STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

VIA ELECTRONIC MAIL

November 4, 2019

Jake Shappy
Transcend Wireless
10 Industrial Avenue, Suite 3
Mahwah, NJ 07430

RE: **TS-SPRINT-077-191001** – Sprint Spectrum L.P. ("Sprint") request for an order to approve tower sharing at an existing telecommunications facility located at 250 Olcott Street, Manchester, Connecticut.

Dear Mr. Shappy:

The Connecticut Siting Council (Council) is in receipt of your correspondence of October 30, 2019 submitted in response to the Council's October 9, 2019 notification of an incomplete request for tower sharing with regard to the above-referenced matter.

The submission renders the request for tower sharing complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/IN/emr

Robidoux, Evan

From: jshappy@transcendwireless.com
Sent: Wednesday, October 30, 2019 9:09 AM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for TS-SPRINT-077-191001 (250 Olcott Street, Manchester, Connecticut)
Attachments: ts-sprint-077-191001_incompleteltr_OlcottSt.pdf; 18116.00 - CT03XC067 Mount Analysis Rev 0_19.10.29.pdf; 18116.00 - CT03XC067 - Structural Analysis Rev2 19.10.11.pdf

Evan,

Please see attached soft copies of the mount analysis and revised structural analysis for your review for this exempt mod. The hard copies will be sent to you as soon as they are received from the A&E.

Jake Shappy
10 Industrial Ave, Suite 3
Mahwah, NJ 07430
Cell: 845-553-3330
jshappy@transcendwireless.com

From: Robidoux, Evan <Evan.Robidoux@ct.gov>
Sent: Thursday, October 10, 2019 10:22 AM
To: 'jshappy@transcendwireless.com' <jshappy@transcendwireless.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for TS-SPRINT-077-191001 (250 Olcott Street, Manchester, Connecticut)

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

Sprint Site Ref: CT03XC067

20 Olcott Street
Manchester, CT

Centek Project No. 18116.00

Date: October 29, 2019

Max Stress Ratio = 75.4%

Prepared for:

Transcend Wireless
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

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

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

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CENTEK engineering

Centered on Solutions℠

October 29, 2019

Mr. Jake Shappy
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
Sprint – Site Ref: CT03XC067
20 Olcott Street
Manchester, CT 06040

Centek Project No. 18116.00

Dear Mr. Shappy,

Centek Engineering, Inc. has reviewed the Sprint antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the proposed mounts, consisting of three (3) 12-ft V-Frames (SitePro P/N: VFA12-HD-SPT), to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- Sprint:
  V-Frames: Three (3) Commscope NNVV-65B-R4 panel antennas, three (3) Nokia AAHC panel antennas, three (3) 1900MHz 4X45W RRHs and six (6) 800MHz 2X50W RRHs mounted on three (3) 12-ft frames with a RAD center elevation of +/-135-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 a nominal design wind speed of 97 mph for Manchester as required in Appendix N of the 2018 Connecticut State Building Code.

Based on our review of the installation, it is our opinion that the subject antenna mount has sufficient capacity to support the aforementioned 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

Prepared by:

Fernando J. Palacios
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

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

Wind Speeds

Basic Wind Speed	$V := 97$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	Structure_Type := Lattice		(User Input)
Structure Category =	SC := II		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 180$	ft	(User Input)
Height to Center of Antennas =	$z_{Sprint} := 135$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.00$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input) G
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H = 0.85$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if Structure\_Type} = \text{Pole} \\ 0.85 & \text{if Structure\_Type} = \text{Lattice} \end{cases} = 0.85$$

(Per Table 2-2 of TIA-222-G)

(Per Table 2-3 of TIA-222-G)

Importance Factors =

$$I_{Wind} := \begin{cases} 0.87 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.00 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \end{cases} = 1$$

$$K_{iz} := \left(\frac{z_{Sprint}}{33}\right)^{0.1} = 1.151$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.303$$

$$Kz_{Sprint} := 2.01 \cdot \left(\left(\frac{z_{Sprint}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.348$$

Velocity Pressure w/o Ice Antennas = $qz_{Sprint} := 0.00256 \cdot K_d \cdot Kz_{Sprint} \cdot V^2 \cdot I_{Wind} = 27\ psf$

Velocity Pressure with Ice Antennas = $qz_{ice.Sprint} := 0.00256 \cdot K_d \cdot Kz_{Sprint} \cdot V_i^2 \cdot I_{Wind} = 7\ psf$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Commscope NNVV-65B-R4

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 72$ in (User Input)

Antenna Width = $W_{ant} := 19.6$ in (User Input)

Antenna Thickness = $T_{ant} := 7.8$ in (User Input)

Antenna Weight = $WT_{ant} := 77.4$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.7$

Antenna Force Coefficient = $Ca_{ant} = 1.25$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 9.8$ sf

Total Antenna Wind Force Front = $F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 288$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force Side = $F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 115$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz}\right)}{144} = 12.9$ sf

Total Antenna Wind Force w/ Ice Front = $Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 101$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{\left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz}\right)}{144} = 6.6$ sf

Total Antenna Wind Force w/ Ice Side = $Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 52$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 77$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \cdot 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot t_{iz}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz}\right) - V_{ant} = 1 \cdot 10^4$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 389$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 389$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Nokia AAHC

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 25.6$ in (User Input)

Antenna Width = $W_{ant} := 19.7$ in (User Input)

Antenna Thickness = $T_{ant} := 9.6$ in (User Input)

Antenna Weight = $WT_{ant} := 103.6$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.3$

Antenna Force Coefficient = $Ca_{ant} = 1.2$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.5$ sf

Total Antenna Wind Force Front = $F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 99$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.7$ sf

Total Antenna Wind Force Side = $F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 48$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 5.1$ sf

Total Antenna Wind Force w/ Ice Front = $Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 38$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3$ sf

Total Antenna Wind Force w/ Ice Side = $Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 22$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 104$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4841$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5587$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 181$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 181$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	RRUS-2x50-800		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 16$	in	(User Input)
RRUS Width =	$W_{RRUS} := 13$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 10$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 69.1$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 41$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 31$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.5$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 19$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 16$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 69$ lbs

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2080$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 3218$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 104$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 104$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = RRUS-4X45-1900

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 25$ in (User Input)

RRUS Width = $W_{RRUS} := 12$ in (User Input)

RRUS Thickness = $T_{RRUS} := 12$ in (User Input)

RRUS Weight = $WT_{RRUS} := 69.5$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 2.1$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 59$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 2.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 59$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.4$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 26$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 3.4$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 26$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 70$ lbs

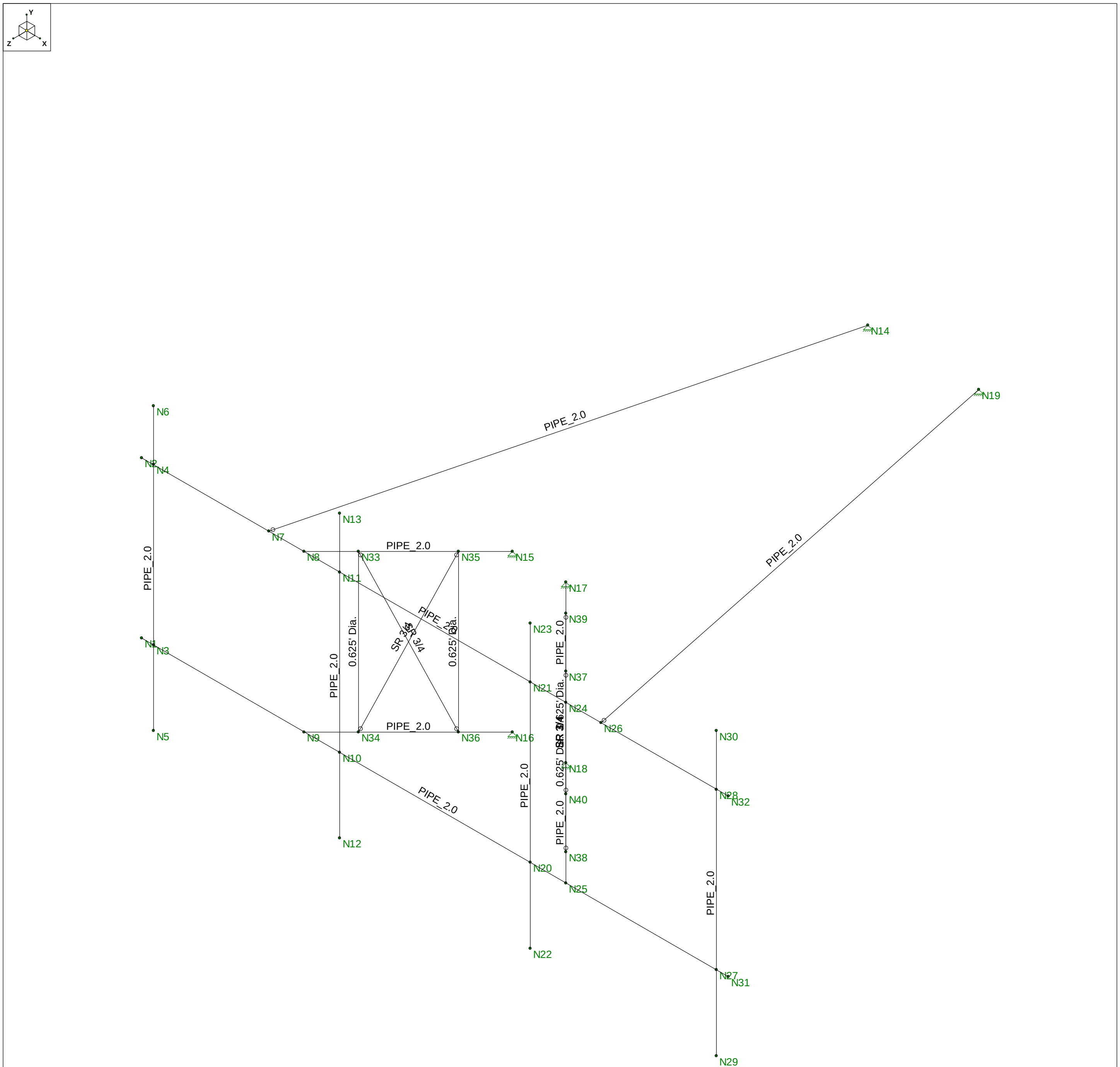
Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 3600$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 4563$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 148$ lbs

$W_{ICERRUS} \cdot N_{RRUS} = 148$



Envelope Only Solution

Centek	CT03XC067 - Mount Member Framing	SK - 1
FJP		Oct 29, 2019 at 10:22 AM
18116.00		Antenna 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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	2" Pipe STD	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
3	Outrigger_2" Pipe STD	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Stabilizer_2"Pipe STD	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	.625" Bar	0.625' Dia.	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	0.75" Bar	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N1	N31			2" Pipe STD	Beam	Pipe	A53 Gra...	Typical
2	M2	N2	N32			2" Pipe STD	Beam	Pipe	A53 Gra...	Typical
3	M3	N5	N6			Antenna Mast	Column	Pipe	A53 Gra...	Typical
4	M4	N29	N30			Antenna Mast	Column	Pipe	A53 Gra...	Typical
5	M5	N7	N14			Stabilizer_2"Pipe STD	Beam	Pipe	A53 Gra...	Typical
6	M6	N12	N13			Antenna Mast	Column	Pipe	A53 Gra...	Typical
7	M7	N22	N23			Antenna Mast	Column	Pipe	A53 Gra...	Typical
8	M8	N26	N19			Stabilizer_2"Pipe STD	Beam	Pipe	A53 Gra...	Typical
9	M9	N8	N15			Outrigger_2" Pipe STD	Beam	Pipe	A53 Gra...	Typical
10	M10	N24	N17			Outrigger_2" Pipe STD	Beam	Pipe	A53 Gra...	Typical
11	M11	N9	N16			Outrigger_2" Pipe STD	Beam	Pipe	A53 Gra...	Typical
12	M12	N25	N18			Outrigger_2" Pipe STD	Beam	Pipe	A53 Gra...	Typical
13	M13	N33	N34			.625" Bar	Column	BAR	A36 Gr.36	Typical
14	M14	N35	N36			.625" Bar	Column	BAR	A36 Gr.36	Typical
15	M15	N39	N40			.625" Bar	Column	BAR	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
16	M16	N37	N38			.625" Bar	Column	BAR	A36 Gr.36	Typical
17	M17	N33	N36			0.75" Bar	Column	BAR	A36 Gr.36	Typical
18	M18	N35	N34			0.75" Bar	Column	BAR	A36 Gr.36	Typical
19	M19	N39	N38			0.75" Bar	Column	BAR	A36 Gr.36	Typical
20	M20	N40	N37			0.75" Bar	Column	BAR	A36 Gr.36	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	2" Pipe STD	12.5			Lbyy						Lateral
2	M2	2" Pipe STD	12.5			Lbyy						Lateral
3	M3	Antenna Mast	6			Lbyy						Lateral
4	M4	Antenna Mast	6			Lbyy						Lateral
5	M5	Stabilizer_2"...	10.503			Lbyy						Lateral
6	M6	Antenna Mast	6			Lbyy						Lateral
7	M7	Antenna Mast	6			Lbyy						Lateral
8	M8	Stabilizer_2"...	10.401			Lbyy						Lateral
9	M9	Outrigger_2...	3.142			Lbyy						Lateral
10	M10	Outrigger_2...	3.142			Lbyy						Lateral
11	M11	Outrigger_2...	3.142			Lbyy						Lateral
12	M12	Outrigger_2...	3.142			Lbyy						Lateral
13	M13	.625" Bar	3.333									Lateral
14	M14	.625" Bar	3.333									Lateral
15	M15	.625" Bar	3.333									Lateral
16	M16	.625" Bar	3.333									Lateral
17	M17	0.75" Bar	3.659									Lateral
18	M18	0.75" Bar	3.659									Lateral
19	M19	0.75" Bar	3.659									Lateral
20	M20	0.75" Bar	3.659									Lateral

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	1	0	0.	0	
2	N2	1	3.333333	0.	0	
3	N3	1.25	0	0.	0	
4	N4	1.25	3.333333	0.	0	
5	N5	1.25	-1.5833...	0.	0	
6	N6	1.25	4.416667	0.	0	
7	N7	3.708333	3.333333	0.	0	
8	N8	4.459167	3.333333	0.	0	
9	N9	4.459167	0	0.	0	
10	N10	5.219167	0	0.	0	
11	N11	5.219167	3.333333	0.	0	
12	N12	5.219167	-1.5833...	0.	0	
13	N13	5.219167	4.416667	0.	0	
14	N14	6.294167	3.333333	-10.18	0	
15	N15	6.680833	3.333333	-2.221667	0	
16	N16	6.680833	0	-2.221667	0	
17	N17	7.819167	3.333333	-2.221667	0	
18	N18	7.819167	0	-2.221667	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
19	N19	8.660833	3.333333	-10.18	0	
20	N20	9.281667	0	0.	0	
21	N21	9.281667	3.333333	0.	0	
22	N22	9.281667	-1.5833...	0.	0	
23	N23	9.281667	4.416667	0.	0	
24	N24	10.040833	3.333333	-0.	0	
25	N25	10.040833	0	-0.	0	
26	N26	10.791667	3.333333	-0.	0	
27	N27	13.25	0	-0.	0	
28	N28	13.25	3.333333	-0.	0	
29	N29	13.25	-1.5833...	-0.	0	
30	N30	13.25	4.416667	-0.	0	
31	N31	13.5	0	-0.	0	
32	N32	13.5	3.333333	-0.	0	
33	N33	5.036637	3.333333	-0.577471	0	
34	N34	5.036637	0	-0.577471	0	
35	N35	6.104368	3.333333	-1.645202	0	
36	N36	6.104368	0	-1.645202	0	
37	N37	9.463363	3.333333	-0.577471	0	
38	N38	9.463363	0	-0.577471	0	
39	N39	8.395632	3.333333	-1.645202	0	
40	N40	8.395632	0	-1.645202	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	N14	Reaction	Reaction	Reaction			
2	N19	Reaction	Reaction	Reaction			
3	N15	Reaction	Reaction	Reaction			
4	N17	Reaction	Reaction	Reaction			
5	N16	Reaction	Reaction	Reaction			
6	N18	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Y	-.038	5.5
2	M4	Y	-.038	.5
3	M3	Y	-.052	4.083
4	M3	Y	-.052	2
5	M4	Y	-.069	3
6	M7	Y	-.07	3

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Y	-.195	5.5
2	M4	Y	-.195	.5
3	M3	Y	-.091	4.083
4	M3	Y	-.091	2
5	M4	Y	-.104	3

Member Point Loads (BLC 3 : Ice Load) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
6	M7	Y	-.148	3

Member Point Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	X	.026	5.5
2	M4	X	.026	.5
3	M3	X	.011	4.083
4	M3	X	.011	2
5	M4	X	.016	3
6	M7	X	.026	3

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	X	.058	5.5
2	M4	X	.058	.5
3	M3	X	.024	4.083
4	M3	X	.024	2
5	M4	X	.031	3
6	M7	X	.059	3

Member Point Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Z	.051	5.5
2	M4	Z	.051	.5
3	M3	Z	.017	4.083
4	M3	Z	.017	2
5	M4	Z	.019	3
6	M7	Z	.026	3

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Z	.144	5.5
2	M4	Z	.144	.5
3	M3	Z	.05	4.083
4	M3	Z	.05	2
5	M4	Z	.041	3
6	M7	Z	.059	3

Member Distributed Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.001	.001	0	0
2	M4	X	.001	.001	0	0
3	M5	X	.001	.001	0	0
4	M6	X	.001	.001	0	0
5	M7	X	.001	.001	0	0
6	M8	X	.001	.001	0	0
7	M9	X	.001	.001	0	0
8	M10	X	.001	.001	0	0

Member Distributed Loads (BLC 4 : Wind with Ice X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
9	M11	X	.001	.001	0	0
10	M12	X	.001	.001	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.005	.005	0	0
2	M4	X	.005	.005	0	0
3	M5	X	.005	.005	0	0
4	M6	X	.005	.005	0	0
5	M7	X	.005	.005	0	0
6	M8	X	.005	.005	0	0
7	M9	X	.005	.005	0	0
8	M10	X	.005	.005	0	0
9	M11	X	.005	.005	0	0
10	M12	X	.005	.005	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.001	.001	0	0
2	M2	Z	.001	.001	0	0
3	M9	Z	.001	.001	0	0
4	M10	Z	.001	.001	0	0
5	M11	Z	.001	.001	0	0
6	M12	Z	.001	.001	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.005	.005	0	0
2	M2	Z	.005	.005	0	0
3	M9	Z	.005	.005	0	0
4	M10	Z	.005	.005	0	0
5	M11	Z	.005	.005	0	0
6	M12	Z	.005	.005	0	0

Member Area Loads

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[ksf]
No Data to Print ...						

