EVERSOURCE ENERGY

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

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

April 16, 2021

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

RE: **Notice of Exempt Modification**
Eversource Site # ES-158 Greenwich Hospital
5 Perryridge Road, Greenwich, CT 06830
Latitude: 41-2-3.14 N / Longitude: 73-37-51.03 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains three antennas on an existing 164-foot monopole tower located at 5 Perryridge Road in Greenwich. See Attachment A, Parcel Map and Property Card. The tower and property are owned by Greenwich Hospital. Eversource and Greenwich Hospital have entered into an agreement allowing the modification of Eversource's equipment on the tower. See Attachment B, Letter of Authorization. Eversource plans to install one 3-foot 8-inch tall omni-directional receive only antenna to be mounted at 114 feet above ground level ("AGL"), one 5.5-foot tall inverted dipole antenna mounted at 114 feet AGL, and two 7/8-inch diameter coaxial cables. There will be no changes to the area of the fenced compound, the tower or the existing antennas and equipment currently mounted on the tower. The antennas will be mounted to the existing tower by a crossover pipe-to-pipe mount on the existing low-profile platform. See Attachment C, Mount Analysis. The tower and existing and proposed equipment are depicted on Attachment D, Construction Drawings, dated March 2, 2021 and Attachment E, Structural Analysis, dated February 24, 2021. The Connecticut Siting Council approved an initial rooftop installation by Verizon's predecessor at Greenwich Hospital in Docket No. 73 in April 1987; additional carrier installations followed. In approximately 2002, Greenwich Hospital obtained approval from the Town of Greenwich to replace the rooftop installation with a monopole. The Council subsequently approved Eversource's Tower Share application under TS-EVER-057-150608.

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

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies ("R.C.S.A.") §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to Fred Camillo, First Selectman for the Town of Greenwich and Katie DeLuca, AICP, Director of Planning and Zoning for the Town of Greenwich, via private carrier. Proof of delivery is attached. See Attachment F, Proof of Delivery of Notice.

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

1. There will be no change to the height of the existing tower.
2. The proposed modifications will not require an extension of the site boundary.
3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the new antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard as shown in the attached Radio Frequency Emissions Report, dated March 9, 2021 (Attachment G – Power Density Report)[1].
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure, antenna mounts, and its foundation can support the proposed loading.

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

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

By: _____
Kathleen M. Shanley
Manager – Transmission Siting

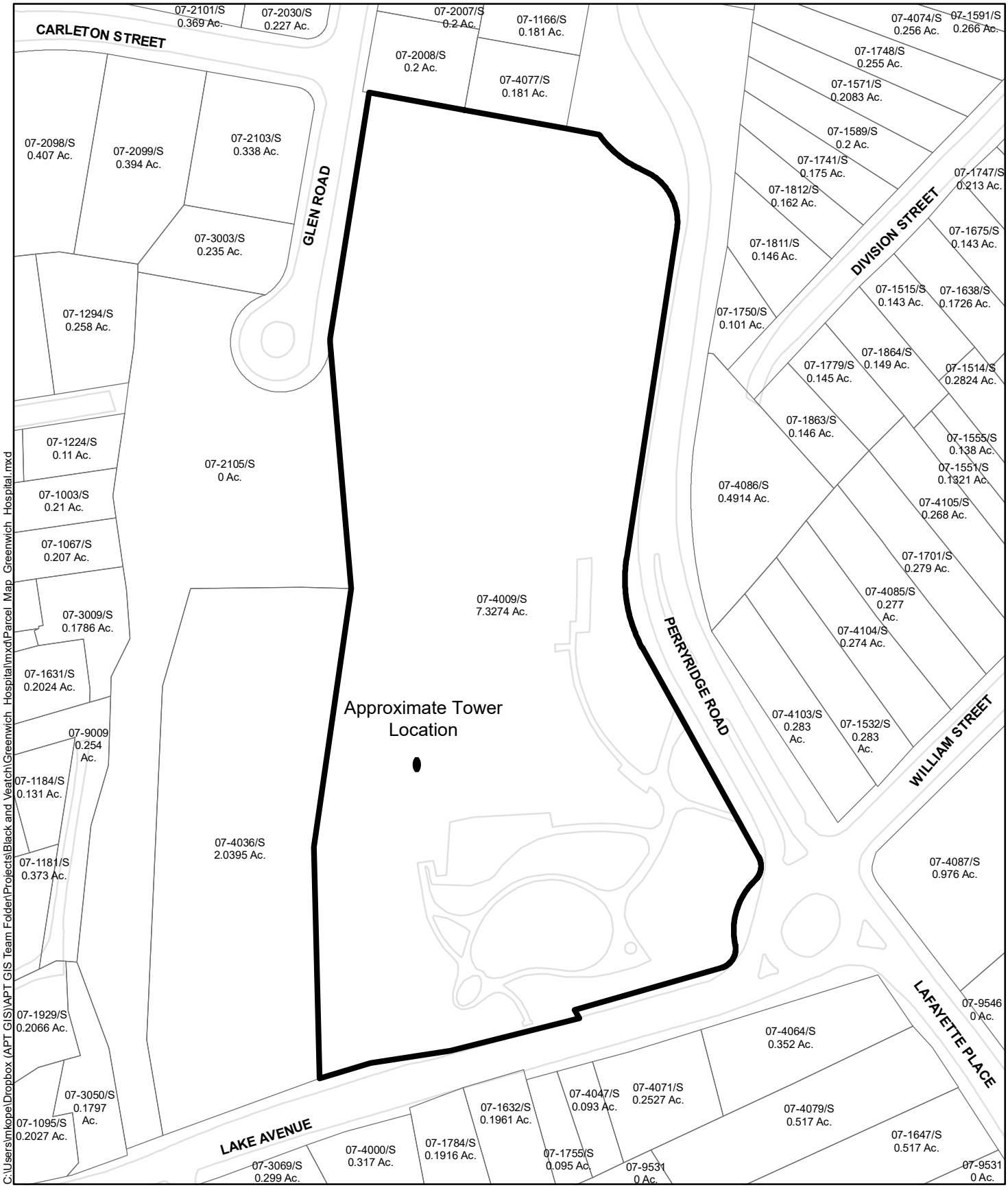
cc: Honorable Fred Camillo, First Selectman, Town of Greenwich
Katie DeLuca, AICP, Director of Planning & Zoning, Town of Greenwich
Greenwich Hospital

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

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

ATTACHMENT A – PARCEL MAP AND PROPERTY CARD



Legend

- Subject Property
- Parcel Boundary (Greenwich GIS 2018)
- Road

N

100 50 0 100 Feet

Map Date: January, 2021

Parcel Map

Proposed Communications Facility
Greenwich Hospital
5 Perryridge Road
Greenwich, Connecticut

EVERSOURCE ENERGY

ALL-POINTS TECHNOLOGY CORPORATION

TAX_ACCT	PVAL_ADDR	HOUSENO	STREET	LEGAL_DESC	OWNER1
07-4009/S	PERRYRIDGE ROAD 0005	5	PERRYRIDGE ROAD	LOT NO 1 2 3 4 PERRYRIDE RD & LAKE AVE W1 1A	GREENWICH HOSPITAL

OWNER2	OWN_ADDR	OWN_CITY	OWN_STATE	OWN_ZIP
C/O NANCYE FRITZ FACILITIES MGMT	5 PERRYRIDGE ROAD	GREENWICH	CT	06830

ATTACHMENT B – LETTER OF AUTHORIZATION

Yale
NewHaven
Health
Greenwich
Hospital

Michael Wolpensinger
Executive Director, Support Services GH
Greenwich Hospital
5 Perryridge Rd.
Greenwich, CT 06830
Phone:203-863-3128

Michael.Wolpensinger@greenwichhospital.org
www.greenwichhospital.org

April 13, 2021

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: Letter of Authorization
Property Address:
Greenwich Hospital
5 Perryridge Rd.
Greenwich, CT 06830

To Whom It May Concern:

Eversource Energy (Eversource) has an Agreement with Greenwich Hospital to co-locate it communications equipment on the Greenwich Hospital tower located at 5 Perryridge Rd., Greenwich, CT.

Eversource shall be required by the terms of the agreement to seek and obtain all necessary permits and approvals. As a dully authorized representative of Greenwich Hospital, permission is hereby granted to Eversource and agents therefore, 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.

Best regards,

Michael Wolpensinger 4/13/21

Michael Wolpensinger
Executive Director, Support Services GH
Greenwich Hospital

ATTACHMENT C – MOUNT ANALYSIS

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

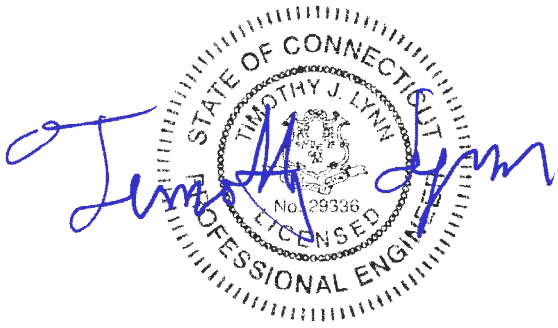
Site Reference: Greenwich Hospital

5 Perryridge Road
Greenwich, CT

Centek Project No. 21009.00

~~Date: February 10, 2021~~
Rev 1: February 24, 2021

Max Stress Ratio =56.3%



Prepared for:

Eversource
56 Prospect Street
Hartford, CT 06103

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CENTEK engineering

Centered on Solutions℠

February 24, 2021

Mr. Steven J. Florio
Eversource Energy
56 Prospect Street
Hartford, CT 06103

Re: Structural Letter ~ Antenna Mount
Eversource – Site Ref: Greenwich Hospital
5 Perryridge Road
Greenwich, CT 06830

Centek Project No. 21009.00

Dear Mr. Florio,

Centek Engineering, Inc. has reviewed the Eversource antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of one (1) low profile platform to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and and TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- Eversource:
  Low Profile Platform: Two (2) Decibel DB586-Y antennas (one upright and one inverted), one (1) Telewave ANT150F2 antenna, one (1) Comprod 531-70HD antenna, one (1) Telewave ANT220F2 antenna, one (1) Comprod 871F-70-2 antenna (inverted) and one (1) TTA mounted on one (1) low profile platform with an elevation of 114-ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering an ultimate design wind speed of 130 mph for Greenwich (Risk Category III) as required in Appendix N of the 2018 Connecticut State Building Code.

A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the equipment upgrade, it is our opinion that the existing antenna platform is structurally adequate to support the proposed antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Section 2 - Calculations

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	TIA-222-H Loads
Location:	Greenwich, CT
Rev. 0: 2/24/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-H

Wind Speeds

Basic Wind Speed	$V := 130$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input - TIA-222-H Annex B)
Basic Wind Speed (Mount)	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 164$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 114$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	Id := 56.00	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.998$		(User Input)
Gust Response Factor =	$G_H := 1.0$		(User Input)

Output

Wind Direction Probability Factor = $K_d := 0.95$ (Per Table 2-2 of TIA-222-H)

Importance Factors = $I_{ice} :=$ (Per Table 2-3 of TIA-222-H)

- 0 if SC = 1 = 1.15
- 1.00 if SC = 2
- 1.15 if SC = 3
- 1.25 if SC = 4

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.132$$

$$t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.302$$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.301$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 53.376$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.896$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.843$

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: TIA-222-H Loads

Location: Greenwich, CT

Rev. 0: 2/24/21

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 21009.00

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Decibel DB586-Y		
Antenna Shape =	Round		(User Input)
Antenna Height =	$L_{ant} := 59$	in	(User Input)
Antenna Width =	$W_{ant} := 1.5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 9$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 39.3$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.6$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 39$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 1.8$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 17$	lbs

Wind Load (Maintenance)

Surface Area for One Appurtenance (Front) =

Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 2$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 9$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot \left(\frac{1}{4} \cdot \pi W_{ant}^2\right) = 104$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot \left[\frac{1}{4} \cdot \pi (W_{ant} + 2 \cdot t_{iz})^2\right] - V_{ant} = 710$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 23$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 23$	lbs

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Subject:	TIA-222-H Loads
Location:	Greenwich, CT
Rev. 0: 2/24/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Telewave ANT150F2		
Antenna Shape =	Round		(User Input)
Antenna Height =	$L_{ant} := 60$	in	(User Input)
Antenna Width =	$W_{ant} := 2.75$	in	(User Input)
Antenna Weight =	$WT_{ant} := 12$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 21.8$		
Antenna Force Coefficient =	$Ca_{ant} = 1.13$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 1.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 69$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 2.3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 21$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =

Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 4$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 12$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot \left(\frac{1}{4} \cdot \pi W_{ant}^2\right) = 356$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot \left[\frac{1}{4} \cdot \pi (W_{ant} + 2 \cdot t_{iz})^2\right] - V_{ant} = 1053$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 34$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 34$	lbs

CENTEK engineering
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Branford, CT 06405 F: (203) 488-8587

Subject:	TIA-222-H Loads
Location:	Greenwich, CT
Rev. 0: 2/24/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Comprod 531-70HD		
Antenna Shape =	Round		(User Input)
Antenna Weight =	$WT_{ant} := 43$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Force Coefficient =	$Ca_{ant} := 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 5.94$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 380$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 7$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 66$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =		
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 20$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 43$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} := 25$	lbs

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	TIA-222-H Loads
Location:	Greenwich, CT
Rev. 0: 2/24/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Telewave ANT220F2		
Antenna Shape =	Round		(User Input)
Antenna Height =	$L_{ant} := 51$	in	(User Input)
Antenna Width =	$W_{ant} := 2.75$	in	(User Input)
Antenna Weight =	$WT_{ant} := 11$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 18.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.06$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 55$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 2$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 17$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =		
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 3$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 11$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot \left(\frac{1}{4} \cdot \pi W_{ant}^2\right) = 303$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot \left[\frac{1}{4} \cdot \pi (W_{ant} + 2 \cdot t_{iz})^2\right] - V_{ant} = 904$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 29$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 29$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Comprod 871F-70-2		
Antenna Shape =	Round		(User Input)
Antenna Weight =	$WT_{ant} := 13$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Force Coefficient =	$Ca_{ant} := 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 1.5$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 96$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 2.5$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 24$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =		
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 5$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 13$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} := 25$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	TTA		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 24$	in	(User Input)
Appurtenance Width =	$W_{app} := 12$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 12$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 40$	lbs	(User Input)
Number of Appurtenances=	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 2.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 128$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 128$	lbs

Wind Load (with ice)

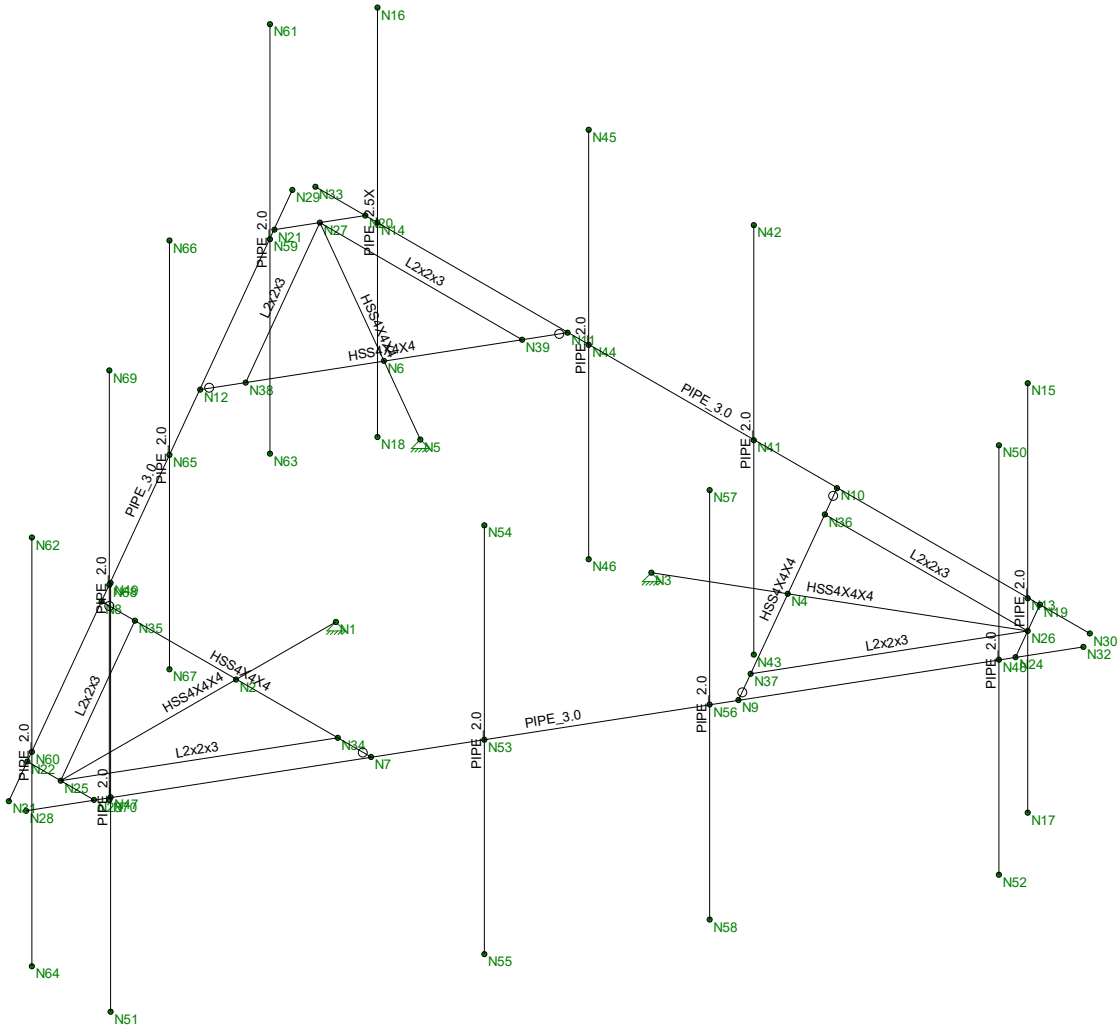
Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.7$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 26$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 2.7$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 26$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 7$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 3456$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 2218$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 72$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 72$	lbs



Envelope Only Solution

Centek		
TJL	Mount	Feb 24, 2021 at 11:16 AM
21009.00	Member Framing	Mount.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
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 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

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 7-10
Seismic Base Elevation (ft)	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	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	Horz	PIPE_3.0	Beam	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
3	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Support	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
5	L2x2	L2x2x3	Beam	Tube	A500 Gr.46	Typical	.722	.271	.271	.009
6	(P) Antenna Mast	PIPE_2.5X	Column	Pipe	A53 Grade B	Typical	2.1	1.83	1.83	3.66

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Outrigger	4.446			Lbyy						Lateral
2	M2	Support	4.346			Lbyy						Lateral
3	M3	Outrigger	4.445			Lbyy						Lateral
4	M4	Support	4.346			Lbyy						Lateral
5	M5	Outrigger	4.445			Lbyy						Lateral
6	M6	Support	4.346			Lbyy						Lateral
7	M7	Horz	12.5			Lbyy						Lateral
8	M8	Horz	12.5			Lbyy						Lateral
9	M9	Horz	12.5			Lbyy						Lateral
10	M10	Antenna Mast	6			Lbyy						Lateral
11	M11	(P) Antenna Mast	6			Lbyy						Lateral
12	M15	L2x2	3.271			Lbyy						Lateral
13	M16	L2x2	3.271			Lbyy						Lateral
14	M17	L2x2	3.27			Lbyy						Lateral
15	M18	L2x2	3.271			Lbyy						Lateral
16	M19	L2x2	3.271			Lbyy						Lateral
17	M20	L2x2	3.27			Lbyy						Lateral
18	M21	Antenna Mast	6			Lbyy						Lateral
19	M22	Antenna Mast	6			Lbyy						Lateral
20	M23	Antenna Mast	6			Lbyy						Lateral
21	M24	Antenna Mast	6			Lbyy						Lateral
22	M25	Antenna Mast	6			Lbyy						Lateral
23	M26	Antenna Mast	6			Lbyy						Lateral
24	M27	Antenna Mast	6			Lbyy						Lateral
25	M28	Antenna Mast	6			Lbyy						Lateral
26	M29	Antenna Mast	6			Lbyy						Lateral
27	M30	Antenna Mast	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N1	N25			Outrigger	Beam	Tube	A500 Gr.46	Typical
2	M2	N7	N8			Support	Beam	Tube	A500 Gr.46	Typical
3	M3	N3	N26			Outrigger	Beam	Tube	A500 Gr.46	Typical
4	M4	N9	N10			Support	Beam	Tube	A500 Gr.46	Typical
5	M5	N5	N27			Outrigger	Beam	Tube	A500 Gr.46	Typical
6	M6	N11	N12			Support	Beam	Tube	A500 Gr.46	Typical
7	M7	N28	N32			Horz	Beam	Pipe	A53 Grade B	Typical
8	M8	N30	N33			Horz	Beam	Pipe	A53 Grade B	Typical
9	M9	N29	N31			Horz	Beam	Pipe	A53 Grade B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
10	M10	N17	N15			Antenna Mast	Column	Pipe	A53 Grade B	Typical
11	M11	N18	N16			(P) Antenna Mast	Column	Pipe	A53 Grade B	Typical
12	M12	N21	N20			RIGID	None	None	RIGID	Typical
13	M13	N19	N24			RIGID	None	None	RIGID	Typical
14	M14	N23	N22			RIGID	None	None	RIGID	Typical
15	M15	N25	N34		180	L2x2	Beam	Tube	A500 Gr.46	Typical
16	M16	N25	N35		180	L2x2	Beam	Tube	A500 Gr.46	Typical
17	M17	N26	N36		180	L2x2	Beam	Tube	A500 Gr.46	Typical
18	M18	N26	N37		180	L2x2	Beam	Tube	A500 Gr.46	Typical
19	M19	N27	N38		180	L2x2	Beam	Tube	A500 Gr.46	Typical
20	M20	N27	N39		180	L2x2	Beam	Tube	A500 Gr.46	Typical
21	M21	N43	N42			Antenna Mast	Column	Pipe	A53 Grade B	Typical
22	M22	N46	N45			Antenna Mast	Column	Pipe	A53 Grade B	Typical
23	M23	N51	N49			Antenna Mast	Column	Pipe	A53 Grade B	Typical
24	M24	N50	N52			Antenna Mast	Column	Pipe	A53 Grade B	Typical
25	M25	N55	N54			Antenna Mast	Column	Pipe	A53 Grade B	Typical
26	M26	N58	N57			Antenna Mast	Column	Pipe	A53 Grade B	Typical
27	M27	N63	N61			Antenna Mast	Column	Pipe	A53 Grade B	Typical
28	M28	N62	N64			Antenna Mast	Column	Pipe	A53 Grade B	Typical
29	M29	N67	N66			Antenna Mast	Column	Pipe	A53 Grade B	Typical
30	M30	N70	N69			Antenna Mast	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	0	0	2.150723	0	
2	N2	0	0	3.763765	0	
3	N3	1.86258	0	-1.075361	0	
4	N4	3.259516	0	-1.881882	0	
5	N5	-1.86258	0	-1.075361	0	
6	N6	-3.259516	0	-1.881882	0	
7	N7	2.173011	0	3.763765	0	
8	N8	-2.173011	0	3.763765	0	
9	N9	4.346021	0	-0.	0	
10	N10	2.173011	0	-3.763765	0	
11	N11	-2.173011	0	-3.763765	0	
12	N12	-4.346021	0	0.	0	
13	N13	5.250196	0	-3.763765	0	
14	N14	-5.249805	0	-3.763765	0	
15	N15	5.250196	3	-3.763765	0	
16	N16	-5.249805	3	-3.763765	0	
17	N17	5.250196	-3	-3.763765	0	
18	N18	-5.249805	-3	-3.763765	0	
19	N19	5.44367	0	-3.763765	0	
20	N20	-5.443288	0	-3.763765	0	
21	N21	-5.981351	0	-2.832474	0	
22	N22	-0.537681	0	6.596239	0	
23	N23	0.537681	0	6.596239	0	
24	N24	5.98116	0	-2.832143	0	
25	N25	0	0	6.596239	0	
26	N26	5.712367	0	-3.298037	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
27	N27	-5.712367	0	-3.298037	0	
28	N28	0.13442	0	7.294707	0	
29	N29	-6.384611	0	-3.530942	0	
30	N30	6.250191	0	-3.763765	0	
31	N31	-0.134611	0	7.294375	0	
32	N32	6.38442	0	-3.530611	0	
33	N33	-6.249809	0	-3.763765	0	
34	N34	1.63533	0	3.763765	0	
35	N35	-1.63533	0	3.763765	0	
36	N36	2.441899	0	-3.298037	0	
37	N37	4.077181	0	-0.465645	0	
38	N38	-4.077181	0	-0.465645	0	
39	N39	-2.441899	0	-3.298037	0	
40	N41	0.833529	0	-3.763765	0	
41	N42	0.833529	3	-3.763765	0	
42	N43	0.833529	-3	-3.763765	0	
43	N44	-1.833137	0	-3.763765	0	
44	N45	-1.833137	3	-3.763765	0	
45	N46	-1.833137	-3	-3.763765	0	
46	N47	0.634418	0	6.428685	0	
47	N48	5.884418	0	-2.664582	0	
48	N49	0.634418	3	6.428685	0	
49	N50	5.884418	3	-2.664582	0	
50	N51	0.634418	-3	6.428685	0	
51	N52	5.884418	-3	-2.664582	0	
52	N53	2.842751	0	2.60374	0	
53	N54	2.842751	3	2.60374	0	
54	N55	2.842751	-3	2.60374	0	
55	N56	4.176084	0	0.294339	0	
56	N57	4.176084	3	0.294339	0	
57	N58	4.176084	-3	0.294339	0	
58	N59	-5.884614	0	-2.664921	0	
59	N60	-0.634613	0	6.428347	0	
60	N61	-5.884614	3	-2.664921	0	
61	N62	-0.634613	3	6.428347	0	
62	N63	-5.884614	-3	-2.664921	0	
63	N64	-0.634613	-3	6.428347	0	
64	N65	-3.67628	0	1.160025	0	
65	N66	-3.67628	3	1.160025	0	
66	N67	-3.67628	-3	1.160025	0	
67	N68	-2.342947	0	3.469426	0	
68	N69	-2.342947	3	3.469426	0	
69	N70	-2.342947	-3	3.469426	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			
2	N3	Reaction	Reaction	Reaction			
3	N5	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	Y	-.009	.5
2	M23	Y	-.009	5.5
3	M23	Y	-.04	4.5
4	M26	Y	-.012	5.5
5	M21	Y	-.043	4
6	M11	Y	-.011	5.5
7	M11	Y	-.013	.5

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	Y	-.023	.5
2	M23	Y	-.023	5.5
3	M23	Y	-.072	4.5
4	M26	Y	-.034	5.5
5	M21	Y	-.025	4
6	M11	Y	-.029	5.5
7	M11	Y	-.025	.5

Member Point Loads (BLC 6 : Wind w/ Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	X	.017	.5
2	M23	X	.017	5.5
3	M23	X	.026	4.5
4	M26	X	.021	5.5
5	M21	X	.066	4
6	M11	X	.017	5.5
7	M11	X	.024	.5

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	X	.039	.5
2	M23	X	.039	5.5
3	M23	X	.128	4.5
4	M26	X	.069	5.5
5	M21	X	.38	4
6	M11	X	.055	5.5
7	M11	X	.096	.5

Member Point Loads (BLC 8 : Wind Load Maintenance X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	X	.002	.5
2	M23	X	.002	5.5
3	M23	X	.007	4.5
4	M26	X	.004	5.5
5	M21	X	.02	4
6	M11	X	.003	5.5
7	M11	X	.005	.5

Member Point Loads (BLC 9 : Wind w/ Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	Z	.017	.5
2	M23	Z	.017	5.5
3	M23	Z	.026	4.5
4	M26	Z	.021	5.5
5	M21	Z	.066	4
6	M11	Z	.017	5.5
7	M11	Z	.024	.5

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	Z	.039	.5
2	M23	Z	.039	5.5
3	M23	Z	.128	4.5
4	M26	Z	.069	5.5
5	M21	Z	.38	4
6	M11	Z	.055	5.5
7	M11	Z	.096	.5

Member Point Loads (BLC 11 : Wind Load Maintenance Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M23	Z	.002	.5
2	M23	Z	.002	5.5
3	M23	Z	.007	4.5
4	M26	Z	.004	5.5
5	M21	Z	.02	4
6	M11	Z	.003	5.5
7	M11	Z	.005	.5

Member Distributed Loads (BLC 6 : Wind w/ Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M11	X	.002	.002	0	0
2	M22	X	.002	.002	0	0
3	M21	X	.002	.002	0	0
4	M10	X	.002	.002	0	0
5	M24	X	.002	.002	0	0
6	M26	X	.002	.002	0	0
7	M25	X	.002	.002	0	0
8	M23	X	.002	.002	0	0
9	M28	X	.002	.002	0	0
10	M30	X	.002	.002	0	0
11	M29	X	.002	.002	0	0
12	M27	X	.002	.002	0	0
13	M9	X	.002	.002	0	0
14	M7	X	.002	.002	0	0

Member Distributed Loads (BLC 7 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M11	X	.008	.008	0	0
2	M22	X	.008	.008	0	0

Member Distributed Loads (BLC 7 : Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
3	M21	X	.008	.008	0	0
4	M10	X	.008	.008	0	0
5	M24	X	.008	.008	0	0
6	M26	X	.008	.008	0	0
7	M25	X	.008	.008	0	0
8	M23	X	.008	.008	0	0
9	M28	X	.008	.008	0	0
10	M30	X	.008	.008	0	0
11	M29	X	.008	.008	0	0
12	M27	X	.008	.008	0	0
13	M9	X	.008	.008	0	0
14	M7	X	.008	.008	0	0

Member Distributed Loads (BLC 9 : Wind w/ Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M11	Z	.002	.002	0	0
2	M22	Z	.002	.002	0	0
3	M21	Z	.002	.002	0	0
4	M10	Z	.002	.002	0	0
5	M24	Z	.002	.002	0	0
6	M26	Z	.002	.002	0	0
7	M25	Z	.002	.002	0	0
8	M23	Z	.002	.002	0	0
9	M28	Z	.002	.002	0	0
10	M30	Z	.002	.002	0	0
11	M29	Z	.002	.002	0	0
12	M27	Z	.002	.002	0	0
13	M9	Z	.002	.002	0	0
14	M7	Z	.002	.002	0	0
15	M8	Z	.002	.002	0	0

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M11	Z	.008	.008	0	0
2	M22	Z	.008	.008	0	0
3	M21	Z	.008	.008	0	0
4	M10	Z	.008	.008	0	0
5	M24	Z	.008	.008	0	0
6	M26	Z	.008	.008	0	0
7	M25	Z	.008	.008	0	0
8	M23	Z	.008	.008	0	0
9	M28	Z	.008	.008	0	0
10	M30	Z	.008	.008	0	0
11	M29	Z	.008	.008	0	0
12	M27	Z	.008	.008	0	0
13	M9	Z	.008	.008	0	0
14	M7	Z	.008	.008	0	0
15	M8	Z	.008	.008	0	0

Member Distributed Loads (BLC 12 : BLC 2 Transient Area Loads)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]

Member Distributed Loads (BLC 12 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	1.334	4.001
2	M15	Y	-.0004265	-.002	0	1.635
3	M15	Y	-.002	-.003	1.635	3.271
4	M16	Y	-.0004619	-.002	0	1.635
5	M16	Y	-.002	-.003	1.635	3.271
6	M5	Y	-.006	-.002	1.334	4.001
7	M19	Y	-.0004198	-.002	0	1.635
8	M19	Y	-.002	-.003	1.635	3.271
9	M20	Y	-.0004265	-.002	0	1.635
10	M20	Y	-.002	-.003	1.635	3.27
11	M3	Y	-.006	-.002	1.334	4.001
12	M17	Y	-.0004619	-.002	0	1.635
13	M17	Y	-.002	-.003	1.635	3.27
14	M18	Y	-.0004199	-.002	0	1.635
15	M18	Y	-.002	-.003	1.635	3.271

