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

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

September 21, 2021

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

RE: **Notice of Exempt Modification**
Eversource Site # ES-068 Southbury Cassidy
Cassidy Road (AKA Spruce Brook Road), Southbury, CT 06488
Latitude: 41-30-24.5 N / Longitude: 73-17-0.5 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains two antennas on an existing 180-foot self-support tower located at Cassidy Road in Southbury. See Attachment A, Parcel Map and Property Card. The tower and property are owned by the State of Connecticut Department of Emergency Services and Public Protection ("DESPP"). Eversource and DESPP have entered into an agreement allowing the modification of Eversource's equipment on the DESPP tower. See Attachment B, Letter of Authorization. Eversource is seeking the Connecticut Siting Council's authorization for the installation of one 19-foot omni-directional antenna to be mounted at 126 feet above ground level ("AGL") with a four-foot stand-off mount and the removal of two 14-foot 3-inch omni directional antennas, one upright and one inverted. There will be no other changes to the area of the fenced compound, the tower or the existing antennas and other equipment currently mounted on the tower. The antenna will be mounted to the existing tower on a new 4-foot stand-off mount. See Attachment C, Mount Analysis, dated August 19, 2021. The tower and existing and proposed equipment are depicted on Attachment D, Construction Drawings, dated August 17, 2021 and Attachment E, Structural Analysis, dated September 2, 2021. The tower, a replacement for a previously existing tower, was the subject of an exempt modification filed by the Department of Public Safety, Division of State Police in August 1989.

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-130-210115, dated March 1, 2021). 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 Jeff Manville, First Selectman for the Town of Southbury and Jessica Townsend, Land Use Administrator for the Town of Southbury, 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 modifications will not require an extension of the site boundary.
3. The 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 23, 2021 (Attachment G – Power Density Report)[1].
5. The modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure, antenna mounts, and its foundation can support the proposed loading.

For the foregoing reasons, Eversource respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2). One original and two copies of this notice and a check in the amount of $625 are enclosed.

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

By: _____
Kathleen M. Shanley
Manager – Transmission Siting

cc: Honorable Jeff Manville, First Selectman, Town of Southbury
Jessica Townsend, Land Use Administrator, Town of Southbury
DESPP

Attachments

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

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

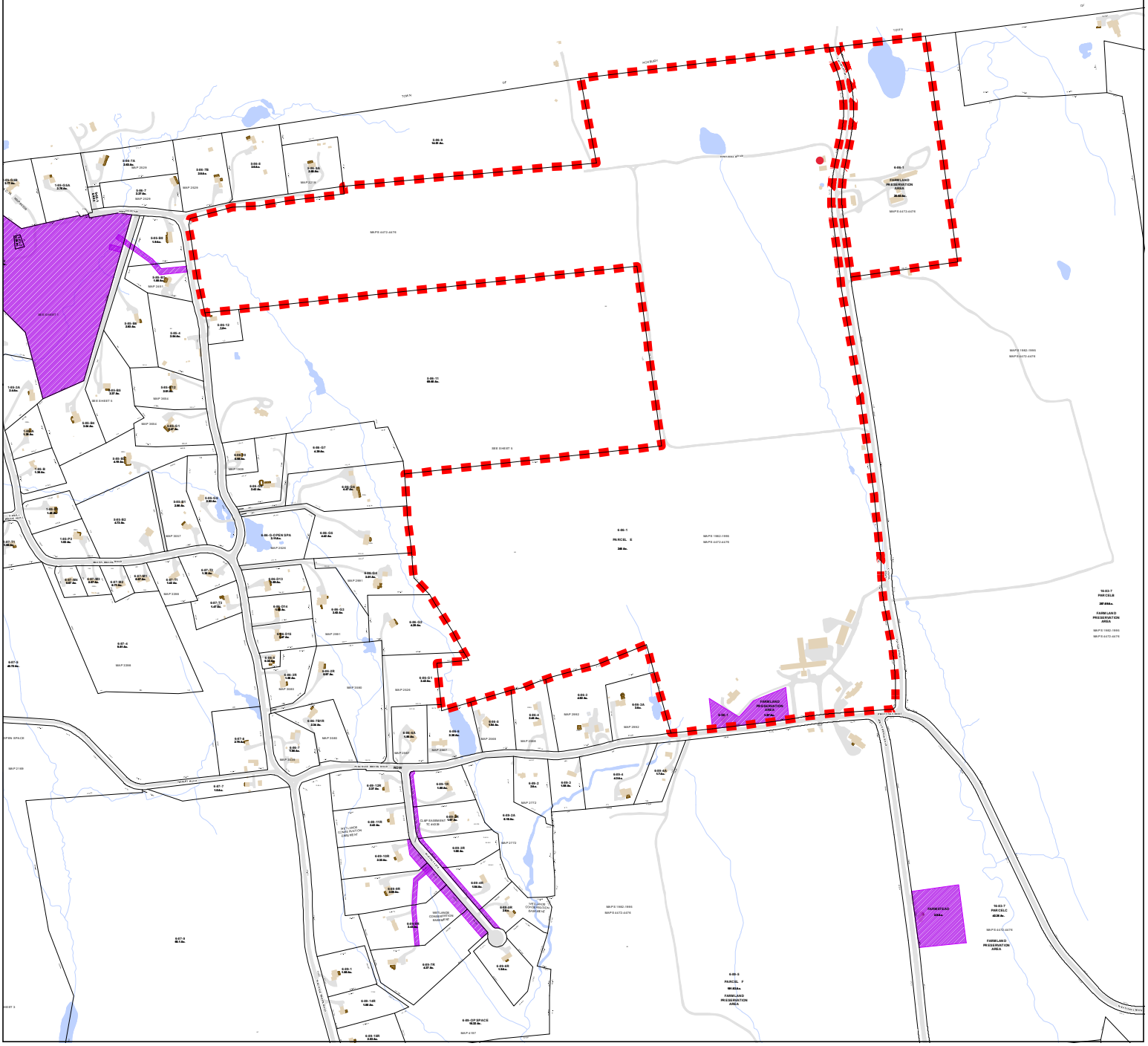
ATTACHMENT A – PARCEL MAP AND PROPERTY CARD

Town of Southbury Connecticut - Assessment Parcel Map

Parcel: 6-86-1 **Location:** SPRUCE BROOK ROAD

Legend

● Approximate Tower Location



N

Approximate Scale: 1 inch = 900 feet

0 260 520 780 1,040 Feet

Map Produced August 2019

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

Town of Southbury, CT

Property Listing Report

Map Block Lot	Building #	Section #	Account
6-86-1			00000320

Property Information

Property Location	SPRUCE BROOK ROAD
Owner	CONN STATE OF
Co-Owner	SOUTHBURY TRAINING SCHOOL
Mailing Address	25 SIGOURNEY STREET HARTFORD CT 06106
Land Use	900 Exempt Vac
Land Class	E
Zoning Code	R-80
Census Tract	4472-4476

Street Index	
Acreage	240
Utilities	
Lot Setting/Desc	
Additional Info	

Photo

Sketch

Primary Construction Details

Year Built		Bedrooms		Exterior Walls	
Stories		Full Bathrooms		Exterior Walls 2	
Building Style		Half Bathrooms		Interior Walls	
Building Use		Extra Fixtures		Interior Walls 2	
Building Condition		Bath Style		Heating Type	
Interior Floors 1		Kitchen Style		Heating Fuel	
Interior Floors 2		Roof Style		Sq. Ft. Basement	
Percent Good		Roof Cover		Fin BSMT Quality	
Total Rooms		AC Percent		Percent Basement	
Basement Garages		PLN FPL		Basement Access	
Occupancy		DET FPL		% Attic Finished	
Building Grade		Gas Fireplace		LF Dormer	
Foundation					

Report Created On 2/27/2020

Town of Southbury, CT

Property Listing Report

Map Block Lot	Building #	Section #	Account
6-86-1			00000320

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	0	0
Extras	0	0
Improvements		
Outbuildings	0	0
Land	1771200	1239840
Total	1771200	1239840

Outbuilding and Extra Features

Type	Description

Sub Areas

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

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
CONN STATE OF	0/ 0		0

Report Created On 2/27/2020

ATTACHMENT B – LETTER OF AUTHORIZATION

STATE OF CONNECTICUT

DEPARTMENT OF EMERGENCY SERVICES AND PUBLIC PROTECTION

January 7, 2020

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Letter of Authorization** – Co-location on Connecticut State Police tower
Property address: Cassidy Road, Southbury, CT
Latitude: 41-30-24.42" Longitude: 73-17-0.51"

To Whom It May Concern:

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

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

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

Yours truly,

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

ATTACHMENT C – MOUNT ANALYSIS

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

August 19, 2021

MOUNT EVALUATION LETTER

Site Number: ES-068
Site Name: SOUTHBURY CASSIDY
Site Data: Cassidy Rd. (Southbury Tracing School)
Southbury, CT 06488
Latitude: 41° 30' 24.5"
Longitude: -73° 17' 0.5"

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

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

Structure Rating (max from all components) =	83.7%

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

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: Shaun Donley
Submitted By: Josh Riley, P.E.

08/19/2021

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
Eversource	1	-	136	126	1	Omni	dbSpectra	SP2D03P36D-D

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 130 mph
WIND SPEED WITH ICE	50 mph with 2" radial ice thickness
EXPOSURE CATEGORY	C
RISK CATEGORY	III
TOPO CATEGORY	Hill
CREST HEIGHT	98 ft

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	83.7%	Pass	32.8%	Pass
Bracing: Pipe 2.0 Std	55.1%	Pass	10.3%	Pass
Mount Pipe: Pipe 3.0 Std	61.0%	Pass	35.7%	Pass

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

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

APPENDIX 1:
MOUNT ANALYSIS REPORT

Dead and Live Loads

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

Appurtenance Dead Loads	
Name	Weight (lb)
SP2D03P36D-D	75

Client:	Eversource	Computed By:	Shaun Donley
Site Name:	SOUTHBURY CASSIDY (ES-068)	Date:	8/19/2021
		Verified By:	JJ
Title:	MOUNT ANALYSIS REPORT	Date:	8/19/2021

BLACK & VEATCH

Appurtenance Wind Loading

			TIA-222-H
Exposure Category =	C		2.6.5.2
Risk Category =	III		
Topographic Category =	1		2.6.6.2.1
Basic Wind Speed, V =	130	mph	
Height Above Ground, z =	136	ft	2.6.6.2.1
Crest Height, H =	98 ft	ft	
Velocity Pressure Coefficient, K_z =	1.35		2.6.8
Topographic Factor, K_{zt} =	1.07		
Wind Directionality Factor, K_d =	0.95		2.6.11.6
Shielding Factor, K_a =	0.90		
Ground Elevation Factor, K_e =	1.000		2.6.11.2
Wind Velocity Pressure, q_z =	59.22	psf	
Gust Effect Factor, G_h =	1.00		2.6.11.2

Equations

$K_z = 2.01\ (z / z_g)^{2/\alpha}$

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

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

$K_e = e^{-0.000032 \cdot zs}$

$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$

$F_A = q_z G_h (EPA)$

$F_M = q_z G_h C_f D_p$

Appurtenance Wind Loads

Name	Height (ft)	Width (ft)	Depth (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
SP2D03P36D-D	19.00	0.25	0.25	2.00	8.55	506.36	2.00	8.55	506.36

BLACK & VEATCH	Client: Eversource		Computed By: Shaun Donley
	Site Name: SOUTHBURY CASSIDY (ES-068)		Date: 8/19/2021
			Verified By: JJ
	Title: MOUNT ANALYSIS REPORT		Date: 8/19/2021

Member Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Basic Wind Speed, V =	130	mph		
Height Above Ground, z =	136	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	98 ft	ft		
Velocity Pressure Coefficient, K_z =	1.35		$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.07			
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 =	59.22	psf		
Gust Effect Factor, G_h =	1.00		$F_M = q_z G_h C_f D_p$	2.6.11.2

Member Wind Loads

Name	Depth (ft)	Width (ft)	C_f	D_p (ft)	F_M (lb)
Arm: HSS3X3X3	0.25	0.25	2	0.25	29.61
Bracing: Pipe 2.0 Std	0.20		1.2	0.20	14.07
Mount Pipe: Pipe 3.0 Std	0.29		1.2	0.29	20.73

BLACK & VEATCH	Client: Eversource		Computed By: Shaun Donley
	Site Name: SOUTHBURY CASSIDY (ES-068)		Date: 8/19/2021
			Verified By: JJ
	Title: MOUNT ANALYSIS REPORT		Date: 8/19/2021

Appurtenance Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	C			
Risk Category =	III		$K_h = e^{(f \cdot z/H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	136	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	98 ft	ft		
Design Ice Thickness, T_i =	2.00	in	$K_{iz} = (z/33)^{0.10}$	2.6.10
Importance Factor, I =	1.15			
Topographic Factor, K_{zt} =	1.07		$T_{iz} = T_i I K_{iz}(K_{zt})^{0.35}$	2.6.10
Height Escalation Factor, K_{iz} =	1.15			
Factored Ice Thickness, T_{iz} =	2.71	in	$DL_{ice}=[(H_{ice}*D_{ice}*W_{ice}) - (H*W*D)]*56pcf$	
Grating Ice Dead Load, D_{Gice} =	12.65	psf		

Appurtenance Ice Dead Loads

Name	Height w/ ice (ft)	Width w/ice (ft)	Depth w/ ice (ft)	V_{ice} (ft^3)	DL_{ice} (lb)
SP2D03P36D-D	19.45	0.70	0.70	8.39	470.02

BLACK & VEATCH

Client: Eversource | Computed By: Shaun Donley
Site Name: SOUTHBURY CASSIDY (ES-068) | Date: 8/19/2021
Verified By: JJ
Title: MOUNT ANALYSIS REPORT | Date: 8/19/2021

Member Ice Dead Loading

Exposure Category =	C	
Risk Category =	III	
Topographic Category =	1	
Height Above Ground, z =	136	ft
Crest Height, H =	98 ft	ft
Design Ice Thickness, T_i =	2.00	in
Importance Factor, I =	1.15	
Topographic Factor, K_{zt} =	1.07	
Height Escalation Factor, K_{iz} =	1.15	
Factored Ice Thickness, T_{iz} =	2.71	in
Grating Ice Dead Load, D_{Gice} =	12.65	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	0.70	0.70	0.35	0.41	23.03
Bracing: Pipe 2.0 Std	0.65		0.20	0.30	16.84
Mount Pipe: Pipe 3.0 Std	0.74		0.29	0.37	20.57

BLACK & VEATCH	Client: Eversource		Computed By: Shaun Donley
	Site Name: SOUTHBURY CASSIDY (ES-068)		Date: 8/19/2021
			Verified By: JJ
	Title: MOUNT ANALYSIS REPORT		Date: 8/19/2021

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	50	mph		
Height Above Ground, z =	136	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	98 ft	ft		
Velocity Pressure Coefficient, K_z =	1.35	psf	$K_e = e^{-0.000032 \cdot zs}$	2.6.8
Topographic Factor, K_{zt} =	1.07			
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, $q_{z(ice)}$ =	8.761			
Factored Ice Thickness, T_{iz} =	2.71	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Appurtenance Ice Wind Loads

Name	Height w/ Ice (ft)	Width w/ Ice (ft)	Depth w/ Ice (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
SP2D03P36D-D	19.45	0.70	0.70	-	18.16	159.13	-	18.16	159.13

Client:	Eversource	Computed By:	Shaun Donley
Site Name:	SOUTHBURY CASSIDY (ES-068)	Date:	8/19/2021
		Verified By:	JJ
Title:	MOUNT ANALYSIS REPORT	Date:	8/19/2021

BLACK & VEATCH

Member Ice Wind Loading

Exposure Category =	C		
Risk Category =	III		
Topographic Category =	1		
Ice Wind Speed, V_{ice} =	50	mph	
Height Above Ground, z =	136	ft	
Crest Height, H =	98 ft	ft	
Velocity Pressure Coefficient, K_z =	1.35	psf	
Topographic Factor, K_{zt} =	1.07		
Wind Directionality Factor, K_d =	0.95		
Shielding Factor, K_a =	0.90		
Ground Elevation Factory, K_e =	1.000		
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	8.761		
Factored Ice Thickness, T_{iz} =	2.71	in	
Gust Effect Factor, G_h =	1		

Equations

$K_z = 2.01\ (z / z_g)^{2/\alpha}$ — TIA-222-H 2.6.5.2

$K_h = e^{(f \cdot z / H)}$ — 2.6.6.2.1

$K_{zt} = [1 + K_c K_t / K_h]^2$ — 2.6.6.2.1

$K_e = e^{-0.000032 z^{2.5}}$ — 2.6.8

$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$ — 2.6.11.6

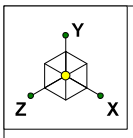
$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$ — 2.6.11.2

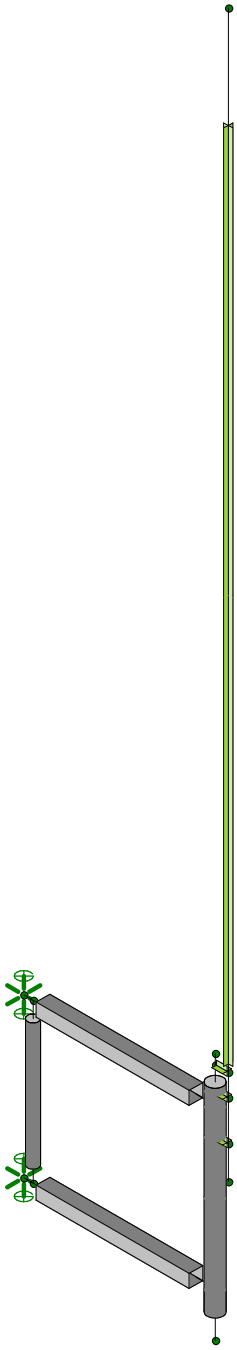
$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$ — 2.6.11.2

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	0.70	0.70	2	0.70	12.30
Bracing: Pipe 2.0 Std	0.65		1.2	0.65	6.83
Mount Pipe: Pipe 3.0 Std	0.74		1.2	0.74	7.82

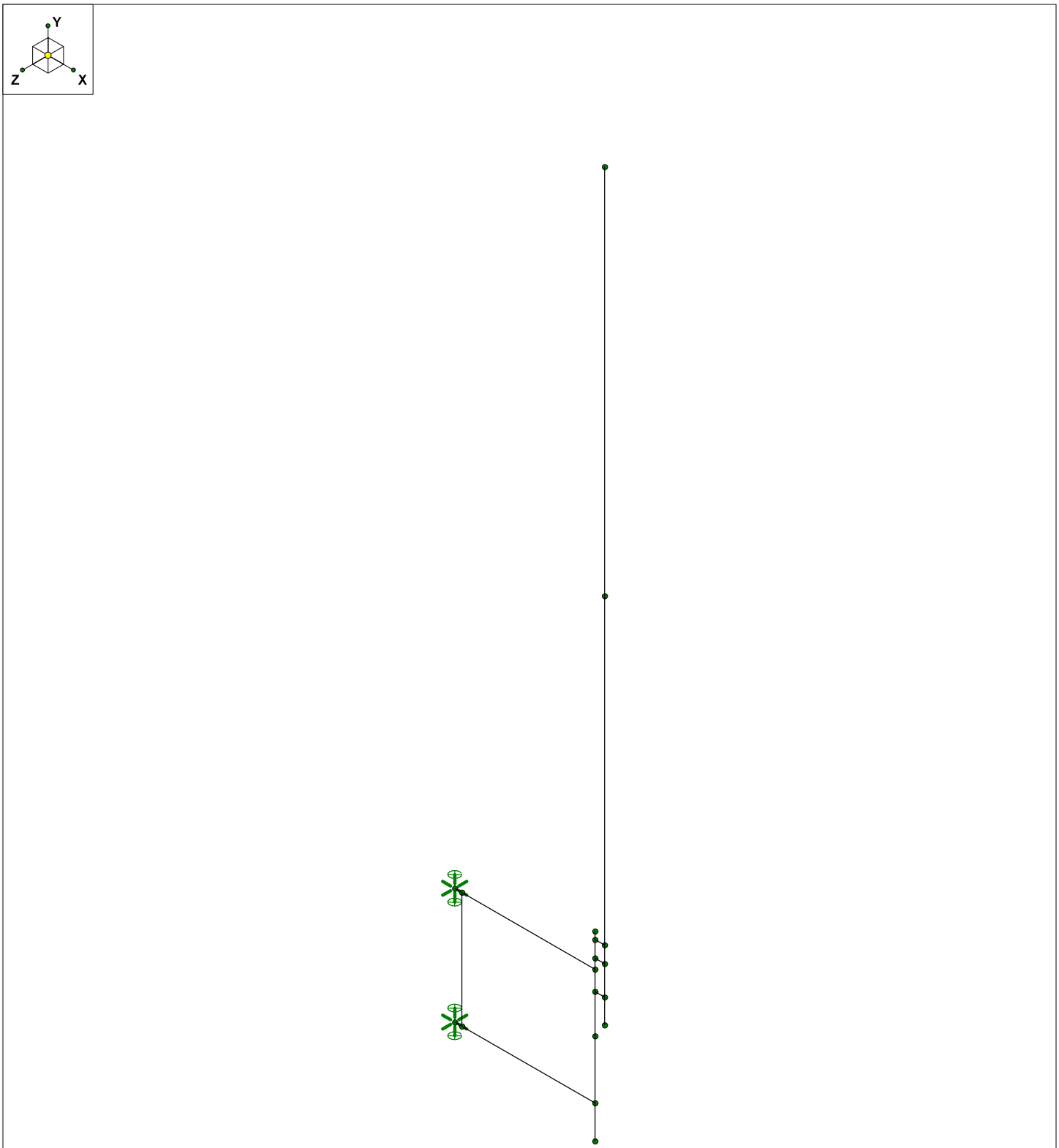
APPENDIX 2:
RISA PRINTOUTS





Envelope Only Solution

Black & Veatch	SOUTHBURYCASSIDY USF-4U Model	SK - 1
Shaun Donley		Aug 19, 2021 at 2:46 PM
405025.3022.2200		SOUTHBURYCASSIDY USF-4U M...



Envelope Only Solution

Black & Veatch	SOUTHBURYCASSIDY USF-4U Model	SK - 2
Shaun Donley		Aug 19, 2021 at 2:46 PM
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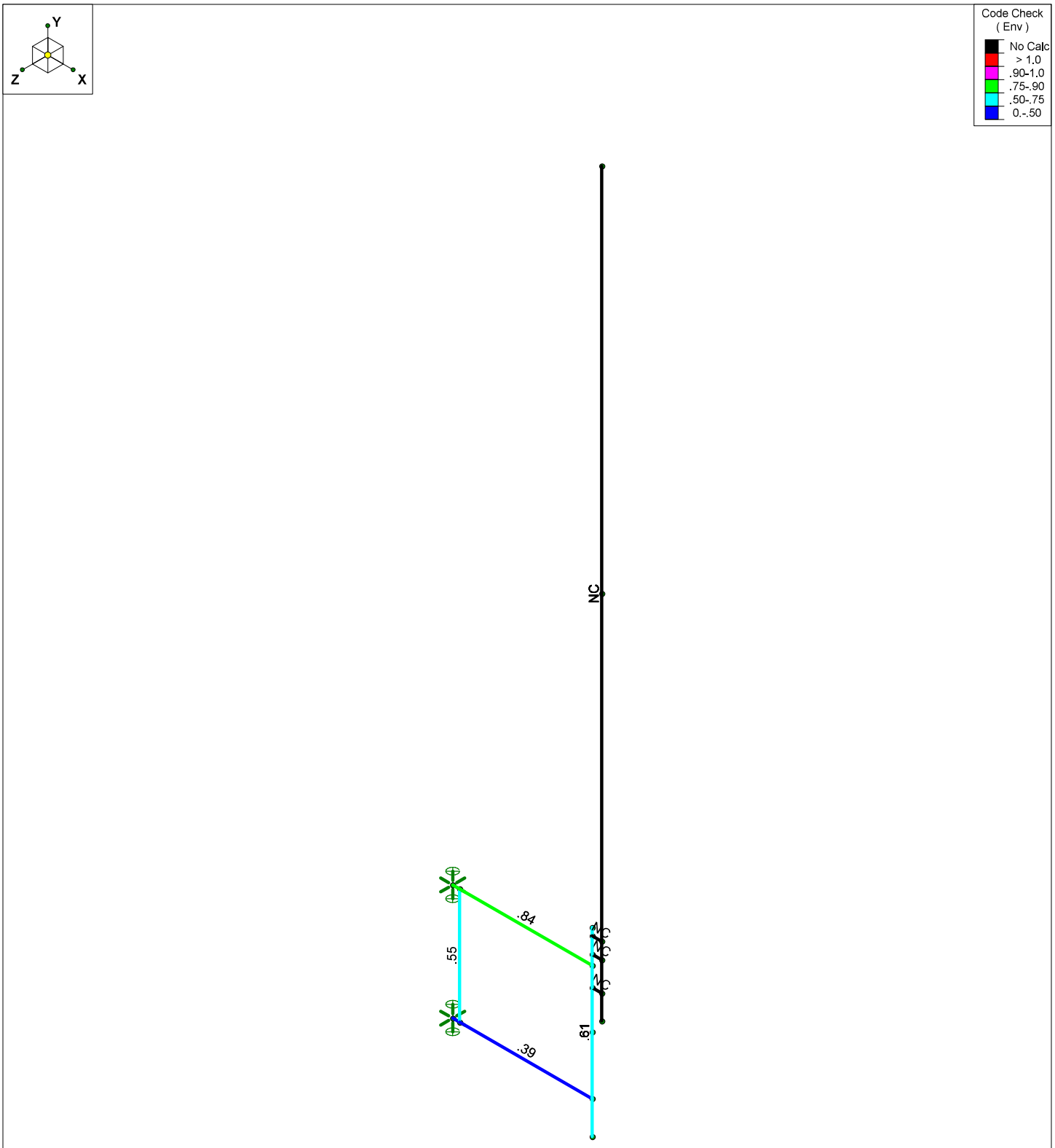
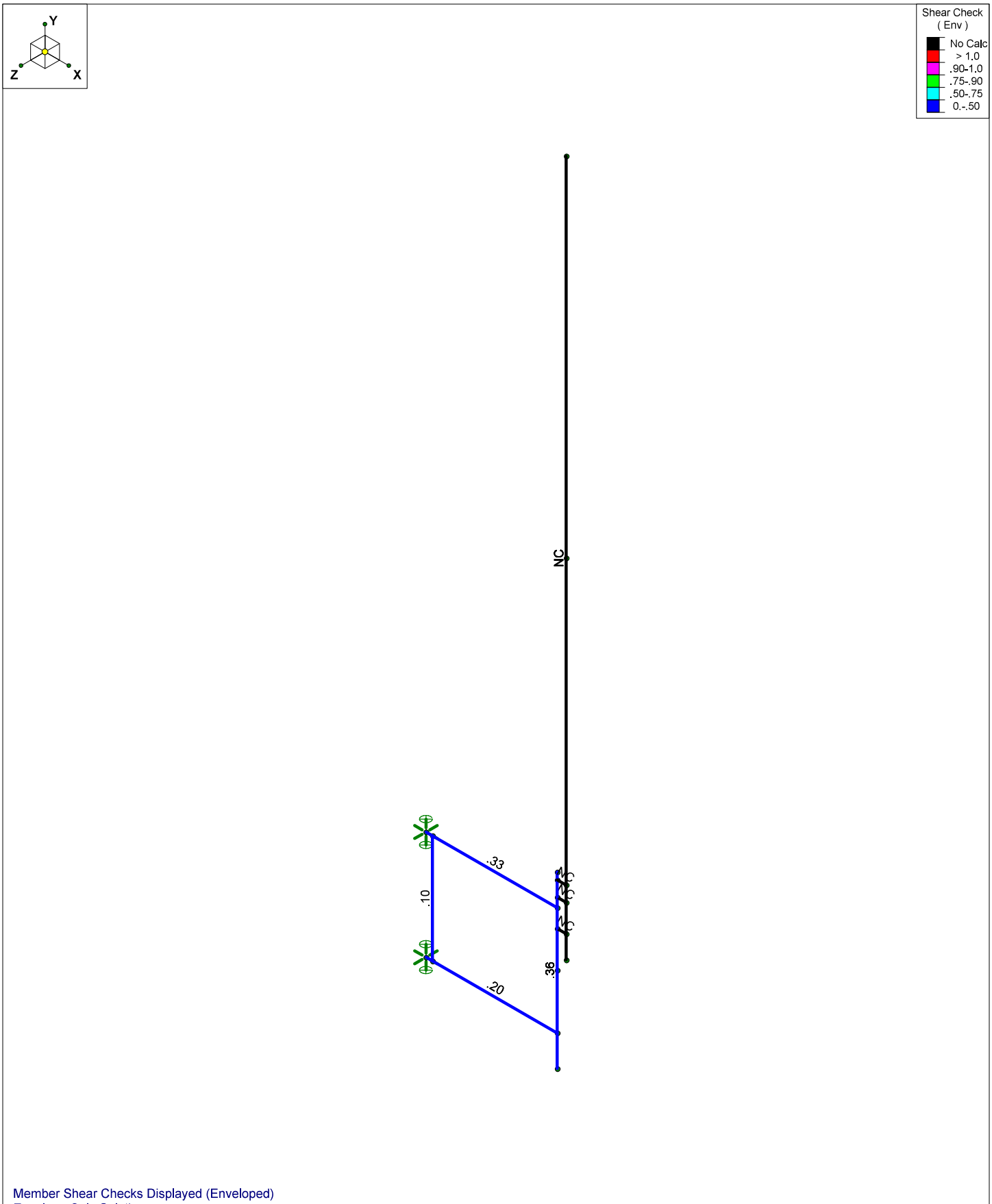


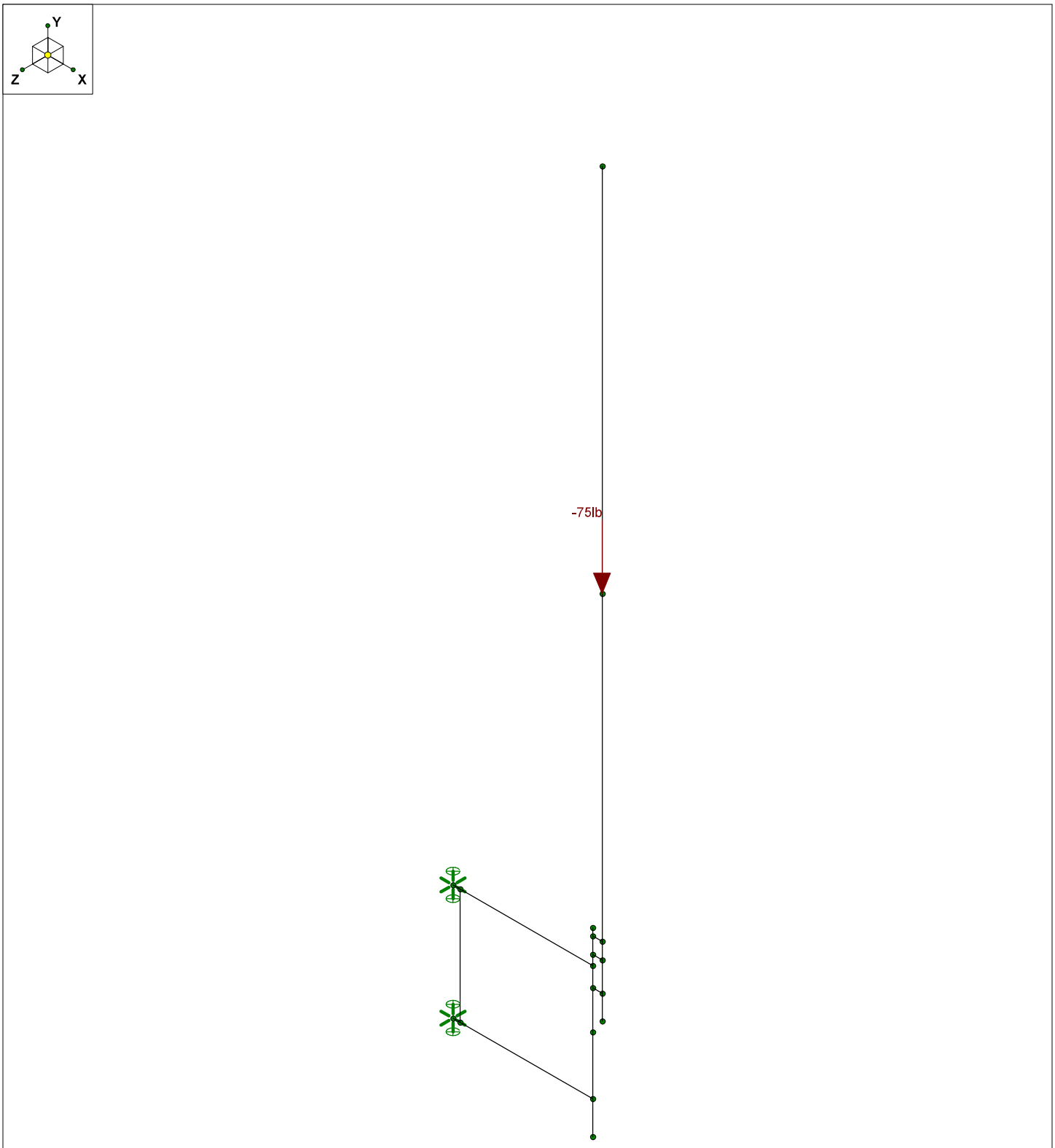
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	SOUTHBURYCASSIDY USF-4U Model	SK - 3
Shaun Donley		Aug 19, 2021 at 2:47 PM
405025.3022.2200		SOUTHBURYCASSIDY USF-4U M...



