



# STATE OF CONNECTICUT

## CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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[www.ct.gov/csc](http://www.ct.gov/csc)

September 13, 2017

Kenneth C. Baldwin, Esq.  
Robinson & Cole LLP  
280 Trumbull Street  
Hartford, CT 06103-3597

RE: **PE1133-VER-20151104** – Cellco Partnership d/b/a Verizon Wireless sub-petition for a declaratory ruling for approval of an eligible facility request for modifications to an existing telecommunications facility located at 1249 Hartford Turnpike, Killingly, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) is in receipt of your letter dated September 11, 2017, submitted on behalf of Cellco, requesting a second extension of time to submit a notice of completion of construction and compliance with site-specific conditions, if applicable, for the above-referenced sub-petition.

The Council hereby grants a second one-year extension of time until December 17, 2018, to submit a notice of completion of construction and compliance with site-specific conditions, if applicable, for the above-referenced sub-petition. The Council also acknowledges Cellco's notification regarding installation of a new model remote radio head

This extension is granted with the understanding that the Council will be notified should Cellco need additional time to submit a notice of completion and compliance with site-specific conditions, if applicable, or decides not to proceed with construction.

Thank you for your attention to this matter.

Sincerely,

Melanie A. Bachman  
Executive Director

MAB/CMW/bm



September 11, 2017

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

**Re: PE1133-VER-20151104 – Cellco Partnership d/b/a Verizon Wireless  
1249 Hartford Turnpike, Killingly, Connecticut**

Dear Ms. Bachman:

On December 17, 2015, the Siting Council approved the above-referenced Sub-Petition for modifications to the existing telecommunications facility at 1249 Hartford Turnpike in Killingly, Connecticut. Cellco's approval was extended to December 17, 2017. Due to changes in Cellco's build program, Cellco has not yet completed the approved modifications. We are, therefore, requesting an extension of one year, to December 17, 2018, to complete these modifications.

In addition, due to availability, Cellco has discontinued use of the model remote radio head (RRH) described in PE1133-VER-20151104 and now intends to install a new model RRH (Model B66A RRH4x45) at this facility. Attached is a copy of the new RRH specifications and an updated Rev G. structural analysis verifying that the tower can support this minor change. As modified, Cellco's facility remains compliant with the Sub-Petition requirements and Section 6409(a) of the FCC Order (14-533).

If you have any questions please do not hesitate to contact me.

Sincerely,



Kenneth C. Baldwin

Copy to:  
Elizabeth Jamieson

17084188-v1

# ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

**Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity**, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.



The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

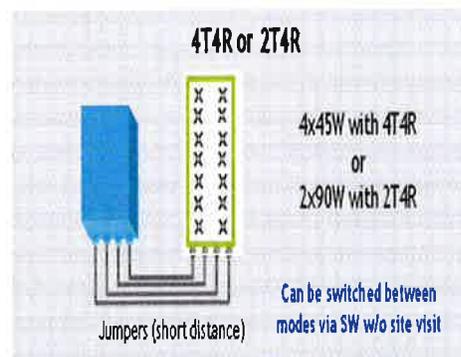
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

## FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

## BENEFITS

- Compact to reduce additional footprint when adding LTE in AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



# TECHNICAL SPECIFICATIONS

Features & Performance	
<b>Number of TX/RX paths</b>	4 duplexed (either 4T4R or 2T4R selectable by SW)
<b>Frequency band</b>	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
<b>Instantaneous bandwidth - #carriers</b>	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
<b>LTE carrier bandwidth</b>	5, 10, 15, 20 MHz
<b>RF output power</b>	2x90W or 4x45W (selectable by SW)
<b>Noise figure – RX Diversity scheme</b>	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity
<b>Receiver Sensivity (FRC A1-3)</b>	-104.5 dBm maximum
<b>Sizes (HxWxD) in mm (in.)</b>	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield)
<b>Volume in Liters</b>	35.5 (with solar shield) 29.7 (without solar shield)
<b>Weight in kg (lb) (w/o mounting HW)</b>	25.8kg (56.8lb) (with solar shield)
<b>DC voltage range</b>	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
<b>DC power consumption</b>	750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
<b>Environmental conditions</b>	-40°C (-40°F) / +55°C (+131°F) UL50E Type 4 Enclosure
<b>Wind load (@150km/h or 93mph)</b>	250N (56lb) Frontal/150N (34lb) Lateral
<b>Antenna ports</b>	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
<b>CPRI ports</b>	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
<b>AISG interfaces</b>	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
<b>Misc. Interfaces</b>	4 external alarms (1 connector) 1 DC connector (2 pins)
<b>Installation conditions</b>	Pole and wall mounting
<b>Regulatory compliance</b>	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