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfa...
1	Self Weight	DL		-1						
2	Equipment Weight	None					7		3	
3	Ice Weight	None					7			
4	Lm Maintenance Load (500lb)	None				1				
5	Lv Maintenance Load (250lb)	None				1				
6	Wind w/ Ice X	None					7	14		
7	Wind X	None					7	14		
8	Wind Load Maintenance X	None					7			
9	Wind w/ Ice Z	None					7	15		
10	Wind Z	None					7	15		
11	Wind Load Maintenance Z	None					7			
12	BLC 2 Transient Area Loads	None						15		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4D	Yes	Y		1	1.4	2	1.4																
2	1.2D +1.5Lv	Yes	Y		1	1.2	2	1.2	5	1.5														
3	1.2D + 1.0W (X-dir...	Yes	Y		1	1.2	2	1.2	7	1														
4	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	6	1												
5	1.2D +1.5Lm+ 1.0...	Yes	Y		1	1.2	2	1.2	4	1.5	8	1												
6	1.2D + 1.0W (Z-dire...	Yes	Y		1	1.2	2	1.2	10	1														
7	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	9	1												
8	1.2D +1.5Lm+ 1.0...	Yes	Y		1	1.2	2	1.2	4	1.5	11	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	.002	5	.719	7	.042	3	0	8	0	8	0	8
2		min	-.143	3	-.183	5	-.77	6	0	1	0	1	0	1
3	N3	max	.191	6	.558	3	.237	3	0	8	0	8	0	8

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
4		min	-.74	3	.005	8	-.494	6	0	1	0	1	0	1
5	N5	max	0	8	2.229	8	0	2	0	8	0	8	0	8
6		min	-.699	3	.3	3	-.418	6	0	1	0	1	0	1
7	Totals:	max	0	6	2.062	8	0	4						
8		min	-1.582	3	1.312	3	-1.682	6						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N1	max	0	8	0	8	0	8	1.033e-02	7	2.388e-04	6	2.529e-03	8
2		min	0	1	0	1	0	1	-1.019e-03	5	-2.472e-05	5	-5.925e-04	3
3	N2	max	.004	6	.019	5	0	6	9.6e-03	7	1.757e-04	6	2.529e-03	8
4		min	-.001	3	-.196	7	0	3	-8.216e-04	5	-1.707e-04	3	-5.925e-04	3
5	N3	max	0	8	0	8	0	8	-3.832e-04	6	3.635e-05	4	3.531e-03	8
6		min	0	1	0	1	0	1	-3.191e-03	3	-3.989e-04	3	-5.846e-03	3
7	N4	max	.004	3	.04	8	.006	3	-2.342e-04	6	1.523e-04	6	3.529e-03	8
8		min	0	4	-.126	3	0	4	-2.908e-03	3	-2.289e-04	3	-5.357e-03	3
9	N5	max	0	8	0	8	0	8	-2.095e-03	6	5.126e-04	6	2.839e-02	8
10		min	0	1	0	1	0	1	-1.804e-02	5	-3.419e-04	3	4.179e-03	3
11	N6	max	.003	3	-.091	3	.007	6	-1.906e-03	6	2.045e-04	6	2.64e-02	8
12		min	-.004	6	-.638	8	-.005	3	-1.689e-02	5	-2.304e-04	3	3.913e-03	3
13	N7	max	.004	6	.085	5	.006	3	8.561e-03	7	2.708e-05	4	2.747e-03	8
14		min	-.001	3	-.214	7	-.003	6	-8.006e-04	5	-1.443e-04	3	-2.357e-03	3
15	N8	max	.004	6	-.045	5	.005	6	8.481e-03	7	1.788e-04	6	7.862e-03	8
16		min	-.001	3	-.204	7	-.007	3	-4.427e-05	5	-1.257e-04	3	1.099e-03	3
17	N9	max	.007	6	.127	8	.008	3	1.64e-03	6	1.173e-04	6	3.164e-03	8
18		min	0	5	-.141	3	-.002	6	-1.268e-03	5	-4.703e-05	3	-6.034e-03	3
19	N10	max	.008	3	-.025	6	.006	6	-3.268e-04	6	4.679e-04	6	5.875e-03	8
20		min	-.006	6	-.133	3	0	2	-7.757e-03	5	-1.452e-04	3	-3.997e-03	3
21	N11	max	.008	3	-.088	6	.006	6	-1.575e-03	6	2.526e-05	4	2.258e-02	8
22		min	-.006	6	-.712	5	-.002	3	-1.674e-02	5	-1.599e-04	6	2.731e-03	3
23	N12	max	.001	4	-.098	3	.009	6	-1.336e-04	6	1.129e-04	6	2.441e-02	8
24		min	-.002	6	-.641	8	-.007	3	-1.237e-02	5	-6.064e-05	3	4.211e-03	3
25	N13	max	.008	3	.081	8	.01	3	-1.739e-04	6	2.864e-04	6	3.155e-03	8
26		min	-.005	6	-.314	3	-.004	6	-2.906e-03	3	-1.682e-04	3	-5.319e-03	3
27	N14	max	.008	3	-.236	3	.01	6	-2.031e-03	6	7.754e-05	6	2.636e-02	8
28		min	-.006	6	-1.651	5	-.01	3	-1.742e-02	5	-1.974e-04	3	4.177e-03	3
29	N15	max	.209	3	.081	8	0	6	1.825e-04	6	2.864e-04	6	3.156e-03	8
30		min	-.114	8	-.314	3	-.095	5	-2.907e-03	3	-1.682e-04	3	-5.677e-03	3
31	N16	max	-.124	3	-.236	3	-.044	6	-1.326e-03	6	7.754e-05	6	2.668e-02	8
32		min	-.957	8	-1.651	5	-.633	5	-1.762e-02	5	-1.974e-04	3	3.473e-03	3
33	N17	max	.113	8	.081	8	.115	3	-5.301e-04	6	2.864e-04	6	3.154e-03	8
34		min	-.174	3	-.314	3	.012	6	-2.905e-03	3	-1.682e-04	3	-4.961e-03	3
35	N18	max	.951	5	-.236	3	.627	8	-2.401e-03	3	7.754e-05	6	2.64e-02	5
36		min	.148	6	-1.651	5	.077	3	-1.744e-02	8	-1.974e-04	3	4.285e-03	6
37	N19	max	.008	3	.088	8	.01	3	-1.642e-04	6	3.143e-04	6	3.304e-03	8
38		min	-.005	6	-.326	3	-.005	6	-2.849e-03	3	-1.598e-04	3	-5.313e-03	3
39	N20	max	.008	3	-.245	3	.01	6	-2.014e-03	6	6.516e-05	4	2.624e-02	8
40		min	-.006	6	-1.712	5	-.01	3	-1.744e-02	5	-1.909e-04	3	4.112e-03	3
41	N21	max	.006	3	-.246	3	.011	6	-2.014e-03	6	6.516e-05	4	2.624e-02	8
42		min	-.006	6	-1.687	8	-.011	3	-1.744e-02	5	-1.909e-04	3	4.112e-03	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
43	N22	max	.01	6	.026	5	.001	6	9.72e-03	7	1.385e-04	6	2.539e-03	8
44		min	-.009	3	-.519	7	-.002	3	-3.619e-04	5	-3.213e-04	3	-8.371e-04	3
45	N23	max	.01	6	.059	5	.002	3	9.72e-03	7	1.385e-04	6	2.539e-03	8
46		min	-.009	3	-.523	7	0	6	-3.619e-04	5	-3.213e-04	3	-8.371e-04	3
47	N24	max	.006	3	.134	8	.011	3	-1.642e-04	6	3.143e-04	6	3.304e-03	8
48		min	-.002	6	-.329	3	-.007	6	-2.849e-03	3	-1.598e-04	3	-5.313e-03	3
49	N25	max	.01	6	.042	5	0	6	9.72e-03	7	1.385e-04	6	2.539e-03	8
50		min	-.009	3	-.521	7	0	3	-3.619e-04	5	-3.213e-04	3	-8.371e-04	3
51	N26	max	.007	3	.111	8	.011	3	-1.642e-04	6	3.143e-04	6	3.304e-03	8
52		min	-.004	6	-.328	3	-.006	6	-2.849e-03	3	-1.598e-04	3	-5.313e-03	3
53	N27	max	.007	3	-.246	3	.011	6	-2.014e-03	6	6.516e-05	4	2.624e-02	8
54		min	-.006	6	-1.699	8	-.011	3	-1.744e-02	5	-1.909e-04	3	4.112e-03	3
55	N28	max	.011	6	.05	5	0	3	9.722e-03	7	1.392e-04	6	2.54e-03	8
56		min	-.011	3	-.603	7	0	4	-3.605e-04	5	-3.2e-04	3	-8.363e-04	3
57	N29	max	.007	3	-.285	3	.011	6	-2.016e-03	6	6.483e-05	4	2.625e-02	8
58		min	-.006	6	-1.96	8	-.012	3	-1.744e-02	5	-1.922e-04	3	4.112e-03	3
59	N30	max	.008	3	.12	8	.012	3	-1.642e-04	6	3.128e-04	6	3.303e-03	8
60		min	-.005	6	-.378	3	-.008	6	-2.849e-03	3	-1.598e-04	3	-5.315e-03	3
61	N31	max	.011	6	.041	5	0	6	9.722e-03	7	1.377e-04	6	2.538e-03	8
62		min	-.011	3	-.602	7	0	3	-3.605e-04	5	-3.2e-04	3	-8.379e-04	3
63	N32	max	.007	3	.132	8	.012	3	-1.656e-04	6	3.135e-04	6	3.303e-03	8
64		min	-.005	6	-.378	3	-.008	6	-2.85e-03	3	-1.611e-04	3	-5.314e-03	3
65	N33	max	.008	3	-.285	3	.011	6	-2.014e-03	6	6.516e-05	4	2.625e-02	8
66		min	-.006	6	-1.966	8	-.012	3	-1.744e-02	5	-1.909e-04	3	4.113e-03	3
67	N34	max	.004	6	.069	5	.005	3	8.831e-03	7	1.207e-04	6	2.592e-03	8
68		min	-.001	3	-.209	7	-.003	6	-8.05e-04	5	-2.798e-04	3	-1.013e-03	3
69	N35	max	.004	6	-.03	5	.004	6	8.771e-03	7	1.794e-04	6	2.472e-03	8
70		min	-.001	3	-.2	7	-.005	3	-2.448e-04	5	-2.831e-04	3	-1.04e-04	3
71	N36	max	.007	3	-.027	6	.004	6	-2.454e-04	6	3.412e-04	6	3.14e-03	8
72		min	-.004	6	-.13	3	0	4	-3.141e-03	3	-1.851e-04	3	-4.603e-03	3
73	N37	max	.005	6	.106	8	.007	3	5.949e-06	6	2.954e-04	6	3.49e-03	8
74		min	0	5	-.136	3	-.001	4	-2.22e-03	3	-1.15e-04	3	-5.312e-03	3
75	N38	max	0	4	-.096	3	.008	6	-1.483e-03	6	7.141e-05	4	2.486e-02	8
76		min	-.002	6	-.636	8	-.007	3	-1.363e-02	5	-1.462e-04	3	3.788e-03	3
77	N39	max	.007	3	-.089	6	.006	6	-1.893e-03	6	5.755e-05	4	2.326e-02	8
78		min	-.006	6	-.69	5	-.003	3	-1.727e-02	5	-2.076e-04	3	3.489e-03	3
79	N41	max	.008	3	-.02	6	.013	6	8.771e-05	6	2.598e-04	6	9.029e-03	8
80		min	-.006	6	-.175	5	0	2	-1.053e-02	5	-9.479e-05	3	-2.25e-03	3
81	N42	max	.16	3	-.02	6	.087	6	2.328e-03	6	2.598e-04	6	9.042e-03	8
82		min	-.326	8	-.175	5	-.379	5	-1.054e-02	5	-9.479e-05	3	-4.494e-03	3
83	N43	max	.325	8	-.02	6	.379	5	-2.686e-04	6	2.598e-04	6	9.027e-03	8
84		min	-.063	3	-.175	5	.02	6	-1.053e-02	5	-9.479e-05	3	-1.893e-03	3
85	N44	max	.008	3	-.075	6	.007	6	-1.387e-03	6	1.52e-05	4	2.056e-02	8
86		min	-.006	6	-.625	5	-.002	3	-1.604e-02	5	-2.613e-04	6	2.23e-03	3
87	N45	max	-.063	3	-.075	6	-.033	6	-1.031e-03	6	1.52e-05	4	2.057e-02	8
88		min	-.741	8	-.625	5	-.578	5	-1.605e-02	5	-2.613e-04	6	1.874e-03	3
89	N46	max	.74	8	-.075	6	.577	5	-1.743e-03	6	1.52e-05	4	2.056e-02	8
90		min	.098	3	-.625	5	.067	6	-1.604e-02	5	-2.613e-04	6	2.586e-03	3
91	N47	max	.009	6	.061	5	.002	3	9.775e-03	7	1.51e-04	6	2.529e-03	8
92		min	-.008	3	-.504	7	0	6	-4.247e-04	5	-3.159e-04	3	-9.399e-04	3
93	N48	max	.006	3	.135	8	.011	3	-1.614e-04	6	3.17e-04	6	3.301e-03	8
94		min	-.001	6	-.317	3	-.006	6	-2.831e-03	3	-1.715e-04	3	-5.419e-03	3

Envelope Joint Displacements (Continued)

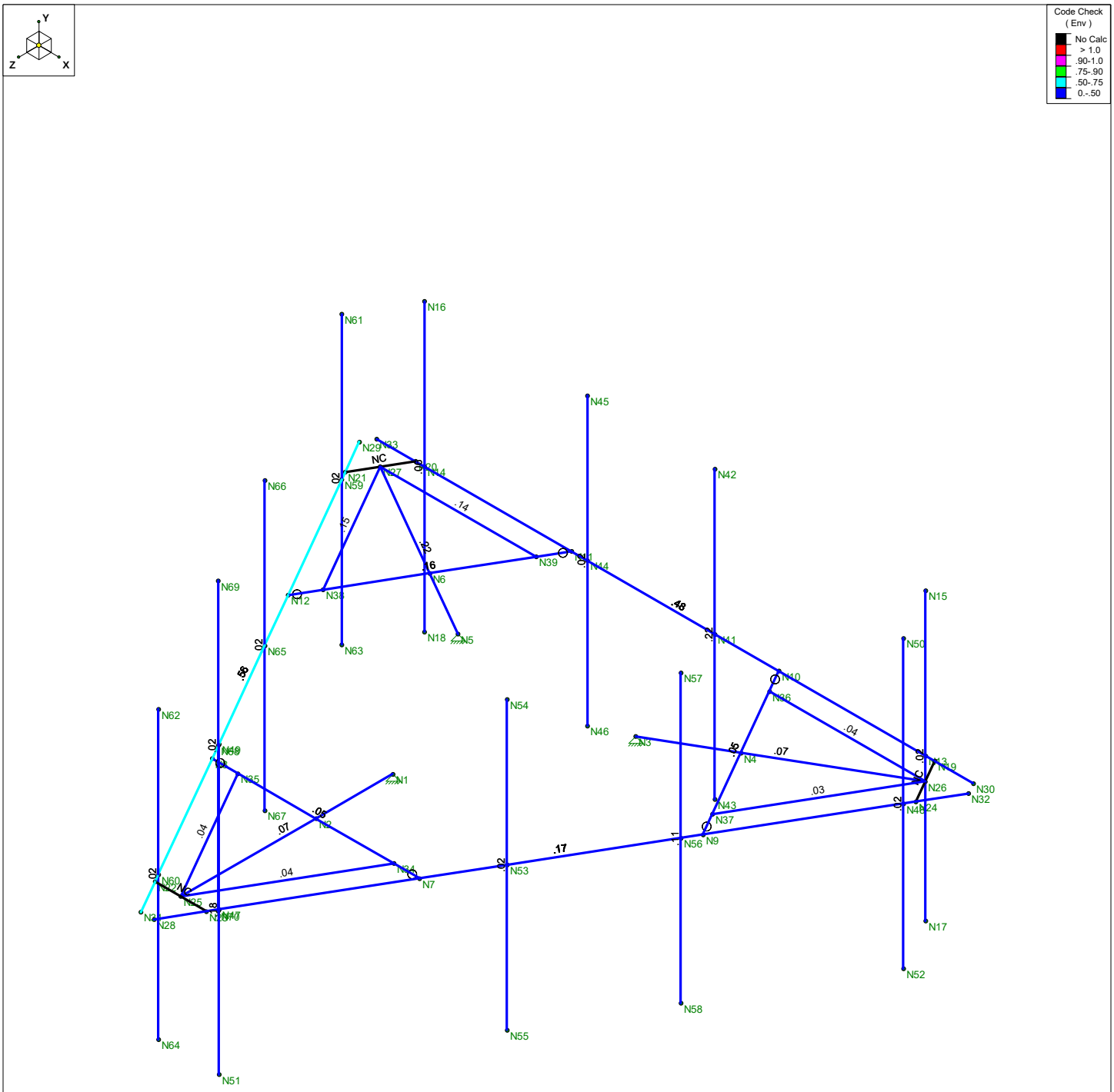
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
95	N49	max	.11	3	.061	5	.383	6	1.13e-02	6	1.51e-04	6	2.533e-03	8
96		min	-.091	8	-.504	7	-.015	5	-4.254e-04	5	-3.159e-04	3	-3.933e-03	3
97	N50	max	.21	3	.135	8	-.003	6	1.95e-04	6	3.17e-04	6	3.302e-03	8
98		min	-.119	8	-.317	3	-.091	3	-2.832e-03	3	-1.715e-04	3	-5.777e-03	3
99	N51	max	.091	8	.061	5	.016	5	9.212e-03	4	1.51e-04	6	2.554e-03	5
100		min	-.011	7	-.504	7	-.336	7	-4.245e-04	5	-3.159e-04	3	-3.558e-04	7
101	N52	max	.119	8	.135	8	.113	3	-5.177e-04	6	3.17e-04	6	3.3e-03	8
102		min	-.18	3	-.317	3	.009	6	-2.831e-03	3	-1.715e-04	3	-5.061e-03	3
103	N53	max	.005	6	.097	5	.008	3	5.959e-03	7	2.999e-06	4	2.956e-03	8
104		min	0	5	-.13	7	-.003	6	-7.697e-04	5	-1.199e-04	6	-3.458e-03	3
105	N54	max	.135	3	.097	5	.216	7	6.05e-03	7	2.999e-06	4	2.957e-03	8
106		min	-.106	8	-.13	7	-.027	5	-7.699e-04	5	-1.199e-04	6	-3.815e-03	3
107	N55	max	.107	8	.097	5	.028	5	5.868e-03	7	2.999e-06	4	2.955e-03	8
108		min	-.114	3	-.13	7	-.213	7	-7.695e-04	5	-1.199e-04	6	-3.101e-03	3
109	N56	max	.007	6	.124	8	.008	3	2.041e-03	6	7.189e-05	6	3.17e-03	8
110		min	0	5	-.128	3	-.002	4	-1.152e-03	5	-7.226e-06	3	-5.832e-03	3
111	N57	max	.276	3	.124	8	.138	6	4.534e-03	6	7.189e-05	6	3.172e-03	8
112		min	-.114	8	-.128	3	-.041	5	-1.153e-03	5	-7.226e-06	3	-8.327e-03	3
113	N58	max	.114	8	.124	8	.042	5	1.726e-03	7	7.189e-05	6	3.169e-03	8
114		min	-.2	3	-.128	3	-.065	6	-1.152e-03	5	-7.226e-06	3	-5.474e-03	3
115	N59	max	.005	3	-.236	3	.011	6	-2.009e-03	6	6.543e-05	4	2.631e-02	8
116		min	-.006	6	-1.621	8	-.011	3	-1.744e-02	5	-2.01e-04	3	4.164e-03	3
117	N60	max	.009	6	.023	5	.002	6	9.788e-03	7	1.437e-04	6	2.705e-03	8
118		min	-.008	3	-.499	7	-.002	3	-8.64e-05	5	-3.125e-04	3	-7.708e-04	3
119	N61	max	-.135	3	-.236	3	-.052	6	-1.654e-03	6	6.543e-05	4	2.632e-02	8
120		min	-.947	8	-1.621	8	-.629	5	-1.745e-02	5	-2.01e-04	3	3.809e-03	3
121	N62	max	.029	3	.023	5	.355	7	9.879e-03	7	1.437e-04	6	2.706e-03	8
122		min	-.098	5	-.499	7	-.003	5	-8.643e-05	5	-3.125e-04	3	-1.127e-03	3
123	N63	max	.947	5	-.236	3	.627	8	-2.331e-03	3	6.543e-05	4	2.63e-02	8
124		min	.152	6	-1.621	8	.073	3	-1.744e-02	5	-2.01e-04	3	4.376e-03	6
125	N64	max	.098	8	.023	5	.003	5	9.696e-03	7	1.437e-04	6	2.704e-03	8
126		min	-.026	3	-.499	7	-.349	7	-8.638e-05	5	-3.125e-04	3	-4.143e-04	3
127	N65	max	.002	4	-.066	3	.008	6	2.091e-03	7	1.072e-04	6	1.804e-02	8
128		min	0	6	-.345	8	-.007	3	-6.368e-03	5	-1.044e-05	5	3.348e-03	3
129	N66	max	-.111	3	-.066	3	.083	6	2.181e-03	7	1.072e-04	6	1.804e-02	8
130		min	-.649	8	-.345	8	-.23	5	-6.369e-03	5	-1.044e-05	5	2.993e-03	3
131	N67	max	.649	8	-.066	3	.228	5	2.002e-03	7	1.072e-04	6	1.803e-02	8
132		min	.13	3	-.345	8	-.071	7	-6.366e-03	5	-1.044e-05	5	3.703e-03	3
133	N68	max	.004	6	-.063	5	.005	6	7.693e-03	7	1.8e-04	6	8.737e-03	8
134		min	0	3	-.179	7	-.007	3	-2.812e-04	5	-1.062e-04	3	1.386e-03	3
135	N69	max	-.041	3	-.063	5	.281	7	7.784e-03	7	1.8e-04	6	8.74e-03	8
136		min	-.314	8	-.179	7	-.011	5	-2.812e-04	5	-1.062e-04	3	1.03e-03	3
137	N70	max	.315	8	-.063	5	.009	5	7.602e-03	7	1.8e-04	6	8.735e-03	8
138		min	.059	3	-.179	7	-.273	7	-2.811e-04	5	-1.062e-04	3	1.742e-03	3

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	Dir	...	phi*...	phi*...	phi*...	phi*...	Cb	Eqn
1	M9	PIPE_3.0	.563	4....	8	.193	4....		5	28.251	65.205	5.749	5.749	1.89	H1-...
2	M8	PIPE_3.0	.483	8....	5	.208	8....		8	28.251	65.205	5.749	5.749	1.8..	H1-...
3	M21	PIPE_2.0	.224	3	3	.042	3		3	20.867	32.13	1.872	1.872	1.8..	H1-...

Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	Dir	...	phi*...	phi*...	phi*...	phi*...	Cb	Eqn
4	M5	HSS4X4X4	.217	1....	8	.058	0	y	8	128....	139....	16.181	16.181	2.5..	H1-...
5	M23	PIPE_2.0	.176	3	6	.020	3		6	20.867	32.13	1.872	1.872	1.4..	H1-...
6	M7	PIPE_3.0	.173	4....	7	.072	.911		3	28.251	65.205	5.749	5.749	1.6..	H1-...
7	M6	HSS4X4X4	.161	2....	8	.170	3....	y	5	128....	139....	16.181	16.181	1.3..	H1-...
8	M19	L2x2x3	.146	3....	5	.007	3....	y	8	15.072	29.891	.713	1.536	1.8..	H2-1
9	M20	L2x2x3	.138	3.27	8	.006	3.27	y	8	15.072	29.891	.713	1.571	2.1..	H2-1
10	M26	PIPE_2.0	.112	3	3	.010	3		3	20.867	32.13	1.872	1.872	1.6..	H1-...
11	M3	HSS4X4X4	.071	1....	3	.014	0	y	3	128....	139....	16.181	16.181	2.2..	H1-...
12	M1	HSS4X4X4	.071	1....	7	.019	0	y	7	128....	139....	16.181	16.181	2.4..	H1-...
13	M11	PIPE_2.5X	.060	3	6	.006	3		6	48.786	66.15	4.646	4.646	1.3..	H1-...
14	M2	HSS4X4X4	.055	2....	7	.049	3....	y	7	128....	139....	16.181	16.181	1.3..	H1-...
15	M4	HSS4X4X4	.054	2....	3	.034	3....	y	3	128....	139....	16.181	16.181	1.3..	H1-...
16	M15	L2x2x3	.044	3....	7	.002	3....	y	7	15.071	29.891	.713	1.558	2.0..	H2-1
17	M16	L2x2x3	.043	3....	7	.003	0	y	5	15.071	29.891	.713	1.527	1.7..	H2-1
18	M17	L2x2x3	.039	0	5	.003	0	y	5	15.072	29.891	.713	1.566	2.1..	H2-1
19	M18	L2x2x3	.027	0	8	.002	3....	y	1	15.072	29.891	.713	1.584	2.4..	H2-1
20	M28	PIPE_2.0	.020	3	6	.002	3		6	20.867	32.13	1.872	1.872	1	H1-...
21	M24	PIPE_2.0	.020	3	3	.002	3		3	20.867	32.13	1.872	1.872	1.5..	H1-...
22	M30	PIPE_2.0	.019	3	6	.002	3		6	20.867	32.13	1.872	1.872	1.3..	H1-...
23	M10	PIPE_2.0	.019	3	3	.002	3		3	20.867	32.13	1.872	1.872	1.5..	H1-...
24	M25	PIPE_2.0	.019	3	6	.002	3		6	20.867	32.13	1.872	1.872	1.3..	H1-...
25	M29	PIPE_2.0	.019	3	6	.002	3		6	20.867	32.13	1.872	1.872	1.3..	H1-...
26	M22	PIPE_2.0	.019	3	6	.002	3		6	20.867	32.13	1.872	1.872	1.3..	H1-...
27	M27	PIPE_2.0	.019	3	6	.002	3		6	20.867	32.13	1.872	1.872	1.3..	H1-...



Member Code Checks Displayed (Enveloped)
Loads: BLC 1, Self Weight
Envelope Only Solution

Centek		
TJL	Mount	Feb 24, 2021 at 1:24 PM
21009.00	Unity Check	Mount.r3d

ATTACHMENT D – CONSTRUCTION DRAWINGS

EVERSOURCE ENERGY

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

PROJECT SUMMARY

THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (2) NEW ANTENNAS, (1) AT ELEVATION 119'–9"± AGL AND (1) AT ELEVATION 112'–3"± AGL
2. INSTALL (1) NEW RACK WITH DMR EQUIPMENT IN EXISTING SHELTER

GOVERNING CODES

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

GENERAL NOTES

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

SITE INFORMATION

SITE NAME:	GREENWICH HOSPITAL
SITE ADDRESS:	5 PERRYRIDGE ROAD GREENWICH, CT 06830
MAP: LOT: ZONE:	247 1, 2, 3 AND 4 H–1
LATITUDE: LONGITUDE: ELEVATION:	41° 2' 3.14" N 73° 37' 51.03" W 121'± AMSL
FEMA/FIRM DESIGNATION: ACREAGE:	X 7.3274± AC (BOOK: 6265, PAGE: 4)

CONTACT INFORMATION

APPLICANTS:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
GREENWICH HOSPITAL
C/O NANCYE FRITZ FACILITIES MGMT
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

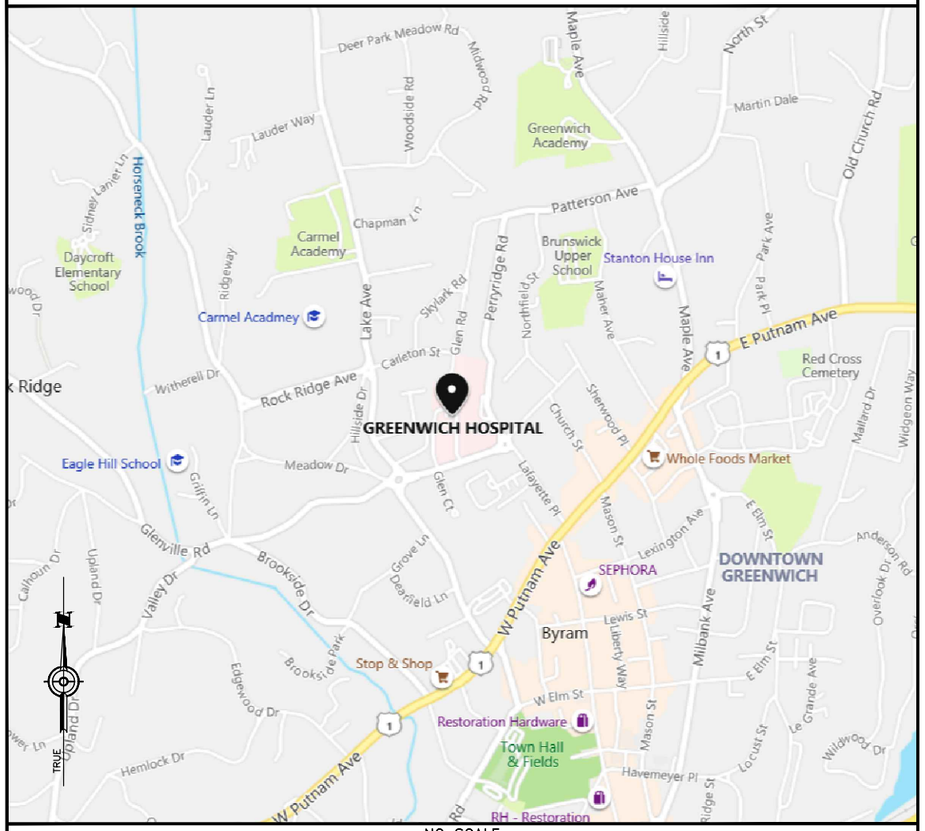
EVERSOURCE ENERGY PROJECT MANAGER:
NIKOLL PRECI
(860) 655–3079

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
MONOPOLE

DRAWING INDEX

SHEET NO:	SHEET TITLE
T–1	TITLE SHEET
C–1	PARTIAL SITE PLAN
C–2	COMPOUND PLAN
C–3	TOWER ELEVATION
C–4	ANTENNA EQUIPMENT
G–1	GROUNDING DETAILS
N–1	NOTES & SPECIFICATIONS
N–2	NOTES & SPECIFICATIONS
N–3	NOTES & SPECIFICATIONS

DO NOT SCALE DRAWINGS

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

UNDERGROUND SERVICE ALERT
UTILITIES PROTECTION CENTER, INC.
811
48 HOURS BEFORE YOU DIG

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

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

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

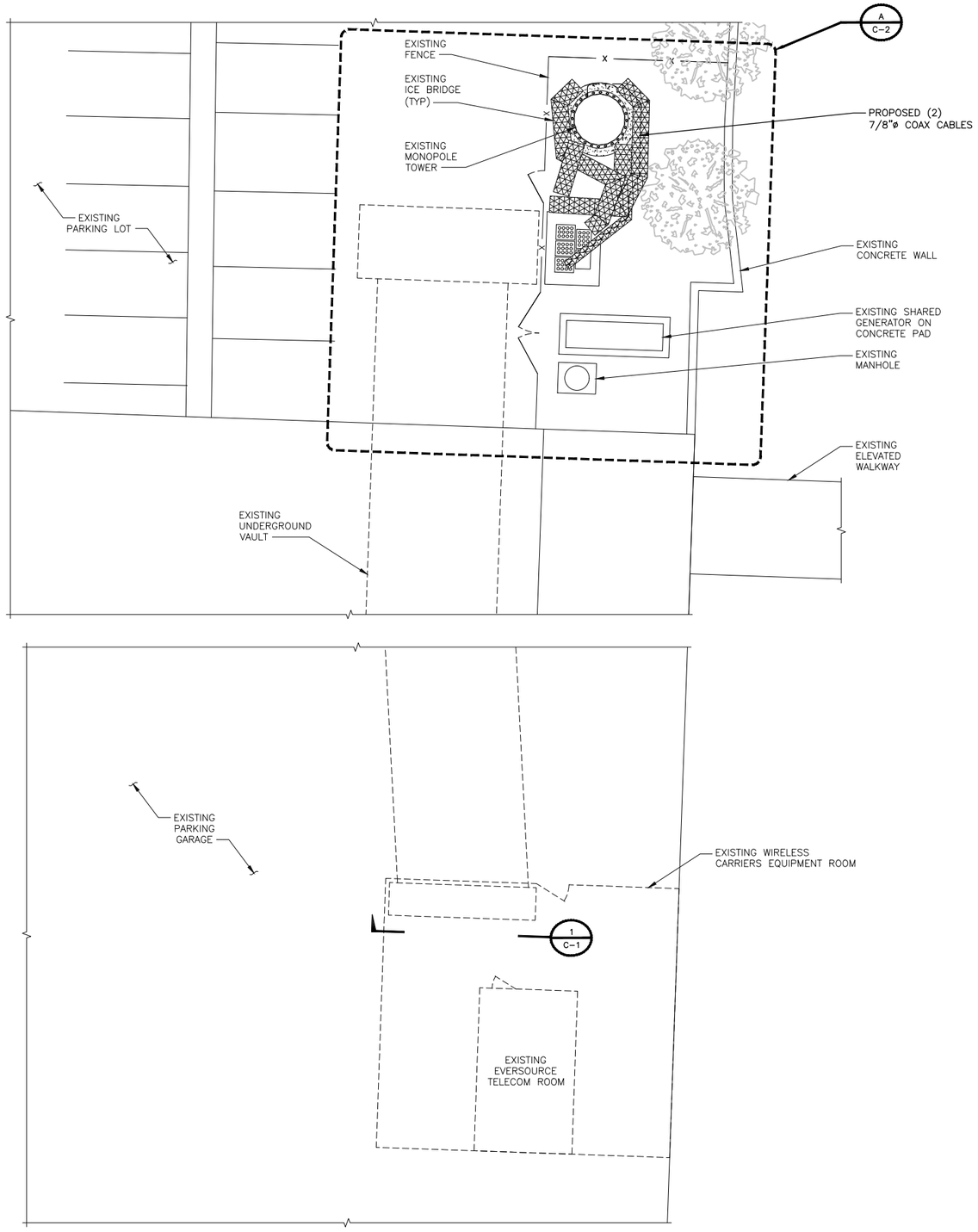
REV	DATE	DESCRIPTION
0	03/02/21	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
03/02/2021

