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: **EM-SPRINT-128-191003** – Sprint notice of intent to modify an existing telecommunications facility located at 91 Mountain Road, Simsbury, Connecticut.

Dear Mr. Shappy:

The Connecticut Siting Council (Council) is in receipt of your correspondence of October 29, 2019 submitted in response to the Council's October 9, 2019 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification 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: Tuesday, October 29, 2019 10:03 AM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-SPRINT-128-191003 (91 Mountain Road, Simsbury)
Attachments: 17159.04 - CT03XC071 - Mount Analysis Rev 0_19.10.28.pdf; em-sprint-128-191003 _incompleteltr_MountainRd.pdf

Evan,

Please see attached soft copies of the mount 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 3:11 PM
To: 'jshappy@transcendwireless.com' <jshappy@transcendwireless.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for EM-SPRINT-128-191003 (91 Mountain Road, Simsbury)

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

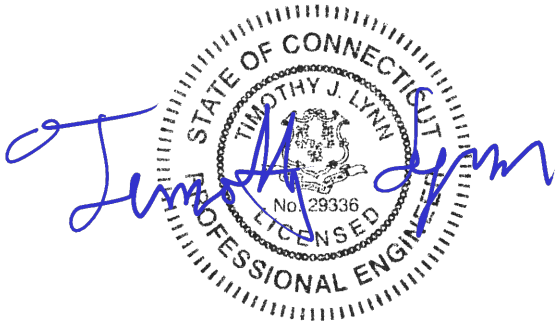
Sprint Site Ref: CT03XC071

Wintonbury Road
Simsbury, CT

Centek Project No. 17159.04

Date: October 28, 2019

Max Stress Ratio = 37.8%



Prepared for:

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

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CENTEK engineering

Centered on Solutions℠

October 28, 2019

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

Re: Structural Letter ~ Antenna Mount
Sprint – Site Ref: CT03XC071
27 Wintonbury Road
Simsbury, CT 06070

Centek Project No. 17159.04

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 existing mount, consisting of three (3) 12-ft T-Arms 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:
  T-Arms: Three (3) Commscope NNVV-65B-R4 panel antennas, three (3) Nokia AAHC panel antennas, six (6) RRH 800MHz 2X50W remote radio heads and three (3) RRH 1900MHz 4x45 remote radio heads mounted on three (3) existing 12-ft T-Arms with a RAD center elevation of 75-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 93 mph for Simsbury 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

Subject: TIA-222-G Loads

Location: Simsbury, CT

Rev. 0: 10/28/19

Prepared by: F.J.P Checked by: T.J.L.
Job No. 17159.04

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

Wind Speeds

Basic Wind Speed	$V := 93$	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 =	$h := 100$	ft	(User Input)
Height to Center of Antennas =	$z_{Sprint} := 75$	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)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H = 0.85$		(User Input)

$G_H :=$

Output

Wind Direction Probability Factor =

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

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

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

Importance Factors =

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

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

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

$$K_{iz} := \left(\frac{z_{Sprint}}{33}\right)^{0.1} = 1.086$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{\frac{0.35}{2}} = 2.171$$

$$Kz_{Sprint} := 2.01 \cdot \left(\left(\frac{z_{Sprint}}{zg}\right)\right)^{\alpha} = 1.191$$

Velocity Pressure w/o Ice Antennas = $qz_{Sprint} := 0.00256 \cdot K_d \cdot Kz_{Sprint} \cdot V^2 \cdot I_{Wind} = 22$ psf

Velocity Pressure with Ice Antennas = $qz_{ice.Sprint} := 0.00256 \cdot K_d \cdot Kz_{Sprint} \cdot V_i^2 \cdot I_{Wind} = 6$ psf

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

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 =	$F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 234$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.9$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 93$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 12.7$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 88$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 6.4$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 44$	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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 363$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 363$	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 =	$F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 80$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.7$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 39$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 5$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 33$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.9$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 19$	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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5195$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 168$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 168$	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 =	$F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 33$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 25$	lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.4$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 16$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 13$	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 =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2980$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 97$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 97$	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 =	$F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 48$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 2.1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz_{Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 48$	lbs

Wind Load (with ice)