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# STRUCTURAL ANALYSIS REPORT

For

## DAYVILLE CT SC2

1249 HARTFORD PIKE  
EAST KILLINGLY, CT 06243

### Antennas Mounted on the Tower



Prepared for:

**verizon**✓

99 East River Road, 9<sup>th</sup> Floor  
East Hartford, CT 06108

Dated: September 8, 2017

Prepared by:



1600 Osgood Street Bldg. 20N Suite 3090  
North Andover, MA 01845  
(P) 978.557.5553 (F) 978.336.5586  
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### **SCOPE OF WORK:**

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the 150' self supporting tower supporting the proposed Verizon's antennas located at elevation 130' above the ground level.

This report represents this office's findings, conclusions and recommendations pertaining to the support of Verizon's antennas listed below.

Record drawings of the existing tower were not available for our use. The previous structural analysis report prepared by Chappell Engineering Associates LLC, dated November 12, 2013, was available and obtained for our use.

### **CONCLUSION SUMMARY:**

Based on our evaluation, we have determined that the existing tower **IS IN CONFORMANCE** with the ANSI/TIA-222-G Standard for the loading considered under the criteria listed in this report. The tower structure is rated at **83.8%** - (Diagonals at Tower Section T7 from EL.20' to EL.40' Controlling).



**APPURTENANCES CONFIGURATION:**

Tenant	Appurtenances	Elev.	Mount
	DB222	155.5'	Steel Platform
	(3) Station Master 201	155.5'	Steel Platform
	DB420	155.5'	Steel Platform
	(2) PD1142	155'	Steel Platform
	4' Dish	150'	Side Mount Standoff
	4' Dish	140'	Side Mount Standoff
	(3) 4' Yagi	137'	Side Mount Standoff
	4' Yagi	133'	Side Mount Standoff
	Diamond D130J	133'	Side Mount Standoff
	(2) 4' Yagi	132'	Side Mount Standoff
<b>VERIZON</b>	<b>NH65PS-DG-F0M</b>	<b>130'</b>	<b>Side Mount Standoff</b>
<b>VERIZON</b>	<b>RRH2X90 AWS</b>	<b>130'</b>	<b>Side Mount Standoff</b>
	4' Yagi	127'	Side Mount Standoff
	DB222	123'	Side Mount Standoff
	DB225-A	123'	Side Mount Standoff
	3' Omni	87'	Tower Leg

*\*Proposed Verizon Appurtenances shown in Bold.*

**VERIZON EXISTING/PROPOSED COAX CABLES:**

Tenant	Coax Cables	Elev.	Mount
<b>VERIZON</b>	<b>Fiber Cable</b>	130'	Face of Tower

*\*Proposed Verizon Coax Cables shown in Bold.*

**ANALYSIS RESULTS SUMMARY:**

Component	Max. Stress Ratio	Elev. of Component (ft)	Pass/Fail	Comments
Leg	66.9 %	20 – 40	PASS	
Diagonal	<b>83.8 %</b>	20 – 40	PASS	<b>Controlling</b>
Horizontal	16.3 %	120 – 140	PASS	
Top Girt	10.6 %	120 – 140	PASS	
Bottom Girt	14.2 %	120 – 140	PASS	
Mid Girt	5.6 %	120 – 140	PASS	



