Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts and New York

October 6, 2020

Via Electronic Mail

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

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of an Existing Tower at 435 Mill Street, Southington, Connecticut**

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Siting Council ("Council") to approve the shared use of an existing telecommunications tower located on a 2.8-acre parcel at 435 Mill Street in Southington, Connecticut (the "Property"). The Property and tower are owned by the Town of Southington ("Town") and operated by the Southington Water Department. Cellco identifies this site as its "Southington 4 Facility". The existing 120-foot self-supporting lattice tower was approved by the Town of Southington Planning and Zoning Commission on August 21, 2018. (*See* Attachment 1).

Cellco requests that the Council find that the proposed shared use of the existing tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving this request. A copy of this filing is being sent to Southington's Town Manager Mark Sciota; Bill Casarella, Superintendent of the Southington Water Department; and Rob Phillips, Southington's Town Planner.

Background

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and the Town have agreed to the proposed shared use of the Mill Street tower pursuant to mutually acceptable terms and

conditions. Likewise, the Town and Cellco have agreed to the proposed installation of equipment on the ground within a fenced enclosure. The Town has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (*See* owner's authorization letter included in Attachment 2).

Cellco proposes to install six (6) antennas and nine (9) remote radio heads ("RRHs") on the tower at a height of 88 feet above ground level ("AGL")[1]. Cellco will also install an equipment cabinet and a 30-kW diesel-fueled backup generator to the south of the tower within the existing fenced compound. Included in Attachment 3 are Cellco's project plans showing the location of Cellco's proposed site improvements. Attachment 4 contains specifications for Cellco's proposed generator, antennas and RRHs.

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use." Cellco respectfully submits that the shared use of the tower satisfies these criteria.

A. Technical Feasibility. The existing tower is structurally capable of supporting Cellco's antennas, RRHs, antenna mounting frame and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis Report dated September 4, 2020 prepared by Paul J. Ford & Company confirms that the tower can support all of Cellco's proposed tower loading. A copy of the Structural Analysis Report is included in Attachment 5.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower, such as the Town tower. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. In addition, § 16-50x(a) directs the Council to "give such consideration to other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing tower facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested shared use would permit the Applicant to obtain a building permit for the proposed installations.

[1] The tower is also shared by AT&T, T-Mobile and the Town.

C. Environmental Feasibility. The proposed shared use of the Town tower would have minimal environmental effects, for the following reasons:

1. The proposed installation of six (6) antennas and nine (9) RRHs on an antenna mounting frame at a height of 88 feet AGL on the existing 120-foot tower would have an insignificant incremental visual impact on the area around the Property. As mentioned above, Cellco's equipment will be located within a fenced enclosure. Cellco's shared use of the Town tower would, therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing site.

2. Noise associated with Cellco's proposed facility will comply with State and local noise standards. Noise associated with the backup generator is exempt from these same standards.

3. Operation of Cellco's antennas at this site would not exceed the RF emissions standards adopted by the Federal Communications Commission ("FCC"). Included in Attachment 6 of this filing are Far Field approximation tables that demonstrate that the facility will operate well within the FCC's safety standards.

4. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the facility other than periodic maintenance visits to the cell site.

The proposed shared use of the Town tower would, therefore, have a minimal environmental effect, and is environmentally feasible.

D. Economic Feasibility. As previously mentioned, Cellco has entered into an agreement with the Town for the shared use of the existing tower subject to mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible.

E. Public Safety Concerns. As discussed above, the tower is structurally capable of supporting Cellco's antennas, antenna mounting frame, RRHs and all related equipment. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing the

Town tower. In fact, the provision of new and improved wireless service through shared use of the existing tower is expected to enhance the safety and welfare of area residents and members of the general public traveling through the Town of Southington.

Conclusion

A Certificate of Mailing verifying that this filing was sent to the municipal officials and the Property owner is included in Attachment 7.

For the reasons discussed above, the proposed shared use of the existing Town tower at the Property satisfies the criteria stated in C.G.S. § 16-50aa and advances the General Assembly's and the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The Applicant, therefore, respectfully requests that the Council issue an order approving the proposed shared use.

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Mark Sciota, Town Manager
Bill Casarella, Water Department Superintendent
Rob Phillips, Town Planner
Hollis Redding (via email)

ATTACHMENT 1

PLANNING AND ZONING DEPARTMENT

JOHN WEICHSEL MUNICIPAL CENTER – 196 NORTH MAIN STREET
SOUTHINGTON, CONNECTICUT 06489
Phone: (860)276-6248 / Fax: (860)628-3511

August 27, 2018

Southington Water Department
605 West Queen Street
PO Box 111
Southington, CT 06489

RE: Site plan application – 435 and 471 (rear) Mill Street (SPR #1760)

Dear Sir:

Please be advised that on August 21, 2018, the Southington Planning and Zoning Commission voted to approve your site plan application to construct a new 65 ft tall water storage tank and a 120' tall communications tower. The Commission also granted a waiver of the communications tower fall radius.

Please submit six sets of revised plans addressing Engineering comments prior to bidding. Building and zoning permits and a preconstruction meeting will also be required. Please note that this approval is good for a period of five (5) years, which will expire on August 21, 2023. You can request a five year extension prior to the expiration date if the work has not been completed.

Respectfully,

Robert A. Phillips, AICP
Director of Planning and Community Development

cc: Engineering Dept.
Building Dept.
Assessor's Dept.

PLANNING AND ZONING DEPARTMENT

JOHN WEICHSEL MUNICIPAL CENTER – 196 NORTH MAIN STREET
SOUTHINGTON, CONNECTICUT 06489
Phone: (860)276-6248 / Fax: (860)628-3511

August 28, 2018

Southington Water Department
605 West Queen Street
PO Box 111
Southington, CT 06489

RE: Special Permit Approval – 435 and 471 (rear) Mill Street (SPU #605)

Dear Sir:

On August 21, 2018, the Planning and Zoning Commission voted to approve your Special Permit Application to construct a new 65-ft water storage tank and a 120-ft tall communications tower on properties located at 435 and 471 (rear) Mill Street.