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE
TITLE SHEET

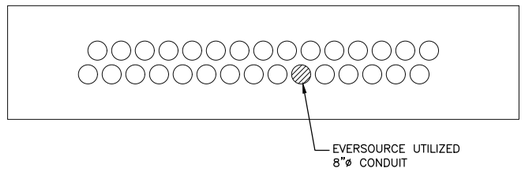
SHEET NUMBER
T-1



PARTIAL SITE PLAN
NO SCALE

NOTES

1. UNDERGROUND COAX BANK IS APPRXIMATELY 135 FT FROM CABLE PORTS IN COMPOUND TO CONDUITS IN EQUIPMENT ROOM.



SECTION 1
NO SCALE

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

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

PROJECT NO:	405025
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STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED
PROFESSIONAL ENGINEER
03/02/2021

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE
PARTIAL SITE PLAN

SHEET NUMBER
C-1

DETAIL A
COMPOUND PLAN
NO SCALE

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

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

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

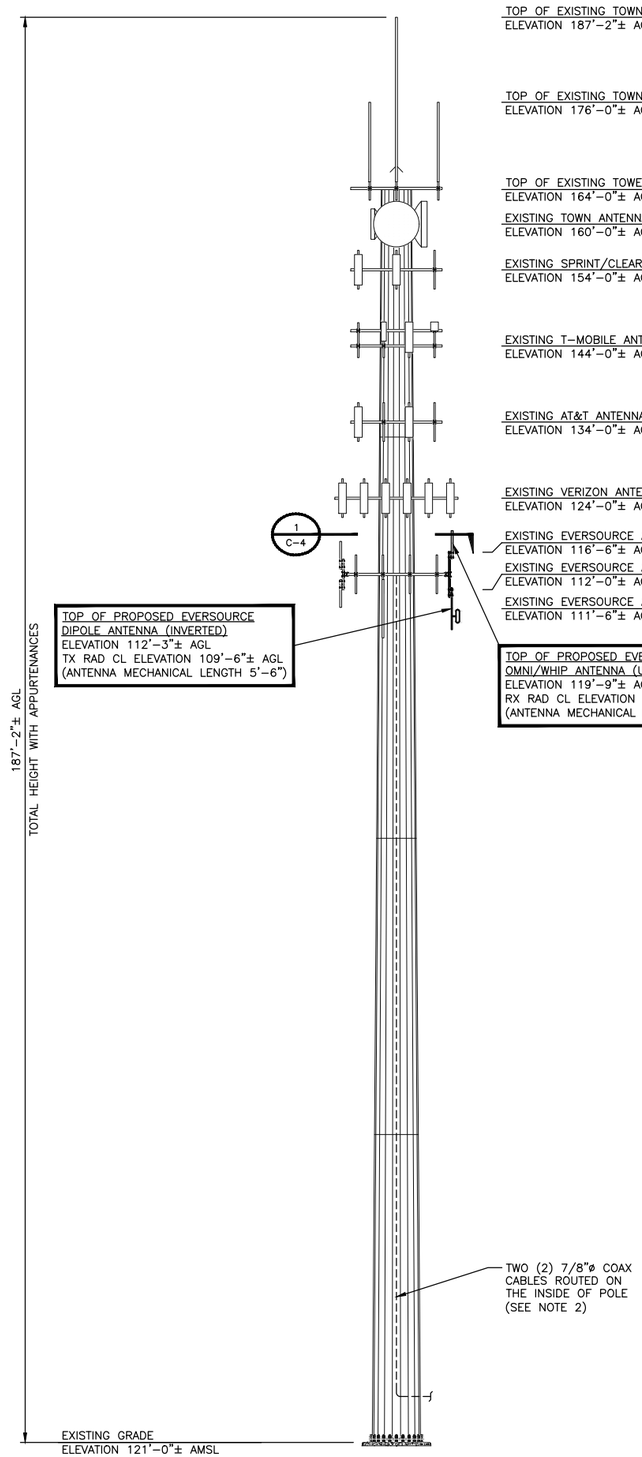
REV	DATE	DESCRIPTION
0	03/02/21	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33206
LICENSED PROFESSIONAL ENGINEER
03/02/2021

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE
COMPOUND PLAN

SHEET NUMBER
C-2



TOWER ELEVATION

NO SCALE

NOTES

1. BLACK & VEATCH HAS NOT EVALUATED THE EXISTING STRUCTURE FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO THE STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ANY CONSTRUCTION.
2. COAX CABLES TO BE ROUTED INSIDE POLE PER STRUCTURAL ANALYSIS BY OTHERS.
3. RESERVED TOWER LOADING NOT SHOWN PER CLIENT REQUEST.

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

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

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

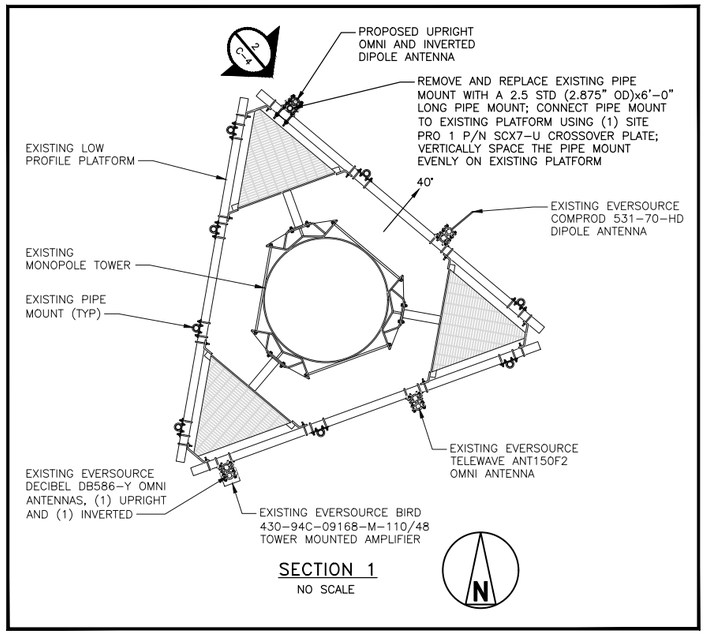
REV	DATE	DESCRIPTION
0	03/02/21	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33206
LICENSED PROFESSIONAL ENGINEER
03/02/2021

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

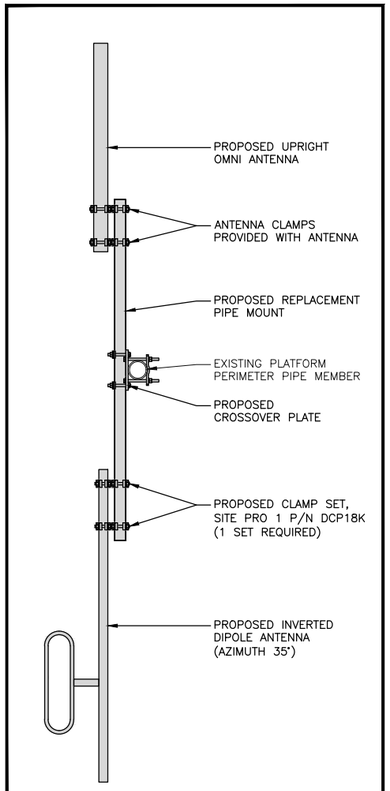
SHEET TITLE
TOWER ELEVATION

SHEET NUMBER
C-3



SECTION 1

NO SCALE



SECTION 2

NO SCALE

EVERSOURCE ENERGY

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

BLACK & VEATCH

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

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

REV	DATE	DESCRIPTION
0	03/02/21	ISSUED FOR FILING

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED
PROFESSIONAL ENGINEER

03/02/2021

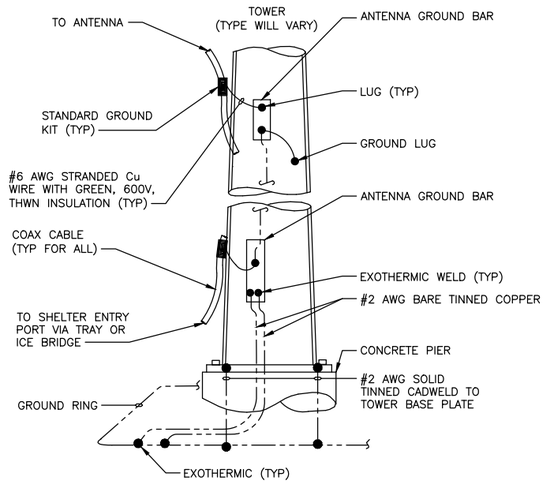
GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE

ANTENNA EQUIPMENT

SHEET NUMBER

C-4

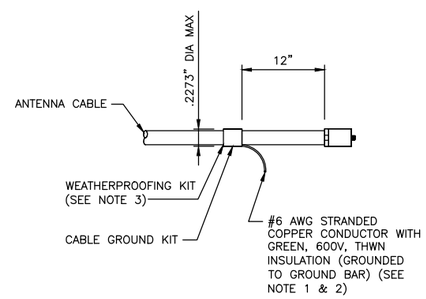


NOTE

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

ANTENNA CABLE GROUNDING

NO SCALE

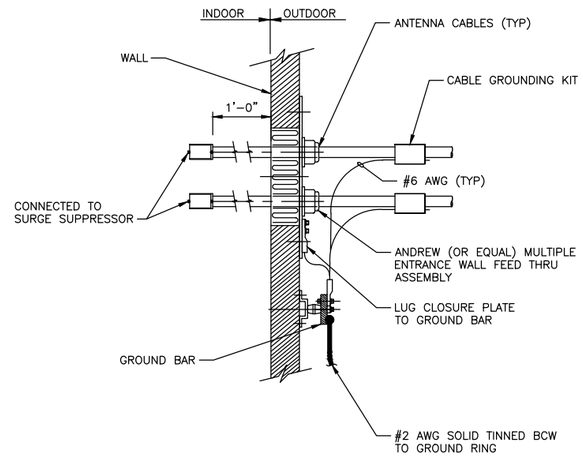


NOTES

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

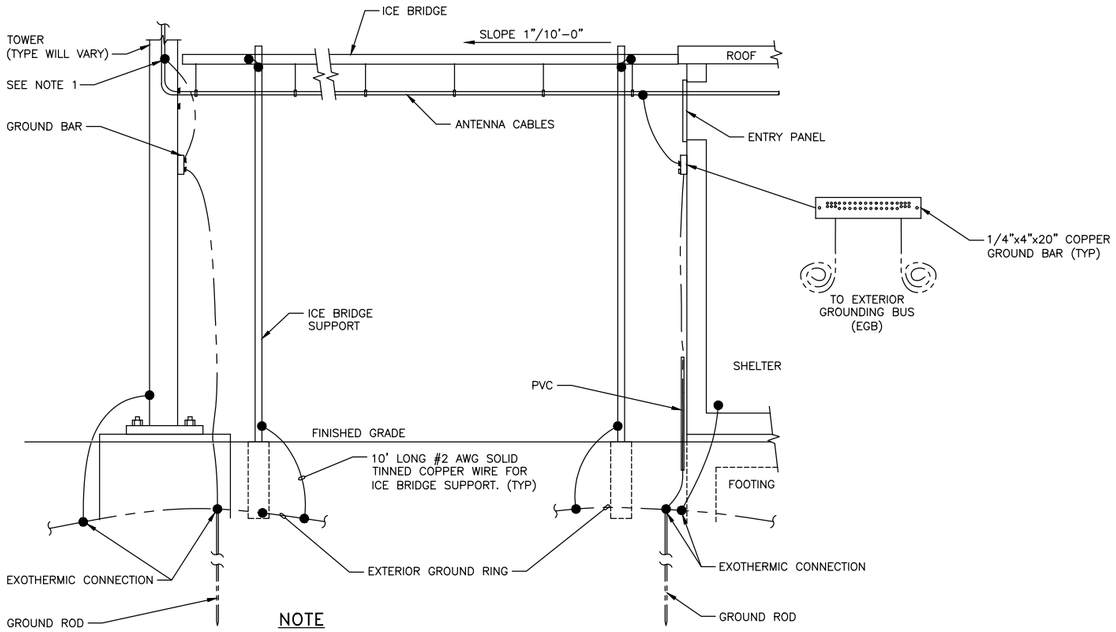
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NO SCALE



CABLE INSTALLATION WITH WALL FEED THRU ASSEMBLY

NO SCALE



NOTE

1. PROVIDE GROUND KIT 6" BEFORE TURN

ICE BRIDGE AND ANTENNA CABLE DETAIL

NO SCALE

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

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

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

REV	DATE	DESCRIPTION
0	03/02/21	ISSUED FOR FILING

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

3/2/21

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER
G-1

DESIGN BASIS

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

GENERAL CONDITIONS

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

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

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

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

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

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

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

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

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

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

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

THERMAL & MOISTURE PROTECTION

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

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

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

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

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

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

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

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

SUBMITTALS

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

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

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

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

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

STEEL

1. MATERIAL:

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

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

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

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

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

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

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

SITE GENERAL

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

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

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

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

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

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

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

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

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

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

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

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

REV	DATE	DESCRIPTION
0	03/02/21	ISSUED FOR FILING

03/02/2021

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-1

ELECTRICAL

1. CONTRACTOR SHALL VERIFY EXISTING ELECTRIC SERVICE TYPE AND CAPACITY AND ORDER NEW ELECTRIC SERVICE FROM LOCAL ELECTRIC UTILITY, WHERE APPLICABLE.
2. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, AND SHALL BE ACCEPTABLE TO ALL AUTHORITIES HAVING JURISDICTION. WHERE A CONFLICT EXISTS BETWEEN CODES, PLAN AND SPECIFICATIONS, OR AUTHORITIES HAVING JURISDICTION, THE MORE STRINGENT AUTHORITIES SHALL APPLY.
3. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC, FOR A COMPLETE AND PROPERLY OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN AND/OR OTHERWISE REQUIRED.
4. ALL ELECTRICAL CONDUCTORS SHALL BE 100% COPPER AND SHALL HAVE TYPE THHN INSULATION UNLESS INDICATED OTHERWISE.
5. CONDUIT SHALL BE THREADED RIGID GALVANIZED STEEL OR EMT WITH ONLY COMPRESSION TYPE COUPLINGS AND CONNECTORS, ALL MADE UP WRENCH TIGHT.
6. ALL BURIED CONDUIT SHALL BE MINIMUM SCH 40 PVC UNLESS NOTED OTHERWISE, OR AS PER LOCAL CODE REQUIREMENTS.
7. PROVIDE FLEXIBLE STEEL CONDUIT OR LIQUID TIGHT FLEXIBLE STEEL CONDUIT TO ALL VIBRATING EQUIPMENT, INCLUDING HVAC UNITS, TRANSFORMERS, MOTORS, ETC, OR WHERE EQUIPMENT IS PLACED UPON A SLAB ON GRADE.
8. ALL BRANCH CIRCUITS AND FEEDERS SHALL HAVE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR BONDED TO ALL ENCLOSURES, PULLBOXES, ETC.
9. CONDUIT AND CABLE WITHIN CORRIDORS SHALL BE CONCEALED AND EXPOSED ELSEWHERE, UNLESS NOTED OTHERWISE.
10. ELECTRICAL MATERIALS INSTALLED ON ROOFTOP SHALL BE LISTED FOR NEMA 3R USE. –AND ALL WIRING WITHIN A VENTILATION DUCT SHALL BE LISTED FOR SUCH USE. IN GENERAL WIRING METHODS WITHIN A DUCT SHALL BE AN MC CABLE WITH SMOOTH OR CORRUGATED METAL JACKET AND HAVE NO OUTER COVERING OVER THE METAL JACKET. INTERLOCKED ARMOR TYPE OF MC CABLE IS NOT ACCEPTABLE FOR THIS APPLICATION. CONTRACTOR CAN ALSO USE TYPE MI CABLE IN THE VENTILATION DUCT PROVIDED IT DOES NOT HAVE ANY OUTER COVERINGS OVER THE METAL EXTERIOR.
11. WIRING DEVICES SHALL BE SPECIFICATION GRADE, AND WIRING DEVICE COVER PLATES SHALL BE PLASTIC WITH ENGRAVING AS SPECIFIED.

GROUNDING

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

ANTENNA & CABLE NOTES

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

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

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

PROJECT NO:	405025
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CHECKED BY:	JR

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3/2/21

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GREENWICH, CT 06830

SHEET TITLE
NOTES
& SPECIFICATIONS

SHEET NUMBER
N-2

DEMOLITION SPECIFICATIONS AND NOTES

1. REMOVE AND LEGALLY DISPOSE OF ITEMS EXCEPT THOSE INDICATED TO BE REINSTALLED, SALVAGED, OR TO REMAIN THE OWNER'S PROPERTY.
2. PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING DEMOLITION. WHEN PERMITTED, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE AREA DURING DEMOLITION AND THEN CLEANED AND REINSTALLED IN THEIR ORIGINAL LOCATIONS.
3. DEMOLISHED MATERIALS SHALL BECOME THE CONTRACTOR'S PROPERTY AND SHALL BE REMOVED FROM THE SITE WITH FURTHER DISPOSITION AT THE CONTRACTOR'S OPTION.
4. COMPLY WITH GOVERNING LOCAL, STATE AND FEDERAL NOTIFICATION REGULATIONS BEFORE STARTING DEMOLITION.
5. BUILDING COMPONENTS TO BE DEMOLISHED SHALL BE VACATED AND THEIR USE DISCONTINUED BEFORE START OF DEMOLITION.
6. STORAGE OR SALE OF REMOVED ITEMS OR MATERIALS ON-SITE WILL NOT BE PERMITTED.
7. ARRANGE DEMOLITION ACTIVITIES SO AS NOT TO INTERFERE WITH THE OWNER'S ON-SITE OPERATIONS. OTHERWISE LIMIT CONSTRUCTION AND DEMOLITION WORK TO WITHIN THE NORMAL HOURS OF 8AM TO 6PM.
8. VERIFY THAT ALL UTILITIES HAVE BEEN DISCONNECTED AND CAPPED.
9. PERFORM INSPECTIONS AS THE DEMOLITION PROGRESSES TO DETECT HAZARDS RESULTING FROM SAID ACTIVITIES.
10. MAINTAIN EXISTING UTILITIES INDICATED TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE DURING DEMOLITION OPERATIONS.
11. DO NOT CLOSE OR OBSTRUCT STREETS, WALKS, OR OTHER ADJACENT OCCUPIED OR USED AREAS WITHOUT PERMISSION FROM OWNER. IF REQUIRED, PROVIDE FOR ALTERNATE ROUTES AROUND CLOSED OR OBSTRUCTED TRAFFIC WAYS.
12. CONDUCT DEMOLITION OPERATIONS TO PREVENT INJURY TO PEOPLE AND DAMAGE TO ADJACENT AREAS, BUILDINGS, AND/OR FACILITIES TO REMAIN. ENSURE SAFE PASSAGE OF PEOPLE AROUND DEMOLITION AREAS.
13. PROVIDE AND MAINTAIN INTERIOR AND EXTERIOR SHORING, BRACING, OR STRUCTURAL SUPPORT TO PRESERVE STABILITY AND PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF PERIPHERAL STRUCTURES AND/OR AREAS.
14. USE WATER MIST, TEMPORARY ENCLOSURES, AND OTHER SUITABLE METHODS TO LIMIT THE SPREAD OF DUST AND DIRT. COMPLY WITH GOVERNING ENVIRONMENTAL PROTECTION REGULATIONS.
15. DO NOT CREATE HAZARDOUS OR OBJECTIONABLE CONDITIONS, SUCH AS ICE, FLOODING, AND POLLUTION, WHEN USING WATER.
16. REMOVE AND TRANSPORT DEBRIS IN A MANNER THAT WILL PREVENT SPILLAGE ON ADJACENT SURFACES AND AREAS.
17. CLEAN ADJACENT AREAS AND IMPROVEMENTS OF DUST, DIRT AND DEBRIS CAUSED BY DEMOLITION OPERATIONS. RETURN ADJACENT AREAS TO ORIGINAL CONDITION AFTER COMPLETION OF DEMOLITION ACTIVITIES.
18. USE METHODS REQUIRED TO COMPLETE DEMOLITION WITHIN LIMITATIONS OF GOVERNING REGULATIONS.
19. DISPERSE DEMOLITION EQUIPMENT THROUGHOUT THE BUILDING AND REMOVE DEBRIS AND MATERIALS SO AS NOT TO IMPOSE EXCESSIVE LOADS ON SUPPORTING WALLS, FLOORS, OR FRAMING.
20. REMOVE AIR-CONDITIONING EQUIPMENT WITHOUT RELEASING REFRIGERANTS.
21. BREAKUP AND REMOVE CONCRETE SLABS ON GRADE, UNLESS OTHERWISE NOTED.
22. REMOVE BELOW-GRADE CONSTRUCTION, INCLUDING FOUNDATION WALLS, TO AT LEAST 24 INCHES BELOW GRADE.
23. BREAK UP BELOW-GRADE CONCRETE SLABS IN SECTIONS NO LARGER THAN 24 INCHES SQUARE. PROMPTLY REPAIR DAMAGES TO ADJACENT FACILITIES CAUSED BY DEMOLITION.
24. PATCH TO PRODUCE SUITABLE SURFACES FOR NEW MATERIALS WHEN REPAIRING EXISTING SURFACES.
25. EXTEND RESTORED, EXPOSED FINISHES OF PATCH SURFACES INTO ADJOINING CONSTRUCTION IN A MANNER THAT ELIMINATES EVIDENCE OF PATCHING AND RESURFACING.
26. DO NOT BURN DEMOLISHED MATERIALS.
27. PROMPTLY SUBMIT A WRITTEN REPORT TO THE ENGINEER SHOULD UNANTICIPATED STRUCTURAL, ELECTRICAL, OR MECHANICAL CONDITIONS BE ENCOUNTERED. THE SUBMITTED REPORT SHALL INCLUDE SUFFICIENT DETAIL REGARDING THE EXTENT AND NATURE OF THE CONDITION.
28. MAINTAIN BUILDING SECURITY TO ADJACENT AND COMMON AREAS DURING DEMOLITION ACTIVITIES TO PREVENT UNAUTHORIZED PERSON FROM ENTERING THE SITE.
29. DUE CARE SHALL BE TAKEN SO THAT THE EQUIPMENT AND ITS INSTALLATION ARE HANDLED IN A MANNER THAT WILL NOT AFFECT FIRE SAFETY OR CREATE A FIRE HAZARD.

SYMBOLS

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

ABBREVIATIONS

AC	ALTERNATING CURRENT	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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STATE OF CONNECTICUT · JOSHUA J. RILEY · 33206 · LICENSED PROFESSIONAL ENGINEER
03/02/2021

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-3

REFERENCE CUTSHEETS

TELEWAVE, INC.®

195 - 260 MHz

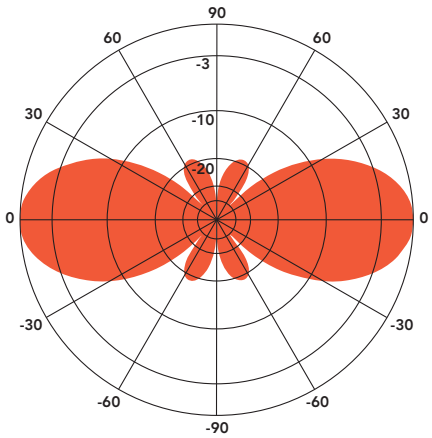
ANT220F2DIN

FIBERGLASS COLLINEAR ANTENNA 2.5 dBd

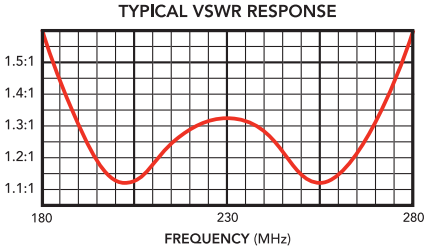
The Telewave ANT220F2 is an extremely rugged collinear antenna, with moderate gain and wide vertical beamwidth. This compact antenna produces 2.5 dBd gain, and is designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, with a path to ground potential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

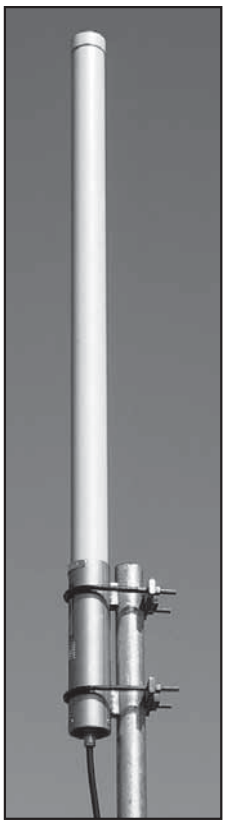
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray,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

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



ANT220F2 - 230 MHz
Vertical Plane
Gain = 2.58 dBd





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

ORDER WITH DIN CONNECTOR
ONE SITE PRO 1 P/N DCP18K CLAMP SET REQUIRED.

220MHz EXPOSED DIPOLES — 215-225 MHz

870 Series 220MHz Exposed Dipoles

The 870 Series 220MHz Exposed Dipoles are available in 1, 2, 4, 8 dipole configurations. All our antennas can be completely customized to your particular applications. Our antennas can be black anodized, adjustable, or fixed, side mount or top mount, and heavy-duty versions are available.

- Each antenna is offered in a 1/4, 3/8 or 1/2 wave spacing versions.
- The 87XA-70 has external cabling and a field-adjustable pattern.
- The 87XF-70 has internal cabling and fixed dipole-mast spacing.
- Heavy-duty versions are available. Please contact our Technical Support team for consultation.

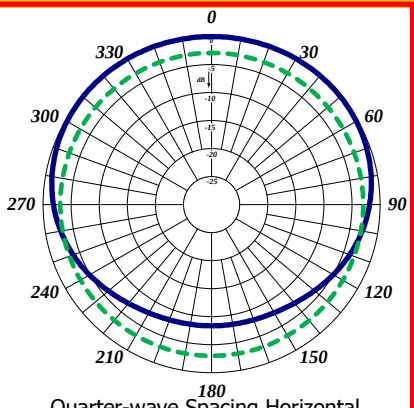
Electrical Specifications	871F-70-2	872F-70-2	874F-70-2
Frequency Range, MHz	215-225	215-225	215-225
Nominal Gain, dBd	2.0-2.5	5.0-5.5	8.0-8.5
Number of Dipoles	1	2	4
Bandwidth 1.5:1 VSWR, MHz	10	10	10
Polarization	Vertical	Vertical	Vertical
Pattern	Offset / bi	Offset / bi	Offset / bi
Power Rating, Watts	200	300	500
Nominal Impedance, Ohms	50	50	50
Lightning Protection	DC Ground	DC Ground	DC Ground
Standard Termination	Type DIN Male	Type N Male	Type N Male
Mechanical Specifications	**871F-70-2**	**872F-70-2**	**874F-70-2**
Length, in (mm)	66 (1676)	112 (2845)	200 (5080)
Width (1/2 Wave Spacing), in (mm)	31 (787)	31 (787)	32 (813)
Weight, lbs. (kg)	12.5 (5.7)	21 (9.5)	51 (23)
Rated Wind Velocity, No Ice, mph (km/h)	165 (266)	150 (241)	145 (233)
Rated Wind Velocity, 0.5" (13mm) ice, mph (km/h)	140 (225)	130 (209)	105 (177)
Lateral Thrust @ 100 mph, wind, lbs. (kg)	40 (18)	66 (30)	143 (65)
Bending Moment @ top clamp: 100 mph, ft.*lb (kg*m)	58 (8)	150 (21)	610 (84)
Projected Area, ft² (m²)	1.5 (0.14)	2.6 (0.24)	5.5 (0.51)
Mounting Information Mast O.D. (mm)	1.9" (48)	1.9" (48)	2.4" (60)
* See next page for ordering information (page 3) *			

872F-70-2

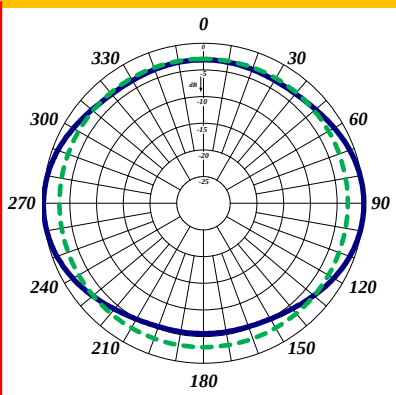
Tel: US 1.877.825.2007 / CAN 1.800.603.1454
Email: sales@comprodcom.com
Fax: 1.800.554.1033

220MHz EXPOSED DIPOLES — 215-225 MHz

871F-70-2



Quarter-wave Spacing Horizontal



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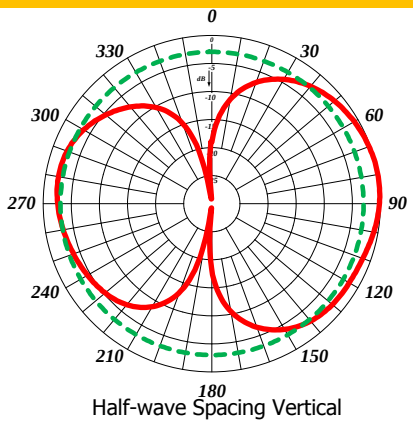
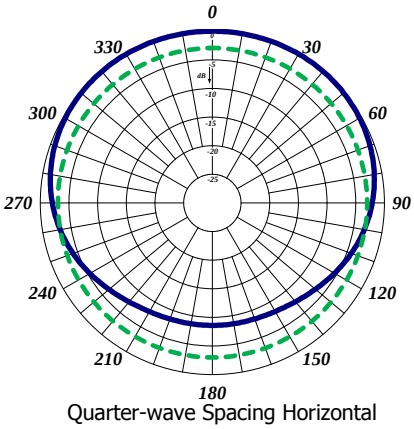


Half-wave Spacing Vertical

872F-70-2



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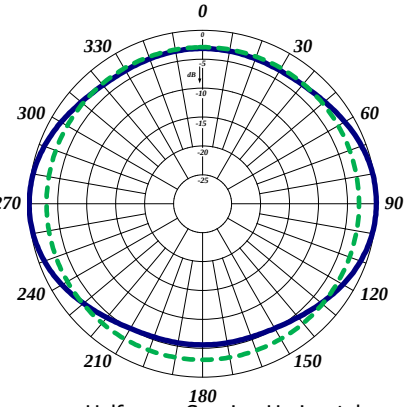

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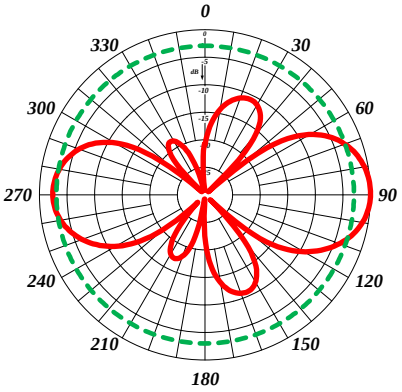