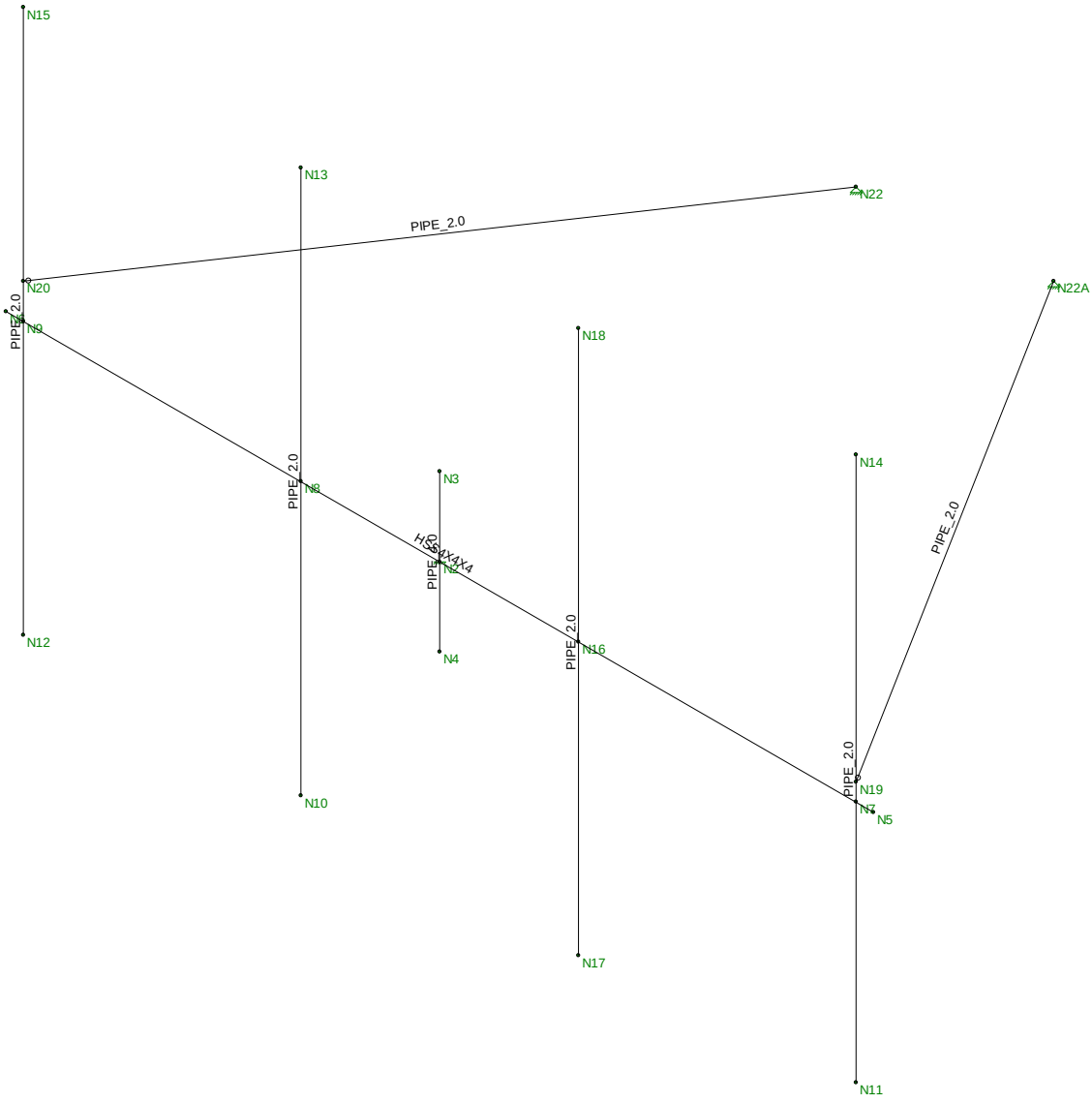
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.3$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 3.3$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 22$	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 =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 4236$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 137$	lbs
	$W_{ICERRUS} \cdot N_{RRUS} = 137$	