The special permit use becomes effective upon the filing of the approved special permit use plan with the Town Planner's office and the filing **of this original approval letter in the office of the Town Clerk**, pursuant to Section 8-3d of the General Statutes of Connecticut. Such plan shall be certified by the Planning and Zoning Commission prior to filing. An approved special permit use not put into effect within one year becomes null and void. A single one year extension may be granted before the approval's first anniversary date (Section 8-03.3).

Respectfully,

Robert A. Phillips, AICP
Director of Planning and Community Development

cc: Town Engineer
Building Dept.
Town Assessor

I:\Planning and Zoning\PZC Meetings 2018\August 21\SPU 605 approval.doc

ATTACHMENT 2

September 4, 2020

Verizon Site Name: Southington 4 CT

Site Address: 435 Mill Street, Southington, CT

RE: Application for Zoning and Permitting in the Town of Southington, County of Hartford CT.

To Whom It May Concern:

This letter authorizes SAI Inc. to file for all necessary administrative approvals, zoning approvals and building permits (local, state and federal) for the purposes of upgrading, installing, operating and maintaining a telecommunications facility at the site/property referenced above on behalf of Verizon Wireless.

All fees or charges associated with any applications or permits, and any conditions placed on the Applicant shall be the responsibility of Verizon Wireless, its subsidiaries and/or agents.

Signature: William M Casarella

Print Name: William M. Casarella

Title: Superintendent, Southington Water Company

Date: 9/4/2020

ATTACHMENT 3

verizon

WIRELESS COMMUNICATIONS FACILITY

SITE NAME: SOUTHINGTON 4 CT

TOWN OF SOUTHINGTON
435 MILL ST.
SOUTHINGTON, CT 06489

PROJECT SUMMARY

SITE NAME:	SOUTHINGTON 4 CT
SITE ADDRESS:	435 MILL ST. SOUTHINGTON, CT 06489
PROPERTY OWNER & MAILING ADDRESS:	TOWN OF SOUTHINGTON 75 MAIN ST. SOUTHINGTON, CT 06489
TOWER OWNER:	TOWN OF SOUTHINGTON 75 MAIN ST. SOUTHINGTON, CT 06489
PARCEL MBLU:	109/ / 120/ /
TOWER COORDINATES:	41° 36' 16.50" N 72° 53' 39.60" W
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DR. WALLINGFORD, CT 06492
VERIZON WIRELESS CONSTRUCTION:	BRYON MORAWSKI - CONSTRUCTION STRUCTURE CONSULTING GROUP
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE, LLP (860) 275-8345

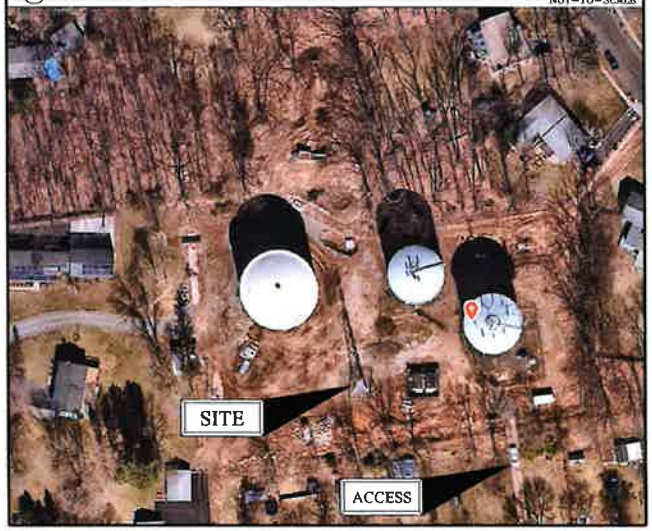
PROJECT DESCRIPTION

- INSTALLATION OF (1) OUTDOOR EQUIPMENT CABINET AND DIESEL FUELED GENERATOR ON A NEW 16'x10' CONCRETE PAD WITHIN A NEW FENCED-IN COMPOUND AREA
- INSTALLATION OF (6) PANEL ANTENNAS AND ASSOCIATED DEVICES ON THE EXISTING TOWER
- INSTALLATION OF (2) GPS ANTENNAS ON EQUIPMENT CANOPY
- INSTALLATION OF CABLING FROM EQUIP. CABINETS TO ANTENNAS
- ELECTRICAL & TELEPHONE SERVICES ROUTED UNDERGROUND TO EXISTING UTILITY DEMARCATION POINTS AT COMPOUND

AERIAL PHOTO

N

NOT-TO-SCALE



DRAWING SCHEDULE

SHEET NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
C-1	SITE LAYOUT
A-1	COMPOUND PLAN, EQUIPMENT PLAN & WEST ELEVATION
A-2	ANTENNA PLAN & EQUIPMENT DETAILS