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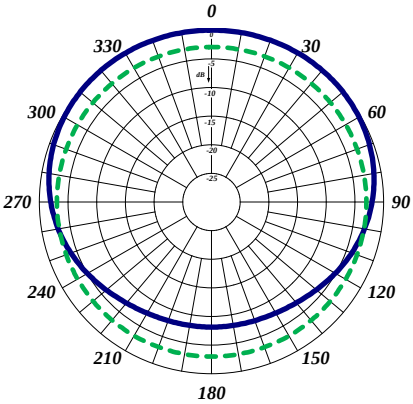

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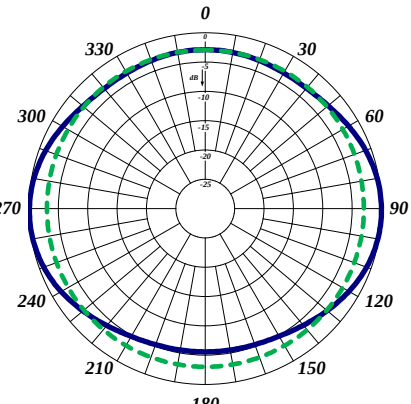

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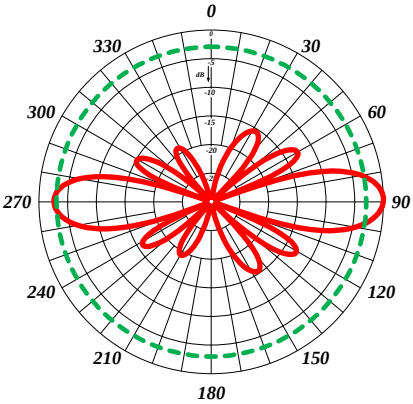
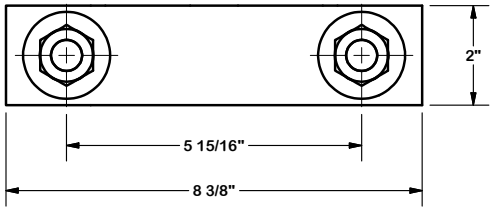
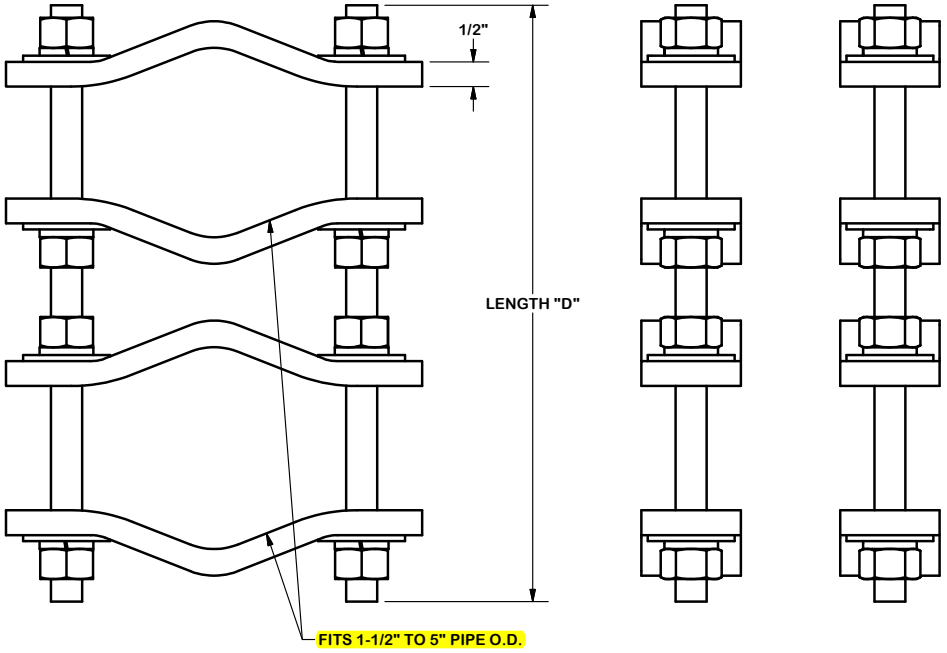


Half-wave Spacing Vertical

COMPROD Simplifying RF Solutions
www.comprodcom.com
Tel: US 1.877.825.2007 / CAN 1.800.603.1454
Email: sales@comprodcom.com
Fax: 1.800.554.1033

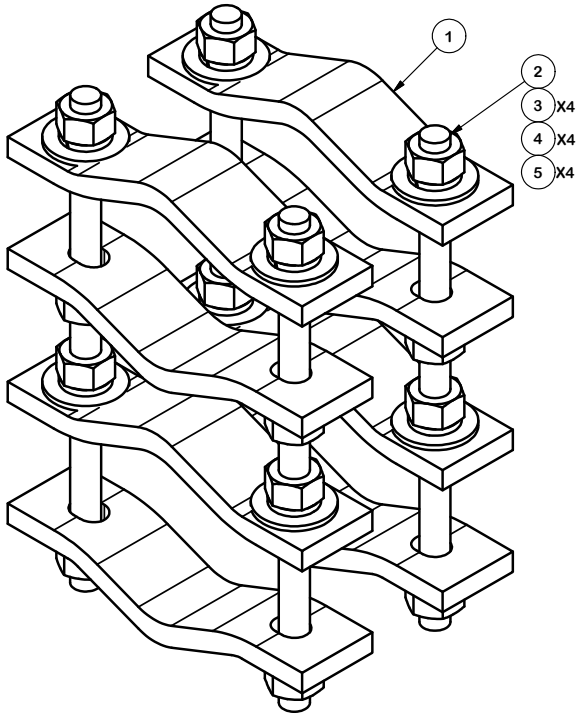
ONE SITE PRO 1 P/N DCP18K CLAMP SET REQUIRED.





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

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



TOLERANCE NOTES

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

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

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

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

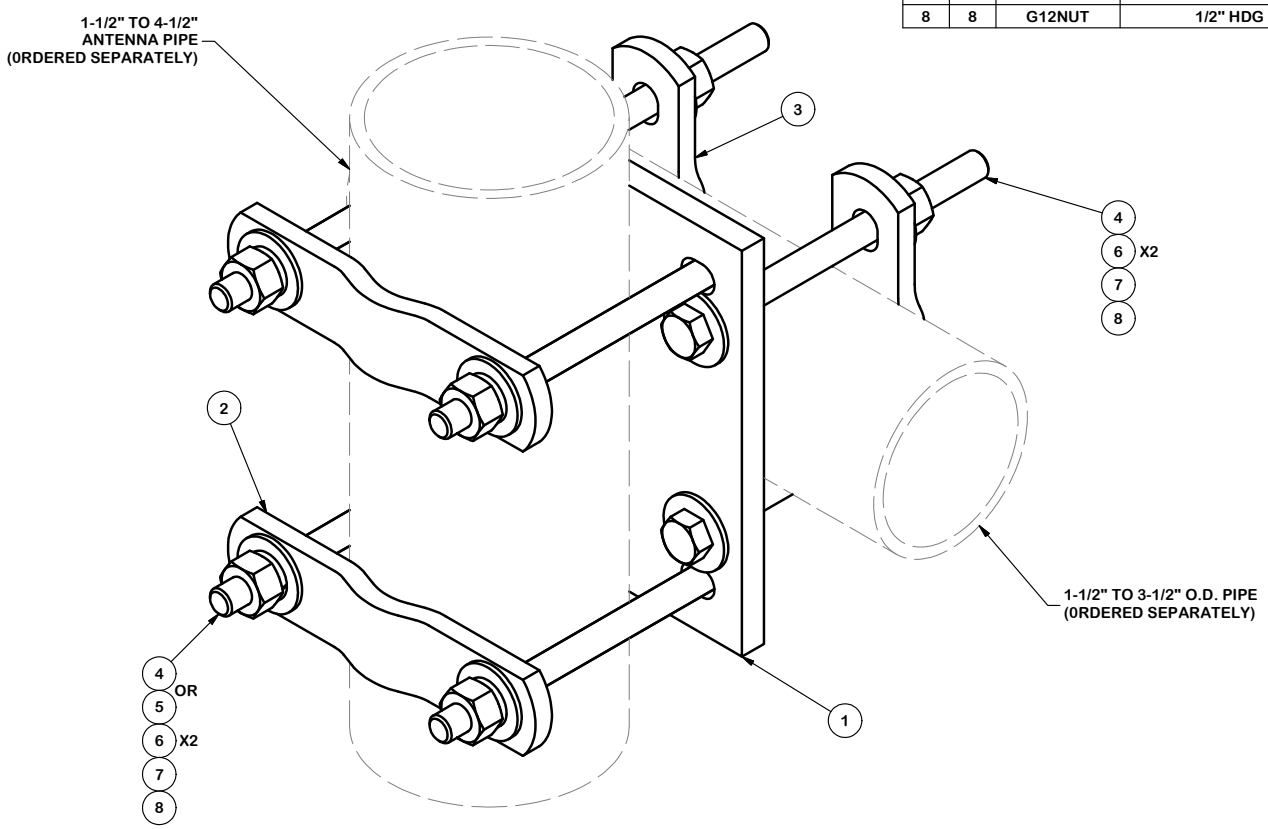
CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
	KC8 8/21/2012		SEE ASSEMBLY "A"	1 OF 1

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

ONE (1) 2.5 STD (2.875" OD) X 6' LONG ASTM GR. B PIPE MOUNT REQUIRED.

PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	SCX7	CROSSOVER PLATE	8 in	7.55	7.55
2	2	X-115765	5" V-CLAMP		1.02	2.04
3	2	X-100064	CLAMP (S) (4" V-CLAMP) GALVANIZED		0.91	1.83
4	8	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	3.28
5	4	G12045	1/2" x 4.5" HDG HEX BOLT GR5 FULL THREAD	4 1/2 in	0.30	1.19
6	16	G12FW	1/2" HDG USS FLATWASHER		0.03	0.54
7	8	G12LW	1/2" HDG LOCKWASHER		0.01	0.11
8	8	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	0.57
					TOTAL WT. #	16.98



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: CROSSOVER PLATE (V-CLAMP STYLE)

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
	CEK 10/7/2010		SCX7-U	1 OF 1

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 10/8/2010	SCX7-U

ATTACHMENT E – STRUCTURAL ANALYSIS

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

164-ft Existing EEI Monopole

Proposed Eversource
Antenna Upgrade

Site Ref: Greenwich Hospital

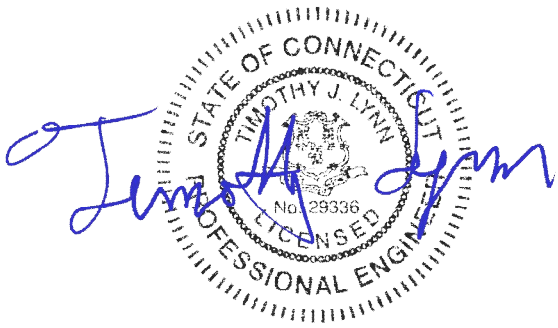
5 Perryridge Road
Greenwich, CT

Centek Project No. 21009.00

~~Date: February 10, 2021~~

Rev 1: February 24, 2021

Max Stress Ratio =63.6%



Prepared for:

Eversource
56 Prospect Street
Hartford, CT 06103

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 upgrade proposed by Eversource on the existing monopole (tower) owned and operated by Greenwich Hospital located in Greenwich, Connecticut.

The host tower is a 164-ft tall, five-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 11030 dated August 21, 2002. The tower geometry, structure member sizes and foundation system information were obtained from the original manufacturers design documents.

Antenna and appurtenance information were obtained a previous structural analysis report prepared by Centek job no. 20074.46 dated July 13, 2020 and information provided by Eversource.

The tower is made up of five (5) tapered vertical sections consisting of A572-65 pole sections. The bottom four (4) vertical tower sections are slip joint connected while the top section is flange connected. The diameter of the pole (flat-flat) is 47.0-in at the top and 76.0-in at the base.

Antenna and Appurtenance Summary

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

- TOWN (EXISTING TO REMAIN):
  Antennas: Four (4) 12-ft Omni-directional whip antennas, one (1) Sinclair SC229-SFXLDF Omni-directional whip antenna, two (2) Sinclair SC479-HF1LDF Omni-directional whip antennas, one (1) Bird 432E-83I-01-T tower top amplifier and one (1) camera mounted on a PiROD 13-ft low profile platform with an elevation of 164-ft above grade level.
  Coax Cables: Two (2) 1/2"∅, two (2) 7/8"∅, six (6) 1-1/4" ∅ and one (1) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- TOWN (EXISTING):
  Antennas: Two (2) 4-ft Dishes and one (1) 2-ft Dish mounted on three 4'x4" pipes with a RAD center elevation of 160-ft above grade level.
  Coax Cables: Three (3) 1-1/4" ∅ coax cables running on the inside of the existing tower.
- CLEARWIRE (EXISTING):
  Antennas: Three (3) Argus LLPX310R panel antennas, three (3) Samsung FDD-R6-RRH, two (2) Dragonwave Horizon ODU's and two (2) Dragonwave A-ANT-23-G-2-C dishes mounted on the Sprint 13-ft low profile platform with a RAD center elevation of 154-ft above the existing tower base plate.
  Coax Cables: Two (2) 2" ∅ conduits and two (2) 5/8" ∅ coax cables running on the inside of the existing tower.

- SPRINT (EXISTING):
  Antennas: Two (2) RFS APXVSPP18-C-A20 panel antennas, one (1) Powerwave P40-16-XLPP-RR-A panel antennas, three (3) RFS APXVTM14 panel antennas and one (1) GPS antenna mounted to a low profile platform with a RAD center elevation of 154-ft above the existing tower base plate. Three (3) ALU 1900 MHz RRH's, three (3) ALU 800 MHz RRH's and three (3) ALU TD-RRH-820 remote radio heads mounted on a universal tr-bracket below the existing low profile platform.
  Coax Cables: Six (6) 1-5/8" ∅ Hybriflex cables and one (1) 1/2" ∅ coax cable running on the inside of the existing tower.
- T-MOBILE (EXISTING):
  Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24_43 panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4449 remote radio units, three (3) Ericsson 4415 remote radio units, three (3) Commscope SDX1926Q-43 diplexers and three (3) TMAs mounted on a platform w/ handrail with a RAD center elevation of 144-ft above grade level.
  Cables: Six (6) 1-5/8" ∅ coax cables and six (6) 6x12 fiber cables running on the inside of the existing tower.
- AT&T (EXISTING):
  Antennas: Three (3) Powerwave 7770.00 panel antennas, three (3) Quintel QS66512 panel antennas, three (3) Kathrein 80010965 panel antennas, three (3) Powerwave P65-16-XLH-RR panel antennas, six (6) LGP21401 TMA's, six (6) CCI TPX-070821 triplexers and three (3) Ericsson RRUS-32-B2 remote radio heads, three (3) Ericsson RRUS-32-B66 remote radio heads, three (3) Ericsson B14 4478 remote radio heads, three (3) ION-M23 RRHs, three (3) Commscope CBC23SR-43 diplexers and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on a 16-ft low profile platform with a RAD center elevation of 134-ft above grade level. Three (3) Ericsson RRUS-11 remote radio heads, three (3) Ericsson RRUS-32 remote radio heads and two (2) Raycap DC6-48-60-18-8F surge arrestor mounted to one (1) universal ring mount with a RAD center elevation of 138-ft above grade level.
  Cables: Twelve (12) 1-5/8" ∅ coax cables, two (2) fiber cable and six (6) dc control cables running on the inside of the existing tower.
- VERIZON (EXISTING):
  Antennas: Six (6) Decibel DB844G65ZAXY panel antennas, three (3) Samsung CBRS panel antennas, six (6) Quintel QS6656-5D panel antennas, three (3) Samsung B2/B66 remote radio heads, three (3) Samsung B5/B13 remote radio heads, three (3) Samsung CBRS remote radio heads and two (2) Raycap RC2DC-3315-PF-48 main distribution boxes mounted on a 13-ft low profile platform with a RAD center elevation of 124-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ fiber cables running inside the monopole.
- UNKNOWN (EXISTING):
  Antennas: Three GPS antennas mounted on three (3) standoffs with a RAD center elevation of 50-ft above grade level.
  Coax Cables: Three (3) 7/8" ∅ coax cables running on the exterior of the existing tower.

- EVERSOURCE ENERGY (EXISTING TO REMAIN):
  Antennas: Two (2) Decibel DB586-Y omni-directional whips (one upright and one inverted), one (1) Telewave ANT150F2 omni-directional whip, one (1) Comprod 531-70HD dipole and one (1) tower top amplifier mounted on a PiROD 13-ft low profile platform with an elevation of 114-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅, two (2) 7/8" ∅ and one (1) 1/2" ∅ coax cables running on the inside of the existing tower.
- **EVERSOURCE ENERGY (PROPOSED):**
  Antennas: One (1) Telewave ANT220F2 omni-directional whip and one (1) Comprod 871F-70-2 dipole mounted on a PiROD 13-ft low profile platform with an elevation of 114-ft above grade level.
  Coax Cables: Two (2) 7/8" ∅ coax cables running on the inside of the existing tower.

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 or reinforcement drawings.
- 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 to be installed as indicated in 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 (3-second gust) 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

- Calculated stresses were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L5)	1.50'-39.88'	53.0%	**PASS**

Foundation and Anchors

The existing foundation consists of a 9.0 ∅ x 28.0-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design report; project no. 11030 dated August 21, 2002. The base of the tower is connected to the foundation by means of (30) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	63 kips
	Compression	105 kips
	Moment	7097 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	66.7%	**PASS**
	Lateral Deflection	0.13 in.(1)	**PASS**

(1) Lateral deflection limited to 0.75 in under service load combination per TIA-222-G section 9.5.

- The flange bolts and plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Flange Bolts	Tension	56.6%	**PASS**
Flange Plate	Bending	45.2%	**PASS**

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Bending	41.1%	**PASS**
Base Plate	Bending	63.6%	**PASS**

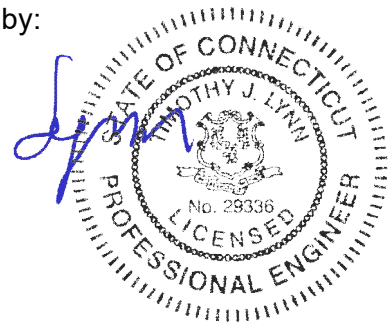
Conclusion

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

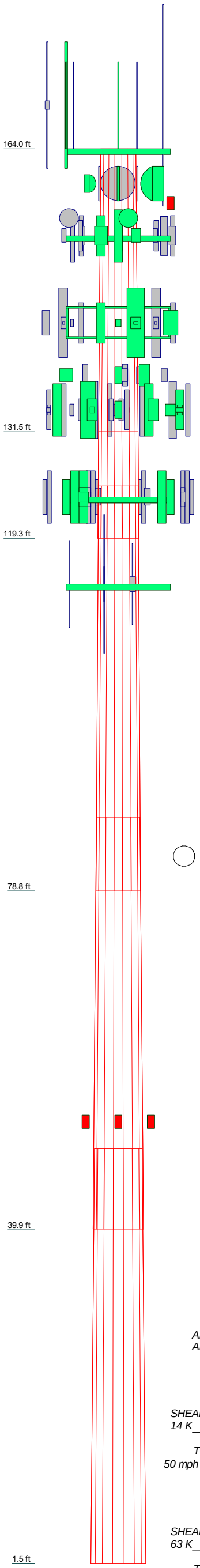
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, 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	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	32.50	18	0.3125		47.0000	53.4200		5.5
2	12.21	18	0.3750	6.00	53.4200	56.1500		2.7
3	46.50	18	0.4375	8.42	54.0585	62.9700	A572-65	12.8
4	47.33	18	0.5625	9.25	60.4813	69.6600		18.5
5	47.63	18	0.5625		66.7412	76.0000		20.5
								60.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' x 3" Dia Omni (Town Existing)	164	DC6-48-60-18-8F Surge Arrestor (ATI Existing)	138
12' x 3" Dia Omni (Town Existing)	164	RRUS-11 (ATI Existing)	138
12' x 3" Dia Omni (Town Existing)	164	RRUS-11 (ATI Existing)	138
12' x 3" Dia Omni (Town Existing)	164	RRUS-11 (ATI Existing)	138
Camera (Town Existing)	164	QS66512-2 (ATI Existing)	134
SC479-HF1LDF (Town Existing)	164	80010965 (ATI Existing)	134
TX/RX 432E-83I-01T (Town Existing)	164	P65-16-XLH-RR (ATI Existing)	134
SC229-SFXLDF (Town Existing)	164	7770.00 (ATI Existing)	134
SC479-HF1LDF (Town Existing)	164	QS66512-2 (ATI Existing)	134
Low Profile Platform (Town Existing)	164	80010965 (ATI Existing)	134
4'x4" Pipe Mount (Town Existing)	160	P65-16-XLH-RR (ATI Existing)	134
4'x4" Pipe Mount (Town Existing)	160	(2) LGP21401 TMA (ATI Existing)	134
4'x4" Pipe Mount (Town Existing)	160	(2) LGP21401 TMA (ATI Existing)	134
4 FT DISH (Town Existing)	160	(2) LGP21401 TMA (ATI Existing)	134
4 FT DISH (Town Existing)	160	(2) TPX-070821 (ATI Existing)	134
2 FT DISH (Town Existing)	160	(2) TPX-070821 (ATI Existing)	134
Horizon ODU (Clearwire Existing)	154	(2) TPX-070821 (ATI Existing)	134
Horizon ODU (Clearwire Existing)	154	RRUS-32 (ATI Existing)	134
APXVSPP18-C-A20 (Sprint Existing)	154	RRUS-32 (ATI Existing)	134
P40-16-XLPP-RR-A (Sprint Existing)	154	RRUS-32 (ATI Existing)	134
APXVSPP18-C-A20 (Sprint Existing)	154	RRUS-32 (ATI Existing)	134
FD-RRH 4x45 1900 (Sprint Existing)	154	RRUS-32 (ATI Existing)	134
FD-RRH 4x45 1900 (Sprint Existing)	154	RRUS-32 (ATI Existing)	134
FD-RRH 4x45 1900 (Sprint Existing)	154	B14 4478 (ATI Existing)	134
FD-RRH 2x50 800 (Sprint Existing)	154	B14 4478 (ATI Existing)	134
FD-RRH 2x50 800 (Sprint Existing)	154	B14 4478 (ATI Existing)	134
FD-RRH 2x50 800 (Sprint Existing)	154	RRU (ATI Existing)	134
GPS (Sprint Existing)	154	RRU (ATI Existing)	134
APXVTM14 (Sprint Existing)	154	RRU (ATI Existing)	134
APXVTM14 (Sprint Existing)	154	CBC23SR-43 (ATI Existing)	134
APXVTM14 (Sprint Existing)	154	CBC23SR-43 (ATI Existing)	134
TD-RRH8x20-25 (Sprint Existing)	154	CBC23SR-43 (ATI Existing)	134
TD-RRH8x20-25 (Sprint Existing)	154	DC6-48-60-18-8F Surge Arrestor (ATI Existing)	134
TD-RRH8x20-25 (Sprint Existing)	154	EEI 16-ft Low Profile Platform (ATI Existing)	134
Low Profile Platform (Sprint Existing)	154	7770.00 (ATI Existing)	134
LLPX310R (Clearwire Existing)	154	QS66512-2 (ATI Existing)	134
LLPX310R (Clearwire Existing)	154	80010965 (ATI Existing)	134
LLPX310R (Clearwire Existing)	154	P65-16-XLH-RR (ATI Existing)	134
A-Ant-23G-2-C (Clearwire Existing)	154	7770.00 (ATI Existing)	134
A-Ant-23G-2-C (Clearwire Existing)	154	(2) QS66512 (Verizon Existing)	124
Remote Radio Head FD R6 RRH (Clearwire Existing)	151.5	CBRS Antenna (Verizon Existing)	124
Remote Radio Head FD R6 RRH (Clearwire Existing)	151.5	DB844G65ZAXY (Verizon Existing)	124
		DB844G65ZAXY (Verizon Existing)	124
Valmont Uni-Tri Bracket (Sprint Existing)	151.5	(2) QS66512 (Verizon Existing)	124
Remote Radio Head FD R6 RRH (Clearwire Existing)	151.5	CBRS Antenna (Verizon Existing)	124
		DB844G65ZAXY (Verizon Existing)	124
AIR32 (T-Mobile Existing)	144	B2/B66A RRH (Verizon Existing)	124
AIR6449 (T-Mobile Existing)	144	B2/B66A RRH (Verizon Existing)	124
APXVAARR24-43 (T-Mobile Existing)	144	B2/B66A RRH (Verizon Existing)	124
AIR32 (T-Mobile Existing)	144	B5/B15 RRH -BRO4C (Verizon Existing)	124
Radio 4449 B71 B12 (T-Mobile Existing)	144	B5/B15 RRH -BRO4C (Verizon Existing)	124
Radio 4449 B71 B12 (T-Mobile Existing)	144	B5/B15 RRH -BRO4C (Verizon Existing)	124
Radio 4449 B71 B12 (T-Mobile Existing)	144	RRU (Verizon Existing)	124
TMA 10"x8"x3" (T-Mobile Existing)	144	RRU (Verizon Existing)	124
TMA 10"x8"x3" (T-Mobile Existing)	144	RRU (Verizon Existing)	124
TMA 10"x8"x3" (T-Mobile Existing)	144	RC2DC-3315-PF-48 (Verizon Existing)	124
4415 B25 (T-Mobile Existing)	144	RC2DC-3315-PF-48 (Verizon Existing)	124
4415 B25 (T-Mobile Existing)	144	Low Profile Platform (Verizon Existing)	124
4415 B25 (T-Mobile Existing)	144	DB844G65ZAXY (Verizon Existing)	124
SDX1926Q-43 (T-Mobile Existing)	144	(2) QS66512 (Verizon Existing)	124
SDX1926Q-43 (T-Mobile Existing)	144	CBRS Antenna (Verizon Existing)	124
SDX1926Q-43 (T-Mobile Existing)	144	DB844G65ZAXY (Verizon Existing)	124
EEI 16-ft Platform w/ Handrail (T-Mobile Existing)	144	DB844G65ZAXY (Verizon Existing)	124
APXVAARR24-43 (T-Mobile Existing)	144	ANT220F2 (Eversource Proposed)	114
AIR32 (T-Mobile Existing)	144	871F-70 (Eversource Proposed)	114
AIR6449 (T-Mobile Existing)	144	Low Profile Platform	114
APXVAARR24-43 (T-Mobile Existing)	144	531-70HD (Eversource Existing)	114
AIR6449 (T-Mobile Existing)	144	DB586-Y (Eversource Existing)	114
RRUS-32 (ATI Existing)	138	DB586-Y (Eversource Existing)	114
RRUS-32 (ATI Existing)	138	ANT150F2 (Eversource Existing)	114
RRUS-32 (ATI Existing)	138	Tower Top Amplifier (Eversource Existing)	114
Valmont Uni-Tri Bracket (ATI Existing)	138	GPS	51.5
DC6-48-60-18-8F Surge Arrestor (ATI Existing)	138	GPS	51.5
		GPS	51.5

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 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 members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.
9. TOWER RATING: 53%

ALL REACTIONS ARE FACTORED

AXIAL 144 K
SHEAR 14 K
MOMENT 1599 kip-ft
TORQUE 1 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 105 K
SHEAR 63 K
MOMENT 7097 kip-ft
TORQUE 6 kip-ft
REACTIONS - 130 mph WIND

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

Job: 21009.00 - Greenwich Hospital			
Project: 164' EEI Monopole - 5 Perryridge Rd., Greenwich, CT			
Client: Eversource	Drawn by: TJL		App'd:
Code: TIA-222-H	Date: 02/24/21		Scale: NTS
Path: J:\Jobs\2100900.W\05 Structural\Tower Analysis\Backup Documentation\Rev (1)\ERI Files\164' EEI Monopole Greenwich, CT.eri			Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower base elevation above sea level: 1.50 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.
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole 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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	164.00-131.50	32.50	0.00	18	47.0000	53.4200	0.3125	1.2500	A572-65 (65 ksi)
L2	131.50-119.29	12.21	6.00	18	53.4200	56.1500	0.3750	1.5000	A572-65 (65 ksi)
L3	119.29-78.79	46.50	8.42	18	54.0585	62.9700	0.4375	1.7500	A572-65 (65 ksi)
L4	78.79-39.88	47.33	9.25	18	60.4813	69.6600	0.5625	2.2500	A572-65 (65 ksi)
L5	39.88-1.50	47.63		18	66.7412	76.0000	0.5625	2.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	47.6768	46.3082	12752.5270	16.5741	23.8760	534.1149	25521.8341	23.1585	7.7220	24.71
	54.1959	52.6760	18769.9004	18.8532	27.1374	691.6627	37564.4987	26.3430	8.8519	28.326
L2	54.1862	63.1368	22444.4518	18.8310	27.1374	827.0684	44918.4365	31.5744	8.7419	23.312
	56.9584	66.3862	26091.2194	19.8001	28.5242	914.7047	52216.7704	33.1994	9.2224	24.593
L3	55.9925	74.4594	27047.4669	19.0354	27.4617	984.9157	54130.5236	37.2368	8.7443	19.987
	63.8739	86.8342	42898.2727	22.1990	31.9888	1341.0421	85852.9920	43.4253	10.3127	23.572
L4	62.9857	106.9776	48524.0652	21.2712	30.7245	1579.3269	97111.9796	53.4990	9.6547	17.164
	70.6478	123.3649	74413.8720	24.5296	35.3873	2102.8424	148925.6597	61.6942	11.2702	20.036
L5	69.5098	118.1537	65376.3617	23.4934	33.9045	1928.2498	130838.7474	59.0881	10.7564	19.123
	77.0856	134.6842	96834.1984	26.7803	38.6080	2508.1382	193795.8137	67.3549	12.3860	22.02

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
L1 164.00-131.50				1	1	1			
L2 131.50-119.29				1	1	1			
L3 119.29-78.79				1	1	1			
L4 78.79-39.88				1	1	1			
L5 39.88-1.50				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
7/8	B	No	Surface Ar (CaAa)	51.50 - 4.50	3	3	0.000 0.000	1.1100		0.54
HYBRIFLEX 1-5/8"	B	No	Surface Ar	144.00 -	3	3	0.000	1.9800		1.90

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
(T-Mobile - Existing)			(CaAa)	7.50			0.000			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1/2 (Town Existing)	A	No	No	Inside Pole	164.00 - 4.50	1	No Ice	0.00	0.25
							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
1 1/4 (Town Existing)	A	No	No	Inside Pole	164.00 - 4.50	6	No Ice	0.00	0.66
							1/2" Ice	0.00	0.66
							1" Ice	0.00	0.66
1/2 (Sprint Existing)	B	No	No	Inside Pole	154.00 - 7.50	1	No Ice	0.00	0.25
							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
2" Rigid Conduit (Clearwire Existing)	B	No	No	Inside Pole	154.00 - 7.50	2	No Ice	0.00	2.80
							1/2" Ice	0.00	2.80
							1" Ice	0.00	2.80
LDF4.5-50 (5/8 FOAM) (Clearwire Existing)	B	No	No	Inside Pole	154.00 - 7.50	2	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
1 5/8 (T-Mobile Existing)	B	No	No	Inside Pole	144.00 - 4.50	6	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (AT&T Existing)	A	No	No	Inside Pole	134.00 - 11.50	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (Verizon Existing)	C	No	No	Inside Pole	124.00 - 7.50	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
RG6-Fiber (AT&T Existing)	A	No	No	Inside Pole	134.00 - 11.50	2	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
#8 AWG Copper WIre (AT&T Existing)	A	No	No	Inside Pole	134.00 - 11.50	4	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
HYBRIFLEX 1-5/8" (Sprint Existing)	B	No	No	Inside Pole	154.00 - 7.50	6	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90
HYBRIFLEX 1-5/8" (Verizon Existing)	C	No	No	Inside Pole	124.00 - 7.50	2	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90
7/8 (Eversource Existing)	C	No	No	Inside Pole	114.00 - 1.50	2	No Ice	0.00	0.54
							1/2" Ice	0.00	0.54
							1" Ice	0.00	0.54
1 5/8 (Eversource Existing)	C	No	No	Inside Pole	114.00 - 1.50	2	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1/2 (Eversource Existing)	C	No	No	Inside Pole	114.00 - 1.50	1	No Ice	0.00	0.25
							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
HYBRIFLEX 1-5/8" (T-Mobile - Existing)	B	No	No	Inside Pole	144.00 - 7.50	3	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90
1 5/8	A	No	No	Inside Pole	164.00 - 4.50	1	No Ice	0.00	1.04