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch	SOUTHBURYCASSIDY USF-4U Model	SK - 4
Shaun Donley		Aug 19, 2021 at 2:47 PM
405025.3022.2200		SOUTHBURYCASSIDY USF-4U M...



Loads: BLC 1, DL
Envelope Only Solution

Black & Veatch	SOUTHBURYCASSIDY USF-4U Model	SK - 5
Shaun Donley		Aug 19, 2021 at 2:47 PM
405025.3022.2200		SOUTHBURYCASSIDY USF-4U M...

(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 (/1E...	Density[k/ft...	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 R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Arm	HSS3X3X3	Beam	SquareTube	A53 Gr.B	Typical	1.89	2.46	2.46	4.03
2	Bracing	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	Mount Pipe	PIPE_3.0	Column	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69

General Material Properties

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

Joint Boundary Conditions

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

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Ru...
1	M1	N1	N2			Arm	Beam	SquareTube	A53 Gr.B	Typical
2	M2	N3	N4			Arm	Beam	SquareTube	A53 Gr.B	Typical
3	M3	N5	N6			Bracing	Column	Pipe	A53 Gr.B	Typical
4	M4	N7	N8			Mount Pipe	Column	Pipe	A53 Gr.B	Typical
5	M5	N9	N10			RIGID	None	None	RIGID	Typical
6	M6	N11	N12			RIGID	None	None	RIGID	Typical
7	M7	N14	N13			RIGID	None	None	RIGID	Typical
8	M8	N17	N16			RIGID	None	None	RIGID	Typical
9	M9	N19	N20			RIGID	None	None	RIGID	Typical
10	M10	N22	N23			RIGID	None	None	RIGID	Typical
11	M11	N24	N25			RIGID	None	None	RIGID	Typical
12	M12	N26	N27			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
8	M8						Yes	** NA **			None
9	M9						Yes	** NA **			None
10	M10						Yes	** NA **			None
11	M11						Yes	** NA **			None
12	M12						Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[i...	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		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
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		
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...	S...	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 (130 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																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	.053	16	.053												
19	1.2DL + 1.5LM + WL (30 DEG)	Yes	Y		1	1.2	3	1.5	5	.053	17	.053												
20	1.2DL + 1.5LM + WL (60 DEG)	Yes	Y		1	1.2	3	1.5	6	.053	18	.053												
21	1.2DL + 1.5LM + WL (90 DEG)	Yes	Y		1	1.2	3	1.5	7	.053	19	.053												
22	1.2DL + 1.5LM + WL (120 DEG)	Yes	Y		1	1.2	3	1.5	8	.053	20	.053												
23	1.2DL + 1.5LM + WL (150 DEG)	Yes	Y		1	1.2	3	1.5	9	.053	21	.053												
24	1.2DL + 1.5LM + WL (180 DEG)	Yes	Y		1	1.2	3	1.5	10	.053	22	.053												
25	1.2DL + 1.5LM + WL (210 DEG)	Yes	Y		1	1.2	3	1.5	11	.053	23	.053												
26	1.2DL + 1.5LM + WL (240 DEG)	Yes	Y		1	1.2	3	1.5	12	.053	24	.053												
27	1.2DL + 1.5LM + WL (270 DEG)	Yes	Y		1	1.2	3	1.5	13	.053	25	.053												
28	1.2DL + 1.5LM + WL (300 DEG)	Yes	Y		1	1.2	3	1.5	14	.053	26	.053												
29	1.2DL + 1.5LM + WL (330 DEG)	Yes	Y		1	1.2	3	1.5	15	.053	27	.053												
30																								
31	ICE LOAD COMBOS (2", 50 MPH)																							
32	1.2DL + Ice DL + Ice WL (0 DEG)	Yes	Y		1	1.2	28	1	29	1	41	1												
33	1.2DL + Ice DL + Ice WL (30 DEG)	Yes	Y		1	1.2	28	1	30	1	42	1												
34	1.2DL + Ice DL + Ice WL (60 DEG)	Yes	Y		1	1.2	28	1	31	1	43	1												
35	1.2DL + Ice DL + Ice WL (90 DEG)	Yes	Y		1	1.2	28	1	32	1	44	1												
36	1.2DL + Ice DL + Ice WL (120 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	1920.43	2	1178.545	8	2123.509	5	0	43	3924.164	11	0	43
2		min	-2317.003	8	-968.096	2	-2123.509	11	0	2	-3924.164	5	0	2
3	N3	max	1456.159	8	1166.34	2	1262.624	11	0	43	1216.467	5	0	43
4		min	-1059.585	2	-980.294	8	-1262.624	5	0	2	-1216.467	11	0	2
5	Totals:	max	860.845	2	982.619	38	860.885	5						
6		min	-860.844	8	198.244	2	-860.885	11						

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

	Member	Shape	Code Check	Loc[in]	LC	Shea...	Loc.....		L...	phi*Pn...	phi*Pn...	phi*Mn...	phi*Mn.....		Eqn
1	M1	HSS3X3X3	.825	2.266	11	.323	2.266	z	11	55265....	59535	5171.25	5171.25	2...	H3-6
2	M2	HSS3X3X3	.402	43.5	10	.202	43.5	z	11	55265....	59535	5171.25	5171.25	2...	H1-1b
3	M3	PIPE_2.0	.538	0	11	.102	0		11	28843....	32130	1871.6...	1871.6...	2...	H1-1b
4	M4	PIPE_3.0	.621	16.479	11	.369	16....		11	57908....	65205	5748.75	5748.75	3...	H3-6

APPENDIX 3:
ATTACHMENTS

REPLACEMENT ANTENNA

dbSpectra
Always a Better Value

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

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

Features and Benefits

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

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

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

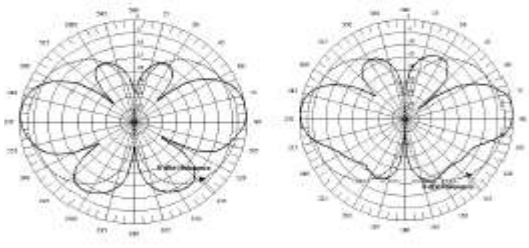
PIM Rated Design – better than -150 dBc.

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

Excellent Lightning Protection – heavy internal conductor DC ground.

Radiation Pattern

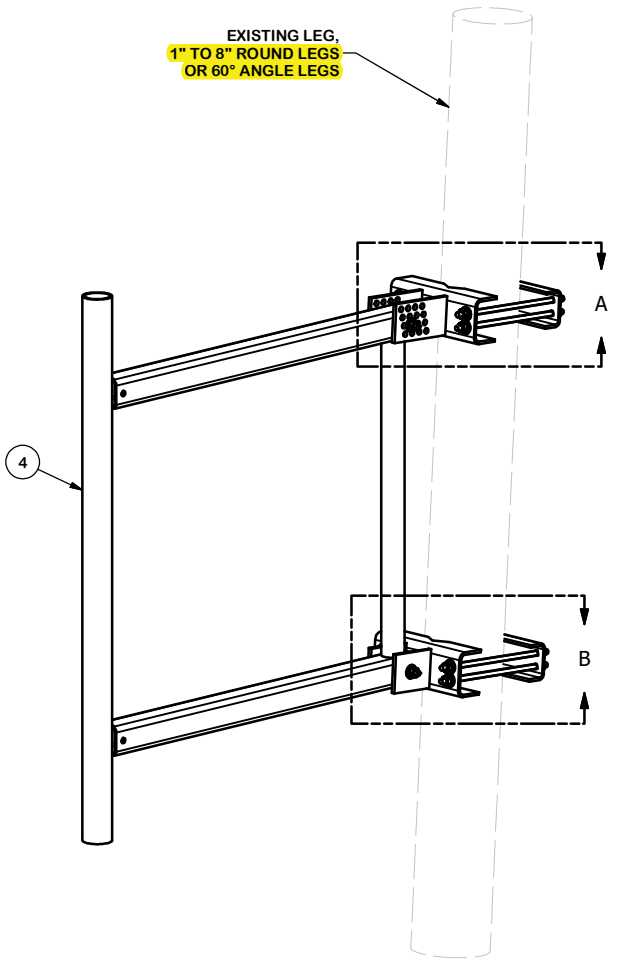
Vertical (No-Tilt)

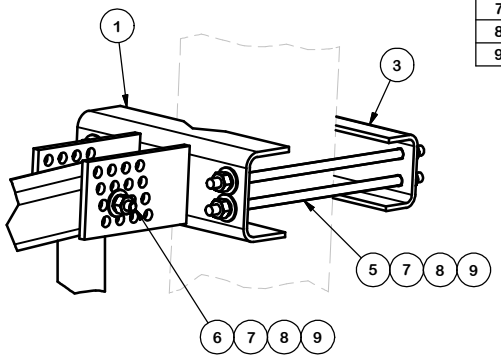


Top **Bottom**

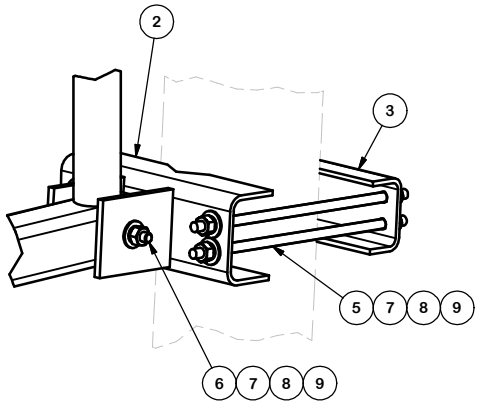
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 5.0" ± DIAMETER.

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

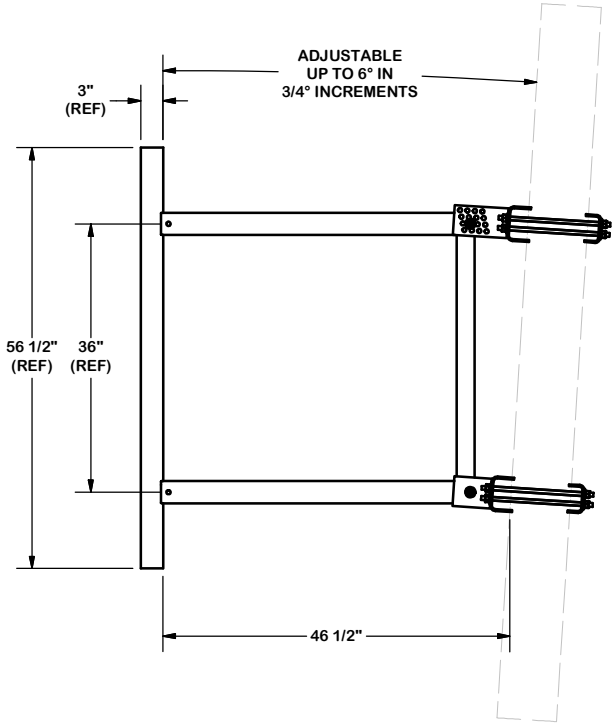




DETAIL A



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

ATTACHMENT D – CONSTRUCTION DRAWINGS

EVERSOURCE ENERGY

SOUTHBURY CASSIDY
CASSIDY RD (SOUTHBURY TRAINING SCHOOL)
SOUTHBURY, CT 06488

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (1) NEW OMNI/WHIP ANTENNA AT ELEVATION 145'–6"± AGL INSTEAD OF (2) OMNI/WHIP ANTENNAS, (1) AT ELEVATION 145'–0± AGL AND (1) AT ELEVATION 130'–0" AGL
2. INSTALL (1) NEW RACK WITH NEW 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:	SOUTHBURY CASSIDY
SITE ID NUMBER:	#6
SITE ADDRESS:	CASSIDY RD (SOUTHBURY TRAINING SCHOOL) SOUTHBURY, CT 06488
MAP:	6
BLOCK:	86
LOT:	1
ZONE:	R–80
LATITUDE:	41° 30' 24.5" N
LONGITUDE:	73° 17' 0.5" W
ELEVATION:	756'± AMSL
FEMA/FIRM DESIGNATION:	X

CONTACT INFORMATION

APPLICANTS:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
STATE OF CONNECTICUT
25 SIGOURNEY STREET
HARTFORD, CT 06106

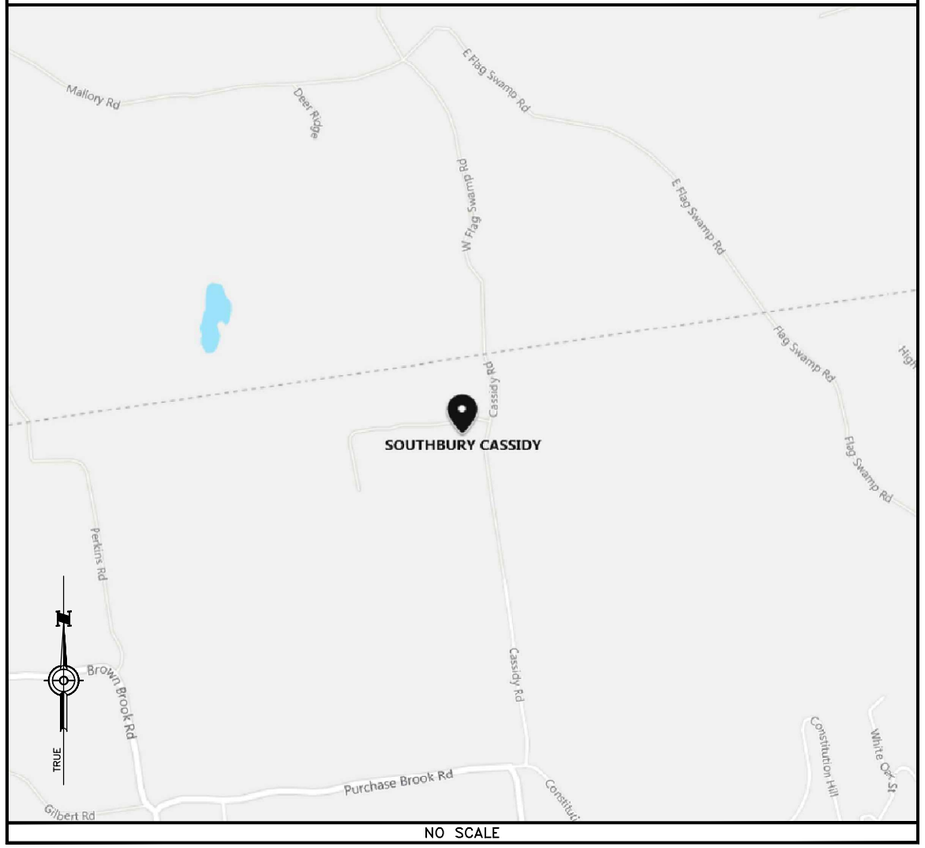
EVERSOURCE ENERGY
PROJECT MANAGER:
NIKOLL PRECI
(860) 655–3079

POWER PROVIDER:
EVERSOURCE ENERGY
(800) 286–2000

TELCO PROVIDER:
FRONTIER
(800) 921–8102

CALL BEFORE YOU DIG:
(800) 922–4455

LOCATION MAP



NO SCALE

DESIGN TYPE

SITE UPGRADE
SELF–SUPPORT TOWER

DRAWING INDEX

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

DO NOT SCALE DRAWINGS

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

UNDERGROUND SERVICE ALERT

UTILITIES PROTECTION CENTER, INC.
811

48 HOURS BEFORE YOU DIG

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

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

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

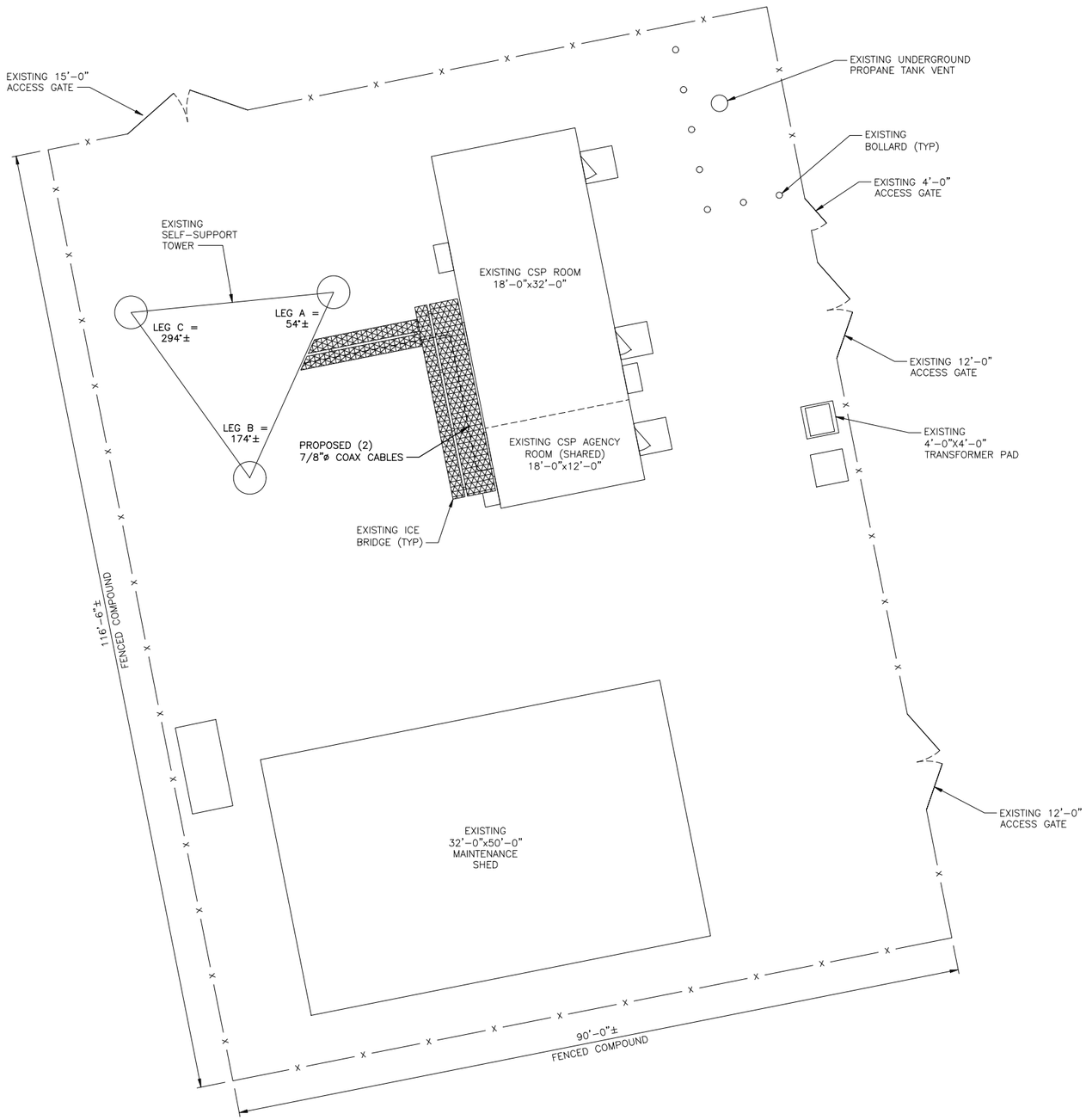
REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	04/29/20	ISSUED FOR FILING

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

SOUTHBURY CASSIDY
CASSIDY RD (SOUTHBURY TRAINING SCHOOL)
SOUTHBURY, CT 06488

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



SITE PLAN
NO SCALE

N

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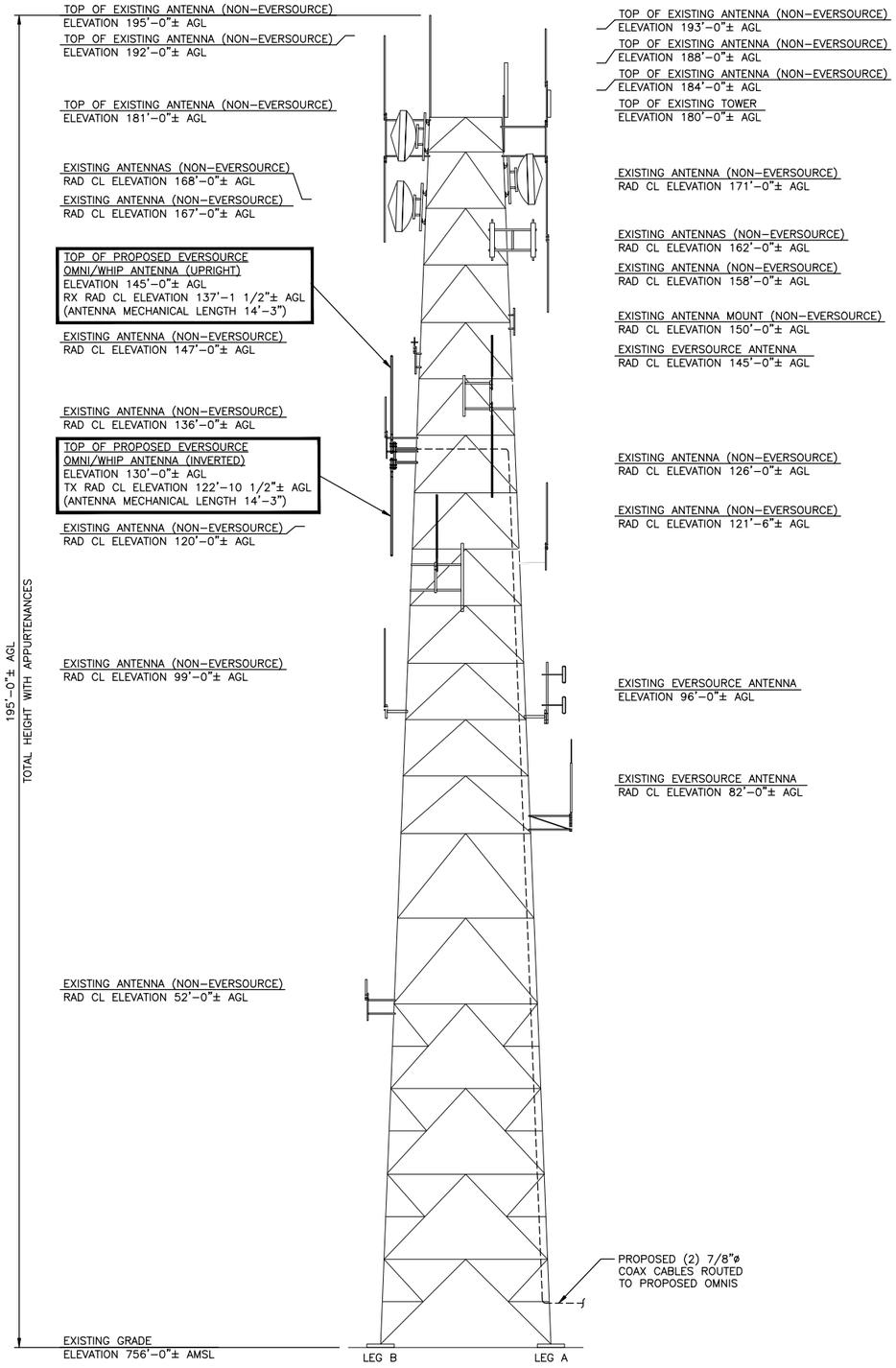
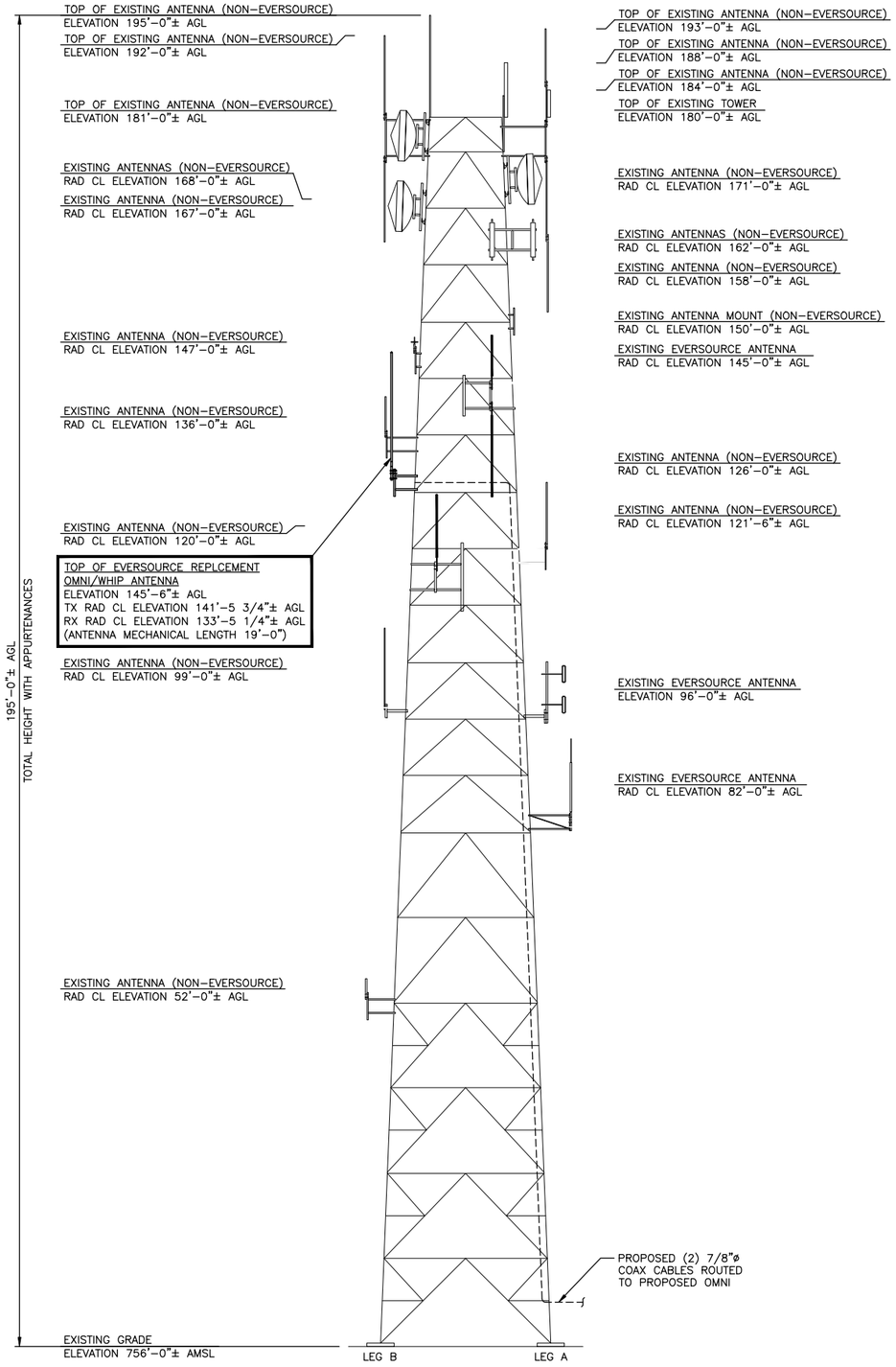
SHEET TITLE
SITE PLAN

SHEET NUMBER
C-1



CSC SUBMITTED INSTALLATION CONFIGURATION

NO SCALE



CURRENT INSTALLATION CONFIGURATION

NO SCALE

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
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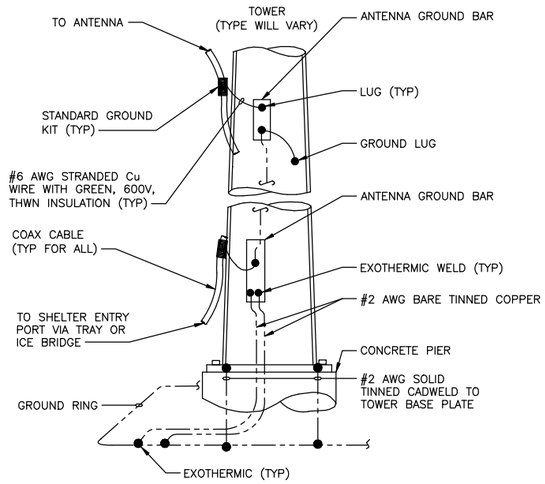
SOUTHBURY, CT 06488

SHEET TITLE
TOWER ELEVATION

SHEET NUMBER
C-2

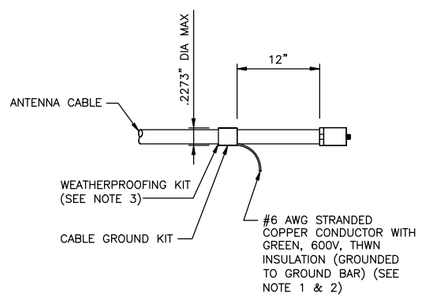


NOTE

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

ANTENNA CABLE GROUNDING

NO SCALE

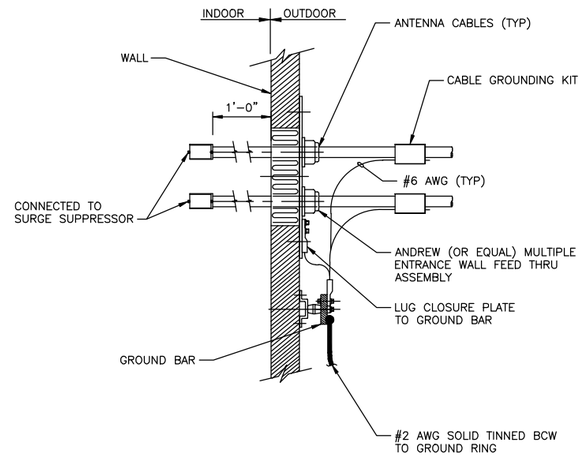


NOTES

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

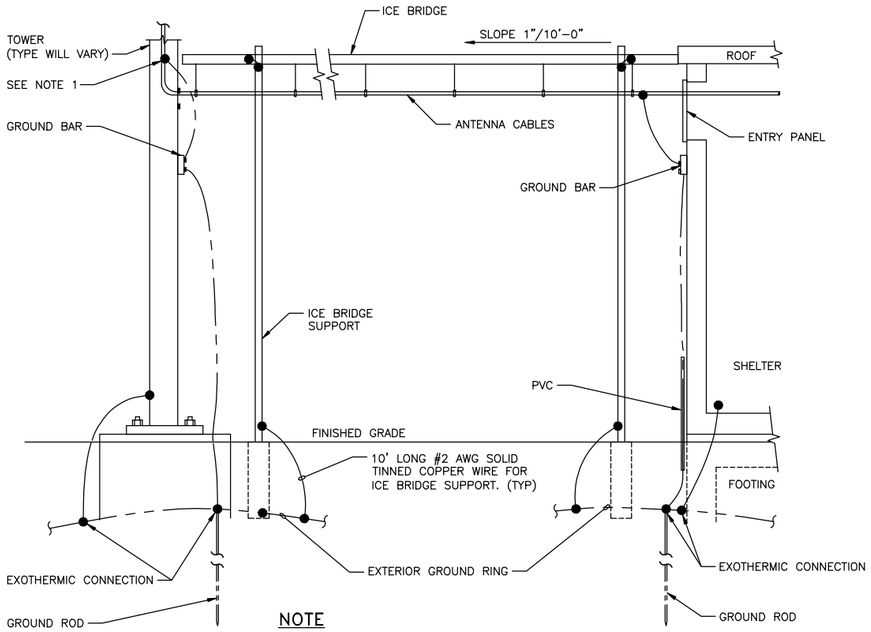
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NO SCALE