Cellco Partnership
d/b/a Verizon Wireless

verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LIC ENSURE

STATE OF CONNECTICUT
LICENSED PROFESSIONAL ENGINEER
NO. 22144

DAVID WEINHAUS, P.E.
CT LIC NO 22144

NO.	DATE	SUBMISSIONS
0	09.10.20	REVIEW
1	09.21.20	CONFIRM

DRAWN BY	CHECKED BY
AS	DW

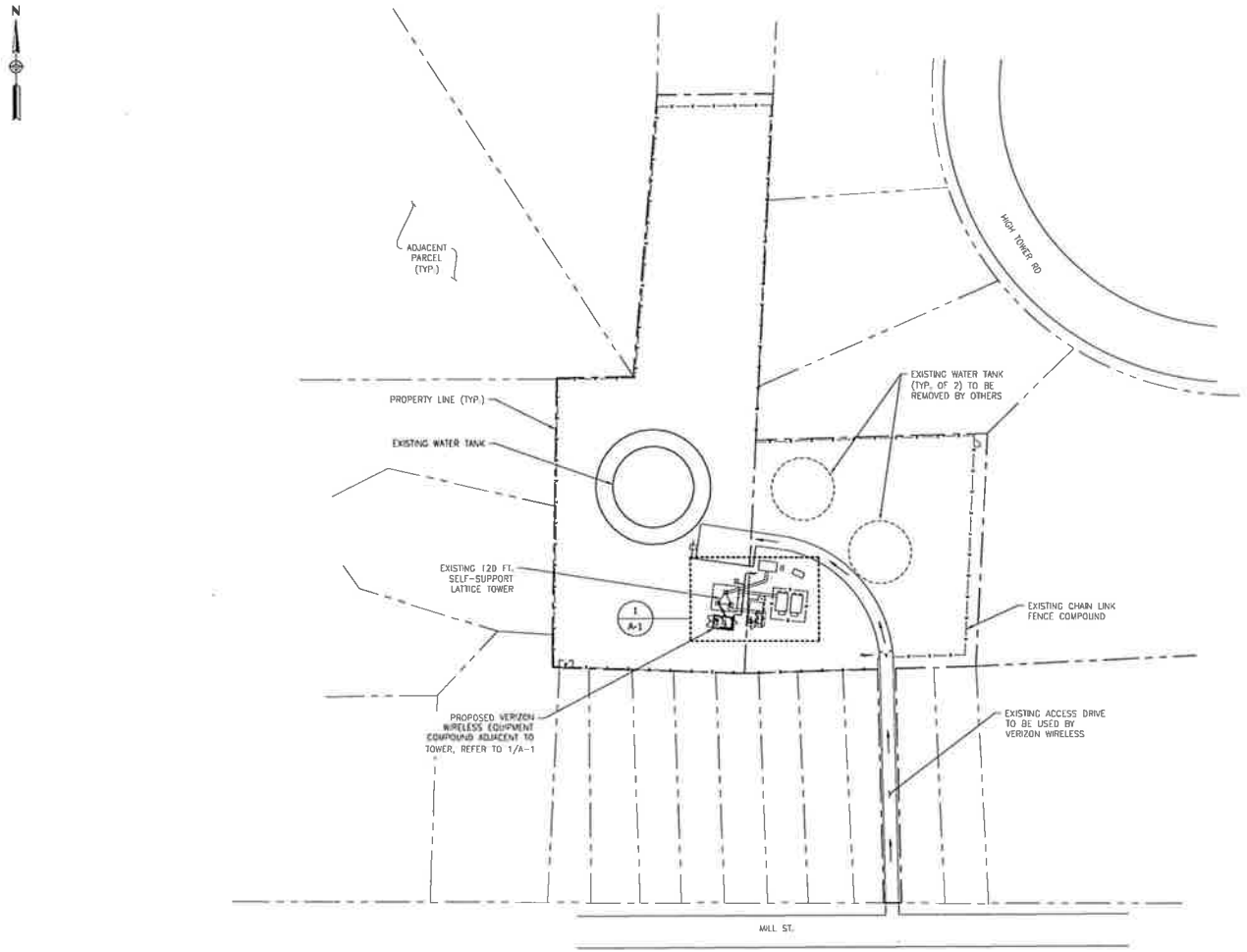
SITE NAME:
SOUTHINGTON 4 CT

PROJECT DESCRIPTION:
NEW BUILD MACRO

PROJECT INFORMATION:
TOWN OF SOUTHINGTON
435 MILL ST.
SOUTHINGTON, CT 06489

DRAWING TITLE:
TITLE SHEET

SHEET NUMBER:
T-1



1 C-1 SITE LAYOUT

Scale: 1"=50'