Envelope Only Solution

Centek		
FJP	CT03XC071 - Mount	Oct 28, 2019 at 10:27 AM
17159.04	Member Framing	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
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	Horz	HSS4X4X4	Beam	Pipe	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
3	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Vert	PIPE_4.0	Column	Pipe	A53 Grade B	Typical	2.96	6.82	6.82	13.6
5	Stabilizers	PIPE_2.0	Beam	RECT	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M2	Vert	2.25			Lbyy						Lateral
2	M3	Horz	12.5	Segment	Segment	Segment	Segment					Lateral
3	M4	Antenna Mast	7.833			Lbyy						Lateral
4	M5	Antenna Mast	7.833			Lbyy						Lateral
5	M6	Antenna Mast	7.833			Lbyy						Lateral
6	M7	Antenna Mast	7.833			Lbyy						Lateral
7	M8	Stabilizers	8.725			Lbyy						Lateral
8	M9	Stabilizers	8.725			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M2	N3	N4			Vert	Column	Pipe	A53 Gra...	Typical
2	M3	N6	N5			Horz	Beam	Pipe	A500 Gr....	Typical
3	M4	N12	N15			Antenna Mast	Column	Pipe	A53 Gra...	Typical
4	M5	N11	N14			Antenna Mast	Column	Pipe	A53 Gra...	Typical
5	M6	N10	N13			Antenna Mast	Column	Pipe	A53 Gra...	Typical
6	M7	N17	N18			Antenna Mast	Column	Pipe	A53 Gra...	Typical
7	M8	N20	N22			Stabilizers	Beam	RECT	A53 Gra...	Typical
8	M9	N19	N22A			Stabilizers	Beam	RECT	A53 Gra...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N2	0	0	3	0	
2	N3	0	1.125	3	0	
3	N4	0	-1.125	3	0	
4	N5	6.25	0	3	0	
5	N6	-6.25	0	3	0	
6	N7	6	0	3	0	
7	N8	-2	0	3	0	
8	N9	-6	0	3	0	
9	N10	-2	-3.916667	3	0	
10	N11	6	-3.5	3	0	
11	N12	-6	-3.916667	3	0	
12	N13	-2	3.916667	3	0	
13	N14	6	4.333333	3	0	
14	N15	-6	3.916667	3	0	
15	N16	2	0	3	0	
16	N17	2	-3.916667	3	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
17	N18	2	3.916667	3	0	
18	N19	6	.25	3	0	
19	N20	-6	.5	3	0	
20	N22	-1.424167	.25	-4.424167	0	
21	N22A	1.424167	.5	-4.424167	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	N22	Reaction	Reaction	Reaction			
2	N22A	Reaction	Reaction	Reaction			
3	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Y	-.039	.25
2	M4	Y	-.039	7.583
3	M5	Y	-.052	2.833
4	M5	Y	-.052	5
5	M6	Y	-.069	2
6	M6	Y	-.07	6
7	M5	Y	-.069	6

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Y	-.182	.25
2	M4	Y	-.182	7.583
3	M5	Y	-.084	2.833
4	M5	Y	-.084	5
5	M6	Y	-.097	2
6	M6	Y	-.137	6
7	M5	Y	-.097	6

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	X	.022	.25
2	M4	X	.022	7.583
3	M5	X	.01	2.833
4	M5	X	.01	5
5	M6	X	.013	2
6	M6	X	.022	6
7	M5	X	.013	6

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	X	.047	.25
2	M4	X	.047	7.583
3	M5	X	.02	2.833

Member Point Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
4	M5	X	.02	5
5	M6	X	.025	2
6	M6	X	.048	6
7	M5	X	.025	6

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Z	.044	.25
2	M4	Z	.044	7.583
3	M5	Z	.017	2.833
4	M5	Z	.017	5
5	M6	Z	.016	2
6	M6	Z	.022	6
7	M5	Z	.016	6

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M4	Z	.117	.25
2	M4	Z	.117	7.583
3	M5	Z	.04	2.833
4	M5	Z	.04	5
5	M6	Z	.033	2
6	M6	Z	.048	6
7	M5	Z	.033	6

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

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.002	.002	0	0
2	M5	X	.002	.002	0	0
3	M6	X	.002	.002	0	0
4	M7	X	.002	.002	0	0
5	M8	X	.002	.002	0	0
6	M9	X	.002	.002	0	0
7	M2	X	.002	.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.007	.007	0	0
2	M5	X	.007	.007	0	0
3	M6	X	.007	.007	0	0
4	M7	X	.007	.007	0	0
5	M8	X	.007	.007	0	0
6	M9	X	.007	.007	0	0
7	M2	X	.008	.008	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	.002	.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
2	M7	Z	.002	.002	0	0
3	M6	Z	.002	.002	0	0
4	M5	Z	.002	.002	0	2.833
5	M5	Z	.002	.002	5	0
6	M8	Z	.002	.002	0	0
7	M9	Z	.002	.002	0	0
8	M2	Z	.002	.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	.007	.007	0	0
2	M7	Z	.007	.007	0	0
3	M6	Z	.007	.007	0	0
4	M5	Z	.007	.007	0	2.833
5	M8	Z	.007	.007	0	0
6	M9	Z	.007	.007	0	0
7	M5	Z	.007	.007	5	0
8	M2	Z	.008	.008	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfac...
1	Self Weight	None		-1						
2	Dead Load	None					7			
3	Ice Load	None					7			
4	Wind with Ice X	None					7	7		
5	Wind X	None					7	7		
6	Wind with Ice Z	None					7	8		
7	Wind Z	None					7	8		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	1.2D + 1.6..	Yes	Y		1	1.2	2	1.2	5	1.6																
2	0.9D + 1.6..	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0..	Yes	Y		1	1.2	2	1.2	3	1	4	1														
4	1.2D + 1.6..	Yes	Y		1	1.2	2	1.2	7	1.6																
5	0.9D + 1.6..	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0..	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	N22	max	.301	4	.018	1	0	2	0	6	0	6	0	6
2		min	-.051	2	-.002	5	-.54	4	0	1	0	1	0	1
3	N22A	max	-.034	3	.031	4	-.02	2	0	6	0	6	0	6
4		min	-.223	4	.014	2	-.413	4	0	1	0	1	0	1
5	N2	max	-.009	6	1.696	6	.063	3	.021	3	-.113	3	.623	1
6		min	-.858	2	.625	2	-.37	5	.005	2	-.264	4	-.736	6
7	Totals:	max	0	6	1.733	6	0	3						