Basic Load Cases

	BLC Description	Category	X Grav...	Y Grav...	Z Gra...	Joint	Point	Distrib...	Area(M...	Surface(Plate/Wall)
1	Self Weight	DL		-1						
2	Dead Load	None					6			
3	Ice Load	None					6			
4	Wind with Ice X	None					6	10		
5	Wind X	None					6	10		
6	Wind with Ice Z	None					6	6		
7	Wind Z	None					6	6		

Load Combinations

	Description	Solve	PD...	SR...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-direction)	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1.0Wi (X-...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-direction)	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-direction)	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1.0Wi (Z-...	Yes	Y		1	1.2	2	1.2	3	1	6	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	N14	max	.125	4	.022	1	-.085	3	0	6	0	6	0	6
2		min	.014	3	.016	5	-.491	4	0	1	0	1	0	1
3	N19	max	.03	2	.022	4	.356	2	0	6	0	6	0	6
4		min	-.271	4	.016	2	-1.294	4	0	1	0	1	0	1
5	N15	max	.109	3	.207	1	.39	5	0	6	0	6	0	6
6		min	-.411	5	.022	5	-.128	3	0	1	0	1	0	1
7	N17	max	.531	5	.617	6	.559	5	0	6	0	6	0	6
8		min	-.894	3	.097	2	-.867	3	0	1	0	1	0	1
9	N16	max	.27	5	.208	1	.305	1	0	6	0	6	0	6
10		min	-.351	1	.022	5	-.164	5	0	1	0	1	0	1
11	N18	max	.788	3	.609	6	.773	3	0	6	0	6	0	6
12		min	-.243	5	.103	2	-.106	5	0	1	0	1	0	1
13	Totals:	max	0	6	1.593	6	0	3						
14		min	-.903	1	.577	2	-1.105	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	N1	max	.07	2	.01	5	.104	2	1.866e-03	6	4.145e-03	5	2.012e-03	1
2		min	-.08	4	-.141	3	-.081	6	-2.364e-03	2	-6.249e-04	3	-1.343e-03	5
3	N2	max	.014	1	.01	5	.085	5	1.674e-03	6	3.423e-03	5	2.211e-03	1
4		min	.004	6	-.141	3	-.022	3	-2.369e-03	2	-7.677e-04	3	-1.385e-03	5
5	N3	max	.07	2	.006	5	.103	2	1.866e-03	6	4.145e-03	5	2.012e-03	1
6		min	-.08	4	-.139	3	-.082	6	-2.364e-03	2	-6.249e-04	3	-1.343e-03	5
7	N4	max	.014	1	.006	5	.075	5	1.674e-03	6	3.423e-03	5	2.211e-03	1
8		min	.004	6	-.139	3	-.019	3	-2.369e-03	2	-7.677e-04	3	-1.385e-03	5
9	N5	max	.108	1	.006	5	.148	2	1.865e-03	6	4.145e-03	5	2.069e-03	1
10		min	-.104	5	-.139	3	-.117	6	-2.364e-03	2	-6.249e-04	3	-1.343e-03	5
11	N6	max	.023	5	.006	5	.084	5	1.674e-03	6	3.423e-03	5	2.192e-03	1
12		min	-.015	1	-.139	3	-.032	1	-2.369e-03	2	-7.677e-04	3	-1.385e-03	5
13	N7	max	.014	1	-.004	5	.005	1	1.071e-03	6	5.391e-04	5	3.392e-03	3
14		min	.004	6	-.051	3	.002	6	-1.322e-03	2	-8.316e-04	1	9.661e-05	5
15	N8	max	.014	1	-.004	5	.013	1	1.081e-03	4	-2.707e-05	5	2.068e-03	3
16		min	.004	6	-.025	3	.004	5	-1.002e-03	2	-4.214e-04	1	-2.179e-04	5
17	N9	max	.07	2	-.004	5	.069	2	1.219e-03	4	1.823e-03	2	2.056e-03	1
18		min	-.081	4	-.024	3	-.08	4	-9.865e-04	2	-1.538e-03	6	-2.898e-04	5
19	N10	max	.07	2	-.004	2	.052	2	1.45e-03	4	1.874e-03	2	1.106e-03	1
20		min	-.081	4	-.014	6	-.074	4	-8.388e-04	2	-1.535e-03	6	-7.398e-04	5
21	N11	max	.014	1	-.004	2	.014	1	1.35e-03	4	2.733e-04	2	1.061e-03	1
22		min	.005	6	-.014	6	.003	5	-8.543e-04	2	6.548e-06	6	-7.235e-04	5

Envelope Joint Displacements (Continued)

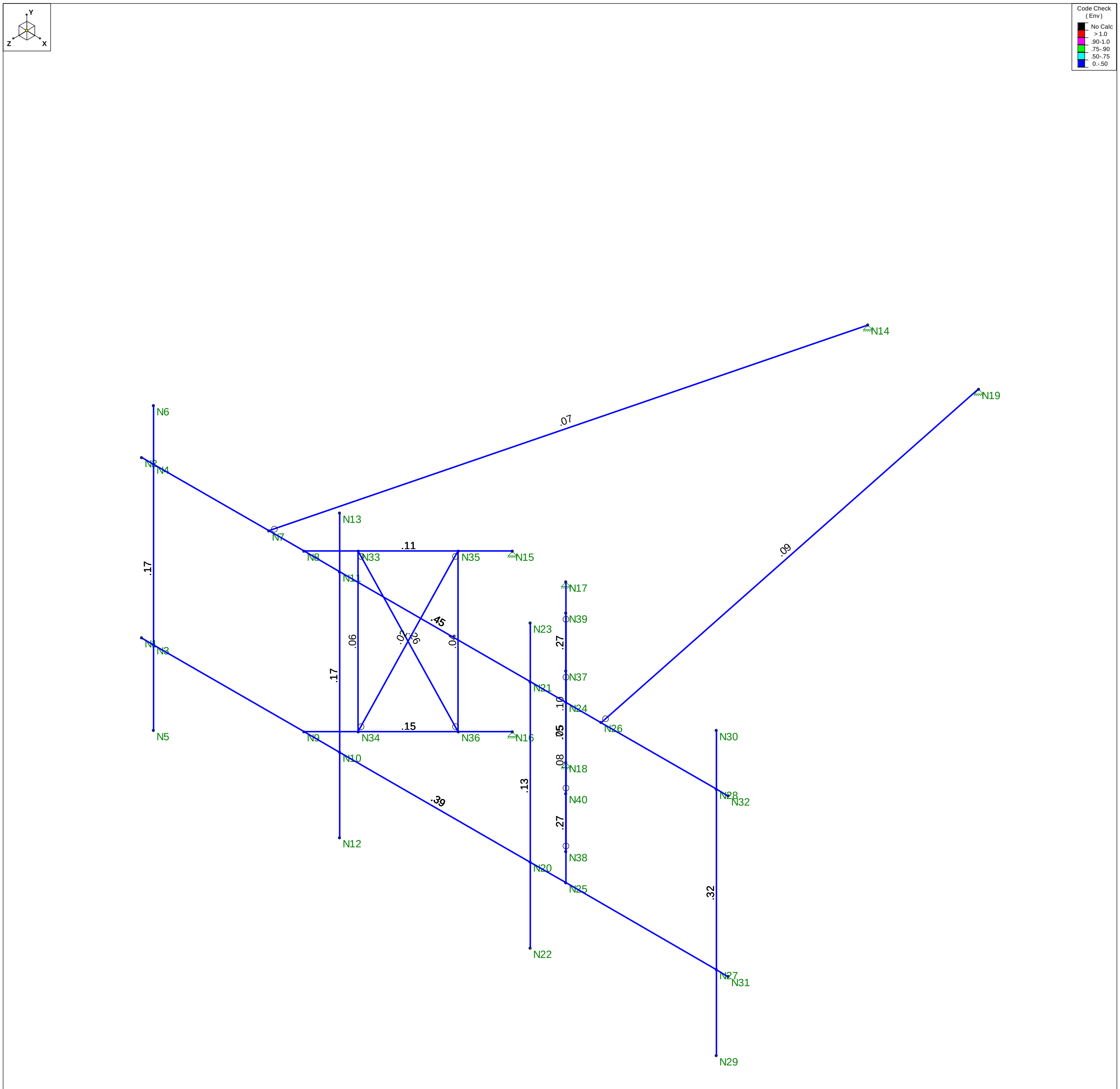
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
23	N12	max	.09	2	-.004	2	.068	2	1.45e-03	4	1.874e-03	2	1.163e-03	1
24		min	-.093	4	-.014	6	-.102	4	-8.388e-04	2	-1.535e-03	6	-7.398e-04	5
25	N13	max	.015	5	-.004	2	.021	4	1.35e-03	4	2.733e-04	2	1.043e-03	1
26		min	0	1	-.014	6	.002	2	-8.543e-04	2	6.548e-06	6	-7.235e-04	5
27	N14	max	0	6	0	6	0	6	1.95e-03	4	4.12e-03	1	3.656e-03	3
28		min	0	1	0	1	0	1	1.07e-03	2	3.665e-05	6	2.359e-04	5
29	N15	max	0	6	0	6	0	6	7.141e-04	4	9.838e-04	1	2.399e-03	1
30		min	0	1	0	1	0	1	-5.203e-04	2	2.948e-04	6	-6.35e-04	5
31	N16	max	0	6	0	6	0	6	8.209e-04	4	3.042e-03	2	2.395e-03	1
32		min	0	1	0	1	0	1	-5.169e-04	2	-4.239e-03	4	-7.253e-04	5
33	N17	max	0	6	0	6	0	6	8.276e-04	1	1.012e-03	1	-2.398e-05	2
34		min	0	1	0	1	0	1	-8.632e-04	6	4.19e-04	6	-6.252e-03	6
35	N18	max	0	6	0	6	0	6	7.455e-04	1	3.041e-03	2	-9.795e-05	2
36		min	0	1	0	1	0	1	-1.016e-03	5	-2.388e-03	6	-6.254e-03	6
37	N19	max	0	6	0	6	0	6	1.881e-03	1	4.047e-03	1	-8.035e-04	2
38		min	0	1	0	1	0	1	1.025e-03	5	4.491e-05	5	-9.804e-03	6
39	N20	max	.07	2	-.003	5	.043	6	8.863e-04	2	1.872e-03	2	1.361e-04	2
40		min	-.082	4	-.03	3	-.053	2	-1.17e-03	4	-4.356e-03	4	-2.655e-03	6
41	N21	max	.014	1	-.003	5	-.006	6	8.293e-04	2	2.544e-04	1	4.69e-04	2
42		min	.006	6	-.03	3	-.014	1	-1.322e-03	4	-4.263e-04	5	-2.719e-03	6
43	N22	max	.073	2	-.003	5	.064	6	8.863e-04	2	1.872e-03	2	1.927e-04	2
44		min	-.118	6	-.03	3	-.069	2	-1.17e-03	4	-4.356e-03	4	-2.655e-03	6
45	N23	max	.041	6	-.003	5	-.003	2	8.293e-04	2	2.544e-04	1	4.509e-04	2
46		min	.008	2	-.03	3	-.03	4	-1.322e-03	4	-4.263e-04	5	-2.719e-03	6
47	N24	max	.014	1	-.012	2	-.005	6	9.61e-04	2	-1.989e-04	3	-2.142e-04	2
48		min	.006	6	-.067	6	-.013	1	-1.722e-03	4	-4.797e-04	4	-6.214e-03	6
49	N25	max	.07	2	-.014	2	.083	4	1.053e-03	2	1.825e-03	2	-4.6e-04	2
50		min	-.082	4	-.067	6	-.07	2	-2.09e-03	4	-6.666e-03	4	-6.14e-03	6
51	N26	max	.014	1	-.017	2	.006	5	1.294e-03	2	-5.315e-04	3	-7.703e-04	2
52		min	.006	6	-.139	6	-.005	1	-2.405e-03	4	-4.04e-03	4	-9.237e-03	6
53	N27	max	.07	2	-.035	2	.612	4	2.411e-03	2	3.152e-04	2	1.007e-03	2
54		min	-.082	4	-.405	6	-.102	2	-8.4e-03	4	-1.673e-02	4	-5.235e-03	6
55	N28	max	.015	1	-.035	2	.332	4	2.382e-03	2	7.137e-05	2	2.572e-04	2
56		min	.006	6	-.405	6	.003	2	-4.642e-03	4	-1.483e-02	4	-5.184e-03	6
57	N29	max	.098	2	-.035	2	.792	4	2.411e-03	2	3.152e-04	2	1.602e-03	2
58		min	-.168	6	-.405	6	-.148	2	-9.735e-03	4	-1.673e-02	4	-5.227e-03	6
59	N30	max	.074	6	-.035	2	.277	5	2.383e-03	2	7.137e-05	2	8.277e-05	2
60		min	.013	2	-.405	6	.004	3	-4.254e-03	4	-1.483e-02	4	-5.187e-03	6
61	N31	max	.07	2	-.032	2	.663	4	2.411e-03	2	3.152e-04	2	1.007e-03	2
62		min	-.082	4	-.421	6	-.103	2	-8.4e-03	4	-1.673e-02	4	-5.235e-03	6
63	N32	max	.015	1	-.034	2	.377	4	2.382e-03	2	7.137e-05	2	2.571e-04	2
64		min	.006	6	-.421	6	.003	2	-4.642e-03	4	-1.483e-02	4	-5.184e-03	6
65	N33	max	.014	1	0	5	.014	1	8.289e-04	5	1.821e-04	1	1.732e-03	1
66		min	.004	6	-.013	1	.004	5	-1.24e-03	1	7.184e-05	6	-4.989e-04	5
67	N34	max	.055	2	0	5	.055	2	9.066e-04	5	2.319e-03	2	1.733e-03	1
68		min	-.071	4	-.013	1	-.07	4	-1.231e-03	1	-2.198e-03	4	-6.22e-04	5
69	N35	max	.007	1	0	5	.007	1	6.35e-04	5	8.798e-04	1	1.918e-03	1
70		min	.002	6	-.011	1	.002	5	-9.723e-04	1	2.644e-04	6	-6.849e-04	5
71	N36	max	.021	2	0	5	.021	2	7.337e-04	5	2.936e-03	2	1.912e-03	1
72		min	-.029	4	-.011	1	-.029	4	-9.638e-04	1	-3.992e-03	4	-7.754e-04	5
73	N37	max	.015	1	-.006	2	-.005	6	6.132e-04	2	1.714e-04	1	1.614e-04	2
74		min	.006	6	-.039	6	-.014	1	-2.547e-03	6	5.792e-05	6	-4.792e-03	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
75	N38	max	.055	2	-.006	2	.048	6	6.438e-04	2	2.33e-03	2	-2.833e-05	2
76		min	-.049	6	-.039	6	-.055	2	-2.574e-03	6	-4.208e-03	4	-4.763e-03	6
77	N39	max	.007	1	-.005	2	-.003	6	5.663e-04	2	9.005e-04	1	2.e-04	2
78		min	.003	6	-.032	6	-.007	1	-2.29e-03	6	3.672e-04	6	-4.825e-03	6
79	N40	max	.021	2	-.005	2	.016	6	4.625e-04	2	2.939e-03	2	1.399e-04	2
80		min	-.017	6	-.032	6	-.021	2	-2.284e-03	6	-2.399e-03	6	-4.832e-03	6

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

	Me...	Shape	Code ...	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt ...	phi*Mn y-...	phi*M...	Cb	Eqn
1	M1	PIPE_2.0	.386	9.115	4	.143	9.115		4	6.295	32.13	1.872	1.872	2.21	H1-1b
2	M2	PIPE_2.0	.453	9.766	5	.154	9.766		4	6.295	32.13	1.872	1.872	2.3...	H1-1b
3	M3	PIPE_2.0	.174	1.625	6	.027	1.625		4	20.867	32.13	1.872	1.872	2.31	H1-1b
4	M4	PIPE_2.0	.320	4.875	3	.046	3.063		4	20.867	32.13	1.872	1.872	2.2...	H1-1b
5	M5	PIPE_2.0	.075	5.252	1	.005	10.503		1	8.917	32.13	1.872	1.872	1.1...	H1-1b
6	M6	PIPE_2.0	.169	4.875	6	.047	1.625		6	20.867	32.13	1.872	1.872	2.3...	H1-1b
7	M7	PIPE_2.0	.128	4.875	1	.078	1.625		5	20.867	32.13	1.872	1.872	2.0...	H1-1b
8	M8	PIPE_2.0	.088	5.2	1	.005	0		1	9.093	32.13	1.872	1.872	1.1...	H1-1b
9	M9	PIPE_2.0	.107	.785	3	.026	.818		3	28.544	32.13	1.872	1.872	1.53	H1-1b
10	M10	PIPE_2.0	.271	2.356	6	.073	.818		6	28.544	32.13	1.872	1.872	1.5...	H1-1b
11	M11	PIPE_2.0	.148	0	4	.026	.818		3	28.544	32.13	1.872	1.872	1.5...	H1-1b
12	M12	PIPE_2.0	.275	2.356	6	.072	.818		6	28.544	32.13	1.872	1.872	1.5...	H1-1b
13	M13	0.625' Dia.	.058	3.333	6	.011	0		6	1.058	9.94	.104	.104	2.27	H1-1b
14	M14	0.625' Dia.	.036	0	1	.019	0		4	1.058	9.94	.104	.104	2.2...	H1-1b
15	M15	0.625' Dia.	.099	0	6	.014	0		6	1.058	9.94	.104	.104	2.2...	H1-1b
16	M16	0.625' Dia.	.078	3.333	6	.020	0		4	1.058	9.94	.104	.104	2.2...	H1-1b
17	M17	SR 3/4	.261	2.058	3	.019	0		4	1.82	14.314	.179	.179	1.1...	H1-1a
18	M18	SR 3/4	.023	1.83	3	.011	3.659		6	1.82	14.314	.179	.179	1.1...	H1-1b
19	M19	SR 3/4	.054	1.83	6	.021	0		4	1.82	14.314	.179	.179	1.1...	H1-1b
20	M20	SR 3/4	.754	1.601	6	.012	0		2	1.82	14.314	.179	.179	1.1...	H1-1a



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek	CT03XC067 - Mount	SK - 2
FJP	Member Unity Check	Oct 29, 2019 at 10:22 AM
18116.00		Antenna Mount.r3d

Site Data	**Region: Northeast** **Market:**	**Northern CT**	Revision 2.7	Rev Date: 23-July-2018
	Cascade ID	**CT03XC067**	BTS OEM: ALU	RFDS Type: Preliminary
	Augment Import Code:	Augment: Relocation	Structure Type:	Tower
	Address: 250 South Olcott Street, Manchester CT 06040	Sprint Eng. Name: Bill Hastings	Bill.M.Hastings@sprint.com	Eng. Phone: 978-590-9700
	Latitude: 41.77000352 | Longitude: -72.55834028	Manager Name: Jonathan Hull	Jonathan.B.Hull@sprint.com	Manager Phone: 617-233-2920
	Detailed RFDS Description:	RFE:		RFE Phone:
	Tower Relocation	Filter Analysis Complete:	Border Analysis Complete:	Channel Plan Complete:
		Alpha	Beta	Gamma
1900	1900MHz_Azimuth	0	120	240
	1900MHz_No_of_Antennas	1	1	1
	1900MHz_RADCenter(ft)	135	135	135
	1900MHz_Antenna Make	CommScope	CommScope	CommScope
	1900MHz_Antenna Model	NNVV-65B-R4	NNVV-65B-R4	NNVV-65B-R4
	1900MHz_Horizontal_Beamwidth	68	68	68
	1900MHz_Vertical_Beamwidth	5.1	5.1	5.1
	1900MHz_Antenna Dimensions (ft) & Weight (lbs)	72 x 19.6 x 7.8 | 77.4 (lbs)	72 x 19.6 x 7.8 | 77.4 (lbs)	72 x 19.6 x 7.8 | 77.4 (lbs)
	1900MHz_AntennaGain(dBi)	18.8	18.8	18.8
	1900MHz_E_Tilt	0	0	
	1900MHz _M_Tilt	0	0	
	1900_Effective_Tilt	0	0	
	1900MHz_Carrier_Forecast_Year_2017			
	1900MHz_RRH Manufacturer	ALU	ALU	
	1900MHz_RRH Model	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz
	1900MHz_RRH Count	1	1	1
	1900MHz_RRH Specs	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)
	1900MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	1900MHz Combiner Model	No Combiner Required	No Combiner Required	No Combiner Required
	1900MHz Power Split Ratio (Main/Split)			
	1900MHz Splitter Manufacturer			
	1900MHz Splitter Model	No Splitter Required	No Splitter Required	No Splitter Required
	1900MHz Number of Splitters	0	0	0
	1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount, ft)	8	8	8
	1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount)	LCF12-50J	LCF12-50J	LCF12-50J

	1900MHz_Top_Jumper #2_Length (RRH to Combiner for TT if applicable, ft)			
	1900MHz_Top_Jumper #2_Cable_Model (RRH to Combiner for TT if applicable)			
	1900MHz_Main_Cable_Length (ft)	135	135	135
	1900MHz_Main_Cable_Model	HB114-1-08U4-M5F	HB114-1-08U4-M5F	HB114-1-08U4-M5F
	1900MHz_Bottom_Jumper #1_Length (Ground based RRH to Combiner OR-Main Coax, ft)			
	1900MHz_Bottom_Jumper #1_Cable_Model (Ground based RRH to Combiner-OR-Main Coax)			
	1900MHz_Bottom_Jumper #2_Length (Ground based-Combiner to Main Coax, ft)			
	1900MHz_Bottom_Jumper #2_Cable_Model (Ground based-Combiner to Main Coax)			
800	800MHz_Azimuth	0	120	240
	800MHz_No_of_Antennas	1	1	1
	800MHz_RADCenter(ft)	135	135	135
	800MHz_AntennaMake	NA	NA	NA
	800MHz_AntennaModel	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band
	800MHz_Horizontal_Beamwidth	NA	NA	NA
	800MHz_Vertical_Beamwidth	NA	NA	NA
	800MHz_Antenna Dimensions (ft) & Weight (lbs)	NA | NA	NA | NA	NA | NA
	800MHz_AntennaGain (dBi)	NA	NA	NA
	800MHz_E_Tilt	0	0	0
	800MHz_M_Tilt	0	0	0
	800 MHz_Effective Tilt (degrees)	0	0	0
	800MHz_RRH Manufacturer	ALU	ALU	ALU
	800_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
	800MHz_RRH Model	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W
	800MHz_RRH Specs	15.8 x 13.0 x 14.0 (64 lbs)	15.8 x 13.0 x 14.0 (64 lbs)	15.8 x 13.0 x 14.0 (64 lbs)
	800MHz_RRH Count	2	2	2
	800MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	800MHz BILT Border Filter	na	na	na
	800MHz Splitter Manufacturer			
	800MHz Splitter Model			
	800MHz Number of Splitters	0	0	0
	800_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
	800_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J

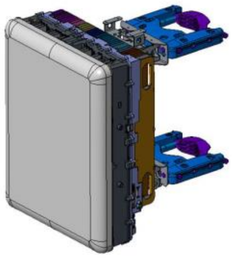
	800MHz_Main_Coax_Cable_Length (ft)	NA	NA	NA
	800MHz_Main_Coax_Cable_Model	NA	NA	NA
	800_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
	800_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
2500	2500MHz_Azimuth	0	120	240
	2500MHz_No_of_Antennas	1	1	1
	2500MHz_RADCenter(ft)	135	135	135
	2500MHz_AntennaMake	Nokia	Nokia	Nokia
	2500MHz_AntennaModel	AAHC (Nokia Massive MIMO RRU/Antenna Standard)	AAHC (Nokia Massive MIMO RRU/Antenna Standard)	AAHC (Nokia Massive MIMO RRU/Antenna Standard)
	2500MHz_Horizontal_Beamwidth	65	65	65
	2500MHz_Vertical_Beamwidth			
	2500MHz_AntennaHeight (ft)	25.6 x 19.7 x 9.64 | 103.7 (lbs)	25.6 x 19.7 x 9.64 | 103.7 (lbs)	25.6 x 19.7 x 9.64 | 103.7 (lbs)
	2500MHz_AntennaGain (dBi)			
	2500MHz_E_Tilt	0	0	0
	2500MHz_M_Tilt	0	0	0
	2500 MHz_Effective Tilt (degrees)	0	0	0
	2500MHz_RRH Manufacturer			
	2500_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
	2500MHz_RRH Model			
	2500MHz_RRH Count			
	2500MHz_RRH Location			
	2500MHz Power Split Ratio (Main/Split)			
	2500MHz Splitter Manufacturer			
	2500MHz Splitter Model			
	2500MHz Number of Splitters	0	0	0
	2500_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
	2500_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J
	2500MHz_Main_Cable_Length (ft)	135		
	2500MHz_Main_Cable_Model	HB114-08U3M12-xxxF		
	2500_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
	2500_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
	Has_Split			
	Plumbing Scenario			

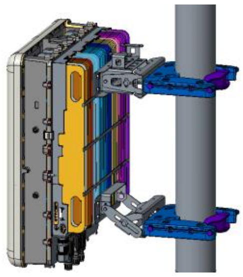
Comments				
	Date Updated			
	Update Description			
	Site Type			
	Comments			
	This RFDS is Deployment View			