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSED BY

DANIEL WINSPEAR, JR.
CT REG. NO. 22144

NO	DATE	SUBMISSIONS
0	09.15.20	REVIEW
1	09.17.20	CONSTRUCTION

DRAWN BY: AS

CHECKED BY: DW

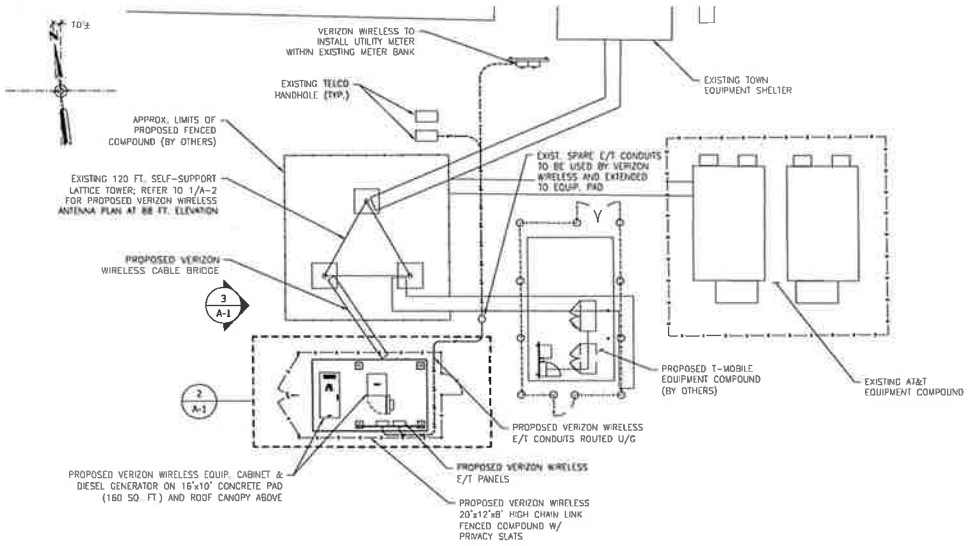
SITE NAME:
SOUTHINGTON 4 CT

PROJECT DESCRIPTION:
NEW BUILD MACRO

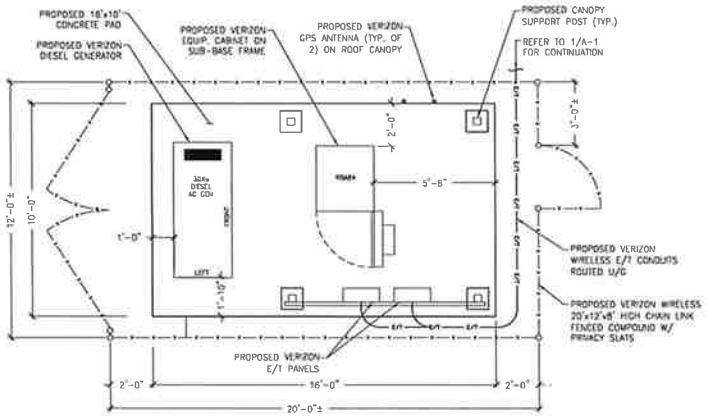
PROJECT INFORMATION:
TOWN OF SOUTHINGTON
435 MILL ST.
SOUTHINGTON, CT 06489

DRAWING TITLE:
SITE LAYOUT

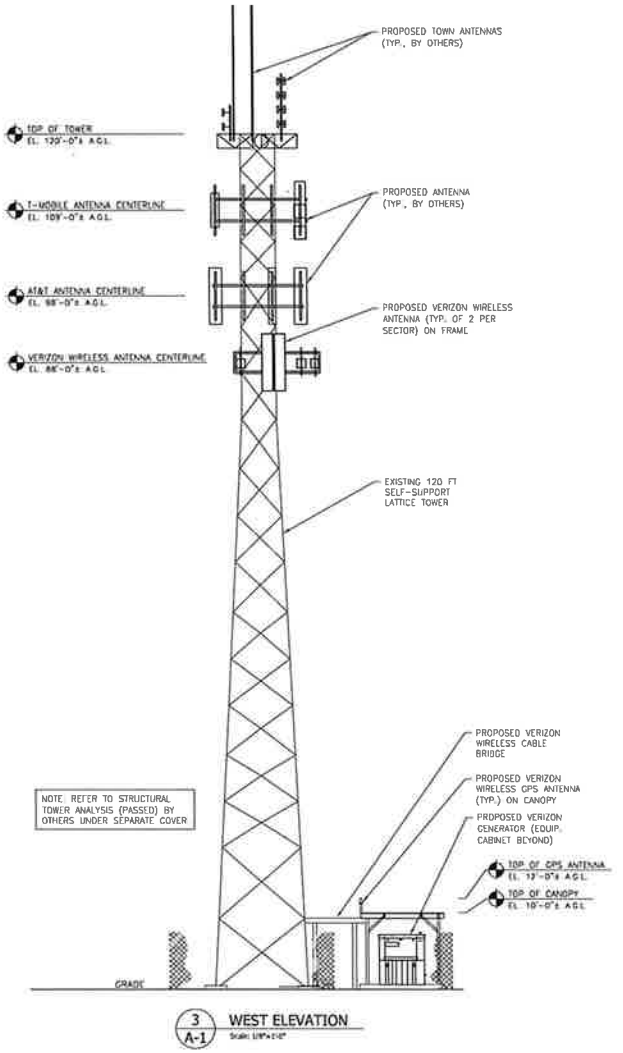
SHEET NUMBER:
C-1



1 A-1 **COMPOUND PLAN**



2 A-1 **EQUIPMENT PLAN**



3 A-1 **WEST ELEVATION**

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

SHAUN WINDSOR, PE
CT LIC. NO. 32144

NO.	DATE	SUBMISSIONS
B	09.19.20	REVISED
A	09.01.20	ISSUED FOR

DRAWN BY	CHECKED BY
AS	DW

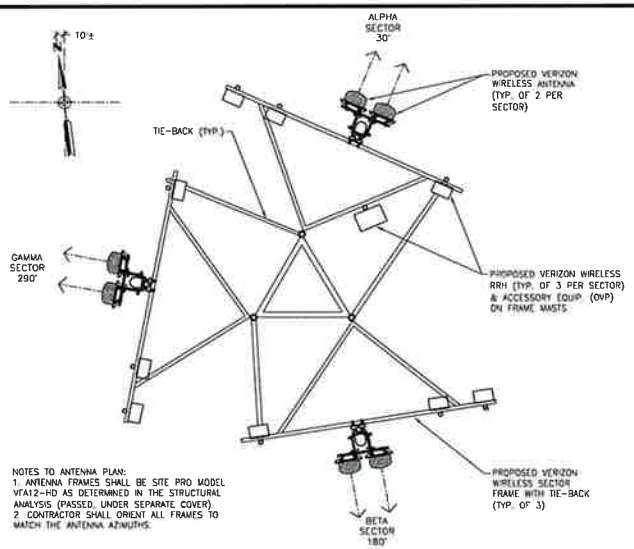
SITE NAME
SOUTHINGTON 4 CT

PROJECT DESCRIPTION
NEW BUILD MACRO

PROJECT INFORMATION
TOWN OF SOUTHINGTON
435 MILL ST.
SOUTHINGTON, CT 06489

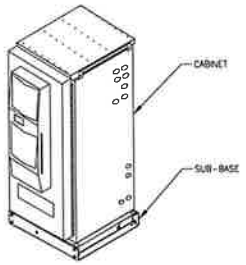
DRAWING TITLE
COMPOUND PLAN, EQUIPMENT PLAN & WEST ELEVATION

SHEET NUMBER
A-1



NOTES TO ANTENNA PLAN:
1. ANTENNA FRAMES SHALL BE SITE PRO MODEL VFA12-HD AS DETERMINED IN THE STRUCTURAL ANALYSIS (PASSED, UNDER SEPARATE COVER).
2. CONTRACTOR SHALL ORIENT ALL FRAMES TO MATCH THE ANTENNA AZIMUTHS.