Envelope Joint Reactions (Continued)

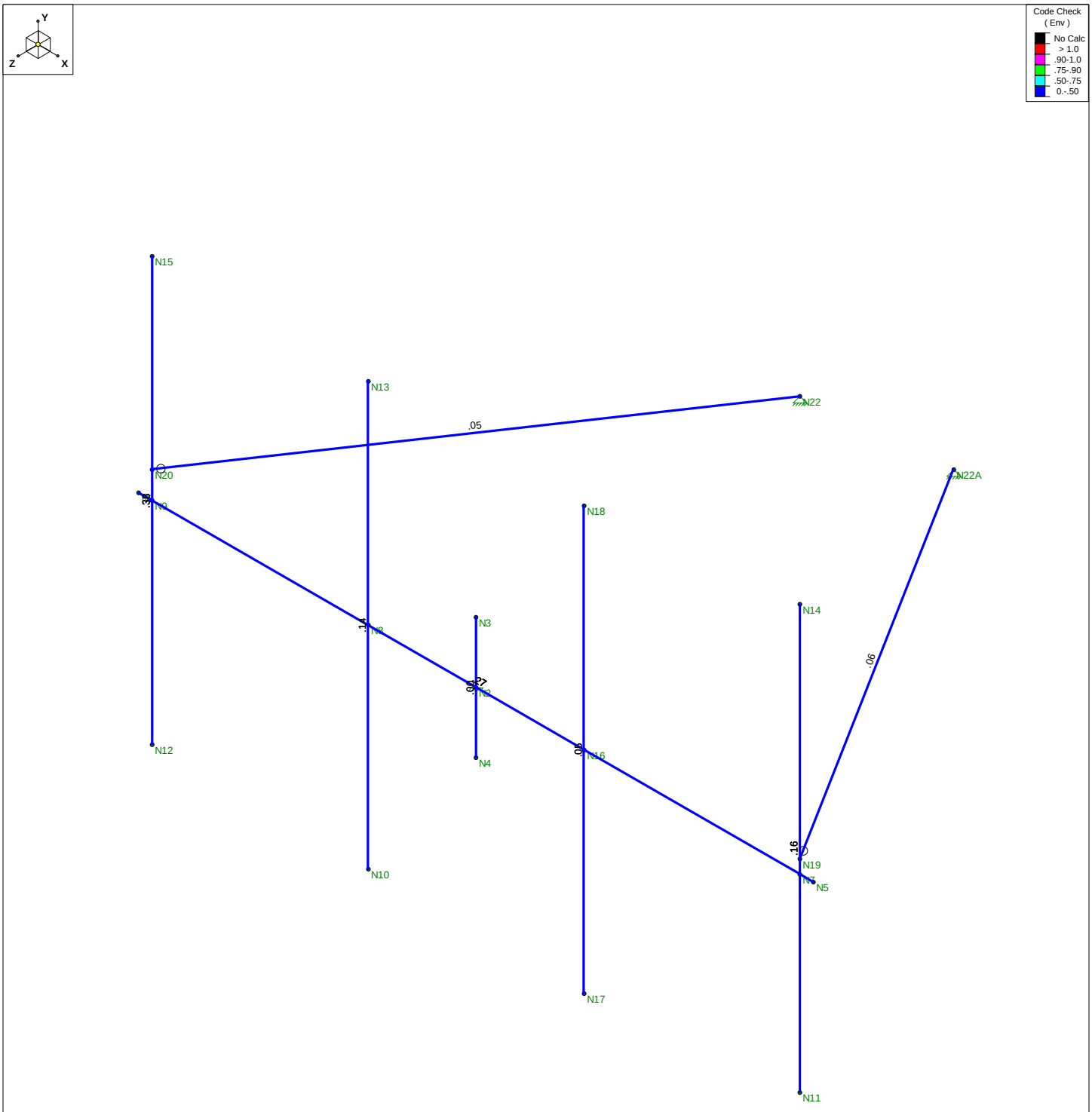
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
8		min	-.973	1	.653	2	-1.316	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N2	max	0	6	0	6	0	6	0	6	0	6	0	6
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N3	max	0	2	0	5	0	5	2.851e-06	5	0	6	0	6
4		min	0	4	0	1	0	1	0	1	0	1	-2.851e-06	1
5	N4	max	0	2	0	5	0	5	0	3	0	6	2.851e-06	2
6		min	0	4	0	1	0	1	-2.851e-06	4	0	1	0	4
7	N5	max	0	2	-.145	5	-.012	5	8.33e-04	5	5.849e-04	6	-2.716e-03	5
8		min	0	4	-.421	3	-.03	3	-6.198e-05	3	2.914e-04	2	-8.198e-03	3
9	N6	max	0	1	-.099	5	0	5	-2.16e-07	2	-1.026e-06	2	8.346e-03	3
10		min	0	6	-.442	3	-.016	6	-1.191e-03	4	-3.504e-04	6	1.641e-03	5
11	N7	max	0	2	-.137	5	-.011	5	8.33e-04	5	5.849e-04	6	-2.716e-03	5
12		min	0	4	-.396	3	-.028	3	-6.198e-05	3	2.914e-04	2	-8.198e-03	3
13	N8	max	0	1	-.016	2	.003	5	-7.2e-08	2	1.283e-04	5	5.012e-03	6
14		min	0	6	-.068	6	-.002	3	-3.168e-04	4	-1.749e-04	3	1.157e-03	2
15	N9	max	0	1	-.094	5	.001	5	-2.16e-07	2	-1.026e-06	2	8.346e-03	3
16		min	0	6	-.417	3	-.015	3	-1.191e-03	4	-3.504e-04	6	1.641e-03	5
17	N10	max	.25	3	-.016	2	.097	5	-7.18e-08	2	1.283e-04	5	5.394e-03	3
18		min	.057	5	-.068	6	-.001	3	-2.434e-03	5	-1.749e-04	3	1.217e-03	5
19	N11	max	-.114	5	-.137	5	-.013	2	1.842e-05	6	5.849e-04	6	-2.711e-03	5
20		min	-.338	3	-.396	3	-.03	6	-1.38e-04	4	2.914e-04	2	-7.995e-03	3
21	N12	max	.444	3	-.094	5	.461	5	-2.156e-07	2	-1.026e-06	2	9.92e-03	3