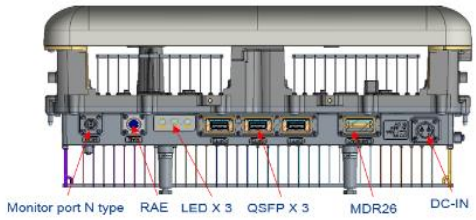
Nokia Networks
6000 Connection Drive, Irvine, TX 75039, (972) 374 3000

NOKIA

TD LTE 2.5G Massive MIMO Adaptive Antenna (MAA) – AAHC



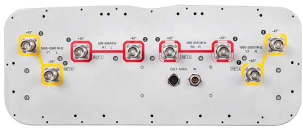




Category	Description	Unit	AAHC
Spectrum	3GPP Band		B41
	Operating frequency	MHz	2496-2690
RF characteristic	Number of TX/RX paths	#	64T64R
	Instantaneous Bandwidth IBW	MHz	194
	Occupied Bandwidth OBW	MHz	60
	Total Output power	W	120
	EIRP	dBm	74.8
	TX OBUE in B41 for sum of all 64 pipes at 1MHz offset	dBm/MHz	-13 sum of all ports
	Emission at IPWireless 2558-2568MHz	dBm/MHz	-57 sum of all ports
	Emission at NEXTRADAR at 2704-3000MHz	dBm/MHz	-27 sum of all ports
Power	Power inputs		2 pin, and with APPB/APPC
	Supply Voltage / Voltage Range	V	-48V DC voltage (-40.5V~-57V)
	Typical Power Consumption	W	75% duty cycle, 1400W for LTE
Interface	Optical Interface		3x QSFP (4 x 9.8G CPRI each)
	RAE Interface		Circle connector, AISG-ES-RAE v2.1.0
	LMI interface		MDR26
	Monitor interface		N_Female
Antenna Specifications	Antenna array		8x8x2
	Element Polarization	H/V or ± 45	± 45
	Gain [Broadcast 65 HBW]	dBi	15.2
	Horizontal BW [Broadcast] (@ -3dB)	Degrees	65
	Vertical BW [Broadcast] (@ -3dB)	Degrees	9
	Mechanical Downtilt Range	Degrees	± 5
	Electrical Downtilt Range	Degrees	± 10
	Cross Polar Isolation [Element]	dB	19
	Front-to-Back Ratio [Broadcast] (@ 180° ±15° cone)	dB	25
	Element Spacing	λ (mm)	horizontal 57.5, Vertical 80
	Upper Side Lobe Suppression (1st USLS) [Broadcast]	dB	16
	Cross Polar Discrimination [Broadcast] (@ -3dB)	dB	10
	Traffic (Service) Beam Azmithual Pan	Degrees	± 55
	Traffic (Service) Beam Elevational Tilt	Degrees	± 10
	Azimuth Beamwidth Squint (@ Boresight)	Degrees	configurable
	Broadcast Tracking @ ±60°	dBi	2
	Dimensions (LxWxD)	mm (in)	651x501x245 mm (25.6x19.7x9.6 in)
Mechanical Specifications	Weight	kg (lb)	47Kg (103.6lb)
	Max Wind Speed	kmh/mph	200kmh (125 mph)
	Wind Load Front/Side/Rear @ 150kmh	N(lbF)	349 /168/130 N (78.5 / 37.8 /29.2 lbF)
	Radom Material		PC
	Radom Color		Cold Gray
	Mounting Kit	mm (in)	FPKA/FPKB/FPKC
	Operational Temperature Range	C(F)	-40 ~ 55© -40 ~ 131(F)
	Ingress protection class		IP65
	Installation options		Pole, Wall
	Surge protection	kA	20

Product Specifications

NNVV-65B-R4



8-port sector antenna, 4x 698–896 and 4x 1695–2690 MHz, 65° HPBW, 4x RET

- Uses the 4.3-10 connector which is 40 percent smaller than the 7-16 DIN connector
- Supports re-configurable antenna sharing capability enabling control of the internal RET system using up to two separate RET compatible OEM radios
- All internal RET actuators are connected in "Cascaded MRET" configuration

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2500	2500–2690
Gain, dBi	14.5	14.9	16.8	17.2	17.5	18.1	17.8
Beamwidth, Horizontal, degrees	66	64	60	60	62	59	64
Beamwidth, Vertical, degrees	11.7	10.4	7.3	6.8	6.4	5.4	5.1
Beam Tilt, degrees	2–14	2–14	2–12	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	16	18	14	16	15	16	18
Front-to-Back Ratio at 180°, dB	31	34	38	38	37	33	30
Isolation, dB	25	25	25	25	25	25	25
Isolation, Intersystem, dB	25	25	25	25	25	25	25
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150	-150	-150
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2500	2500–2690
Gain by all Beam Tilts, average, dBi	14.1	14.6	16.5	16.9	17.0	17.6	17.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.5	±0.7	±0.4	±0.5	±0.6	±0.7
Gain by Beam Tilt, average, dBi	2 ° | 14.2 8 ° | 14.2 14 ° | 13.9	2 ° | 14.7 8 ° | 14.7 14 ° | 14.2	2 ° | 16.6 7 ° | 16.7 12 ° | 16.2	2 ° | 16.8 7 ° | 17.1 12 ° | 16.7	2 ° | 16.9 7 ° | 17.2 12 ° | 16.7	2 ° | 17.5 7 ° | 17.9 12 ° | 17.3	2 ° | 16.9 7 ° | 17.5 12 ° | 17.0
Beamwidth, Horizontal Tolerance, degrees	±3.9	±3.9	±5.7	±2.7	±3.1	±7.9	±8
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.8	±0.7	±0.5	±0.6	±0.4	±0.2
USLS, beampeak to 20° above beampeak, dB	16	18	14	15	14	14	14
Front-to-Back Total Power at 180° ± 30°, dB	20	20	31	31	28	28	26
CPR at Boresight, dB	21	20	18	18	19	19	20
CPR at Sector, dB	8	6	8	8	7	8	5

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	685.0 N @ 150 km/h 154.0 lbf @ 150 km/h
Wind Loading, lateral	232.0 N @ 150 km/h 52.2 lbf @ 150 km/h
Wind Loading, maximum	889.0 N @ 150 km/h 199.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	498.0 mm | 19.6 in
Depth	197.0 mm | 7.8 in
Net Weight, without mounting kit	35.1 kg | 77.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

Packed Dimensions

Length	2010.0 mm | 79.1 in
Width	608.0 mm | 23.9 in
Depth	352.0 mm | 13.9 in
Shipping Weight	49.0 kg | 108.0 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Self-Supporting Lattice Tower

Proposed Sprint Antenna Installation

Sprint Site Ref: CT03XC067

250 Olcott Street
Manchester, CT

CENTEK Project No. 18116.00

~~Date: August 13, 2018~~

Rev 2: October 11, 2019

Prepared for:
Transcend Wireless
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by Sprint on the self-supporting lattice tower located in Manchester, Connecticut.

The host tower is a 180-ft, nine-section, three legged, self-supporting tapered lattice tower originally designed and manufactured by Sabre Industries report no. 408277, dated May 9, 2018. The tower geometry, structure member sizes and the foundation system information were obtained from the aforementioned design documents.

Antenna and appurtenance information were obtained from the tower design documents and a Sprint RF sheet.

The existing tower consists of nine (9) tapered steel pipe leg sections conforming to ASTM A500-50. Diagonal lateral support bracing consists of steel angle sections conforming to ASTM A572-50. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted and welded gusset connections. The width of the tower face is 7-ft at the top and 23-ft at the base.

Antenna and Appurtenance Summary

- Eversource:
  Appurtenance: One (1) dBSpectra DS9A09F36D-N antenna, one (1) 24' x 6" Omni antenna, one (1) Kreco CO-41A antenna and one (1) TTA leg mounted to the top of the tower.
  Conduit: Four (4) 1-5/8"∅, one (1) 1/2" ∅ and one (1) 7/8" ∅ coax cable.
- Eversource :
  Appurtenance: Three (3) 8-ft ∅ microwave dishes pipe mounted with a RAD center elevation of 175-ft above existing grade.
  Conduit: Six (6) E65 cables.
- Eversource :
  Appurtenance: One (1) 8-ft ∅ microwave dish pipe mounted with a RAD center elevation of 164-ft above existing grade.
  Conduit: Two (2) E65 cables.
- Eversource:
  Appurtenance: One (1) Comprod 531-70HD antenna and one (1) Sinclair SD212 antenna mounted one a 6-ft sidearm with an elevation of 158-ft above existing grade.
  Conduit: Two (2) 7/8" ∅ coax cables.
- Eversource:
  Appurtenance: One (1) 24' x 6" Omni antenna mounted one a 6-ft sidearm with an elevation of 156-ft above existing grade.
  Conduit: Two (2) 7/8" ∅ coax cables

- FUTURE CARRIER (Reserved):
  Antennas: Twelve (12) 8' panel antennas, twelve (12) RRHs and three (3) distribution boxes mounted on three (3) 14-ft V-Frames with a RAD center elevation of 125-ft above existing grade.
  Coax Cables: Twenty-One (21) 1-5/8"∅ cables running on a face of the existing tower as specified in Section 3 of this report.
- FUTURE CARRIER (Reserved):
  Antennas: Twelve (12) 8' panel antennas, twelve (12) RRHs and three (3) distribution boxes mounted on three (3) 14-ft V-Frames with a RAD center elevation of 115-ft above existing grade.
  Coax Cables: Twenty-One (21) 1-5/8"∅ cables running on a face of the existing tower as specified in Section 3 of this report.
- FUTURE CARRIER (Reserved):
  Antennas: Twelve (12) 8' panel antennas, twelve (12) RRHs and three (3) distribution boxes mounted on three (3) 14-ft V-Frames with a RAD center elevation of 105-ft above existing grade.
  Coax Cables: Twenty-One (21) 1-5/8"∅ cables running on a face of the existing tower as specified in Section 3 of this report.
- **SPRINT (Proposed):**
  Antennas: Three (3) Commscope NNVV-65B-R4 panel antennas, three (3) Nokia AAHC panel antennas, three (3) 1900MHz 4X45W RRHs and six (6) 800MHz 2X50W RRHs mounted on three (3) 14-ft V-Frames with a RAD center elevation of 135-ft above existing grade.
  Coax Cables: Four (4) 1-1/4"∅ Hybriflex cable running on a face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

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-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", 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-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 1.00" radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford County; v = 90-105 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Manchester; v = 105 mph (Nominal – Structure Class III)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 105 mph 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-G-2005]*
	Load Case 3; 105 mph wind speed used in calculation of tower deflection.	

[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. This tower was found to be at **99.8%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	20'-0"-40'-0"	81.6%	**PASS**
Diagonal (9)	0'-0"-20'-0"	99.8%	**PASS**

- The tower combined deflection is **0.4408 degrees**.

Deflection Criteria	Proposed (degrees)
Sway (Tilt)	0.4303
Twist	0.0957
Combined	0.4408

Note 1: *Tower deflection calculated utilizing the service wind load combination and max wind speed.*

Foundation and Anchors

The existing foundation consists of three (3) 4'-0" diameter x 4'-9" long piers on one (1) 34'-0" square x 1'-9" thick concrete mat. The foundation properties and sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned original design documents. Tower legs are connected to the foundation by means of (6) 1-1/2"∅, ASTM F1554-105 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower base maximum corner reactions developed from the governing Load Case 2 were used in the verification of the foundation and its anchors:

Vector	Proposed Reactions
Compression	**491 kips**
Uplift	**443 kips**
Shear	**59 kips**
Total Shear	**99 kips**
Overturning Moment	**9429 kip-ft**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS[(1)]	Proposed Loading (FS)[(1)]	Result
Reinf. Conc. Pad and Piers	Uplift	1.0	1.44	**PASS**

Note 1: FS denotes Factor of Safety

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	57.6%	**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 Sprint. 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

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

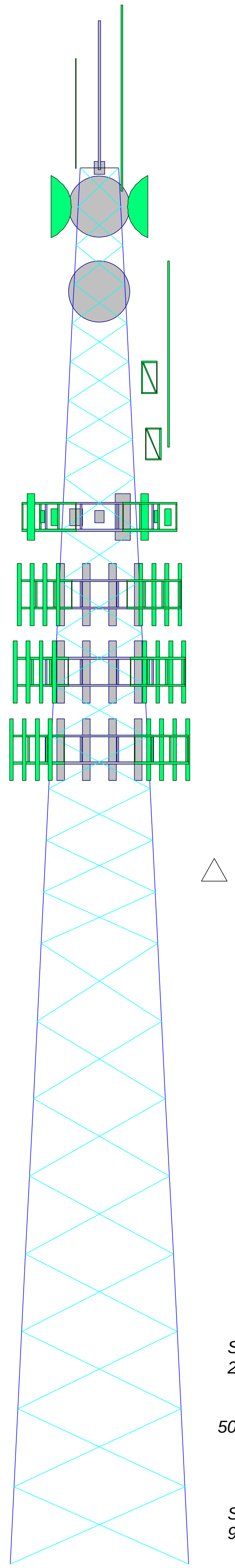
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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	T1	T2	T3	T4	T5	T6	T7	T8	T9	
Legs	P2.5x.276	P3x.3	P5x0.5			P8x.5			P10x.5	
Leg Grade	A500-50									
Diagonals	L2x2x1/8	L2x2x3/16	L2 1/2x2 1/2x1/4	L3 1/2x3x1/4		L4x3 1/2x5/16	L4x3 1/2x3/8	L4x4x3/8	L5x5x5/16	
Diagonal Grade	A572-50									
Top Girts	L2x2x1/8	N.A.								
Face Width (ft)	5	7	9	11	13	15	17	19	21	23
# Panels @ (ft)	8 @ 5		9 @ 6.66667			8 @ 10				
Weight (K)	0.8	1.2	2.5	2.9	3.1	4.3	4.9	5.2	6.3	31.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DS9A09F36D-N (Eversource)	189.4	AAHC (Sprint - Proposed)	135
24' x 6" Omni (Eversource)	189	(4) RRUS-11 (Future Carrier)	125
CO-41A (Eversource)	187	(4) RRUS-11 (Future Carrier)	125
Tower Top Amplifier (Eversource)	180	(3) RC2DC-3315-PF-48 (Future Carrier)	125
8' Dish (Eversource)	175	14' V-Boom (Future Carrier)	125
8' Dish (Eversource)	175	14' V-Boom (Future Carrier)	125
8' Dish (Eversource)	175	14' V-Boom (Future Carrier)	125
8' Dish (Eversource)	164	(4) 8' x1' Panel (Future Carrier)	125
531-70HD (Eversource)	158	(4) 8' x1' Panel (Future Carrier)	125
SD212 (Eversource)	158	(4) 8' x1' Panel (Future Carrier)	125
ROHN 6-ft Side Arm (Eversource)	158	(4) RRUS-11 (Future Carrier)	125
24' x 6" Omni (Eversource)	156	(4) RRUS-11 (Future Carrier)	115
ROHN 6-ft Side Arm (Eversource)	153	(4) RRUS-11 (Future Carrier)	115
ROHN 3-ft Side Arm (Eversource)	144.4	(3) RC2DC-3315-PF-48 (Future Carrier)	115
NNVV-65B-R4 (Sprint - Proposed)	135	14' V-Boom (Future Carrier)	115
AAHC (Sprint - Proposed)	135	14' V-Boom (Future Carrier)	115
FD-RRH 2x50 800 (Sprint - Proposed)	135	14' V-Boom (Future Carrier)	115
FD-RRH 2x50 800 (Sprint - Proposed)	135	(4) 8' x1' Panel (Future Carrier)	115
FD-RRH 2x50 800 (Sprint - Proposed)	135	(4) 8' x1' Panel (Future Carrier)	115
FD-RRH 4x45 1900 (Sprint - Proposed)	135	(4) 8' x1' Panel (Future Carrier)	115
FD-RRH 4x45 1900 (Sprint - Proposed)	135	(4) RRUS-11 (Future Carrier)	115
FD-RRH 4x45 1900 (Sprint - Proposed)	135	(4) RRUS-11 (Future Carrier)	105
FD-RRH 2x50 800 (Sprint - Proposed)	135	(4) RRUS-11 (Future Carrier)	105
FD-RRH 2x50 800 (Sprint - Proposed)	135	(3) RC2DC-3315-PF-48 (Future Carrier)	105
FD-RRH 2x50 800 (Sprint - Proposed)	135	14' V-Boom (Future Carrier)	105
14' V-Boom (Sprint - Proposed)	135	14' V-Boom (Future Carrier)	105
14' V-Boom (Sprint - Proposed)	135	14' V-Boom (Future Carrier)	105
14' V-Boom (Sprint - Proposed)	135	(4) 8' x1' Panel (Future Carrier)	105
NNVV-65B-R4 (Sprint - Proposed)	135	(4) 8' x1' Panel (Future Carrier)	105
AAHC (Sprint - Proposed)	135	(4) 8' x1' Panel (Future Carrier)	105
NNVV-65B-R4 (Sprint - Proposed)	135	(4) RRUS-11 (Future Carrier)	105

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A572-50	50 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G 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 97 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 99.8%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 491 K
SHEAR: 59 K

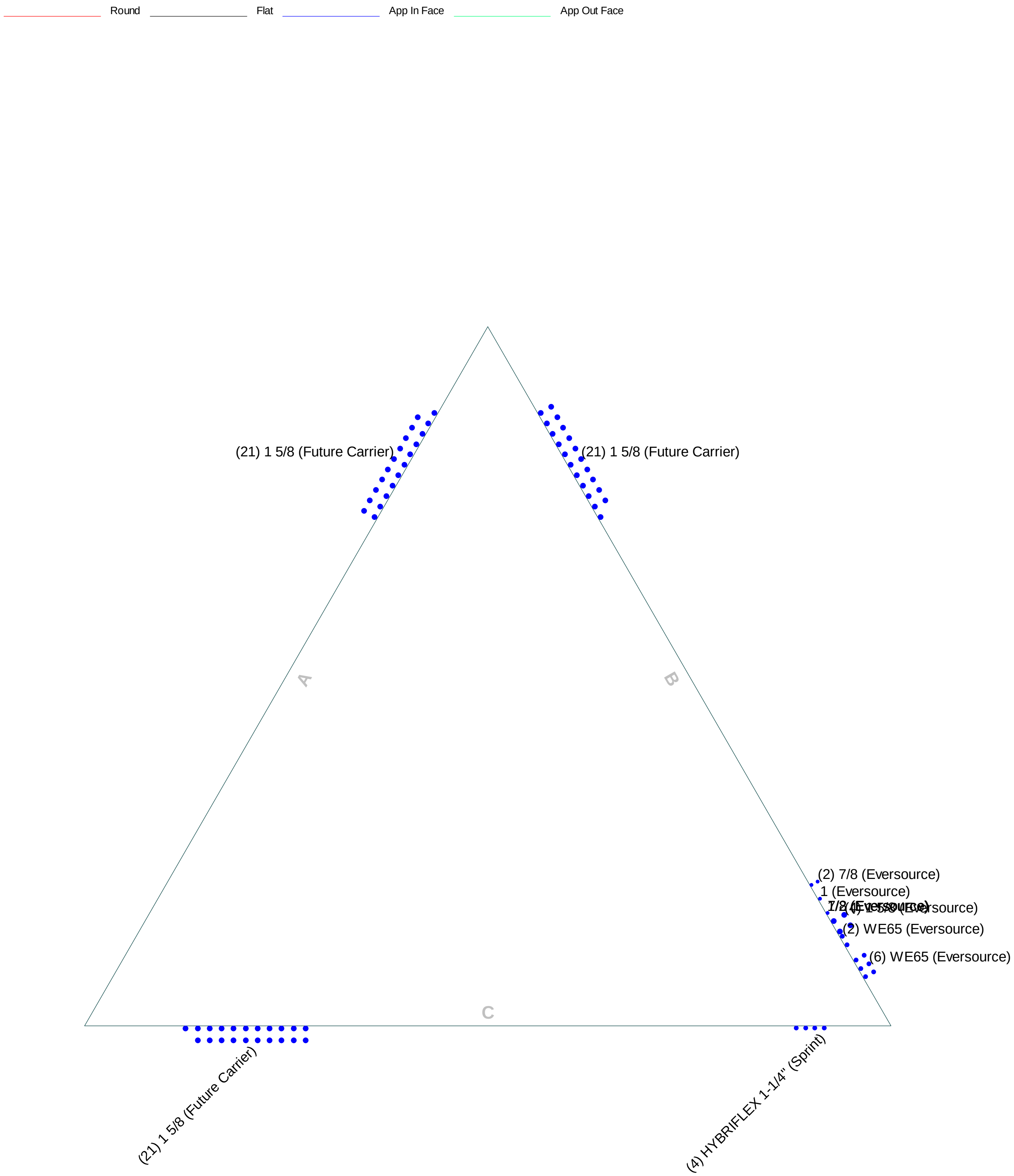
UPLIFT: -443 K
SHEAR: 55 K

AXIAL 245 K
SHEAR 26 K
MOMENT 2673 kip-ft
TORQUE 10 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 55 K
SHEAR 99 K
MOMENT 9429 kip-ft
TORQUE 38 kip-ft
REACTIONS - 97 mph WIND