1 / A-2 **ANTENNA PLAN @ 88 FT. A.G.L.**
Scale: 3/8" = 1'-0"

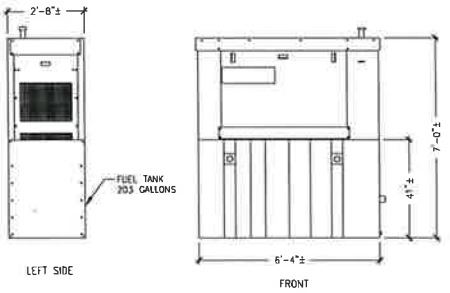


ISOMETRIC

COMMSCOPE EQUIPMENT SPECIFICATIONS				
MODEL #	HEIGHT	WIDTH	DEPTH	WEIGHT
RBA84	85.2"	32.0"	35.4"	1,955 LBS (1)
760238731	6"	32.0"	36.6"	50 LBS (2)

(1) WEIGHT OF CABINET WITH 2-STRINGS OF BATTERIES
(2) ESTIMATED WEIGHT OF SUB-BASE

2 / A-2 **RBA84 EQUIPMENT CABINET**
Scale: 3/4" = 1'-0"



KOHLER EQUIPMENT SPECIFICATIONS				
MODEL #	HEIGHT	WIDTH	LENGTH	WEIGHT (1)
SD030	7'-0"	2'-8"	6'-4"	2,114 LBS

(1) INCLUDES EMPTY BASE TANK

3 / A-2 **30kW DIESEL GENERATOR**
Scale: 1/2" = 1'-0"

COMMSCOPE ANTENNA SPECIFICATIONS			
MODEL #	QTY.	SIZE	ACCESSORY EQUIPMENT
NHH-65B-R2B	3	72.0"Hx11.9"Wx7.1"D; 43.7 LBS. (1)	SIDE-BY-SIDE MOUNTING BRACKET
NHHSS-65B-R2B	3	72.0"Hx11.9"Wx7.1"D; 50.9 LBS. (1)	SIDE-BY-SIDE MOUNTING BRACKET

(1) WEIGHT DOES NOT INCLUDE MOUNTING BRACKET BSAMNT-SBS-1-2 USED FOR NHH 65" ANTENNAS

4 / A-2 **ANTENNA DETAIL**
Scale: N.T.S.

RRH DIMENSIONS 700/850 (B13/B5)				
HEIGHT	WIDTH	DEPTH	WEIGHT	COLOR
15"	15"	8.1"	82.0 LBS	OFF WHITE

5 / A-2 **RRH DETAIL - 700/850**
Scale: N.T.S

RRH DIMENSIONS AWS/PCS (B66/B2)				
HEIGHT	WIDTH	DEPTH	WEIGHT	COLOR
15"	15"	10"	97.5 LBS	OFF WHITE

6 / A-2 **RRH DETAIL - AWS/PCS**
Scale: N.T.S

CBRS RRH SPECIFICATIONS				
HEIGHT	WIDTH	DEPTH	WEIGHT	COLOR
12.1"	8.5"	4.1"	18.6 LBS	LIGHT GREY

7 / A-2 **RRH DETAIL - CBRS**
Scale: N.T.S

RAYCAP OVP SPECIFICATIONS			
HEIGHT	WIDTH	DEPTH	WEIGHT
28.9"	15.7"	10.3"	32 LBS

8 / A-2 **RAYCAP OVP DETAIL**
Scale: N.T.S

Cellco Partnership
d/b/a Verizon Wireless
verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

DAVID WENTHEIL, P.E.
CT LIC. NO. 22144

NO	DATE	SUBMISSIONS
0	09.11.20	REVIEW
1	09.21.20	CSC FILING

DRAWN BY: AS
CHECKED BY: DW

SITE NAME
SOUTHINGTON 4 CT

PROJECT DESCRIPTION
NEW BUILD MACRO

PROJECT INFORMATION
TOWN OF SOUTHINGTON
435 MILL ST.
SOUTHINGTON, CT 06489

DRAWING TITLE
ANTENNA PLAN & EQUIPMENT DETAILS

SHEET NUMBER
A-2

ATTACHMENT 4

30REOZK

30 kW Generator

LEGENDARY KOHLER QUALITY
FOR SMALL SPACES

COMPACT FOOTPRINT

Our 76.5" x 32" rectangular footprint is specially designed for cell tower site applications.

QUIET PERFORMANCE

Our sound enclosure delivers a sound performance of 65 dBA— which is among the quietest available.

RELIABLE POWER

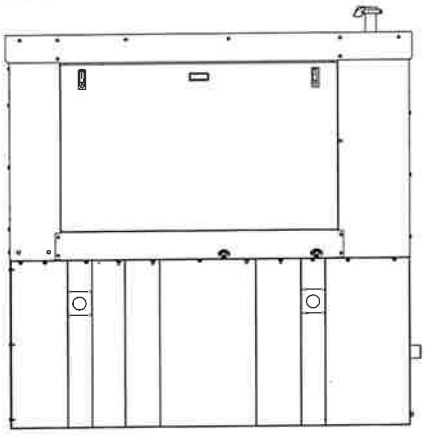
Our direct engine/alternator design eliminates the possibility of generator failure due to improper adjustment or belt breakdowns.

SINGLE-SIDE SERVICE

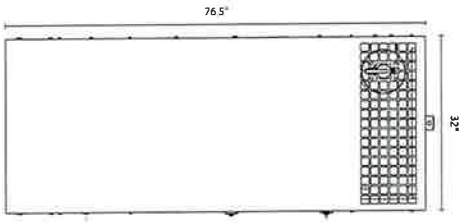
Maintenance is easy. All frequently serviced touch points are located on a single side and accessible by an easy-to-remove lift off door.

30REOZK

Front View



Top View



MODEL		30REOZK
FUEL TYPE		Diesel
ENGINE MAKER		Kohler KDI
OPERATING SPEED	(rpm)	1800
CONTROLLER		Kohler Decision-Maker 3000
VOLTAGE		120/240 1 Phase
TANK GALLON/48 HRS @ FULL LOAD		203
TANK*		Standard, Double Wall
OVERALL DIMENSIONS	L x W x H in	76.5 x 32.0 x 47.0
WEIGHT	lbs	1130
PEOPLESOFT NUMBER		21099077

*Alternative tank sizes, state tanks and 3 phase models available.