22		min	.077	5	-.418	3	-.012	3	-1.363e-02	5	-3.504e-04	6	1.638e-03	5
23	N13	max	.051	2	-.016	2	.094	5	2.504e-03	4	1.283e-04	5	5.058e-03	6
24		min	-.237	6	-.068	6	-.003	3	-2.239e-05	3	-1.749e-04	3	-1.658e-03	2
25	N14	max	.464	3	-.137	5	.189	5	4.617e-03	4	5.849e-04	6	-2.663e-03	5
26		min	.138	5	-.397	3	-.032	3	-7.581e-05	3	2.914e-04	2	-9.118e-03	3
27	N15	max	.119	2	-.094	5	.325	5	1.074e-02	5	-1.026e-06	2	8.266e-03	6
28		min	-.387	6	-.418	3	-.02	3	-9.46e-05	3	-3.504e-04	6	-4.365e-03	2
29	N16	max	0	2	-.022	5	0	5	2.777e-04	5	3.245e-04	3	-1.627e-03	5
30		min	0	4	-.06	3	-.004	3	-2.066e-05	3	5.855e-05	5	-4.585e-03	3
31	N17	max	-.056	2	-.022	5	.028	5	-1.03e-05	2	3.245e-04	3	-9.16e-04	2
32		min	-.21	6	-.06	3	-.003	3	-8.869e-04	4	5.855e-05	5	-4.465e-03	6
33	N18	max	.223	3	-.022	5	.054	5	1.441e-03	5	3.245e-04	3	-1.628e-03	5
34		min	.076	5	-.06	3	-.005	3	-2.067e-05	3	5.855e-05	5	-4.786e-03	3
35	N19	max	.025	3	-.137	5	-.007	5	1.499e-03	5	5.849e-04	6	-2.649e-03	5
36		min	.008	5	-.396	3	-.028	3	-7.474e-05	3	2.914e-04	2	-8.364e-03	3
37	N20	max	-.005	2	-.094	5	.001	5	1.442e-03	5	-1.026e-06	2	8.209e-03	6
38		min	-.049	6	-.417	3	-.016	3	-9.394e-05	3	-3.504e-04	6	1.437e-04	2
39	N22	max	0	6	0	6	0	6	1.664e-03	1	2.695e-03	2	8.515e-03	6
40		min	0	1	0	1	0	1	7.831e-04	6	5.39e-06	6	9.438e-04	2
41	N22A	max	0	6	0	6	0	6	1.166e-03	4	3.096e-03	1	-2.389e-03	5
42		min	0	1	0	1	0	1	1.648e-04	2	-1.546e-03	5	-8.666e-03	3