CABLE INSTALLATION WITH WALL FEED THRU ASSEMBLY

NO SCALE



NOTE

1. PROVIDE GROUND KIT 6" BEFORE TURN

ICE BRIDGE AND ANTENNA CABLE DETAIL

NO SCALE

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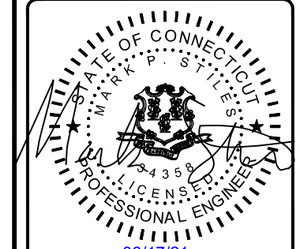

08/17/21

SOUTHBURY CASSIDY
CASSIDY RD (SOUTHBURY TRAINING SCHOOL)
SOUTHBURY, CT 06488

SHEET TITLE

GROUNDING DETAILS

SHEET NUMBER

G-1

DESIGN BASIS

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

GENERAL CONDITIONS

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

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

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

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

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

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

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

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

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

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

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

THERMAL & MOISTURE PROTECTION

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

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

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

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

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

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

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

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

SUBMITTALS

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

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

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

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

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

STEEL

1. MATERIAL:

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

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

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

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

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

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

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

SITE GENERAL

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

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

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

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

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

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

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

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

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

EVERSOURCE ENERGY
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08/17/2021

SOUTHBURY CASSIDY
CASSIDY RD (SOUTHBURY TRAINING SCHOOL)
SOUTHBURY, CT 06488

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-1

ELECTRICAL

1. CONTRACTOR SHALL VERIFY EXISTING ELECTRIC SERVICE TYPE AND CAPACITY AND ORDER NEW ELECTRIC SERVICE FROM LOCAL ELECTRIC UTILITY, WHERE APPLICABLE.
2. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, AND SHALL BE ACCEPTABLE TO ALL AUTHORITIES HAVING JURISDICTION. WHERE A CONFLICT EXISTS BETWEEN CODES, PLAN AND SPECIFICATIONS, OR AUTHORITIES HAVING JURISDICTION, THE MORE STRINGENT AUTHORITIES SHALL APPLY.
3. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC, FOR A COMPLETE AND PROPERLY OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN AND/OR OTHERWISE REQUIRED.
4. ALL ELECTRICAL CONDUCTORS SHALL BE 100% COPPER AND SHALL HAVE TYPE THHN INSULATION UNLESS INDICATED OTHERWISE.
5. CONDUIT SHALL BE THREADED RIGID GALVANIZED STEEL OR EMT WITH ONLY COMPRESSION TYPE COUPLINGS AND CONNECTORS, ALL MADE UP WRENCH TIGHT.
6. ALL BURIED CONDUIT SHALL BE MINIMUM SCH 40 PVC UNLESS NOTED OTHERWISE, OR AS PER LOCAL CODE REQUIREMENTS.
7. PROVIDE FLEXIBLE STEEL CONDUIT OR LIQUID TIGHT FLEXIBLE STEEL CONDUIT TO ALL VIBRATING EQUIPMENT, INCLUDING HVAC UNITS, TRANSFORMERS, MOTORS, ETC, OR WHERE EQUIPMENT IS PLACED UPON A SLAB ON GRADE.
8. ALL BRANCH CIRCUITS AND FEEDERS SHALL HAVE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR BONDED TO ALL ENCLOSURES, PULLBOXES, ETC.
9. CONDUIT AND CABLE WITHIN CORRIDORS SHALL BE CONCEALED AND EXPOSED ELSEWHERE, UNLESS NOTED OTHERWISE.
10. ELECTRICAL MATERIALS INSTALLED ON ROOFTOP SHALL BE LISTED FOR NEMA 3R USE. –AND ALL WIRING WITHIN A VENTILATION DUCT SHALL BE LISTED FOR SUCH USE. IN GENERAL WIRING METHODS WITHIN A DUCT SHALL BE AN MC CABLE WITH SMOOTH OR CORRUGATED METAL JACKET AND HAVE NO OUTER COVERING OVER THE METAL JACKET. INTERLOCKED ARMOR TYPE OF MC CABLE IS NOT ACCEPTABLE FOR THIS APPLICATION. CONTRACTOR CAN ALSO USE TYPE MI CABLE IN THE VENTILATION DUCT PROVIDED IT DOES NOT HAVE ANY OUTER COVERINGS OVER THE METAL EXTERIOR.
11. WIRING DEVICES SHALL BE SPECIFICATION GRADE, AND WIRING DEVICE COVER PLATES SHALL BE PLASTIC WITH ENGRAVING AS SPECIFIED.
12. GROUNDING SYSTEM RESISTANCE SHALL BE MEASURED, RECORDED, AND DATED USING MEGGER DET14 OR SIMILAR INSTRUMENT. GROUND RESISTANCE SHALL NOT EXCEED 5 OHMS. IF THE RESISTANCE VALUE IS EXCEEDED, NOTIFY CONSTRUCTION MANAGER FOR FURTHER INSTRUCTION.
13. COORDINATE WITH BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK INVOLVING EXISTING SYSTEMS OR EQUIPMENT IN ORDER TO DETERMINE THE EFFECT, IF ANY, ON OTHER TENANTS WITHIN THE BUILDING, AND TO DETERMINE THE APPROPRIATE TIME FOR PERFORMING THIS WORK.
14. THE CONTRACTOR SHALL BE REQUIRED TO VISIT THE SITE PRIOR TO SUBMITTING BID IN ORDER TO DETERMINE THE EXTENT OF THE EXISTING CONDITIONS.
15. ALL CONDUCTOR ENDS SHALL BE TAGGED AND ELECTRICAL EQUIPMENT LABELED WITH ENGRAVED IDENTIFICATION PLATES.
16. CONTRACTOR IS RESPONSIBLE FOR ALL CONTROL WIRING AND ALARM TIE–INS.

GROUNDING

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

ANTENNA & CABLE NOTES

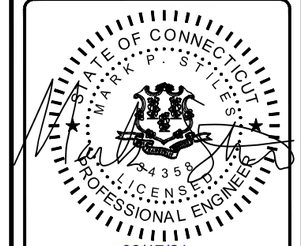
1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL TRANSMISSION CABLES, JUMPERS, CONNECTORS, GROUNDING STRAPS, ANTENNAS, MOUNTS AND HARDWARE. ALL MATERIALS SHALL BE INSPECTED BY THE CONTRACTOR FOR DAMAGE UPON DELIVERY. JUMPERS SHALL BE SUPPLIED AT ANTENNAS AND EQUIPMENT INSIDE SHELTER COORDINATE LENGTH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

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

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

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

REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	04/29/20	ISSUED FOR FILING



08/17/21

SOUTHBURY CASSIDY
CASSIDY RD (SOUTHBURY TRAINING SCHOOL)
SOUTHBURY, CT 06488

SHEET TITLE
NOTES
& SPECIFICATIONS

SHEET NUMBER
N-2

SYMBOLS

●	EXOTHERMIC CONNECTION
■	COMPRESSION CONNECTION
⏚●	5/8"ø x 10'-0" COPPER CLAD STEEL GROUND ROD.
⏚◉	TEST GROUND ROD WITH INSPECTION SLEEVE
– – –	GROUNDING CONDUCTOR
(A)	KEY NOTES
FENCE	——— X ——— X ——— X ——— X ——— X ———
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	MGB	MASTER GROUNDING BAR
AIC	AMPERAGE INTERRUPTION CAPACITY	MIN	MINIMUM
ANI	AUXILIARY NETWORK INTERFACE	MW	MICROWAVE
ATM	ASYNCHRONOUS TRANSFER MODE	MTS	MANUAL TRANSFER SWITCH
ATS	AUTOMATIC TRANSFER SWITCH	NEC	NATIONAL ELECTRICAL CODE
AWG	AMERICAN WIRE GAUGE	OC	ON CENTER
AWS	ADVANCED WIRELESS SERVICES	PP	POLARIZING PRESERVING
BATT	BATTERY	PCU	PRIMARY CONTROL UNIT
BBU	BASEBAND UNIT	PDU	PROTOCOL DATA UNIT
BTC	BARE TINNED COPPER CONDUCTOR	PWR	POWER
BTS	BASE TRANSCEIVER STATION	RECT	RECTIFIER
CCU	CLIMATE CONTROL UNIT	RET	REMOTE ELECTRICAL TILT
CDMA	CODE DIVISION MULTIPLE ACCESS	RMC	RIGID METALLIC CONDUIT
CHG	CHARGING	RF	RADIO FREQUENCY
CLU	CLIMATE UNIT	RUC	RACK USER COMMISSIONING
COMM	COMMON	RRH	REMOTE RADIO HEAD
DC	DIRECT CURRENT	RRU	REMOTE RADIO UNIT
DIA	DIAMETER	RWY	RACEWAY
DWG	DRAWING	SFP	SMALL FORM-FACTOR PLUGGABLE
EC	ELECTRICAL CONDUCTOR	SIAD	SMART INTEGRATED ACCESS DEVICE
EMT	ELECTRICAL METALLIC TUBING	SSC	SITE SOLUTIONS CABINET
FIF	FACILITY INTERFACE FRAME	T1	1544KBPS DIGITAL LINE
GEN	GENERATOR	TDMA	TIME-DIVISION MULTIPLE ACCESS
GPS	GLOBAL POSITIONING SYSTEM	TMA	TOWER MOUNT AMPLIFIER
GSM	GLOBAL SYSTEM FOR MOBILE	TVSS	TRANSIENT VOLTAGE SUPPRESSION SYSTEM
HVAC	HEAT/VENTILATION/AIR CONDITIONING	TYP	TYPICAL
ICF	INTERCONNECTION FRAME	UMTS	UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM
IGR	INTERIOR GROUNDING RING (HALO)	UPS	UNINTERRUPTIBLE POWER SUPPLY (DC POWER PLANT)
LTE	LONG TERM EVOLUTION		

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PHONE: (913) 458-3595

PROJECT NO:	403093
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CHECKED BY:	THM

REV	DATE	DESCRIPTION
1	08/13/21	ISSUED FOR FILING
0	04/29/20	ISSUED FOR FILING

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

SOUTHBURY CASSIDY
CASSIDY RD (SOUTHBURY TRAINING SCHOOL)
SOUTHBURY, CT 06488

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-3

REPLACEMENT ANTENNA

dbSpectra
Always a Better Value

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

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

Features and Benefits

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

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

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

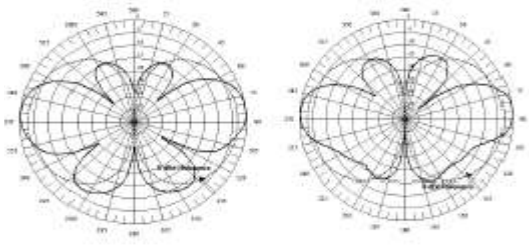
PIM Rated Design – better than -150 dBc.

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

Excellent Lightning Protection – heavy internal conductor DC ground.

Radiation Pattern

Vertical (No-Tilt)



Top **Bottom**

TELEWAVE, INC.

REMOVED AND REPLACED

216 - 225 MHz

ANT220F6 DIN

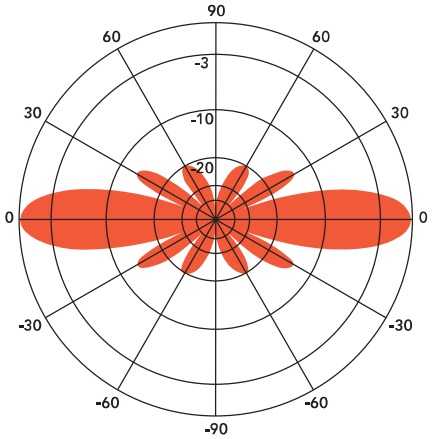
FIBERGLASS COLLINEAR ANTENNA 6 dBd

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

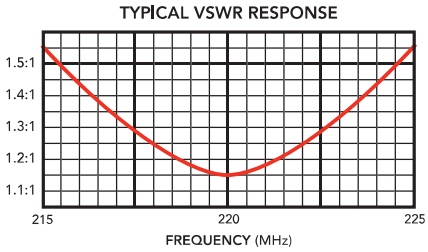
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

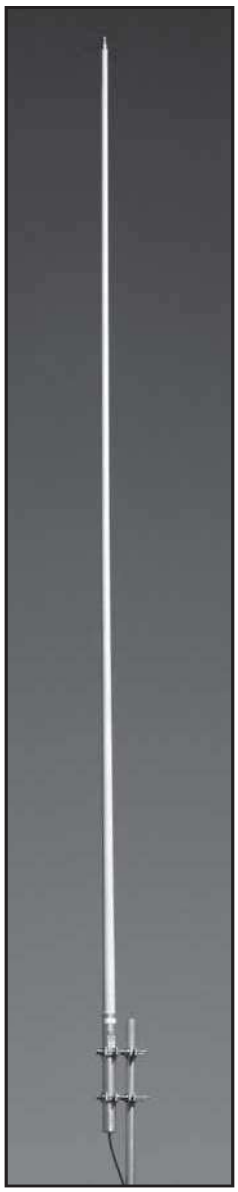
The ANT220F6 includes an ANTC482 dual clamp set for mounting to a 1.5" to 3.5" O.D. support pipe, and a 24" removable RG-213 DIN-Male jumper. Stand-off and top mounts are also available.

NOTE: THIS ANTENNA IS SHIPPED VIA TRUCK FREIGHT ONLY



ANT220F6 - 221 MHz
Vertical Plane
Gain = 6.11 dBd





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

TELEWAVE, INC

REMOVED AND REPLACED

216 - 225 MHz

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

ANT220F6

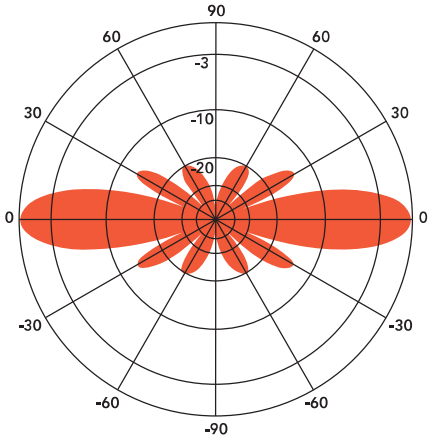
FIBERGLASS COLLINEAR ANTENNA 6 dBd

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

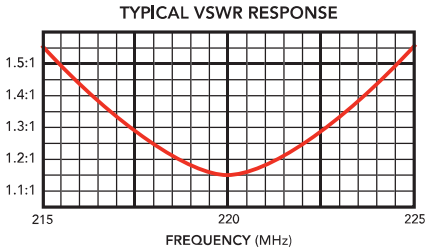
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

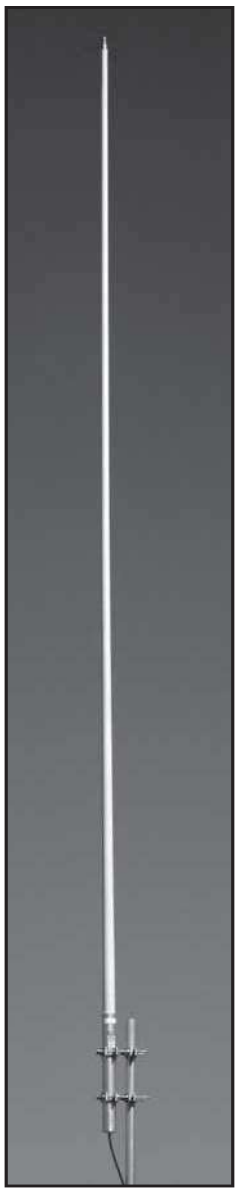
The ANT220F6 includes an ANTC482 dual clamp set for mounting to a 1.5" to 3.5" O.D. support pipe, and a 24" removable RG-213 DIN-Male jumper. Stand-off and top mounts are also available.

NOTE: THIS ANTENNA IS SHIPPED VIA TRUCK FREIGHT ONLY



ANT220F6 - 221 MHz
Vertical Plane
Gain = 6.11 dBd

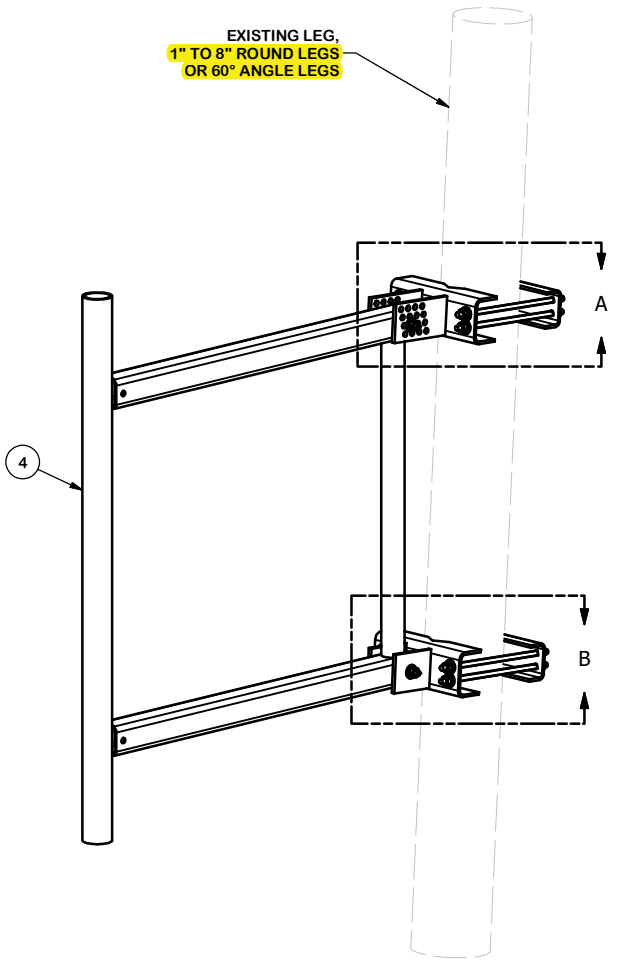


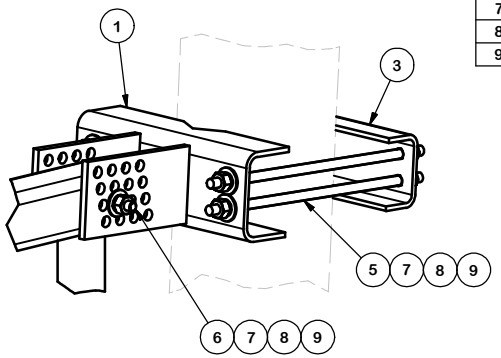


SPECIFICATIONS			
Frequency (continuous)	216-225 MHz	**Dimensions (L x base diam.) in.**	171 x 2.75
Gain	6 dBd	**Tower weight (antenna + clamps)**	35 lb.
Power rating (typ.)	500 watts	**Shipping weight**	50 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	150 / 125 MPH
VSWR	1.5:1 or less	**Maximum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

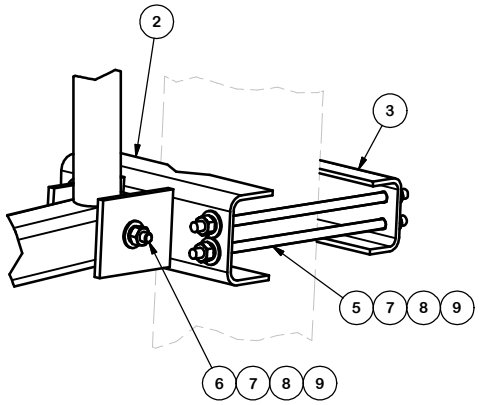
TOWER/MAST SIZE AT PROPOSED ANTENNA ATTACHMENT = 5.0" ± DIAMETER.

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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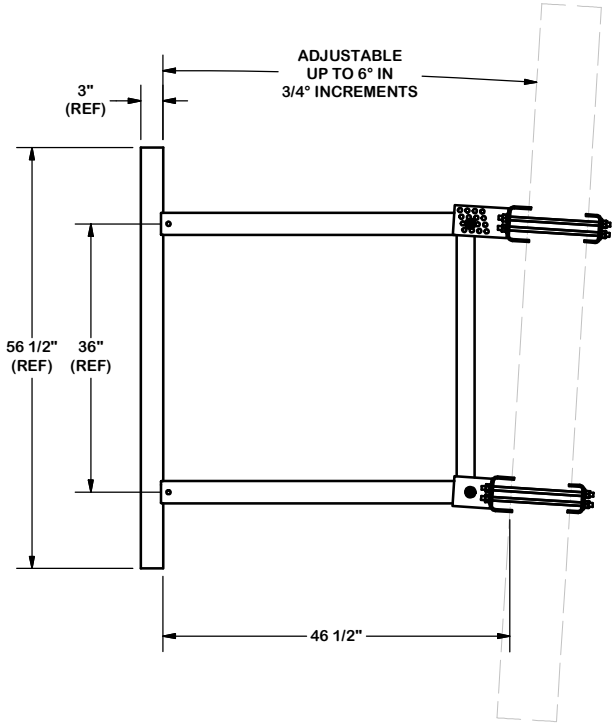

TOLERANCE NOTES

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

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

ATTACHMENT E – STRUCTURAL ANALYSIS

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180' Existing Lattice Tower

Eversource Antenna Installation

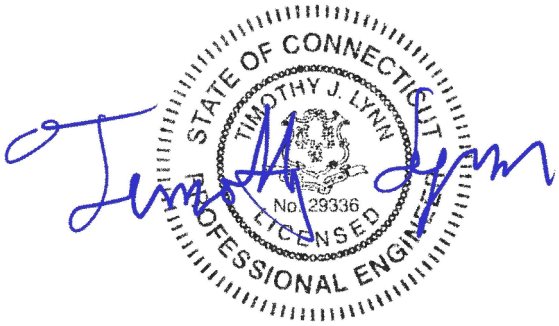
CSP Tower Ref: #21

Cassidy Road
Southbury, CT

CENTEK Project No. 21082.11

Date: September 2, 2021

Max Stress Ratio = 77%



Prepared for:

Eversource
107 Selden Street
Berlin, CT 06037

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation by Eversource on the existing lattice tower located in Southbury, Connecticut.

The host tower is a 180-ft, three legged, lattice tower originally designed and manufactured by Stainless Inc. project no. 358808TP dated January 27, 1995. The tower geometry, structure member sizes and foundation information were taken from a previous structural analysis report prepared by AECOM job no. EVS-016 60627193 dated October 27, 2020.

Antenna and appurtenance inventory was taken from the aforementioned structural analysis and information provided by Eversource.

The tower consists of eight (8) vertical sections consisting of steel pipe legs conforming to ASTM A575-50/A572-60 and steel angle lateral bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 10.6-ft at the top and 25.0-ft at the bottom.

Antenna and Appurtenance Summary

The existing and proposed loads considered in the analysis consist of the following:

- Tower:
  Antenna: One (1) lightning rod pipe mounted to the top of the tower.
- CSP Troop-A:
  Antenna: Two (2) Sinclair SC479-HF1LDF Omni-directional antennas (one inverted) and one (1) TTA mounted on two (2) side arms with an elevation of 175 -ft AGL.
  Cables: Two (2) 1-5/8" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP Troop-L:
  Antenna: Three (3) Sinclair SE419-SWBPALDF antennas and one (1) TTA mounted on two (2) side arms with an elevation of 175 -ft AGL.
  Cables: Two (2) 1-5/8" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP -34 & 35 (D&K-30 & 32):
  Antenna: Two (2) Sinclair SC479-HF1LDFOmni-directional antennas (one inverted) mounted on two (2) side arms with an elevation of 175 -ft AGL.
  Cables: Two (2) 1-5/8" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP -37 & 38 (D&K-18 & 29):
  Antenna: Two (2) Sinclair SC479-HF1LDFOmni-directional antennas (one inverted) mounted on two (2) side arms with an elevation of 175 -ft AGL.
  Cables: Two (2) 1-5/8" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- CSP -4 (D&K-28):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of 175-ft AGL.
  Cables: One (1) WEP65 elliptical cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP -6 (D&K-27):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of 173-ft AGL.
  Cables: One (1) WEP65 elliptical cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP -3 (D&K-23):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of 169-ft AGL.
  Cables: One (1) WEP65 elliptical cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP -2 (D&K-22):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of 163-ft AGL.
  Cables: One (1) WEP65 elliptical cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP -5 (D&K-21):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of 163-ft AGL.
  Cables: One (1) WEP65 elliptical cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Unknown (D&K-16):
  Antenna: One (1) 10-ft dipole mounted on (1) 6-ft side arm with an elevation of 147-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- Unknown (D&K-15):
  Antenna: One (1) 3-ft yagi pipe mounted with an elevation of 147-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- Unknown (D&K-12):
  Antenna: One (1) 6-ft Omni-directional antenna mounted on (1) 3-ft standoff with an elevation of 141-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- Unknown (D&K-7):
  Antenna: One (1) 15-ft Omni-directional antenna mounted on (1) 5-ft standoff with an elevation of 111-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- NEU-26 (D&K-6):
  Antenna: One (1) RFS 1151-3 Omni-directional antenna mounted on (1) 3-ft standoff with an elevation of 110-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report

- DOT-19 (D&K-5):
  Antenna: One (1) Comprod 531-70 dipole mounted on (1) 1-ft standoff with an elevation of 103-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- CSP -28 (D&K-4):
  Antenna: One (1) 10-ft Omni-directional antennas mounted on (1) 3-ft sidearm with an elevation of 100-ft AGL.
  Cables: One (1) 1/2" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- CSP -27 (D&K-3):
  Antenna: One (1) VH150 dipole mounted on (1) 3-ft sidearm with an elevation of 100-ft AGL.
  Cables: One (1) 1/2" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- NEU-44 (D&K-2):
  Antenna: One (1) Kreco CO-41A Omni-directional antennas mounted on (1) 5-ft sidearm with an elevation of 76-ft AGL.
  Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- CSP -29 (D&K-1):
  Antenna: One (1) Decibel DB803 Omni-directional antennas mounted on (1) 3-ft standoof with an elevation of 48-ft AGL.
  Cables: One (1) 1/2" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- **Eversource (Proposed):**
  Antenna: One (1) dbSpectra SP2D03F36D-D antenna mounted one (1) SitePro USF-4U with an elevation of 136-ft AGL.
  Cables: Two (2) 7/8" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables should be routed as specified in section 3 of this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-H entitled "Structural Standard for Antenna Support Structures, Antennas and Small Wind Turbine Support Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-H Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.0" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 130 mph (Risk Cat III) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2018 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*

[1] The 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower.

- Calculated stresses **were found to be within allowable limits**.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	0.0' - 25.0'	64.2%	**PASS**
Diagonal (T8)	0.0' – 25.0'	77.0%	**PASS**
Horizontal (T8)	0.0' - 25.0'	70.2%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 4-ft diameter x 3.5-ft long reinforced concrete piers supported on a 37.5-ft square x 2.5-ft thick mat. The base of the tower is connected to the foundation by means of (6) 1.75"∅ anchor bolts per leg embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case were used in the verification of the foundation and anchor bolts:

Load Effect	Proposed Tower Reactions
Leg Shear	36 kips
Leg Compression	320 kips
Leg Tension	275 kips
Base Moment	6,594 ft-kips
Base Shear	63 kips

- The anchor bolts **were found** to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Compression and Shear	72%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	(percentage of capacity)	Result
Reinforced Concrete Pad and Piers	Overturning	62%	**PASS**
	Bearing	67%	**PASS**

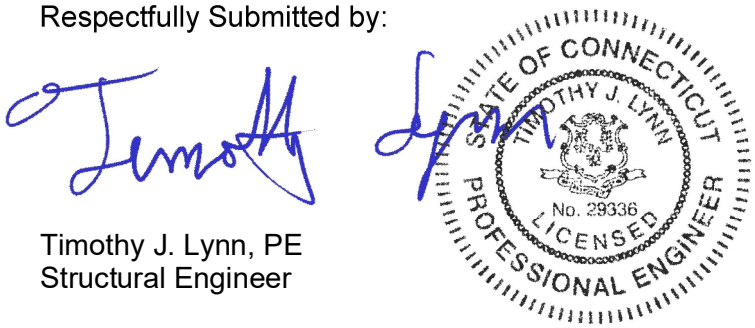
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by Eversource. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

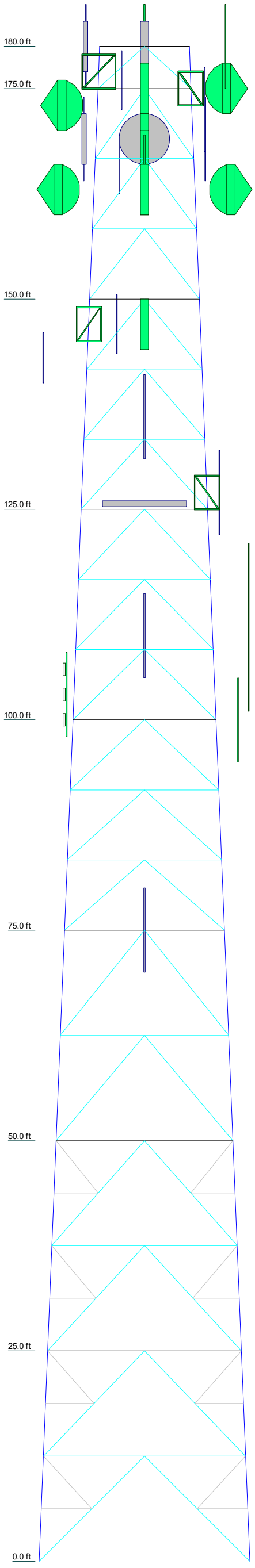
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISA Tower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

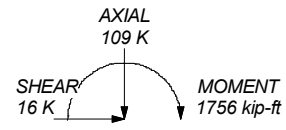
Section	T1	T2	T3	T4	T5	T6	T7	T8
Legs	HSS5x.25			HSS5x.5			HSS6.875x.5	
Leg Grade	A572-50					A572-60		
Diagonals	2L2 1/2x2x3/16			2L3x2 1/2x1/4	A36	2L3 1/2x3x1/4	2L3x3 1/2x1/4	
Diagonal Grade								
Top Girts	L3x3x1/4	L2 1/2x2 1/2x3/16				L4x4x1/4		L2 1/2x2 1/2x3/16
Horizontals	N.A.	L2 1/2x2 1/2x3/16	L3x3x1/4			L4x4x1/4		L3x3x1/4
Red. Horizontals				N.A.			L2 1/2x2 1/2x3/16	
Red. Diagonals				N.A.		L2 1/2x2 1/2x3/16		L3x3x1/4
Inner Bracing								L3x3x1/4
Face Width (ft)	10.599	10.999	12.9991	14.9993	16.9994	18.9996	20.9997	22.9999
# Panels @ (ft)	1 @ 5	12 @ 8.33333					6 @ 12.5	
Weight (K)	0.6	2.2	3.4	4.5	5.0	5.4	6.3	6.6



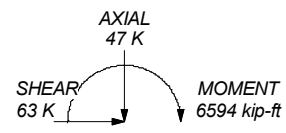
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 320 K
SHEAR: 36 K