KOHLER.
IN POWER. SINCE 1920.

KOHLERPOWER.COM

PRINTED IN U.S.A G12-505 3/18

Model: 30REOZK

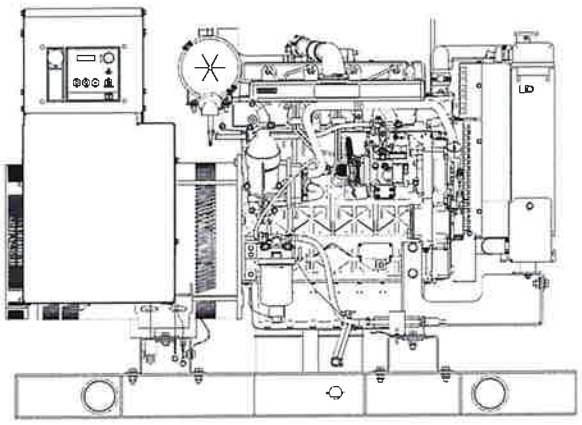
KOHLER. Power Systems 208-600 V Diesel

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Tier 4i EPA-Certified for Stationary Emergency Applications

Ratings Range

		60 Hz
Standby:	**kW**	23-31
	kVA	23-39
Prime:	**kW**	21-28
	kVA	21-35



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- The generator set engine is certified to meet the Environmental Protection Agency (EPA) emergency stationary emissions requirements.
- A one-year limited warranty covers all generator set systems and components. Two- and five-year extended limited warranties are also available.
- Alternator features:
  - Kohler's wound field excitation system with its unique PowerBoost™ design delivers great voltage response and short-circuit capability.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controllers for guaranteed system integration and remote communication. See Controllers on page 3.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.

Generator Set Ratings

				130°C Rise Standby Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
4D5.6	120/208	3	60	29/36	101	26/33	90
	127/220	3	60	29/36	95	26/33	85
	120/240	3	60	29/36	87	26/33	78
	120/240	1	60	23/23	96	21/21	88
	139/240	3	60	29/36	87	26/33	78
	220/380	3	60	27/34	51	25/31	47
	277/480	3	60	29/36	44	26/33	39
	347/600	3	60	29/36	35	26/33	31
4D8.3	120/208	3	60	31/39	108	28/35	97
	127/220	3	60	31/39	102	28/35	92
	120/240	3	60	31/39	93	28/35	84
	120/240	1	60	29/29	121	26/26	108
	139/240	3	60	31/39	93	28/35	84
	220/380	3	60	31/39	59	28/35	53
	277/480	3	60	31/39	47	28/35	42
	347/600	3	60	31/39	37	28/35	34
4E5.6	120/240	1	60	29/29	121	26/26	108
4E8.3	120/240	1	60	31/31	129	27/27	113

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* Standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain the technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Wound Field
Leads: quantity, type	12, Reconnectable 4, 110-120/220-240
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Specifications		Alternator
Peak motor starting kVA:		(35% dip for voltages below)
480 V	4D5.6 (12 lead)	75
480 V	4D8.3 (12 lead)	120
240 V	4E5.6 (4 lead)	44
240 V	4E8.3 (4 lead)	74

Application Data

Engine

Engine Specifications	
Manufacturer	Kohler Diesel
Engine model	KDI2504TM
Engine type	4-Cycle, Turbocharged
Cylinder arrangement	4 Inline
Displacement, L (cu. in.)	2.5 (158)
Bore and stroke, mm (in.)	88 x 102 (3.46 x 4.02)
Compression ratio	18:1
Piston speed, m/min. (ft./min.)	367 (1206)
Main bearings: quantity, type	5, Sleeve
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	36.4 (48.8)
Cylinder head material	Cast Iron
Crankshaft material	Cast Iron
Valve material:	
Intake	Stainless Steel
Exhaust	Stainless Steel
Governor: type, make/model	Stanadyne/Mechanical (or Electronic *)
Frequency regulation, no-load to full-load	Droop, 5% (or Isochronous *)
Frequency regulation, steady state	±0.5%
Frequency	Fixed
Air cleaner type, all models	Dry

* Requires available electronic governor option

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust flow at rated kW, m^3/min. (cfm)	7.8 (275)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	543 (1009)
Maximum allowable back pressure, kPa (in. Hg)	8 (2.4)
Exhaust outlet size at engine hookup, mm (in.)	76.5 (3.0)

Engine Electrical

Engine Electrical System	
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	12
Ampere rating	50
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA):	
Quantity, CCA rating	One, 650
Battery voltage (DC)	12

Fuel

Fuel System	
Fuel supply line, min. ID, mm (in.)	8.0 (0.31)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. lift, engine-driven fuel pump, m (ft.)	3.0 (10.0)
Max. fuel flow, Lph (gph)	46 (12.2)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel filter	
Prefilter	74 Microns
Primary/Water Separator	5 Microns @ 98% Efficiency
Recommended fuel	#2 Ultra Low Sulfur Diesel

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.)	10.7 (11.3)
Oil pan capacity with filter, L (qt.)	11 (11.6)
Oil filter: quantity, type	1, Cartridge
Oil cooler	—

Application Data

Cooling

Radiator System	
Ambient temperature, °C (°F) *	50 (122)
Engine jacket water capacity, L (gal.)	4.4 (1.6)
Radiator system capacity, including engine, L (gal.)	11.4 (3)
Engine jacket water flow, Lpm (gpm)	59.0 (15.6)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	27.0 (1536)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	406 (16.0)
Fan, kWm (HP)	0.6 (0.8)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

* Enclosure reduces ambient temperature capability by 5°C (9°F).