## **DESIGN CRITERIA:**

1. EIA/TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

County: Windham  
Wind Load: 110 mph (3 second gust)  
Structural Class: II  
Exposure Category: B  
Topographic Category: 1  
Crest Height: 0 ft.  
Nominal Ice Thickness: 1.0 inch

2. Approximate height above grade to proposed antennas: 130'

**\*Calculations and referenced documents are attached\***

## **ASSUMPTIONS:**

1. The tower dimensions and member sizes are as indicated in the previous structural analysis report prepared by Chappell Engineering Associates LLC, dated November 12, 2013.
2. The appurtenances configuration is as stated in the previous structural analysis report prepared by Chappell Engineering Associates LLC, dated November 12, 2013. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.
3. The tower and foundation are properly constructed and maintained. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities at this time.
4. The support mounts and platforms are not analyzed and are considered adequate to support the loading. The analysis is limited to the primary support structure itself.
5. All prior structural modification, if any, are assumed to be as per the data supplied (if available), and installed properly.
6. The foundation of the tower was not checked due to lack of information. As-built foundation drawings and geotechnical report would be required to determine whether the foundation is capable of supporting the proposed loadings.



**SUPPORT RECOMMENDATIONS:**

HDG recommends that the proposed antenna and RRH be mounted on the proposed mount pipes supported by the tower.



**Photo 1:** Photo illustrating the Tower with Appurtenances shown.



## CALCULATIONS



 <b>Hudson Design Group LLC</b> 1600 Osgood Street Bldg. 20N Suite 3090 North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 336-5586	<b>Job</b>	DAYVILLE CT SC2	<b>Page</b>	1 of 7
	<b>Project</b>	150 ft Self Supporting Tower	<b>Date</b>	14:42:28 09/08/17
	<b>Client</b>	VERIZON	<b>Designed by</b>	kw

## Tower Input Data

The main tower is a 3x free standing tower with an overall height of 150.00 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 4.00 ft at the top and 16.00 ft at the base.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Tower is located in Windham County, Connecticut.

Basic wind speed of 110 mph.

Structure Class II.

Exposure Category B.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in tower member design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Tower Section Geometry

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Assembly Database</i>	<i>Description</i>	<i>Section Width</i>	<i>Number of Sections</i>	<i>Section Length</i>
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	150.00-140.00			4.00	1	10.00
T2	140.00-120.00			4.00	1	20.00
T3	120.00-100.00			4.00	1	20.00
T4	100.00-80.00			6.00	1	20.00
T5	80.00-60.00			8.00	1	20.00
T6	60.00-40.00			10.00	1	20.00
T7	40.00-20.00			12.00	1	20.00
T8	20.00-0.00			14.00	1	20.00

## Tower Section Geometry (cont'd)

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Diagonal Spacing</i>	<i>Bracing Type</i>	<i>Has K Brace End Panels</i>	<i>Has Horizontals</i>	<i>Top Girt Offset</i>	<i>Bottom Girt Offset</i>
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	150.00-140.00	2.26	X Brace	No	Steps	9.0000	2.5000
T2	140.00-120.00	2.39	X Brace	No	Steps	4.0000	7.0000
T3	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000



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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
T5	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T8	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 150.00-140.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	5/8	A572-50 (50 ksi)
T2 140.00-120.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 120.00-100.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 80.00-60.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 60.00-40.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 40.00-20.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 20.00-0.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)

### Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 150.00-140.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 140.00-120.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)

### Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 150.00-140.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 140.00-120.00	1	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)



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### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	B	No	Af (CaAa)	150.00 - 0.00	1	1	0.3750	0.3750		0.22
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	150.00 - 0.00	5	5	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	150.00 - 0.00	4	4	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	135.00 - 0.00	5	5	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	130.00 - 0.00	5	5	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM)	A	No	Ar (CaAa)	130.00 - 0.00	1	1	0.6300	0.6300		0.15
T-bracket	B	No	Af (CaAa)	150.00 - 8.00	1	1	3.0000	3.0000		8.40
*****										
1 5/8 Fiber Cable (Verizon - proposed)	C	No	Ar (CaAa)	130.00 - 8.00	1	1	1.9800	1.9800		1.04