UPLIFT: -275 K
SHEAR: 32 K



TORQUE 39 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 99 kip-ft
REACTIONS - 130 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SC479-HF1LDF (DK-29 / CSP-37)	180	Dish Antenna Pipe Mount (DK-23 / CSP-3)	169
SC479-HF1LDF (DK-32 / CSP-34)	180	PA6-65AC (DK-23 / CSP-3)	169
Lightning Rod 2"x10' (DK-33 / Tower)	180	7'x2" Antenna Mount Pipe (DK-19)	166
SC479-HF1LDF (D00-E6085) (Troop A P25 TX)	180	7'x2" Antenna Mount Pipe (DK-34)	166
SC479-HF1LDF (D00l-E6085) (Troop A P25 Diversity RX)	180 - 165	PA6-65AC (DK-21 / CSP-5)	163
		Dish Antenna Pipe Mount (DK-21 / CSP-5)	163
SE419-SWBPALDF(D00) (Troop L P25 TX)	180	Dish Antenna Pipe Mount (DK-22 / CSP-2)	163
SE419-SWBPALDF(D00) (Troop L P25 Diversity RX)	180	PA6-65AC (DK-22 / CSP-2)	163
		7'x2" Antenna Mount Pipe (DK-13)	147
432E-83I-01T TTA Unit (Troop A P25 TX / RX)	178	Dish Antenna Pipe Mount (DK-14,15 / CSP-18)	147
432E-83I-01T TTA Unit (Troop L P25 TX / RX)	178	3' Yagi (DK-15)	147
5" Side Mount Standoff (DK-34)	177	10' 4-Bay Dipole (DK-16)	147
5" Side Mount Standoff (DK-34)	177	6' Side Mount Standoff (1) (DK-16)	147
7'x2" Antenna Mount Pipe (DK-25)	176	6'x1" Whip Antenna w/ Mount (DK-12)	146 - 140
(inverted) SC479-HF1LDF (DK-18 / CSP-38)	175 - 163	SP2D03P36D-D (Eversource)	136
5" Side Mount Standoff (DK-18, 20,24, 26,29 / CSP-38,16,17,39, 37)	175	7' Omni (Whip) Antenna (DK-10)	127
		6' Side Mount Standoff (1) (DK-10)	127
5" Side Mount Standoff (DK-18, 20,24, 26,29 / CSP-38,16,17,39, 37)	175	Site Pro USF-4U (Eversource)	126
		3' Side Mount Standoff (DK-8)	114
Dish Antenna Pipe Mount (DK-28 / CSP-4)	175	15' Omni (Whip) Antenna (DK-7)	111
(inverted) SC479-HF1LDF (DK-30 / CSP-35)	175 - 163	5" Side Mount Standoff (DK-7)	110
5" Side Mount Standoff (DK-30, 31, 32 / CSP-35, 36, 34)	175	1151-3 (DK-6 / NEU-26)	110
		3' Side Mount Standoff (DK-6 / NEU-26)	110
5" Side Mount Standoff (DK-30, 31, 32 / CSP-35, 36, 34)	175	531-70 Dipole (DK-5 / DOT-19)	103
		1' Side Mount Standoff (DK-5 / DOT-19)	103
SC479-HF1LDF (D00l-E6085) (Troop A P25 RX)	175 - 163	2" Dia 10' Omni (DK-4 / CSP-28)	100
5" Side Mount Standoff (Troop A P25 TX / RX)	175	3' Side Mount Standoff (DK-4 / CSP-28)	100
5" Side Mount Standoff (Troop A P25 TX / RX)	175	6' Dipole Antenna (DK-3 / CSP-27)	100
SE419-SWBPALDF(D00) (Troop L P25 RX)	175 - 163	3' Side Mount Standoff (DK-3 / CSP-27)	100
5" Side Mount Standoff (Troop L P25 TX / RX)	175	2" Dia 14' Omni (DK-2 / NEU-44)	75
5" Side Mount Standoff (Troop L P25 TX / RX)	175	5' Side Mount Standoff (DK-2 / NEU-44)	75
PA6-65AC (DK-28 / CSP-4)	175	DB803M-Y (DK-1 / CSP-29)	48
Dish Antenna Pipe Mount (DK-27 / CSP-6)	173	3' Side Mount Standoff (DK-1 / CSP-29)	48
PA6-65AC (DK-27 / CSP-6)	173		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A572-60	60 ksi	75 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

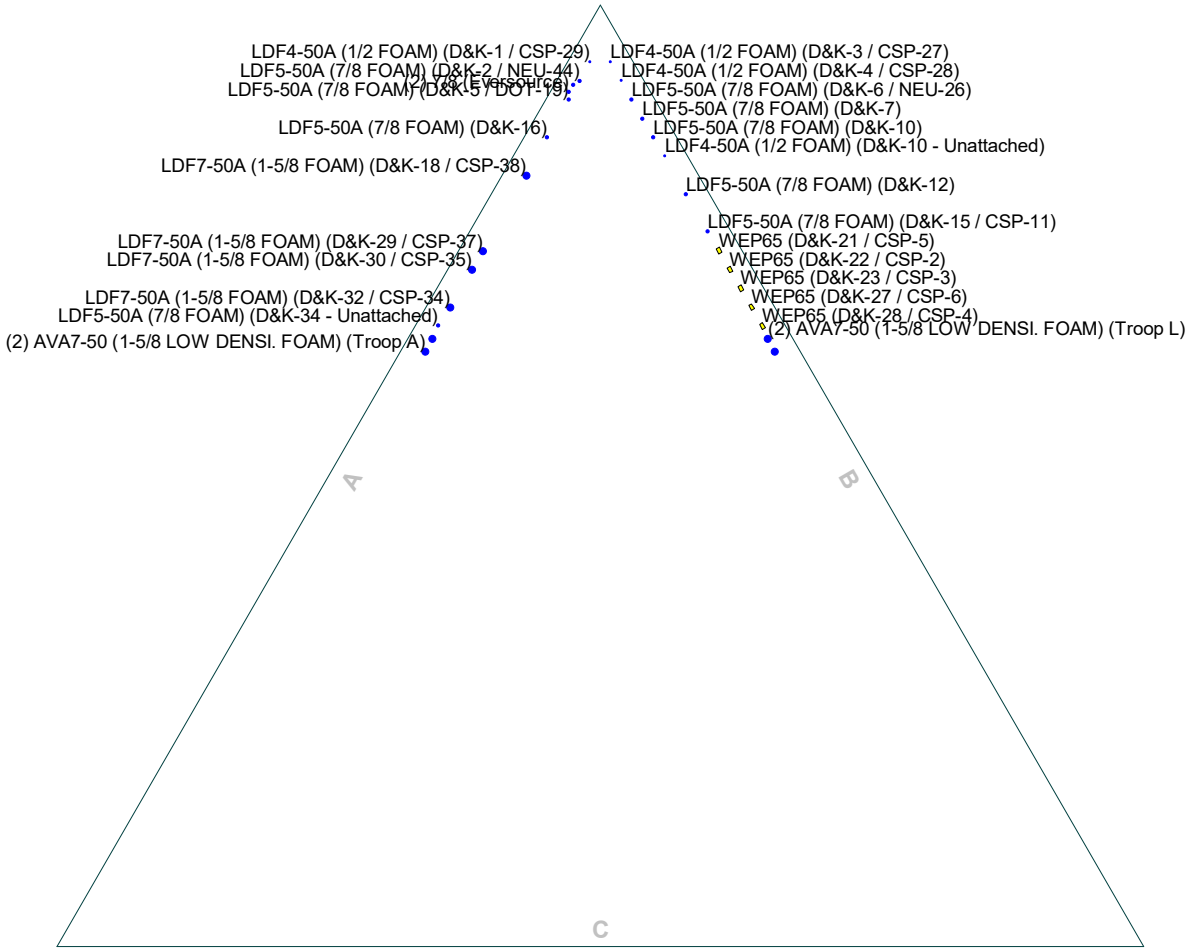
1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 77%

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **21082.11**			
Project: ***180-ft Lattice Tower #21 Southbury***			
Client: Eversource	Drawn by: TJL	App'd:	
Code: TIA-222-H	Date: 09/02/21	Scale: NTS	
Path: J:\Jobs\21082\00 Wk11_CSP #21 Southbury\05_Structural\Backup Documentation\Tnxtower_H_MODification Analysis - Tower.en		Dwg No. E-1	

Feed Line Plan

Round Flat App In Face App Out Face



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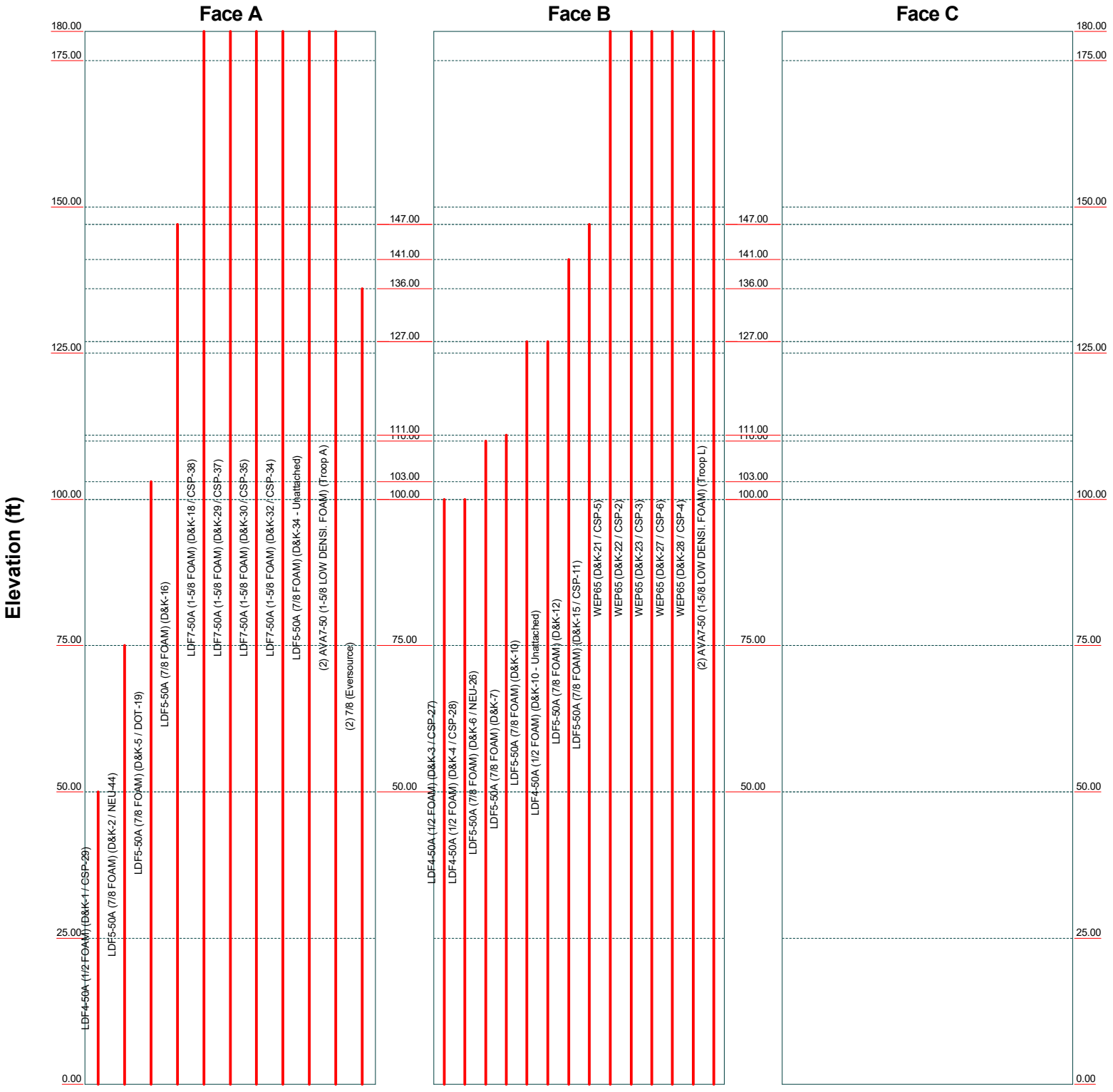
Client: Eversource	Drawn by: TJL	App'd:
Code: TIA-222-H	Date: 09/01/21	Scale: NTS
Path: J:\Jobs\21082\00.W\11_CSP #21 Southbury\05_Structural\Backup Documentation\Tnxtower_H_MODification Analysis - Tower.eri		Dwg No. E-7

Feed Line Distribution Chart
0' - 180'

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



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Code: TIA-222-H	Date: 09/01/21	Scale: NTS	
Path: J:\Jobs\21082\00.W\11_CSP #21 Southbury\05_Structural\Backup Documentation\Tnxtower_H_MODification Analysis - Tower.eri		Dwg No. E-7	

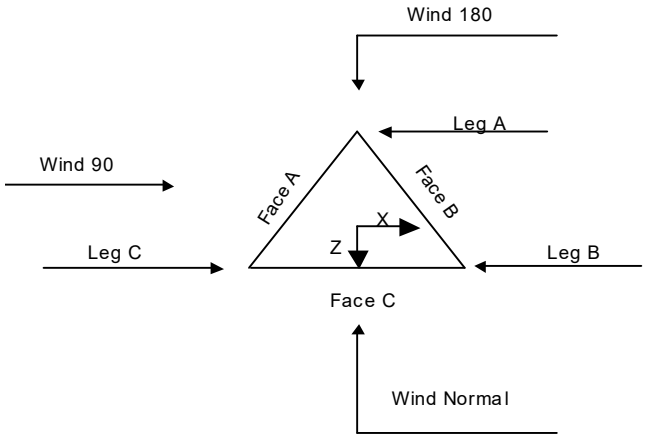
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 10.60 ft at the top and 25.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower base elevation above sea level: 0.00 ft.
Basic wind speed of 130 mph.
Risk Category III.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz		Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
√	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
√	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.00-175.00			10.60	1	5.00
T2	175.00-150.00			11.00	1	25.00
T3	150.00-125.00			13.00	1	25.00
T4	125.00-100.00			15.00	1	25.00
T5	100.00-75.00			17.00	1	25.00
T6	75.00-50.00			19.00	1	25.00
T7	50.00-25.00			21.00	1	25.00
T8	25.00-0.00			23.00	1	25.00

Tower Section Geometry *(cont'd)*

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

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T8	25.00-0.00	12.50	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-175.00	Pipe	HSS5x.25	A572-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T2 175.00-150.00	Pipe	HSS5x.25	A572-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T3 150.00-125.00	Pipe	HSS5x.25	A572-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T4 125.00-100.00	Pipe	HSS5x.5	A572-60 (60 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T5 100.00-75.00	Pipe	HSS5x.5	A572-60 (60 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T6 75.00-50.00	Pipe	HSS6.875x.5	A572-60 (60 ksi)	Double Angle	2L3 1/2x3x1/4	A36 (36 ksi)
T7 50.00-25.00	Pipe	HSS6.875x.5	A572-60 (60 ksi)	Double Angle	2L3x3 1/2x1/4	A36 (36 ksi)
T8 25.00-0.00	Pipe	HSS6.875x.5	A572-60 (60 ksi)	Double Angle	2L3x3 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-175.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 175.00-150.00	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 150.00-125.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T4 125.00-100.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T5 100.00-75.00	Single Angle	L4x4x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T6 75.00-50.00	Single Angle	L4x4x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T7 50.00-25.00	Single Angle	L4x4x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T8 25.00-0.00	Single Angle	L4x4x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T3 150.00-125.00	Solid Round		A572-50 (50 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T4 125.00-100.00	Solid Round		A572-50 (50 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T5 100.00-75.00	Solid Round		A572-50 (50 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 75.00-50.00	Solid Round		A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 50.00-25.00	Solid Round		A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 25.00-0.00	Solid Round		A572-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T7 50.00-25.00	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L3x3x1/4	1
T8 25.00-0.00	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L3x3x1/4	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.00-175.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T2 175.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T3 150.00-125.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T4 125.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T5 100.00-75.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T6 75.00-50.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T7 50.00-25.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000
T8 25.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Third-Pt	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
180.00-175.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
175.00-150.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
150.00-125.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
125.00-100.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
100.00-75.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
75.00-50.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
50.00-25.00				1	1	1	1	1	1	1
T8 25.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-175.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 175.00-150.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 150.00-125.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 125.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-75.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 75.00-50.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 50.00-25.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 25.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-175.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 175.00-150.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 150.00-125.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 125.00-100.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-75.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 75.00-50.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 50.00-25.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 25.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-175.00	Flange	0.0000 A325X	0	0.7500 A325X	1	0.6250 A325X	2	0.0000 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T2 175.00-150.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T3 150.00-125.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T4 125.00-100.00	Flange	0.7500 A325X	6	0.7500 A325X	1	0.6250 A325X	2	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T5 100.00-75.00	Flange	1.0000 A325X	6	0.7500 A325X	1	0.6250 A325X	2	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T6 75.00-50.00	Flange	1.0000 A325X	8	0.7500 A325X	1	0.6250 A325X	2	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T7 50.00-25.00	Flange	1.0000 A325X	8	1.0000 A325X	1	0.6250 A325X	2	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T8 25.00-0.00	Flange	1.0000 A325X	8	1.0000 A325X	1	0.6250 A325X	2	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***** D&K Inventory													
LDF4-50A (1/2 FOAM) (D&K-1 / CSP-29)	A	No	No	Ar (CaAa)	50.00 - 0.00	-5.0000	0.45	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM) (D&K-2 / NEU-44)	A	No	No	Ar (CaAa)	75.00 - 0.00	-5.0000	0.43	1	1	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (D&K-3 / CSP-27)	B	No	No	Ar (CaAa)	100.00 - 0.00	-5.0000	-0.45	1	1	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (D&K-4 / CSP-28)	B	No	No	Ar (CaAa)	100.00 - 0.00	-5.0000	-0.43	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM) (D&K-5 / DOT-19)	A	No	No	Ar (CaAa)	103.00 - 0.00	-5.0000	0.41	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (D&K-6 / NEU-26)	B	No	No	Ar (CaAa)	110.00 - 0.00	-5.0000	-0.41	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (D&K-7)	B	No	No	Ar (CaAa)	111.00 - 0.00	-5.0000	-0.39	1	1	1.0900	1.0900		0.33
*** No Coax for D&K-8 ***													
LDF5-50A (7/8 FOAM) (D&K-10)	B	No	No	Ar (CaAa)	127.00 - 0.00	-5.0000	-0.37	1	1	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (D&K-10 - Unattached)	B	No	No	Ar (CaAa)	127.00 - 0.00	-5.0000	-0.35	1	1	0.6300	0.6300		0.15

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement ft*	*Face Offset in*	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing in*	*Width or Diameter in*	*Perimeter in*	*Weight plf*
LDF5-50A (7/8 FOAM) (D&K-12) *** No Coax for D&K-13 ***	B	No	No	Ar (CaAa)	141.00 - 0.00	-5.0000	-0.31	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (D&K-15 / CSP-11)	B	No	No	Ar (CaAa)	147.00 - 0.00	-5.0000	-0.27	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (D&K-16)	A	No	No	Ar (CaAa)	147.00 - 0.00	-5.0000	0.37	1	1	1.0900	1.0900		0.33
LDF7-50A (1-5/8 FOAM) (D&K-18 / CSP-38) *** No Coax for D&K-19 ***	A	No	No	Ar (CaAa)	180.00 - 0.00	-5.0000	0.33	1	1	1.9800	1.9800		0.82
WEP65 (D&K-21 / CSP-5)	B	No	No	Af (CaAa)	180.00 - 0.00	-5.0000	-0.25	1	1	1.5836	1.5836		0.53
WEP65 (D&K-22 / CSP-2)	B	No	No	Af (CaAa)	180.00 - 0.00	-5.0000	-0.23	1	1	1.5836	1.5836		0.53
WEP65 (D&K-23 / CSP-3) *** No Coax for D&K-25 ***	B	No	No	Af (CaAa)	180.00 - 0.00	-5.0000	-0.21	1	1	1.5836	1.5836		0.53
WEP65 (D&K-27 / CSP-6)	B	No	No	Af (CaAa)	180.00 - 0.00	-5.0000	-0.19	1	1	1.5836	1.5836		0.53
WEP65 (D&K-28 / CSP-4)	B	No	No	Af (CaAa)	180.00 - 0.00	-5.0000	-0.17	1	1	1.5836	1.5836		0.53
LDF7-50A (1-5/8 FOAM) (D&K-29 / CSP-37)	A	No	No	Ar (CaAa)	180.00 - 0.00	-5.0000	0.25	1	1	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (D&K-30 / CSP-35)	A	No	No	Ar (CaAa)	180.00 - 0.00	-5.0000	0.23	1	1	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (D&K-32 / CSP-34) *** No Coax for D&K-25 ***	A	No	No	Ar (CaAa)	180.00 - 0.00	-5.0000	0.19	1	1	1.9800	1.9800		0.82
LDF5-50A (7/8 FOAM) (D&K-34 - Unattached) *** PNS Proposed	A	No	No	Ar (CaAa)	180.00 - 0.00	-5.0000	0.17	1	1	1.0900	1.0900		0.33
AVA7-50	A	No	No	Ar (CaAa)	180.00 -	-5.0000	0.15	2	2	1.9800	1.9800		0.72

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(1-5/8 LOW DENSI. FOAM) (Troop A) AVA7-50	B	No	No	Ar (CaAa)	0.00 180.00 - 0.00	-5.0000	-0.15	2	2	1.9800	1.9800		0.72
(1-5/8 LOW DENSI. FOAM) (Troop L) *Eversource Proposed Equipment* 7/8 (Eversource)	A	No	No	Ar (CaAa)	136.00 - 0.00	-4.0000	0.42	2	2	1.1100	1.1100		0.54

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-175.00	A	0.000	0.000	6.485	0.000	0.03
		B	0.000	0.000	8.578	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.00
T2	175.00-150.00	A	0.000	0.000	32.425	0.000	0.13
		B	0.000	0.000	42.891	0.000	0.10
		C	0.000	0.000	0.000	0.000	0.00
T3	150.00-125.00	A	0.000	0.000	37.265	0.000	0.15
		B	0.000	0.000	47.377	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.00
T4	125.00-100.00	A	0.000	0.000	41.027	0.000	0.16
		B	0.000	0.000	54.930	0.000	0.14
		C	0.000	0.000	0.000	0.000	0.00
T5	100.00-75.00	A	0.000	0.000	43.425	0.000	0.17
		B	0.000	0.000	61.241	0.000	0.15
		C	0.000	0.000	0.000	0.000	0.00
T6	75.00-50.00	A	0.000	0.000	46.150	0.000	0.18
		B	0.000	0.000	61.241	0.000	0.15
		C	0.000	0.000	0.000	0.000	0.00
T7	50.00-25.00	A	0.000	0.000	47.725	0.000	0.18
		B	0.000	0.000	61.241	0.000	0.15
		C	0.000	0.000	0.000	0.000	0.00
T8	25.00-0.00	A	0.000	0.000	47.725	0.000	0.18
		B	0.000	0.000	61.241	0.000	0.15
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-175.00	A	1.361	0.000	0.000	17.468	0.000	0.21
		B		0.000	0.000	19.561	0.000	0.21
		C		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T2	175.00-150.00	A	1.349	0.000	0.000	86.940	0.000	1.06
		B		0.000	0.000	97.406	0.000	1.06
		C		0.000	0.000	0.000	0.000	0.00
T3	150.00-125.00	A	1.326	0.000	0.000	104.144	0.000	1.22
		B		0.000	0.000	112.286	0.000	1.22
		C		0.000	0.000	0.000	0.000	0.00
T4	125.00-100.00	A	1.300	0.000	0.000	117.502	0.000	1.33
		B		0.000	0.000	139.276	0.000	1.49
		C		0.000	0.000	0.000	0.000	0.00
T5	100.00-75.00	A	1.268	0.000	0.000	123.940	0.000	1.38
		B		0.000	0.000	163.758	0.000	1.71
		C		0.000	0.000	0.000	0.000	0.00
T6	75.00-50.00	A	1.226	0.000	0.000	130.611	0.000	1.42
		B		0.000	0.000	160.677	0.000	1.64
		C		0.000	0.000	0.000	0.000	0.00
T7	50.00-25.00	A	1.165	0.000	0.000	134.528	0.000	1.41
		B		0.000	0.000	156.194	0.000	1.54
		C		0.000	0.000	0.000	0.000	0.00
T8	25.00-0.00	A	1.044	0.000	0.000	127.016	0.000	1.24
		B		0.000	0.000	147.297	0.000	1.34
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-175.00	0.8196	-12.9202	0.6202	-17.1278
T2	175.00-150.00	1.0588	-16.2796	0.7528	-20.5478
T3	150.00-125.00	1.2074	-19.1920	1.0234	-26.3273
T4	125.00-100.00	1.4445	-23.8596	1.3844	-33.9554
T5	100.00-75.00	1.4748	-26.6831	1.4755	-40.2459
T6	75.00-50.00	1.6855	-31.5599	1.6010	-45.9775
T7	50.00-25.00	1.5881	-30.6277	1.5443	-46.2618
T8	25.00-0.00	1.6613	-31.9066	1.6286	-48.0720

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	20	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	23	WEP65	175.00 - 180.00	0.6000	0.6000
T1	24	WEP65	175.00 - 180.00	0.6000	0.6000
T1	25	WEP65	175.00 - 180.00	0.6000	0.6000
T1	29	WEP65	175.00 - 180.00	0.6000	0.6000
T1	30	WEP65	175.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	31	LDF7-50A (1-5/8 FOAM)	180.00 175.00 - 180.00	0.6000	0.6000
T1	32	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	34	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	36	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	175.00 - 180.00	0.6000	0.6000
T1	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	175.00 - 180.00	0.6000	0.6000
T2	20	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	23	WEP65	150.00 - 175.00	0.6000	0.6000
T2	24	WEP65	150.00 - 175.00	0.6000	0.6000
T2	25	WEP65	150.00 - 175.00	0.6000	0.6000
T2	29	WEP65	150.00 - 175.00	0.6000	0.6000
T2	30	WEP65	150.00 - 175.00	0.6000	0.6000
T2	31	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	32	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	34	LDF7-50A (1-5/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	36	LDF5-50A (7/8 FOAM)	150.00 - 175.00	0.6000	0.6000
T2	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	150.00 - 175.00	0.6000	0.6000
T2	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	150.00 - 175.00	0.6000	0.6000
T3	11	LDF5-50A (7/8 FOAM)	125.00 - 127.00	0.6000	0.6000
T3	12	LDF4-50A (1/2 FOAM)	125.00 - 127.00	0.6000	0.6000
T3	14	LDF5-50A (7/8 FOAM)	125.00 - 141.00	0.6000	0.6000
T3	17	LDF5-50A (7/8 FOAM)	125.00 - 147.00	0.6000	0.6000
T3	18	LDF5-50A (7/8 FOAM)	125.00 - 147.00	0.6000	0.6000
T3	20	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	23	WEP65	125.00 - 150.00	0.6000	0.6000
T3	24	WEP65	125.00 - 150.00	0.6000	0.6000
T3	25	WEP65	125.00 - 150.00	0.6000	0.6000
T3	29	WEP65	125.00 - 150.00	0.6000	0.6000
T3	30	WEP65	125.00 - 150.00	0.6000	0.6000
T3	31	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	32	LDF7-50A (1-5/8 FOAM)	125.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	34	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	36	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T3	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	125.00 - 150.00	0.6000	0.6000
T3	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	125.00 - 150.00	0.6000	0.6000
T3	41	7/8	125.00 - 136.00	0.6000	0.6000
T4	6	LDF5-50A (7/8 FOAM)	100.00 - 103.00	0.6000	0.6000
T4	7	LDF5-50A (7/8 FOAM)	100.00 - 110.00	0.6000	0.6000
T4	8	LDF5-50A (7/8 FOAM)	100.00 - 111.00	0.6000	0.6000
T4	11	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	12	LDF4-50A (1/2 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	14	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	17	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	18	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	20	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	23	WEP65	100.00 - 125.00	0.6000	0.6000
T4	24	WEP65	100.00 - 125.00	0.6000	0.6000
T4	25	WEP65	100.00 - 125.00	0.6000	0.6000
T4	29	WEP65	100.00 - 125.00	0.6000	0.6000
T4	30	WEP65	100.00 - 125.00	0.6000	0.6000
T4	31	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	32	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	34	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	36	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T4	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	100.00 - 125.00	0.6000	0.6000
T4	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	100.00 - 125.00	0.6000	0.6000
T4	41	7/8	100.00 - 125.00	0.6000	0.6000
T5	4	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	5	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	6	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	7	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	8	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	11	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	12	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	14	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	17	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	18	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	20	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	23	WEP65	75.00 - 100.00	0.6000	0.6000
T5	24	WEP65	75.00 - 100.00	0.6000	0.6000
T5	25	WEP65	75.00 - 100.00	0.6000	0.6000
T5	29	WEP65	75.00 - 100.00	0.6000	0.6000
T5	30	WEP65	75.00 - 100.00	0.6000	0.6000
T5	31	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	32	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	34	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	36	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T5	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	75.00 - 100.00	0.6000	0.6000
T5	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	75.00 - 100.00	0.6000	0.6000
T5	41	7/8	75.00 - 100.00	0.6000	0.6000
T6	3	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	4	LDF4-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	5	LDF4-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	6	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	7	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	8	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	11	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	12	LDF4-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	14	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	17	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	18	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	20	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	23	WEP65	50.00 - 75.00	0.6000	0.6000
T6	24	WEP65	50.00 - 75.00	0.6000	0.6000
T6	25	WEP65	50.00 - 75.00	0.6000	0.6000
T6	29	WEP65	50.00 - 75.00	0.6000	0.6000
T6	30	WEP65	50.00 - 75.00	0.6000	0.6000
T6	31	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	32	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	34	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	36	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T6	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	50.00 - 75.00	0.6000	0.6000
T6	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	50.00 - 75.00	0.6000	0.6000
T6	41	7/8	50.00 - 75.00	0.6000	0.6000
T7	2	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	3	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	4	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	5	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	6	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	7	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	8	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	11	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	12	LDF4-50A (1/2 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	14	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	17	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	18	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	20	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	23	WEP65	25.00 - 50.00	0.6000	0.6000
T7	24	WEP65	25.00 - 50.00	0.6000	0.6000
T7	25	WEP65	25.00 - 50.00	0.6000	0.6000
T7	29	WEP65	25.00 - 50.00	0.6000	0.6000
T7	30	WEP65	25.00 - 50.00	0.6000	0.6000
T7	31	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	32	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	34	LDF7-50A (1-5/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	36	LDF5-50A (7/8 FOAM)	25.00 - 50.00	0.6000	0.6000
T7	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	25.00 - 50.00	0.6000	0.6000
T7	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	25.00 - 50.00	0.6000	0.6000
T7	41	7/8	25.00 - 50.00	0.6000	0.6000
T8	2	LDF4-50A (1/2 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	3	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	4	LDF4-50A (1/2 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	5	LDF4-50A (1/2 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	6	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	7	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	8	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	11	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	12	LDF4-50A (1/2 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	14	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	17	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	18	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	20	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	23	WEP65	0.00 - 25.00	0.6000	0.6000
T8	24	WEP65	0.00 - 25.00	0.6000	0.6000
T8	25	WEP65	0.00 - 25.00	0.6000	0.6000
T8	29	WEP65	0.00 - 25.00	0.6000	0.6000
T8	30	WEP65	0.00 - 25.00	0.6000	0.6000
T8	31	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	32	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	34	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	36	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T8	38	AVA7-50 (1-5/8 LOW DENSI. FOAM)	0.00 - 25.00	0.6000	0.6000
T8	39	AVA7-50 (1-5/8 LOW DENSI. FOAM)	0.00 - 25.00	0.6000	0.6000
T8	41	7/8	0.00 - 25.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
*** D&K Climb Inventory ***									
DB803M-Y (D&K-1 / CSP-29)	B	From Leg	3.00 0.00 0.00	0.0000	48.00	No Ice 1/2" Ice 1" Ice	0.50 0.68 0.87	0.50 0.68 0.87	0.00 0.01 0.02
3' Side Mount Standoff (D&K-1 / CSP-29)	B	None		0.0000	48.00	No Ice 1/2" Ice 1" Ice	2.72 4.91 7.10	2.72 4.91 7.10	0.05 0.09 0.13
2" Dia 14' Omni (D&K-2 / NEU-44)	A	From Leg	5.00 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	2.00 3.03 4.06	2.00 3.03 4.06	0.01 0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
5' Side Mount Standoff (D&K-2 / NEU-44)	A	None		0.0000	75.00	No Ice	4.97	4.97	0.07
						1/2" Ice	6.12	6.12	0.13
						1" Ice	7.27	7.27	0.19
6' Dipole Antenna (D&K-3 / CSP-27)	A	From Leg	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	7.00 7.47 7.95	2.02 2.90 3.79	0.08 0.12 0.17
3' Side Mount Standoff (D&K-3 / CSP-27)	A	None		0.0000	100.00	No Ice	2.72	2.72	0.05
						1/2" Ice	4.91	4.91	0.09
						1" Ice	7.10	7.10	0.13
2" Dia 10' Omni (D&K-4 / CSP-28)	B	From Leg	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	2.00 3.03 4.06	2.00 3.03 4.06	0.01 0.03 0.04
3' Side Mount Standoff (D&K-4 / CSP-28)	B	None		0.0000	100.00	No Ice	2.72	2.72	0.05
						1/2" Ice	4.91	4.91	0.09
						1" Ice	7.10	7.10	0.13
531-70 Dipole (D&K-5 / DOT-19)	C	From Leg	1.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1" Ice	3.23 5.00 6.78	2.63 4.39 6.17	0.04 0.06 0.09
1' Side Mount Standoff (D&K-5 / DOT-19)	C	None		0.0000	103.00	No Ice	2.72	2.72	0.05
						1/2" Ice	4.91	4.91	0.09
						1" Ice	7.10	7.10	0.13
1151-3 (D&K-6 / NEU-26)	A	From Leg	3.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	4.18 5.73 7.30	4.18 5.73 7.30	0.02 0.05 0.09
3' Side Mount Standoff (D&K-6 / NEU-26)	A	None		0.0000	110.00	No Ice	2.72	2.72	0.05
						1/2" Ice	4.91	4.91	0.09
						1" Ice	7.10	7.10	0.13
15' Omni (Whip) Antenna (D&K-7)	B	From Leg	5.00 0.00 0.00	0.0000	111.00	No Ice 1/2" Ice 1" Ice	4.00 6.00 8.00	4.00 6.00 8.00	0.06 0.10 0.14
5" Side Mount Standoff (D&K-7)	B	None		0.0000	110.00	No Ice	4.97	4.97	0.07
						1/2" Ice	6.12	6.12	0.13
						1" Ice	7.27	7.27	0.19
3' Side Mount Standoff (D&K-8)	C	None		0.0000	114.00	No Ice	2.72	2.72	0.05
						1/2" Ice	4.91	4.91	0.09
						1" Ice	7.10	7.10	0.13
7' Omni (Whip) Antenna (D&K-10)	B	From Face	6.00 0.00 0.00	0.0000	127.00	No Ice 1/2" Ice 1" Ice	2.00 3.03 4.06	2.00 3.03 4.06	0.01 0.02 0.03
6' Side Mount Standoff (1) (D&K-10)	B	From Leg	0.00 0.00 0.00	45.0000	127.00	No Ice 1/2" Ice 1" Ice	4.97 6.12 7.27	4.97 6.12 7.27	0.07 0.13 0.19
6'x1" Whip Antenna w/ Mount (D&K-12)	A	From Face	10.00 0.00 0.00	0.0000	146.00 - 140.00	No Ice 1/2" Ice 1" Ice	2.02 3.14 4.13	2.02 3.14 4.13	0.05 0.07 0.10
7'x2" Antenna Mount Pipe (D&K-13)	A	From Face	0.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	1.66 2.39 2.83	1.66 2.39 2.83	0.03 0.04 0.06
Dish Antenna Pipe Mount (D&K-14,15 / CSP-18)	B	None		0.0000	147.00	No Ice	1.32	1.32	0.04
						1/2" Ice	1.58	1.58	0.06
						1" Ice	1.84	1.84	0.07
3' Yagi (D&K-15)	B	From Leg	1.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	2.08 3.79 5.52	2.08 3.79 5.52	0.03 0.05 0.09
10' 4-Bay Dipole (D&K-16)	C	From Face	6.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	4.00 6.00 8.00	4.00 6.00 8.00	0.06 0.10 0.14