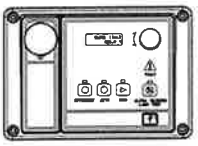
Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m^3/min. (scfm) †	53.8 (1900)
Combustion air, m^3/min. (cfm)	2.7 (96.9)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	10.3 (587)
Alternator, kW (Btu/min.)	6.7 (381)
Max. air intake restriction, kPa (in. Hg)	3.0 (0.89)

† Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption	
Diesel, Lph (gph) at % load	**Standby Rating**
100%	9.8 (2.6)
75%	7.9 (2.1)
50%	5.7 (1.5)
25%	3.4 (0.9)
Diesel, Lph (gph) at % load	**Prime Rating**
100%	9.1 (2.4)
75%	7.2 (1.9)
50%	5.3 (1.4)
25%	3.0 (0.8)

Controller



Decision-Maker® 3000 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-100 for additional controller features and accessories.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Additional Standard Features

- Air Cleaner, Heavy Duty
- Alternator Protection
- Battery Rack and Cables
- Closed Crankcase Ventilation
- Oil Drain and Coolant Drain with Hose Barb
- Oil Drain Extension (with enclosure models only)
- Operation and Installation Literature
- Stainless Steel Fasteners on Enclosure (with enclosure models only)
- Rodent Guards
- Stainless Steel Fasteners on Enclosures

Available Options

Approvals and Listings

- ❑ CSA Approval
- ❑ UL2200 Listing

Enclosed Unit

- ❑ Sound Enclosure (with enclosed critical silencer)
- ❑ Weather Enclosure (with enclosed critical silencer)
- ❑ Stainless Steel Latches and Hinges

Open Unit

- ❑ Exhaust Silencer, Critical (kit: PA-352663)
- ❑ Flexible Exhaust Connector, Stainless Steel

Fuel System

- ❑ Flexible Fuel Lines
- ❑ Fuel Pressure Gauge
- ❑ Subbase Fuel Tanks

Controller

- ❑ Common Failure Relay
- ❑ Input/Output Module
- ❑ Manual Speed Adjust (requires Electronic Governor)
- ❑ Remote Annunciator Panel
- ❑ Remote Emergency Stop
- ❑ Run Relay

Cooling System

- ❑ Block Heater (700 W, 110–120 V)
  Recommended for ambient temperatures below 0°C (32°F).
- ❑ Radiator Duct Flange

Electrical System

- ❑ Alternator Strip Heater
- ❑ Battery
- ❑ Battery Charger, Equalize/Float Type
- ❑ Battery Heater
- ❑ Electronic Governor
- ❑ Line Circuit Breaker (NEMA type 1 enclosure)
- ❑ Line Circuit Breaker with Shunt Trip (NEMA type 1 enclosure)

Miscellaneous

- ❑ Air Cleaner Restriction Indicator
- ❑ Engine Fluids Added
- ❑ Rated Power Factor Testing

Literature

- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

Warranty

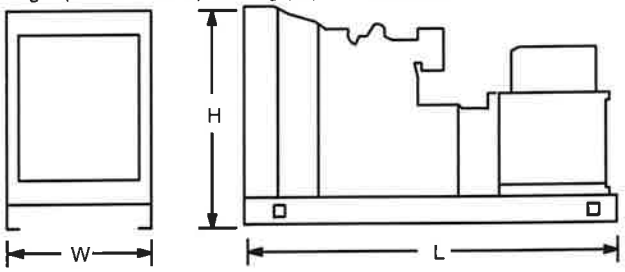
- ❑ 2-Year Basic Limited
- ❑ 5-Year Basic Limited
- ❑ 5-Year Comprehensive Limited

Other Options

- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____

Dimensions and Weights

Overall Size, L x W x H, mm (in.):
Open Unit Skid: 1400 x 813 x 1024 (55.1 x 32.0 x 40.3)
Enclosure Skid: 1938 x 813 x 1174 (76.5 x 32.0 x 47.0)
Weight (radiator model), wet, kg (lb.): 512 (1130)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

NHH-65B-R2B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Effective Projective Area (EPA), frontal	0.26 m^2 | 2.799 ft^2
Effective Projective Area (EPA), lateral	0.22 m^2 | 2.368 ft^2
Grounding Type	RF connector body grounded to reflector and mounting bracket
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, high band	4
RF Connector Quantity, low band	2
RF Connector Quantity, total	6

Remote Electrical Tilt (RET) Information, General

RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

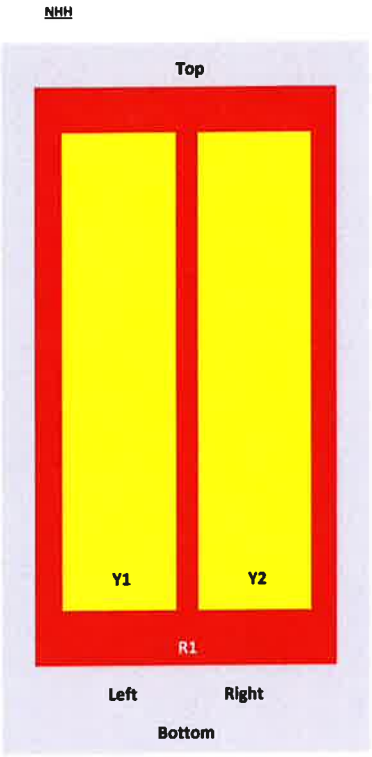
Dimensions

Width	301 mm | 11.85 in
Length	1828 mm | 71.969 in

NHH-65B-R2B

Depth	180 mm | 7.087 in

Array Layout



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	AN[illegible]1
Y1	1695-2360	3-4	2	AN[illegible]2
Y2	1695-2360	5-6		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Polarization	±45°
Total Input Power, maximum	900 W @ 50 °C

Remote Electrical Tilt (RET) Information, Electrical

Protocol	3GPP/AISG 2.0 (Single RET)
Power Consumption, idle state, maximum	2 W

NHH-65B-R2B

Power Consumption, normal conditions, maximum	13 W
Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 3
Internal RET	High band (1) | Low band (1)