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(Town Existing)							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
7/8	A	No	No	Inside Pole	164.00 - 4.50	2	No Ice	0.00	0.54
(Town Existing)							1/2" Ice	0.00	0.54
							1" Ice	0.00	0.54
1/2	A	No	No	Inside Pole	164.00 - 4.50	1	No Ice	0.00	0.25
(Town Existing)							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
#8 AWG Copper	A	No	No	Inside Pole	134.00 - 11.50	2	No Ice	0.00	0.05
WIre							1/2" Ice	0.00	0.05
(AT&T Existing)							1" Ice	0.00	0.05
7/8	C	No	No	Inside Pole	114.00 - 1.50	2	No Ice	0.00	0.54
(Eversource							1/2" Ice	0.00	0.54
Proposed)							1" Ice	0.00	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
L1	164.00-131.50	A	0.000	0.000	0.000	0.000	0.25
		B	0.000	0.000	7.425	0.000	0.62
		C	0.000	0.000	0.000	0.000	0.00
L2	131.50-119.29	A	0.000	0.000	0.000	0.000	0.23
		B	0.000	0.000	7.253	0.000	0.43
		C	0.000	0.000	0.000	0.000	0.08
L3	119.29-78.79	A	0.000	0.000	0.000	0.000	0.78
		B	0.000	0.000	24.057	0.000	1.43
		C	0.000	0.000	0.000	0.000	0.82
L4	78.79-39.88	A	0.000	0.000	0.000	0.000	0.75
		B	0.000	0.000	26.982	0.000	1.39
		C	0.000	0.000	0.000	0.000	0.81
L5	39.88-1.50	A	0.000	0.000	0.000	0.000	0.59
		B	0.000	0.000	31.015	0.000	1.22
		C	0.000	0.000	0.000	0.000	0.70

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
L1	164.00-131.50	A	1.336	0.000	0.000	0.000	0.000	0.25
		B		0.000	0.000	13.455	0.000	0.74
		C		0.000	0.000	0.000	0.000	0.00
L2	131.50-119.29	A	1.314	0.000	0.000	0.000	0.000	0.23
		B		0.000	0.000	13.077	0.000	0.55
		C		0.000	0.000	0.000	0.000	0.08
L3	119.29-78.79	A	1.283	0.000	0.000	0.000	0.000	0.78
		B		0.000	0.000	43.377	0.000	1.83
		C		0.000	0.000	0.000	0.000	0.82
L4	78.79-39.88	A	1.219	0.000	0.000	0.000	0.000	0.75

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
		B		0.000	0.000	49.939	0.000	1.84
		C		0.000	0.000	0.000	0.000	0.81
L5	39.88-1.50	A	1.099	0.000	0.000	0.000	0.000	0.59
		B		0.000	0.000	59.426	0.000	1.72
		C		0.000	0.000	0.000	0.000	0.70

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	164.00-131.50	1.6105	-0.9298	1.6188	-0.9346
L2	131.50-119.29	3.6734	-2.1208	3.5256	-2.0355
L3	119.29-78.79	3.7047	-2.1389	3.5836	-2.0690
L4	78.79-39.88	4.2990	-2.4820	4.2438	-2.4502
L5	39.88-1.50	4.8795	-2.8172	4.9239	-2.8428

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	22	HYBRIFLEX 1-5/8"	131.50 - 144.00	1.0000	1.0000
L2	22	HYBRIFLEX 1-5/8"	119.29 - 131.50	1.0000	1.0000
L3	11	7/8	78.79 - 51.50	1.0000	1.0000
L3	22	HYBRIFLEX 1-5/8"	78.79 - 119.29	1.0000	1.0000
L4	11	7/8	39.88 - 51.50	1.0000	1.0000
L4	22	HYBRIFLEX 1-5/8"	39.88 - 78.79	1.0000	1.0000

Discrete Tower Loads

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
4'x4" Pipe Mount	A	From Face	0.50	0.0000	160.00	No Ice	1.06	1.06	0.04
(Town Existing)			0.00			1/2" Ice	1.58	1.58	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	1.84	1.84	0.07
4'x4" Pipe Mount	B	From Face	0.50	0.0000	160.00	No Ice	1.06	1.06	0.04
(Town Existing)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
4'x4" Pipe Mount	C	From Face	0.50	0.0000	160.00	No Ice	1.06	1.06	0.04
(Town Existing)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
12' x 3" Dia Omni	A	From Face	4.00	0.0000	164.00	No Ice	3.60	3.60	0.04
(Town Existing)			0.00			1/2" Ice	4.83	4.83	0.06
			5.00			1" Ice	6.08	6.08	0.09
12' x 3" Dia Omni	B	From Face	4.00	0.0000	164.00	No Ice	3.60	3.60	0.04
(Town Existing)			-6.00			1/2" Ice	4.83	4.83	0.06
			5.00			1" Ice	6.08	6.08	0.09
12' x 3" Dia Omni	C	From Face	4.00	0.0000	164.00	No Ice	3.60	3.60	0.04
(Town Existing)			6.00			1/2" Ice	4.83	4.83	0.06
			5.00			1" Ice	6.08	6.08	0.09
12' x 3" Dia Omni	C	From Face	4.00	0.0000	164.00	No Ice	3.60	3.60	0.04
(Town Existing)			0.00			1/2" Ice	4.83	4.83	0.06
			5.00			1" Ice	6.08	6.08	0.09
Camera	B	From Face	4.00	0.0000	164.00	No Ice	3.00	3.00	0.10
(Town Existing)			-6.00			1/2" Ice	4.00	4.00	0.15
			2.00			1" Ice	5.00	5.00	0.20
SC479-HF1LDF	A	From Face	4.00	0.0000	164.00	No Ice	4.39	4.39	0.03
(Town Existing)			-6.00			1/2" Ice	6.54	6.54	0.07
			5.00			1" Ice	8.04	8.04	0.11
TX/RX 432E-83I-01T	A	From Face	4.00	0.0000	164.00	No Ice	1.20	0.75	0.03
(Town Existing)			-6.00			1/2" Ice	1.34	0.86	0.04
			5.00			1" Ice	1.48	0.98	0.05
SC229-SFXLDF	B	From Face	4.00	0.0000	164.00	No Ice	6.67	6.67	0.03
(Town Existing)			0.00			1/2" Ice	9.02	9.02	0.08
			5.00			1" Ice	11.39	11.39	0.14
SC479-HF1LDF	C	From Face	4.00	0.0000	164.00	No Ice	4.39	4.39	0.03
(Town Existing)			6.00			1/2" Ice	6.54	6.54	0.07
			5.00			1" Ice	8.04	8.04	0.11
Low Profile Platform	C	None		0.0000	164.00	No Ice	15.70	15.70	1.30
(Town Existing)						1/2" Ice	20.10	20.10	1.76
						1" Ice	24.50	24.50	2.23
LLPX310R	A	From Face	3.00	0.0000	154.00	No Ice	4.30	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	4.60	2.21	0.05
			0.00			1" Ice	4.90	2.49	0.08
LLPX310R	B	From Face	3.00	0.0000	154.00	No Ice	4.30	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	4.60	2.21	0.05
			0.00			1" Ice	4.90	2.49	0.08
LLPX310R	C	From Face	3.00	0.0000	154.00	No Ice	4.30	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	4.60	2.21	0.05
			0.00			1" Ice	4.90	2.49	0.08
Remote Radio Head FD R6	A	From Face	3.00	0.0000	151.50	No Ice	1.80	0.78	0.03
RRH			0.00			1/2" Ice	1.99	0.92	0.04
(Clearwire Existing)			0.00			1" Ice	2.18	1.07	0.06
Remote Radio Head FD R6	B	From Face	3.00	0.0000	151.50	No Ice	1.80	0.78	0.03
RRH			0.00			1/2" Ice	1.99	0.92	0.04
(Clearwire Existing)			0.00			1" Ice	2.18	1.07	0.06
Remote Radio Head FD R6	C	From Face	3.00	0.0000	151.50	No Ice	1.80	0.78	0.03
RRH			0.00			1/2" Ice	1.99	0.92	0.04
(Clearwire Existing)			0.00			1" Ice	2.18	1.07	0.06
Horizon ODU	A	None		0.0000	154.00	No Ice	0.68	0.16	0.00
(Clearwire Existing)						1/2" Ice	0.78	0.22	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	0.89	0.29	0.01
Horizon ODU	C	None		0.0000	154.00	No Ice	0.68	0.16	0.00
(Clearwire Existing)						1/2" Ice	0.78	0.22	0.00
						1" Ice	0.89	0.29	0.01
APXVSPP18-C-A20	A	From Face	4.00	0.0000	154.00	No Ice	8.02	5.28	0.06
(Sprint Existing)			0.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
P40-16-XLPP-RR-A	B	From Face	4.00	0.0000	154.00	No Ice	9.07	3.52	0.05
(Sprint Existing)			0.00			1/2" Ice	9.47	3.87	0.11
			0.00			1" Ice	9.87	4.22	0.16
APXVSPP18-C-A20	C	From Face	4.00	0.0000	154.00	No Ice	8.02	5.28	0.06
(Sprint Existing)			0.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
FD-RRH 4x45 1900	A	From Face	4.00	0.0000	154.00	No Ice	2.32	2.38	0.06
(Sprint Existing)			2.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	B	From Face	4.00	0.0000	154.00	No Ice	2.32	2.38	0.06
(Sprint Existing)			2.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 4x45 1900	C	From Face	4.00	0.0000	154.00	No Ice	2.32	2.38	0.06
(Sprint Existing)			2.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 2x50 800	A	From Face	4.00	0.0000	154.00	No Ice	2.06	1.93	0.06
(Sprint Existing)			-2.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	B	From Face	4.00	0.0000	154.00	No Ice	2.06	1.93	0.06
(Sprint Existing)			-2.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	C	From Face	4.00	0.0000	154.00	No Ice	2.06	1.93	0.06
(Sprint Existing)			-2.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
GPS	C	From Face	4.00	0.0000	154.00	No Ice	1.00	1.00	0.01
(Sprint Existing)			-6.00			1/2" Ice	1.50	1.50	0.01
			3.00			1" Ice	2.00	2.00	0.02
APXVTM14	A	From Face	4.00	0.0000	154.00	No Ice	6.34	3.61	0.06
(Sprint Existing)			2.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
APXVTM14	B	From Face	4.00	0.0000	154.00	No Ice	6.34	3.61	0.06
(Sprint Existing)			2.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
APXVTM14	C	From Face	4.00	0.0000	154.00	No Ice	6.34	3.61	0.06
(Sprint Existing)			2.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
TD-RRH8x20-25	A	From Face	4.00	0.0000	154.00	No Ice	4.05	1.53	0.07
(Sprint Existing)			2.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	B	From Face	4.00	0.0000	154.00	No Ice	4.05	1.53	0.07
(Sprint Existing)			2.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	C	From Face	4.00	0.0000	154.00	No Ice	4.05	1.53	0.07
(Sprint Existing)			2.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
Valmont Uni-Tri Bracket	A	None		0.0000	151.50	No Ice	1.75	1.75	0.29
(Sprint Existing)						1/2" Ice	1.94	1.94	0.31
						1" Ice	2.13	2.13	0.32
Low Profile Platform	C	None		0.0000	154.00	No Ice	15.70	15.70	1.30
(Sprint Existing)						1/2" Ice	20.10	20.10	1.76

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	24.50	24.50	2.23
AIR6449	A	From Face	4.00	0.0000	144.00	No Ice	5.65	2.42	0.10
(T-Mobile Existing)			-6.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
APXVAARR24-43	A	From Face	4.00	0.0000	144.00	No Ice	20.24	8.89	0.15
(T-Mobile Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	A	From Face	4.00	0.0000	144.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			2.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR6449	B	From Face	4.00	0.0000	144.00	No Ice	5.65	2.42	0.10
(T-Mobile Existing)			-6.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
APXVAARR24-43	B	From Face	4.00	0.0000	144.00	No Ice	20.24	8.89	0.15
(T-Mobile Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	B	From Face	4.00	0.0000	144.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			2.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR6449	C	From Face	4.00	0.0000	144.00	No Ice	5.65	2.42	0.10
(T-Mobile Existing)			-6.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
APXVAARR24-43	C	From Face	4.00	0.0000	144.00	No Ice	20.24	8.89	0.15
(T-Mobile Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	C	From Face	4.00	0.0000	144.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			2.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
Radio 4449 B71 B12	A	From Face	4.00	0.0000	144.00	No Ice	1.64	1.29	0.07
(T-Mobile Existing)			-2.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	B	From Face	4.00	0.0000	144.00	No Ice	1.64	1.29	0.07
(T-Mobile Existing)			-2.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	C	From Face	4.00	0.0000	144.00	No Ice	1.64	1.29	0.07
(T-Mobile Existing)			-2.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
TMA 10"x8"x3"	A	From Face	4.00	0.0000	144.00	No Ice	0.67	0.26	0.02
(T-Mobile Existing)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
TMA 10"x8"x3"	B	From Face	4.00	0.0000	144.00	No Ice	0.67	0.26	0.02
(T-Mobile Existing)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
TMA 10"x8"x3"	C	From Face	4.00	0.0000	144.00	No Ice	0.67	0.26	0.02
(T-Mobile Existing)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
4415 B25	A	From Face	4.00	0.0000	144.00	No Ice	1.84	0.82	0.05
(T-Mobile Existing)			-2.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4415 B25	B	From Face	4.00	0.0000	144.00	No Ice	1.84	0.82	0.05
(T-Mobile Existing)			-2.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4415 B25	C	From Face	4.00	0.0000	144.00	No Ice	1.84	0.82	0.05
(T-Mobile Existing)			-2.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
SDX1926Q-43	A	From Face	4.00	0.0000	144.00	No Ice	0.24	0.10	0.03
(T-Mobile Existing)			-2.00			1/2" Ice	0.31	0.14	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	0.38	0.19	0.04
SDX1926Q-43	B	From Face	4.00	0.0000	144.00	No Ice	0.24	0.10	0.03
(T-Mobile Existing)			-2.00			1/2" Ice	0.31	0.14	0.03
			0.00			1" Ice	0.38	0.19	0.04
SDX1926Q-43	C	From Face	4.00	0.0000	144.00	No Ice	0.24	0.10	0.03
(T-Mobile Existing)			-2.00			1/2" Ice	0.31	0.14	0.03
			0.00			1" Ice	0.38	0.19	0.04
EEI 16-ft Platform w/ Handrail	C	None		0.0000	144.00	No Ice	26.00	26.00	2.30
						1/2" Ice	32.00	32.00	2.75
(T-Mobile Existing)						1" Ice	38.00	38.00	3.20
DC6-48-60-18-8F Surge	B	From Face	0.50	0.0000	138.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T Existing)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	138.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T Existing)			0.00			1" Ice	2.29	2.29	0.06
RRUS-11	A	From Face	0.50	0.0000	138.00	No Ice	2.57	1.07	0.05
(AT&T Existing)			6.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	B	From Face	0.50	0.0000	138.00	No Ice	2.57	1.07	0.05
(AT&T Existing)			6.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	C	From Face	0.50	0.0000	138.00	No Ice	2.57	1.07	0.05
(AT&T Existing)			6.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-32	A	From Face	0.50	0.0000	138.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			-3.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	B	From Face	0.50	0.0000	138.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			-3.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	C	From Face	0.50	0.0000	138.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			-3.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
Valmont Uni-Tri Bracket	C	None		0.0000	138.00	No Ice	1.75	1.75	0.29
(AT&T Existing)						1/2" Ice	1.94	1.94	0.31
						1" Ice	2.13	2.13	0.32
7770.00	A	From Face	3.00	0.0000	134.00	No Ice	5.51	2.93	0.04
(AT&T Existing)			-7.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
QS66512-2	A	From Face	3.00	0.0000	134.00	No Ice	8.13	6.80	0.11
(AT&T Existing)			-3.50			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	A	From Face	3.00	0.0000	134.00	No Ice	13.81	5.83	0.11
(AT&T Existing)			3.50			1/2" Ice	14.35	6.32	0.19
			0.00			1" Ice	14.89	6.82	0.27
P65-16-XLH-RR	A	From Face	3.00	0.0000	134.00	No Ice	8.13	4.70	0.06
(AT&T Existing)			7.00			1/2" Ice	8.59	5.15	0.11
			0.00			1" Ice	9.05	5.60	0.16
7770.00	B	From Face	3.00	0.0000	134.00	No Ice	5.51	2.93	0.04
(AT&T Existing)			-7.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
QS66512-2	B	From Face	3.00	0.0000	134.00	No Ice	8.13	6.80	0.11
(AT&T Existing)			-3.50			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	B	From Face	3.00	0.0000	134.00	No Ice	13.81	5.83	0.11
(AT&T Existing)			3.50			1/2" Ice	14.35	6.32	0.19

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	14.89	6.82	0.27
P65-16-XLH-RR	B	From Face	3.00	0.0000	134.00	No Ice	8.13	4.70	0.06
(AT&T Existing)			7.00			1/2" Ice	8.59	5.15	0.11
			0.00			1" Ice	9.05	5.60	0.16
7770.00	C	From Face	3.00	0.0000	134.00	No Ice	5.51	2.93	0.04
(AT&T Existing)			-7.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
QS66512-2	C	From Face	3.00	0.0000	134.00	No Ice	8.13	6.80	0.11
(AT&T Existing)			-3.50			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	C	From Face	3.00	0.0000	134.00	No Ice	13.81	5.83	0.11
(AT&T Existing)			3.50			1/2" Ice	14.35	6.32	0.19
			0.00			1" Ice	14.89	6.82	0.27
P65-16-XLH-RR	C	From Face	3.00	0.0000	134.00	No Ice	8.13	4.70	0.06
(AT&T Existing)			7.00			1/2" Ice	8.59	5.15	0.11
			0.00			1" Ice	9.05	5.60	0.16
(2) LGP21401 TMA	A	From Face	3.00	0.0000	134.00	No Ice	0.82	0.35	0.02
(AT&T Existing)			-2.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	B	From Face	3.00	0.0000	134.00	No Ice	0.82	0.35	0.02
(AT&T Existing)			-2.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	C	From Face	3.00	0.0000	134.00	No Ice	0.82	0.35	0.02
(AT&T Existing)			-2.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) TPX-070821	A	From Face	3.00	0.0000	134.00	No Ice	0.47	0.10	0.01
(AT&T Existing)			-2.00			1/2" Ice	0.56	0.15	0.01
			0.00			1" Ice	0.66	0.20	0.02
(2) TPX-070821	B	From Face	3.00	0.0000	134.00	No Ice	0.47	0.10	0.01
(AT&T Existing)			-2.00			1/2" Ice	0.56	0.15	0.01
			0.00			1" Ice	0.66	0.20	0.02
(2) TPX-070821	C	From Face	3.00	0.0000	134.00	No Ice	0.47	0.10	0.01
(AT&T Existing)			-2.00			1/2" Ice	0.56	0.15	0.01
			0.00			1" Ice	0.66	0.20	0.02
RRUS-32	A	From Face	0.50	0.0000	134.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			3.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	B	From Face	0.50	0.0000	134.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			3.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	C	From Face	0.50	0.0000	134.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			3.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	A	From Face	0.50	0.0000	134.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			-4.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	B	From Face	0.50	0.0000	134.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			-4.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	C	From Face	0.50	0.0000	134.00	No Ice	3.31	2.42	0.08
(AT&T Existing)			-4.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
B14 4478	A	From Face	0.50	0.0000	134.00	No Ice	1.84	1.06	0.06
(AT&T Existing)			-6.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
B14 4478	B	From Face	0.50	0.0000	134.00	No Ice	1.84	1.06	0.06
(AT&T Existing)			-6.00			1/2" Ice	2.01	1.20	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	2.19	1.34	0.09
B14 4478	C	From Face	0.50	0.0000	134.00	No Ice	1.84	1.06	0.06
(AT&T Existing)			-6.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
RRU	A	From Face	0.50	0.0000	134.00	No Ice	1.80	0.78	0.03
(AT&T Existing)			3.00			1/2" Ice	2.00	0.92	0.04
			0.00			1" Ice	2.20	1.06	0.06
RRU	B	From Face	0.50	0.0000	134.00	No Ice	1.80	0.78	0.03
(AT&T Existing)			3.00			1/2" Ice	2.00	0.92	0.04
			0.00			1" Ice	2.20	1.06	0.06
RRU	C	From Face	0.50	0.0000	134.00	No Ice	1.80	0.78	0.03
(AT&T Existing)			3.00			1/2" Ice	2.00	0.92	0.04
			0.00			1" Ice	2.20	1.06	0.06
CBC23SR-43	A	From Face	0.50	0.0000	134.00	No Ice	0.42	0.15	0.01
(AT&T Existing)			3.00			1/2" Ice	0.50	0.20	0.01
			0.00			1" Ice	0.59	0.27	0.01
CBC23SR-43	B	From Face	0.50	0.0000	134.00	No Ice	0.42	0.15	0.01
(AT&T Existing)			3.00			1/2" Ice	0.50	0.20	0.01
			0.00			1" Ice	0.59	0.27	0.01
CBC23SR-43	C	From Face	0.50	0.0000	134.00	No Ice	0.42	0.15	0.01
(AT&T Existing)			3.00			1/2" Ice	0.50	0.20	0.01
			0.00			1" Ice	0.59	0.27	0.01
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	134.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T Existing)			0.00			1" Ice	2.29	2.29	0.06
EEI 16-ft Low Profile	C	None		0.0000	134.00	No Ice	21.00	21.00	2.00
Platform						1/2" Ice	26.00	26.00	2.40
(AT&T Existing)						1" Ice	31.00	31.00	2.80
DB844G65ZAXY	A	From Face	4.00	0.0000	124.00	No Ice	4.34	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.66	3.92	0.05
			0.00			1" Ice	4.98	4.23	0.09
(2) QS66512	A	From Face	4.00	0.0000	124.00	No Ice	8.13	6.80	0.11
(Verizon Existing)			0.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
CBRS Antenna	A	From Face	4.00	0.0000	124.00	No Ice	1.72	1.17	0.03
(Verizon Existing)			4.00			1/2" Ice	1.93	1.44	0.05
			0.00			1" Ice	2.14	1.71	0.07
DB844G65ZAXY	A	From Face	4.00	0.0000	124.00	No Ice	4.34	3.61	0.02
(Verizon Existing)			6.00			1/2" Ice	4.66	3.92	0.05
			0.00			1" Ice	4.98	4.23	0.09
DB844G65ZAXY	B	From Face	4.00	0.0000	124.00	No Ice	4.34	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.66	3.92	0.05
			0.00			1" Ice	4.98	4.23	0.09
(2) QS66512	B	From Face	4.00	0.0000	124.00	No Ice	8.13	6.80	0.11
(Verizon Existing)			0.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
CBRS Antenna	B	From Face	4.00	0.0000	124.00	No Ice	1.72	1.17	0.03
(Verizon Existing)			4.00			1/2" Ice	1.93	1.44	0.05
			0.00			1" Ice	2.14	1.71	0.07
DB844G65ZAXY	B	From Face	4.00	0.0000	124.00	No Ice	4.34	3.61	0.02
(Verizon Existing)			6.00			1/2" Ice	4.66	3.92	0.05
			0.00			1" Ice	4.98	4.23	0.09
DB844G65ZAXY	C	From Face	4.00	0.0000	124.00	No Ice	4.34	3.61	0.02
(Verizon Existing)			-6.00			1/2" Ice	4.66	3.92	0.05
			0.00			1" Ice	4.98	4.23	0.09
(2) QS66512	C	From Face	4.00	0.0000	124.00	No Ice	8.13	6.80	0.11
(Verizon Existing)			0.00			1/2" Ice	8.59	7.27	0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	9.05	7.72	0.23
CBRS Antenna	C	From Face	4.00	0.0000	124.00	No Ice	1.72	1.17	0.03
(Verizon Existing)			4.00			1/2" Ice	1.93	1.44	0.05
			0.00			1" Ice	2.14	1.71	0.07
DB844G65ZAXY	C	From Face	4.00	0.0000	124.00	No Ice	4.34	3.61	0.02
(Verizon Existing)			6.00			1/2" Ice	4.66	3.92	0.05
			0.00			1" Ice	4.98	4.23	0.09
B2/B66A RRH	A	From Face	4.00	0.0000	124.00	No Ice	2.54	1.61	0.06
(Verizon Existing)			4.00			1/2" Ice	2.75	1.79	0.08
			0.00			1" Ice	2.97	1.98	0.10
B2/B66A RRH	B	From Face	4.00	0.0000	124.00	No Ice	2.54	1.61	0.06
(Verizon Existing)			4.00			1/2" Ice	2.75	1.79	0.08
			0.00			1" Ice	2.97	1.98	0.10
B2/B66A RRH	C	From Face	4.00	0.0000	124.00	No Ice	2.54	1.61	0.06
(Verizon Existing)			4.00			1/2" Ice	2.75	1.79	0.08
			0.00			1" Ice	2.97	1.98	0.10
B5/B15 RRH -BRO4C	A	From Face	4.00	0.0000	124.00	No Ice	1.87	1.02	0.07
(Verizon Existing)			4.00			1/2" Ice	2.03	1.15	0.09
			0.00			1" Ice	2.21	1.29	0.11
B5/B15 RRH -BRO4C	B	From Face	4.00	0.0000	124.00	No Ice	1.87	1.02	0.07
(Verizon Existing)			4.00			1/2" Ice	2.03	1.15	0.09
			0.00			1" Ice	2.21	1.29	0.11
B5/B15 RRH -BRO4C	C	From Face	4.00	0.0000	124.00	No Ice	1.87	1.02	0.07
(Verizon Existing)			4.00			1/2" Ice	2.03	1.15	0.09
			0.00			1" Ice	2.21	1.29	0.11
RRU	A	From Face	4.00	0.0000	124.00	No Ice	1.80	0.78	0.03
(Verizon Existing)			4.00			1/2" Ice	2.00	0.92	0.04
			0.00			1" Ice	2.20	1.06	0.06
RRU	B	From Face	4.00	0.0000	124.00	No Ice	1.80	0.78	0.03
(Verizon Existing)			4.00			1/2" Ice	2.00	0.92	0.04
			0.00			1" Ice	2.20	1.06	0.06
RRU	C	From Face	4.00	0.0000	124.00	No Ice	1.80	0.78	0.03
(Verizon Existing)			4.00			1/2" Ice	2.00	0.92	0.04
			0.00			1" Ice	2.20	1.06	0.06
RC2DC-3315-PF-48	A	From Face	1.00	0.0000	124.00	No Ice	3.01	1.96	0.03
(Verizon Existing)			1.00			1/2" Ice	3.23	2.15	0.05
			0.00			1" Ice	3.46	2.35	0.08
RC2DC-3315-PF-48	B	From Face	1.00	0.0000	124.00	No Ice	3.01	1.96	0.03
(Verizon Existing)			1.00			1/2" Ice	3.23	2.15	0.05
			0.00			1" Ice	3.46	2.35	0.08
Low Profile Platform	C	None		0.0000	124.00	No Ice	15.70	15.70	1.30
(Verizon Existing)						1/2" Ice	20.10	20.10	1.76
						1" Ice	24.50	24.50	2.23
531-70HD	A	From Face	3.00	0.0000	114.00	No Ice	6.00	6.00	0.04
(Eversource Existing)			-2.00			1/2" Ice	6.90	6.90	0.05
			0.00			1" Ice	7.80	7.80	0.06
DB586-Y	B	From Face	3.00	0.0000	114.00	No Ice	1.01	1.01	0.01
(Eversource Existing)			-6.00			1/2" Ice	1.28	1.28	0.02
			2.50			1" Ice	1.56	1.56	0.03
DB586-Y	B	From Face	3.00	0.0000	114.00	No Ice	1.01	1.01	0.01
(Eversource Existing)			-6.00			1/2" Ice	1.28	1.28	0.02
			-2.50			1" Ice	1.56	1.56	0.03
ANT150F2	B	From Face	3.00	0.0000	114.00	No Ice	1.30	1.30	0.02
(Eversource Existing)			2.00			1/2" Ice	1.60	1.60	0.02
			2.50			1" Ice	1.90	1.90	0.03
Tower Top Amplifier	B	From Face	3.00	0.0000	114.00	No Ice	2.67	1.03	0.04
(Eversource Existing)			-6.00			1/2" Ice	2.87	1.17	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	3.08	1.32	0.08
ANT220F2	A	From Face	3.00	0.0000	114.00	No Ice	1.03	1.03	0.02
(Eversource Proposed)			6.00			1/2" Ice	1.29	1.29	0.02
			3.00			1" Ice	1.56	1.56	0.04
871F-70	A	From Face	3.00	0.0000	114.00	No Ice	2.40	2.40	0.01
(Eversource Proposed)			6.00			1/2" Ice	3.20	3.20	0.03
			-3.00			1" Ice	4.00	4.00	0.04
Low Profile Platform	C	None		0.0000	114.00	No Ice	15.70	15.70	1.30
						1/2" Ice	20.10	20.10	1.76
						1" Ice	24.50	24.50	2.23
GPS	A	From Face	1.50	0.0000	51.50	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02
GPS	B	From Face	1.50	0.0000	51.50	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02
GPS	C	From Face	1.50	0.0000	51.50	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
4 FT DISH	A	Paraboloid	From	1.00	Worst		160.00	4.00	No Ice	12.56	0.17
(Town Existing)		w/Shroud (HP)	Leg	0.00					1/2" Ice	13.09	0.24
				0.00					1" Ice	13.62	0.30
4 FT DISH	B	Paraboloid	From	1.00	Worst		160.00	4.00	No Ice	12.56	0.17
(Town Existing)		w/Shroud (HP)	Leg	0.00					1/2" Ice	13.09	0.24
				0.00					1" Ice	13.62	0.30
2 FT DISH	C	Paraboloid	From	1.00	Worst		160.00	2.00	No Ice	3.14	0.03
(Town Existing)		w/Shroud (HP)	Leg	0.00					1/2" Ice	3.41	0.04
				0.00					1" Ice	3.67	0.06
A-Ant-23G-2-C	A	Paraboloid	From	3.10	Worst		154.00	2.17	No Ice	3.72	0.03
(Clearwire Existing)		w/Radome	Face	-2.52					1/2" Ice	4.01	0.05
				2.00					1" Ice	4.30	0.07
A-Ant-23G-2-C	C	Paraboloid	From	3.80	Worst		154.00	2.17	No Ice	3.72	0.03
(Clearwire Existing)		w/Radome	Face	-1.24					1/2" Ice	4.01	0.05
				2.00					1" Ice	4.30	0.07

Tower Pressures - No Ice

$G_H = 1.100$

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
L1	147.50	1.374	56	137.953	A	0.000	137.953	137.953	100.00	0.000	0.000
164.00-131.50					B	0.000	137.953		100.00	7.425	0.000
					C	0.000	137.953		100.00	0.000	0.000
L2	125.34	1.327	55	56.545	A	0.000	56.545	56.545	100.00	0.000	0.000
131.50-119.29					B	0.000	56.545		100.00	7.253	0.000
					C	0.000	56.545		100.00	0.000	0.000
L3	98.81	1.262	52	202.275	A	0.000	202.275	202.275	100.00	0.000	0.000
119.29-78.79					B	0.000	202.275		100.00	24.057	0.000
					C	0.000	202.275		100.00	0.000	0.000
L4 78.79-39.88	59.30	1.134	46	216.653	A	0.000	216.653	216.653	100.00	0.000	0.000
					B	0.000	216.653		100.00	26.982	0.000
					C	0.000	216.653		100.00	0.000	0.000
L5 39.88-1.50	21.06	0.912	38	234.431	A	0.000	234.431	234.431	100.00	0.000	0.000
					B	0.000	234.431		100.00	31.015	0.000
					C	0.000	234.431		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

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
L1	147.50	1.374	8	1.3357	145.188	A	0.000	145.188	145.188	100.00	0.000	0.000
164.00-131.50						B	0.000	145.188		100.00	13.455	0.000
						C	0.000	145.188		100.00	0.000	0.000
L2	125.34	1.327	8	1.3142	59.219	A	0.000	59.219	59.219	100.00	0.000	0.000
131.50-119.29						B	0.000	59.219		100.00	13.077	0.000
						C	0.000	59.219		100.00	0.000	0.000
L3 119.29-78.79	98.81	1.262	8	1.2833	211.145	A	0.000	211.145	211.145	100.00	0.000	0.000
						B	0.000	211.145		100.00	43.377	0.000
						C	0.000	211.145		100.00	0.000	0.000
L4 78.79-39.88	59.30	1.134	7	1.2194	224.976	A	0.000	224.976	224.976	100.00	0.000	0.000
						B	0.000	224.976		100.00	49.939	0.000
						C	0.000	224.976		100.00	0.000	0.000
L5 39.88-1.50	21.06	0.912	6	1.0995	242.231	A	0.000	242.231	242.231	100.00	0.000	0.000
						B	0.000	242.231		100.00	59.426	0.000
						C	0.000	242.231		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