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
6' Side Mount Standoff (1)	C	From Leg	0.00	45.0000	147.00	No Ice	4.97	4.97	0.07
(D&K-16)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19
(inverted) SC479-HF1LDF	A	From Face	5.00	0.0000	163.00 - 175.00	No Ice	5.06	5.06	0.03
(D&K-18 / CSP-38)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00			1" Ice	8.04	8.04	0.11
5" Side Mount Standoff	A	From Leg	0.00	-45.0000	175.00	No Ice	4.97	4.97	0.07
(D&K-18, 20,24, 26,29 /			0.00			1/2" Ice	6.12	6.12	0.13
CSP-38,16,17,39, 37)			0.00			1" Ice	7.27	7.27	0.19
5" Side Mount Standoff	A	From Leg	0.00	45.0000	175.00	No Ice	4.97	4.97	0.07
(D&K-18, 20,24, 26,29 /			0.00			1/2" Ice	6.12	6.12	0.13
CSP-38,16,17,39, 37)			0.00			1" Ice	7.27	7.27	0.19
7'x2" Antenna Mount Pipe	A	From Face	0.00	0.0000	166.00	No Ice	1.66	1.66	0.03
(D&K-19)			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
Dish Antenna Pipe Mount	C	None		0.0000	163.00	No Ice	1.32	1.32	0.04
(D&K-21 / CSP-5)						1/2" Ice	1.58	1.58	0.06
						1" Ice	1.84	1.84	0.07
Dish Antenna Pipe Mount	B	None		0.0000	163.00	No Ice	1.32	1.32	0.04
(D&K-22 / CSP-2)						1/2" Ice	1.58	1.58	0.06
						1" Ice	1.84	1.84	0.07
Dish Antenna Pipe Mount	A	None		0.0000	169.00	No Ice	1.32	1.32	0.04
(D&K-23 / CSP-3)						1/2" Ice	1.58	1.58	0.06
						1" Ice	1.84	1.84	0.07
7'x2" Antenna Mount Pipe	A	From Face	0.00	0.0000	176.00	No Ice	1.66	1.66	0.03
(D&K-25)			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
Dish Antenna Pipe Mount	C	None		0.0000	173.00	No Ice	1.32	1.32	0.04
(D&K-27 / CSP-6)						1/2" Ice	1.58	1.58	0.06
						1" Ice	1.84	1.84	0.07
Dish Antenna Pipe Mount	B	None		0.0000	175.00	No Ice	1.32	1.32	0.04
(D&K-28 / CSP-4)						1/2" Ice	1.58	1.58	0.06
						1" Ice	1.84	1.84	0.07
SC479-HF1LDF	A	From Face	5.00	0.0000	180.00	No Ice	4.35	4.35	0.03
(D&K-29 / CSP-37)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00			1" Ice	8.04	8.04	0.11
(inverted) SC479-HF1LDF	B	From Face	5.00	0.0000	163.00 - 175.00	No Ice	5.06	5.06	0.03
(D&K-30 / CSP-35)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00			1" Ice	8.04	8.04	0.11
5" Side Mount Standoff	B	From Leg	0.00	-45.0000	175.00	No Ice	4.97	4.97	0.07
(D&K-30, 31, 32 / CSP-35,			0.00			1/2" Ice	6.12	6.12	0.13
36, 34)			0.00			1" Ice	7.27	7.27	0.19
5" Side Mount Standoff	B	From Leg	0.00	45.0000	175.00	No Ice	4.97	4.97	0.07
(D&K-30, 31, 32 / CSP-35,			0.00			1/2" Ice	6.12	6.12	0.13
36, 34)			0.00			1" Ice	7.27	7.27	0.19
SC479-HF1LDF	B	From Leg	5.00	0.0000	180.00	No Ice	4.35	4.35	0.03
(D&K-32 / CSP-34)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00			1" Ice	8.04	8.04	0.11
Lightning Rod 2"x10'	A	None		0.0000	180.00	No Ice	2.00	2.00	0.08
(D&K-33 / Tower)						1/2" Ice	3.02	3.02	0.10
						1" Ice	4.07	4.07	0.12
7'x2" Antenna Mount Pipe	C	From Face	10.00	0.0000	166.00	No Ice	1.66	1.66	0.03
(D&K-34)			0.00			1/2" Ice	2.39	2.39	0.04
			0.00			1" Ice	2.83	2.83	0.06
5" Side Mount Standoff	C	From Leg	0.00	-45.0000	177.00	No Ice	4.97	4.97	0.07
(D&K-34)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
5" Side Mount Standoff	C	From Leg	0.00	45.0000	177.00	No Ice	4.97	4.97	0.07
(D&K-34)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19
***PNS									
SC479-HF1LDF	B	From Leg	5.00	0.0000	180.00	No Ice	5.06	5.06	0.03
(D00-E6085)			0.00			1/2" Ice	6.54	6.54	0.07
(Troop A P25 TX)			0.00			1" Ice	8.04	8.04	0.11
432E-83I-01T TTA Unit	B	From Face	2.50	0.0000	178.00	No Ice	2.85	0.97	0.03
(Troop A P25 TX / RX)			0.00			1/2" Ice	3.06	1.11	0.04
			0.00			1" Ice	3.28	1.26	0.07
SC479-HF1LDF	B	From Face	5.00	0.0000	163.00 - 175.00	No Ice	5.06	5.06	0.03
(D00I-E6085)			0.00			1/2" Ice	6.54	6.54	0.07
(Troop A P25 RX)			0.00			1" Ice	8.04	8.04	0.11
5" Side Mount Standoff	B	From Leg	0.00	-45.0000	175.00	No Ice	4.97	4.97	0.07
(Troop A P25 TX / RX)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19
5" Side Mount Standoff	B	From Leg	0.00	45.0000	175.00	No Ice	4.97	4.97	0.07
(Troop A P25 TX / RX)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19
SC479-HF1LDF	B	From Face	5.00	0.0000	165.00 - 180.00	No Ice	5.06	5.06	0.03
(D00I-E6085)			0.00			1/2" Ice	6.54	6.54	0.07
(Troop A P25 Diversity RX)			0.00			1" Ice	8.04	8.04	0.11
SE419-SWBPALDF(D00)	A	From Leg	5.00	0.0000	180.00	No Ice	25.03	9.55	0.05
(Troop L P25 TX)			0.00			1/2" Ice	25.87	10.19	0.17
			0.00			1" Ice	26.70	10.82	0.31
432E-83I-01T TTA Unit	A	From Face	2.50	0.0000	178.00	No Ice	2.85	0.97	0.03
(Troop L P25 TX / RX)			0.00			1/2" Ice	3.06	1.11	0.04
			0.00			1" Ice	3.28	1.26	0.07
SE419-SWBPALDF(D00)	A	From Face	5.00	0.0000	163.00 - 175.00	No Ice	25.03	9.55	0.05
(Troop L P25 RX)			0.00			1/2" Ice	25.87	10.19	0.17
			0.00			1" Ice	26.70	10.82	0.31
5" Side Mount Standoff	A	From Leg	0.00	-45.0000	175.00	No Ice	4.97	4.97	0.07
(Troop L P25 TX / RX)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19
5" Side Mount Standoff	A	From Leg	0.00	45.0000	175.00	No Ice	4.97	4.97	0.07
(Troop L P25 TX / RX)			0.00			1/2" Ice	6.12	6.12	0.13
			0.00			1" Ice	7.27	7.27	0.19
SE419-SWBPALDF(D00)	A	From Face	5.00	0.0000	180.00	No Ice	25.03	9.55	0.05
(Troop L P25 Diversity RX)			0.00			1/2" Ice	25.87	10.19	0.17
			0.00			1" Ice	26.70	10.82	0.31
**Eversource Proposed Equipment*									
SP2D03P36D-D	A	From Leg	4.00	0.0000	136.00	No Ice	4.75	4.75	0.08
(Eversource)			0.00			1/2" Ice	6.68	6.68	0.11
			0.00			1" Ice	8.63	8.63	0.16
Site Pro USF-4U	A	From Leg	0.50	0.0000	126.00	No Ice	1.25	2.50	0.17
(Eversource)			0.00			1/2" Ice	1.49	2.76	0.20
			0.00			1" Ice	1.73	3.03	0.23

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
PA6-65AC	C	Paraboloid	From	2.00	Worst		163.00	6.00	No Ice	28.27	0.09
(D&K-21 / CSP-5)		w/Radome	Leg	0.00					1/2" Ice	29.05	0.24
				0.00					1" Ice	29.83	0.39
PA6-65AC	C	Paraboloid	From	2.00	Worst		173.00	6.00	No Ice	28.27	0.09
(D&K-27 / CSP-6)		w/Radome	Leg	0.00					1/2" Ice	29.05	0.24
				0.00					1" Ice	29.83	0.39
PA6-65AC	A	Paraboloid	From	2.00	Worst		169.00	6.00	No Ice	28.27	0.09
(D&K-23 / CSP-3)		w/Radome	Leg	0.00					1/2" Ice	29.05	0.24
				0.00					1" Ice	29.83	0.39
PA6-65AC	B	Paraboloid	From	2.00	Worst		163.00	6.00	No Ice	28.27	0.09
(D&K-22 / CSP-2)		w/Radome	Leg	0.00					1/2" Ice	29.05	0.24
				0.00					1" Ice	29.83	0.39
PA6-65AC	B	Paraboloid	From	2.00	Worst		175.00	6.00	No Ice	28.27	0.09
(D&K-28 / CSP-4)		w/Radome	Leg	0.00					1/2" Ice	29.05	0.24
				0.00					1" Ice	29.83	0.39

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	177.50	1.428	53	56.080	A	5.526	4.171	4.171	43.02	6.485	0.000
180.00-175.00					B	5.526	4.171		43.02	8.578	0.000
					C	5.526	4.171		43.02	0.000	0.000
T2	162.50	1.402	52	310.401	A	19.556	20.856	20.856	51.61	32.425	0.000
175.00-150.00					B	19.556	20.856		51.61	42.891	0.000
					C	19.556	20.856		51.61	0.000	0.000
T3	137.50	1.353	50	360.405	A	25.949	20.856	20.856	44.56	37.265	0.000
150.00-125.00					B	25.949	20.856		44.56	47.377	0.000
					C	25.949	20.856		44.56	0.000	0.000
T4	112.50	1.297	48	410.409	A	28.497	20.856	20.856	42.26	41.027	0.000
125.00-100.00					B	28.497	20.856		42.26	54.930	0.000
					C	28.497	20.856		42.26	0.000	0.000
T5	87.50	1.231	45	460.412	A	35.414	20.856	20.856	37.06	43.425	0.000
100.00-75.00					B	35.414	20.856		37.06	61.241	0.000
					C	35.414	20.856		37.06	0.000	0.000
T6 75.00-50.00	62.50	1.146	42	514.325	A	30.954	28.676	28.676	48.09	46.150	0.000
					B	30.954	28.676		48.09	61.241	0.000
					C	30.954	28.676		48.09	0.000	0.000
T7 50.00-25.00	37.50	1.029	38	564.329	A	42.216	28.676	28.676	40.45	47.725	0.000
					B	42.216	28.676		40.45	61.241	0.000
					C	42.216	28.676		40.45	0.000	0.000
T8 25.00-0.00	12.50	0.85	31	614.333	A	45.019	28.676	28.676	38.91	47.725	0.000
					B	45.019	28.676		38.91	61.241	0.000
					C	45.019	28.676		38.91	0.000	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	177.50	1.428	8	1.3607	57.215	A	5.526	11.995	6.441	36.77	17.468	0.000
180.00-175.00						B	5.526	11.995		36.77	19.561	0.000
						C	5.526	11.995		36.77	0.000	0.000
T2	162.50	1.402	8	1.3488	316.026	A	19.556	53.208	32.107	44.13	86.940	0.000
175.00-150.00						B	19.556	53.208		44.13	97.406	0.000
						C	19.556	53.208		44.13	0.000	0.000
T3	137.50	1.353	7	1.3264	365.936	A	25.949	54.867	31.921	39.50	104.144	0.000
150.00-125.00						B	25.949	54.867		39.50	112.286	0.000
						C	25.949	54.867		39.50	0.000	0.000
T4	112.50	1.297	7	1.3001	415.830	A	28.497	56.399	31.701	37.34	117.502	0.000
125.00-100.00						B	28.497	56.399		37.34	139.276	0.000
						C	28.497	56.399		37.34	0.000	0.000
T5 100.00-75.00	87.50	1.231	7	1.2678	465.699	A	35.414	57.718	31.432	33.75	123.940	0.000
						B	35.414	57.718		33.75	163.758	0.000
						C	35.414	57.718		33.75	0.000	0.000
T6 75.00-50.00	62.50	1.146	6	1.2258	519.437	A	30.954	59.481	38.903	43.02	130.611	0.000
						B	30.954	59.481		43.02	160.677	0.000
						C	30.954	59.481		43.02	0.000	0.000
T7 50.00-25.00	37.50	1.029	6	1.1648	569.186	A	42.216	69.126	38.393	34.48	134.528	0.000
						B	42.216	69.126		34.48	156.194	0.000
						C	42.216	69.126		34.48	0.000	0.000
T8 25.00-0.00	12.50	0.85	5	1.0436	618.684	A	45.019	66.694	37.382	33.46	127.016	0.000
						B	45.019	66.694		33.46	147.297	0.000
						C	45.019	66.694		33.46	0.000	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	177.50	1.428	11	56.080	A	5.526	4.171	4.171	43.02	6.485	0.000
180.00-175.00					B	5.526	4.171		43.02	8.578	0.000
					C	5.526	4.171		43.02	0.000	0.000
T2	162.50	1.402	11	310.401	A	19.556	20.856	20.856	51.61	32.425	0.000
175.00-150.00					B	19.556	20.856		51.61	42.891	0.000
					C	19.556	20.856		51.61	0.000	0.000
T3	137.50	1.353	11	360.405	A	25.949	20.856	20.856	44.56	37.265	0.000
150.00-125.00					B	25.949	20.856		44.56	47.377	0.000
					C	25.949	20.856		44.56	0.000	0.000
T4	112.50	1.297	10	410.409	A	28.497	20.856	20.856	42.26	41.027	0.000
125.00-100.00					B	28.497	20.856		42.26	54.930	0.000
					C	28.497	20.856		42.26	0.000	0.000
T5	87.50	1.231	10	460.412	A	35.414	20.856	20.856	37.06	43.425	0.000
100.00-75.00					B	35.414	20.856		37.06	61.241	0.000
					C	35.414	20.856		37.06	0.000	0.000
T6 75.00-50.00	62.50	1.146	9	514.325	A	30.954	28.676	28.676	48.09	46.150	0.000
					B	30.954	28.676		48.09	61.241	0.000
					C	30.954	28.676		48.09	0.000	0.000
T7 50.00-25.00	37.50	1.029	8	564.329	A	42.216	28.676	28.676	40.45	47.725	0.000
					B	42.216	28.676		40.45	61.241	0.000
					C	42.216	28.676		40.45	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T8 25.00-0.00	12.50	0.85	7	614.333	A	45.019	28.676	28.676	38.91	47.725	0.000
					B	45.019	28.676		38.91	61.241	0.000
					C	45.019	28.676		38.91	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	53	1	1	7.520	1.31	261.23	C
180.00-175.00			B	0.173	2.689		1	1	7.520			
			C	0.173	2.689		1	1	7.520			
T2	0.23	2.24	A	0.13	2.846	52	1	1	29.247	5.63	225.09	C
175.00-150.00			B	0.13	2.846		1	1	29.247			
			C	0.13	2.846		1	1	29.247			
T3	0.26	3.43	A	0.13	2.847	50	1	1	35.732	6.45	258.08	C
150.00-125.00			B	0.13	2.847		1	1	35.732			
			C	0.13	2.847		1	1	35.732			
T4	0.30	4.46	A	0.12	2.884	48	1	1	38.330	6.82	272.71	C
125.00-100.00			B	0.12	2.884		1	1	38.330			
			C	0.12	2.884		1	1	38.330			
T5	0.32	4.96	A	0.122	2.876	45	1	1	45.397	7.44	297.53	C
100.00-75.00			B	0.122	2.876		1	1	45.397			
			C	0.122	2.876		1	1	45.397			
T6	0.33	5.41	A	0.116	2.901	42	1	1	42.488	6.73	269.02	C
75.00-50.00			B	0.116	2.901		1	1	42.488			
			C	0.116	2.901		1	1	42.488			
T7	0.34	6.26	A	0.126	2.863	38	1	1	54.163	7.09	283.78	C
50.00-25.00			B	0.126	2.863		1	1	54.163			
			C	0.126	2.863		1	1	54.163			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	31	1	1	57.712	6.16	246.44	C
			B	0.12	2.885		1	1	57.712			
			C	0.12	2.885		1	1	57.712			
Sum Weight:	2.17	33.96						OTM	4214.64 kip-ft	47.62		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	53	0.825	1	6.553	1.19	238.02	C
180.00-175.00			B	0.173	2.689		0.825	1	6.553			
			C	0.173	2.689		0.825	1	6.553			
T2	0.23	2.24	A	0.13	2.846	52	0.825	1	25.825	5.20	208.02	C
175.00-150.00			B	0.13	2.846		0.825	1	25.825			
			C	0.13	2.846		0.825	1	25.825			
T3	0.26	3.43	A	0.13	2.847	50	0.825	1	31.191	5.91	236.20	C
150.00-125.00			B	0.13	2.847		0.825	1	31.191			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.13	2.847		0.825	1	31.191			
T4	0.30	4.46	A	0.12	2.884	48	0.825	1	33.343	6.23	249.38	C
125.00-100.00			B	0.12	2.884		0.825	1	33.343			
			C	0.12	2.884		0.825	1	33.343			
T5	0.32	4.96	A	0.122	2.876	45	0.825	1	39.199	6.75	270.10	C
100.00-75.00			B	0.122	2.876		0.825	1	39.199			
			C	0.122	2.876		0.825	1	39.199			
T6	0.33	5.41	A	0.116	2.901	42	0.825	1	37.071	6.16	246.49	C
75.00-50.00			B	0.116	2.901		0.825	1	37.071			
			C	0.116	2.901		0.825	1	37.071			
T7	0.34	6.26	A	0.126	2.863	38	0.825	1	46.776	6.41	256.55	C
50.00-25.00			B	0.126	2.863		0.825	1	46.776			
			C	0.126	2.863		0.825	1	46.776			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	31	0.825	1	49.834	5.56	222.29	C
			B	0.12	2.885		0.825	1	49.834			
			C	0.12	2.885		0.825	1	49.834			
Sum Weight:	2.17	33.96						OTM	3855.61 kip-ft	43.42		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	53	0.8	1	6.415	1.17	234.70	C
180.00-175.00			B	0.173	2.689		0.8	1	6.415			
			C	0.173	2.689		0.8	1	6.415			
T2	0.23	2.24	A	0.13	2.846	52	0.8	1	25.336	5.14	205.58	C
175.00-150.00			B	0.13	2.846		0.8	1	25.336			
			C	0.13	2.846		0.8	1	25.336			
T3	0.26	3.43	A	0.13	2.847	50	0.8	1	30.542	5.83	233.08	C
150.00-125.00			B	0.13	2.847		0.8	1	30.542			
			C	0.13	2.847		0.8	1	30.542			
T4	0.30	4.46	A	0.12	2.884	48	0.8	1	32.630	6.15	246.05	C
125.00-100.00			B	0.12	2.884		0.8	1	32.630			
			C	0.12	2.884		0.8	1	32.630			
T5	0.32	4.96	A	0.122	2.876	45	0.8	1	38.314	6.65	266.18	C
100.00-75.00			B	0.122	2.876		0.8	1	38.314			
			C	0.122	2.876		0.8	1	38.314			
T6	0.33	5.41	A	0.116	2.901	42	0.8	1	36.297	6.08	243.28	C
75.00-50.00			B	0.116	2.901		0.8	1	36.297			
			C	0.116	2.901		0.8	1	36.297			
T7	0.34	6.26	A	0.126	2.863	38	0.8	1	45.720	6.32	252.66	C
50.00-25.00			B	0.126	2.863		0.8	1	45.720			
			C	0.126	2.863		0.8	1	45.720			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	31	0.8	1	48.708	5.47	218.84	C
			B	0.12	2.885		0.8	1	48.708			
			C	0.12	2.885		0.8	1	48.708			
Sum Weight:	2.17	33.96						OTM	3804.32 kip-ft	42.82		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	53	0.85	1	6.691	1.21	241.33	C
180.00-175.00			B	0.173	2.689		0.85	1	6.691			
			C	0.173	2.689		0.85	1	6.691			
T2	0.23	2.24	A	0.13	2.846	52	0.85	1	26.314	5.26	210.45	C
175.00-150.00			B	0.13	2.846		0.85	1	26.314			
			C	0.13	2.846		0.85	1	26.314			
T3	0.26	3.43	A	0.13	2.847	50	0.85	1	31.840	5.98	239.33	C
150.00-125.00			B	0.13	2.847		0.85	1	31.840			
			C	0.13	2.847		0.85	1	31.840			
T4	0.30	4.46	A	0.12	2.884	48	0.85	1	34.055	6.32	252.72	C
125.00-100.00			B	0.12	2.884		0.85	1	34.055			
			C	0.12	2.884		0.85	1	34.055			
T5	0.32	4.96	A	0.122	2.876	45	0.85	1	40.085	6.85	274.02	C
100.00-75.00			B	0.122	2.876		0.85	1	40.085			
			C	0.122	2.876		0.85	1	40.085			
T6	0.33	5.41	A	0.116	2.901	42	0.85	1	37.845	6.24	249.71	C
75.00-50.00			B	0.116	2.901		0.85	1	37.845			
			C	0.116	2.901		0.85	1	37.845			
T7	0.34	6.26	A	0.126	2.863	38	0.85	1	47.831	6.51	260.44	C
50.00-25.00			B	0.126	2.863		0.85	1	47.831			
			C	0.126	2.863		0.85	1	47.831			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	31	0.85	1	50.959	5.64	225.74	C
			B	0.12	2.885		0.85	1	50.959			
			C	0.12	2.885		0.85	1	50.959			
Sum Weight:	2.17	33.96						OTM	3906.90 kip-ft	44.02		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.43	1.51	A	0.306	2.28	8	1	1	12.733	0.34	67.68	C
180.00-175.00			B	0.306	2.28		1	1	12.733			
			C	0.306	2.28		1	1	12.733			
T2	2.12	5.83	A	0.23	2.498	8	1	1	50.439	1.53	61.35	C
175.00-150.00			B	0.23	2.498		1	1	50.439			
			C	0.23	2.498		1	1	50.439			
T3	2.44	8.12	A	0.221	2.528	7	1	1	57.686	1.73	69.01	C
150.00-125.00			B	0.221	2.528		1	1	57.686			
			C	0.221	2.528		1	1	57.686			
T4	2.82	9.39	A	0.204	2.582	7	1	1	60.938	1.87	74.73	C
125.00-100.00			B	0.204	2.582		1	1	60.938			
			C	0.204	2.582		1	1	60.938			
T5	3.09	10.45	A	0.2	2.596	7	1	1	68.571	2.00	79.80	C
100.00-75.00			B	0.2	2.596		1	1	68.571			
			C	0.2	2.596		1	1	68.571			
T6	3.06	10.34	A	0.174	2.685	6	1	1	64.884	1.85	73.99	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
75.00-50.00			B	0.174	2.685		1	1	64.884			
			C	0.174	2.685		1	1	64.884			
T7	2.94	12.04	A	0.196	2.611	6	1	1	81.876	1.85	73.92	C
50.00-25.00			B	0.196	2.611		1	1	81.876			
			C	0.196	2.611		1	1	81.876			
T8 25.00-0.00	2.58	12.03	A	0.181	2.662	5	1	1	83.125	1.52	60.67	C
			B	0.181	2.662		1	1	83.125			
			C	0.181	2.662		1	1	83.125			
Sum Weight:	19.48	69.70						OTM	1135.13 kip-ft	12.68		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.43	1.51	A	0.306	2.28	8	0.825	1	11.766	0.32	64.77	C
180.00-175.00			B	0.306	2.28		0.825	1	11.766			
			C	0.306	2.28		0.825	1	11.766			
T2	2.12	5.83	A	0.23	2.498	8	0.825	1	47.017	1.48	59.13	C
175.00-150.00			B	0.23	2.498		0.825	1	47.017			
			C	0.23	2.498		0.825	1	47.017			
T3	2.44	8.12	A	0.221	2.528	7	0.825	1	53.145	1.65	66.13	C
150.00-125.00			B	0.221	2.528		0.825	1	53.145			
			C	0.221	2.528		0.825	1	53.145			
T4	2.82	9.39	A	0.204	2.582	7	0.825	1	55.951	1.79	71.64	C
125.00-100.00			B	0.204	2.582		0.825	1	55.951			
			C	0.204	2.582		0.825	1	55.951			
T5	3.09	10.45	A	0.2	2.596	7	0.825	1	62.374	1.90	76.14	C
100.00-75.00			B	0.2	2.596		0.825	1	62.374			
			C	0.2	2.596		0.825	1	62.374			
T6	3.06	10.34	A	0.174	2.685	6	0.825	1	59.467	1.77	70.91	C
75.00-50.00			B	0.174	2.685		0.825	1	59.467			
			C	0.174	2.685		0.825	1	59.467			
T7	2.94	12.04	A	0.196	2.611	6	0.825	1	74.488	1.76	70.24	C
50.00-25.00			B	0.196	2.611		0.825	1	74.488			
			C	0.196	2.611		0.825	1	74.488			
T8 25.00-0.00	2.58	12.03	A	0.181	2.662	5	0.825	1	75.246	1.43	57.37	C
			B	0.181	2.662		0.825	1	75.246			
			C	0.181	2.662		0.825	1	75.246			
Sum Weight:	19.48	69.70						OTM	1087.67 kip-ft	12.11		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.43	1.51	A	0.306	2.28	8	0.8	1	11.628	0.32	64.35	C
180.00-175.00			B	0.306	2.28		0.8	1	11.628			
			C	0.306	2.28		0.8	1	11.628			
T2	2.12	5.83	A	0.23	2.498	8	0.8	1	46.528	1.47	58.81	C
175.00-150.00			B	0.23	2.498		0.8	1	46.528			
			C	0.23	2.498		0.8	1	46.528			
T3	2.44	8.12	A	0.221	2.528	7	0.8	1	52.496	1.64	65.72	C
150.00-125.00			B	0.221	2.528		0.8	1	52.496			
			C	0.221	2.528		0.8	1	52.496			
T4	2.82	9.39	A	0.204	2.582	7	0.8	1	55.239	1.78	71.20	C
125.00-100.00			B	0.204	2.582		0.8	1	55.239			
			C	0.204	2.582		0.8	1	55.239			
T5	3.09	10.45	A	0.2	2.596	7	0.8	1	61.489	1.89	75.62	C
100.00-75.00			B	0.2	2.596		0.8	1	61.489			
			C	0.2	2.596		0.8	1	61.489			
T6	3.06	10.34	A	0.174	2.685	6	0.8	1	58.693	1.76	70.47	C
75.00-50.00			B	0.174	2.685		0.8	1	58.693			
			C	0.174	2.685		0.8	1	58.693			
T7	2.94	12.04	A	0.196	2.611	6	0.8	1	73.432	1.74	69.72	C
50.00-25.00			B	0.196	2.611		0.8	1	73.432			
			C	0.196	2.611		0.8	1	73.432			
T8 25.00-0.00	2.58	12.03	A	0.181	2.662	5	0.8	1	74.121	1.42	56.90	C
			B	0.181	2.662		0.8	1	74.121			
			C	0.181	2.662		0.8	1	74.121			
Sum Weight:	19.48	69.70						OTM	1080.89 kip-ft	12.03		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.43	1.51	A	0.306	2.28	8	0.85	1	11.904	0.33	65.18	C
180.00-175.00			B	0.306	2.28		0.85	1	11.904			
			C	0.306	2.28		0.85	1	11.904			
T2	2.12	5.83	A	0.23	2.498	8	0.85	1	47.506	1.49	59.45	C
175.00-150.00			B	0.23	2.498		0.85	1	47.506			
			C	0.23	2.498		0.85	1	47.506			
T3	2.44	8.12	A	0.221	2.528	7	0.85	1	53.794	1.66	66.55	C
150.00-125.00			B	0.221	2.528		0.85	1	53.794			
			C	0.221	2.528		0.85	1	53.794			
T4	2.82	9.39	A	0.204	2.582	7	0.85	1	56.664	1.80	72.08	C
125.00-100.00			B	0.204	2.582		0.85	1	56.664			
			C	0.204	2.582		0.85	1	56.664			
T5	3.09	10.45	A	0.2	2.596	7	0.85	1	63.259	1.92	76.67	C
100.00-75.00			B	0.2	2.596		0.85	1	63.259			
			C	0.2	2.596		0.85	1	63.259			
T6	3.06	10.34	A	0.174	2.685	6	0.85	1	60.240	1.78	71.35	C
75.00-50.00			B	0.174	2.685		0.85	1	60.240			
			C	0.174	2.685		0.85	1	60.240			
T7	2.94	12.04	A	0.196	2.611	6	0.85	1	75.543	1.77	70.77	C
50.00-25.00			B	0.196	2.611		0.85	1	75.543			
			C	0.196	2.611		0.85	1	75.543			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T8 25.00-0.00	2.58	12.03	A	0.181	2.662	5	0.85	1	76.372	1.45	57.84	C
			B	0.181	2.662		0.85	1	76.372			
			C	0.181	2.662		0.85	1	76.372			
Sum Weight:	19.48	69.70						OTM	1094.45 kip-ft	12.19		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	11	1	1	7.904	0.29	57.61	C
180.00-175.00			B	0.173	2.689		1	1	7.904			
			C	0.173	2.689		1	1	7.904			
T2	0.23	2.24	A	0.13	2.846	11	1	1	31.356	1.25	50.19	C
175.00-150.00			B	0.13	2.846		1	1	31.356			
			C	0.13	2.846		1	1	31.356			
T3	0.26	3.43	A	0.13	2.847	11	1	1	37.749	1.43	57.05	C
150.00-125.00			B	0.13	2.847		1	1	37.749			
			C	0.13	2.847		1	1	37.749			
T4	0.30	4.46	A	0.12	2.884	10	1	1	40.284	1.50	60.04	C
125.00-100.00			B	0.12	2.884		1	1	40.284			
			C	0.12	2.884		1	1	40.284			
T5	0.32	4.96	A	0.122	2.876	10	1	1	47.203	1.63	65.08	C
100.00-75.00			B	0.122	2.876		1	1	47.203			
			C	0.122	2.876		1	1	47.203			
T6	0.33	5.41	A	0.116	2.901	9	1	1	47.155	1.54	61.44	C
75.00-50.00			B	0.116	2.901		1	1	47.155			
			C	0.116	2.901		1	1	47.155			
T7	0.34	6.26	A	0.126	2.863	8	1	1	58.433	1.60	63.80	C
50.00-25.00			B	0.126	2.863		1	1	58.433			
			C	0.126	2.863		1	1	58.433			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	7	1	1	61.226	1.37	54.79	C
			B	0.12	2.885		1	1	61.226			
			C	0.12	2.885		1	1	61.226			
Sum Weight:	2.17	33.96						OTM	935.28 kip-ft	10.60		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	11	0.825	1	6.937	0.26	52.67	C
180.00-175.00			B	0.173	2.689		0.825	1	6.937			
			C	0.173	2.689		0.825	1	6.937			
T2	0.23	2.24	A	0.13	2.846	11	0.825	1	27.934	1.16	46.55	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
175.00-150.00			B	0.13	2.846		0.825	1	27.934			
			C	0.13	2.846		0.825	1	27.934			
T3	0.26	3.43	A	0.13	2.847	11	0.825	1	33.208	1.31	52.38	C
150.00-125.00			B	0.13	2.847		0.825	1	33.208			
			C	0.13	2.847		0.825	1	33.208			
T4	0.30	4.46	A	0.12	2.884	10	0.825	1	35.297	1.38	55.07	C
125.00-100.00			B	0.12	2.884		0.825	1	35.297			
			C	0.12	2.884		0.825	1	35.297			
T5	0.32	4.96	A	0.122	2.876	10	0.825	1	41.006	1.48	59.24	C
100.00-75.00			B	0.122	2.876		0.825	1	41.006			
			C	0.122	2.876		0.825	1	41.006			
T6	0.33	5.41	A	0.116	2.901	9	0.825	1	41.738	1.42	56.64	C
75.00-50.00			B	0.116	2.901		0.825	1	41.738			
			C	0.116	2.901		0.825	1	41.738			
T7	0.34	6.26	A	0.126	2.863	8	0.825	1	51.045	1.45	58.00	C
50.00-25.00			B	0.126	2.863		0.825	1	51.045			
			C	0.126	2.863		0.825	1	51.045			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	7	0.825	1	53.348	1.24	49.65	C
			B	0.12	2.885		0.825	1	53.348			
			C	0.12	2.885		0.825	1	53.348			
Sum Weight:	2.17	33.96						OTM	858.80 kip-ft	9.70		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	11	0.8	1	6.799	0.26	51.96	C
180.00-175.00			B	0.173	2.689		0.8	1	6.799			
			C	0.173	2.689		0.8	1	6.799			
T2	0.23	2.24	A	0.13	2.846	11	0.8	1	27.445	1.15	46.03	C
175.00-150.00			B	0.13	2.846		0.8	1	27.445			
			C	0.13	2.846		0.8	1	27.445			
T3	0.26	3.43	A	0.13	2.847	11	0.8	1	32.559	1.29	51.72	C
150.00-125.00			B	0.13	2.847		0.8	1	32.559			
			C	0.13	2.847		0.8	1	32.559			
T4	0.30	4.46	A	0.12	2.884	10	0.8	1	34.584	1.36	54.36	C
125.00-100.00			B	0.12	2.884		0.8	1	34.584			
			C	0.12	2.884		0.8	1	34.584			
T5	0.32	4.96	A	0.122	2.876	10	0.8	1	40.120	1.46	58.40	C
100.00-75.00			B	0.122	2.876		0.8	1	40.120			
			C	0.122	2.876		0.8	1	40.120			
T6	0.33	5.41	A	0.116	2.901	9	0.8	1	40.964	1.40	55.96	C
75.00-50.00			B	0.116	2.901		0.8	1	40.964			
			C	0.116	2.901		0.8	1	40.964			
T7	0.34	6.26	A	0.126	2.863	8	0.8	1	49.990	1.43	57.17	C
50.00-25.00			B	0.126	2.863		0.8	1	49.990			
			C	0.126	2.863		0.8	1	49.990			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	7	0.8	1	52.223	1.22	48.91	C
			B	0.12	2.885		0.8	1	52.223			
			C	0.12	2.885		0.8	1	52.223			
Sum Weight:	2.17	33.96						OTM	847.87	9.57		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
									kip-ft			