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	...	Eqn
1	M2	PIPE_4.0	.001	1.1...	4	.001	1.1...		5	91.742	93.24	10.631	10.631	1	H1-...
2	M3	HSS4X4X4	.273	6.25	3	.030	6.25	y	6	137....	139....	16.181	16.181	...	H1-...
3	M4	PIPE_2.0	.378	3.9...	4	.041	3.9...		4	15.396	32.13	1.872	1.872	...	H1-...
4	M5	PIPE_2.0	.159	3.7...	4	.028	3.5...		4	15.396	32.13	1.872	1.872	...	H1-...
5	M6	PIPE_2.0	.137	3.9...	4	.013	3.9...		4	15.396	32.13	1.872	1.872	...	H1-...
6	M7	PIPE_2.0	.048	3.9...	1	.005	3.9...		1	15.396	32.13	1.872	1.872	...	H1-...
7	M8	PIPE_2.0	.055	4.3...	1	.005	8.7...		1	12.899	32.13	1.872	1.872	...	H1-...
8	M9	PIPE_2.0	.055	4.3...	1	.005	0		1	12.899	32.13	1.872	1.872	...	H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CT03XC071 - Mount	Oct 28, 2019 at 4:14 PM
17159.04	Unity Check	Antenna Mount.r3d

Augment ID: CT03XC071Q17.1

RFDS ID: 111223

SprintVision

RF Design Sheet

Site Identification	
Cascade	CT03XC071
SMS Schedule ID	12456299
SMS Schedule Name	DO Macro Upgrade
PID	
RRU OEM	ALU
Switch OEM	Alcatel Lucent
RFDS Issue Date	2017-08-15 00:00:00.0
RFDS Revision Date	2018-03-29 14:45:54.0
RFDS Revision	5

Filter Analysis Complete	YES
RFDS - Issue Date	08/15/2017
Design Status	Complete
Project Description	DO Macro Upgrade - Add 2500 MHz. Include MIMO.

Battery Backup Cabinet Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	

Junction Box Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Junction Boxes needed at site	

BTS #2 Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Needed at site	

Contact Information	
Engineer Email	Bill.M.Hastings@sprint.com
Sprint Badged RF Engineer	Bill Hastings
RF Engineer Email	Bill.M.Hastings@sprint.com
RF Engineer Phone	978-590-9700
RF Manager	Jonathan Hull
RF Manager Email	Jonathan.B.Hull@Sprint.com
RF Manager Phone	617-233-2920

Carrier Count	
2500 LTE	3
1900 LTE	1
1900 EVDO	
1900 Voice	1
800 LTE	1
800 Voice	1

UE Relay Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
UE Relay Azimuth	
Manufacturer	
UE Relay CL Height (meters)	

ALU Top Hat Model	
Model Number	SPR13MW0264A1
Weight (Lbs.)	110
Dimensions (In.)	10.6 x 29.5 x 20.1
Manufacturer	ALU
Top Hat Quantity	1

Power Protection Cabinet Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Power Protection Cabinet	

Location Details	
Latitude	41.89244999
Longitude	-72.76953888
Market	Northern Connecticut
Region	Northeast
City	Simsbury
State	CT
Zip Code	CT/06070
County	Hartford

2500MHz	3
1900MHz	3
800MHz	3

GPS Antenna Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
GPS Antenna needed at site	