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CA <sub>A</sub> Front ft <sup>2</sup>	CA <sub>A</sub> Side ft <sup>2</sup>	Weight lb
PiROD 13' Top Mounted Platform w/handrails (Lattice)	A	None		0.0000	148.00	No Ice 31.30 1/2" Ice 40.20 1" Ice 49.10	31.30 40.20 49.10	1822.00 2452.00 3082.00
(2) PD1142-1	C	From Centroid-Fa ce	8.00 0.00 5.00	0.0000	150.00	No Ice 1.32 1/2" Ice 3.21 1" Ice 5.12	1.32 3.21 5.12	10.00 23.85 49.42
DB222	B	From Centroid-Fa ce	8.00 0.00 5.50	0.0000	150.00	No Ice 1.60 1/2" Ice 2.88 1" Ice 4.16	1.60 2.88 4.16	16.00 20.80 25.60
Station Master 201 Omni	A	From Centroid-Fa ce	8.00 0.00 5.50	0.0000	150.00	No Ice 1.25 1/2" Ice 2.10 1" Ice 2.98	1.25 2.10 2.98	6.00 16.34 32.08
Station Master 201 Omni	B	From Centroid-Fa ce	8.00 0.00 5.50	0.0000	150.00	No Ice 1.25 1/2" Ice 2.10 1" Ice 2.98	1.25 2.10 2.98	6.00 16.34 32.08
Station Master 201 Omni	C	From Centroid-Fa ce	8.00 0.00 5.50	0.0000	150.00	No Ice 1.25 1/2" Ice 2.10 1" Ice 2.98	1.25 2.10 2.98	6.00 16.34 32.08
DB420	C	From Centroid-Fa ce	8.00 0.00 5.50	0.0000	150.00	No Ice 3.33 1/2" Ice 5.99 1" Ice 8.66	3.33 5.99 8.66	34.00 44.20 54.40
1' Side Mount Standoff	C	From Centroid-Fa ce	8.00 0.00 0.00	0.0000	150.00	No Ice 1.00 1/2" Ice 1.50 1" Ice 2.00	1.00 1.50 2.00	30.00 50.00 70.00
3' Side Mount Standoff	A	From Leg	1.50 0.00 0.00	0.0000	135.00	No Ice 1.50 1/2" Ice 2.20 1" Ice 2.90	1.50 2.20 2.90	45.00 70.00 95.00
3' Side Mount Standoff	B	From Leg	1.50 0.00 0.00	0.0000	135.00	No Ice 1.50 1/2" Ice 2.20 1" Ice 2.90	1.50 2.20 2.90	45.00 70.00 95.00
3' Side Mount Standoff	C	From Leg	1.50 0.00 0.00	0.0000	135.00	No Ice 1.50 1/2" Ice 2.20 1" Ice 2.90	1.50 2.20 2.90	45.00 70.00 95.00