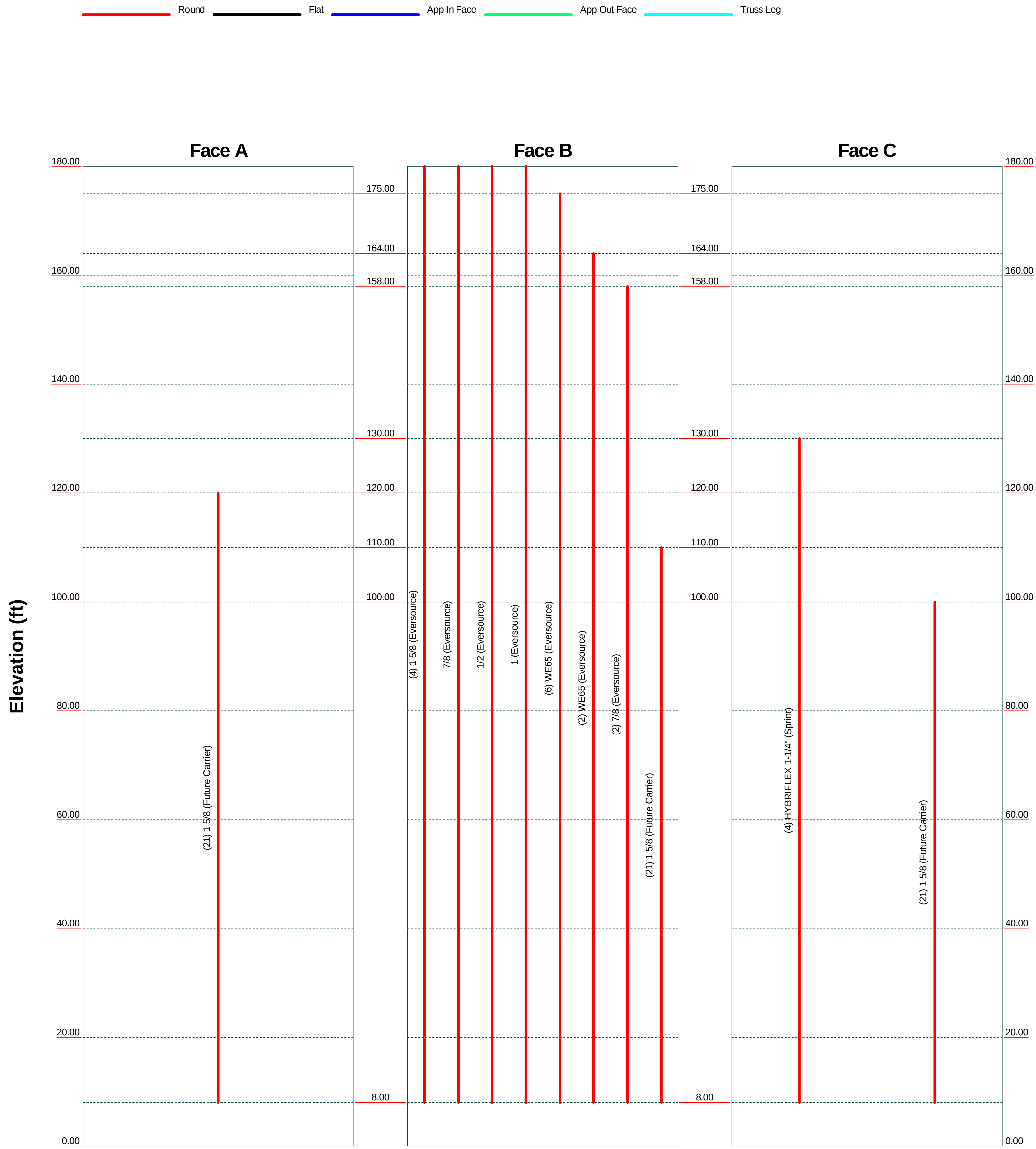
Centek Engineering Inc.	Job: 18116.00 - CT03XC067		
63-2 North Branford Rd.	Project: 180-ft Sabre Lattice Tower - 250 Olcott St., Manchester, CT		
Branford, CT 06405	Client: Sprint	Drawn by: TJL	App'd:
Phone: (203) 488-0580	Code: TIA-222-G	Date: 01/03/19	Scale: NTS
FAX: (203) 488-8587	Path: J:\Jobs\1811600.WI\04_Structural\Backup Documentation\Rev (1)\ERI Files\180' Self-supporting Lattice.eri		Dwg No. E-1

Feed Line Plan



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***18116.00 - CT03XC067***		
	Project: ***180-ft Sabre Lattice Tower - 250 Olcott St., Manchester, CT***		
	Client: Sprint	Drawn by: TJL	App'd:
	Code: TIA-222-G	Date: 01/03/19	Scale: NTS
	Path: J:\Jobs\1811600.WI\04_Structural\Backup Documentation\Rev (1)\ERI Files\180' Self-supporting Lattice.eri		Dwg No. E-7

Feed Line Distribution Chart
0' - 180'



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***18116.00 - CT03XC067***		
	Project: ***180-ft Sabre Lattice Tower - 250 Olcott St., Manchester, CT***		
	Client: Sprint	Drawn by: TJL	App'd:
	Code: TIA-222-G	Date: 01/03/19	Scale: NTS
	Path: J:\Jobs\1811600.WI\04_Structural\Backup Documentation\Rev (1)\ERI Files\180' Self-supporting Lattice.eri		Dwg No. E-7

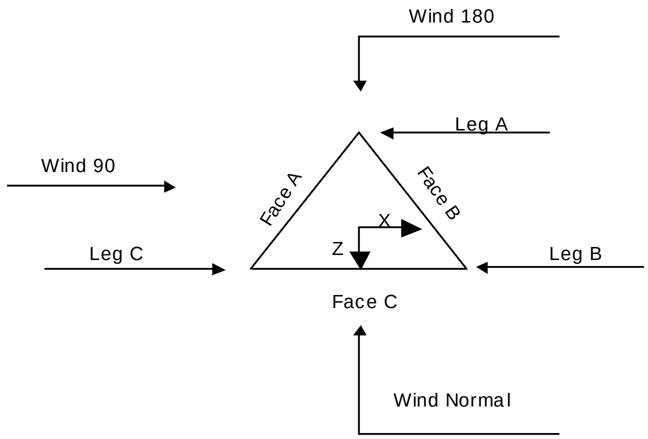
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 23.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Basic wind speed of 97 mph.
- Structure Class III.
- Exposure Category C.
- 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 97 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice		Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G 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				



Triangular Tower

Tower Section Geometry

Tower Section	*Tower Elevation* *ft*	*Assembly Database*	*Description*	*Section Width* *ft*	*Number of Sections*	*Section Length* *ft*
T1	180.00-160.00			5.00	1	20.00
T2	160.00-140.00			7.00	1	20.00
T3	140.00-120.00			9.00	1	20.00
T4	120.00-100.00			11.00	1	20.00
T5	100.00-80.00			13.00	1	20.00
T6	80.00-60.00			15.00	1	20.00
T7	60.00-40.00			17.00	1	20.00
T8	40.00-20.00			19.00	1	20.00
T9	20.00-0.00			21.00	1	20.00

Tower Section Geometry *(cont'd)*

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

Tower Section	*Tower Elevation* *ft*	*Diagonal Spacing* *ft*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* *in*	*Bottom Girt Offset* *in*
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 180.00-160.00	Pipe	P2.5x.276	A500-50 (50 ksi)	Single Angle	L2x2x1/8	A572-50 (50 ksi)
T2 160.00-140.00	Pipe	P3x.3	A500-50 (50 ksi)	Single Angle	L2x2x3/16	A572-50 (50 ksi)
T3 140.00-120.00	Pipe	P5x0.5	A500-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A572-50 (50 ksi)
T4 120.00-100.00	Pipe	P5x0.5	A500-50 (50 ksi)	Single Angle	L3 1/2x3x1/4	A572-50 (50 ksi)
T5 100.00-80.00	Pipe	P5x0.5	A500-50 (50 ksi)	Single Angle	L3 1/2x3x1/4	A572-50 (50 ksi)
T6 80.00-60.00	Pipe	P8x.5	A500-50 (50 ksi)	Single Angle	L4x3 1/2x5/16	A572-50 (50 ksi)
T7 60.00-40.00	Pipe	P8x.5	A500-50 (50 ksi)	Single Angle	L4x3 1/2x3/8	A572-50 (50 ksi)
T8 40.00-20.00	Pipe	P8x.5	A500-50 (50 ksi)	Single Angle	L4x4x3/8	A572-50 (50 ksi)
T9 20.00-0.00	Pipe	P10x.5	A500-50 (50 ksi)	Single Angle	L5x5x5/16	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Top Girt Type*	*Top Girt Size*	*Top Girt Grade*	*Bottom Girt Type*	*Bottom Girt Size*	*Bottom Girt Grade*
T1 180.00-160.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Gusset Area (per face)* ft^2	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*	*Double Angle Stitch Bolt Spacing Redundants* *in*
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

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

Tower Section Geometry *(cont'd)*

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

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

Tower Section Geometry *(cont'd)*

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Connection Type*	*Leg*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
		Bolt Size in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*
T1 180.00-160.00	Flange	0.7500 A325N	0	0.6250 A325X	1	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	0.7500 A325N	0	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	0.7500 A325N	0	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-80.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-60.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 60.00-40.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 40.00-20.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 20.00-0.00	Flange	1.5000 F1554-105	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement* ft	*Face Offset* in	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing* in	*Width or Diameter* in	*Perimeter* in	*Weight* plf
1 5/8 (Eversource)	B	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.36	4	2	1.9800	1.9800		1.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8 (Eversource)	B	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.34	1	1	1.1100	1.1100		0.54
1/2 (Eversource)	B	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.34	1	1	0.5800	0.5800		0.25
1 (Eversource)	B	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.32	1	1	1.2500	1.2500		0.58
WE65 (Eversource)	B	No	Ar (CaAa)	175.00 - 8.00	0.0000	0.42	6	3	1.5836	1.5836		0.53
WE65 (Eversource)	B	No	Ar (CaAa)	164.00 - 8.00	0.0000	0.38	2	2	1.5836	1.5836		0.53
7/8 (Eversource)	B	No	Ar (CaAa)	158.00 - 8.00	0.0000	0.3	2	1	1.1100	1.1100		0.54
HYBRIFLEX 1-1/4" (Sprint)	C	No	Ar (CaAa)	130.00 - 8.00	0.0000	-0.4	4	4	1.5400	1.5400		1.30
1 5/8 (Future Carrier)	A	No	Ar (CaAa)	120.00 - 8.00	0.0000	0.3	21	11	1.9800	1.9800		1.04
1 5/8 (Future Carrier)	B	No	Ar (CaAa)	110.00 - 8.00	0.0000	-0.3	21	11	1.9800	1.9800		1.04
1 5/8 (Future Carrier)	C	No	Ar (CaAa)	100.00 - 8.00	0.0000	0.3	21	11	1.9800	1.9800		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	37.239	0.000	0.16
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	51.053	0.000	0.21
		C	0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	51.497	0.000	0.22
		C	0.000	0.000	6.160	0.000	0.05
T4	120.00-100.00	A	0.000	0.000	83.160	0.000	0.44
		B	0.000	0.000	93.077	0.000	0.44
		C	0.000	0.000	12.320	0.000	0.10
T5	100.00-80.00	A	0.000	0.000	83.160	0.000	0.44
		B	0.000	0.000	134.657	0.000	0.65
		C	0.000	0.000	95.480	0.000	0.54
T6	80.00-60.00	A	0.000	0.000	83.160	0.000	0.44
		B	0.000	0.000	134.657	0.000	0.65
		C	0.000	0.000	95.480	0.000	0.54
T7	60.00-40.00	A	0.000	0.000	83.160	0.000	0.44
		B	0.000	0.000	134.657	0.000	0.65
		C	0.000	0.000	95.480	0.000	0.54
T8	40.00-20.00	A	0.000	0.000	83.160	0.000	0.44
		B	0.000	0.000	134.657	0.000	0.65
		C	0.000	0.000	95.480	0.000	0.54
T9	20.00-0.00	A	0.000	0.000	49.896	0.000	0.26
		B	0.000	0.000	80.794	0.000	0.39

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C	0.000	0.000	57.288	0.000	0.32

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	180.00-160.00	A	2.945	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	122.241	0.000	2.72
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	2.909	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	183.751	0.000	3.87
		C		0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	2.867	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	184.965	0.000	3.86
		C		0.000	0.000	22.557	0.000	0.45
T4	120.00-100.00	A	2.820	0.000	0.000	121.547	0.000	3.94
		B		0.000	0.000	243.836	0.000	5.75
		C		0.000	0.000	44.802	0.000	0.88
T5	100.00-80.00	A	2.764	0.000	0.000	121.209	0.000	3.90
		B		0.000	0.000	302.028	0.000	7.58
		C		0.000	0.000	165.642	0.000	4.76
T6	80.00-60.00	A	2.695	0.000	0.000	120.794	0.000	3.84
		B		0.000	0.000	298.868	0.000	7.41
		C		0.000	0.000	164.777	0.000	4.68
T7	60.00-40.00	A	2.606	0.000	0.000	120.257	0.000	3.76
		B		0.000	0.000	294.761	0.000	7.19
		C		0.000	0.000	163.655	0.000	4.57
T8	40.00-20.00	A	2.476	0.000	0.000	119.476	0.000	3.65
		B		0.000	0.000	288.788	0.000	6.88
		C		0.000	0.000	162.025	0.000	4.42
T9	20.00-0.00	A	2.219	0.000	0.000	70.759	0.000	2.06
		B		0.000	0.000	166.165	0.000	3.77
		C		0.000	0.000	95.283	0.000	2.48

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	5.0894	1.8428	2.5391	0.8865
T2	160.00-140.00	6.9381	2.5952	4.0233	1.3833
T3	140.00-120.00	7.8683	3.2783	5.1931	2.0047
T4	120.00-100.00	3.5018	-5.9550	3.4434	-2.9211
T5	100.00-80.00	0.3520	-3.4771	1.4120	-1.8168
T6	80.00-60.00	0.3828	-3.8635	1.5850	-2.1003
T7	60.00-40.00	0.4199	-4.3111	1.7278	-2.3776
T8	40.00-20.00	0.4562	-4.7498	1.8425	-2.6789
T9	20.00-0.00	0.4009	-4.2139	1.5620	-2.5424

Shielding Factor Ka

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
T1	1	1 5/8	160.00 - 180.00	0.6000	0.4660
T1	2	7/8	160.00 - 180.00	0.6000	0.4660
T1	3	1/2	160.00 - 180.00	0.6000	0.4660
T1	4	1	160.00 - 180.00	0.6000	0.4660
T1	5	WE65	160.00 - 175.00	0.6000	0.4660
T1	6	WE65	160.00 - 164.00	0.6000	0.4660
T2	1	1 5/8	140.00 - 160.00	0.6000	0.5525
T2	2	7/8	140.00 - 160.00	0.6000	0.5525
T2	3	1/2	140.00 - 160.00	0.6000	0.5525
T2	4	1	140.00 - 160.00	0.6000	0.5525
T2	5	WE65	140.00 - 160.00	0.6000	0.5525
T2	6	WE65	140.00 - 160.00	0.6000	0.5525
T2	7	7/8	140.00 - 158.00	0.6000	0.5525
T3	1	1 5/8	120.00 - 140.00	0.6000	0.6000
T3	2	7/8	120.00 - 140.00	0.6000	0.6000
T3	3	1/2	120.00 - 140.00	0.6000	0.6000
T3	4	1	120.00 - 140.00	0.6000	0.6000
T3	5	WE65	120.00 - 140.00	0.6000	0.6000
T3	6	WE65	120.00 - 140.00	0.6000	0.6000
T3	7	7/8	120.00 - 140.00	0.6000	0.6000
T3	9	HYBRIFLEX 1-1/4"	120.00 - 130.00	0.6000	0.6000
T4	1	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	2	7/8	100.00 - 120.00	0.6000	0.6000
T4	3	1/2	100.00 - 120.00	0.6000	0.6000
T4	4	1	100.00 - 120.00	0.6000	0.6000
T4	5	WE65	100.00 - 120.00	0.6000	0.6000
T4	6	WE65	100.00 - 120.00	0.6000	0.6000
T4	7	7/8	100.00 - 120.00	0.6000	0.6000
T4	9	HYBRIFLEX 1-1/4"	100.00 -	0.6000	0.6000

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	K_a *No Ice*	K_a *Ice*
			120.00		
T4	10	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	11	1 5/8	100.00 - 110.00	0.6000	0.6000
T5	1	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	2	7/8	80.00 - 100.00	0.6000	0.6000
T5	3	1/2	80.00 - 100.00	0.6000	0.6000
T5	4	1	80.00 - 100.00	0.6000	0.6000
T5	5	WE65	80.00 - 100.00	0.6000	0.6000
T5	6	WE65	80.00 - 100.00	0.6000	0.6000
T5	7	7/8	80.00 - 100.00	0.6000	0.6000
T5	9	HYBRIFLEX 1-1/4"	80.00 - 100.00	0.6000	0.6000
T5	10	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	11	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	12	1 5/8	80.00 - 100.00	0.6000	0.6000
T6	1	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	2	7/8	60.00 - 80.00	0.6000	0.6000
T6	3	1/2	60.00 - 80.00	0.6000	0.6000
T6	4	1	60.00 - 80.00	0.6000	0.6000
T6	5	WE65	60.00 - 80.00	0.6000	0.6000
T6	6	WE65	60.00 - 80.00	0.6000	0.6000
T6	7	7/8	60.00 - 80.00	0.6000	0.6000
T6	9	HYBRIFLEX 1-1/4"	60.00 - 80.00	0.6000	0.6000
T6	10	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	11	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	12	1 5/8	60.00 - 80.00	0.6000	0.6000
T7	1	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	2	7/8	40.00 - 60.00	0.6000	0.6000
T7	3	1/2	40.00 - 60.00	0.6000	0.6000
T7	4	1	40.00 - 60.00	0.6000	0.6000
T7	5	WE65	40.00 - 60.00	0.6000	0.6000
T7	6	WE65	40.00 - 60.00	0.6000	0.6000
T7	7	7/8	40.00 - 60.00	0.6000	0.6000
T7	9	HYBRIFLEX 1-1/4"	40.00 - 60.00	0.6000	0.6000
T7	10	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	11	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	12	1 5/8	40.00 - 60.00	0.6000	0.6000
T8	1	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	2	7/8	20.00 - 40.00	0.6000	0.6000
T8	3	1/2	20.00 - 40.00	0.6000	0.6000
T8	4	1	20.00 - 40.00	0.6000	0.6000
T8	5	WE65	20.00 - 40.00	0.6000	0.6000
T8	6	WE65	20.00 - 40.00	0.6000	0.6000
T8	7	7/8	20.00 - 40.00	0.6000	0.6000
T8	9	HYBRIFLEX 1-1/4"	20.00 - 40.00	0.6000	0.6000
T8	10	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	11	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	12	1 5/8	20.00 - 40.00	0.6000	0.6000
T9	1	1 5/8	8.00 - 20.00	0.6000	0.6000
T9	2	7/8	8.00 - 20.00	0.6000	0.6000
T9	3	1/2	8.00 - 20.00	0.6000	0.6000
T9	4	1	8.00 - 20.00	0.6000	0.6000
T9	5	WE65	8.00 - 20.00	0.6000	0.6000
T9	6	WE65	8.00 - 20.00	0.6000	0.6000
T9	7	7/8	8.00 - 20.00	0.6000	0.6000
T9	9	HYBRIFLEX 1-1/4"	8.00 - 20.00	0.6000	0.6000
T9	10	1 5/8	8.00 - 20.00	0.6000	0.6000
T9	11	1 5/8	8.00 - 20.00	0.6000	0.6000
T9	12	1 5/8	8.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert ft ft ft*	*Azimuth Adjustment °*	*Placement ft*		*C_AA_A Front ft^2*	*C_AA_A Side ft^2*	*Weight K*
DS9A09F36D-N	A	From Leg	1.00	0.0000	189.40	No Ice	5.78	5.78	0.05
(Eversource)			0.00			1/2" Ice	7.73	7.73	0.09
			0.00			1" Ice	9.71	9.71	0.15
24' x 6" Omni	B	From Leg	1.00	0.0000	189.00	No Ice	7.36	7.36	0.10
(Eversource)			0.00			1/2" Ice	16.86	16.86	0.20
			0.00			1" Ice	19.33	19.33	0.31
CO-41A	C	From Leg	1.00	0.0000	187.00	No Ice	2.27	2.27	0.01
(Eversource)			0.00			1/2" Ice	3.71	3.71	0.03
			0.00			1" Ice	5.16	5.16	0.06
Tower Top Amplifier	A	From Leg	1.00	0.0000	180.00	No Ice	2.67	1.03	0.04
(Eversource)			0.00			1/2" Ice	2.87	1.17	0.06
			0.00			1" Ice	3.08	1.32	0.08
531-70HD	A	From Leg	6.00	0.0000	158.00	No Ice	6.00	6.00	0.04
(Eversource)			0.00			1/2" Ice	6.90	6.90	0.05
			0.00			1" Ice	7.80	7.80	0.06
SD212	A	From Leg	6.00	0.0000	158.00	No Ice	2.14	2.14	0.03
(Eversource)			0.00			1/2" Ice	3.71	3.71	0.06
			0.00			1" Ice	5.28	5.28	0.08
ROHN 6-ft Side Arm	A	From Leg	3.00	0.0000	158.00	No Ice	6.68	6.68	0.08
(Eversource)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
24' x 6" Omni	B	From Leg	6.00	0.0000	156.00	No Ice	7.52	7.52	0.10
(Eversource)			0.00			1/2" Ice	16.86	16.86	0.20
			0.00			1" Ice	19.33	19.33	0.31
ROHN 6-ft Side Arm	B	From Leg	3.00	0.0000	153.00	No Ice	6.68	6.68	0.08
(Eversource)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
ROHN 3-ft Side Arm	B	From Leg	3.00	0.0000	144.40	No Ice	3.10	3.10	0.07
(Eversource)			0.00			1/2" Ice	5.00	5.00	0.10
			0.00			1" Ice	6.90	6.90	0.13
NNVV-65B-R4	A	From Leg	3.00	0.0000	135.00	No Ice	14.61	9.17	0.11
(Sprint - Proposed)			3.00			1/2" Ice	15.13	9.63	0.21
			0.00			1" Ice	15.65	10.11	0.32
AAHC	A	From Leg	3.00	0.0000	135.00	No Ice	4.20	2.06	0.10
(Sprint - Proposed)			-3.00			1/2" Ice	4.46	2.25	0.14
			0.00			1" Ice	4.72	2.45	0.17
NNVV-65B-R4	B	From Leg	3.00	0.0000	135.00	No Ice	14.61	9.17	0.11
(Sprint - Proposed)			3.00			1/2" Ice	15.13	9.63	0.21
			0.00			1" Ice	15.65	10.11	0.32
AAHC	B	From Leg	3.00	0.0000	135.00	No Ice	4.20	2.06	0.10
(Sprint - Proposed)			-3.00			1/2" Ice	4.46	2.25	0.14
			0.00			1" Ice	4.72	2.45	0.17
NNVV-65B-R4	C	From Leg	3.00	0.0000	135.00	No Ice	14.61	9.17	0.11
(Sprint - Proposed)			3.00			1/2" Ice	15.13	9.63	0.21
			0.00			1" Ice	15.65	10.11	0.32
AAHC	C	From Leg	3.00	0.0000	135.00	No Ice	4.20	2.06	0.10
(Sprint - Proposed)			-3.00			1/2" Ice	4.46	2.25	0.14
			0.00			1" Ice	4.72	2.45	0.17
FD-RRH 2x50 800	A	From Leg	3.00	0.0000	135.00	No Ice	0.00	1.93	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
(Sprint - Proposed)			0.00			1/2" Ice	0.00	2.11	0.09
			0.00			1" Ice	0.00	2.29	0.11
FD-RRH 2x50 800	B	From Leg	3.00	0.0000	135.00	No Ice	0.00	1.93	0.06
(Sprint - Proposed)			0.00			1/2" Ice	0.00	2.11	0.09
			0.00			1" Ice	0.00	2.29	0.11
FD-RRH 2x50 800	C	From Leg	3.00	0.0000	135.00	No Ice	0.00	1.93	0.06
(Sprint - Proposed)			0.00			1/2" Ice	0.00	2.11	0.09
			0.00			1" Ice	0.00	2.29	0.11
FD-RRH 4x45 1900	A	From Leg	3.00	0.0000	135.00	No Ice	0.00	2.38	0.06
(Sprint - Proposed)			0.00			1/2" Ice	0.00	2.59	0.08
			0.00			1" Ice	0.00	2.80	0.11
FD-RRH 4x45 1900	B	From Leg	3.00	0.0000	135.00	No Ice	0.00	2.38	0.06
(Sprint - Proposed)			0.00			1/2" Ice	0.00	2.59	0.08
			0.00			1" Ice	0.00	2.80	0.11
FD-RRH 4x45 1900	C	From Leg	3.00	0.0000	135.00	No Ice	0.00	2.38	0.06
(Sprint - Proposed)			0.00			1/2" Ice	0.00	2.59	0.08
			0.00			1" Ice	0.00	2.80	0.11
FD-RRH 2x50 800	A	From Leg	3.00	0.0000	135.00	No Ice	2.06	1.93	0.06
(Sprint - Proposed)			0.00			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 Leg	3.00	0.0000	135.00	No Ice	2.06	1.93	0.06
(Sprint - Proposed)			0.00			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 Leg	3.00	0.0000	135.00	No Ice	2.06	1.93	0.06
(Sprint - Proposed)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
14' V-Boom	A	From Leg	2.00	0.0000	135.00	No Ice	13.00	13.00	0.04
(Sprint - Proposed)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	B	From Leg	2.00	0.0000	135.00	No Ice	13.00	13.00	0.04
(Sprint - Proposed)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	C	From Leg	2.00	0.0000	135.00	No Ice	13.00	13.00	0.04
(Sprint - Proposed)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
(4) 8' x1' Panel	A	From Leg	3.00	0.0000	125.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) 8' x1' Panel	B	From Leg	3.00	0.0000	125.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) 8' x1' Panel	C	From Leg	3.00	0.0000	125.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) RRUS-11	A	From Leg	3.00	0.0000	125.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(4) RRUS-11	B	From Leg	3.00	0.0000	125.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(4) RRUS-11	C	From Leg	3.00	0.0000	125.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(3) RC2DC-3315-PF-48	A	From Leg	3.00	0.0000	125.00	No Ice	0.00	1.96	0.03
(Future Carrier)			0.00			1/2" Ice	0.00	2.15	0.05
			0.00			1" Ice	0.00	2.35	0.08
14' V-Boom	A	From Leg	2.00	0.0000	125.00	No Ice	13.00	13.00	0.04