Repeater Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	

Growth Cabinet Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	

BTS #1 Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
Number of BTS #1	

A&E Drawing Requirements

03/14/2018 (SP): RFDS revised to include MIMO. 02/13/2018 (SP): RFDS revised to change to Dual Antennas due to KMW backorder. 12/13/2017 (WR): RFDS revised to replace NV dual band antenna with KMW 16 port tri-band antenna for 1900 2T4R, 800 2T4R and 2500 8T8R.
12/11/2017 (WR): RFDS revised to Keep Existing NV Antenna for 800/1900 and add 1 800/2500 antenna for LTE2.5 8T8R and enhance 2R for 800 MHz.
11/03/2017 (WR): RFDS revised to replace existing NV dual band antenna with Commscope 10 port tri-band antenna and add diplexers for ground mount 1900/800/2500 RRUs.

Additional RF Notes Special Construction Requirements

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11/03/2017 (WR): RFDS revised to replace existing NV dual band antenna with Commscope 10 port tri-band antenna and add diplexers for ground mount 1900/800/2500 RRUs.

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Radio Model						
Model Number	Nokia MIMO Integrated Radio/Antenna	Nokia MIMO Integrated Radio/Antenna	Nokia MIMO Integrated Radio/Antenna	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	Refer to Antenna model for details	Refer to Antenna model for details	Refer to Antenna model for details	N/A	N/A	N/A
Manufacturer	Nokia	Nokia	Nokia	N/A	N/A	N/A
Number of RRUs needed	1	1	1	0	0	0
Filter Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 2						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A		N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 3						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions		N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1						
Model Number	MIMO Upgrade Hybrid Nokia	MIMO Upgrade Hybrid Nokia	N/A	N/A	N/A	N/A
Weight (Lbs.)	2.307	2.307	N/A	N/A	N/A	N/A
Dimensions (In.)	1.689	1.689	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1 Qty						
Power Junction Cylinder Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Power Junction Cylinder Qty	0	0	0	0	0	0
Optical Junction Cylinder Qty needed						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Optical Junction Cylinder Qty needed	0	0	0	0	0	0

Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Radio Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Number of RRUs needed	0	0	0	0	0	0
Filter Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 2						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A		N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 3						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions		N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1 Qty						
Power Junction Cylinder Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Power Junction Cylinder Qty	0	0	0	0	0	0
Optical Junction Cylinder Qty needed						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Optical Junction Cylinder Qty needed	0	0	0	0	0	0

Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Radio Model						
Model Number	RRH-2x50-800	RRH-2x50-800	RRH-2x50-800	N/A	N/A	N/A
Weight (lbs)	69.1	69.1	69.1	N/A	N/A	N/A
Dimensions	16 x 13 x 10	16 x 13 x 10	16 x 13 x 10	N/A	N/A	N/A
Manufacturer	ALU	ALU	ALU	N/A	N/A	N/A
Number of RRUs needed	1	1	1	0	0	0
Filter Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 2						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A		N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Filter Model 3						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions		N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Trunk Cable 1 Qty						
Power Junction Cylinder Model						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Power Junction Cylinder Qty	0	0	0	0	0	0
Optical Junction Cylinder Qty needed						
Model Number	N/A	N/A	N/A	N/A	N/A	N/A
Weight (Lbs.)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions (In.)	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Optical Junction Cylinder Qty needed	0	0	0	0	0	0

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RF Design Sheet

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1						
Model Number	AAHC	AAHC	AAHC			
Weight (lbs)	103.7	103.7	103.7	N/A	N/A	N/A
Dimensions	25.6 x 19.7 x 9.64	25.6 x 19.7 x 9.64	25.6 x 19.7 x 9.64	N/A	N/A	N/A
Manufacturer	Nokia	Nokia	Nokia	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qtyl	2.5 Jumper | 8	2.5 Jumper | 8	2.5 Jumper | 8	N/A | 0	N/A | 0	N/A | 0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	75.0000024	75.0000024	75.0000024	N/A	N/A	N/A
Antenna 1 Electrical DT	2	2	2	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
Antenna2						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Top Jumper Make/Mode/Qtyl	N/A | 0	N/A | 0	N/A | 0	N/A | 0	N/A | 0	N/A | 0
Ant 2 RF Top Jumper Diameter	N/A	N/A	N/A	N/A	N/A	N/A
Ant 2 RF Top Jumper Length(ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Azimuth	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Center Line (ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Twist	N/A	N/A	N/A	N/A	N/A	N/A