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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub>		Weight
			Horz	Vert			Front	Side	
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
4' Yagi antenna	A	From Leg	3.00	0.0000	137.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
4' Yagi antenna	B	From Leg	3.00	0.0000	137.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
4' Yagi antenna	C	From Leg	3.00	0.0000	137.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
4' Yagi antenna	C	From Leg	3.00	0.0000	133.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
3' Side Mount Standoff	C	From Leg	1.50	0.0000	130.00	No Ice	1.50	1.50	45.00
			0.00			1/2" Ice	2.20	2.20	70.00
			0.00			1" Ice	2.90	2.90	95.00
4' Yagi antenna	C	From Leg	3.00	0.0000	132.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
3' Side Mount Standoff	A	From Leg	1.50	0.0000	130.00	No Ice	1.50	1.50	45.00
			0.00			1/2" Ice	2.20	2.20	70.00
			0.00			1" Ice	2.90	2.90	95.00
4' Yagi antenna	A	From Leg	3.00	0.0000	132.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
3' Side Mount Standoff	A	From Leg	1.50	0.0000	129.00	No Ice	1.50	1.50	45.00
			0.00			1/2" Ice	2.20	2.20	70.00
			0.00			1" Ice	2.90	2.90	95.00
Diamond D130J Antenna	A	From Leg	3.00	0.0000	133.00	No Ice	2.49	2.49	2.20
			0.00			1/2" Ice	2.84	2.84	25.62
			0.00			1" Ice	3.21	3.21	53.21
3' Side Mount Standoff	A	From Leg	1.50	0.0000	125.00	No Ice	1.50	1.50	45.00
			0.00			1/2" Ice	2.20	2.20	70.00
			0.00			1" Ice	2.90	2.90	95.00
4' Yagi antenna	A	From Leg	3.00	0.0000	127.00	No Ice	0.80	0.40	10.00
			0.00			1/2" Ice	1.08	0.55	54.43
			0.00			1" Ice	1.37	0.70	103.85
3' Side Mount Standoff	A	From Leg	1.50	0.0000	118.00	No Ice	1.50	1.50	45.00
			0.00			1/2" Ice	2.20	2.20	70.00
			0.00			1" Ice	2.90	2.90	95.00
DB222	A	From Leg	3.00	0.0000	118.00	No Ice	1.60	1.60	16.00
			0.00			1/2" Ice	2.88	2.88	20.80
			5.00			1" Ice	4.16	4.16	25.60
3' Side Mount Standoff	C	From Leg	1.50	0.0000	118.00	No Ice	1.50	1.50	45.00
			0.00			1/2" Ice	2.20	2.20	70.00
			0.00			1" Ice	2.90	2.90	95.00
DB225-A	C	From Leg	3.00	0.0000	118.00	No Ice	3.21	3.21	37.00
			0.00			1/2" Ice	5.78	5.78	48.10
			5.00			1" Ice	8.35	8.35	59.20
Omni 1"x3'	A	From Leg	1.00	0.0000	85.00	No Ice	0.30	0.30	12.00
			0.00			1/2" Ice	0.54	0.54	14.85
			2.00			1" Ice	0.73	0.73	19.79
*****									
2' Side Mount Standoff (VERIZON - proposed)	B	From Leg	1.00	0.0000	130.00	No Ice	1.00	1.00	30.00
			0.00			1/2" Ice	1.50	1.50	50.00
			0.00			1" Ice	2.00	2.00	70.00
NH65PS-DG-F0M w/ Mount Pipe	B	From Leg	2.00	0.0000	130.00	No Ice	1.82	1.82	36.35
			0.00			1/2" Ice	2.71	2.71	67.62



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<b>Client</b>	VERIZON	<b>Designed by</b>	kw

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
RRH 2X90 AWS	B	From Leg	0.00				1" Ice	3.12	3.12	102.85
			1.00		0.0000	130.00	No Ice	2.66	1.59	64.00
			0.00				1/2" Ice	2.88	1.77	84.35
			0.00				1" Ice	3.10	1.96	107.85

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight		
				Horz	Lateral								
				ft	ft	°	°	ft	ft	ft <sup>2</sup>	lb		
SP4-5.2	C	Paraboloid w/o Radome	From Centroid	8.00		0.0000		150.00	4.21	No Ice	13.91	60.00	
				0.00							1/2" Ice	14.47	130.00
				0.00							1" Ice	15.02	210.00
SP4-5.2	C	Paraboloid w/o Radome	From Centroid	8.00		0.0000		140.00	4.21	No Ice	13.91	60.00	
				0.00							1/2" Ice	14.47	130.00
				0.00							1" Ice	15.02	210.00

### 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
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



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Comb. No.	Description
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 Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	150 - 140	2.970	39	0.1873	0.1300
T2	140 - 120	2.565	39	0.1840	0.0787
T3	120 - 100	1.815	39	0.1558	0.0378
T4	100 - 80	1.215	39	0.1232	0.0150
T5	80 - 60	0.759	39	0.0890	0.0078
T6	60 - 40	0.424	39	0.0651	0.0043
T7	40 - 20	0.187	39	0.0411	0.0023
T8	20 - 0	0.050	39	0.0173	0.0009