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft²	C_AA_A *Side* ft²	*Weight* K
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	B	From Leg	2.00	0.0000	125.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	C	From Leg	2.00	0.0000	125.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
(4) 8' x1' Panel	A	From Leg	3.00	0.0000	115.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) 8' x1' Panel	B	From Leg	3.00	0.0000	115.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) 8' x1' Panel	C	From Leg	3.00	0.0000	115.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) RRUS-11	A	From Leg	3.00	0.0000	115.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(4) RRUS-11	B	From Leg	3.00	0.0000	115.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(4) RRUS-11	C	From Leg	3.00	0.0000	115.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(3) RC2DC-3315-PF-48	A	From Leg	3.00	0.0000	115.00	No Ice	0.00	1.96	0.03
(Future Carrier)			0.00			1/2" Ice	0.00	2.15	0.05
			0.00			1" Ice	0.00	2.35	0.08
14' V-Boom	A	From Leg	2.00	0.0000	115.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	B	From Leg	2.00	0.0000	115.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	C	From Leg	2.00	0.0000	115.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
(4) 8' x1' Panel	A	From Leg	3.00	0.0000	105.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) 8' x1' Panel	B	From Leg	3.00	0.0000	105.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) 8' x1' Panel	C	From Leg	3.00	0.0000	105.00	No Ice	11.47	6.80	0.03
(Future Carrier)			0.00			1/2" Ice	12.08	7.38	0.09
			0.00			1" Ice	12.71	7.98	0.16
(4) RRUS-11	A	From Leg	3.00	0.0000	105.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(4) RRUS-11	B	From Leg	3.00	0.0000	105.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(4) RRUS-11	C	From Leg	3.00	0.0000	105.00	No Ice	0.00	1.07	0.05
(Future Carrier)			0.00			1/2" Ice	0.00	1.21	0.07
			0.00			1" Ice	0.00	1.36	0.09
(3) RC2DC-3315-PF-48	A	From Leg	3.00	0.0000	105.00	No Ice	0.00	1.96	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
(Future Carrier)			0.00			1/2" Ice	0.00	2.15	0.05
			0.00			1" Ice	0.00	2.35	0.08
14' V-Boom	A	From Leg	2.00	0.0000	105.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	B	From Leg	2.00	0.0000	105.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07
14' V-Boom	C	From Leg	2.00	0.0000	105.00	No Ice	13.00	13.00	0.04
(Future Carrier)			0.00			1/2" Ice	15.00	15.00	0.06
			0.00			1" Ice	17.00	17.00	0.07

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
8' Dish	A	Paraboloid w/o	From	1.00	0.0000		175.00	8.00	No Ice	50.27	0.10
(Eversource)		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
8' Dish	B	Paraboloid w/o	From	1.00	0.0000		175.00	8.00	No Ice	50.27	0.10
(Eversource)		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
8' Dish	C	Paraboloid w/o	From	1.00	0.0000		175.00	8.00	No Ice	50.27	0.10
(Eversource)		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
8' Dish	A	Paraboloid w/o	From	1.00	0.0000		164.00	8.00	No Ice	50.27	0.10
(Eversource)		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.415	33	124.798	A	10.802	9.599	9.599	47.05	0.000	0.000
180.00-160.00					B	10.802	9.599		47.05	37.239	0.000
					C	10.802	9.599		47.05	0.000	0.000
T2	150.00	1.378	32	165.841	A	12.137	11.686	11.686	49.05	0.000	0.000
160.00-140.00					B	12.137	11.686		49.05	51.053	0.000
					C	12.137	11.686		49.05	0.000	0.000
T3	130.00	1.337	31	209.283	A	14.377	18.574	18.574	56.37	0.000	0.000

Section Elevation *ft*	*z* *ft*	K_Z	q_z *psf*	A_G ft^2	*Face*	A_F ft^2	A_R ft^2	A_{leg} ft^2	*Leg %*	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2
140.00-120.00					B	14.377	18.574		56.37	51.497	0.000
					C	14.377	18.574		56.37	6.160	0.000
T4 120.00-100.00	110.00	1.291	30	249.283	A	23.101	18.574	18.574	44.57	83.160	0.000
					B	23.101	18.574		44.57	93.077	0.000
					C	23.101	18.574		44.57	12.320	0.000
T5 100.00-80.00	90.00	1.238	29	289.283	A	26.242	18.574	18.574	41.45	83.160	0.000
					B	26.242	18.574		41.45	134.657	0.000
					C	26.242	18.574		41.45	95.480	0.000
T6 80.00-60.00	70.00	1.174	28	334.393	A	24.133	28.798	28.798	54.41	83.160	0.000
					B	24.133	28.798		54.41	134.657	0.000
					C	24.133	28.798		54.41	95.480	0.000
T7 60.00-40.00	50.00	1.094	26	374.393	A	26.363	28.798	28.798	52.21	83.160	0.000
					B	26.363	28.798		52.21	134.657	0.000
					C	26.363	28.798		52.21	95.480	0.000
T8 40.00-20.00	30.00	0.982	23	414.393	A	28.747	28.798	28.798	50.04	83.160	0.000
					B	28.747	28.798		50.04	134.657	0.000
					C	28.747	28.798		50.04	95.480	0.000
T9 20.00-0.00	10.00	0.85	20	457.939	A	38.722	35.893	35.893	48.10	49.896	0.000
					B	38.722	35.893		48.10	80.794	0.000
					C	38.722	35.893		48.10	57.288	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation *ft*	*z* *ft*	K_Z	q_z *psf*	t_Z *in*	A_G ft^2	*Face*	A_F ft^2	A_R ft^2	A_{leg} ft^2	*Leg %*	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2
T1 180.00-160.00	170.00	1.415	8	2.9453	134.628	A	10.802	61.083	29.268	40.71	0.000	0.000
						B	10.802	61.083		40.71	122.241	0.000
						C	10.802	61.083		40.71	0.000	0.000
T2 160.00-140.00	150.00	1.378	7	2.9087	175.548	A	12.137	66.414	31.110	39.60	0.000	0.000
						B	12.137	66.414		39.60	183.751	0.000
						C	12.137	66.414		39.60	0.000	0.000
T3 140.00-120.00	130.00	1.337	7	2.8674	218.853	A	14.377	70.700	37.722	44.34	0.000	0.000
						B	14.377	70.700		44.34	184.965	0.000
						C	14.377	70.700		44.34	22.557	0.000
T4 120.00-100.00	110.00	1.291	7	2.8199	258.695	A	23.101	74.629	37.405	38.27	121.547	0.000
						B	23.101	74.629		38.27	243.836	0.000
						C	23.101	74.629		38.27	44.802	0.000
T5 100.00-80.00	90.00	1.238	7	2.7638	298.508	A	26.242	78.476	37.030	35.36	121.209	0.000
						B	26.242	78.476		35.36	302.028	0.000
						C	26.242	78.476		35.36	165.642	0.000
T6 80.00-60.00	70.00	1.174	6	2.6952	343.388	A	24.133	79.319	46.796	45.23	120.794	0.000
						B	24.133	79.319		45.23	298.868	0.000
						C	24.133	79.319		45.23	164.777	0.000
T7 60.00-40.00	50.00	1.094	6	2.6061	383.091	A	26.363	80.553	46.201	43.21	120.257	0.000
						B	26.363	80.553		43.21	294.761	0.000
						C	26.363	80.553		43.21	163.655	0.000
T8 40.00-20.00	30.00	0.982	5	2.4763	422.658	A	28.747	80.926	45.334	41.34	119.476	0.000
						B	28.747	80.926		41.34	288.788	0.000
						C	28.747	80.926		41.34	162.025	0.000
T9 20.00-0.00	10.00	0.85	5	2.2186	465.344	A	38.722	85.073	50.709	40.96	70.759	0.000
						B	38.722	85.073		40.96	166.165	0.000
						C	38.722	85.073		40.96	95.283	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 180.00-160.00	170.00	1.415	29	124.798	A	10.802	9.599	9.599	47.05	0.000	0.000
					B	10.802	9.599		47.05	37.239	0.000
					C	10.802	9.599		47.05	0.000	0.000
T2 160.00-140.00	150.00	1.378	28	165.841	A	12.137	11.686	11.686	49.05	0.000	0.000
					B	12.137	11.686		49.05	51.053	0.000
					C	12.137	11.686		49.05	0.000	0.000
T3 140.00-120.00	130.00	1.337	27	209.283	A	14.377	18.574	18.574	56.37	0.000	0.000
					B	14.377	18.574		56.37	51.497	0.000
					C	14.377	18.574		56.37	6.160	0.000
T4 120.00-100.00	110.00	1.291	26	249.283	A	23.101	18.574	18.574	44.57	83.160	0.000
					B	23.101	18.574		44.57	93.077	0.000
					C	23.101	18.574		44.57	12.320	0.000
T5 100.00-80.00	90.00	1.238	25	289.283	A	26.242	18.574	18.574	41.45	83.160	0.000
					B	26.242	18.574		41.45	134.657	0.000
					C	26.242	18.574		41.45	95.480	0.000
T6 80.00-60.00	70.00	1.174	24	334.393	A	24.133	28.798	28.798	54.41	83.160	0.000
					B	24.133	28.798		54.41	134.657	0.000
					C	24.133	28.798		54.41	95.480	0.000
T7 60.00-40.00	50.00	1.094	22	374.393	A	26.363	28.798	28.798	52.21	83.160	0.000
					B	26.363	28.798		52.21	134.657	0.000
					C	26.363	28.798		52.21	95.480	0.000
T8 40.00-20.00	30.00	0.982	20	414.393	A	28.747	28.798	28.798	50.04	83.160	0.000
					B	28.747	28.798		50.04	134.657	0.000
					C	28.747	28.798		50.04	95.480	0.000
T9 20.00-0.00	10.00	0.85	17	457.939	A	38.722	35.893	35.893	48.10	49.896	0.000
					B	38.722	35.893		48.10	80.794	0.000
					C	38.722	35.893		48.10	57.288	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 ft^2	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.16	0.79	A	0.163	2.723	33	1	1	16.265	1.89	94.35	C
			B	0.163	2.723		1	1	16.265			
			C	0.163	2.723		1	1	16.265			
T2 160.00-140.00	0.21	1.17	A	0.144	2.795	32	1	1	18.562	2.28	113.81	C
			B	0.144	2.795		1	1	18.562			
			C	0.144	2.795		1	1	18.562			
T3 140.00-120.00	0.27	2.50	A	0.157	2.744	31	1	1	22.921	2.61	130.49	C
			B	0.157	2.744		1	1	22.921			
			C	0.157	2.744		1	1	22.921			
T4 120.00-100.00	0.98	2.94	A	0.167	2.709	30	1	1	31.802	5.15	257.52	C
			B	0.167	2.709		1	1	31.802			
			C	0.167	2.709		1	1	31.802			
T5 100.00-80.00	1.63	3.11	A	0.155	2.753	29	1	1	34.948	7.04	352.04	C
			B	0.155	2.753		1	1	34.948			

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	0.155	2.753		1	1	34.948			
T6 80.00-60.00	1.63	4.34	A	0.158	2.741	28	1	1	36.314	6.76	337.79	C
			B	0.158	2.741		1	1	36.314			
			C	0.158	2.741		1	1	36.314			
T7 60.00-40.00	1.63	4.86	A	0.147	2.781	26	1	1	38.382	6.45	322.58	C
			B	0.147	2.781		1	1	38.382			
			C	0.147	2.781		1	1	38.382			
T8 40.00-20.00	1.63	5.22	A	0.139	2.813	23	1	1	40.644	5.94	297.14	C
			B	0.139	2.813		1	1	40.644			
			C	0.139	2.813		1	1	40.644			
T9 20.00-0.00	0.98	6.28	A	0.163	2.724	20	1	1	53.991	4.42	221.05	C
			B	0.163	2.724		1	1	53.991			
			C	0.163	2.724		1	1	53.991			
Sum Weight:	9.13	31.22						OTM	3219.69 kip-ft	42.54		

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 ft^2	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.16	0.79	A	0.163	2.723	33	0.8	1	14.104	1.72	86.02	C
			B	0.163	2.723		0.8	1	14.104			
			C	0.163	2.723		0.8	1	14.104			
T2 160.00-140.00	0.21	1.17	A	0.144	2.795	32	0.8	1	16.135	2.09	104.45	C
			B	0.144	2.795		0.8	1	16.135			
			C	0.144	2.795		0.8	1	16.135			
T3 140.00-120.00	0.27	2.50	A	0.157	2.744	31	0.8	1	20.046	2.40	119.93	C
			B	0.157	2.744		0.8	1	20.046			
			C	0.157	2.744		0.8	1	20.046			
T4 120.00-100.00	0.98	2.94	A	0.167	2.709	30	0.8	1	27.182	4.83	241.34	C
			B	0.167	2.709		0.8	1	27.182			
			C	0.167	2.709		0.8	1	27.182			
T5 100.00-80.00	1.63	3.11	A	0.155	2.753	29	0.8	1	29.700	6.68	334.14	C
			B	0.155	2.753		0.8	1	29.700			
			C	0.155	2.753		0.8	1	29.700			
T6 80.00-60.00	1.63	4.34	A	0.158	2.741	28	0.8	1	31.487	6.45	322.25	C
			B	0.158	2.741		0.8	1	31.487			
			C	0.158	2.741		0.8	1	31.487			
T7 60.00-40.00	1.63	4.86	A	0.147	2.781	26	0.8	1	33.109	6.13	306.53	C
			B	0.147	2.781		0.8	1	33.109			
			C	0.147	2.781		0.8	1	33.109			
T8 40.00-20.00	1.63	5.22	A	0.139	2.813	23	0.8	1	34.894	5.62	281.24	C
			B	0.139	2.813		0.8	1	34.894			
			C	0.139	2.813		0.8	1	34.894			
T9 20.00-0.00	0.98	6.28	A	0.163	2.724	20	0.8	1	46.246	4.06	203.10	C
			B	0.163	2.724		0.8	1	46.246			
			C	0.163	2.724		0.8	1	46.246			
Sum Weight:	9.13	31.22						OTM	3017.09 kip-ft	39.98		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 180.00-160.00	0.16	0.79	A	0.163	2.723	33	0.85	1	14.644	1.76	88.10	C
			B	0.163	2.723		0.85	1	14.644			
			C	0.163	2.723		0.85	1	14.644			
T2 160.00-140.00	0.21	1.17	A	0.144	2.795	32	0.85	1	16.742	2.14	106.79	C
			B	0.144	2.795		0.85	1	16.742			
			C	0.144	2.795		0.85	1	16.742			
T3 140.00-120.00	0.27	2.50	A	0.157	2.744	31	0.85	1	20.765	2.45	122.57	C
			B	0.157	2.744		0.85	1	20.765			
			C	0.157	2.744		0.85	1	20.765			
T4 120.00-100.00	0.98	2.94	A	0.167	2.709	30	0.85	1	28.337	4.91	245.38	C
			B	0.167	2.709		0.85	1	28.337			
			C	0.167	2.709		0.85	1	28.337			
T5 100.00-80.00	1.63	3.11	A	0.155	2.753	29	0.85	1	31.012	6.77	338.62	C
			B	0.155	2.753		0.85	1	31.012			
			C	0.155	2.753		0.85	1	31.012			
T6 80.00-60.00	1.63	4.34	A	0.158	2.741	28	0.85	1	32.694	6.52	326.14	C
			B	0.158	2.741		0.85	1	32.694			
			C	0.158	2.741		0.85	1	32.694			
T7 60.00-40.00	1.63	4.86	A	0.147	2.781	26	0.85	1	34.427	6.21	310.55	C
			B	0.147	2.781		0.85	1	34.427			
			C	0.147	2.781		0.85	1	34.427			
T8 40.00-20.00	1.63	5.22	A	0.139	2.813	23	0.85	1	36.332	5.70	285.22	C
			B	0.139	2.813		0.85	1	36.332			
			C	0.139	2.813		0.85	1	36.332			
T9 20.00-0.00	0.98	6.28	A	0.163	2.724	20	0.85	1	48.183	4.15	207.59	C
			B	0.163	2.724		0.85	1	48.183			
			C	0.163	2.724		0.85	1	48.183			
Sum Weight:	9.13	31.22						OTM	3067.74 kip-ft	40.62		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 180.00-160.00	2.72	6.26	A	0.534	1.86	8	1	1	53.799	1.03	51.38	C
			B	0.534	1.86		1	1	53.799			
			C	0.534	1.86		1	1	53.799			
T2 160.00-140.00	3.87	7.16	A	0.447	1.978	7	1	1	55.841	1.35	67.55	C
			B	0.447	1.978		1	1	55.841			
			C	0.447	1.978		1	1	55.841			
T3 140.00-120.00	4.30	9.13	A	0.389	2.087	7	1	1	59.019	1.53	76.59	C
			B	0.389	2.087		1	1	59.019			
			C	0.389	2.087		1	1	59.019			
T4 120.00-100.00	10.57	11.00	A	0.378	2.11	7	1	1	69.887	2.35	117.49	C
			B	0.378	2.11		1	1	69.887			
			C	0.378	2.11		1	1	69.887			
T5	16.23	11.75	A	0.351	2.17	7	1	1	74.612	2.95	147.45	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
100.00-80.00			B	0.351	2.17		1	1	74.612			
			C	0.351	2.17		1	1	74.612			
T6	15.92	12.56	A	0.301	2.293	6	1	1	71.671	2.80	139.79	C
80.00-60.00			B	0.301	2.293		1	1	71.671			
			C	0.301	2.293		1	1	71.671			
T7	15.53	13.24	A	0.279	2.353	6	1	1	74.106	2.64	131.90	C
60.00-40.00			B	0.279	2.353		1	1	74.106			
			C	0.279	2.353		1	1	74.106			
T8	14.96	13.84	A	0.259	2.409	5	1	1	76.281	2.39	119.44	C
40.00-20.00			B	0.259	2.409		1	1	76.281			
			C	0.259	2.409		1	1	76.281			
T9 20.00-0.00	8.31	15.70	A	0.266	2.39	5	1	1	88.839	1.62	80.90	C
			B	0.266	2.39		1	1	88.839			
			C	0.266	2.39		1	1	88.839			
Sum Weight:	92.41	100.64						OTM	1515.79 kip-ft	18.65		