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
L1	147.50	1.374	11	137.953	A	0.000	137.953	137.953	100.00	0.000	0.000
164.00-131.50					B	0.000	137.953		100.00	7.425	0.000
					C	0.000	137.953		100.00	0.000	0.000
L2	125.34	1.327	10	56.545	A	0.000	56.545	56.545	100.00	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
131.50-119.29					B	0.000	56.545		100.00	7.253	0.000
					C	0.000	56.545		100.00	0.000	0.000
L3	98.81	1.262	10	202.275	A	0.000	202.275	202.275	100.00	0.000	0.000
119.29-78.79					B	0.000	202.275		100.00	24.057	0.000
					C	0.000	202.275		100.00	0.000	0.000
L4 78.79-39.88	59.30	1.134	9	216.653	A	0.000	216.653	216.653	100.00	0.000	0.000
					B	0.000	216.653		100.00	26.982	0.000
					C	0.000	216.653		100.00	0.000	0.000
L5 39.88-1.50	21.06	0.912	7	234.431	A	0.000	234.431	234.431	100.00	0.000	0.000
					B	0.000	234.431		100.00	31.015	0.000
					C	0.000	234.431		100.00	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
L1	0.86	5.47	A	1	0.73	56	1	1	137.953	6.25	192.35	C
164.00-131.50			B	1	0.73		1	1	137.953			
			C	1	0.73		1	1	137.953			
L2	0.74	2.69	A	1	0.73	55	1	1	56.545	2.48	202.86	C
131.50-119.29			B	1	0.73		1	1	56.545			
			C	1	0.73		1	1	56.545			
L3	3.02	12.76	A	1	0.73	52	1	1	202.275	8.42	207.82	C
119.29-78.79			B	1	0.73		1	1	202.275			
			C	1	0.73		1	1	202.275			
L4	2.94	18.55	A	1	0.73	46	1	1	216.653	8.08	207.63	C
78.79-39.88			B	1	0.73		1	1	216.653			
			C	1	0.73		1	1	216.653			
L5 39.88-1.50	2.50	20.49	A	1	0.73	38	1	1	234.431	7.08	184.48	C
			B	1	0.73		1	1	234.431			
			C	1	0.73		1	1	234.431			
Sum Weight:	10.07	59.96						OTM	2643.93 kip-ft	32.30		

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
L1	0.86	5.47	A	1	0.73	56	1	1	137.953	6.25	192.35	C
164.00-131.50			B	1	0.73		1	1	137.953			
			C	1	0.73		1	1	137.953			
L2	0.74	2.69	A	1	0.73	55	1	1	56.545	2.48	202.86	C
131.50-119.29			B	1	0.73		1	1	56.545			
			C	1	0.73		1	1	56.545			
L3	3.02	12.76	A	1	0.73	52	1	1	202.275	8.42	207.82	C
119.29-78.79			B	1	0.73		1	1	202.275			
			C	1	0.73		1	1	202.275			

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
L4	2.94	18.55	A	1	0.73	46	1	1	216.653	8.08	207.63	C
78.79-39.88			B	1	0.73		1	1	216.653			
			C	1	0.73		1	1	216.653			
L5 39.88-1.50	2.50	20.49	A	1	0.73	38	1	1	234.431	7.08	184.48	C
			B	1	0.73		1	1	234.431			
			C	1	0.73		1	1	234.431			
Sum Weight:	10.07	59.96						OTM	2643.93 kip-ft	32.30		

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
L1	0.86	5.47	A	1	0.73	56	1	1	137.953	6.25	192.35	C
164.00-131.50			B	1	0.73		1	1	137.953			
			C	1	0.73		1	1	137.953			
L2	0.74	2.69	A	1	0.73	55	1	1	56.545	2.53	207.05	B
131.50-119.29			B	1	0.745		1	1	56.545			
			C	1	0.73		1	1	56.545			
L3	3.02	12.76	A	1	0.73	52	1	1	202.275	8.42	207.82	C
119.29-78.79			B	1	0.73		1	1	202.275			
			C	1	0.73		1	1	202.275			
L4	2.94	18.55	A	1	0.73	46	1	1	216.653	8.08	207.63	C
78.79-39.88			B	1	0.73		1	1	216.653			
			C	1	0.73		1	1	216.653			
L5 39.88-1.50	2.50	20.49	A	1	0.73	38	1	1	234.431	7.08	184.48	C
			B	1	0.73		1	1	234.431			
			C	1	0.73		1	1	234.431			
Sum Weight:	10.07	59.96						OTM	2650.27 kip-ft	32.35		

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
L1	0.99	8.24	A	1	1.2	8	1	1	145.188	1.60	49.23	C
164.00-131.50			B	1	1.2		1	1	145.188			
			C	1	1.2		1	1	145.188			
L2	0.86	3.80	A	1	1.2	8	1	1	59.219	0.63	51.66	C
131.50-119.29			B	1	1.2		1	1	59.219			
			C	1	1.2		1	1	59.219			
L3	3.42	16.63	A	1	1.2	8	1	1	211.145	2.14	52.75	C
119.29-78.79			B	1	1.2		1	1	211.145			
			C	1	1.2		1	1	211.145			
L4	3.39	22.48	A	1	1.2	7	1	1	224.976	2.04	52.43	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
78.79-39.88			B	1	1.2		1	1	224.976			
			C	1	1.2		1	1	224.976			
L5 39.88-1.50	3.01	24.31	A	1	1.2	6	1	1	242.231	1.78	46.35	C
			B	1	1.2		1	1	242.231			
			C	1	1.2		1	1	242.231			
Sum Weight:	11.67	75.46						OTM	672.31 kip-ft	8.19		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.99	8.24	A	1	1.2	8	1	1	145.188	1.60	49.23	C
164.00-131.50			B	1	1.2		1	1	145.188			
			C	1	1.2		1	1	145.188			
L2	0.86	3.80	A	1	1.2	8	1	1	59.219	0.63	51.66	C
131.50-119.29			B	1	1.2		1	1	59.219			
			C	1	1.2		1	1	59.219			
L3	3.42	16.63	A	1	1.2	8	1	1	211.145	2.14	52.75	C
119.29-78.79			B	1	1.2		1	1	211.145			
			C	1	1.2		1	1	211.145			
L4	3.39	22.48	A	1	1.2	7	1	1	224.976	2.04	52.43	C
78.79-39.88			B	1	1.2		1	1	224.976			
			C	1	1.2		1	1	224.976			
L5 39.88-1.50	3.01	24.31	A	1	1.2	6	1	1	242.231	1.78	46.35	C
			B	1	1.2		1	1	242.231			
			C	1	1.2		1	1	242.231			
Sum Weight:	11.67	75.46						OTM	672.31 kip-ft	8.19		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.99	8.24	A	1	1.2	8	1	1	145.188	1.60	49.23	C
164.00-131.50			B	1	1.2		1	1	145.188			
			C	1	1.2		1	1	145.188			
L2	0.86	3.80	A	1	1.2	8	1	1	59.219	0.63	51.66	C
131.50-119.29			B	1	1.2		1	1	59.219			
			C	1	1.2		1	1	59.219			
L3	3.42	16.63	A	1	1.2	8	1	1	211.145	2.14	52.75	C
119.29-78.79			B	1	1.2		1	1	211.145			
			C	1	1.2		1	1	211.145			
L4	3.39	22.48	A	1	1.2	7	1	1	224.976	2.04	52.43	C
78.79-39.88			B	1	1.2		1	1	224.976			

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
			C	1	1.2		1	1	224.976			
L5 39.88-1.50	3.01	24.31	A	1	1.2	6	1	1	242.231	1.78	46.35	C
			B	1	1.2		1	1	242.231			
			C	1	1.2		1	1	242.231			
Sum Weight:	11.67	75.46						OTM	672.31 kip-ft	8.19		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.86	5.47	A	1	0.73	11	1	1	137.953	1.19	36.66	C
164.00-131.50			B	1	0.73		1	1	137.953			
			C	1	0.73		1	1	137.953			
L2	0.74	2.69	A	1	0.73	10	1	1	56.545	0.47	38.66	C
131.50-119.29			B	1	0.73		1	1	56.545			
			C	1	0.73		1	1	56.545			
L3	3.02	12.76	A	1	0.73	10	1	1	202.275	1.60	39.61	C
119.29-78.79			B	1	0.73		1	1	202.275			
			C	1	0.73		1	1	202.275			
L4	2.94	18.55	A	1	0.73	9	1	1	216.653	1.54	39.57	C
78.79-39.88			B	1	0.73		1	1	216.653			
			C	1	0.73		1	1	216.653			
L5 39.88-1.50	2.50	20.49	A	1	0.73	7	1	1	234.431	1.35	35.16	C
			B	1	0.73		1	1	234.431			
			C	1	0.73		1	1	234.431			
Sum Weight:	10.07	59.96						OTM	503.92 kip-ft	6.16		

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
L1	0.86	5.47	A	1	0.73	11	1	1	137.953	1.19	36.66	C
164.00-131.50			B	1	0.73		1	1	137.953			
			C	1	0.73		1	1	137.953			
L2	0.74	2.69	A	1	0.73	10	1	1	56.545	0.47	38.66	C
131.50-119.29			B	1	0.73		1	1	56.545			
			C	1	0.73		1	1	56.545			
L3	3.02	12.76	A	1	0.73	10	1	1	202.275	1.60	39.61	C
119.29-78.79			B	1	0.73		1	1	202.275			
			C	1	0.73		1	1	202.275			
L4	2.94	18.55	A	1	0.73	9	1	1	216.653	1.54	39.57	C
78.79-39.88			B	1	0.73		1	1	216.653			
			C	1	0.73		1	1	216.653			

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
L5 39.88-1.50	2.50	20.49	A	1	0.73	7	1	1	234.431	1.35	35.16	C
			B	1	0.73		1	1	234.431			
			C	1	0.73		1	1	234.431			
Sum Weight:	10.07	59.96						OTM	503.92 kip-ft	6.16		

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
L1	0.86	5.47	A	1	0.73	11	1	1	137.953	1.19	36.66	C
164.00-131.50			B	1	0.73		1	1	137.953			
			C	1	0.73		1	1	137.953			
L2	0.74	2.69	A	1	0.73	10	1	1	56.545	0.48	39.46	B
131.50-119.29			B	1	0.745		1	1	56.545			
			C	1	0.73		1	1	56.545			
L3	3.02	12.76	A	1	0.73	10	1	1	202.275	1.60	39.61	C
119.29-78.79			B	1	0.73		1	1	202.275			
			C	1	0.73		1	1	202.275			
L4	2.94	18.55	A	1	0.73	9	1	1	216.653	1.54	39.57	C
78.79-39.88			B	1	0.73		1	1	216.653			
			C	1	0.73		1	1	216.653			
L5 39.88-1.50	2.50	20.49	A	1	0.73	7	1	1	234.431	1.35	35.16	C
			B	1	0.73		1	1	234.431			
			C	1	0.73		1	1	234.431			
Sum Weight:	10.07	59.96						OTM	505.13 kip-ft	6.17		

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	59.96					
Bracing Weight	0.00					
Total Member Self-Weight	59.96			-2.49	-1.59	
Total Weight	87.75			-2.49	-1.59	
Wind 0 deg - No Ice		0.09	-62.92	-6928.47	-13.48	-4.47
Wind 30 deg - No Ice		31.63	-54.54	-6006.51	-3487.24	-5.53
Wind 60 deg - No Ice		54.70	-31.54	-3475.78	-6027.01	-5.11
Wind 90 deg - No Ice		63.11	-0.09	-14.38	-6952.28	-3.32
Wind 120 deg - No Ice		54.61	31.38	3450.21	-6015.12	-0.64
Wind 150 deg - No Ice		31.50	54.49	5995.13	-3469.81	2.21
Wind 180 deg - No Ice		-0.09	62.92	6923.50	10.30	4.47
Wind 210 deg - No Ice		-31.63	54.54	6001.54	3484.06	5.53
Wind 240 deg - No Ice		-54.70	31.54	3470.80	6023.83	5.11

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 270 deg - No Ice		-63.11	0.09	9.41	6949.10	3.32
Wind 300 deg - No Ice		-54.61	-31.38	-3455.18	6011.94	0.64
Wind 330 deg - No Ice		-31.50	-54.49	-6000.10	3466.63	-2.21
Member Ice	15.50					
Total Weight Ice	123.63			-6.36	-4.23	
Wind 0 deg - Ice		0.01	-14.36	-1544.88	-6.08	-1.23
Wind 30 deg - Ice		7.21	-12.45	-1339.69	-777.06	-1.43
Wind 60 deg - Ice		12.47	-7.19	-777.23	-1340.96	-1.25
Wind 90 deg - Ice		14.39	-0.01	-8.21	-1546.68	-0.73
Wind 120 deg - Ice		12.46	7.17	761.29	-1339.11	-0.02
Wind 150 deg - Ice		7.18	12.43	1325.11	-773.85	0.70
Wind 180 deg - Ice		-0.01	14.36	1532.16	-2.38	1.23
Wind 210 deg - Ice		-7.21	12.45	1326.96	768.60	1.43
Wind 240 deg - Ice		-12.47	7.19	764.50	1332.50	1.25
Wind 270 deg - Ice		-14.39	0.01	-4.51	1538.23	0.73
Wind 300 deg - Ice		-12.46	-7.17	-774.02	1330.65	0.02
Wind 330 deg - Ice		-7.18	-12.43	-1337.84	765.40	-0.70
Total Weight	87.75			-2.49	-1.59	
Wind 0 deg - Service		0.02	-11.99	-1321.37	-1.83	-0.85
Wind 30 deg - Service		6.03	-10.39	-1145.65	-663.91	-1.05
Wind 60 deg - Service		10.43	-6.01	-663.31	-1147.98	-0.97
Wind 90 deg - Service		12.03	-0.02	-3.58	-1324.33	-0.63
Wind 120 deg - Service		10.41	5.98	656.75	-1145.71	-0.12
Wind 150 deg - Service		6.00	10.39	1141.80	-660.59	0.42
Wind 180 deg - Service		-0.02	11.99	1318.74	2.70	0.85
Wind 210 deg - Service		-6.03	10.39	1143.02	664.78	1.05
Wind 240 deg - Service		-10.43	6.01	660.67	1148.85	0.97
Wind 270 deg - Service		-12.03	0.02	0.95	1325.20	0.63
Wind 300 deg - Service		-10.41	-5.98	-659.38	1146.58	0.12
Wind 330 deg - Service		-6.00	-10.39	-1144.43	661.46	-0.42

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice

Comb. No.	Description
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	164 - 131.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.53	1.31	0.85
			Max. Mx	20	-22.82	496.83	-0.24
			Max. My	2	-22.82	-0.72	495.04
			Max. Vy	8	30.67	-496.30	1.61
			Max. Vx	2	-30.58	-0.72	495.04
			Max. Torque	2			3.94
L2	131.5 - 119.29	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-43.23	1.10	0.97
			Max. Mx	20	-24.87	691.20	-0.48
			Max. My	2	-24.88	-1.10	689.01
			Max. Vy	8	31.96	-690.84	1.99
			Max. Vx	2	-31.88	-1.10	689.01
			Max. Torque	24			2.84
L3	119.29 - 78.79	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.01	-0.32	4.42
			Max. Mx	8	-47.03	-2307.97	6.34
			Max. My	2	-47.03	-4.63	2300.52
			Max. Vy	8	47.18	-2307.97	6.34
			Max. Vx	2	-47.00	-4.63	2300.52
			Max. Torque	4			5.58
L4	78.79 - 39.88	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-104.21	-2.01	5.40
			Max. Mx	8	-71.43	-4259.03	10.29

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-71.44	-8.79	4244.16
			Max. Vy	8	55.19	-4259.03	10.29
			Max. Vx	2	-55.01	-8.79	4244.16
			Max. Torque	4			5.58
L5	39.88 - 1.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-143.53	-4.55	6.86
			Max. Mx	8	-105.28	-7091.76	15.20
			Max. My	2	-105.28	-14.09	7067.66
			Max. Vy	8	63.15	-7091.76	15.20
			Max. Vx	2	-62.96	-14.09	7067.66
			Max. Torque	4			5.57

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	143.53	0.00	0.00
	Max. H_x	20	105.30	63.11	-0.09
	Max. H_z	2	105.30	-0.09	62.92
	Max. M_x	2	7067.66	-0.09	62.92
	Max. M_z	8	7091.76	-63.11	0.09
	Max. Torsion	4	5.57	-31.63	54.54
	Min. Vert	13	78.97	-31.50	-54.49
	Min. H_x	8	105.30	-63.11	0.09
	Min. H_z	14	105.30	0.09	-62.92
	Min. M_x	14	-7061.54	0.09	-62.92
	Min. M_z	20	-7087.89	63.11	-0.09
	Min. Torsion	16	-5.57	31.63	-54.54

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	87.75	0.00	0.00	-2.49	-1.59	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	105.30	0.09	-62.92	-7067.66	-14.09	-4.50
0.9 Dead+1.0 Wind 0 deg - No Ice	78.97	0.09	-62.92	-7031.23	-13.53	-4.49
1.2 Dead+1.0 Wind 30 deg - No Ice	105.30	31.63	-54.54	-6127.25	-3557.37	-5.57
0.9 Dead+1.0 Wind 30 deg - No Ice	78.97	31.63	-54.54	-6095.56	-3538.93	-5.56
1.2 Dead+1.0 Wind 60 deg - No Ice	105.30	54.70	-31.54	-3545.87	-6147.98	-5.15
0.9 Dead+1.0 Wind 60 deg - No Ice	78.97	54.70	-31.54	-3527.21	-6116.47	-5.14
1.2 Dead+1.0 Wind 90 deg - No Ice	105.30	63.11	-0.09	-15.20	-7091.76	-3.35
0.9 Dead+1.0 Wind 90 deg - No Ice	78.97	63.11	-0.09	-14.36	-7055.49	-3.34
1.2 Dead+1.0 Wind 120 deg -	105.30	54.61	31.38	3518.72	-6135.85	-0.65

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
No Ice						
0.9 Dead+1.0 Wind 120 deg - No Ice	78.97	54.61	31.38	3501.73	-6104.40	-0.65
1.2 Dead+1.0 Wind 150 deg - No Ice	105.30	31.50	54.49	6114.59	-3539.58	2.22
0.9 Dead+1.0 Wind 150 deg - No Ice	78.97	31.50	54.49	6084.50	-3521.23	2.22
1.2 Dead+1.0 Wind 180 deg - No Ice	105.30	-0.09	62.92	7061.54	10.20	4.50
0.9 Dead+1.0 Wind 180 deg - No Ice	78.97	-0.09	62.92	7026.67	10.62	4.49
1.2 Dead+1.0 Wind 210 deg - No Ice	105.30	-31.63	54.54	6121.13	3553.48	5.57
0.9 Dead+1.0 Wind 210 deg - No Ice	78.97	-31.63	54.54	6091.01	3536.03	5.56
1.2 Dead+1.0 Wind 240 deg - No Ice	105.30	-54.70	31.54	3539.75	6144.10	5.15
0.9 Dead+1.0 Wind 240 deg - No Ice	78.97	-54.70	31.54	3522.65	6113.57	5.14
1.2 Dead+1.0 Wind 270 deg - No Ice	105.30	-63.11	0.09	9.08	7087.89	3.35
0.9 Dead+1.0 Wind 270 deg - No Ice	78.97	-63.11	0.09	9.80	7052.59	3.34
1.2 Dead+1.0 Wind 300 deg - No Ice	105.30	-54.61	-31.38	-3524.85	6131.97	0.65
0.9 Dead+1.0 Wind 300 deg - No Ice	78.97	-54.61	-31.38	-3506.30	6101.50	0.65
1.2 Dead+1.0 Wind 330 deg - No Ice	105.30	-31.50	-54.49	-6120.72	3535.69	-2.22
0.9 Dead+1.0 Wind 330 deg - No Ice	78.97	-31.50	-54.49	-6089.07	3518.33	-2.22
1.2 Dead+1.0 Ice+1.0 Temp	143.53	0.00	0.00	-6.86	-4.55	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	143.53	0.01	-14.36	-1593.70	-6.56	-1.25
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	143.53	7.21	-12.45	-1382.10	-801.61	-1.46
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	143.53	12.47	-7.19	-802.08	-1383.12	-1.28
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	143.53	14.39	-0.01	-9.05	-1595.27	-0.75
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	143.53	12.46	7.17	784.48	-1381.21	-0.02
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	143.53	7.18	12.43	1365.90	-798.30	0.71
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	143.53	-0.01	14.36	1579.41	-2.74	1.25
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	143.53	-7.21	12.45	1367.81	792.32	1.46
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	143.53	-12.47	7.19	787.79	1373.83	1.28
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	143.53	-14.39	0.01	-5.23	1585.98	0.75
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	143.53	-12.46	-7.17	-798.77	1371.92	0.02
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	143.53	-7.18	-12.43	-1380.19	789.01	-0.71
Dead+Wind 0 deg - Service	87.75	0.02	-11.99	-1344.76	-3.92	-0.86
Dead+Wind 30 deg - Service	87.75	6.03	-10.39	-1166.09	-677.11	-1.06
Dead+Wind 60 deg - Service	87.75	10.43	-6.01	-675.65	-1169.31	-0.98
Dead+Wind 90 deg - Service	87.75	12.03	-0.02	-4.85	-1348.62	-0.64
Dead+Wind 120 deg - Service	87.75	10.41	5.98	666.57	-1167.00	-0.12

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - Service	87.75	6.00	10.39	1159.76	-673.73	0.42
Dead+Wind 180 deg - Service	87.75	-0.02	11.99	1339.67	0.69	0.86
Dead+Wind 210 deg - Service	87.75	-6.03	10.39	1161.00	673.89	1.06
Dead+Wind 240 deg - Service	87.75	-10.43	6.01	670.56	1166.08	0.98
Dead+Wind 270 deg - Service	87.75	-12.03	0.02	-0.24	1345.40	0.64
Dead+Wind 300 deg - Service	87.75	-10.41	-5.98	-671.65	1163.78	0.12
Dead+Wind 330 deg - Service	87.75	-6.00	-10.39	-1164.85	670.51	-0.42

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	-87.75	0.00	0.00	87.75	0.00	0.000%
2	0.09	-105.30	-62.92	-0.09	105.30	62.92	0.000%
3	0.09	-78.97	-62.92	-0.09	78.97	62.92	0.000%
4	31.63	-105.30	-54.54	-31.63	105.30	54.54	0.000%
5	31.63	-78.97	-54.54	-31.63	78.97	54.54	0.000%
6	54.70	-105.30	-31.54	-54.70	105.30	31.54	0.000%
7	54.70	-78.97	-31.54	-54.70	78.97	31.54	0.000%
8	63.11	-105.30	-0.09	-63.11	105.30	0.09	0.000%
9	63.11	-78.97	-0.09	-63.11	78.97	0.09	0.000%
10	54.61	-105.30	31.38	-54.61	105.30	-31.38	0.000%
11	54.61	-78.97	31.38	-54.61	78.97	-31.38	0.000%
12	31.50	-105.30	54.49	-31.50	105.30	-54.49	0.000%
13	31.50	-78.97	54.49	-31.50	78.97	-54.49	0.000%
14	-0.09	-105.30	62.92	0.09	105.30	-62.92	0.000%
15	-0.09	-78.97	62.92	0.09	78.97	-62.92	0.000%
16	-31.63	-105.30	54.54	31.63	105.30	-54.54	0.000%
17	-31.63	-78.97	54.54	31.63	78.97	-54.54	0.000%
18	-54.70	-105.30	31.54	54.70	105.30	-31.54	0.000%
19	-54.70	-78.97	31.54	54.70	78.97	-31.54	0.000%
20	-63.11	-105.30	0.09	63.11	105.30	-0.09	0.000%
21	-63.11	-78.97	0.09	63.11	78.97	-0.09	0.000%
22	-54.61	-105.30	-31.38	54.61	105.30	31.38	0.000%
23	-54.61	-78.97	-31.38	54.61	78.97	31.38	0.000%
24	-31.50	-105.30	-54.49	31.50	105.30	54.49	0.000%
25	-31.50	-78.97	-54.49	31.50	78.97	54.49	0.000%
26	0.00	-143.53	0.00	0.00	143.53	0.00	0.000%
27	0.01	-143.53	-14.36	-0.01	143.53	14.36	0.000%
28	7.21	-143.53	-12.45	-7.21	143.53	12.45	0.000%
29	12.47	-143.53	-7.19	-12.47	143.53	7.19	0.000%
30	14.39	-143.53	-0.01	-14.39	143.53	0.01	0.000%
31	12.46	-143.53	7.17	-12.46	143.53	-7.17	0.000%
32	7.18	-143.53	12.43	-7.18	143.53	-12.43	0.000%
33	-0.01	-143.53	14.36	0.01	143.53	-14.36	0.000%
34	-7.21	-143.53	12.45	7.21	143.53	-12.45	0.000%
35	-12.47	-143.53	7.19	12.47	143.53	-7.19	0.000%
36	-14.39	-143.53	0.01	14.39	143.53	-0.01	0.000%
37	-12.46	-143.53	-7.17	12.46	143.53	7.17	0.000%
38	-7.18	-143.53	-12.43	7.18	143.53	12.43	0.000%
39	0.02	-87.75	-11.99	-0.02	87.75	11.99	0.000%
40	6.03	-87.75	-10.39	-6.03	87.75	10.39	0.000%
41	10.43	-87.75	-6.01	-10.43	87.75	6.01	0.000%
42	12.03	-87.75	-0.02	-12.03	87.75	0.02	0.000%
43	10.41	-87.75	5.98	-10.41	87.75	-5.98	0.000%
44	6.00	-87.75	10.39	-6.00	87.75	-10.39	0.000%
45	-0.02	-87.75	11.99	0.02	87.75	-11.99	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
46	-6.03	-87.75	10.39	6.03	87.75	-10.39	0.000%
47	-10.43	-87.75	6.01	10.43	87.75	-6.01	0.000%
48	-12.03	-87.75	0.02	12.03	87.75	-0.02	0.000%
49	-10.41	-87.75	-5.98	10.41	87.75	5.98	0.000%
50	-6.00	-87.75	-10.39	6.00	87.75	10.39	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	0.00029370
3	Yes	4	0.00000001	0.00018968
4	Yes	5	0.00000001	0.00004555
5	Yes	5	0.00000001	0.00002158
6	Yes	5	0.00000001	0.00005278
7	Yes	5	0.00000001	0.00002516
8	Yes	4	0.00000001	0.00020913
9	Yes	4	0.00000001	0.00013156
10	Yes	5	0.00000001	0.00004824
11	Yes	5	0.00000001	0.00002294
12	Yes	5	0.00000001	0.00004667
13	Yes	5	0.00000001	0.00002217
14	Yes	4	0.00000001	0.00030937
15	Yes	4	0.00000001	0.00020015
16	Yes	5	0.00000001	0.00005309
17	Yes	5	0.00000001	0.00002535
18	Yes	5	0.00000001	0.00004572
19	Yes	5	0.00000001	0.00002168
20	Yes	4	0.00000001	0.00019386
21	Yes	4	0.00000001	0.00012121
22	Yes	5	0.00000001	0.00004857
23	Yes	5	0.00000001	0.00002309
24	Yes	5	0.00000001	0.00005047
25	Yes	5	0.00000001	0.00002405
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00096454
28	Yes	5	0.00000001	0.00003768
29	Yes	5	0.00000001	0.00003774
30	Yes	4	0.00000001	0.00096237
31	Yes	4	0.00000001	0.00099585
32	Yes	4	0.00000001	0.00099201
33	Yes	4	0.00000001	0.00095258
34	Yes	4	0.00000001	0.00099444
35	Yes	4	0.00000001	0.00099465
36	Yes	4	0.00000001	0.00095876
37	Yes	5	0.00000001	0.00003747
38	Yes	5	0.00000001	0.00003754
39	Yes	4	0.00000001	0.00001874
40	Yes	4	0.00000001	0.00002770
41	Yes	4	0.00000001	0.00003336
42	Yes	4	0.00000001	0.00001668
43	Yes	4	0.00000001	0.00002771
44	Yes	4	0.00000001	0.00002687
45	Yes	4	0.00000001	0.00001871
46	Yes	4	0.00000001	0.00003389

47	Yes	4	0.00000001	0.00002712
48	Yes	4	0.00000001	0.00001659
49	Yes	4	0.00000001	0.00002811
50	Yes	4	0.00000001	0.00003032

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	8.215	41	0.3799	0.0012
L2	131.5 - 119.29	5.667	41	0.3609	0.0008
L3	125.29 - 78.79	5.203	41	0.3524	0.0008
L4	87.21 - 39.88	2.671	41	0.2677	0.0004
L5	49.13 - 1.5	0.901	41	0.1634	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	12' x 3" Dia Omni	41	8.215	0.3799	0.0012	302140
160.00	4 FT DISH	41	7.896	0.3788	0.0011	302140
156.00	A-Ant-23G-2-C	41	7.577	0.3776	0.0011	188838
154.00	LLPX310R	41	7.418	0.3769	0.0010	151070
151.50	Remote Radio Head FD R6 RRH	41	7.220	0.3759	0.0010	120856
144.00	AIR6449	41	6.630	0.3721	0.0009	75535
138.00	DC6-48-60-18-8F Surge Arrestor	41	6.164	0.3676	0.0009	58104
134.00	7770.00	41	5.857	0.3638	0.0008	50288
124.00	DB844G65ZAXY	41	5.108	0.3504	0.0008	36281
114.00	531-70HD	41	4.392	0.3319	0.0007	31868
51.50	GPS	41	0.980	0.1705	0.0002	14463

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	43.180	6	1.9977	0.0062
L2	131.5 - 119.29	29.791	6	1.8976	0.0043
L3	125.29 - 78.79	27.352	6	1.8528	0.0041
L4	87.21 - 39.88	14.040	6	1.4075	0.0023
L5	49.13 - 1.5	4.734	6	0.8588	0.0011

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	12' x 3" Dia Omni	6	43.180	1.9977	0.0062	57912
160.00	4 FT DISH	6	41.503	1.9917	0.0059	57912
156.00	A-Ant-23G-2-C	6	39.829	1.9852	0.0056	36195
154.00	LLPX310R	6	38.994	1.9815	0.0055	28955
151.50	Remote Radio Head FD R6 RRH	6	37.953	1.9764	0.0053	23164
144.00	AIR6449	6	34.850	1.9562	0.0048	14477
138.00	DC6-48-60-18-8F Surge Arrestor	6	32.400	1.9328	0.0045	11136
134.00	7770.00	6	30.788	1.9125	0.0044	9636
124.00	DB844G65ZAXY	6	26.853	1.8421	0.0040	6918
114.00	531-70HD	6	23.088	1.7451	0.0036	6075
51.50	GPS	6	5.152	0.8965	0.0011	2752

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	164 - 131.5 (1)	TP53.42x47x0.3125	32.50	162.50	103.4	52.6760	-22.81	1112.38	0.021
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	12.21	162.50	100.9	64.7894	-24.87	1437.35	0.017
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	46.50	162.50	90.2	84.5934	-47.02	2284.89	0.021
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	47.33	162.50	81.6	120.1620	-71.43	3732.12	0.019
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	47.63	162.50	72.8	134.6840	-105.28	4759.96	0.022

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	164 - 131.5 (1)	TP53.42x47x0.3125	496.91	3478.16	0.143	0.00	3478.16	0.000
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	691.60	4715.67	0.147	0.00	4715.67	0.000
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	2310.37	7005.47	0.330	0.00	7005.47	0.000
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	4262.79	11587.92	0.368	0.00	11587.92	0.000
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	7097.24	14008.00	0.507	0.00	14008.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	164 - 131.5 (1)	TP53.42x47x0.3125	30.69	924.46	0.033	0.62	4299.57	0.000
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	31.99	1137.05	0.028	0.62	5420.35	0.000
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	47.22	1484.61	0.032	5.15	7920.37	0.001
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	55.23	2108.85	0.026	5.15	12429.83	0.000
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	63.18	2363.71	0.027	5.15	15615.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	164 - 131.5 (1)	0.021	0.143	0.000	0.033	0.000	0.164 ✔	1.000	4.8.2 ✔
L2	131.5 - 119.29 (2)	0.017	0.147	0.000	0.028	0.000	0.165 ✔	1.000	4.8.2 ✔
L3	119.29 - 78.79 (3)	0.021	0.330	0.000	0.032	0.001	0.351 ✔	1.000	4.8.2 ✔
L4	78.79 - 39.88 (4)	0.019	0.368	0.000	0.026	0.000	0.388 ✔	1.000	4.8.2 ✔
L5	39.88 - 1.5 (5)	0.022	0.507	0.000	0.027	0.000	0.530 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	164 - 131.5	Pole	TP53.42x47x0.3125	1	-22.81	1112.38	16.4	Pass
L2	131.5 - 119.29	Pole	TP56.15x53.42x0.375	2	-24.87	1437.35	16.5	Pass
L3	119.29 - 78.79	Pole	TP62.97x54.0585x0.4375	3	-47.02	2284.89	35.1	Pass
L4	78.79 - 39.88	Pole	TP69.66x60.4813x0.5625	4	-71.43	3732.12	38.8	Pass
L5	39.88 - 1.5	Pole	TP76x66.7412x0.5625	5	-105.28	4759.96	53.0	Pass
							Summary	
						Pole (L5)	53.0	Pass
						RATING =	**53.0**	**Pass**