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.05	0.58	A	0.173	2.689	11	0.85	1	7.075	0.27	53.37	C
180.00-175.00			B	0.173	2.689		0.85	1	7.075			
			C	0.173	2.689		0.85	1	7.075			
T2	0.23	2.24	A	0.13	2.846	11	0.85	1	28.423	1.18	47.07	C
175.00-150.00			B	0.13	2.846		0.85	1	28.423			
			C	0.13	2.846		0.85	1	28.423			
T3	0.26	3.43	A	0.13	2.847	11	0.85	1	33.857	1.33	53.05	C
150.00-125.00			B	0.13	2.847		0.85	1	33.857			
			C	0.13	2.847		0.85	1	33.857			
T4	0.30	4.46	A	0.12	2.884	10	0.85	1	36.009	1.39	55.78	C
125.00-100.00			B	0.12	2.884		0.85	1	36.009			
			C	0.12	2.884		0.85	1	36.009			
T5	0.32	4.96	A	0.122	2.876	10	0.85	1	41.891	1.50	60.07	C
100.00-75.00			B	0.122	2.876		0.85	1	41.891			
			C	0.122	2.876		0.85	1	41.891			
T6	0.33	5.41	A	0.116	2.901	9	0.85	1	42.512	1.43	57.33	C
75.00-50.00			B	0.116	2.901		0.85	1	42.512			
			C	0.116	2.901		0.85	1	42.512			
T7	0.34	6.26	A	0.126	2.863	8	0.85	1	52.101	1.47	58.83	C
50.00-25.00			B	0.126	2.863		0.85	1	52.101			
			C	0.126	2.863		0.85	1	52.101			
T8 25.00-0.00	0.34	6.62	A	0.12	2.885	7	0.85	1	54.473	1.26	50.38	C
			B	0.12	2.885		0.85	1	54.473			
			C	0.12	2.885		0.85	1	54.473			
Sum Weight:	2.17	33.96						OTM	869.72 kip-ft	9.83		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	12.52					
Bracing Weight	21.44					
Total Member Self-Weight	33.96			-17.04	-0.76	
Total Weight	39.32			-17.04	-0.76	
Wind 0 deg - No Ice		-0.59	-62.92	-6686.18	102.28	9.96
Wind 30 deg - No Ice		29.12	-51.08	-5474.65	-3091.43	-40.64
Wind 45 deg - No Ice		41.06	-41.10	-4406.10	-4388.70	-62.63
Wind 60 deg - No Ice		49.99	-28.55	-3057.21	-5368.17	-80.36

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 90 deg - No Ice		59.26	0.59	86.00	-6360.57	-98.54
Wind 120 deg - No Ice		54.74	31.97	3406.77	-5826.55	-90.32
Wind 135 deg - No Ice		43.59	43.63	4662.81	-4679.49	-76.72
Wind 150 deg - No Ice		30.14	51.66	5543.62	-3269.90	-57.90
Wind 180 deg - No Ice		0.59	58.11	6241.78	-103.80	-9.96
Wind 210 deg - No Ice		-29.12	51.08	5440.58	3089.92	40.64
Wind 225 deg - No Ice		-41.06	41.10	4372.03	4387.18	62.63
Wind 240 deg - No Ice		-54.15	30.95	3228.30	5722.00	80.36
Wind 270 deg - No Ice		-59.26	-0.59	-120.07	6359.06	98.54
Wind 300 deg - No Ice		-50.57	-29.56	-3235.68	5469.68	90.32
Wind 315 deg - No Ice		-41.89	-41.93	-4551.82	4532.90	76.72
Wind 330 deg - No Ice		-30.14	-51.66	-5577.69	3268.38	57.90
Member Ice	35.74					
Total Weight Ice	100.64			-136.29	-5.17	
Wind 0 deg - Ice		-0.09	-16.04	-1793.39	10.60	3.25
Wind 30 deg - Ice		7.70	-13.43	-1528.27	-800.02	-16.68
Wind 45 deg - Ice		10.88	-10.88	-1263.33	-1132.62	-25.27
Wind 60 deg - Ice		13.29	-7.62	-924.06	-1385.91	-32.14
Wind 90 deg - Ice		15.55	0.09	-120.52	-1622.17	-38.99
Wind 120 deg - Ice		13.93	8.10	705.91	-1448.65	-35.39
Wind 135 deg - Ice		11.23	11.23	1032.22	-1174.10	-29.87
Wind 150 deg - Ice		7.86	13.52	1271.45	-827.33	-22.31
Wind 180 deg - Ice		0.09	15.40	1466.57	-20.94	-3.25
Wind 210 deg - Ice		-7.70	13.43	1255.68	789.67	16.68
Wind 225 deg - Ice		-10.88	10.88	990.75	1122.28	25.27
Wind 240 deg - Ice		-13.84	7.94	678.60	1422.54	32.14
Wind 270 deg - Ice		-15.55	-0.09	-152.06	1611.83	38.99
Wind 300 deg - Ice		-13.38	-7.78	-951.38	1391.33	35.39
Wind 315 deg - Ice		-11.01	-11.01	-1285.63	1144.58	29.87
Wind 330 deg - Ice		-7.86	-13.52	-1544.04	816.98	22.31
Total Weight	39.32			-17.04	-0.76	
Wind 0 deg - Service		-0.12	-13.87	-1463.75	21.15	2.14
Wind 30 deg - Service		6.44	-11.28	-1200.33	-679.13	-8.64
Wind 45 deg - Service		9.08	-9.09	-966.36	-963.74	-13.32
Wind 60 deg - Service		11.05	-6.31	-670.76	-1178.72	-17.10
Wind 90 deg - Service		13.09	0.12	18.77	-1395.47	-20.98
Wind 120 deg - Service		12.06	7.04	746.11	-1276.37	-19.24
Wind 135 deg - Service		9.62	9.62	1021.94	-1025.68	-16.35
Wind 150 deg - Service		6.65	11.41	1215.91	-717.14	-12.34
Wind 180 deg - Service		0.12	12.85	1369.98	-22.74	-2.14
Wind 210 deg - Service		-6.44	11.28	1193.96	677.53	8.64
Wind 225 deg - Service		-9.08	9.09	960.00	962.14	13.32
Wind 240 deg - Service		-11.94	6.83	708.09	1252.83	17.10
Wind 270 deg - Service		-13.09	-0.12	-25.13	1393.88	20.98
Wind 300 deg - Service		-11.18	-6.53	-708.77	1199.08	19.24
Wind 315 deg - Service		-9.25	-9.26	-997.40	993.18	16.35
Wind 330 deg - Service		-6.65	-11.41	-1222.27	715.55	12.34

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice

Comb. No.	Description
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 175	Leg	Max Tension	13	0.02	-0.00	-0.00
			Max. Compression	35	-1.60	0.07	0.06
			Max. Mx	13	-0.14	0.60	0.05
			Max. My	25	-0.26	-0.26	-0.88
			Max. Vy	18	-0.87	0.00	0.00
			Max. Vx	26	-1.00	-0.00	-0.00
		Diagonal	Max Tension	15	1.42	0.00	0.00
			Max. Compression	14	-1.54	0.00	0.00
			Max. Mx	50	0.16	0.09	0.00
			Max. My	40	-0.11	0.00	0.00
			Max. Vy	50	-0.05	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Top Girt	Max Tension	29	1.21	0.01	0.00
			Max. Compression	12	-1.23	0.02	0.00
			Max. Mx	48	-0.17	0.05	0.01
			Max. My	35	0.09	0.05	0.01
			Max. Vy	48	0.05	0.05	0.01
			Max. Vx	35	-0.00	0.00	0.00
T2	175 - 150	Leg	Max Tension	29	18.97	-0.48	0.18
			Max. Compression	12	-22.34	0.36	0.07
			Max. Mx	13	-9.84	1.31	0.01
			Max. My	24	3.06	-0.67	-1.50
			Max. Vy	13	0.81	1.31	0.01
			Max. Vx	26	1.16	0.03	-1.35
		Diagonal	Max Tension	17	9.33	0.00	0.00
			Max. Compression	16	-9.46	0.00	0.00
			Max. Mx	50	1.98	0.15	0.00
			Max. My	40	0.09	0.00	0.01
			Max. Vy	50	0.06	0.00	0.00
			Max. Vx	40	0.00	0.00	0.00
		Horizontal	Max Tension	30	5.79	0.02	0.01
			Max. Compression	15	-5.83	0.02	0.01
			Max. Mx	48	-0.22	0.06	0.02
			Max. My	35	0.17	0.06	0.02
			Max. Vy	48	0.05	0.06	0.02
			Max. Vx	35	-0.00	0.00	0.00
		Top Girt	Max Tension	28	3.72	0.01	0.01
			Max. Compression	13	-3.73	0.01	0.01
			Max. Mx	38	-0.14	0.05	0.01
			Max. My	35	0.31	0.05	0.02
			Max. Vy	38	0.04	0.05	0.01
			Max. Vx	35	-0.00	0.00	0.00
T3	150 - 125	Leg	Max Tension	29	55.17	-0.34	-0.17
			Max. Compression	12	-62.26	0.27	0.09
			Max. Mx	13	-34.60	0.38	0.03
			Max. My	26	-4.77	-0.00	-0.51
			Max. Vy	3	0.23	0.35	0.03
			Max. Vx	10	-0.29	-0.01	0.51
		Diagonal	Max Tension	15	10.87	0.00	0.00
			Max. Compression	14	-11.14	0.00	0.00
			Max. Mx	50	2.41	0.24	0.00
			Max. My	40	0.10	0.00	0.01
			Max. Vy	50	-0.08	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Horizontal	Max Tension	30	7.32	0.03	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	15	-7.40	0.04	0.00
			Max. Mx	48	-0.25	0.11	0.00
			Max. My	12	-0.10	0.00	-0.02
			Max. Vy	48	-0.07	0.11	0.00
			Max. Vx	12	0.00	0.01	-0.02
		Top Girt	Max Tension	16	6.19	0.03	-0.00
			Max. Compression	15	-6.25	0.03	0.00
			Max. Mx	48	-0.22	0.09	0.00
			Max. My	12	0.08	0.01	-0.02
			Max. Vy	48	-0.06	0.09	0.00
			Max. Vx	12	0.00	0.01	-0.02
		Inner Bracing	Max Tension	13	0.01	0.00	0.00
	ati		Max. Compression	28	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.07	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T4	125 - 100	Leg	Max Tension	29	93.52	-0.47	-0.10
			Max. Compression	12	-106.20	0.38	0.07
			Max. Mx	13	-90.06	0.48	0.10
			Max. My	10	-2.73	-0.01	0.55
			Max. Vy	25	-0.29	0.48	-0.06
			Max. Vx	10	-0.39	-0.01	0.55
		Diagonal	Max Tension	15	12.82	0.00	0.00
			Max. Compression	14	-13.12	0.00	0.00
			Max. Mx	50	3.01	0.28	0.00
			Max. My	40	0.21	0.00	0.01
			Max. Vy	50	-0.10	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Horizontal	Max Tension	30	9.16	0.04	-0.01
			Max. Compression	15	-9.31	0.04	0.00
			Max. Mx	48	-0.42	0.13	0.00
			Max. My	12	-0.37	0.03	-0.02
			Max. Vy	48	-0.08	0.13	0.00
			Max. Vx	12	0.00	0.03	-0.02
		Top Girt	Max Tension	16	7.88	0.04	-0.00
			Max. Compression	15	-7.97	0.04	0.00
			Max. Mx	48	-0.29	0.11	0.00
			Max. My	12	-0.24	0.02	-0.02
			Max. Vy	48	-0.07	0.11	0.00
			Max. Vx	12	0.00	0.02	-0.02
		Inner Bracing	Max Tension	13	0.00	0.00	0.00
			Max. Compression	30	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.09	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.04	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T5	100 - 75	Leg	Max Tension	29	134.83	-0.32	-0.08
			Max. Compression	12	-153.85	0.49	0.15
			Max. Mx	13	-151.92	0.50	0.15
			Max. My	10	-4.89	-0.03	0.75
			Max. Vy	18	-0.30	-0.35	-0.02
			Max. Vx	26	-0.32	-0.00	-0.46
		Diagonal	Max Tension	15	14.34	0.00	0.00
			Max. Compression	14	-14.73	0.00	0.00
			Max. Mx	50	3.40	0.33	0.00
			Max. My	40	0.23	0.00	0.01
			Max. Vy	50	-0.10	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Horizontal	Max Tension	14	10.84	0.11	0.01
			Max. Compression	15	-10.93	0.09	0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	48	-0.44	0.23	0.00
			Max. My	12	-0.72	0.02	-0.04
			Max. Vy	48	-0.11	0.23	0.00
			Max. Vx	12	0.01	0.01	-0.04
		Top Girt	Max Tension	16	9.81	0.08	-0.00
			Max. Compression	15	-9.96	0.07	0.01
			Max. Mx	48	-0.45	0.20	0.01
			Max. My	12	-0.46	0.01	-0.04
			Max. Vy	48	-0.10	0.20	0.01
			Max. Vx	12	0.01	0.01	-0.04
		Inner Bracing	Max Tension	3	0.01	0.00	0.00
			Max. Compression	30	-0.01	0.00	0.00
			Max. Mx	34	-0.01	-0.11	0.00
			Max. My	12	0.01	0.00	-0.00
			Max. Vy	34	-0.05	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T6	75 - 50	Leg	Max Tension	29	169.88	-1.33	-0.21
			Max. Compression	12	-195.06	-1.07	0.30
			Max. Mx	12	-194.61	1.47	0.20
			Max. My	10	-6.74	-0.14	1.89
			Max. Vy	12	0.37	1.47	0.20
			Max. Vx	26	0.35	-0.20	-1.89
		Diagonal	Max Tension	15	19.02	0.00	0.00
			Max. Compression	14	-19.47	0.00	0.00
			Max. Mx	50	4.67	0.54	0.00
			Max. My	40	0.52	0.00	0.02
			Max. Vy	50	-0.13	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Horizontal	Max Tension	14	12.22	0.13	0.01
			Max. Compression	15	-12.43	0.10	0.01
			Max. Mx	48	-0.63	0.26	0.00
			Max. My	12	-0.94	0.03	-0.04
			Max. Vy	48	-0.12	0.26	0.00
			Max. Vx	12	0.01	0.03	-0.04
		Top Girt	Max Tension	14	11.48	0.12	0.01
			Max. Compression	15	-11.70	0.09	0.01
			Max. Mx	48	-0.55	0.24	0.00
			Max. My	12	-0.72	0.02	-0.04
			Max. Vy	48	-0.11	0.24	0.00
			Max. Vx	12	0.01	0.02	-0.04
		Inner Bracing	Max Tension	11	0.01	0.00	0.00
			Max. Compression	30	-0.02	0.00	0.00
			Max. Mx	34	-0.01	-0.14	0.00
			Max. My	12	0.01	0.00	-0.00
			Max. Vy	34	0.05	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T7	50 - 25	Leg	Max Tension	29	209.96	3.64	-0.44
			Max. Compression	12	-243.21	-5.25	0.46
			Max. Mx	12	-243.12	6.46	-0.38
			Max. My	26	-17.42	-0.59	-3.44
			Max. Vy	12	1.95	6.46	-0.38
			Max. Vx	26	0.99	-0.59	-3.44
		Diagonal	Max Tension	31	20.26	-0.13	-0.01
			Max. Compression	14	-21.51	0.00	0.00
			Max. Mx	30	11.58	-0.19	0.02
			Max. My	41	-6.19	-0.10	-0.03
			Max. Vy	49	0.08	-0.15	0.03
			Max. Vx	49	0.01	0.00	0.00
		Horizontal	Max Tension	14	13.32	0.15	0.01
			Max. Compression	15	-13.90	0.12	0.01
			Max. Mx	48	-0.96	0.30	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	12	-0.92	0.05	-0.04
			Max. Vy	48	-0.12	0.30	0.00
			Max. Vx	12	0.00	0.05	-0.04
		Top Girt	Max Tension	14	12.78	0.14	0.01
			Max. Compression	15	-13.20	0.11	0.01
			Max. Mx	48	0.77	0.28	0.00
			Max. My	12	-1.04	0.04	-0.04
			Max. Vy	48	-0.12	0.28	0.00
			Max. Vx	12	0.01	0.04	-0.04
		Redund Horz 1 Bracing	Max Tension	30	2.47	0.00	0.00
			Max. Compression	15	-2.43	0.00	0.00
			Max. Mx	34	0.35	-0.04	0.00
			Max. My	47	0.59	0.00	0.00
			Max. Vy	34	-0.03	0.00	0.00
			Max. Vx	47	-0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	32	1.94	0.00	0.00
			Max. Compression	30	-1.76	0.00	0.00
			Max. Mx	50	-0.18	-0.07	0.00
			Max. My	40	0.40	0.00	-0.00
			Max. Vy	50	0.04	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Inner Bracing	Max Tension	27	0.01	0.00	0.00
			Max. Compression	30	-0.02	0.00	0.00
			Max. Mx	34	-0.01	-0.16	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.06	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T8	25 - 0	Leg	Max Tension	29	252.67	4.07	-0.44
			Max. Compression	12	-294.79	-0.00	0.00
			Max. Mx	12	-268.43	6.86	-0.39
			Max. My	26	-18.98	-0.60	-3.51
			Max. Vy	12	2.02	6.86	-0.39
			Max. Vx	26	0.99	-0.60	-3.51
		Diagonal	Max Tension	15	20.86	-0.10	0.01
			Max. Compression	14	-21.99	0.00	0.00
			Max. Mx	30	11.28	-0.21	0.02
			Max. My	44	-6.01	-0.11	0.03
			Max. Vy	49	0.09	-0.16	0.03
			Max. Vx	44	0.01	0.00	0.00
		Horizontal	Max Tension	14	14.33	0.17	0.01
			Max. Compression	15	-15.02	0.13	0.01
			Max. Mx	48	-0.99	0.28	0.00
			Max. My	12	-1.00	0.07	-0.04
			Max. Vy	48	0.12	0.28	0.00
			Max. Vx	12	0.00	0.07	-0.04
		Top Girt	Max Tension	14	13.97	0.16	0.01
			Max. Compression	15	-14.48	0.13	0.01
			Max. Mx	48	-0.95	0.31	0.00
			Max. My	12	-1.14	0.06	-0.04
			Max. Vy	48	-0.12	0.31	0.00
			Max. Vx	12	0.00	0.06	-0.04
		Redund Horz 1 Bracing	Max Tension	30	2.59	0.00	0.00
			Max. Compression	15	-2.56	0.00	0.00
			Max. Mx	41	0.36	-0.04	0.00
			Max. My	47	-0.07	0.00	0.00
			Max. Vy	41	-0.03	0.00	0.00
			Max. Vx	47	-0.00	0.00	0.00
		Redund Diag 1	Max Tension	32	2.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Bracing					
			Max. Compression	30	-1.79	0.00	0.00
			Max. Mx	35	-0.09	-0.08	0.00
			Max. My	40	0.43	0.00	-0.00
			Max. Vy	35	-0.04	0.00	0.00
			Max. Vx	40	-0.00	0.00	0.00
		Inner Bracing	Max Tension	27	0.00	0.00	0.00
			Max. Compression	12	-0.02	0.00	0.00
			Max. Mx	34	-0.01	-0.23	0.00
			Max. My	12	0.00	0.00	-0.00
			Max. Vy	34	0.08	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	24	311.94	29.76	-19.28
	Max. H_x	24	311.94	29.76	-19.28
	Max. H_z	7	-258.92	-24.69	17.97
	Min. Vert	9	-266.80	-26.07	17.21
	Min. H_x	9	-266.80	-26.07	17.21
	Min. H_z	24	311.94	29.76	-19.28
Leg B	Max. Vert	12	320.27	-30.15	-19.81
	Max. H_x	29	-275.00	26.47	17.76
	Max. H_z	31	-268.08	25.11	18.62
	Min. Vert	29	-275.00	26.47	17.76
	Min. H_x	12	320.27	-30.15	-19.81
	Min. H_z	14	303.87	-27.64	-20.01
Leg A	Max. Vert	2	317.58	0.26	35.75
	Max. H_x	27	17.29	8.96	1.17
	Max. H_z	2	317.58	0.26	35.75
	Min. Vert	19	-269.89	-0.27	-31.50
	Min. H_x	11	7.75	-8.97	0.46
	Min. H_z	19	-269.89	-0.27	-31.50

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	39.32	0.00	0.00	-17.04	-0.76	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	47.19	-0.59	-62.92	-6535.24	102.37	9.96
0.9 Dead+1.0 Wind 0 deg - No Ice	35.39	-0.59	-62.92	-6526.49	102.53	9.95
1.2 Dead+1.0 Wind 30 deg - No Ice	47.19	29.12	-51.08	-5352.82	-3019.00	-40.69
0.9 Dead+1.0 Wind 30 deg - No Ice	35.39	29.12	-51.08	-5344.72	-3017.10	-40.68
1.2 Dead+1.0 Wind 45 deg - No Ice	47.19	41.06	-41.10	-4308.40	-4287.52	-62.69

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.0 Wind 45 deg - No Ice	35.39	41.06	-41.10	-4300.88	-4284.90	-62.67
1.2 Dead+1.0 Wind 60 deg - No Ice	47.19	49.99	-28.55	-2989.95	-5245.76	-80.42
0.9 Dead+1.0 Wind 60 deg - No Ice	35.39	49.99	-28.55	-2983.16	-5242.60	-80.40
1.2 Dead+1.0 Wind 90 deg - No Ice	47.19	59.26	0.59	82.59	-6216.20	-98.63
0.9 Dead+1.0 Wind 90 deg - No Ice	35.39	59.26	0.59	87.65	-6212.49	-98.60
1.2 Dead+1.0 Wind 120 deg - No Ice	47.19	54.74	31.97	3326.15	-5693.27	-90.43
0.9 Dead+1.0 Wind 120 deg - No Ice	35.39	54.74	31.97	3329.41	-5689.86	-90.40
1.2 Dead+1.0 Wind 135 deg - No Ice	47.19	43.59	43.63	4553.71	-4574.30	-76.81
0.9 Dead+1.0 Wind 135 deg - No Ice	35.39	43.59	43.63	4556.29	-4571.51	-76.80
1.2 Dead+1.0 Wind 150 deg - No Ice	47.19	30.14	51.66	5415.03	-3198.16	-57.96
0.9 Dead+1.0 Wind 150 deg - No Ice	35.39	30.14	51.66	5417.12	-3196.12	-57.95
1.2 Dead+1.0 Wind 180 deg - No Ice	47.19	0.59	58.11	6097.04	-104.26	-9.96
0.9 Dead+1.0 Wind 180 deg - No Ice	35.39	0.59	58.11	6098.75	-103.96	-9.95
1.2 Dead+1.0 Wind 210 deg - No Ice	47.19	-29.12	51.08	5311.75	3017.34	40.69
0.9 Dead+1.0 Wind 210 deg - No Ice	35.39	-29.12	51.08	5313.91	3015.89	40.68
1.2 Dead+1.0 Wind 225 deg - No Ice	47.19	-41.06	41.10	4267.23	4285.91	62.68
0.9 Dead+1.0 Wind 225 deg - No Ice	35.39	-41.06	41.10	4269.96	4283.74	62.67
1.2 Dead+1.0 Wind 240 deg - No Ice	47.19	-54.15	30.95	3147.25	5588.12	80.42
0.9 Dead+1.0 Wind 240 deg - No Ice	35.39	-54.15	30.95	3150.63	5585.24	80.40
1.2 Dead+1.0 Wind 270 deg - No Ice	47.19	-59.26	-0.59	-124.03	6214.36	98.63
0.9 Dead+1.0 Wind 270 deg - No Ice	35.39	-59.26	-0.59	-118.83	6211.11	98.60
1.2 Dead+1.0 Wind 300 deg - No Ice	47.19	-50.57	-29.56	-3168.91	5347.22	90.42
0.9 Dead+1.0 Wind 300 deg - No Ice	35.39	-50.57	-29.56	-3162.01	5344.44	90.40
1.2 Dead+1.0 Wind 315 deg - No Ice	47.19	-41.89	-41.93	-4454.54	4431.76	76.81
0.9 Dead+1.0 Wind 315 deg - No Ice	35.39	-41.89	-41.93	-4446.92	4429.49	76.79
1.2 Dead+1.0 Wind 330 deg - No Ice	47.19	-30.14	-51.66	-5456.16	3196.07	57.96
0.9 Dead+1.0 Wind 330 deg - No Ice	35.39	-30.14	-51.66	-5447.99	3194.49	57.95
1.2 Dead+1.0 Ice+1.0 Temp	108.51	0.00	0.00	-140.43	-5.36	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	108.51	-0.09	-16.04	-1755.73	10.52	3.26
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	108.51	7.70	-13.43	-1497.34	-779.86	-16.75
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	108.51	10.88	-10.88	-1238.98	-1104.26	-25.37

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	108.51	13.29	-7.62	-908.13	-1351.38	-32.26
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	108.51	15.55	0.09	-124.68	-1581.86	-39.13
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	108.51	13.93	8.10	680.78	-1412.70	-35.52
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	108.51	11.23	11.23	998.93	-1145.29	-29.98
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	108.51	7.86	13.52	1232.17	-807.39	-22.39
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	108.51	0.09	15.40	1422.26	-21.24	-3.26
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	108.51	-7.70	13.43	1216.30	769.17	16.75
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	108.51	-10.88	10.88	957.93	1093.57	25.37
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	108.51	-13.84	7.94	653.28	1386.10	32.27
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	108.51	-15.55	-0.09	-156.43	1571.15	39.13
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	108.51	-13.38	-7.78	-935.64	1356.55	35.51
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	108.51	-11.01	-11.01	-1261.44	1116.01	29.97
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	108.51	-7.86	-13.52	-1513.22	796.65	22.39
Dead+Wind 0 deg - Service	39.32	-0.12	-13.87	-1442.97	21.23	2.14
Dead+Wind 30 deg - Service	39.32	6.44	-11.28	-1186.01	-662.77	-8.64
Dead+Wind 45 deg - Service	39.32	9.08	-9.09	-957.47	-940.88	-13.34
Dead+Wind 60 deg - Service	39.32	11.05	-6.31	-668.70	-1151.07	-17.12
Dead+Wind 90 deg - Service	39.32	13.09	0.13	4.92	-1362.89	-21.00
Dead+Wind 120 deg - Service	39.32	12.06	7.04	714.92	-1246.35	-19.25
Dead+Wind 135 deg - Service	39.32	9.62	9.62	984.32	-1001.93	-16.36
Dead+Wind 150 deg - Service	39.32	6.65	11.41	1173.86	-700.89	-12.35
Dead+Wind 180 deg - Service	39.32	0.12	12.85	1324.25	-22.76	-2.14
Dead+Wind 210 deg - Service	39.32	-6.44	11.28	1151.86	661.26	8.64
Dead+Wind 225 deg - Service	39.32	-9.08	9.09	923.30	939.39	13.33
Dead+Wind 240 deg - Service	39.32	-11.94	6.83	676.82	1222.83	17.11
Dead+Wind 270 deg - Service	39.32	-13.09	-0.12	-39.07	1361.37	21.00
Dead+Wind 300 deg - Service	39.32	-11.18	-6.53	-706.80	1171.55	19.25
Dead+Wind 315 deg - Service	39.32	-9.25	-9.26	-988.58	970.47	16.36
Dead+Wind 330 deg - Service	39.32	-6.65	-11.41	-1208.00	699.35	12.35