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
T1	2.72	6.26	A	0.534	1.86	8	0.8	1	51.638	1.00	50.06	C
180.00-160.00			B	0.534	1.86		0.8	1	51.638			
			C	0.534	1.86		0.8	1	51.638			
T2	3.87	7.16	A	0.447	1.978	7	0.8	1	53.413	1.32	66.02	C
160.00-140.00			B	0.447	1.978		0.8	1	53.413			
			C	0.447	1.978		0.8	1	53.413			
T3	4.30	9.13	A	0.389	2.087	7	0.8	1	56.144	1.49	74.73	C
140.00-120.00			B	0.389	2.087		0.8	1	56.144			
			C	0.389	2.087		0.8	1	56.144			
T4	10.57	11.00	A	0.378	2.11	7	0.8	1	65.267	2.29	114.58	C
120.00-100.00			B	0.378	2.11		0.8	1	65.267			
			C	0.378	2.11		0.8	1	65.267			
T5	16.23	11.75	A	0.351	2.17	7	0.8	1	69.363	2.88	144.19	C
100.00-80.00			B	0.351	2.17		0.8	1	69.363			
			C	0.351	2.17		0.8	1	69.363			
T6	15.92	12.56	A	0.301	2.293	6	0.8	1	66.844	2.74	136.78	C
80.00-60.00			B	0.301	2.293		0.8	1	66.844			
			C	0.301	2.293		0.8	1	66.844			
T7	15.53	13.24	A	0.279	2.353	6	0.8	1	68.834	2.58	128.76	C
60.00-40.00			B	0.279	2.353		0.8	1	68.834			
			C	0.279	2.353		0.8	1	68.834			
T8	14.96	13.84	A	0.259	2.409	5	0.8	1	70.532	2.33	116.30	C
40.00-20.00			B	0.259	2.409		0.8	1	70.532			
			C	0.259	2.409		0.8	1	70.532			
T9 20.00-0.00	8.31	15.70	A	0.266	2.39	5	0.8	1	81.095	1.55	77.26	C
			B	0.266	2.39		0.8	1	81.095			
			C	0.266	2.39		0.8	1	81.095			
Sum Weight:	92.41	100.64						OTM	1479.68 kip-ft	18.17		

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*
T1 180.00-160.00	2.72	6.26	A	0.534	1.86	8	0.85	1	52.179	1.01	50.39	C
			B	0.534	1.86		0.85	1	52.179			
			C	0.534	1.86		0.85	1	52.179			
T2 160.00-140.00	3.87	7.16	A	0.447	1.978	7	0.85	1	54.020	1.33	66.40	C
			B	0.447	1.978		0.85	1	54.020			
			C	0.447	1.978		0.85	1	54.020			
T3 140.00-120.00	4.30	9.13	A	0.389	2.087	7	0.85	1	56.863	1.50	75.20	C
			B	0.389	2.087		0.85	1	56.863			
			C	0.389	2.087		0.85	1	56.863			
T4 120.00-100.00	10.57	11.00	A	0.378	2.11	7	0.85	1	66.422	2.31	115.31	C
			B	0.378	2.11		0.85	1	66.422			
			C	0.378	2.11		0.85	1	66.422			
T5 100.00-80.00	16.23	11.75	A	0.351	2.17	7	0.85	1	70.675	2.90	145.00	C
			B	0.351	2.17		0.85	1	70.675			
			C	0.351	2.17		0.85	1	70.675			
T6 80.00-60.00	15.92	12.56	A	0.301	2.293	6	0.85	1	68.051	2.75	137.53	C
			B	0.301	2.293		0.85	1	68.051			
			C	0.301	2.293		0.85	1	68.051			
T7 60.00-40.00	15.53	13.24	A	0.279	2.353	6	0.85	1	70.152	2.59	129.55	C
			B	0.279	2.353		0.85	1	70.152			
			C	0.279	2.353		0.85	1	70.152			
T8 40.00-20.00	14.96	13.84	A	0.259	2.409	5	0.85	1	71.969	2.34	117.09	C
			B	0.259	2.409		0.85	1	71.969			
			C	0.259	2.409		0.85	1	71.969			
T9 20.00-0.00	8.31	15.70	A	0.266	2.39	5	0.85	1	83.031	1.56	78.17	C
			B	0.266	2.39		0.85	1	83.031			
			C	0.266	2.39		0.85	1	83.031			
Sum Weight:	92.41	100.64						OTM	1488.71 kip-ft	18.29		

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*
T1 180.00-160.00	0.16	0.79	A	0.163	2.723	29	1	1	16.265	1.64	82.04	C
			B	0.163	2.723		1	1	16.265			
			C	0.163	2.723		1	1	16.265			
T2 160.00-140.00	0.21	1.17	A	0.144	2.795	28	1	1	18.562	1.98	98.97	C
			B	0.144	2.795		1	1	18.562			
			C	0.144	2.795		1	1	18.562			
T3 140.00-120.00	0.27	2.50	A	0.157	2.744	27	1	1	22.921	2.27	113.47	C
			B	0.157	2.744		1	1	22.921			
			C	0.157	2.744		1	1	22.921			
T4 120.00-100.00	0.98	2.94	A	0.167	2.709	26	1	1	31.802	4.48	223.93	C
			B	0.167	2.709		1	1	31.802			
			C	0.167	2.709		1	1	31.802			
T5	1.63	3.11	A	0.155	2.753	25	1	1	34.948	6.12	306.12	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
100.00-80.00			B	0.155	2.753		1	1	34.948			
			C	0.155	2.753		1	1	34.948			
T6	1.63	4.34	A	0.158	2.741	24	1	1	36.314	5.87	293.73	C
80.00-60.00			B	0.158	2.741		1	1	36.314			
			C	0.158	2.741		1	1	36.314			
T7	1.63	4.86	A	0.147	2.781	22	1	1	38.382	5.61	280.51	C
60.00-40.00			B	0.147	2.781		1	1	38.382			
			C	0.147	2.781		1	1	38.382			
T8	1.63	5.22	A	0.139	2.813	20	1	1	40.644	5.17	258.38	C
40.00-20.00			B	0.139	2.813		1	1	40.644			
			C	0.139	2.813		1	1	40.644			
T9 20.00-0.00	0.98	6.28	A	0.163	2.724	17	1	1	53.991	3.84	192.22	C
			B	0.163	2.724		1	1	53.991			
			C	0.163	2.724		1	1	53.991			
Sum Weight:	9.13	31.22						OTM	2799.73 kip-ft	36.99		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.16	0.79	A	0.163	2.723	29	0.8	1	14.104	1.50	74.80	C
180.00-160.00			B	0.163	2.723		0.8	1	14.104			
			C	0.163	2.723		0.8	1	14.104			
T2	0.21	1.17	A	0.144	2.795	28	0.8	1	16.135	1.82	90.83	C
160.00-140.00			B	0.144	2.795		0.8	1	16.135			
			C	0.144	2.795		0.8	1	16.135			
T3	0.27	2.50	A	0.157	2.744	27	0.8	1	20.046	2.09	104.28	C
140.00-120.00			B	0.157	2.744		0.8	1	20.046			
			C	0.157	2.744		0.8	1	20.046			
T4	0.98	2.94	A	0.167	2.709	26	0.8	1	27.182	4.20	209.86	C
120.00-100.00			B	0.167	2.709		0.8	1	27.182			
			C	0.167	2.709		0.8	1	27.182			
T5	1.63	3.11	A	0.155	2.753	25	0.8	1	29.700	5.81	290.56	C
100.00-80.00			B	0.155	2.753		0.8	1	29.700			
			C	0.155	2.753		0.8	1	29.700			
T6	1.63	4.34	A	0.158	2.741	24	0.8	1	31.487	5.60	280.22	C
80.00-60.00			B	0.158	2.741		0.8	1	31.487			
			C	0.158	2.741		0.8	1	31.487			
T7	1.63	4.86	A	0.147	2.781	22	0.8	1	33.109	5.33	266.55	C
60.00-40.00			B	0.147	2.781		0.8	1	33.109			
			C	0.147	2.781		0.8	1	33.109			
T8	1.63	5.22	A	0.139	2.813	20	0.8	1	34.894	4.89	244.56	C
40.00-20.00			B	0.139	2.813		0.8	1	34.894			
			C	0.139	2.813		0.8	1	34.894			
T9 20.00-0.00	0.98	6.28	A	0.163	2.724	17	0.8	1	46.246	3.53	176.61	C
			B	0.163	2.724		0.8	1	46.246			
			C	0.163	2.724		0.8	1	46.246			
Sum Weight:	9.13	31.22						OTM	2623.56 kip-ft	34.77		

Tower Forces - Service - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 180.00-160.00	0.16	0.79	A	0.163	2.723	29	0.85	1	14.644	1.53	76.61	C
			B	0.163	2.723		0.85	1	14.644			
			C	0.163	2.723		0.85	1	14.644			
T2 160.00-140.00	0.21	1.17	A	0.144	2.795	28	0.85	1	16.742	1.86	92.86	C
			B	0.144	2.795		0.85	1	16.742			
			C	0.144	2.795		0.85	1	16.742			
T3 140.00-120.00	0.27	2.50	A	0.157	2.744	27	0.85	1	20.765	2.13	106.58	C
			B	0.157	2.744		0.85	1	20.765			
			C	0.157	2.744		0.85	1	20.765			
T4 120.00-100.00	0.98	2.94	A	0.167	2.709	26	0.85	1	28.337	4.27	213.38	C
			B	0.167	2.709		0.85	1	28.337			
			C	0.167	2.709		0.85	1	28.337			
T5 100.00-80.00	1.63	3.11	A	0.155	2.753	25	0.85	1	31.012	5.89	294.45	C
			B	0.155	2.753		0.85	1	31.012			
			C	0.155	2.753		0.85	1	31.012			
T6 80.00-60.00	1.63	4.34	A	0.158	2.741	24	0.85	1	32.694	5.67	283.60	C
			B	0.158	2.741		0.85	1	32.694			
			C	0.158	2.741		0.85	1	32.694			
T7 60.00-40.00	1.63	4.86	A	0.147	2.781	22	0.85	1	34.427	5.40	270.04	C
			B	0.147	2.781		0.85	1	34.427			
			C	0.147	2.781		0.85	1	34.427			
T8 40.00-20.00	1.63	5.22	A	0.139	2.813	20	0.85	1	36.332	4.96	248.01	C
			B	0.139	2.813		0.85	1	36.332			
			C	0.139	2.813		0.85	1	36.332			
T9 20.00-0.00	0.98	6.28	A	0.163	2.724	17	0.85	1	48.183	3.61	180.51	C
			B	0.163	2.724		0.85	1	48.183			
			C	0.163	2.724		0.85	1	48.183			
Sum Weight:	9.13	31.22						OTM	2667.60 kip-ft	35.32		

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	17.08					
Bracing Weight	14.14					
Total Member Self-Weight	31.22			-17.85	-6.55	
Total Weight	46.20			-17.85	-6.55	
Wind 0 deg - No Ice		0.00	-61.49	-5874.57	-6.55	10.49
Wind 30 deg - No Ice		30.29	-50.12	-4703.11	-2937.86	-2.64
Wind 60 deg - No Ice		50.27	-29.14	-2788.11	-4756.70	-13.75
Wind 90 deg - No Ice		58.06	-1.12	-213.02	-5434.45	-20.83
Wind 120 deg - No Ice		52.58	32.33	3170.31	-4952.53	-20.47
Wind 150 deg - No Ice		27.79	52.33	5040.91	-2506.76	-15.62
Wind 180 deg - No Ice		0.00	59.18	5670.21	-6.55	-10.02
Wind 210 deg - No Ice		-27.79	52.33	5040.91	2493.65	-1.94
Wind 240 deg - No Ice		-52.58	32.33	3170.31	4939.43	9.98

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		-58.06	-1.12	-213.02	5421.34	20.83
Wind 300 deg - No Ice		-50.27	-29.14	-2788.11	4743.60	23.77
Wind 330 deg - No Ice		-30.29	-50.12	-4703.11	2924.76	20.19
Member Ice	69.42					
Total Weight Ice	235.96			-119.87	-130.41	
Wind 0 deg - Ice		0.00	-25.96	-2638.15	-130.41	7.37
Wind 30 deg - Ice		12.86	-21.80	-2212.51	-1387.49	3.27
Wind 60 deg - Ice		21.75	-12.66	-1346.53	-2228.03	-1.42
Wind 90 deg - Ice		25.07	-0.28	-169.43	-2534.20	-5.60
Wind 120 deg - Ice		22.18	13.38	1205.19	-2264.48	-7.76
Wind 150 deg - Ice		12.22	22.36	2067.57	-1278.04	-8.21
Wind 180 deg - Ice		0.00	25.54	2370.90	-130.41	-7.27
Wind 210 deg - Ice		-12.22	22.36	2067.57	1017.23	-4.43
Wind 240 deg - Ice		-22.18	13.38	1205.19	2003.67	0.40
Wind 270 deg - Ice		-25.07	-0.28	-169.43	2273.39	5.60
Wind 300 deg - Ice		-21.75	-12.66	-1346.53	1967.21	8.69
Wind 330 deg - Ice		-12.86	-21.80	-2212.51	1126.68	9.37
Total Weight	46.20			-17.85	-6.55	
Wind 0 deg - Service		0.00	-53.47	-5096.21	-2.19	9.12
Wind 30 deg - Service		26.34	-43.59	-4077.55	-2551.16	-2.29
Wind 60 deg - Service		43.72	-25.34	-2412.33	-4132.76	-11.96
Wind 90 deg - Service		50.49	-0.97	-173.13	-4722.10	-18.11
Wind 120 deg - Service		45.73	28.11	2768.90	-4303.04	-17.80
Wind 150 deg - Service		24.16	45.50	4395.51	-2176.28	-13.58
Wind 180 deg - Service		0.00	51.46	4942.73	-2.19	-8.71
Wind 210 deg - Service		-24.16	45.50	4395.51	2171.90	-1.68
Wind 240 deg - Service		-45.73	28.11	2768.90	4298.66	8.68
Wind 270 deg - Service		-50.49	-0.97	-173.13	4717.72	18.11
Wind 300 deg - Service		-43.72	-25.34	-2412.33	4128.38	20.67
Wind 330 deg - Service		-26.34	-43.59	-4077.55	2546.78	17.56

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice

Comb. No.	*Description*
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
T1	180 - 160	Leg	Max Tension	15	21.00	-0.45	0.01
			Max. Compression	2	-23.72	0.31	-0.03
			Max. Mx	10	11.51	0.59	-0.02
			Max. My	16	-4.83	0.13	-0.65
			Max. Vy	3	2.44	0.06	-0.01
			Max. Vx	2	-2.05	-0.03	0.14
		Diagonal	Max Tension	10	4.37	0.00	0.00
			Max. Compression	10	-4.36	0.00	0.00
			Max. Mx	29	0.56	0.04	0.01
			Max. My	10	-3.79	-0.00	0.01
			Max. Vy	29	0.05	0.04	0.01
			Max. Vx	10	-0.00	0.00	0.00
		Top Girt	Max Tension	15	0.65	0.00	0.00
			Max. Compression	18	-0.70	0.00	0.00
			Max. Mx	29	-0.01	-0.07	0.00
			Max. My	27	-0.02	0.00	0.00
			Max. Vy	29	0.06	0.00	0.00
			Max. Vx	27	0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	15	57.24	-0.07	0.01
			Max. Compression	2	-60.71	0.39	-0.06
			Max. Mx	14	30.52	-0.39	0.03
			Max. My	23	-15.40	0.14	-0.57
			Max. Vy	14	-0.24	-0.39	0.03
			Max. Vx	8	0.51	0.00	0.54

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	24	5.47	0.00	0.00
			Max. Compression	10	-5.54	0.00	0.00
			Max. Mx	29	0.94	0.07	-0.01
			Max. My	27	-0.04	0.06	-0.01
			Max. Vy	29	0.07	0.07	-0.01
			Max. Vx	27	0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	15	91.57	-0.84	0.02
			Max. Compression	2	-98.61	1.61	-0.05
			Max. Mx	11	-97.47	1.65	0.12
			Max. My	8	-13.39	0.02	1.66
			Max. Vy	22	-1.32	-0.83	-0.02
			Max. Vx	8	1.37	0.01	0.82
		Diagonal	Max Tension	24	8.61	0.00	0.00
			Max. Compression	24	-8.66	0.00	0.00
			Max. Mx	29	1.66	0.12	0.02
			Max. My	27	0.09	0.11	-0.02
			Max. Vy	29	0.09	0.12	0.02
			Max. Vx	27	-0.01	0.00	0.00
T4	120 - 100	Leg	Max Tension	15	141.69	-1.10	0.02
			Max. Compression	2	-154.67	0.97	-0.01
			Max. Mx	11	-113.34	1.65	0.12
			Max. My	8	-14.25	0.02	1.66
			Max. Vy	22	-1.40	-1.08	-0.06
			Max. Vx	8	1.48	0.02	1.04
		Diagonal	Max Tension	24	13.47	0.00	0.00
			Max. Compression	24	-13.55	0.00	0.00
			Max. Mx	31	2.63	0.20	0.02
			Max. My	27	0.21	0.17	-0.03
			Max. Vy	29	0.13	0.19	0.02
			Max. Vx	27	-0.01	0.00	0.00
T5	100 - 80	Leg	Max Tension	15	202.10	-0.40	-0.01
			Max. Compression	2	-220.47	1.53	-0.06
			Max. Mx	10	-220.34	1.54	0.19
			Max. My	8	-21.22	0.06	1.47
			Max. Vy	19	-0.26	1.54	-0.13
			Max. Vx	8	-0.28	0.06	1.47
		Diagonal	Max Tension	24	15.12	0.00	0.00
			Max. Compression	24	-15.32	0.00	0.00
			Max. Mx	31	3.33	0.24	0.03
			Max. My	27	0.36	0.22	-0.03
			Max. Vy	29	0.15	0.24	0.03
			Max. Vx	27	-0.01	0.00	0.00
T6	80 - 60	Leg	Max Tension	15	257.02	-1.56	-0.01
			Max. Compression	10	-281.08	2.33	0.18
			Max. Mx	10	-281.08	2.33	0.18
			Max. My	12	-33.99	0.08	-1.82
			Max. Vy	19	-0.24	2.32	-0.15
			Max. Vx	8	-0.21	0.01	1.74
		Diagonal	Max Tension	24	18.09	0.00	0.00
			Max. Compression	24	-18.32	0.00	0.00
			Max. Mx	29	3.60	0.38	0.05
			Max. My	27	0.41	0.33	-0.05
			Max. Vy	29	0.19	0.38	0.05
			Max. Vx	27	-0.01	0.00	0.00
T7	60 - 40	Leg	Max Tension	15	316.28	-1.67	-0.00
			Max. Compression	10	-347.29	2.39	0.14
			Max. Mx	10	-347.29	2.39	0.14
			Max. My	12	-37.99	0.04	-1.95
			Max. Vy	33	0.30	-2.01	0.04
			Max. Vx	8	0.21	-0.02	1.91
		Diagonal	Max Tension	24	19.40	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	24	-19.69	0.00	0.00
			Max. Mx	29	4.10	0.46	0.06
			Max. My	27	0.08	0.44	-0.06
			Max. Vy	29	0.21	0.46	-0.06
			Max. Vx	27	-0.01	0.00	0.00
T8	40 - 20	Leg	Max Tension	15	374.13	-1.63	0.00
			Max. Compression	10	-412.48	3.03	0.09
			Max. Mx	29	41.09	-5.40	0.01
			Max. My	12	-41.85	-0.03	-2.52
			Max. Vy	33	0.81	-5.38	0.03
			Max. Vx	8	0.29	-0.08	2.46
		Diagonal	Max Tension	24	20.50	0.00	0.00
			Max. Compression	24	-20.87	0.00	0.00
			Max. Mx	29	2.87	0.54	0.07
			Max. My	37	-5.15	0.47	-0.07
			Max. Vy	29	0.24	0.52	-0.06
			Max. Vx	37	-0.01	0.00	0.00
T9	20 - 0	Leg	Max Tension	15	429.25	-3.31	0.00
			Max. Compression	10	-475.37	-0.00	-0.00
			Max. Mx	27	-196.37	8.50	0.10
			Max. My	12	-45.58	-0.03	-6.18
			Max. Vy	33	-1.27	-5.38	0.03
			Max. Vx	8	0.75	-0.12	5.97
		Diagonal	Max Tension	12	21.48	0.00	0.00
			Max. Compression	24	-21.83	0.00	0.00
			Max. Mx	29	0.88	0.77	0.08
			Max. My	37	-8.11	0.70	-0.09
			Max. Vy	29	0.27	0.77	0.08
			Max. Vx	37	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	490.63	51.29	-30.10
	Max. H_x	18	490.63	51.29	-30.10
	Max. H_z	7	-429.15	-46.31	27.36
	Min. Vert	7	-429.15	-46.31	27.36
	Min. H_x	7	-429.15	-46.31	27.36
	Min. H_z	18	490.63	51.29	-30.10
Leg B	Max. Vert	10	491.32	-51.09	-30.47
	Max. H_x	23	-428.63	46.09	27.71
	Max. H_z	23	-428.63	46.09	27.71
	Min. Vert	23	-428.63	46.09	27.71
	Min. H_x	10	491.32	-51.09	-30.47
	Min. H_z	10	491.32	-51.09	-30.47
Leg A	Max. Vert	2	490.93	0.42	59.30
	Max. H_x	21	30.38	8.20	2.34
	Max. H_z	2	490.93	0.42	59.30
	Min. Vert	15	-442.90	-0.41	-54.91
	Min. H_x	9	30.38	-8.19	2.34
	Min. H_z	15	-442.90	-0.41	-54.91