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Branford, CT 06405 F: (203) 488-8587

Subject:	Flange Bolts and Flangeplate Analysis
Location:	164-ft EEI Monopole Greenwich, CT
Rev. 1: 2/24/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 497 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 31 \cdot kips$	(Input From tnxTower)
Axial Force =	$Axial := 41 \cdot kips$	(Input From tnxTower)

Flange Bolt Data:

Use AST MA325

Number of Flange Bolts =	$N := 12$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 58 \cdot in$	(User Input)
Bolt Minimum Tensile Strength =	$F_{ub} := 120 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Flange Bolts =	$D := 1.00 \cdot in$	(User Input)
Threads per Inch =	$n := 8$	(User Input)

Flange Plate Data:

Use AST MA36

Plate Yield Strength =	$Fy_{bp} := 36 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{bp} := 1.0 \cdot in$	(User Input)
Flange Plate Diameter =	$D_{bp} := 61.0 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 53.42 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 29 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N} \right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 14.50 \cdot in$ $d_7 = -14.50 \cdot in$

$d_2 = 25.11 \cdot in$ $d_8 = -25.11 \cdot in$

$d_3 = 29.00 \cdot in$ $d_9 = -29.00 \cdot in$

$d_4 = 25.11 \cdot in$ $d_{10} = -25.11 \cdot in$

$d_5 = 14.50 \cdot in$ $d_{11} = -14.50 \cdot in$

$d_6 = 0.00 \cdot in$ $d_{12} = -0.00 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 26.71 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 2.29 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 0.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 0.00 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ $MA_{12} = 0.00 \cdot in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 23.6 \cdot in$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 5.046 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 30.9 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 2.6 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := \left(0.75 \cdot F_{ub} \cdot A_n\right) = 54.5 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{\Phi R_{nt}} = 56.60 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := \left(0.625 \cdot F_{ub} \cdot 0.8 \cdot A_g\right) = 47.1 \cdot kips$

Condition2 = $Condition2 := if\left[\left(\frac{V_{Max}}{\Phi R_{nv}}\right)^2 + \left(\frac{T_{Max}}{\Phi R_{nt}}\right)^2 \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Flange Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 20.6 \cdot kips$ $C_7 = -13.7 \cdot kips$

$C_2 = 33.1 \cdot kips$ $C_8 = -26.3 \cdot kips$

$C_3 = 37.7 \cdot kips$ $C_9 = -30.9 \cdot kips$

$C_4 = 33.1 \cdot kips$ $C_{10} = -26.3 \cdot kips$

$C_5 = 20.6 \cdot kips$ $C_{11} = -13.7 \cdot kips$

$C_6 = 3.4 \cdot kips$ $C_{12} = 3.4 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{4 \cdot C_i \cdot MA_i}{\left(B_{eff} \, t_{bp}^{\,2}\right)} = 14.7 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot Fy_{bp} = 32.4 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 45.2 \cdot \%$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	164-FT Monopole Greenwich, CT
Rev. 1: 2/24/21	Prepafred by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 7097 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 63 \cdot kips$	(Input From tnxTower)
Axial Force =	$R_u := 105 \cdot kips$	(Input From tnxTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 30$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 86 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c = 1$	Table 2-1 Addendum 3

Base Plate Data:

ASTMA572 Grade 60

Plate Yield Strength =	$F_{yf} := 60 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 3.0 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 92.0 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 76.0 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.5625 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	164-FT Monopole Greenwich, CT
Rev. 1: 2/24/21	Prepafred by: T.J.L. Checked by: C.F.C. Job No. 21009.00

Anchor Bolt Analysis:

Gross Area of Bolt = $A_g := \frac{\pi}{4}\cdot D^2 = 3.976\cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 = 3.248\cdot in^2$

Tensile Root Diameter = $d_{rt} := D - \frac{0.9743\cdot in}{n} = 2.033\cdot in$

Plastic Section Modulus = $Z := \frac{d_{rt}^3}{6} = 1.401\cdot in^3$

Maximum Anchor Rod Force = $P_{ut} := \frac{n_c\cdot\pi\cdot M_u}{N\cdot D_{BC}} - \frac{R_u}{N} = 100.2\cdot kips$

Maximum Anchor Rod Force = $P_{uc} := \frac{n_c\cdot\pi\cdot M_u}{N\cdot D_{BC}} + \frac{R_u}{N} = 107.2\cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 2.1\cdot kips$

$\Phi_t := 0.75 \quad \Phi_v := 0.75 \quad \Phi_c := 1.0$

Design Tensile Strength = $\Phi R_{nt} := \Phi_t\cdot F_u\cdot A_n = 243.576\cdot k$

Design Compression Strength = $\Phi R_{nc} := \Phi_c\cdot F_y\cdot A_n = 243.576\cdot k$

Design Shear Rupture Strength = $\Phi R_{nv} := \Phi_v\cdot 0.5\cdot F_u\cdot A_g = 149.103\cdot k$

Design Shear Yield Strength = $\Phi R_{nvc} := \Phi_c\cdot 0.6\cdot F_y\cdot \frac{A_n}{2} = 73.073\cdot k$

Bolt % of Capacity = $\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2\right]\cdot 100 = 16.9$ $\quad \frac{P_{ut}}{\Phi R_{nt}} = 0.411$

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

Condition1 = "OK"

Bolt % of Capacity = $\left[\left(\frac{P_{uc}}{\Phi R_{nc}}\right)^2 + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right]\cdot 100 = 19.5$

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

Condition2 = "OK"

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 76.25 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le \left(D_{BC} + 6 \cdot t_{TP}\right) \\ \left(D_{BC} + 6 \cdot t_{TP}\right) & \text{otherwise} \end{cases} = 92 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.105$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.432$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.338$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := \min\left(\theta_1, \theta_2, \theta_3\right) = 0.105$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot \left(D_{BC} - D_e\right) = 4.875 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 8.989 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := \left(D_{oe} - D_e\right) \cdot \sin(\theta) = 1.646 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 10.636 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_{uc} \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.908 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 63.6 \cdot \%$

Condition2 = $Condition3 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.914 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 30.5 \cdot \%$

Condition2 = $Condition4 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, "Ok", "Overstressed"\right)$

Condition4 = "Ok"

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Subject:	CAISSON FOUNDATION
Location:	164-ft EEI Monopole Greenwich, CT
Rev. 1: 2/24/21	Prepared by: TJL Checked by: C.F.C. Job No. 21009.00

Caisson Foundation:

Input Data:

Shear Force =	$S := 63k$	*USER INPUT-FROM tnxTower*
Overturning Moment =	$M := 7097ft \cdot k$	*USER INPUT-FROM tnxTower*
Applied Axial Load =	$A1 := 105k$	*USER INPUT-FROM tnxTower*
Bending Moment =	$Mu := 7436ft \cdot k$	*USER INPUT--FROM LPILE*
Moment Capacity =	$Mn := 12372ft \cdot k$	*USER INPUT--FROM LPILE*
Foundation Diameter =	$d := 9.0ft$	*USER INPUT*
Overall Length of Caisson =	$L_c := 28.0ft$	*USER INPUT*
Depth From Top of Caisson to Grade =	$L_{pag} := 1.0ft$	*USER INPUT*
Number of Rebar =	$n := 33$	*USER INPUT*
Area of Rebar =	$Ar := 1.560in^2$	*USER INPUT*
Rebar Yield Strength =	$fy := 60ksi$	*USER INPUT*
Concrete Comp Strength =	$f'c := 3ksi$	*USER INPUT*

Check Moment Capacity:

Factor of Safety = $FS := \frac{0.9 \cdot Mn}{Mu} = 1.5$

Factor of Safety Required = $FS_{reqd} := 1$

$FOSCheck := if(FS \geq FS_{reqd}, "OK", "NO GOOD")$

FOSCheck = "OK"

==========

LPILE Plus for Windows, Version 5.0 (5.0.47)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

TJL
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Files Used for Analysis

Path to file locations: J:\Jobs\2100900.WI\05_Structural\Tower Analysis\Backup Documentation\Rev (0)\Foundation\
Name of input data file: Greenwich Hospital Caisson Analysis.lpd
Name of output file: Greenwich Hospital Caisson Analysis.lpo
Name of plot output file: Greenwich Hospital Caisson Analysis.lpp
Name of runtime file: Greenwich Hospital Caisson Analysis.lpr

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Time and Date of Analysis

Date: February 24, 2021 Time: 11:40:54

Problem Title

21009.00 - Greenwich Hospital

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 8

Pile Structural Properties and Geometry

Pile Length = 336.00 in

Depth of ground surface below top of pile = 12.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	108.00000	6678285.	9160.9000	3600000.
2	336.0000	108.00000	6678285.	9160.9000	3600000.

Please note that because this analysis makes computations of ultimate
moment capacity and pile response using nonlinear bending stiffness
that the above values of moment of inertia and modulus of are not used
for any computations other than total stress due to combined axial
loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 12.000 in
Distance from top of pile to bottom of layer = 48.000 in
p-y subgrade modulus k for top of soil layer = 20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 20.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 48.000 in
Distance from top of pile to bottom of layer = 72.000 in
p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 72.000 in
Distance from top of pile to bottom of layer = 132.000 in
p-y subgrade modulus k for top of soil layer = 150.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 150.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 132.000 in
Distance from top of pile to bottom of layer = 360.000 in
p-y subgrade modulus k for top of soil layer = 250.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 250.000 lbs/in**3

(Depth of lowest layer extends 24.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	0.05800
2	48.00	0.05800
3	48.00	0.06900
4	72.00	0.06900
5	72.00	0.06900
6	132.00	0.06900
7	132.00	0.07500

8 360.00 0.07500

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	12.000	0.00000	20.00	------	------
2	48.000	0.00000	20.00	------	------
3	48.000	0.00000	30.00	------	------
4	72.000	0.00000	30.00	------	------
5	72.000	0.00000	35.00	------	------
6	132.000	0.00000	35.00	------	------
7	132.000	0.00000	42.00	------	------
8	360.000	0.00000	42.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 63000.000 lbs
Bending moment at pile head = 85164000.000 in-lbs

Axial load at pile head = 105000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head
may rotate under the applied pile-head loading, but is not a free-head
(zero moment) condition.

Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 13000.000 lbs
Bending moment at pile head = 18228000.000 in-lbs
Axial load at pile head = 105000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head
may rotate under the applied pile-head loading, but is not a free-head
(zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 108.0000 in

Material Properties:

Compressive Strength of Concrete	=	3.000 kip/in**2
Yield Stress of Reinforcement	=	60. kip/in**2
Modulus of Elasticity of Reinforcement	=	29000. kip/in**2
Number of Reinforcing Bars	=	33
Area of Single Bar	=	1.56000 in**2
Number of Rows of Reinforcing Bars	=	33
Area of Steel	=	51.480 in**2
Area of Shaft	=	9160.884 in**2
Percentage of Steel Reinforcement	=	0.562 percent
Cover Thickness (edge to bar center)	=	4.000 in

Unfactored Axial Squash Load Capacity = 26317.78 kip

Distribution and Area of Steel Reinforcement

Row	Area of	Distance to

Number	Reinforcement in**2	Centroidal Axis in
1	1.560	49.943
2	1.560	49.491
3	1.560	48.591
4	1.560	47.250
5	1.560	45.482
6	1.560	43.301
7	1.560	40.729
8	1.560	37.787
9	1.560	34.504
10	1.560	30.908
11	1.560	27.032
12	1.560	22.911
13	1.560	18.583
14	1.560	14.087
15	1.560	9.463
16	1.560	4.753
17	1.560	0.000
18	1.560	-4.753
19	1.560	-9.463
20	1.560	-14.087
21	1.560	-18.583
22	1.560	-22.911
23	1.560	-27.032
24	1.560	-30.908
25	1.560	-34.504
26	1.560	-37.787
27	1.560	-40.729
28	1.560	-43.301
29	1.560	-45.482
30	1.560	-47.250
31	1.560	-48.591
32	1.560	-49.491
33	1.560	-49.943

Axial Thrust Force = 105000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
11412273.	2.282455E+13	5.000000E-07	0.00003060	61.20000118	94.07059618	828.57884
22709716.	2.270972E+13	0.00000100	0.00005770	57.69642895	175.73805	

```
 1555.55408
   33889425.  2.259295E+13    0.00000150    0.00008483   56.55283910     256.13334
 2283.58496
   44945754.  2.247288E+13    0.00000200    0.00011192   55.96208149     335.03262
 3010.51601
   55887932.  2.235517E+13    0.00000250    0.00013911   55.64593917     412.82732
 3740.22469
   55887932.  1.862931E+13    0.00000300    0.00008777   29.25626940     260.87894
 6497.77749
   55887932.  1.596798E+13    0.00000350    0.00010032   28.66196483     296.83675
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20287.53682
   55887932.  5.882940E+12    0.00000950    0.00024828   26.13441950     699.11289
21436.36502
   55887932.  5.588793E+12    0.00001000    0.00026065   26.06504792     730.96742
22584.71252
   55887932.  5.322660E+12    0.00001050    0.00027304   26.00386781     762.58931
23732.57749
   55887932.  5.080721E+12    0.00001100    0.00028545   25.94978160     793.97798
24879.95373
   55887932.  4.859820E+12    0.00001150    0.00029787   25.90186554     825.13230
26026.84072
   55887932.  4.657328E+12    0.00001200    0.00031031   25.85936326     856.05154
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   55887932.  4.471035E+12    0.00001250    0.00032277   25.82163745     886.73490
28319.12695
   55887932.  4.299072E+12    0.00001300    0.00033525   25.78814417     917.18142
29464.51899
   55887932.  4.139847E+12    0.00001350    0.00034774   25.75841993     947.39011
30609.40676
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32897.64843					
61377927.	4.091862E+12	0.00001500	0.00038532	25.68820184	1036.58094
34040.99682					
63283640.	4.082815E+12	0.00001550	0.00039789	25.67012268	1065.82969
35183.82330					
65187132.	4.074196E+12	0.00001600	0.00041047	25.65430623	1094.83616
36326.12418					
67088384.	4.065963E+12	0.00001650	0.00042307	25.64055294	1123.59931
37467.89651					
68987381.	4.058081E+12	0.00001700	0.00043569	25.62868899	1152.11817
38609.13624					
70884117.	4.050521E+12	0.00001750	0.00044832	25.61856312	1180.39187
39749.83795					
72778571.	4.043254E+12	0.00001800	0.00046098	25.61003691	1208.41935
40889.99829					
74670737.	4.036256E+12	0.00001850	0.00047366	25.60299128	1236.19973
42029.61155					
76560590.	4.029505E+12	0.00001900	0.00048635	25.59731358	1263.73184
43168.67541					
78448126.	4.022981E+12	0.00001950	0.00049906	25.59291047	1291.01484
44307.18315					
82216164.	4.010545E+12	0.00002050	0.00052455	25.58757716	1344.82902
46582.51703					
85974732.	3.998825E+12	0.00002150	0.00055011	25.58638948	1397.63395
48855.57546					
89723689.	3.987720E+12	0.00002250	0.00057575	25.58884853	1449.42084
51126.32327					
93462930.	3.977146E+12	0.00002350	0.00060147	25.59455198	1500.18120
53394.71741					
97192304.	3.967033E+12	0.00002450	0.00062728	25.60315543	1549.90583
55660.72029					
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1.484654E+08	6.889345E+11	0.00021550	0.00370890	17.21065217	2548.12531
60000.00000					
1.484654E+08	6.763799E+11	0.00021950	0.00376898	17.17074412	2549.46645
60000.00000					
1.484654E+08	6.642747E+11	0.00022350	0.00382923	17.13303119	2549.99260
60000.00000					

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 148465.39377 in-kip

Axial Thrust Force = 105000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
11412273.	2.282455E+13	5.000000E-07	0.00003060	61.20000118	94.07059618	828.57884
22709716.	2.270972E+13	0.00000100	0.00005770	57.69642895	175.73805	1555.55408
33889425.	2.259295E+13	0.00000150	0.00008483	56.55283910	256.13334	2283.58496
44945754.	2.247288E+13	0.00000200	0.00011192	55.96208149	335.03262	3010.51601
55887932.	2.235517E+13	0.00000250	0.00013911	55.64593917	412.82732	3740.22469
55887932.	1.862931E+13	0.00000300	0.00008777	29.25626940	260.87894	6497.77749

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  55887932.  1.596798E+13    0.00000350    0.00010032   28.66196483     296.83675
 7641.06232
  55887932.  1.397198E+13    0.00000400    0.00011256   28.14087492     331.62450
 8793.08908
  55887932.  1.241954E+13    0.00000450    0.00012482   27.73879784     366.18376
 9944.69627
  55887932.  1.117759E+13    0.00000500    0.00013710   27.42004842     400.51382
11095.88119
  55887932.  1.016144E+13    0.00000550    0.00014939   27.16191584     434.61391
12246.64145
  55887932.  9.314655E+12    0.00000600    0.00016200   26.99999839     469.34939
13388.14613
  55887932.  8.598143E+12    0.00000650    0.00017438   26.82765251     503.14924
14536.31217
  55887932.  7.983990E+12    0.00000700    0.00018666   26.66508812     536.38160
15687.49060
  55887932.  7.451724E+12    0.00000750    0.00019895   26.52633208     569.38637
16838.20509
  55887932.  6.985992E+12    0.00000800    0.00021126   26.40692979     602.16266
17988.45342
  55887932.  6.575051E+12    0.00000850    0.00022358   26.30348235     634.70974
19138.23156
  55887932.  6.209770E+12    0.00000900    0.00023592   26.21334082     667.02673
20287.53682
  55887932.  5.882940E+12    0.00000950    0.00024828   26.13441950     699.11289
21436.36502
  55887932.  5.588793E+12    0.00001000    0.00026065   26.06504792     730.96742
22584.71252
  55887932.  5.322660E+12    0.00001050    0.00027304   26.00386781     762.58931
23732.57749
  55887932.  5.080721E+12    0.00001100    0.00028545   25.94978160     793.97798
24879.95373
  55887932.  4.859820E+12    0.00001150    0.00029787   25.90186554     825.13230
26026.84072
  55887932.  4.657328E+12    0.00001200    0.00031031   25.85936326     856.05154
27173.23329
  55887932.  4.471035E+12    0.00001250    0.00032277   25.82163745     886.73490
28319.12695
  55887932.  4.299072E+12    0.00001300    0.00033525   25.78814417     917.18142
29464.51899
  55887932.  4.139847E+12    0.00001350    0.00034774   25.75841993     947.39011
30609.40676
  57559887.  4.111420E+12    0.00001400    0.00036025   25.73207527     977.36024
31753.78442
  59470009.  4.101380E+12    0.00001450    0.00037278   25.70876902    1007.09088
32897.64843
  61377927.  4.091862E+12    0.00001500    0.00038532   25.68820184    1036.58094
34040.99682
  63283640.  4.082815E+12    0.00001550    0.00039789   25.67012268    1065.82969
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  65187132.  4.074196E+12    0.00001600    0.00041047   25.65430623    1094.83616
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38609.13624
   70884117. 4.050521E+12   0.00001750   0.00044832   25.61856312   1180.39187
39749.83795
   72778571. 4.043254E+12   0.00001800   0.00046098   25.61003691   1208.41935
40889.99829
   74670737. 4.036256E+12   0.00001850   0.00047366   25.60299128   1236.19973
42029.61155
   76560590. 4.029505E+12   0.00001900   0.00048635   25.59731358   1263.73184
43168.67541
   78448126. 4.022981E+12   0.00001950   0.00049906   25.59291047   1291.01484
44307.18315
   82216164. 4.010545E+12   0.00002050   0.00052455   25.58757716   1344.82902
46582.51703
   85974732. 3.998825E+12   0.00002150   0.00055011   25.58638948   1397.63395
48855.57546
   89723689. 3.987720E+12   0.00002250   0.00057575   25.58884853   1449.42084
51126.32327
   93462930. 3.977146E+12   0.00002350   0.00060147   25.59455198   1500.18120
53394.71741
   97192304. 3.967033E+12   0.00002450   0.00062728   25.60315543   1549.90583
55660.72029
1.009117E+08 3.957321E+12   0.00002550   0.00065317   25.61437565   1598.58559
57924.28907
1.045980E+08 3.947095E+12   0.00002650   0.00067909   25.62602395   1646.11421
60000.00000
1.075432E+08 3.910664E+12   0.00002750   0.00070343   25.57916361   1689.52651
60000.00000
1.099879E+08 3.859226E+12   0.00002850   0.00072667   25.49719423   1729.91716
60000.00000
1.121215E+08 3.800730E+12   0.00002950   0.00074922   25.39737099   1768.13298
60000.00000
1.140107E+08 3.738055E+12   0.00003050   0.00077122   25.28580934   1804.48765
60000.00000
1.158936E+08 3.679162E+12   0.00003150   0.00079380   25.20000011   1840.95386
60000.00000
1.173461E+08 3.610649E+12   0.00003250   0.00081674   25.13040322   1877.08062
60000.00000
1.187292E+08 3.544154E+12   0.00003350   0.00083717   24.99025673   1908.31513
60000.00000
1.200710E+08 3.480319E+12   0.00003450   0.00085753   24.85606152   1938.69181
60000.00000
1.212255E+08 3.414804E+12   0.00003550   0.00087732   24.71321779   1967.46612
60000.00000
1.223766E+08 3.352782E+12   0.00003650   0.00089715   24.57933480   1995.60756
60000.00000
1.233753E+08 3.290007E+12   0.00003750   0.00091647   24.43932670   2022.33990
60000.00000

1.243470E+08 3.229792E+12 0.00003850 0.00093576 24.30535358 2048.34512
60000.00000
1.252784E+08 3.171606E+12 0.00003950 0.00095493 24.17547137 2073.54845
60000.00000
1.260910E+08 3.113357E+12 0.00004050 0.00097369 24.04171389 2097.54960
60000.00000
1.269006E+08 3.057846E+12 0.00004150 0.00099248 23.91527563 2120.97731
60000.00000
1.276962E+08 3.004617E+12 0.00004250 0.00101127 23.79452151 2143.76804
60000.00000
1.283669E+08 2.950964E+12 0.00004350 0.00102956 23.66812509 2165.34139
60000.00000
1.290350E+08 2.899663E+12 0.00004450 0.00104789 23.54817563 2186.36672
60000.00000
1.297005E+08 2.850560E+12 0.00004550 0.00106626 23.43425471 2206.84091
60000.00000
1.302336E+08 2.800722E+12 0.00004650 0.00108810 23.39999861 2230.60863
60000.00000
1.309764E+08 2.757398E+12 0.00004750 0.00110693 23.30386072 2250.28456
60000.00000
1.315069E+08 2.711482E+12 0.00004850 0.00112427 23.18072480 2267.76378
60000.00000
1.320352E+08 2.667378E+12 0.00004950 0.00114163 23.06321186 2284.75047
60000.00000
1.325614E+08 2.624978E+12 0.00005050 0.00115903 22.95099682 2301.24197
60000.00000
1.330366E+08 2.583234E+12 0.00005150 0.00117616 22.83814770 2316.95952
60000.00000
1.334605E+08 2.542105E+12 0.00005250 0.00119304 22.72461623 2331.92338
60000.00000
1.338825E+08 2.502476E+12 0.00005350 0.00120995 22.61589342 2346.41763
60000.00000
1.343025E+08 2.464265E+12 0.00005450 0.00122689 22.51172501 2360.43992
60000.00000
1.347205E+08 2.427396E+12 0.00005550 0.00124386 22.41186315 2373.98729
60000.00000
1.351365E+08 2.391796E+12 0.00005650 0.00126086 22.31608897 2387.05732
60000.00000
1.354898E+08 2.356345E+12 0.00005750 0.00127748 22.21707362 2399.33402
60000.00000
1.358215E+08 2.321735E+12 0.00005850 0.00129400 22.11966115 2411.05331
60000.00000
1.361514E+08 2.288258E+12 0.00005950 0.00131055 22.02601451 2422.31878
60000.00000
1.368056E+08 2.224481E+12 0.00006150 0.00134373 21.84930414 2443.47841
60000.00000
1.374524E+08 2.164605E+12 0.00006350 0.00137704 21.68561643 2462.79237
60000.00000
1.386452E+08 2.116721E+12 0.00006550 0.00141480 21.60000032 2482.48043
60000.00000
1.386452E+08 2.054003E+12 0.00006750 0.00144968 21.47670346 2498.36789

60000.00000
1.390856E+08 2.001232E+12 0.00006950 0.00148094 21.30846781 2510.72668
60000.00000
1.395528E+08 1.951788E+12 0.00007150 0.00151231 21.15123993 2521.43549
60000.00000
1.400032E+08 1.904806E+12 0.00007350 0.00154369 21.00261873 2530.44417
60000.00000
1.403548E+08 1.859004E+12 0.00007550 0.00157420 20.85036367 2537.56090
60000.00000
1.407008E+08 1.815494E+12 0.00007750 0.00160482 20.70738477 2543.09259
60000.00000
1.410411E+08 1.774102E+12 0.00007950 0.00163555 20.57300287 2547.02093
60000.00000
1.413756E+08 1.734670E+12 0.00008150 0.00166640 20.44660646 2549.32718
60000.00000
1.417033E+08 1.697046E+12 0.00008350 0.00169736 20.32764512 2549.49942
60000.00000
1.420043E+08 1.660869E+12 0.00008550 0.00172825 20.21350211 2544.39577
60000.00000
1.422396E+08 1.625595E+12 0.00008750 0.00175845 20.09658140 2540.82166
60000.00000
1.424724E+08 1.591870E+12 0.00008950 0.00178876 19.98613662 2544.92472
60000.00000
1.427026E+08 1.559592E+12 0.00009150 0.00181918 19.88176543 2547.83163
60000.00000
1.427026E+08 1.526231E+12 0.00009350 0.00185130 19.79999882 2549.59126
60000.00000
1.428175E+08 1.495471E+12 0.00009550 0.00189090 19.79999882 2547.59774
60000.00000
1.434988E+08 1.471782E+12 0.00009750 0.00192620 19.75591618 2542.35274
60000.00000
1.437027E+08 1.444248E+12 0.00009950 0.00195577 19.65602535 2538.11269
60000.00000
1.439051E+08 1.417784E+12 0.00010150 0.00198544 19.56097537 2542.00664
60000.00000
1.440521E+08 1.391807E+12 0.00010350 0.00201413 19.46022838 2545.10220
60000.00000
1.441941E+08 1.366769E+12 0.00010550 0.00204284 19.36341780 2547.44463
60000.00000
1.443350E+08 1.342651E+12 0.00010750 0.00207163 19.27101034 2549.03701
60000.00000
1.444745E+08 1.319402E+12 0.00010950 0.00210051 19.18277425 2549.86945
60000.00000
1.446116E+08 1.296965E+12 0.00011150 0.00212954 19.09900242 2548.52058
60000.00000
1.447463E+08 1.275298E+12 0.00011350 0.00215871 19.01947600 2544.98232
60000.00000
1.448803E+08 1.254375E+12 0.00011550 0.00218794 18.94323260 2541.43334
60000.00000
1.450135E+08 1.234157E+12 0.00011750 0.00221724 18.87011129 2537.87351
60000.00000

1.451459E+08 1.214610E+12 0.00011950 0.00224660 18.79996079 2534.65765
60000.00000
1.452775E+08 1.195700E+12 0.00012150 0.00227602 18.73264593 2538.49174
60000.00000
1.454084E+08 1.177396E+12 0.00012350 0.00230550 18.66802830 2541.78694
60000.00000
1.454998E+08 1.159361E+12 0.00012550 0.00233405 18.59800333 2544.39009
60000.00000
1.455901E+08 1.141883E+12 0.00012750 0.00236265 18.53055006 2546.50417
60000.00000
1.456797E+08 1.124940E+12 0.00012950 0.00239130 18.46563953 2548.12571
60000.00000
1.457687E+08 1.108507E+12 0.00013150 0.00242002 18.40316552 2549.24922
60000.00000
1.458570E+08 1.092562E+12 0.00013350 0.00244879 18.34302181 2549.86899
60000.00000
1.459441E+08 1.077078E+12 0.00013550 0.00247767 18.28541118 2549.18108
60000.00000
1.460292E+08 1.062030E+12 0.00013750 0.00250670 18.23054606 2546.29970
60000.00000
1.461140E+08 1.047412E+12 0.00013950 0.00253577 18.17752844 2543.41160
60000.00000
1.462825E+08 1.019391E+12 0.00014350 0.00259401 18.07672995 2537.61520
60000.00000
1.466286E+08 9.940921E+11 0.00014750 0.00265500 18.00000054 2531.33751
60000.00000
1.476109E+08 9.743296E+11 0.00015150 0.00272700 18.00000054 2536.11274
60000.00000
1.484654E+08 9.547614E+11 0.00015550 0.00279900 18.00000054 2543.79153
60000.00000
1.484654E+08 9.308175E+11 0.00015950 0.00287010 17.99433571 2548.34886
60000.00000
1.484654E+08 9.080452E+11 0.00016350 0.00292687 17.90136498 2549.72462
60000.00000
1.484654E+08 8.863606E+11 0.00016750 0.00298435 17.81700414 2548.55401
60000.00000
1.484654E+08 8.656874E+11 0.00017150 0.00304339 17.74574000 2543.88008
60000.00000
1.484654E+08 8.459567E+11 0.00017550 0.00310256 17.67841548 2539.18488
60000.00000
1.484654E+08 8.271053E+11 0.00017950 0.00316185 17.61478275 2534.46792
60000.00000
1.484654E+08 8.090757E+11 0.00018350 0.00322127 17.55461973 2529.72856
60000.00000
1.484654E+08 7.918154E+11 0.00018750 0.00328082 17.49771720 2524.96640
60000.00000
1.484654E+08 7.752762E+11 0.00019150 0.00334051 17.44389170 2520.32206
60000.00000
1.484654E+08 7.594138E+11 0.00019550 0.00340089 17.39584368 2526.96308
60000.00000
1.484654E+08 7.441874E+11 0.00019950 0.00346245 17.35563308 2533.06809

```
  60000.00000
  1.484654E+08  7.295597E+11    0.00020350    0.00352419   17.31791049    2538.27456
  60000.00000
  1.484654E+08  7.154959E+11    0.00020750    0.00358613   17.28256005    2542.55961
  60000.00000
  1.484654E+08  7.019640E+11    0.00021150    0.00364827   17.24948841    2545.89954
  60000.00000
  1.484654E+08  6.889345E+11    0.00021550    0.00370890   17.21065217    2548.12531
  60000.00000
  1.484654E+08  6.763799E+11    0.00021950    0.00376898   17.17074412    2549.46645
  60000.00000
  1.484654E+08  6.642747E+11    0.00022350    0.00382923   17.13303119    2549.99260
  60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 =  148465.39377
in-kip



------------------------------------------------------------------------------
             Computed Values of Load Distribution and Deflection
                 for Lateral Loading for Load Case Number  1
------------------------------------------------------------------------------

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head  =       63000.000 lbs
Specified moment at pile head       =    85164000.000 in-lbs
Specified axial load at pile head   =      105000.000 lbs

  Depth   Deflect.  Moment     Shear     Slope     Total   Flx. Rig. Soil Res.
Es*h
    X        y        M          V         S       Stress      EI        p
F/L
    in       in      lbs-in      lbs       Rad.  lbs/in**2 lbs-in**2  lbs/in
-------- --------- --------- --------- --------- --------- --------- ---------
---------
   0.000  0.978683  8.52E+07    63000. -0.006583   700.090  4.00E+12     0.000
0.000
  26.880  0.809463  8.69E+07    61123. -0.006005   713.852  4.00E+12  -240.896
999.936
  53.760  0.655946  8.84E+07    48157. -0.005415   726.198  3.99E+12 -1006.170
5153.974
  80.640  0.518419  8.92E+07  6891.585 -0.004816   732.905  3.99E+12 -2190.887
14200.
 107.520  0.397028  8.85E+07   -67795. -0.004217   726.971  3.99E+12 -3344.208
28302.
 134.400  0.291617  8.54E+07 -1.73E+05 -0.003630   701.595  4.00E+12 -5404.655
62272.
 161.280  0.201564  7.86E+07 -3.28E+05 -0.003078   647.275  4.02E+12 -5602.504
93392.
```