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-39.32	0.00	0.00	39.32	0.00	0.000%
2	-0.59	-47.19	-62.92	0.59	47.19	62.92	0.000%
3	-0.59	-35.39	-62.92	0.59	35.39	62.92	0.000%
4	29.12	-47.19	-51.08	-29.12	47.19	51.08	0.000%
5	29.12	-35.39	-51.08	-29.12	35.39	51.08	0.000%
6	41.06	-47.19	-41.10	-41.06	47.19	41.10	0.000%
7	41.06	-35.39	-41.10	-41.06	35.39	41.10	0.000%
8	49.99	-47.19	-28.55	-49.99	47.19	28.55	0.000%
9	49.99	-35.39	-28.55	-49.99	35.39	28.55	0.000%
10	59.26	-47.19	0.59	-59.26	47.19	-0.59	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	59.26	-35.39	0.59	-59.26	35.39	-0.59	0.000%
12	54.74	-47.19	31.97	-54.74	47.19	-31.97	0.000%
13	54.74	-35.39	31.97	-54.74	35.39	-31.97	0.000%
14	43.59	-47.19	43.63	-43.59	47.19	-43.63	0.000%
15	43.59	-35.39	43.63	-43.59	35.39	-43.63	0.000%
16	30.14	-47.19	51.66	-30.14	47.19	-51.66	0.000%
17	30.14	-35.39	51.66	-30.14	35.39	-51.66	0.000%
18	0.59	-47.19	58.11	-0.59	47.19	-58.11	0.000%
19	0.59	-35.39	58.11	-0.59	35.39	-58.11	0.000%
20	-29.12	-47.19	51.08	29.12	47.19	-51.08	0.000%
21	-29.12	-35.39	51.08	29.12	35.39	-51.08	0.000%
22	-41.06	-47.19	41.10	41.06	47.19	-41.10	0.000%
23	-41.06	-35.39	41.10	41.06	35.39	-41.10	0.000%
24	-54.15	-47.19	30.95	54.15	47.19	-30.95	0.000%
25	-54.15	-35.39	30.95	54.15	35.39	-30.95	0.000%
26	-59.26	-47.19	-0.59	59.26	47.19	0.59	0.000%
27	-59.26	-35.39	-0.59	59.26	35.39	0.59	0.000%
28	-50.57	-47.19	-29.56	50.57	47.19	29.56	0.000%
29	-50.57	-35.39	-29.56	50.57	35.39	29.56	0.000%
30	-41.89	-47.19	-41.93	41.89	47.19	41.93	0.000%
31	-41.89	-35.39	-41.93	41.89	35.39	41.93	0.000%
32	-30.14	-47.19	-51.66	30.14	47.19	51.66	0.000%
33	-30.14	-35.39	-51.66	30.14	35.39	51.66	0.000%
34	0.00	-108.51	0.00	0.00	108.51	0.00	0.000%
35	-0.09	-108.51	-16.04	0.09	108.51	16.04	0.000%
36	7.70	-108.51	-13.43	-7.70	108.51	13.43	0.000%
37	10.88	-108.51	-10.88	-10.88	108.51	10.88	0.000%
38	13.29	-108.51	-7.62	-13.29	108.51	7.62	0.000%
39	15.55	-108.51	0.09	-15.55	108.51	-0.09	0.000%
40	13.93	-108.51	8.10	-13.93	108.51	-8.10	0.000%
41	11.23	-108.51	11.23	-11.23	108.51	-11.23	0.000%
42	7.86	-108.51	13.52	-7.86	108.51	-13.52	0.000%
43	0.09	-108.51	15.40	-0.09	108.51	-15.40	0.000%
44	-7.70	-108.51	13.43	7.70	108.51	-13.43	0.000%
45	-10.88	-108.51	10.88	10.88	108.51	-10.88	0.000%
46	-13.84	-108.51	7.94	13.84	108.51	-7.94	0.000%
47	-15.55	-108.51	-0.09	15.55	108.51	0.09	0.000%
48	-13.38	-108.51	-7.78	13.38	108.51	7.78	0.000%
49	-11.01	-108.51	-11.01	11.01	108.51	11.01	0.000%
50	-7.86	-108.51	-13.52	7.86	108.51	13.52	0.000%
51	-0.12	-39.32	-13.87	0.12	39.32	13.87	0.000%
52	6.44	-39.32	-11.28	-6.44	39.32	11.28	0.000%
53	9.08	-39.32	-9.09	-9.08	39.32	9.09	0.000%
54	11.05	-39.32	-6.31	-11.05	39.32	6.31	0.000%
55	13.09	-39.32	0.12	-13.09	39.32	-0.13	0.001%
56	12.06	-39.32	7.04	-12.06	39.32	-7.04	0.000%
57	9.62	-39.32	9.62	-9.62	39.32	-9.62	0.000%
58	6.65	-39.32	11.41	-6.65	39.32	-11.41	0.000%
59	0.12	-39.32	12.85	-0.12	39.32	-12.85	0.000%
60	-6.44	-39.32	11.28	6.44	39.32	-11.28	0.000%
61	-9.08	-39.32	9.09	9.08	39.32	-9.09	0.000%
62	-11.94	-39.32	6.83	11.94	39.32	-6.83	0.000%
63	-13.09	-39.32	-0.12	13.09	39.32	0.12	0.001%
64	-11.18	-39.32	-6.53	11.18	39.32	6.53	0.000%
65	-9.25	-39.32	-9.26	9.25	39.32	9.26	0.000%
66	-6.65	-39.32	-11.41	6.65	39.32	11.41	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000081
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000075
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000075
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001

60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	2.669	51	0.1141	0.0297
T2	175 - 150	2.549	51	0.1142	0.0293
T3	150 - 125	1.931	51	0.1103	0.0254
T4	125 - 100	1.382	51	0.0934	0.0226
T5	100 - 75	0.911	51	0.0787	0.0186
T6	75 - 50	0.532	51	0.0587	0.0142
T7	50 - 25	0.255	56	0.0417	0.0096
T8	25 - 0	0.074	56	0.0220	0.0048

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	SC479-HF1LDF	51	2.669	0.1141	0.0297	105235
178.00	432E-83I-01T TTA Unit	51	2.621	0.1141	0.0296	105235
177.00	5" Side Mount Standoff	51	2.597	0.1142	0.0295	105235
176.00	7'x2" Antenna Mount Pipe	51	2.573	0.1142	0.0294	105235
175.00	PA6-65AC	51	2.549	0.1142	0.0293	105235
173.00	PA6-65AC	51	2.500	0.1142	0.0291	103198
170.00	SC479-HF1LDF (D00I-E6085)	51	2.426	0.1141	0.0287	139379
169.00	PA6-65AC	51	2.401	0.1141	0.0286	163291
166.00	7'x2" Antenna Mount Pipe	51	2.326	0.1140	0.0281	336457
165.00	SC479-HF1LDF (D00I-E6085)	51	2.301	0.1139	0.0279	520426
163.00	PA6-65AC	51	2.251	0.1137	0.0276	Inf
147.00	7'x2" Antenna Mount Pipe	51	1.860	0.1088	0.0250	71089
146.00	6'x1" Whip Antenna w/ Mount	51	1.837	0.1082	0.0249	72036
143.00	6'x1" Whip Antenna w/ Mount	51	1.768	0.1064	0.0245	76043
140.00	6'x1" Whip Antenna w/ Mount	51	1.701	0.1043	0.0242	80580
136.00	SP2D03P36D-D	51	1.613	0.1014	0.0238	87467
127.00	7' Omni (Whip) Antenna	51	1.423	0.0948	0.0229	107443
126.00	Site Pro USF-4U	51	1.402	0.0941	0.0228	109144
114.00	3' Side Mount Standoff	51	1.165	0.0870	0.0210	95406
111.00	15' Omni (Whip) Antenna	51	1.108	0.0853	0.0205	91264
110.00	1151-3	51	1.090	0.0848	0.0204	89931
103.00	531-70 Dipole	51	0.963	0.0807	0.0191	81539
100.00	6' Dipole Antenna	51	0.911	0.0787	0.0186	78790
75.00	2" Dia 14' Omni	51	0.532	0.0587	0.0142	70298
48.00	DB803M-Y	56	0.237	0.0403	0.0092	87046

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	12.275	12	0.5243	0.1398
T2	175 - 150	11.722	12	0.5245	0.1379
T3	150 - 125	8.874	12	0.5079	0.1194
T4	125 - 100	6.347	12	0.4294	0.1064
T5	100 - 75	4.179	12	0.3616	0.0875
T6	75 - 50	2.440	12	0.2692	0.0667
T7	50 - 25	1.167	12	0.1910	0.0449
T8	25 - 0	0.334	12	0.1009	0.0227

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	SC479-HF1LDF	12	12.275	0.5243	0.1398	22625
178.00	432E-83I-01T TTA Unit	12	12.055	0.5244	0.1391	22625
177.00	5" Side Mount Standoff	12	11.944	0.5244	0.1387	22625
176.00	7'x2" Antenna Mount Pipe	12	11.834	0.5245	0.1383	22625
175.00	PA6-65AC	12	11.722	0.5245	0.1379	22625
173.00	PA6-65AC	12	11.498	0.5246	0.1369	22250
170.00	SC479-HF1LDF (D00I-E6085)	12	11.157	0.5246	0.1351	30586
169.00	PA6-65AC	12	11.043	0.5246	0.1344	36221
166.00	7'x2" Antenna Mount Pipe	12	10.697	0.5241	0.1322	77230
165.00	SC479-HF1LDF (D00I-E6085)	12	10.582	0.5239	0.1314	123167
163.00	PA6-65AC	12	10.351	0.5232	0.1298	274193
147.00	7'x2" Antenna Mount Pipe	12	8.548	0.5009	0.1175	15343
146.00	6'x1" Whip Antenna w/ Mount	12	8.440	0.4983	0.1169	15553
143.00	6'x1" Whip Antenna w/ Mount	12	8.124	0.4896	0.1152	16443
140.00	6'x1" Whip Antenna w/ Mount	12	7.813	0.4801	0.1137	17452
136.00	SP2D03P36D-D	12	7.409	0.4665	0.1119	19009
127.00	7' Omni (Whip) Antenna	12	6.535	0.4357	0.1075	23578
126.00	Site Pro USF-4U	12	6.441	0.4325	0.1070	23969
114.00	3' Side Mount Standoff	12	5.348	0.3995	0.0989	20720
111.00	15' Omni (Whip) Antenna	12	5.087	0.3919	0.0966	19764
110.00	1151-3	12	5.001	0.3894	0.0958	19464
103.00	531-70 Dipole	12	4.419	0.3706	0.0900	17607
100.00	6' Dipole Antenna	12	4.179	0.3616	0.0875	17023
75.00	2" Dia 14' Omni	12	2.440	0.2692	0.0667	15288
48.00	DB803M-Y	12	1.083	0.1846	0.0432	18856

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Diagonal	A325X	0.7500	1	1.42	17.94	0.079 ✔	1	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325X	0.6250	2	0.61	10.26	0.059 ✔	1	Member Block Shear
T2	175	Leg	A325X	0.7500	6	0.28	30.10	0.009 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	9.33	17.94	0.520 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	2.90	7.19	0.403 ✔	1	Member Block Shear
T3	150	Leg	A325X	0.7500	6	5.13	30.10	0.170 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	10.87	25.23	0.431 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	3.66	10.26	0.356 ✔	1	Member Block Shear
T4	125	Leg	A325X	0.7500	6	11.30	30.10	0.375 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	12.82	25.23	0.508 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	4.58	10.26	0.446 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	3.94	10.26	0.384 ✔	1	Member Block Shear
T5	100	Leg	A325X	1.0000	6	17.84	54.52	0.327 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	14.34	25.23	0.568 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	5.42	11.62	0.466 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	4.91	11.62	0.422 ✔	1	Member Block Shear
T6	75	Leg	A325X	1.0000	8	18.60	54.52	0.341 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	19.02	25.23	0.754 ✔	1	Member Bearing
		Horizontal	A325X	0.6250	2	6.11	11.62	0.526 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	5.74	11.62	0.494 ✔	1	Member Block Shear
T7	50	Leg	A325X	1.0000	8	23.65	54.52	0.434 ✔	1	Bolt Tension
		Diagonal	A325X	1.0000	1	20.26	27.10	0.748 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	6.66	11.62	0.573 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	6.39	11.62	0.550 ✔	1	Member Block Shear
T8	25	Leg	A325X	1.0000	8	28.88	54.52	0.530 ✔	1	Bolt Tension
		Diagonal	A325X	1.0000	1	20.86	27.10	0.770 ✔	1	Member Block Shear
		Horizontal	A325X	0.6250	2	7.17	11.62	0.617 ✔	1	Member Block Shear
		Top Girt	A325X	0.6250	2	6.99	11.62	0.601 ✔	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	HSS5x.25	5.01	5.01	35.6 K=1.00	3.4894	-1.60	143.13	0.011 [1]
T2	175 - 150	HSS5x.25	25.03	8.34	59.3 K=1.00	3.4894	-22.34	121.40	0.184 [1]
T3	150 - 125	HSS5x.25	25.03	8.34	59.3 K=1.00	3.4894	-62.26	121.40	0.513 [1]
T4	125 - 100	HSS5x.5	25.03	8.34	62.1 K=1.00	6.6249	-106.20	255.02	0.416 [1]
T5	100 - 75	HSS5x.5	25.03	8.34	62.1 K=1.00	6.6249	-153.85	255.02	0.603 [1]
T6	75 - 50	HSS6.875x.5	25.03	12.51	66.1 K=1.00	9.3640	-195.06	344.70	0.566 [1]
T7	50 - 25	HSS6.875x.5	25.03	6.26	33.0 K=1.00	9.3640	-243.21	459.46	0.529 [1]
T8	25 - 0	HSS6.875x.5	25.03	6.26	33.0 K=1.00	9.3640	-294.79	459.46	0.642 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	2L2 1/2x2x3/16	7.43	6.88	104.5 K=1.00	1.6200	-1.54	38.28	0.040 [1]
T2	175 - 150	2L2 1/2x2x3/16	10.57	9.96	151.3 K=1.00	1.6200	-9.46	20.26	0.467 [1]
T3	150 - 125	2L3x2 1/2x1/4	11.21	10.63	135.0 K=1.00	2.6300	-11.14	41.31	0.270 [1]
T4	125 - 100	2L3x2 1/2x1/4	11.90	11.34	144.0 K=1.00	2.6300	-13.12	36.29	0.362 [1]
T5	100 - 75	2L3x2 1/2x1/4	12.64	12.09	153.5 K=1.00	2.6300	-14.73	31.94	0.461 [1]
T6	75 - 50	2L3 1/2x3x1/4	16.33	15.61	168.8 K=1.00	3.1300	-19.47	31.45	0.619 [1]
T7	50 - 25	2L3x3 1/2x1/4	16.99	16.23	128.1 K=1.00	3.1300	-21.51	54.56	0.394 [1]
T8	25 - 0	2L3x3 1/2x1/4	17.68	16.94	133.8 K=1.00	3.1300	-21.89	50.08	0.437 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	175 - 150	L2 1/2x2 1/2x3/16	12.33	5.76	135.0 K=0.97	0.9020	-5.83	14.17	0.411 [1]
T3	150 - 125	L3x3x1/4	14.33	6.76	133.0 K=0.97	1.4400	-7.40	23.29	0.318 [1]
T4	125 - 100	L3x3x1/4	16.33	7.76	148.5 K=0.94	1.4400	-9.31	18.70	0.498 [1]
T5	100 - 75	L4x4x1/4	18.33	8.76	129.4 K=0.98	1.9400	-10.93	33.18	0.330 [1]
T6	75 - 50	L4x4x1/4	20.00	9.52	138.0 K=0.96	1.9400	-12.43	29.14	0.427 [1]
T7	50 - 25	L4x4x1/4	22.00	10.52	149.5 K=0.94	1.9400	-13.90	24.83	0.560 [1]
T8	25 - 0	L4x4x1/4	24.00	11.52	161.1 K=0.93	1.9400	-15.02	21.41	0.702 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	L3x3x1/4	10.60	4.89	109.6 K=1.10	1.4400	-1.23	32.26	0.038 [1]
T2	175 - 150	L2 1/2x2 1/2x3/16	11.00	5.29	126.3 K=0.98	0.9020	-3.73	16.17	0.231 [1]
T3	150 - 125	L3x3x1/4	13.00	6.29	125.8 K=0.99	1.4400	-6.25	26.05	0.240 [1]
T4	125 - 100	L3x3x1/4	15.00	7.09	138.2 K=0.96	1.4400	-7.97	21.59	0.369 [1]
T5	100 - 75	L4x4x1/4	17.00	8.09	121.7 K=1.00	1.9400	-9.96	37.12	0.268 [1]
T6	75 - 50	L4x4x1/4	19.00	9.02	132.3 K=0.97	1.9400	-11.70	31.73	0.369 [1]
T7	50 - 25	L4x4x1/4	21.00	10.02	143.8 K=0.95	1.9400	-13.20	26.85	0.492 [1]
T8	25 - 0	L4x4x1/4	23.00	11.02	155.3 K=0.93	1.9400	-14.48	23.02	0.629 [1]

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	50 - 25	L2 1/2x2 1/2x3/16	5.50	5.21	126.4	0.9020	-4.22	16.16	0.261 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T8	25 - 0	L2 1/2x2 1/2x3/16	6.00	5.71	K=1.00 138.5 K=1.00	0.9020	-5.11	13.46	✔ 0.380 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	50 - 25	L3x3x1/4	8.16	7.72	156.5 K=1.00	1.4400	-3.13	16.84	0.186 [1] ✔
T8	25 - 0	L3x3x1/4	8.49	8.07	163.6 K=1.00	1.4400	-3.62	15.40	0.235 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	150 - 125	L2 1/2x2x3/16	7.17	7.17	201.4 K=1.00	0.8090	-0.01	5.71	0.002 [1] ✔
T4	125 - 100	L2 1/2x2x3/16	8.17	8.17	229.5 K=1.00	0.8090	-0.01	4.40	0.002 [1] ✔
T5	100 - 75	L2 1/2x2x3/16	9.17	9.17	257.6 K=1.00	0.8090	-0.01	3.49	0.004 [1] ✔
T6	75 - 50	KL/R > 250 (C) - 136 L2 1/2x2 1/2x3/16	10.00	10.00	242.4 K=1.00	0.9020	-0.02	4.39	0.003 [1] ✔
T7	50 - 25	L2 1/2x2 1/2x3/16	11.00	11.00	266.7 K=1.00	0.9020	-0.02	3.63	0.004 [1] ✔
T8	25 - 0	KL/R > 250 (C) - 215 L3x3x1/4	12.00	12.00	243.2 K=1.00	1.4400	-0.02	6.97	0.002 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 175	HSS5x.25	5.01	5.01	35.6	3.4894	0.02	157.02	0.000 [1] ✔
T2	175 - 150	HSS5x.25	25.03	8.34	59.3	3.4894	18.97	157.02	0.121 [1] ✔
T3	150 - 125	HSS5x.25	25.03	8.34	59.3	3.4894	55.17	157.02	0.351 [1] ✔
T4	125 - 100	HSS5x.5	25.03	8.34	62.1	6.6249	93.52	357.75	0.261 [1] ✔
T5	100 - 75	HSS5x.5	25.03	8.34	62.1	6.6249	134.83	357.75	0.377 [1] ✔
T6	75 - 50	HSS6.875x.5	25.03	12.51	66.1	9.3640	169.88	505.65	0.336 [1] ✔
T7	50 - 25	HSS6.875x.5	25.03	6.26	33.0	9.3640	209.96	505.65	0.415 [1] ✔
T8	25 - 0	HSS6.875x.5	25.03	6.26	33.0	9.3640	252.67	505.65	0.500 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 175	2L2 1/2x2x3/16	7.43	6.88	108.6	0.9689	1.42	42.15	0.034 [1] ✔
T2	175 - 150	2L2 1/2x2x3/16	10.57	9.96	155.4	0.9689	9.33	42.15	0.221 [1] ✔
T3	150 - 125	2L3x2 1/2x1/4	11.21	10.63	138.4	1.6444	10.87	71.53	0.152 [1] ✔
T4	125 - 100	2L3x2 1/2x1/4	11.90	11.34	147.5	1.6444	12.82	71.53	0.179 [1] ✔
T5	100 - 75	2L3x2 1/2x1/4	12.64	12.09	157.0	1.6444	14.34	71.53	0.200 [1] ✔
T6	75 - 50	2L3 1/2x3x1/4	16.33	15.61	171.7	2.0194	19.02	87.84	0.217 [1] ✔
T7	50 - 25	2L3x3 1/2x1/4	16.99	16.23	130.8	1.9256	20.26	83.76	0.242 [1] ✔
T8	25 - 0	2L3x3 1/2x1/4	17.68	16.94	136.4	1.9256	20.86	83.76	0.249 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	175 - 150	L2 1/2x2 1/2x3/16	12.33	5.76	137.8	0.5710	5.79	24.84	0.233 [1] ✔
T3	150 - 125	L3x3x1/4	14.33	6.76	89.8	0.9394	7.32	40.86	0.179 [1] ✔
T4	125 - 100	L3x3x1/4	16.33	7.76	102.7	0.9394	9.16	40.86	0.224 [1] ✔
T5	100 - 75	L4x4x1/4	18.33	8.76	86.0	1.3144	10.84	57.18	0.190 [1] ✔
T6	75 - 50	L4x4x1/4	20.00	9.52	93.2	1.3144	12.22	57.18	0.214 [1] ✔
T7	50 - 25	L4x4x1/4	22.00	10.52	102.8	1.3144	13.32	57.18	0.233 [1] ✔
T8	25 - 0	L4x4x1/4	24.00	11.52	112.4	1.3144	14.33	57.18	0.251 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	L3x3x1/4	10.60	4.89	98.5	0.9394	1.21	40.86	0.030 [1] ✔
T2	175 - 150	L2 1/2x2 1/2x3/16	11.00	5.29	122.4	0.9020	3.72	29.22	0.127 [1] ✔
T3	150 - 125	L3x3x1/4	13.00	6.29	81.2	1.4400	6.19	46.66	0.133 [1] ✔
T4	125 - 100	L3x3x1/4	15.00	7.09	94.1	0.9394	7.88	40.86	0.193 [1] ✔
T5	100 - 75	L4x4x1/4	17.00	8.09	79.6	1.3144	9.81	57.18	0.172 [1] ✔
T6	75 - 50	L4x4x1/4	19.00	9.02	88.4	1.3144	11.48	57.18	0.201 [1] ✔
T7	50 - 25	L4x4x1/4	21.00	10.02	98.0	1.3144	12.78	57.18	0.224 [1] ✔
T8	25 - 0	L4x4x1/4	23.00	11.02	107.6	1.3144	13.97	57.18	0.244 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Tension)

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

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	50 - 25	L2 1/2x2 1/2x3/16	5.50	5.21	80.4	0.9020	4.22	29.22	0.144 [1] ✔
T8	25 - 0	L2 1/2x2 1/2x3/16	6.00	5.71	88.1	0.9020	5.11	29.22	0.175 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	50 - 25	L3x3x1/4	8.01	7.56	97.5	1.4400	3.21	46.66	0.069 [1] ✔
T8	25 - 0	L3x3x1/4	8.33	7.90	102.0	1.4400	3.70	46.66	0.079 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	150 - 125	L2 1/2x2x3/16	6.50	6.50	130.0	0.8090	0.01	26.21	0.000 [1] ✔
T4	125 - 100	L2 1/2x2x3/16	7.50	7.50	150.1	0.8090	0.00	26.21	0.000 [1] ✔
T5	100 - 75	L2 1/2x2x3/16	8.50	8.50	170.1	0.8090	0.01	26.21	0.000 [1] ✔
T6	75 - 50	L2 1/2x2 1/2x3/16	9.50	9.50	146.5	0.9020	0.01	29.22	0.000 [1] ✔
T7	50 - 25	L2 1/2x2 1/2x3/16	10.50	10.50	162.0	0.9020	0.01	29.22	0.000 [1] ✔
T8	25 - 0	L3x3x1/4	11.50	11.50	148.4	1.4400	0.00	46.66	0.000 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 175	Leg	HSS5x.25	1	-0.95	143.13	1.8	Pass
		Leg	HSS5x.25	2	-0.32	143.13	2.1	Pass
		Leg	HSS5x.25	3	-1.60	143.13	2.3	Pass
T2	175 - 150	Leg	HSS5x.25	13	-20.65	121.40	17.0	Pass
		Leg	HSS5x.25	14	-22.34	121.40	18.4	Pass
		Leg	HSS5x.25	15	-21.95	121.40	18.1	Pass
T3	150 - 125	Leg	HSS5x.25	43	-58.78	121.40	48.4	Pass
		Leg	HSS5x.25	44	-62.26	121.40	51.3	Pass
		Leg	HSS5x.25	45	-61.20	121.40	50.4	Pass
T4	125 - 100	Leg	HSS5x.5	82	-101.26	255.02	39.7	Pass
		Leg	HSS5x.5	83	-106.20	255.02	41.6	Pass
		Leg	HSS5x.5	84	-104.34	255.02	40.9	Pass
T5	100 - 75	Leg	HSS5x.5	121	-147.82	255.02	58.0	Pass
		Leg	HSS5x.5	122	-153.85	255.02	60.3	Pass
		Leg	HSS5x.5	123	-151.71	255.02	59.5	Pass
T6	75 - 50	Leg	HSS6.875x.5	160	-188.32	344.70	54.6	Pass
		Leg	HSS6.875x.5	161	-195.06	344.70	56.6	Pass
		Leg	HSS6.875x.5	162	-192.80	344.70	55.9	Pass
T7	50 - 25	Leg	HSS6.875x.5	187	-235.79	459.46	51.3	Pass
		Leg	HSS6.875x.5	188	-243.21	459.46	52.9	Pass
		Leg	HSS6.875x.5	189	-240.81	459.46	52.4	Pass
T8	25 - 0	Leg	HSS6.875x.5	238	-286.73	459.46	62.4	Pass
		Leg	HSS6.875x.5	239	-294.79	459.46	64.2	Pass
		Leg	HSS6.875x.5	240	-292.26	459.46	63.6	Pass
T1	180 - 175	Diagonal	2L2 1/2x2x3/16	7	-0.79	38.28	2.1 3.7 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	8	-0.79	38.28	2.1 3.7 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	9	-1.54	38.28	4.0 7.9 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	10	-1.53	38.28	4.0 7.9 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	11	-1.24	38.28	3.2 6.3 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	12	-1.25	38.28	3.3 6.3 (b)	Pass
T2	175 - 150	Diagonal	2L2 1/2x2x3/16	20	-8.13	20.26	40.1 44.6 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	21	-8.12	20.26	40.1 44.6 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	23	-9.46	20.26	46.7 52.0 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	24	-9.45	20.26	46.6 52.0 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	26	-8.61	20.26	42.5 47.4 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	27	-8.62	20.26	42.6 47.3 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	29	-7.04	21.10	33.4 38.6 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	30	-7.03	21.10	33.3 38.6 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	32	-8.85	21.10	42.0 48.6 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	33	-8.84	21.10	41.9 48.7 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	35	-8.01	21.10	38.0 44.1 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	36	-8.03	21.10	38.1 44.0 (b)	Pass
		Diagonal	2L2 1/2x2x3/16	37	-4.62	21.97	21.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
							25.1 (b)	
		Diagonal	2L2 1/2x2x3/16	38	-4.62	21.97	21.0	Pass
							25.2 (b)	
		Diagonal	2L2 1/2x2x3/16	39	-6.04	21.97	27.5	Pass
							33.0 (b)	
		Diagonal	2L2 1/2x2x3/16	40	-6.03	21.97	27.5	Pass
							33.0 (b)	
		Diagonal	2L2 1/2x2x3/16	41	-5.02	21.97	22.8	Pass
							27.4 (b)	
		Diagonal	2L2 1/2x2x3/16	42	-5.03	21.97	22.9	Pass
							27.4 (b)	
T3	150 - 125	Diagonal	2L3x2 1/2x1/4	50	-9.09	41.31	22.0	Pass
							35.0 (b)	
		Diagonal	2L3x2 1/2x1/4	51	-9.09	41.31	22.0	Pass
							35.0 (b)	
		Diagonal	2L3x2 1/2x1/4	53	-11.14	41.31	27.0	Pass
							42.7 (b)	
		Diagonal	2L3x2 1/2x1/4	54	-11.04	41.31	26.7	Pass
							43.1 (b)	
		Diagonal	2L3x2 1/2x1/4	56	-10.49	41.31	25.4	Pass
							40.6 (b)	
		Diagonal	2L3x2 1/2x1/4	57	-10.51	41.31	25.4	Pass
							40.5 (b)	
		Diagonal	2L3x2 1/2x1/4	62	-8.92	43.07	20.7	Pass
							34.4 (b)	
		Diagonal	2L3x2 1/2x1/4	63	-8.93	43.07	20.7	Pass
							34.4 (b)	
		Diagonal	2L3x2 1/2x1/4	65	-10.46	43.07	24.3	Pass
							40.3 (b)	
		Diagonal	2L3x2 1/2x1/4	66	-10.42	43.07	24.2	Pass
							40.5 (b)	
		Diagonal	2L3x2 1/2x1/4	68	-9.94	43.07	23.1	Pass
							38.5 (b)	
		Diagonal	2L3x2 1/2x1/4	69	-9.95	43.07	23.1	Pass
							38.4 (b)	
		Diagonal	2L3x2 1/2x1/4	73	-8.52	44.90	19.0	Pass
							32.9 (b)	
		Diagonal	2L3x2 1/2x1/4	74	-8.52	44.90	19.0	Pass
							32.9 (b)	
		Diagonal	2L3x2 1/2x1/4	75	-9.92	44.90	22.1	Pass
							38.4 (b)	
		Diagonal	2L3x2 1/2x1/4	76	-9.91	44.90	22.1	Pass
							38.4 (b)	
		Diagonal	2L3x2 1/2x1/4	77	-9.23	44.90	20.6	Pass
							35.7 (b)	
		Diagonal	2L3x2 1/2x1/4	78	-9.24	44.90	20.6	Pass
							35.7 (b)	
T4	125 - 100	Diagonal	2L3x2 1/2x1/4	89	-10.20	36.29	28.1	Pass
							39.3 (b)	
		Diagonal	2L3x2 1/2x1/4	90	-10.20	36.29	28.1	Pass
							39.3 (b)	
		Diagonal	2L3x2 1/2x1/4	92	-13.12	36.29	36.2	Pass
							50.1 (b)	
		Diagonal	2L3x2 1/2x1/4	93	-12.94	36.29	35.6	Pass
							50.8 (b)	
		Diagonal	2L3x2 1/2x1/4	95	-12.10	36.29	33.3	Pass
							46.9 (b)	
		Diagonal	2L3x2 1/2x1/4	96	-12.13	36.29	33.4	Pass
							46.8 (b)	
		Diagonal	2L3x2 1/2x1/4	101	-9.70	37.84	25.6	Pass
							37.3 (b)	