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	46.20	0.00	0.00	-17.85	-6.55	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	55.44	-0.00	-98.39	-9410.46	-7.96	16.86
0.9 Dead+1.6 Wind 0 deg - No Ice	41.58	0.00	-98.39	-9400.47	-5.98	16.84
1.2 Dead+1.6 Wind 30 deg - No Ice	55.44	48.46	-80.20	-7532.29	-4707.21	-4.20
0.9 Dead+1.6 Wind 30 deg - No Ice	41.58	48.46	-80.20	-7523.27	-4702.90	-4.20
1.2 Dead+1.6 Wind 60 deg - No Ice	55.44	80.44	-46.62	-4462.53	-7622.82	-22.05
0.9 Dead+1.6 Wind 60 deg - No Ice	41.58	80.44	-46.62	-4454.98	-7617.12	-22.03
1.2 Dead+1.6 Wind 90 deg - No Ice	55.44	92.89	-1.79	-334.61	-8709.23	-33.43
0.9 Dead+1.6 Wind 90 deg - No Ice	41.58	92.89	-1.79	-329.03	-8703.01	-33.40
1.2 Dead+1.6 Wind 120 deg - No Ice	55.44	84.13	51.73	5089.64	-7936.79	-32.89
0.9 Dead+1.6 Wind 120 deg - No Ice	41.58	84.13	51.73	5092.46	-7930.96	-32.87
1.2 Dead+1.6 Wind 150 deg - No Ice	55.44	44.46	83.72	8088.42	-4015.79	-25.11
0.9 Dead+1.6 Wind 150 deg - No Ice	41.58	44.46	83.72	8089.77	-4011.92	-25.08
1.2 Dead+1.6 Wind 180 deg - No Ice	55.44	-0.00	94.68	9097.25	-7.97	-16.11
0.9 Dead+1.6 Wind 180 deg - No Ice	41.58	-0.00	94.68	9098.12	-5.99	-16.09
1.2 Dead+1.6 Wind 210 deg - No Ice	55.44	-44.46	83.72	8088.47	3999.89	-3.12
0.9 Dead+1.6 Wind 210 deg - No Ice	41.58	-44.46	83.72	8089.82	3999.98	-3.11
1.2 Dead+1.6 Wind 240 deg - No Ice	55.44	-84.13	51.73	5089.70	7920.98	16.04
0.9 Dead+1.6 Wind 240 deg - No Ice	41.58	-84.13	51.73	5092.51	7919.09	16.02
1.2 Dead+1.6 Wind 270 deg - No Ice	55.44	-92.89	-1.79	-334.63	8693.46	33.44
0.9 Dead+1.6 Wind 270 deg - No Ice	41.58	-92.89	-1.79	-329.05	8691.19	33.41
1.2 Dead+1.6 Wind 300 deg - No Ice	55.44	-80.44	-46.62	-4462.61	7607.02	38.15
0.9 Dead+1.6 Wind 300 deg - No Ice	41.58	-80.44	-46.62	-4455.06	7605.27	38.12
1.2 Dead+1.6 Wind 330 deg - No Ice	55.44	-48.46	-80.20	-7532.37	4691.35	32.41
0.9 Dead+1.6 Wind 330 deg - No Ice	41.58	-48.46	-80.20	-7523.35	4690.99	32.38
1.2 Dead+1.0 Ice+1.0 Temp	245.20	-0.00	0.00	-124.60	-133.67	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	245.20	-0.00	-25.96	-2669.53	-133.70	7.65
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	245.20	12.86	-21.80	-2239.18	-1404.12	3.41
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	245.20	21.75	-12.66	-1364.24	-2253.36	-1.42
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	245.20	25.07	-0.28	-174.90	-2562.63	-5.75

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*
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	245.20	22.18	13.38	1214.61	-2290.18	-8.06
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	245.20	12.22	22.36	2086.02	-1293.16	-8.54
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	245.20	-0.00	25.54	2392.50	-133.74	-7.56
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	245.20	-12.22	22.36	2086.01	1025.70	-4.60
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	245.20	-22.18	13.38	1214.59	2022.74	0.38
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	245.20	-25.07	-0.28	-174.95	2295.21	5.77
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	245.20	-21.75	-12.66	-1364.29	1985.94	8.96
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	245.20	-12.86	-21.80	-2239.22	1136.72	9.69
Dead+Wind 0 deg - Service	46.20	0.00	-53.47	-5119.00	-6.59	9.15
Dead+Wind 30 deg - Service	46.20	26.34	-43.59	-4098.58	-2559.73	-2.32
Dead+Wind 60 deg - Service	46.20	43.72	-25.34	-2430.73	-4143.82	-11.98
Dead+Wind 90 deg - Service	46.20	50.49	-0.97	-187.97	-4734.09	-18.13
Dead+Wind 120 deg - Service	46.20	45.73	28.11	2759.04	-4314.42	-17.87
Dead+Wind 150 deg - Service	46.20	24.16	45.50	4388.27	-2184.10	-13.66
Dead+Wind 180 deg - Service	46.20	0.00	51.46	4936.38	-6.59	-8.75
Dead+Wind 210 deg - Service	46.20	-24.16	45.50	4388.29	2170.92	-1.67
Dead+Wind 240 deg - Service	46.20	-45.73	28.11	2759.05	4301.26	8.71
Dead+Wind 270 deg - Service	46.20	-50.49	-0.97	-187.98	4720.95	18.13
Dead+Wind 300 deg - Service	46.20	-43.72	-25.34	-2430.76	4130.68	20.72
Dead+Wind 330 deg - Service	46.20	-26.34	-43.59	-4098.61	2546.58	17.63

Solution Summary

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX* *K*	*PY* *K*	*PZ* *K*	*PX* *K*	*PY* *K*	*PZ* *K*	*% Error*
1	0.00	-46.20	0.00	0.00	46.20	0.00	0.000%
2	0.00	-55.44	-98.39	0.00	55.44	98.39	0.000%
3	0.00	-41.58	-98.39	-0.00	41.58	98.39	0.000%
4	48.46	-55.44	-80.20	-48.46	55.44	80.20	0.000%
5	48.46	-41.58	-80.20	-48.46	41.58	80.20	0.000%
6	80.44	-55.44	-46.62	-80.44	55.44	46.62	0.000%
7	80.44	-41.58	-46.62	-80.44	41.58	46.62	0.000%
8	92.89	-55.44	-1.79	-92.89	55.44	1.79	0.000%
9	92.89	-41.58	-1.79	-92.89	41.58	1.79	0.000%
10	84.13	-55.44	51.73	-84.13	55.44	-51.73	0.000%
11	84.13	-41.58	51.73	-84.13	41.58	-51.73	0.000%
12	44.46	-55.44	83.72	-44.46	55.44	-83.72	0.000%
13	44.46	-41.58	83.72	-44.46	41.58	-83.72	0.000%
14	0.00	-55.44	94.68	0.00	55.44	-94.68	0.000%
15	0.00	-41.58	94.68	0.00	41.58	-94.68	0.000%
16	-44.46	-55.44	83.72	44.46	55.44	-83.72	0.000%
17	-44.46	-41.58	83.72	44.46	41.58	-83.72	0.000%
18	-84.13	-55.44	51.73	84.13	55.44	-51.73	0.000%
19	-84.13	-41.58	51.73	84.13	41.58	-51.73	0.000%
20	-92.89	-55.44	-1.79	92.89	55.44	1.79	0.000%
21	-92.89	-41.58	-1.79	92.89	41.58	1.79	0.000%
22	-80.44	-55.44	-46.62	80.44	55.44	46.62	0.000%
23	-80.44	-41.58	-46.62	80.44	41.58	46.62	0.000%
24	-48.46	-55.44	-80.20	48.46	55.44	80.20	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
25	-48.46	-41.58	-80.20	48.46	41.58	80.20	0.000%
26	0.00	-245.20	0.00	0.00	245.20	-0.00	0.000%
27	0.00	-245.20	-25.96	0.00	245.20	25.96	0.000%
28	12.86	-245.20	-21.80	-12.86	245.20	21.80	0.000%
29	21.75	-245.20	-12.66	-21.75	245.20	12.66	0.000%
30	25.07	-245.20	-0.28	-25.07	245.20	0.28	0.000%
31	22.18	-245.20	13.38	-22.18	245.20	-13.38	0.000%
32	12.22	-245.20	22.36	-12.22	245.20	-22.36	0.000%
33	0.00	-245.20	25.54	0.00	245.20	-25.54	0.000%
34	-12.22	-245.20	22.36	12.22	245.20	-22.36	0.000%
35	-22.18	-245.20	13.38	22.18	245.20	-13.38	0.000%
36	-25.07	-245.20	-0.28	25.07	245.20	0.28	0.000%
37	-21.75	-245.20	-12.66	21.75	245.20	12.66	0.000%
38	-12.86	-245.20	-21.80	12.86	245.20	21.80	0.000%
39	0.00	-46.20	-53.47	-0.00	46.20	53.47	0.000%
40	26.34	-46.20	-43.59	-26.34	46.20	43.59	0.000%
41	43.72	-46.20	-25.34	-43.72	46.20	25.34	0.000%
42	50.49	-46.20	-0.97	-50.49	46.20	0.97	0.000%
43	45.73	-46.20	28.11	-45.73	46.20	-28.11	0.000%
44	24.16	-46.20	45.50	-24.16	46.20	-45.50	0.000%
45	0.00	-46.20	51.46	0.00	46.20	-51.46	0.000%
46	-24.16	-46.20	45.50	24.16	46.20	-45.50	0.000%
47	-45.73	-46.20	28.11	45.73	46.20	-28.11	0.000%
48	-50.49	-46.20	-0.97	50.49	46.20	0.97	0.000%
49	-43.72	-46.20	-25.34	43.72	46.20	25.34	0.000%
50	-26.34	-46.20	-43.59	26.34	46.20	43.59	0.000%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000054
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001

26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000240
28	Yes	4	0.00000001	0.00000244
29	Yes	4	0.00000001	0.00000247
30	Yes	4	0.00000001	0.00000241
31	Yes	4	0.00000001	0.00000240
32	Yes	4	0.00000001	0.00000238
33	Yes	4	0.00000001	0.00000238
34	Yes	4	0.00000001	0.00000227
35	Yes	4	0.00000001	0.00000231
36	Yes	4	0.00000001	0.00000218
37	Yes	4	0.00000001	0.00000230
38	Yes	4	0.00000001	0.00000234
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation ft*	*Horz. Deflection in*	*Gov. Load Comb.*	*Tilt °*	*Twist °*
T1	180 - 160	9.095	43	0.4303	0.0957
T2	160 - 140	7.265	43	0.4049	0.0835
T3	140 - 120	5.630	43	0.3378	0.0503
T4	120 - 100	4.233	43	0.3017	0.0367
T5	100 - 80	2.989	43	0.2539	0.0265
T6	80 - 60	1.941	43	0.1932	0.0165
T7	60 - 40	1.146	43	0.1488	0.0110
T8	40 - 20	0.552	43	0.0989	0.0068
T9	20 - 0	0.173	43	0.0448	0.0032

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	*Appurtenance*	*Gov. Load Comb.*	*Deflection in*	*Tilt °*	*Twist °*	*Radius of Curvature ft*
189.40	DS9A09F36D-N	43	9.095	0.4303	0.0957	84831
189.00	24' x 6" Omni	43	9.095	0.4303	0.0957	84831
187.00	CO-41A	43	9.095	0.4303	0.0957	84831
180.00	Tower Top Amplifier	43	9.095	0.4303	0.0957	84831
175.00	8' Dish	43	8.629	0.4271	0.0943	84831
164.00	8' Dish	43	7.620	0.4139	0.0880	26519
158.00	531-70HD	43	7.091	0.3992	0.0807	20968
156.00	24' x 6" Omni	43	6.919	0.3929	0.0776	20447
153.00	ROHN 6-ft Side Arm	43	6.665	0.3826	0.0724	19903
144.40	ROHN 3-ft Side Arm	43	5.968	0.3515	0.0570	18351

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* *°*	*Twist* *°*	*Radius of Curvature* *ft*
135.00	NNVV-65B-R4	43	5.261	0.3259	0.0449	20641
125.00	(4) 8' x1' Panel	43	4.565	0.3095	0.0388	31370
115.00	(4) 8' x1' Panel	43	3.908	0.2923	0.0344	35797
105.00	(4) 8' x1' Panel	43	3.284	0.2682	0.0293	27355

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* *°*	*Twist* *°*
T1	180 - 160	16.733	10	0.7911	0.1763
T2	160 - 140	13.369	10	0.7445	0.1538
T3	140 - 120	10.361	10	0.6213	0.0927
T4	120 - 100	7.790	10	0.5552	0.0676
T5	100 - 80	5.501	10	0.4673	0.0489
T6	80 - 60	3.574	10	0.3557	0.0304
T7	60 - 40	2.109	10	0.2739	0.0203
T8	40 - 20	1.016	10	0.1820	0.0125
T9	20 - 0	0.318	10	0.0826	0.0059

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* *°*	*Twist* *°*	*Radius of Curvature* *ft*
189.40	DS9A09F36D-N	10	16.733	0.7911	0.1763	46266
189.00	24' x 6" Omni	10	16.733	0.7911	0.1763	46266
187.00	CO-41A	10	16.733	0.7911	0.1763	46266
180.00	Tower Top Amplifier	10	16.733	0.7911	0.1763	46266
175.00	8' Dish	10	15.876	0.7853	0.1737	46266
164.00	8' Dish	10	14.022	0.7610	0.1620	14463
158.00	531-70HD	10	13.048	0.7341	0.1486	11431
156.00	24' x 6" Omni	10	12.732	0.7226	0.1429	11143
153.00	ROHN 6-ft Side Arm	10	12.265	0.7037	0.1334	10841
144.40	ROHN 3-ft Side Arm	10	10.983	0.6466	0.1050	10006
135.00	NNVV-65B-R4	10	9.683	0.5995	0.0826	11253
125.00	(4) 8' x1' Panel	10	8.402	0.5695	0.0714	17094
115.00	(4) 8' x1' Panel	10	7.192	0.5378	0.0634	19480
105.00	(4) 8' x1' Panel	10	6.045	0.4936	0.0540	14896

Bolt Design Data

Section No.	*Elevation* *ft*	*Component Type*	*Bolt Grade*	*Bolt Size* *in*	*Number Of Bolts*	*Maximum Load per Bolt* *K*	*Allowable Load* *K*	*Ratio Load / Allowable*	*Allowable Ratio*	*Criteria*
T1	180	Diagonal	A325X	0.6250	1	4.37	9.75	0.449 ✔	1	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325X	0.6250	1	0.65	5.22	0.124 ✔	1	Member Bearing
T2	160	Diagonal	A325X	0.6250	1	5.54	14.63	0.379 ✔	1	Member Bearing
T3	140	Diagonal	A325X	0.6250	1	8.66	15.19	0.570 ✔	1	Bolt Shear
T4	120	Diagonal	A325X	0.7500	1	13.47	19.99	0.674 ✔	1	Member Bearing
T5	100	Diagonal	A325X	0.7500	1	15.12	19.99	0.757 ✔	1	Member Bearing
T6	80	Diagonal	A325X	0.7500	1	18.32	21.87	0.838 ✔	1	Bolt Shear
T7	60	Diagonal	A325X	0.7500	1	19.69	21.87	0.900 ✔	1	Bolt Shear
T8	40	Diagonal	A325X	0.7500	1	20.87	21.87	0.954 ✔	1	Bolt Shear
T9	20	Leg	F1554-105	1.5000	6	71.54	124.25	0.576 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	21.83	21.87	0.998 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x.276	20.03	5.01	65.0 K=1.00	2.2535	-23.72	74.43	0.319 [1] ✔
T2	160 - 140	P3x.3	20.03	5.01	52.9 K=1.00	3.0159	-60.71	110.61	0.549 [1] ✔
T3	140 - 120	P5x0.5	20.03	6.68	44.5 K=1.00	7.9529	-98.61	309.54	0.319 [1] ✔
T4	120 - 100	P5x0.5	20.03	6.68	44.5 K=1.00	7.9529	-154.67	309.54	0.500 [1] ✔
T5	100 - 80	P5x0.5	20.03	6.68	44.5 K=1.00	7.9529	-220.47	309.54	0.712 [1] ✔
T6	80 - 60	P8x.5	20.03	10.02	41.8 K=1.00	12.7627	-281.08	505.56	0.556 [1] ✔
T7	60 - 40	P8x.5	20.03	10.02	41.8 K=1.00	12.7627	-347.29	505.56	0.687 [1] ✔
T8	40 - 20	P8x.5	20.03	10.02	41.8 K=1.00	12.7627	-412.48	505.56	0.816 [1] ✔
T9	20 - 0	P10x.5	20.03	10.02	33.1 K=1.00	16.1007	-475.37	668.66	0.711 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	8.40	4.04	122.0 K=1.00	0.4844	-4.36	7.34	0.594 [1] ✔
T2	160 - 140	L2x2x3/16	10.08	4.85	147.7 K=1.00	0.7150	-5.42	7.41	0.732 [1] ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.58	6.05	147.8 K=1.00	1.1900	-8.66	12.31	0.704 [1] ✔
T4	120 - 100	L3 1/2x3x1/4	14.32	6.92	131.6 K=1.00	1.5600	-13.55	20.36	0.666 [1] ✔
T5	100 - 80	L3 1/2x3x1/4	16.11	7.82	148.7 K=1.00	1.5600	-15.32	15.94	0.961 [1] ✔
T6	80 - 60	L4x3 1/2x5/16	19.30	9.35	153.8 K=1.00	2.2500	-18.32	21.50	0.852 [1] ✔
T7	60 - 40	L4x3 1/2x3/8	21.03	10.22	168.8 K=1.00	2.6700	-19.69	21.18	0.930 [1] ✔
T8	40 - 20	L4x4x3/8	22.81	11.12	169.3 K=1.00	2.8600	-20.87	22.54	0.926 [1] ✔
T9	20 - 0	L5x5x5/16	24.62	11.93	144.0 K=1.00	3.0300	-21.83	33.01	0.661 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	5.00	4.52	136.5 K=1.00	0.4844	-0.70	5.88	0.120 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x.276	20.03	5.01	65.0	2.2535	21.00	101.41	0.207 [1] ✔
T2	160 - 140	P3x.3	20.03	5.01	52.9	3.0159	57.24	135.72	0.422 [1] ✔
T3	140 - 120	P5x0.5	20.03	6.68	44.5	7.9529	91.57	357.88	0.256 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u / \phi P_n$
T4	120 - 100	P5x0.5	20.03	6.68	44.5	7.9529	141.69	357.88	0.396 [1] ✔
T5	100 - 80	P5x0.5	20.03	6.68	44.5	7.9529	202.10	357.88	0.565 [1] ✔
T6	80 - 60	P8x.5	20.03	10.02	41.8	12.7627	257.02	574.32	0.448 [1] ✔
T7	60 - 40	P8x.5	20.03	10.02	41.8	12.7627	316.28	574.32	0.551 [1] ✔
T8	40 - 20	P8x.5	20.03	10.02	41.8	12.7627	374.13	574.32	0.651 [1] ✔
T9	20 - 0	P10x.5	20.03	10.02	33.1	16.1007	429.25	724.53	0.592 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u / \phi P_n$
T1	180 - 160	L2x2x1/8	8.40	4.04	80.6	0.2930	4.37	14.28	0.306 [1] ✔
T2	160 - 140	L2x2x3/16	9.22	4.43	89.3	0.4308	5.47	21.00	0.261 [1] ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.58	6.05	97.0	0.7519	8.61	36.65	0.235 [1] ✔
T4	120 - 100	L3 1/2x3x1/4	14.32	6.92	93.1	1.0059	13.47	49.04	0.275 [1] ✔
T5	100 - 80	L3 1/2x3x1/4	16.11	7.82	105.0	1.0059	15.12	49.04	0.308 [1] ✔
T6	80 - 60	L4x3 1/2x5/16	19.30	9.35	107.3	1.4824	18.09	72.27	0.250 [1] ✔
T7	60 - 40	L4x3 1/2x3/8	21.03	10.22	118.6	1.7564	19.40	85.62	0.227 [1] ✔
T8	40 - 20	L4x4x3/8	22.81	11.12	110.1	1.8989	20.50	92.57	0.221 [1] ✔
T9	20 - 0	L5x5x5/16	24.62	11.93	92.4	2.0674	21.48	100.79	0.213 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u / \phi P_n$
T1	180 - 160	L2x2x1/8	5.00	4.52	91.2	0.2930	0.65	12.74	0.051 [1]

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

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	øP_allow K	% Capacity	Pass Fail
T1	180 - 160	Leg	P2.5x.276	3	-23.72	74.43	31.9	Pass
T2	160 - 140	Leg	P3x.3	33	-60.71	110.61	54.9	Pass
T3	140 - 120	Leg	P5x0.5	60	-98.61	309.54	31.9	Pass
T4	120 - 100	Leg	P5x0.5	81	-154.67	309.54	50.0	Pass
T5	100 - 80	Leg	P5x0.5	102	-220.47	309.54	71.2	Pass
T6	80 - 60	Leg	P8x.5	122	-281.08	505.56	55.6	Pass
T7	60 - 40	Leg	P8x.5	137	-347.29	505.56	68.7	Pass
T8	40 - 20	Leg	P8x.5	152	-412.48	505.56	81.6	Pass
T9	20 - 0	Leg	P10x.5	167	-475.37	668.66	71.1	Pass
T1	180 - 160	Diagonal	L2x2x1/8	9	-4.36	7.34	59.4	Pass
T2	160 - 140	Diagonal	L2x2x3/16	37	-5.42	7.41	73.2	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	64	-8.66	12.31	70.4	Pass
T4	120 - 100	Diagonal	L3 1/2x3x1/4	85	-13.55	20.36	66.6 67.4 (b)	Pass
T5	100 - 80	Diagonal	L3 1/2x3x1/4	106	-15.32	15.94	96.1	Pass
T6	80 - 60	Diagonal	L4x3 1/2x5/16	127	-18.32	21.50	85.2	Pass
T7	60 - 40	Diagonal	L4x3 1/2x3/8	142	-19.69	21.18	93.0	Pass
T8	40 - 20	Diagonal	L4x4x3/8	157	-20.87	22.54	92.6 95.4 (b)	Pass
T9	20 - 0	Diagonal	L5x5x5/16	172	-21.83	33.01	66.1 99.8 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	5	-0.70	5.88	12.0 12.4 (b)	Pass
							Summary	
						Leg (T8)	81.6	Pass
						Diagonal (T9)	99.8	Pass
						Top Girt (T1)	12.4	Pass
						Bolt Checks	99.8	Pass
						RATING =	**99.8**	**Pass**

