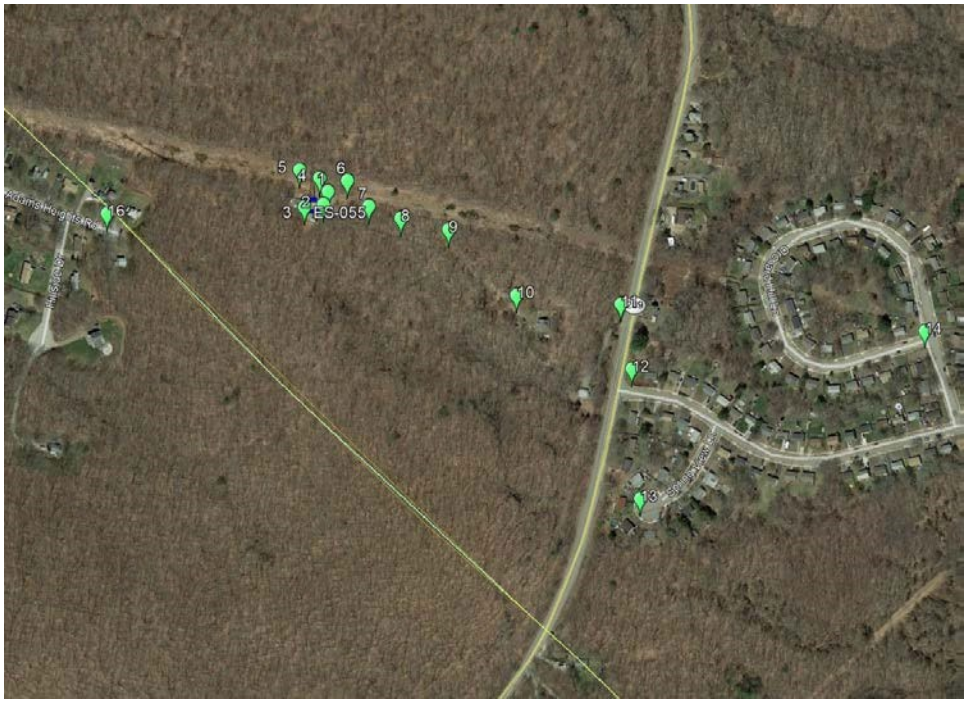

Figure 3: All Measurement Points

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

7. Conclusion

A number of accessible areas around the tower at 349 Mountain Street in Windham, 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 5.71% MPE. This measurement was recorded at Location 11 by the mailbox for 875 Mountain Street.

The highest composite (measured + calculated) power density is **11.78% of the FCC General Population MPE limit,** which includes the proposed Eversource 220 MHz equipment, the net % MPE change of Verizon's equipment modifications, and the maximum calculated % MPE reported by Dish Wireless LLC's in its previously referenced Tower Share Application. This maximum composite % MPE value is also calculated to occur at Location 11.

The above analysis concludes that RF exposure at ground level around the tower 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.

August 4, 2022

Report Prepared By: Ram Acharya
RF Engineer
C Squared Systems, LLC

Date

August 8, 2022

Report 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[8]

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[9]

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)

[8] 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

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

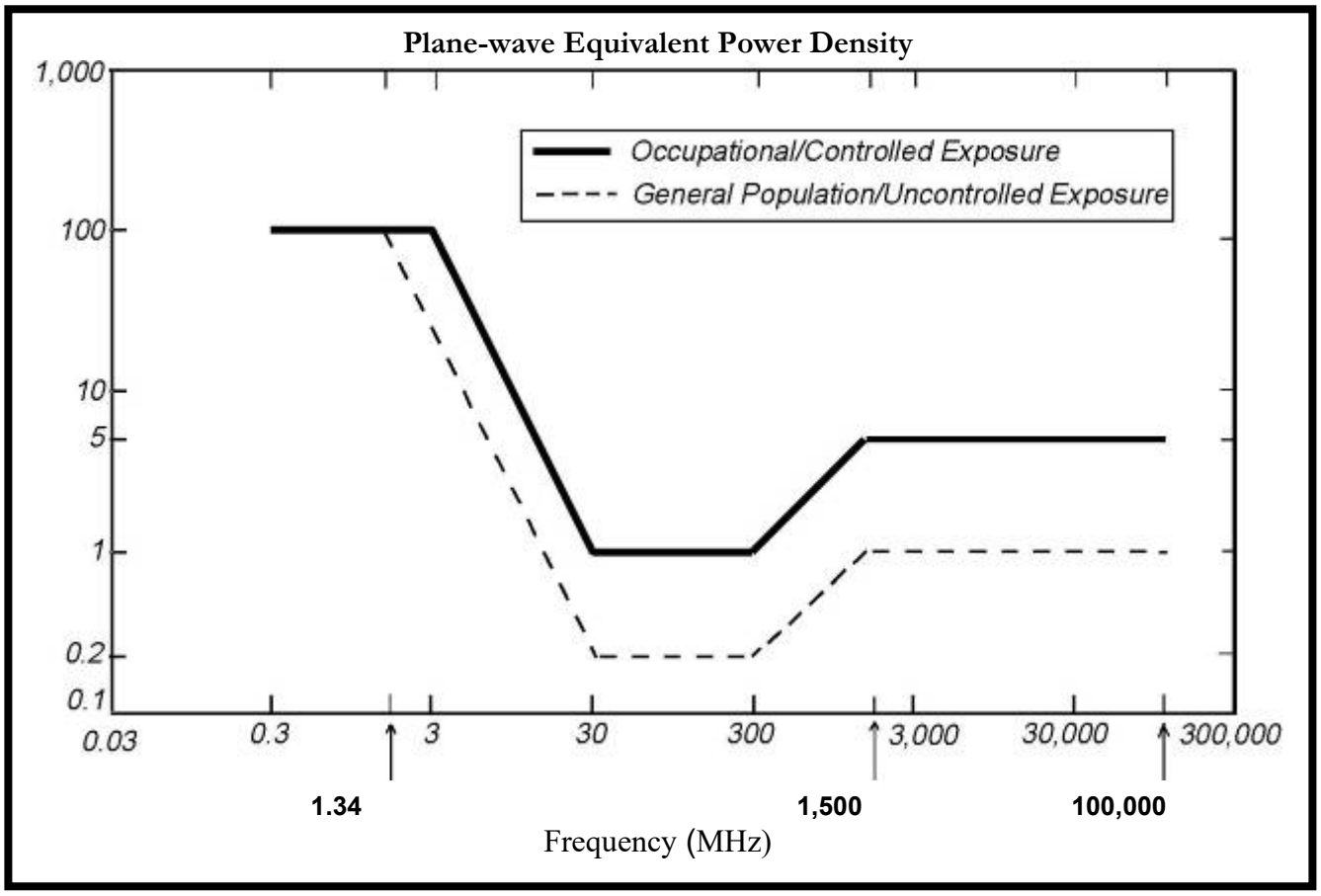

Figure 4: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

217 MHz

Manufacturer:	Comprod
Model #:	876-70-2HSMP40DF1/2
Frequency Band:	215-220 MHz
Gain:	5 dBd
Vertical Beamwidth:	32°
Horizontal Beamwidth:	83.1°
Polarization:	Vertical-Polarization
Length:	20’