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Diagonal	2L3x2 1/2x1/4	102	-9.70	37.84	25.6 37.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	104	-12.31	37.84	32.5 47.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	105	-12.15	37.84	32.1 47.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	107	-11.40	37.84	30.1 44.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	108	-11.43	37.84	30.2 44.1 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	112	-9.39	39.47	23.8 36.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	113	-9.39	39.47	23.8 36.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	114	-11.73	39.47	29.7 44.9 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	115	-11.60	39.47	29.4 45.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	116	-10.88	39.47	27.6 42.1 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	117	-10.90	39.47	27.6 42.1 (b)	Pass
T5	100 - 75	Diagonal	2L3x2 1/2x1/4	128	-11.11	31.94	34.8 42.6 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	129	-11.11	31.94	34.8 42.6 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	131	-14.73	31.94	46.1 55.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	132	-14.43	31.94	45.2 56.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	134	-13.66	31.94	42.8 52.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	135	-13.70	31.94	42.9 52.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	140	-10.88	33.29	32.7 41.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	141	-10.88	33.29	32.7 41.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	143	-14.31	33.29	43.0 54.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	144	-14.05	33.29	42.2 55.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	146	-13.26	33.29	39.8 51.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	147	-13.29	33.29	39.9 51.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	151	-10.63	34.71	30.6 40.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	152	-10.63	34.71	30.6 40.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	153	-13.82	34.71	39.8 52.6 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	154	-13.60	34.71	39.2 53.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	155	-12.81	34.71	36.9 49.5 (b)	Pass
		Diagonal	2L3x2 1/2x1/4	156	-12.84	34.71	37.0 49.4 (b)	Pass
T6	75 - 50	Diagonal	2L3 1/2x3x1/4	167	-14.32	31.45	45.5 55.0 (b)	Pass
		Diagonal	2L3 1/2x3x1/4	168	-14.32	31.45	45.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
							55.1 (b)	
		Diagonal	2L3 1/2x3x1/4	170	-19.47	31.45	61.9	Pass
							73.5 (b)	
		Diagonal	2L3 1/2x3x1/4	171	-18.99	31.45	60.4	Pass
							75.4 (b)	
		Diagonal	2L3 1/2x3x1/4	173	-18.10	31.45	57.5	Pass
							70.2 (b)	
		Diagonal	2L3 1/2x3x1/4	174	-18.15	31.45	57.7	Pass
							70.0 (b)	
		Diagonal	2L3 1/2x3x1/4	178	-13.98	32.77	42.6	Pass
							53.7 (b)	
		Diagonal	2L3 1/2x3x1/4	179	-13.97	32.77	42.6	Pass
							53.8 (b)	
		Diagonal	2L3 1/2x3x1/4	180	-18.85	32.77	57.5	Pass
							71.4 (b)	
		Diagonal	2L3 1/2x3x1/4	181	-18.42	32.77	56.2	Pass
							73.0 (b)	
		Diagonal	2L3 1/2x3x1/4	182	-17.49	32.77	53.4	Pass
							67.8 (b)	
		Diagonal	2L3 1/2x3x1/4	183	-17.54	32.77	53.5	Pass
							67.7 (b)	
T7	50 - 25	Diagonal	2L3x3 1/2x1/4	194	-15.68	54.56	28.7	Pass
							56.0 (b)	
		Diagonal	2L3x3 1/2x1/4	197	-15.73	54.56	28.8	Pass
							56.3 (b)	
		Diagonal	2L3x3 1/2x1/4	201	-21.51	54.56	39.4	Pass
							74.8 (b)	
		Diagonal	2L3x3 1/2x1/4	204	-20.57	54.56	37.7	Pass
							74.2 (b)	
		Diagonal	2L3x3 1/2x1/4	208	-19.75	54.56	36.2	Pass
							71.0 (b)	
		Diagonal	2L3x3 1/2x1/4	211	-20.26	54.56	37.1	Pass
							71.8 (b)	
		Diagonal	2L3x3 1/2x1/4	217	-15.23	56.87	26.8	Pass
							54.6 (b)	
		Diagonal	2L3x3 1/2x1/4	220	-15.27	56.87	26.9	Pass
							54.8 (b)	
		Diagonal	2L3x3 1/2x1/4	223	-20.76	56.87	36.5	Pass
							72.4 (b)	
		Diagonal	2L3x3 1/2x1/4	226	-19.96	56.87	35.1	Pass
							72.4 (b)	
		Diagonal	2L3x3 1/2x1/4	229	-19.10	56.87	33.6	Pass
							68.9 (b)	
		Diagonal	2L3x3 1/2x1/4	232	-19.39	56.87	34.1	Pass
							69.4 (b)	
T8	25 - 0	Diagonal	2L3x3 1/2x1/4	245	-15.77	50.08	31.5	Pass
							56.6 (b)	
		Diagonal	2L3x3 1/2x1/4	248	-15.80	50.08	31.5	Pass
							56.8 (b)	
		Diagonal	2L3x3 1/2x1/4	252	-21.89	50.08	43.7	Pass
							76.2 (b)	
		Diagonal	2L3x3 1/2x1/4	255	-21.02	50.08	42.0	Pass
							77.0 (b)	
		Diagonal	2L3x3 1/2x1/4	259	-20.24	50.08	40.4	Pass
							73.1 (b)	
		Diagonal	2L3x3 1/2x1/4	262	-20.58	50.08	41.1	Pass
							73.5 (b)	
		Diagonal	2L3x3 1/2x1/4	268	-16.01	52.21	30.7	Pass
							57.1 (b)	
		Diagonal	2L3x3 1/2x1/4	271	-16.06	52.21	30.8	Pass
							57.4 (b)	

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Diagonal	2L3x3 1/2x1/4	274	-21.99	52.21	42.1 76.2 (b)	Pass
		Diagonal	2L3x3 1/2x1/4	277	-20.99	52.21	40.2 75.8 (b)	Pass
		Diagonal	2L3x3 1/2x1/4	280	-20.20	52.21	38.7 72.6 (b)	Pass
		Diagonal	2L3x3 1/2x1/4	283	-20.77	52.21	39.8 73.4 (b)	Pass
T2	175 - 150	Horizontal	L2 1/2x2 1/2x3/16	19	-4.92	14.17	34.7	Pass
		Horizontal	L2 1/2x2 1/2x3/16	22	-5.83	14.17	41.1	Pass
		Horizontal	L2 1/2x2 1/2x3/16	25	-5.24	14.17	37.0	Pass
		Horizontal	L2 1/2x2 1/2x3/16	28	-4.26	15.55	27.4 29.2 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	31	-5.51	15.55	35.5 38.2 (b)	Pass
		Horizontal	L2 1/2x2 1/2x3/16	34	-4.95	15.55	31.9 34.6 (b)	Pass
T3	150 - 125	Horizontal	L3x3x1/4	49	-5.92	23.29	25.4 29.3 (b)	Pass
		Horizontal	L3x3x1/4	52	-7.40	23.29	31.8 35.6 (b)	Pass
		Horizontal	L3x3x1/4	55	-6.86	23.29	29.5 33.9 (b)	Pass
		Horizontal	L3x3x1/4	61	-5.66	25.21	22.5 28.0 (b)	Pass
		Horizontal	L3x3x1/4	64	-6.78	25.21	26.9 32.8 (b)	Pass
		Horizontal	L3x3x1/4	67	-6.33	25.21	25.1 31.3 (b)	Pass
T4	125 - 100	Horizontal	L3x3x1/4	88	-7.10	18.70	38.0	Pass
		Horizontal	L3x3x1/4	91	-9.31	18.70	49.8	Pass
		Horizontal	L3x3x1/4	94	-8.51	18.70	45.5	Pass
		Horizontal	L3x3x1/4	100	-6.61	20.07	32.9	Pass
		Horizontal	L3x3x1/4	103	-8.55	20.07	42.6	Pass
		Horizontal	L3x3x1/4	106	-7.83	20.07	39.0	Pass
T5	100 - 75	Horizontal	L4x4x1/4	127	-8.13	33.18	24.5 35.4 (b)	Pass
		Horizontal	L4x4x1/4	130	-10.93	33.18	33.0 46.6 (b)	Pass
		Horizontal	L4x4x1/4	133	-10.07	33.18	30.3 43.8 (b)	Pass
		Horizontal	L4x4x1/4	139	-7.83	35.18	22.3 34.1 (b)	Pass
		Horizontal	L4x4x1/4	142	-10.47	35.18	29.8 44.6 (b)	Pass
		Horizontal	L4x4x1/4	145	-9.62	35.18	27.3 41.8 (b)	Pass
T6	75 - 50	Horizontal	L4x4x1/4	166	-9.02	29.14	30.9 38.8 (b)	Pass
		Horizontal	L4x4x1/4	169	-12.43	29.14	42.7 52.6 (b)	Pass
		Horizontal	L4x4x1/4	172	-11.49	29.14	39.4 49.6 (b)	Pass
T7	50 - 25	Horizontal	L4x4x1/4	193	-9.92	24.83	40.0 41.8 (b)	Pass
		Horizontal	L4x4x1/4	200	-13.90	24.83	56.0 57.3 (b)	Pass
		Horizontal	L4x4x1/4	207	-13.00	24.83	52.4 54.7 (b)	Pass
T8	25 - 0	Horizontal	L4x4x1/4	244	-10.62	21.41	49.6	Pass
		Horizontal	L4x4x1/4	251	-15.02	21.41	70.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Horizontal	L4x4x1/4	258	-14.15	21.41	66.1	Pass
T1	180 - 175	Top Girt	L3x3x1/4	4	-0.83	32.26	2.6	Pass
							4.0 (b)	
		Top Girt	L3x3x1/4	5	-1.23	32.26	3.8	Pass
							5.9 (b)	
		Top Girt	L3x3x1/4	6	-1.02	32.26	3.2	Pass
							4.9 (b)	
T2	175 - 150	Top Girt	L2 1/2x2 1/2x3/16	16	-2.91	16.17	18.0	Pass
		Top Girt	L2 1/2x2 1/2x3/16	17	-3.73	16.17	23.1	Pass
		Top Girt	L2 1/2x2 1/2x3/16	18	-3.27	16.17	20.2	Pass
T3	150 - 125	Top Girt	L3x3x1/4	46	-5.28	26.05	20.3	Pass
		Top Girt	L3x3x1/4	47	-6.25	26.05	24.0	Pass
		Top Girt	L3x3x1/4	48	-5.74	26.05	22.0	Pass
T4	125 - 100	Top Girt	L3x3x1/4	85	-6.25	21.59	29.0	Pass
							31.0 (b)	
		Top Girt	L3x3x1/4	86	-7.97	21.59	36.9	Pass
							38.4 (b)	
		Top Girt	L3x3x1/4	87	-7.30	21.59	33.8	Pass
							36.0 (b)	
T5	100 - 75	Top Girt	L4x4x1/4	124	-7.53	37.12	20.3	Pass
							32.7 (b)	
		Top Girt	L4x4x1/4	125	-9.96	37.12	26.8	Pass
							42.2 (b)	
		Top Girt	L4x4x1/4	126	-9.15	37.12	24.6	Pass
							39.7 (b)	
T6	75 - 50	Top Girt	L4x4x1/4	163	-8.52	31.73	26.9	Pass
							36.9 (b)	
		Top Girt	L4x4x1/4	164	-11.70	31.73	36.9	Pass
							49.4 (b)	
		Top Girt	L4x4x1/4	165	-10.79	31.73	34.0	Pass
							46.7 (b)	
T7	50 - 25	Top Girt	L4x4x1/4	190	-9.54	26.85	35.5	Pass
							40.3 (b)	
		Top Girt	L4x4x1/4	191	-13.20	26.85	49.2	Pass
							55.0 (b)	
		Top Girt	L4x4x1/4	192	-12.25	26.85	45.6	Pass
							52.0 (b)	
T8	25 - 0	Top Girt	L4x4x1/4	241	-10.36	23.02	45.0	Pass
		Top Girt	L4x4x1/4	242	-14.48	23.02	62.9	Pass
		Top Girt	L4x4x1/4	243	-13.54	23.02	58.8	Pass
T7	50 - 25	Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	195	-4.09	16.16	25.3	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	198	-4.22	16.16	26.1	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	202	-4.22	16.16	26.1	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	205	-4.17	16.16	25.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	209	-4.17	16.16	25.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	212	-4.09	16.16	25.3	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	218	-4.09	17.69	23.1	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	221	-4.22	17.69	23.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	224	-4.22	17.69	23.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	227	-4.17	17.69	23.6	Pass
		Redund Horz 1	L2 1/2x2 1/2x3/16	230	-4.17	17.69	23.6	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Bracing						
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	233	-4.09	17.69	23.1	Pass
T8	25 - 0	Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	246	-4.97	13.46	36.9	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	249	-5.11	13.46	38.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	253	-5.11	13.46	38.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	256	-5.07	13.46	37.6	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	260	-5.07	13.46	37.6	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	263	-4.97	13.46	36.9	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	269	-4.97	14.72	33.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	272	-5.11	14.72	34.7	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	275	-5.11	14.72	34.7	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	278	-5.07	14.72	34.4	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	281	-5.07	14.72	34.4	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	284	-4.97	14.72	33.8	Pass
T7	50 - 25	Redund Diag 1 Bracing	L3x3x1/4	196	-3.03	16.84	18.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	199	-3.13	16.84	18.6	Pass
		Redund Diag 1 Bracing	L3x3x1/4	203	-3.13	16.84	18.6	Pass
		Redund Diag 1 Bracing	L3x3x1/4	206	-3.10	16.84	18.4	Pass
		Redund Diag 1 Bracing	L3x3x1/4	210	-3.10	16.84	18.4	Pass
		Redund Diag 1 Bracing	L3x3x1/4	213	-3.03	16.84	18.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	219	-3.12	17.55	17.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	222	-3.21	17.55	18.3	Pass
		Redund Diag 1 Bracing	L3x3x1/4	225	-3.21	17.55	18.3	Pass
		Redund Diag 1 Bracing	L3x3x1/4	228	-3.18	17.55	18.1	Pass
		Redund Diag 1 Bracing	L3x3x1/4	231	-3.18	17.55	18.1	Pass
		Redund Diag 1 Bracing	L3x3x1/4	234	-3.12	17.55	17.8	Pass
T8	25 - 0	Redund Diag 1 Bracing	L3x3x1/4	247	-3.52	15.40	22.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	250	-3.62	15.40	23.5	Pass
		Redund Diag 1 Bracing	L3x3x1/4	254	-3.62	15.40	23.5	Pass
		Redund Diag 1 Bracing	L3x3x1/4	257	-3.59	15.40	23.3	Pass
		Redund Diag 1 Bracing	L3x3x1/4	261	-3.59	15.40	23.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Redund Diag 1 Bracing	L3x3x1/4	264	-3.52	15.40	22.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	270	-3.60	16.06	22.4	Pass
		Redund Diag 1 Bracing	L3x3x1/4	273	-3.70	16.06	23.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	276	-3.70	16.06	23.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	279	-3.67	16.06	22.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	282	-3.67	16.06	22.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	285	-3.60	16.06	22.4	Pass
T3	150 - 125	Inner Bracing	L2 1/2x2x3/16	58	-0.01	5.71	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	59	-0.01	5.71	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	60	-0.01	5.71	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	70	-0.01	6.28	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	71	-0.01	6.28	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	72	-0.01	6.28	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	79	-0.01	6.94	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	80	-0.01	6.94	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	81	-0.01	6.94	0.4	Pass
T4	125 - 100	Inner Bracing	L2 1/2x2x3/16	97	-0.01	4.40	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	98	-0.01	4.40	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	99	-0.01	4.40	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	109	-0.01	4.78	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	110	-0.01	4.78	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	111	-0.01	4.78	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	118	-0.01	5.21	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	119	-0.01	5.21	0.4	Pass
		Inner Bracing	L2 1/2x2x3/16	120	-0.01	5.21	0.4	Pass
T5	100 - 75	Inner Bracing	L2 1/2x2x3/16	136	-0.01	3.49	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	137	-0.01	3.49	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	138	-0.01	3.49	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	148	-0.01	3.76	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	149	-0.01	3.76	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	150	-0.01	3.76	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	157	-0.01	4.06	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	158	-0.01	4.06	0.5	Pass
		Inner Bracing	L2 1/2x2x3/16	159	-0.01	4.06	0.5	Pass
T6	75 - 50	Inner Bracing	L2 1/2x2 1/2x3/16	175	-0.02	4.39	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	176	-0.01	4.39	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	177	-0.01	4.39	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	184	-0.02	4.87	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	185	-0.02	4.87	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	186	-0.02	4.87	0.6	Pass
T7	50 - 25	Inner Bracing	L2 1/2x2 1/2x3/16	214	-0.02	3.63	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	215	-0.02	3.63	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	216	-0.01	3.63	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	235	-0.02	3.98	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	236	-0.02	3.98	0.6	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	237	-0.02	3.98	0.6	Pass
T8	25 - 0	Inner Bracing	L3x3x1/4	265	-0.02	6.97	0.5	Pass
		Inner Bracing	L3x3x1/4	266	-0.02	6.97	0.5	Pass
		Inner Bracing	L3x3x1/4	267	-0.01	6.97	0.5	Pass
		Inner Bracing	L3x3x1/4	286	-0.02	7.58	0.5	Pass
		Inner Bracing	L3x3x1/4	287	-0.02	7.58	0.5	Pass
		Inner Bracing	L3x3x1/4	288	-0.01	7.58	0.5	Pass
							Summary	
						Leg (T8)	64.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Diagonal (T8)	77.0	Pass
						Horizontal (T8)	70.2	Pass
						Top Girt (T8)	62.9	Pass
						Redund Horz 1 Bracing (T8)	38.0	Pass
						Redund Diag 1 Bracing (T8)	23.5	Pass
						Inner Bracing (T7)	0.6	Pass
						Bolt Checks	77.0	Pass
						RATING =	**77.0**	**Pass**

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Subject:	Anchor Bolt Analysis
Location:	180-ft Lattice Tower Southbury, CT
Rev. 0: 9/1/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21082.11

Anchor Bolt Analysis:

Input Data:

Tower Reactions:

Tension Force =	Tension := 275·kips	(Input From tnxTower)
Compression Force =	Compression := 320·kips	(Input From tnxTower)
Shear Force =	Shear := 36·kips	(Input From tnxTower)

Anchor Bolt Data:

ASTMA36

Number of Anchor Bolts =	N := 6	(User Input)
Bolt Ultimate Strength =	F_u := 58·ksi	(User Input)
Bolt Yield Strength =	F_y := 36·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 1.75·in	(User Input)
Threads per Inch =	n := 5	(User Input)
Length from Top of Pier to Bottom of Leveling Nut =	L_{ar} := 0·in	(User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 2.405 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 1.899 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 1.555 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.389 \cdot in$

Elastic Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.369 \cdot in^3$

Plastic Section Modulus of Bolt = $Z_x := \frac{D_n^3}{6} = 0.627 \cdot in^3$

Anchor Bolt Design Strength:

Resistance Factor for Flexure = $\phi_f := 0.9$

Resistance Factor for Compression = $\phi_c := 0.9$

Resistance Factor for Tension = $\phi_t := 0.75$

Resistance Factor for Shear = $\phi_v := 0.75$

Design Tensile Strength = $\Phi R_{nt} := \phi_t \cdot F_u \cdot A_n = 82.6 \cdot k$

Design Compression Strength = $\Phi R_{nc} := \phi_c \cdot F_y \cdot A_g = 77.9 \cdot k$

Design Shear Strength (Tension) = $\Phi R_{nv} := \phi_v \cdot 0.5 F_u \cdot A_g = 52.3 \cdot k$

Design Shear Strength (Compression) = $\Phi R_{nvc} := \phi_c \cdot 0.6 F_y \cdot A_g \cdot 0.75 = 35.1 \cdot k$

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Check Anchor Bolt Tension Force:

Maximum Tensile Force = $P_{ut} := \frac{Tension}{N} = 45.8 \cdot kips$

Maximum Compressive Force = $P_{uc} := \frac{Compression}{N} = 53.3 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 6 \cdot kips$

Condition1 = $Condition1 := if\left[\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2\right] \le 1.00, "OK", "Overstressed"\right]$

Condition1 = "OK"

Condition2 = $Condition2 := if\left[\left[\left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Bolt % of Capacity = $\max\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2, \left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] = 71.4 \cdot \%$

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Subject: FOUNDATION ANALYSIS

Location: Southbury, CT

Rev. 0: 9/1/21

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 21082.11

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 6594 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 63 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 47 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 320 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 275 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	
Tower Width =	$W_t := 25 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 3.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 4.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 37.5 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 3000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 2.5 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 11$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.375 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.00 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 50$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.00 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 50$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$

Load Factor = $LF := 1$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if\left(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}\right) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if\left(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}\right) = 100 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0.884 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot \left(D_f - T_f\right) + c \cdot 2 \cdot \sqrt{K_p} = 0.884 \cdot ksf$

$P_{top} := if\left[n < \left(D_f - T_f\right), P_{pt}, P_{pn}\right] = 0.884 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.769 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.326 \cdot ksf$

$T_p := if\left[n < \left(D_f - T_f\right), T_f, \left(D_f - n\right)\right] = 2.5 \cdot ft$

$A_p := W_f \cdot T_p = 93.75 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 124.352 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (4) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 553.733 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (4) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 0 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{\left(D_f - n\right)^2 \cdot \tan\left(\Phi_s\right)}{2} \cdot W_f\right] \cdot \gamma_s = 7.904 \cdot kip$

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{\left(W_t \cdot \cos(30 \cdot deg)\right)}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{\left(W_t \cdot \cos(30 \cdot deg)\right)}{3}$

$X_t := if\left(Pos_t = 1, X_{t1}, X_{t2}\right) = 11.533$

$X_{off1} := \frac{W_f}{2} - \left[\frac{\left(W_t \cdot \cos(30 \cdot deg)\right)}{3} + X_t\right] = 0$ $X_{off2} := 0$

$X_{off} := if\left(Pos_t = 1, X_{off1}, X_{off2}\right)$ $X_{off} = 0 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} + WT_t = 545.4 \cdot kip$

Resisting Moment = $M_r := \left(WT_{tot}\right) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) + 0.75WT_{s2} \cdot \left[W_f + \frac{\left(D_f - n\right) \cdot \tan\left(\Phi_s\right)}{3}\right] = 11322 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot \left(L_p + T_f\right) = 6972 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.62$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if\left(FS \geq FS_{req}, "Okay", "No\ Good"\right)$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 369.764 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 601 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 1.406 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 8789.06 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.22 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.366 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s), "Okay", "No Good"]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.616$

Distance to Kern = $X_k := \frac{W_f}{6} = 6.25$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 11.606$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.495 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.495 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 2.999 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot C_t, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 26 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.228 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 62.86 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1089 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 19.4$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 29.9$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 313 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1125.6 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Maximum Moment in Pad = $M_{max} := 3400 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 3.778 \times 10^3 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 307.808 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 29.06 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 2.221 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 30.357 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.04552 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 30.4 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 39.3 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 30.4 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 39.3 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 8.04 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 27.4 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 72 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1809.56 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 9.05 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 10.99 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 12.581 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 42 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 2646 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips}\right)$

$(D \ N \ n \ P_u \ M_{xu}) = (48 \ \ 11 \ \ 9 \ \ 426.56 \ \ 2.646 \times 10^3)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (2.593 \times 10^3 \ \ 1.608 \times 10^4 \ \ -27.349 \ \ 6.079 \times 10^{-3})$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

Axial_Load_Check = "Okay"

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 39 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 27 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 34.85 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 17.299 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) = 34.846 \cdot in$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 24.713 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 24.713 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

ATTACHMENT F – PROOF OF DELIVERY OF NOTICE

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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-068

Cassidy Road

Southbury, CT 06488

August 23, 2021

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the Eversource installation on the self-support tower off of Cassidy Road in Southbury, CT. Eversource has recently installed one omnidirectional antenna for both transmit and receive purposes as part of its 220 MHz communications system. The original proposal consisted of two omnidirectional antennas – one transmit and one receive-only antenna.

This report considers the 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.

Figure 1: View of ES-068 Southbury Cassidy

Site Address	Cassidy Road
Latitude	41° 30' 24.5" N
Longitude	73° 17' 0.5" W
Site Elevation AMSL	756’
Survey Engineer	Marc Salas
Survey Date/Time	6/23/2020; 11:15 AM – 12:00 PM

Table 1: Survey Information

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

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

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

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

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

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

3. Power Density Calculation Methods

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

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

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

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

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

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

4. Proposed Antenna Configuration

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

Operator	Antenna Model	TX Freq. (MHz)	Ant Gain (dBd)	Power per Channel (ERP - Watts)	Number of Channels	Vertical Beamwidth	Length (ft)	Antenna Centerline Height (ft)
Eversource	dbSpectra SP2D03P36D-D	217	2.9	124	4	30°	19	141.5

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

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

[2] Transmit antenna height is based on the stamped Black & Veatch construction drawings dated August 13, 2021.

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 23, 2020 between 11:15 AM and 12:00 PM. The calculated % MPE contribution from the recently installed equipment was then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna pattern of the antenna model specified by Eversource to determine the "Off Beam Loss" factor shown in the power density formula from Section 3. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Table 4 below lists 10 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was 6.95% (Average Uncontrolled/General Population MPE) and was recorded at Location 2 by the northern access gate on the east side of the compound. The highest composite (measured + calculated) % MPE value is calculated to be 6.96% (Average Uncontrolled/General Population) and is also calculated to occur at Location 2.

Meas. Location	Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Composite % MPE (Uncontrolled / General)
1	Compound access gate (#1)	41.50673	-73.28317	88	6.46%	0.01%	6.46%
2	**Compound access gate (#2)**	**41.50685**	**-73.28319**	**80**	**6.95%**	**0.01%**	**6.96%**
3	Gate on Cassidy Road to State Property, N of compound	41.50698	-73.28321	96	6.40%	0.01%	6.41%
4	Split of Cassidy Road and gravel drive, between the tower and water tank	41.50657	-73.28304	146	2.04%	0.04%	2.08%
5	along gravel drive, ~ 275' N of measurement point 4	41.50731	-73.28282	255	< 1.00%	0.12%	< 1.12%
6	near the end of the gravel drive, N of the site	41.50903	-73.28311	820	< 1.00%	0.11%	< 1.11%
7	SE of the site, southern driveway entrance to home across street	41.50584	-73.28297	378	< 1.00%	0.24%	< 1.24%
8	S on Cassidy Road, near gated farm field entrance	41.50469	-73.28277	795	< 1.00%	0.11%	< 1.11%
9	S on Cassidy Road, at intersection with Toms Hill Road	41.50218	-73.28229	1720	1.94%	0.03%	1.97%
10	S on Cassidy Road, near accessway to agricultural buildings	41.49939	-73.28192	2742	2.62%	0.01%	2.63%

Table 4: Measured and Calculated % MPE Results [4] [5]

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

[5] Measured and calculated % MPE values listed are rounded to two decimal points and the composite % MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total composite value reflected in the table.

Figures 2 and 3 below are aerial views[6] 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

[6] 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 off of Cassidy Road in Southbury, 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 6.95% MPE. This measurement was recorded at Location 2 by the compound access gate.

The highest composite (measured + calculated) power density is **6.96% of the FCC General Population MPE limit** with the recently installed Eversource equipment and is also calculated to occur at Location 2.

The above analysis concludes that RF exposure at ground level around the tower, both at the time of measurement and with the updated 220 MHz antenna installation, are 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.

Keith Vellante

August 23, 2021

Report Prepared 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[7]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-3.0	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[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)
0.3-1.34	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)

[7] 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

[8] 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

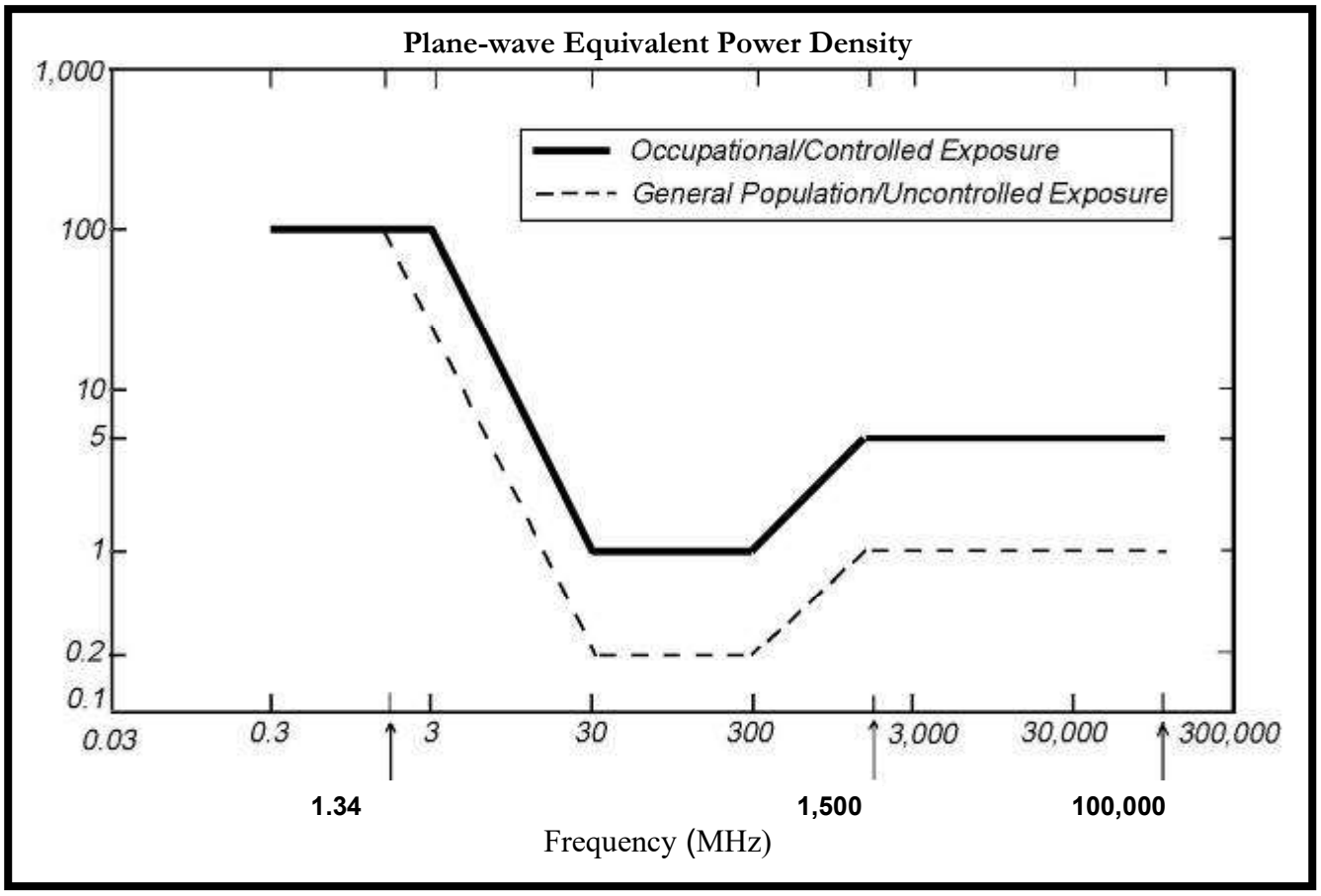
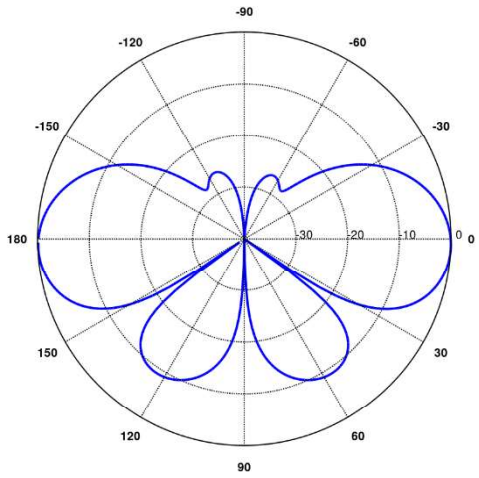


Figure 4: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns[9]

217 MHz

Manufacturer:	dbSpectra
Model #:	SP2D03P36D-D
Frequency Band:	217 - 220 MHz
Gain:	2.9 dBd
Vertical Beamwidth:	30°
Horizontal Beamwidth:	360°
Polarization:	Vertical-Polarization
Length:	19’



[9] In the case where pattern data was unavailable from the manufacturer, vertical patterns shown are for antennas with similar specifications.