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RF Design Sheet

Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1						
Model Number	NNVV-65B-R4	NNVV-65B-R4	NNVV-65B-R4			
Weight (lbs)	84.7	84.7	84.7	N/A	N/A	N/A
Dimensions	72 x 19.6 x 7.8	72 x 19.6 x 7.8	72 x 19.6 x 7.8	N/A	N/A	N/A
Manufacturer	CommScope	CommScope	CommScope	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qtyl	800/1900 Jumper 4	800/1900 Jumper 4	800/1900 Jumper 4	N/A 0	N/A 0	N/A 0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	75.0000024	75.0000024	75.0000024	N/A	N/A	N/A
Antenna 1 Electrical DT	3	3	3	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
Antenna2						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	
Ant2 Top Jumper Make/Mode/Qtyl	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0	N/A
Ant 2 RF Top Jumper Diameter	N/A	N/A	N/A	N/A	N/A	N/A
Ant 2 RF Top Jumper Length(ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Azimuth	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Center Line (ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Twist	N/A	N/A	N/A	N/A	N/A	N/A

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RF Design Sheet

Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1						
Model Number	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band			
Weight (lbs)	0	0	0	N/A	N/A	N/A
Dimensions	0 x 0 x 0	0 x 0 x 0	0 x 0 x 0	N/A	N/A	N/A
Manufacturer	-	-	-	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qtyl	800/1900 Jumper | 2	800/1900 Jumper | 2	800/1900 Jumper | 2	N/A | 0	N/A | 0	N/A | 0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	75.0000024	75.0000024	75.0000024	N/A	N/A	N/A
Antenna 1 Electrical DT	5	5	5	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
Antenna2						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	
Ant2 Top Jumper Make/Mode/Qtyl	N/A | 0	N/A | 0	N/A | 0	N/A | 0	N/A | 0	N/A |
Ant 2 RF Top Jumper Diameter	N/A	N/A	N/A	N/A	N/A	N/A
Ant 2 RF Top Jumper Length(ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Azimuth	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Center Line (ft)	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 Twist	N/A	N/A	N/A	N/A	N/A	N/A

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RF Design Sheet

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant1 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 band combined with	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Upper Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Upper Pass Comp band combi with						
Antenna 1 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Low Pass Comp band comb with						
Position Ant 1						
Antenna2 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant2 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 band combined with						
Antenna 2 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Upper Passive Comp Qty needed	0	0	0	0	0	0
Antenna 2 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Lower Passive Component band combined with						
Position Ant 2						

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RF Design Sheet

Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant1 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 band combined with	800MHz	800MHz	800MHz	N/A	N/A	N/A
Antenna 1 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Upper Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Upper Pass Comp band combi with						
Antenna 1 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Low Pass Comp band comb with						
Position Ant 1						
Antenna2 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant2 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 band combined with						
Antenna 2 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Upper Passive Comp Qty needed	0	0	0	0	0	0
Antenna 2 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Lower Passive Component band combined with						
Position Ant 2						

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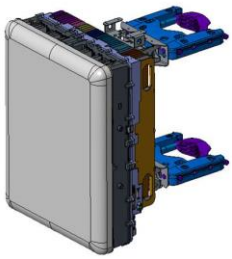
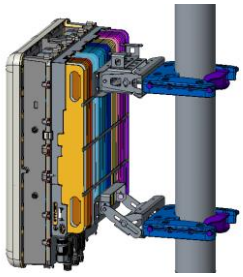
RF Design Sheet

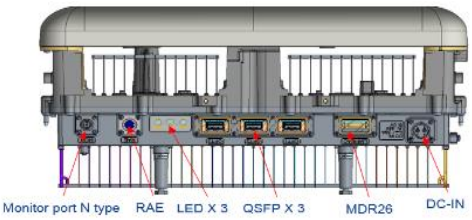
Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Antenna1 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant1 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 band combined with	1900MHz	1900MHz	1900MHz	N/A	N/A	N/A
Antenna 1 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Upper Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Upper Pass Comp band combi with						
Antenna 1 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Low Pass Comp band comb with						
Position Ant 1						
Antenna2 Split						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Accept Proposed Ant2 Model Change?	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 2 band combined with						
Antenna 2 Upper Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant2 Upper Passive Comp Qty needed	0	0	0	0	0	0
Antenna 2 Lower Passive Component Model						
Model Number						
Weight (lbs)	N/A	N/A	N/A	N/A	N/A	N/A
Dimensions	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturer	N/A	N/A	N/A	N/A	N/A	N/A
Ant1 Lower Passive Comp Qty needed	0	0	0	0	0	0
Ant1 Lower Passive Component band combined with						
Position Ant 2						

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

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

COMMSCOPE®

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

Product Specifications

NNVV-65B-R4

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