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 9429 \cdot ft \cdot kips$	(User Input from tnxTower)
Shear Force =	$S_t := 99 \cdot kip$	(User Input from tnxTower)
Axial Force =	$WT_t := 55 \cdot kip$	(User Input from tnxTower)
Max Compression Force =	$C_t := 491 \cdot kip$	(User Input from tnxTower)
Max Uplift Force =	$U_t := 443 \cdot kip$	(User Input from tnxTower)
Tower Height =	$H_t := 180 \cdot ft$	(User Input)
Tower Width =	$W_t := 23 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 6.0 \cdot ft$	(User Input)
Length of Pier =	$L_p := 4.75 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 4.0 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 1.75 \cdot ft$	(User Input)
Width of Footing =	$W_f := 34.0 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4500 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 8000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 20$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 4 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 10$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.27 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 67$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 10$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.27 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 67$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \dfrac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \dfrac{\pi \cdot d_{btop}^2}{4} = 1.267 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \dfrac{\pi \cdot d_{bbot}^2}{4} = 1.267 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \dfrac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Load Factor = $LF := 1$

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 125\cdot\text{pcf}$

Passive Pressure = $P_{pn} := K_p\cdot\gamma_s\cdot n + c\cdot 2\cdot\sqrt{K_p} = 0\cdot\text{ksf}$

$P_{pt} := K_p\cdot\gamma_s\cdot(D_f - T_f) + c\cdot 2\cdot\sqrt{K_p} = 1.594\cdot\text{ksf}$

$P_{top} := \text{if}\left[n < (D_f - T_f), P_{pt}, P_{pn}\right] = 1.594\cdot\text{ksf}$

$P_{bot} := K_p\cdot\gamma_s\cdot D_f + c\cdot 2\cdot\sqrt{K_p} = 2.25\cdot\text{ksf}$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.922\cdot\text{ksf}$$

$T_p := \text{if}\left[n < (D_f - T_f), T_f, (D_f - n)\right] = 1.75\cdot\text{ft}$

$A_p := W_f\cdot T_p = 59.5\cdot\text{ft}^2$

Ultimate Shear = $S_u := P_{ave}\cdot A_p = 114.352\cdot\text{kip}$

Weight of Concrete = $$WT_c := \left[\left(W_f^2\cdot T_f\right) + (3)\cdot\left(\frac{d_p^2\cdot\pi}{4}\cdot L_p\right)\right]\cdot\gamma_c = 330.311\cdot\text{kip}$$

Weight of Soil Above Footing = $$WT_{s1} := \left[\left[W_f^2 - (3)\cdot\left(\frac{d_p^2\cdot\pi}{4}\right)\right]\cdot\left(\left|L_p - L_{pag} - n\right|\right)\right]\cdot\gamma_s = 594.1\cdot\text{kip}$$

Weight of Soil Wedge at Back Face = $$WT_{s2} := \left[\frac{(D_f - n)^2\cdot\tan(\Phi_s)}{2}\cdot W_f\right]\cdot\gamma_s = 44.167\cdot\text{kip}$$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

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

$X_t := \text{if}(\text{Pos}_t = 1, X_{t1}, X_{t2}) = 7.041$

$$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t\cdot\cos(30\cdot\text{deg}))}{3} + X_t\right] = 3.32 \qquad X_{off2} := 0$$

$X_{off} := \text{if}(\text{Pos}_t = 1, X_{off1}, X_{off2}) \qquad X_{off} = 3.32\cdot\text{ft}$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 742.9\cdot\text{kip}$

Resisting Moment = $$M_r := (WT_{tot})\cdot\frac{W_f}{2} + 0.9WT_t\cdot\left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u\cdot\frac{T_p}{3}\right) + 0.75WT_{s2}\cdot\left[W_f + \frac{(D_f - n)\cdot\tan(\Phi_s)}{3}\right] = 14520\cdot\text{kip}\cdot\text{ft}$$

Overturning Moment = $M_{ot} := OM + S_t\cdot(L_p + T_f) = 10072.5\cdot\text{kip}\cdot\text{ft}$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Factor of Safety Actual = $$FS := \frac{M_r}{M_{ot}} = 1.44$$

Factor of Safety Required = $FS_{req} := 1$ OverTurning_Moment_Check := if$(FS \geq FS_{req}$, "Okay", "No Good")

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \dfrac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 448.635 \cdot kips$

Shear_Check := if$(S_p > S_t$, "Okay" , "No Good"$)$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 979 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\,2} = 1.156 \times 10^3$

Section Modulus of Mat = $S := \dfrac{W_f^{\,3}}{6} = 6550.67 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \dfrac{Load_{tot}}{A_{mat}} + \dfrac{M_{ot}}{S} = 2.385 \cdot ksf$

Max_Pressure_Check := if$(P_{max} < 0.75q_s$, "Okay" , "No Good"$)$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \dfrac{Load_{tot}}{A_{mat}} - \dfrac{M_{ot}}{S} = -0.69 \cdot ksf$

Min_Pressure_Check := if$\left[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s)\right.$, "Okay" , "No Good"$\left.\right]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \dfrac{P_{max}}{\dfrac{P_{max} - P_{min}}{W_f}} \cdot \dfrac{1}{3} = 8.789$

Distance to Kern = $X_k := \dfrac{W_f}{6} = 5.667$

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

Eccentricity = $e := \dfrac{M_{ot}}{Load_{tot}} = 10.284$

Adjusted Soil Pressure = $P_a := \dfrac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\dfrac{W_f}{2} - e\right)} = 2.86 \cdot ksf$

$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.86 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 4.499 \times 10^3 \cdot kips$ (ACI-2008 10.14)

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

$Bearing\_Check = \text{"Okay"}$

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 16.73 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.425 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 52.66 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 778 \cdot kip$ (ACI-2008 11.2.1.1)

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

$Beam\_Shear\_Check = \text{"Okay"}$

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

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 16.9$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 22.9$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 481 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 776 \cdot kip$ (ACI-2008 11.11.2.1)

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

$Punching\_Shear\_Check = \text{"Okay"}$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

Maximum Moment in Pad = $M_{max} := 5340 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 5.933 \times 10^3 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[\left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right]\right] & \text{otherwise} \end{cases} = 0.6$$

(ACI-2008 10.2.7.3)

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 287.023 \cdot in$

$A_s := \frac{M_n}{\left(f_y \cdot d\right)} = 70.93 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 5.492 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 84.858 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} \cdot d} = 0.21206 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 84.9 \cdot in^2$

$As_{prov} := A_{bbot} \cdot NB_{bot} = 84.9 \cdot in^2$

Pad_Reinforcement_Bot := if(As$_{prov}$ > As, "Okay", "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 84.9 \cdot in^2$

$As_{prov} := A_{btop} \cdot NB_{top} = 84.9 \cdot in^2$

Pad_Reinforcement_Top := if(As$_{prov}$ > As, "Okay", "No Good")

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing = $B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 4.8 \cdot in$

Spacing or Cover Dimension = $c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 2.401 \cdot in$

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 45.1 \cdot in$$

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

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

Available Length in Pad = $L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 63 \cdot in$

Lpad_Check := if($L_{Pad} > L_{dbt}$, "Okay", "No Good")

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

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

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

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 15.71 \cdot in^2$

Steel_Area_Check := if$\left(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"}\right)$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.54 \cdot in$

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

Maximum Moment in Pier = $M_p := S_t \cdot \left(L_p\right) \cdot LF = 5643 \cdot in \cdot kips$

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

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

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = \left(48 \;\; 20 \;\; 8 \;\; 654.503 \;\; 5.643 \times 10^3\right)$$

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

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

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = \left(2.356 \times 10^3 \;\; 2.031 \times 10^4 \;\; -38.05 \;\; 8.731 \times 10^{-3}\right)$$

Axial_Load_Check := if$\left(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"}\right)$

Axial_Load_Check = "Okay"

Bending_Check := if$\left(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"}\right)$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 54 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 18 \cdot in$

Tension: (ACI-2008 12.2.3)

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

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 22.36 \cdot in$$

Minimum Development Length = $L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 12.522 \cdot in$ (ACI 12.2.1)

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

$L_{db} := max\left(L_{dbt}, L_{dbmin}\right) = 22.361 \cdot in$

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

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

Compression: (ACI-2008 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 17.889 \cdot in$$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \ge L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18 \cdot in$

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

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

Site Data	**Region: Northeast** **Market:**	**Northern CT**	Revision 2.7	Rev Date: 23-July-2018
	Cascade ID	**CT03XC067**	BTS OEM: ALU	RFDS Type: Preliminary
	Augment Import Code:	Augment: Relocation	Structure Type:	Tower
	Address: 250 South Olcott Street, Manchester CT 06040	Sprint Eng. Name: Bill Hastings	Bill.M.Hastings@sprint.com	Eng. Phone: 978-590-9700
	Latitude: 41.77000352 | Longitude: -72.55834028	Manager Name: Jonathan Hull	Jonathan.B.Hull@sprint.com	Manager Phone: 617-233-2920
	Detailed RFDS Description:	RFE:		RFE Phone:
	Tower Relocation	Filter Analysis Complete:	Border Analysis Complete:	Channel Plan Complete:
		Alpha	Beta	Gamma
1900	1900MHz_Azimuth	0	120	240
	1900MHz_No_of_Antennas	1	1	1
	1900MHz_RADCenter(ft)	135	135	135
	1900MHz_Antenna Make	CommScope	CommScope	CommScope
	1900MHz_Antenna Model	NNVV-65B-R4	NNVV-65B-R4	NNVV-65B-R4
	1900MHz_Horizontal_Beamwidth	68	68	68
	1900MHz_Vertical_Beamwidth	5.1	5.1	5.1
	1900MHz_Antenna Dimensions (ft) & Weight (lbs)	72 x 19.6 x 7.8 | 77.4 (lbs)	72 x 19.6 x 7.8 | 77.4 (lbs)	72 x 19.6 x 7.8 | 77.4 (lbs)
	1900MHz_AntennaGain(dBi)	18.8	18.8	18.8
	1900MHz_E_Tilt	0	0	
	1900MHz _M_Tilt	0	0	
	1900_Effective_Tilt	0	0	
	1900MHz_Carrier_Forecast_Year_2017			
	1900MHz_RRH Manufacturer	ALU	ALU	
	1900MHz_RRH Model	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz
	1900MHz_RRH Count	1	1	1
	1900MHz_RRH Specs	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)
	1900MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	1900MHz Combiner Model	No Combiner Required	No Combiner Required	No Combiner Required
	1900MHz Power Split Ratio (Main/Split)			
	1900MHz Splitter Manufacturer			
	1900MHz Splitter Model	No Splitter Required	No Splitter Required	No Splitter Required
	1900MHz Number of Splitters	0	0	0
	1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount, ft)	8	8	8
	1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount)	LCF12-50J	LCF12-50J	LCF12-50J

	1900MHz_Top_Jumper #2_Length (RRH to Combiner for TT if applicable, ft)			
	1900MHz_Top_Jumper #2_Cable_Model (RRH to Combiner for TT if applicable)			
	1900MHz_Main_Cable_Length (ft)	135	135	135
	1900MHz_Main_Cable_Model	HB114-1-08U4-M5F	HB114-1-08U4-M5F	HB114-1-08U4-M5F
	1900MHz_Bottom_Jumper #1_Length (Ground based RRH to Combiner OR-Main Coax, ft)			
	1900MHz_Bottom_Jumper #1_Cable_Model (Ground based RRH to Combiner-OR-Main Coax)			
	1900MHz_Bottom_Jumper #2_Length (Ground based-Combiner to Main Coax, ft)			
	1900MHz_Bottom_Jumper #2_Cable_Model (Ground based-Combiner to Main Coax)			
800	800MHz_Azimuth	0	120	240
	800MHz_No_of_Antennas	1	1	1
	800MHz_RADCenter(ft)	135	135	135
	800MHz_AntennaMake	NA	NA	NA
	800MHz_AntennaModel	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band
	800MHz_Horizontal_Beamwidth	NA	NA	NA
	800MHz_Vertical_Beamwidth	NA	NA	NA
	800MHz_Antenna Dimensions (ft) & Weight (lbs)	NA | NA	NA | NA	NA | NA
	800MHz_AntennaGain (dBi)	NA	NA	NA
	800MHz_E_Tilt	0	0	0
	800MHz_M_Tilt	0	0	0
	800 MHz_Effective Tilt (degrees)	0	0	0
	800MHz_RRH Manufacturer	ALU	ALU	ALU
	800_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
	800MHz_RRH Model	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W
	800MHz_RRH Specs	15.8 x 13.0 x 14.0 (64 lbs)	15.8 x 13.0 x 14.0 (64 lbs)	15.8 x 13.0 x 14.0 (64 lbs)
	800MHz_RRH Count	2	2	2
	800MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	800MHz BILT Border Filter	na	na	na
	800MHz Splitter Manufacturer			
	800MHz Splitter Model			
	800MHz Number of Splitters	0	0	0
	800_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
	800_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J

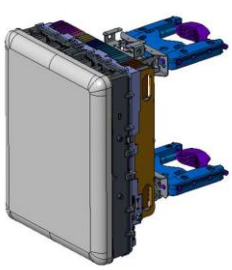
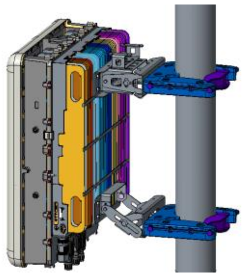
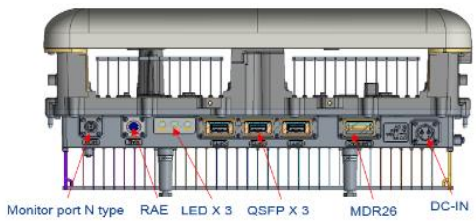
	800MHz_Main_Coax_Cable_Length (ft)	NA	NA	NA
	800MHz_Main_Coax_Cable_Model	NA	NA	NA
	800_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
	800_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
2500	2500MHz_Azimuth	0	120	240
	2500MHz_No_of_Antennas	1	1	1
	2500MHz_RADCenter(ft)	135	135	135
	2500MHz_AntennaMake	Nokia	Nokia	Nokia
	2500MHz_AntennaModel	AAHC (Nokia Massive MIMO RRU/Antenna Standard)	AAHC (Nokia Massive MIMO RRU/Antenna Standard)	AAHC (Nokia Massive MIMO RRU/Antenna Standard)
	2500MHz_Horizontal_Beamwidth	65	65	65
	2500MHz_Vertical_Beamwidth			
	2500MHz_AntennaHeight (ft)	25.6 x 19.7 x 9.64 | 103.7 (lbs)	25.6 x 19.7 x 9.64 | 103.7 (lbs)	25.6 x 19.7 x 9.64 | 103.7 (lbs)
	2500MHz_AntennaGain (dBi)			
	2500MHz_E_Tilt	0	0	0
	2500MHz_M_Tilt	0	0	0
	2500 MHz_Effective Tilt (degrees)	0	0	0
	2500MHz_RRH Manufacturer			
	2500_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
	2500MHz_RRH Model			
	2500MHz_RRH Count			
	2500MHz_RRH Location			
	2500MHz Power Split Ratio (Main/Split)			
	2500MHz Splitter Manufacturer			
	2500MHz Splitter Model			
	2500MHz Number of Splitters	0	0	0
	2500_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
	2500_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J
	2500MHz_Main_Cable_Length (ft)	135		
	2500MHz_Main_Cable_Model	HB114-08U3M12-xxxF		
	2500_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
	2500_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
	Has_Split			
	Plumbing Scenario			

Comments				
	Date Updated			
	Update Description			
	Site Type			
	Comments			
	This RFDS is Deployment View			

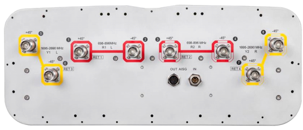
Nokia Networks
6000 Connection Drive, Irvine, TX 75039, (972) 374 3000

NOKIA

TD LTE 2.5G Massive MIMO Adaptive Antenna (MAA) – AAHC

Category	Description	Unit	AAHC
Spectrum	3GPP Band		B41
	Operating frequency	MHz	2496-2690
RF characteristic	Number of TX/RX paths	#	64T64R
	Instantaneous Bandwidth IBW	MHz	194
	Occupied Bandwidth OBW	MHz	60
	Total Output power	W	120
	EIRP	dBm	74.8
	TX OBUE in B41 for sum of all 64 pipes at 1MHz offset	dBm/MHz	-13 sum of all ports
	Emission at IPWireless 2558-2568MHz	dBm/MHz	-57 sum of all ports
	Emission at NEXTRADAR at 2704-3000MHz	dBm/MHz	-27 sum of all ports
Power	Power inputs		2 pin, and with APPB/APPC
	Supply Voltage / Voltage Range	V	-48V DC voltage (-40.5V~-57V)
	Typical Power Consumption	W	75% duty cycle, 1400W for LTE
Interface	Optical Interface		3x QSFP (4 x 9.8G CPRI each)
	RAE Interface		Circle connector, AISG-ES-RAE v2.1.0
	LMI interface		MDR26
	Monitor interface		N_Female
Antenna Specifications	Antenna array		8x8x2
	Element Polarization	H/V or ± 45	± 45
	Gain [Broadcast 65 HBW]	dBi	15.2
	Horizontal BW [Broadcast] (@ -3dB)	Degrees	65
	Vertical BW [Broadcast] (@ -3dB)	Degrees	9
	Mechanical Downtilt Range	Degrees	± 5
	Electrical Downtilt Range	Degrees	± 10
	Cross Polar Isolation [Element]	dB	19
	Front-to-Back Ratio [Broadcast] (@ 180° ±15° cone)	dB	25
	Element Spacing	λ (mm)	horizontal 57.5, Vertical 80
	Upper Side Lobe Suppression (1st USLS) [Broadcast]	dB	16
	Cross Polar Discrimination [Broadcast] (@ -3dB)	dB	10
	Traffic (Service) Beam Azmithual Pan	Degrees	± 55
	Traffic (Service) Beam Elevational Tilt	Degrees	± 10
	Azimuth Beamwidth Squint (@ Boresight)	Degrees	configurable
	Broadcast Tracking @ ±60°	dBi	2
	Dimensions (LxWxD)	mm (in)	651x501x245 mm (25.6x19.7x9.6 in)
Mechanical Specifications	Weight	kg (lb)	47Kg (103.6lb)
	Max Wind Speed	kmh/mph	200kmh (125 mph)
	Wind Load Front/Side/Rear @ 150kmh	N(lbF)	349 /168/130 N (78.5 / 37.8 /29.2 lbF)
	Radom Material		PC
	Radom Color		Cold Gray
	Mounting Kit	mm (in)	FPKA/FPKB/FPKC
	Operational Temperature Range	C(F)	-40 ~ 55© -40 ~ 131(F)
	Ingress protection class		IP65
	Installation options		Pole, Wall
	Surge protection	kA	20



NNVV-65B-R4

8-port sector antenna, 4x 698–896 and 4x 1695–2690 MHz, 65° HPBW, 4x RET

- Uses the 4.3-10 connector which is 40 percent smaller than the 7-16 DIN connector
- Supports re-configurable antenna sharing capability enabling control of the internal RET system using up to two separate RET compatible OEM radios
- All internal RET actuators are connected in "Cascaded MRET" configuration

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2500	2500–2690
Gain, dBi	14.5	14.9	16.8	17.2	17.5	18.1	17.8
Beamwidth, Horizontal, degrees	66	64	60	60	62	59	64
Beamwidth, Vertical, degrees	11.7	10.4	7.3	6.8	6.4	5.4	5.1
Beam Tilt, degrees	2–14	2–14	2–12	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	16	18	14	16	15	16	18
Front-to-Back Ratio at 180°, dB	31	34	38	38	37	33	30
Isolation, dB	25	25	25	25	25	25	25
Isolation, Intersystem, dB	25	25	25	25	25	25	25
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150	-150	-150
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2500	2500–2690
Gain by all Beam Tilts, average, dBi	14.1	14.6	16.5	16.9	17.0	17.6	17.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.5	±0.7	±0.4	±0.5	±0.6	±0.7
Gain by Beam Tilt, average, dBi	2 ° | 14.2 8 ° | 14.2 14 ° | 13.9	2 ° | 14.7 8 ° | 14.7 14 ° | 14.2	2 ° | 16.6 7 ° | 16.7 12 ° | 16.2	2 ° | 16.8 7 ° | 17.1 12 ° | 16.7	2 ° | 16.9 7 ° | 17.2 12 ° | 16.7	2 ° | 17.5 7 ° | 17.9 12 ° | 17.3	2 ° | 16.9 7 ° | 17.5 12 ° | 17.0
Beamwidth, Horizontal Tolerance, degrees	±3.9	±3.9	±5.7	±2.7	±3.1	±7.9	±8
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.8	±0.7	±0.5	±0.6	±0.4	±0.2
USLS, beampeak to 20° above beampeak, dB	16	18	14	15	14	14	14
Front-to-Back Total Power at 180° ± 30°, dB	20	20	31	31	28	28	26
CPR at Boresight, dB	21	20	18	18	19	19	20
CPR at Sector, dB	8	6	8	8	7	8	5

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	685.0 N @ 150 km/h 154.0 lbf @ 150 km/h
Wind Loading, lateral	232.0 N @ 150 km/h 52.2 lbf @ 150 km/h
Wind Loading, maximum	889.0 N @ 150 km/h 199.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	498.0 mm | 19.6 in
Depth	197.0 mm | 7.8 in
Net Weight, without mounting kit	35.1 kg | 77.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

Packed Dimensions

Length	2010.0 mm | 79.1 in
Width	608.0 mm | 23.9 in
Depth	352.0 mm | 13.9 in
Shipping Weight	49.0 kg | 108.0 lb

Regulatory Compliance/Certifications

Agency	**Classification**
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system