```
 188.160  0.125573  6.79E+07 -4.63E+05 -0.002589   560.671  4.06E+12 -4334.162
1.16E+05
 215.040  0.061494  5.41E+07 -5.57E+05 -0.002240   448.985  2.24E+13 -2535.736
1.39E+05
 241.920  0.002064  3.85E+07 -5.94E+05 -0.002185   322.802  2.25E+13   -99.001
1.61E+05
 268.800 -0.056131  2.29E+07 -5.55E+05 -0.002148   196.389  2.27E+13  3068.951
1.84E+05
 295.680 -0.113591  9.50E+06 -4.22E+05 -0.002130    88.259  2.28E+13  6973.955
2.06E+05
 322.560 -0.170738  1.21E+06 -1.74E+05 -0.002124    21.232  2.28E+13    11630.
2.29E+05
```

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.97868275 in
Computed slope at pile head      =    -0.00658345
Maximum bending moment           =      89234764. lbs-in
Maximum shear force              =  -593671.12038 lbs
Depth of maximum bending moment  =    84.00000000 in
Depth of maximum shear force     =      241.92000 in
Number of iterations             =             52
Number of zero deflection points =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)

```
Specified shear force at pile head  =       13000.000 lbs
Specified moment at pile head       =    18228000.000 in-lbs
Specified axial load at pile head   =      105000.000 lbs
```

```
  Depth   Deflect.  Moment     Shear     Slope     Total   Flx. Rig. Soil Res.
Es*h
    X        y        M         V         S       Stress      EI        p
```

F/L

in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs-in**2	lbs/in	
0.000	0.128547	1.82E+07	13000.	-0.000627	158.852	2.27E+13	0.000	0.000
26.880	0.111996	1.86E+07	12742.	-0.000605	161.681	2.27E+13	-33.330	999.936
53.760	0.096037	1.89E+07	10229.	-0.000583	164.301	2.27E+13	-281.310	9842.069
80.640	0.080677	1.91E+07	-960.720	-0.000560	165.509	2.27E+13	-619.310	25793.
107.520	0.065922	1.88E+07	-19907.	-0.000538	163.330	2.27E+13	-771.843	39340.
134.400	0.051763	1.80E+07	-41929.	-0.000516	156.694	2.27E+13	-1090.909	70813.
161.280	0.038172	1.64E+07	-71224.	-0.000496	144.394	2.28E+13	-1060.997	93392.
188.160	0.025101	1.42E+07	-97482.	-0.000477	125.973	2.28E+13	-866.374	1.16E+05
215.040	0.012478	1.13E+07	-1.16E+05	-0.000462	102.565	2.28E+13	-514.536	1.39E+05
241.920	0.000211	8.01E+06	-1.24E+05	-0.000451	76.225	2.28E+13	-10.108	1.61E+05
268.800	-0.011803	4.75E+06	-1.16E+05	-0.000444	49.897	2.28E+13	645.330	1.84E+05
295.680	-0.023665	1.97E+06	-87700.	-0.000440	27.412	2.28E+13	1452.920	2.06E+05
322.560	-0.035462	2.51E+05	-36054.	-0.000438	13.490	2.28E+13	2415.497	2.29E+05

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	0.12854653 in
Computed slope at pile head	=	-0.00062655
Maximum bending moment	=	19051311. lbs-in
Maximum shear force	=	-123766.28792 lbs
Depth of maximum bending moment	=	80.64000000 in
Depth of maximum shear force	=	241.92000 in
Number of iterations	=	5

Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 63000.	M= 8.52E+07	105000.	0.9786828	8.9235E+07	-593671.
1	V= 13000.	M= 1.82E+07	105000.	0.1285465	1.9051E+07	-123766.

Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

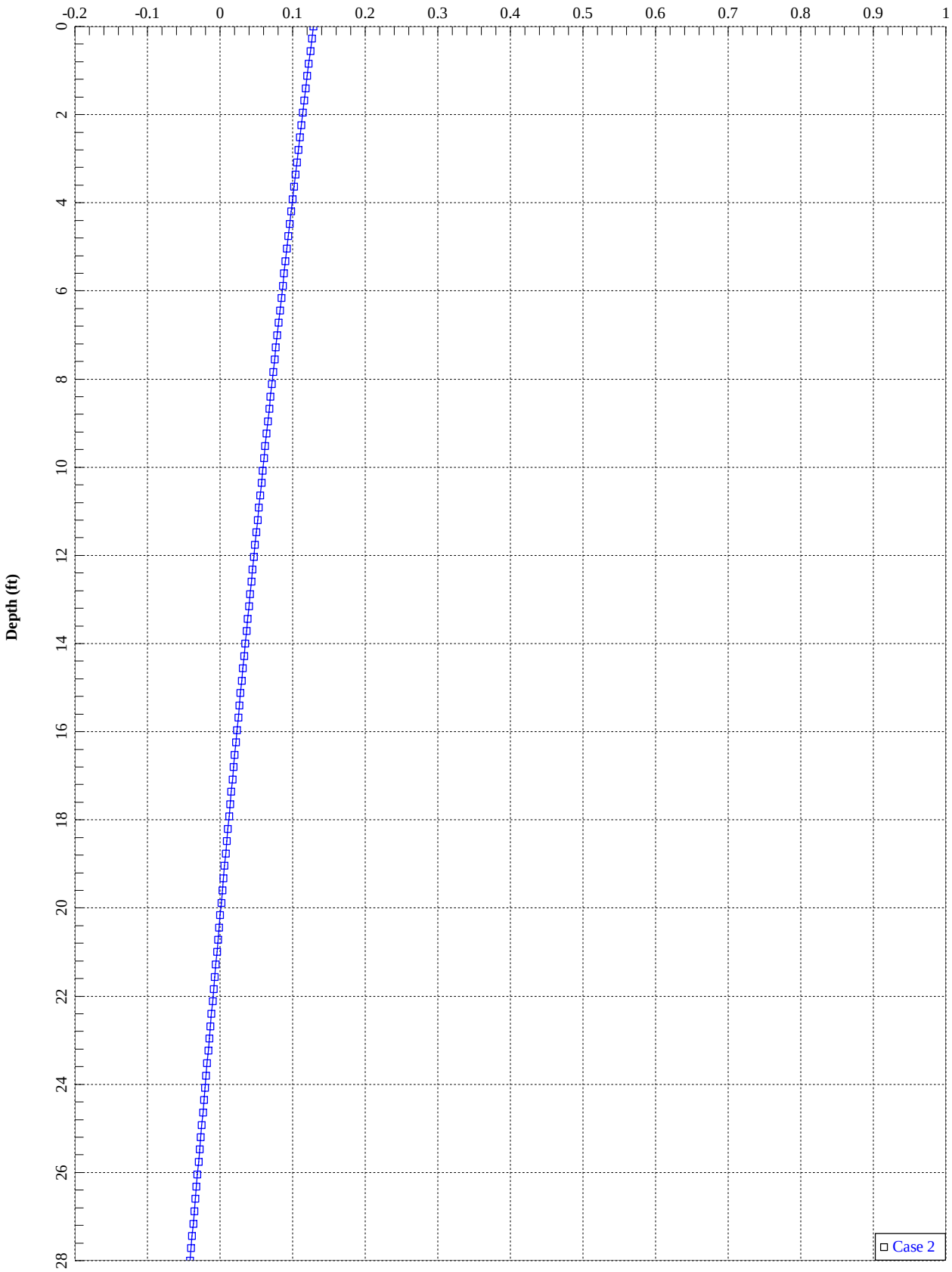
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00162801	6300.00009	1259429.	3869756.	7.736006E+08
0.00490080	18964.88973	3791260.	3869756.	7.736006E+08
0.00776758	30058.63905	6009005.	3869756.	7.736006E+08
0.00980159	37929.77945	7582520.	3869756.	7.736006E+08
0.01137930	44035.11027	8803033.	3869756.	7.736006E+08
0.01266838	49023.52877	9800264.	3869756.	7.736006E+08
0.01375828	53241.17652	10643412.	3869756.	7.736006E+08
0.01470239	56894.66918	11373779.	3869756.	7.736006E+08
0.01553546	60117.27809	12017959.	3869682.	7.735827E+08
0.01628109	63000.00000	12594122.	3869520.	7.735430E+08

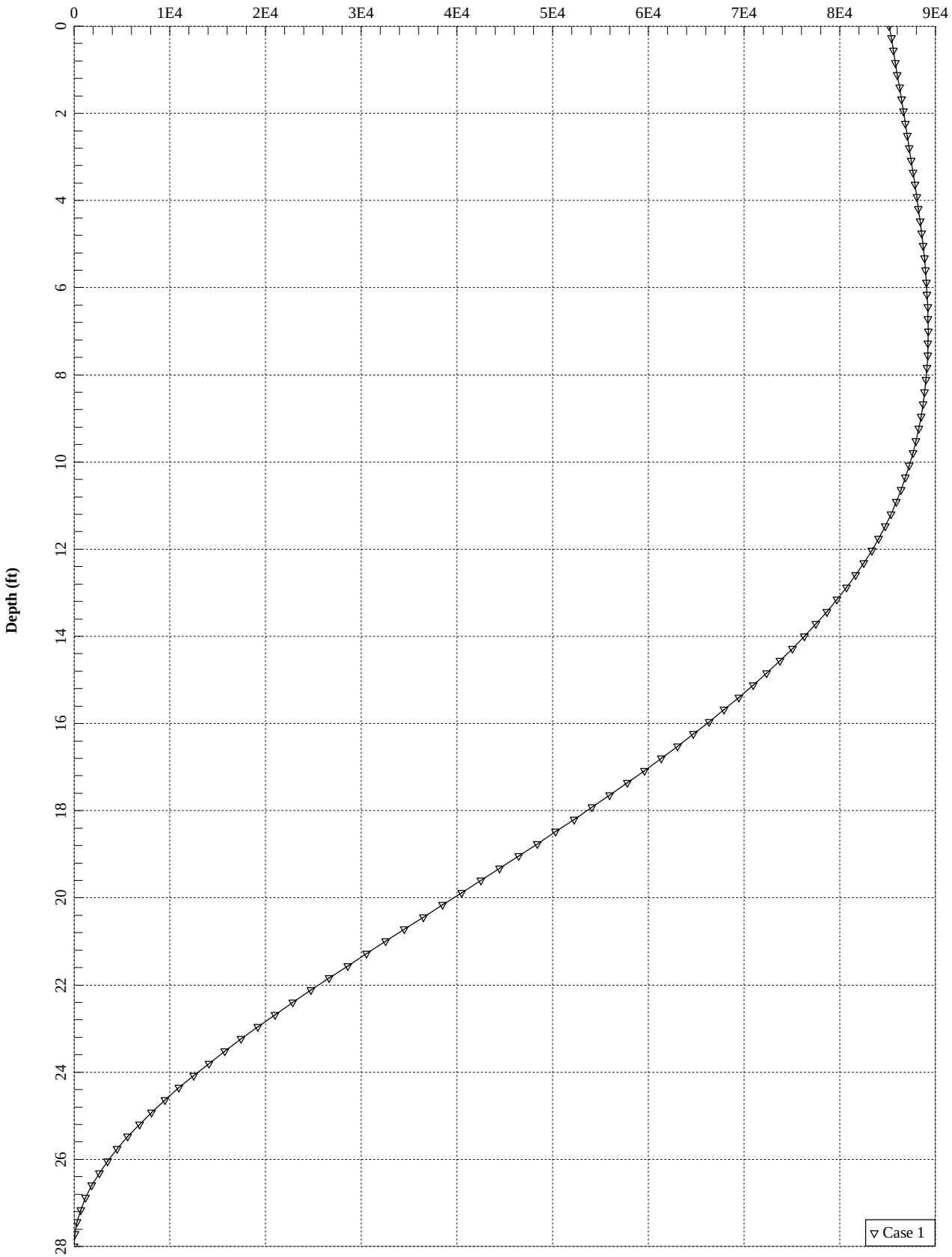
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
0.00004532	35059.16424	8516400.	7.736006E+08	1.879193E+11
0.00013679	105551.56961	25636919.	7.716148E+08	1.874139E+11
0.00021755	167329.28800	40633555.	7.691597E+08	1.867796E+11

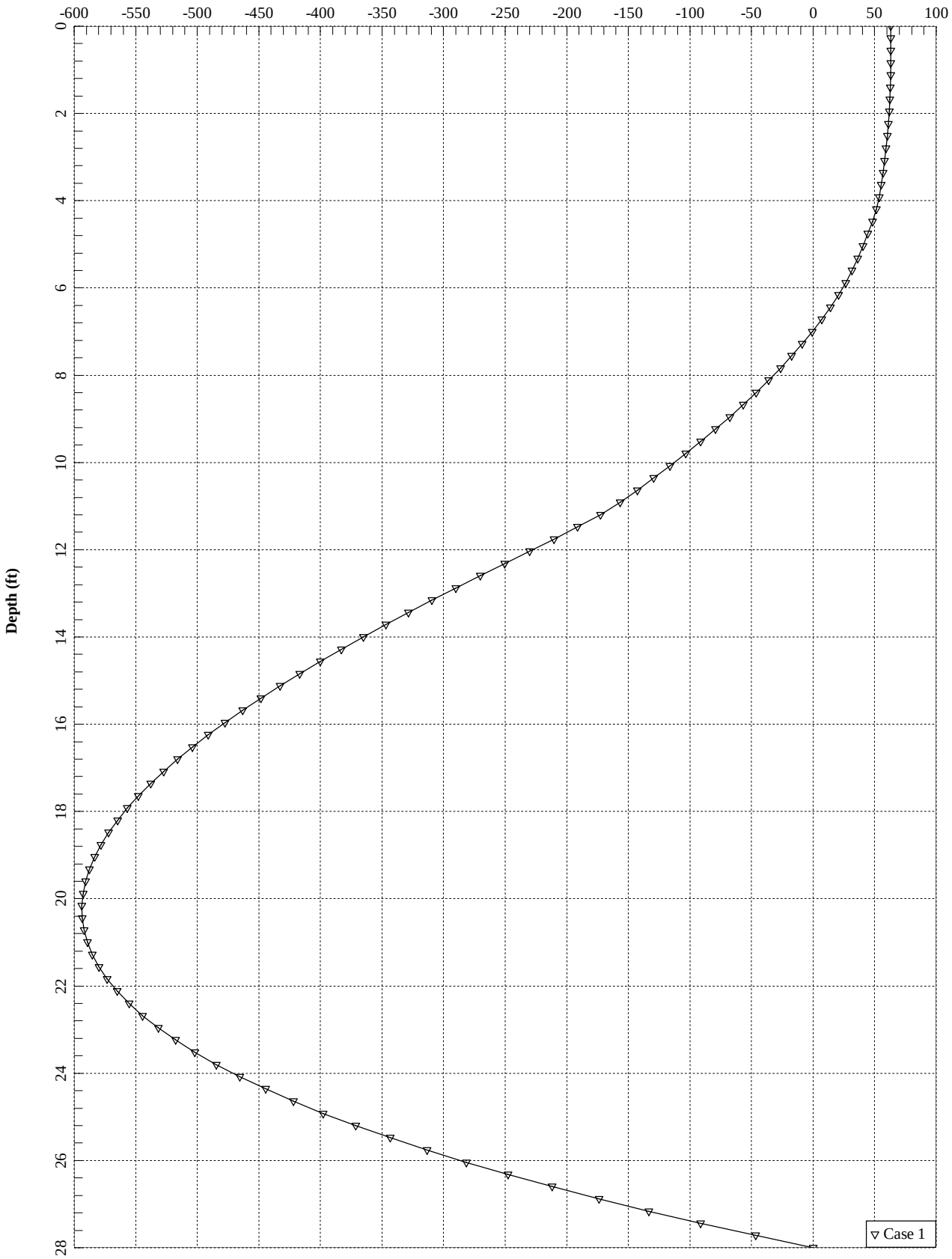
0.00027520	211179.21616	51273837.	7.673537E+08	1.863117E+11
0.00032483	245218.68235	59527081.	7.549245E+08	1.832587E+11
0.00069795	276584.03181	66270473.	3.962791E+08	9.494981E+10
0.00092719	305405.66316	71971929.	3.293902E+08	7.762413E+10
0.00111037	331614.85477	76910756.	2.986526E+08	6.926589E+10
0.00125752	355112.99043	81267109.	2.823906E+08	6.462470E+10
0.00137564	375918.03696	85164000.	2.732668E+08	6.190843E+10

K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.


Lateral Deflection (in)
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 2


Bending Moment (in-kips)
0
1E4
2E4
3E4
4E4
5E4
6E4
7E4
8E4
9E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1


Shear Force (kips)
-600
-550
-500
-450
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1

ATTACHMENT F – PROOF OF DELIVERY OF NOTICE

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 15APR21
ACTWGT: 1.50 LB MAN
CAD: 0765627/CAFE3409

BILL THIRD PARTY

TO

CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE

NEW BRITAIN CT 06051

REF: CT587100-ES-158

DEPT: BL GRAPHICS

56DC2/5EF2/05A2

FedEx Express

J201120121601uw

FRI - 16 APR 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **9544 9955 9051**

00 BDLA

06051
CT-US **BDL**

Part # 156148-434 MIT EXP 09/21

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 15APR21
ACTWGT: 1.50 LB MAN
CAD: 0765627/CAFE3409

BILL THIRD PARTY

TO **MICHAEL WOPENSINGER**
GREENWICH HOSPITAL
5 PERRYRIDGE ROAD

GREENWICH CT 06830

REF: CT587100-ES-158

DEPT: BL GRAPHICS

5BDC2/5EF2/05A2

FedEx Express

J20112012180luv

TRK# 0201 **9544 9955 9040**

FRI - 16 APR 10:30A
PRIORITY OVERNIGHT

EH CTXA

06830
CT-US **SWF**

Part # 156146-434 RIT EXP 03/21 •

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 15APR21
ACTWGT: 1.50 LB MAN
CAD: 0765627/CAFE3409

BILL THIRD PARTY

TO **KATIE DELUCA, AICP**
TOWN OF GREENWICH
101 FIELD POINT ROAD, 2ND FLOOR

GREENWICH CT 06830
REF: CT587100-ES-158

DEPT: BL GRAPHICS

56DC2/5EF2/05A2

FedEx Express

J201120121801uv

FRI - 16 APR 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **9544 9955 9030**

EH CTXA

06830
CT-US **SWF**

Part # 156148-454 RIT EXP 03/21

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 15APR21
ACTWGT: 1.50 LB
CAD: 0765627/CAFE3409

BILL THIRD PARTY

5GDC2/5EF2/05A2

TO **FRED CAMILLO, FIRST SELECTMAN**
TOWN OF GREENWICH
101 FIELD POINT ROAD, 1ST FLOOR

GREENWICH CT 06830

REF: C1587100-ES-158

DEPT: BL GRAPHICS

FedEx Express

J2011201218Ouv

TRK# 0201 **9544 9955 9029**

FRI - 16 APR 10:30A
PRIORITY OVERNIGHT

EH CTXA

06830
CT-US **SWF**

Part # 156349-434 RIT EXP 09/21

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-158

5 Perryridge Road

Greenwich, CT 06830

March 9, 2021

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource installation on the tower at 5 Perryridge Road in Greenwich, CT. Eversource is proposing to install two omnidirectional antennas – one transmit and one receive-only antenna – as part of its 220 MHz communications system.

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

Figure 1: View of ES-158 Greenwich Hospital

Site Address	5 Perryridge Road
Latitude	41° 02' 03.14" N
Longitude	73° 37' 51.03" W
Site Elevation AMSL	121’
Survey Engineer	Marc Salas
Survey Date/Time	3/2/2021; 11:00 AM – 1:00 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	COMPROD 871F-70-2	220	2.5	124	4	~110°	5.5	109.5

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

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

[2] Transmit antenna height listed for the proposed antenna is based on the CENTEK Engineering Inc. Structural Analysis Report dated Feb 24, 2021 and the overall mechanical length of the antenna. The proposed antenna consists of two internally stacked antennas – upper is for receive, lower is for transmit.

5. Measurement Procedure

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

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

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

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

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

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

Table 3: Instrumentation Information

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

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

6. Surveyed and Calculated % MPE Results

Measured and calculated results and a description of each survey location are detailed in the table below. Measurements were recorded on March 2, 2021 between 11:00 AM and 1:00 PM. The calculated % MPE contribution from the proposed equipment modifications 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 23 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was 2.06% (Average Uncontrolled / General Population MPE) and was recorded at Location 12 near the center of the top level of the parking garage. The highest composite (measured + calculated) % MPE value is calculated to be 5.14% (Average Uncontrolled / General Population) and is calculated to occur recorded at Location 13, on the north side of the top level of the parking garage.

Meas. Location	Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Composite % MPE (Uncontrolled / General)
1	SW corner of fenced compound	-73.63088	41.03413	31	< 1.00%	2.30%	< 3.30%
2	West side of fenced compound	-73.63088	41.03420	10	< 1.00%	0.84%	< 1.84%
3	North side of fenced compound	-73.63084	41.03427	23	< 1.00%	1.53%	< 2.53%
4	East side of Greenwich Radiological Group building by mailbox	-73.63114	41.03464	180	< 1.00%	1.45%	< 2.45%
5	Southend of Glen Rd under tree in cul de sac	-73.63096	41.03504	305	< 1.00%	0.68%	< 1.68%
6	Ground level, east-NE side of parking garage	-73.63089	41.03376	163	< 1.00%	1.89%	< 2.89%
7	Ground level, west-NW side of parking garage	-73.63134	41.03380	201	< 1.00%	1.43%	< 2.43%
8	NW corner of parking lot in front of parking garage	-73.63135	41.03420	139	< 1.00%	1.97%	< 2.97%
9	SW corner in front of parking garage on sidewalk	-73.63150	41.03319	412	1.00%	0.42%	< 2.42%
10	SW corner of parking garage at top level	-73.63142	41.03313	423	< 1.00%	0.42%	< 1.42%
11	South side of parking garage at top level	-73.63111	41.03315	392	1.14%	0.49%	1.63%
12	**Center of parking garage at top level**	**-73.63112**	**41.03362**	**226**	**2.06%**	**1.20%**	**3.27%**
13	**North side of parking garage at top level**	**-73.63101**	**41.03399**	**92**	**1.33%**	**3.81%**	**5.14%**
14	NE corner of parking garage at top level	-73.63133	41.03405	147	1.75%	2.19%	3.94%
15	West side of parking garage at top level	-73.63137	41.03360	265	< 1.00%	0.94%	< 1.94%
16	Lake Ave by street leading up to emergency room entrance	-73.63047	41.03305	435	1.25%	0.40%	1.65%
17	Lower walking path south of Garden Café	-73.63019	41.03350	312	< 1.00%	0.76%	< 1.76%
18	Walking path by SE corner of hospital	-73.62960	41.03377	379	< 1.00%	0.55%	< 1.55%
19	In front of Greenwich Gynecology sign by sidewalk	-73.62951	41.03438	372	< 1.00%	0.57%	< 1.57%
20	Intersection of Perryridge Rd & NE corner hospital exit street	-73.62955	41.03526	523	1.77%	0.31%	2.07%
21	Crosswalk by intersection of Lake Ave & Pennyridge Rd	-73.62925	41.03358	495	< 1.00%	0.33%	< 1.33%
22	Intersection of Propsect Dr & Farley St	-73.63212	41.03391	369	< 1.00%	0.57%	< 1.57%
23	East end of Cassidy St	-73.63185	41.03481	355	< 1.00%	0.58%	< 1.58%

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.

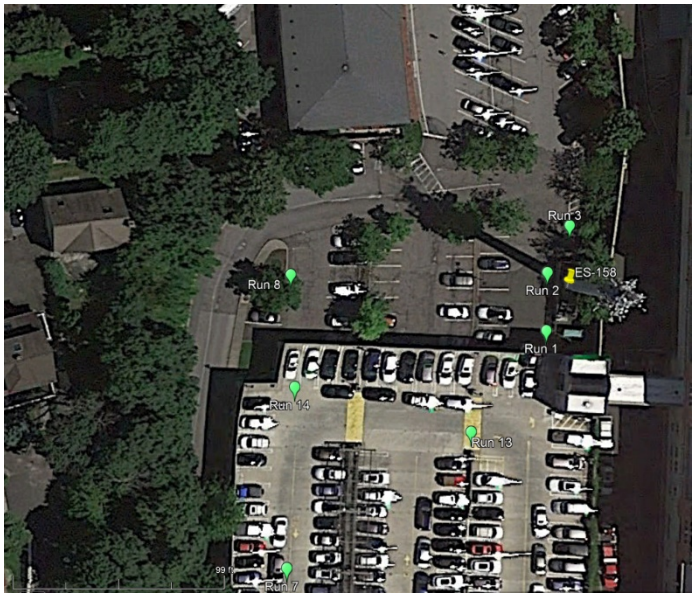


Figure 2: Measurement Points – Zoom In

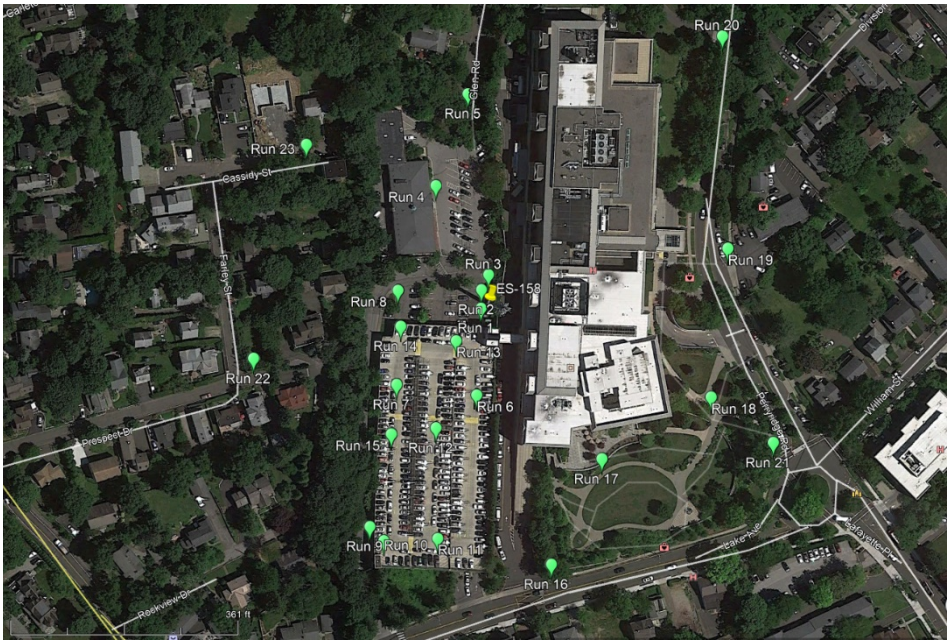


Figure 3: All Measurement Points

[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 at 5 Perryridge Road in Greenwich, 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 2.06% MPE. This measurement was recorded at Location 12 near the center of the top level of the parking garage. The highest composite (measured + calculated) power density is **5.14% of the FCC General Population MPE limit** with the proposed Eversource equipment is calculated to occur at Location 13, on the north side of the top level of the parking garage.

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

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

8. Statement of Certification

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

Report Prepared By: Daniel Garacani
RF Engineer
C Squared Systems, LLC

March 5, 2021
Date

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

March 9, 2021
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

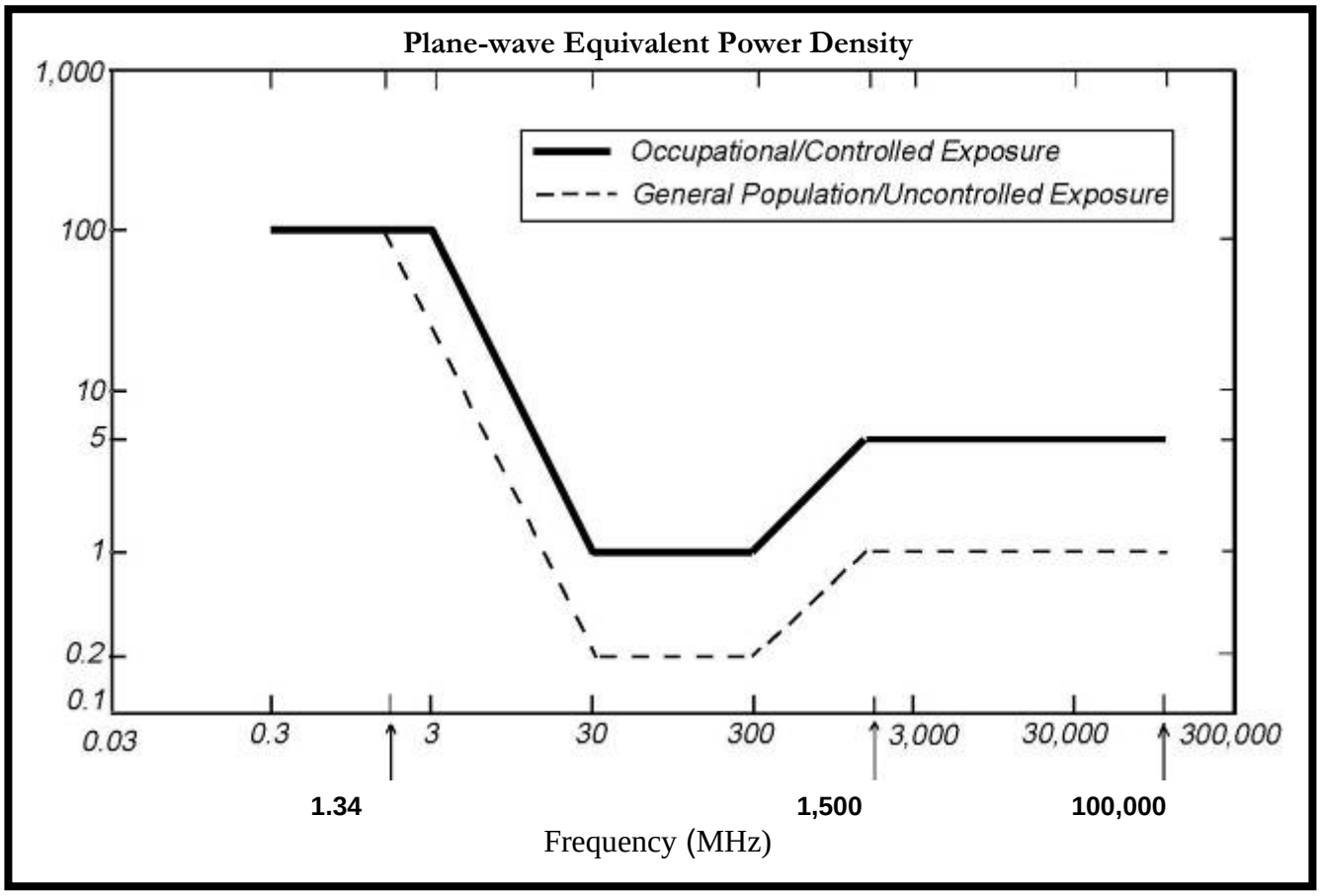
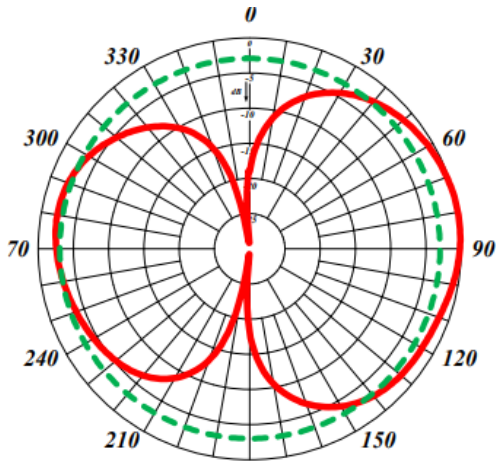


Figure 4: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

220 MHz

Manufacturer:	Comprod
Model #:	871F-70-2
Frequency Band:	215 - 225 MHz
Gain:	2.5 dBd
Vertical Beamwidth:	~110°
Horizontal Beamwidth:	360°
Polarization:	Vertical-Polarization
Length:	5.5’



Half-wave Spacing Vertical