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	SP4-5.2	39	2.970	0.1873	0.1300	121375
148.00	PIROD 13' Top Mounted Platform w/handrails (Lattice)	39	2.889	0.1867	0.1187	121375
140.00	SP4-5.2	39	2.565	0.1840	0.0787	62591
137.00	4' Yagi antenna	39	2.446	0.1816	0.0678	51059
135.00	3' Side Mount Standoff	39	2.368	0.1794	0.0619	46062
133.00	4' Yagi antenna	39	2.290	0.1769	0.0569	42012
132.00	4' Yagi antenna	39	2.251	0.1755	0.0548	40243
130.00	3' Side Mount Standoff	39	2.175	0.1725	0.0509	37117
129.00	3' Side Mount Standoff	39	2.138	0.1710	0.0492	35729
127.00	4' Yagi antenna	39	2.063	0.1677	0.0462	33243



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Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
125.00	3' Side Mount Standoff	39	1.990	0.1644	0.0436	31081
118.00	3' Side Mount Standoff	39	1.747	0.1525	0.0355	27582
85.00	Omni 1"x3'	39	0.860	0.0969	0.0086	37749

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\phi P_{allow}$ lb	% Capacity	Pass Fail	
T1	150 - 140	Leg	1 1/2	3	-7961.51	54242.80	14.7	Pass	
T2	140 - 120	Leg	1 3/4	39	-39728.90	79148.20	50.2	Pass	
T3	120 - 100	Leg	Pirod 105216	105	-58325.10	142493.00	40.9	Pass	
T4	100 - 80	Leg	Pirod 105216	120	-79999.70	142493.00	56.1	Pass	
T5	80 - 60	Leg	Pirod 105217	135	-101894.00	214859.00	47.4	Pass	
T6	60 - 40	Leg	Pirod 105217	150	-123194.00	214859.00	57.3	Pass	
T7	40 - 20	Leg	Pirod 105217	165	-143644.00	214859.00	66.9	Pass	
T8	20 - 0	Leg	Pirod 105218	180	-163543.00	300681.00	54.4	Pass	
T1	150 - 140	Diagonal	5/8	11	-1902.77	3178.33	59.9	Pass	
T2	140 - 120	Diagonal	3/4	49	-3454.28	6483.66	53.3	Pass	
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	112	-5402.87	13992.00	38.6	Pass	
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	122	-4270.48	11048.30	38.7	Pass	
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	137	-4321.10	8808.76	49.1	Pass	
T6	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	152	-4568.38	7079.23	64.5	Pass	
T7	40 - 20	Diagonal	L2 1/2x2 1/2x3/16	167	-4814.78	5747.98	83.8	Pass	
T8	20 - 0	Diagonal	L3x3x3/16	182	-5768.54	8271.42	69.7	Pass	
T1	150 - 140	Horizontal	3/4	23	-61.41	3311.71	1.9	Pass	
T2	140 - 120	Horizontal	3/4	55	-544.90	3347.61	16.3	Pass	
T1	150 - 140	Top Girt	7/8	4	-320.38	6135.36	5.2	Pass	
T2	140 - 120	Top Girt	7/8	42	-657.60	6201.87	10.6	Pass	
T1	150 - 140	Bottom Girt	7/8	7	-574.89	6135.36	9.4	Pass	
T2	140 - 120	Bottom Girt	7/8	43	-879.61	6201.87	14.2	Pass	
T2	140 - 120	Mid Girt	7/8	46	-345.95	6201.87	5.6	Pass	
							<b>Summary</b>		
							Leg (T7)	66.9	Pass
							Diagonal (T7)	83.8	Pass
							Horizontal (T2)	16.3	Pass
							Top Girt (T2)	10.6	Pass
							Bottom Girt (T2)	14.2	Pass
							Mid Girt (T2)	5.6	Pass
							<b>RATING =</b>	<b>83.8</b>	<b>Pass</b>