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.9	15	17.7	17.9	18.4	18.7
Beamwidth, Horizontal, degrees	65	60	71	69	64	57
Beamwidth, Vertical, degrees	12.4	11.2	5.7	5.2	4.9	4.6
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	13	14	18	18	19	18
Front-to-Back Ratio at 180°, dB	30	29	31	30	29	31
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	30	30	30	30	30	30
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
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50° C, maximum, watts	300	300	300	300	300	300

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.5	14.5	17.3	17.7	18.1	18.5
Gain by all Beam Tilts Tolerance, dB	±0.6	±1.1	±0.4	±0.4	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.4 7 ° | 14.6 14 ° | 14.3	0 ° | 14.7 7 ° | 14.7 14 ° | 14.1	0 ° | 17.2 4 ° | 17.3 7 ° | 17.3	0 ° | 17.6 4 ° | 17.7 7 ° | 17.7	0 ° | 18.0 4 ° | 18.2 7 ° | 18.1	0 ° | 18.3 4 ° | 18.5 7 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2	±2.1	±3	±4.1	±6.5	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.7	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	13	14	16	16	17	15
Front-to-Back Total Power at 180° ± 30°, dB	23	22	27	27	25	25
CPR at Boresight, dB	22	21	23	23	22	19

NHH-65B-R2B

CPR at Sector, dB	10	7	16	13	11	4

Mechanical Specifications

Wind Loading at Velocity, frontal	278.0 N @ 150 km/h | 63.6 lbf @ 150 km/h
Wind Loading at Velocity, lateral	230.0 N @ 150 km/h | 51.7 lbf @ 150 km/h
Wind Loading at Velocity, maximum	120.7 lbf @ 150 km/h | 537.0 N @ 150 km/h
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	409 mm | 16.102 in
Depth, packed	299 mm | 11.772 in
Length, packed	1952 mm | 76.85 in
Net Weight, without mounting kit	19.8 kg | 43.651 lb
Weight, gross	32.3 kg | 71.209 lb

Regulatory Compliance/Certifications

Agency	**Classification**
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant

Included Products

BSAMNT-3	—	Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

NHHSS-65B-R2BT4

10-port sector antenna, 2x 698–896, 4x 1695–2200 and 4x 3100-4200 MHz, 65° HPBW, 2x RETs and 2x SBTs. Both high bands share the same electrical tilt.

- Perfect antenna to add 3.5GHz CBRS to macro sites
- 18dBi max CBRS gain to align with FCC max EIRP limitations
- Low band and mid band performance mirrors the performance of existing NHH hex port antennas
- Narrow beamwidth capacity antenna for higher level of densification and enhanced data throughput
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One LB RET and one HB RET. Both high bands are controlled by one RET to ensure same tilt level for 4x Rx or 4x MIMO
- Interleaved dipole technology providing for attractive, low wind load mechanical package

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Effective Projective Area (EPA), frontal	0.26 m^2 | 2.799 ft^2
Effective Projective Area (EPA), lateral	0.22 m^2 | 2.368 ft^2
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Radome Material	Fiberglass, UV resistant
Radiator Material	Copper | Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	8
RF Connector Quantity, low band	2
RF Connector Quantity, total	10

Remote Electrical Tilt (RET) Information, General

RET Hardware	CommRET v2

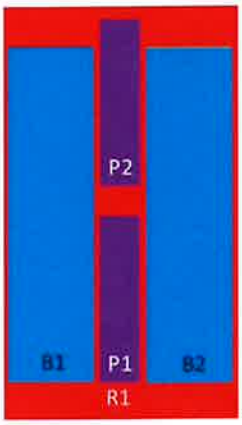
NHHSS-65B-R2BT4

RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

Dimensions

Width	301 mm | 11.85 in
Length	1828 mm | 71.969 in
Depth	181 mm | 7.126 in

Array Layout



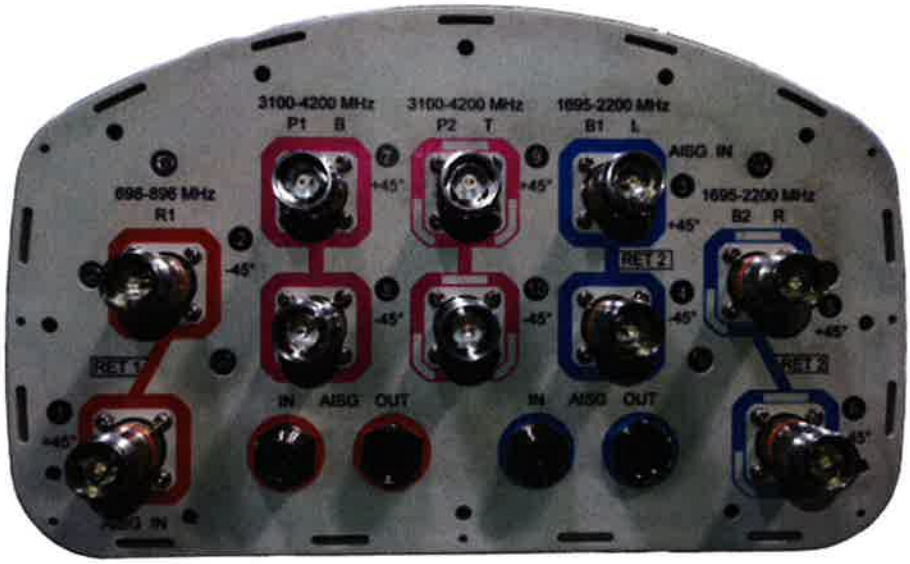
Left Right
Bottom

Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	CPxxxxxxxxxxxxxxR1
B1	1695-2200	3-4	2	CPxxxxxxxxxxxxxxB1
B2	1695-2200	5-6		
P1	3100-4200	7-8	n/a	n/a
P2	3100-4200	9-10	n/a	n/a

(Sizes of colored boxes are not true depictions of array sizes)

Port Configuration

NHHSS-65B-R2BT4



Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2200 MHz | 3100 – 4200 MHz | 698 – 896 MHz
Polarization	±45°
Total Input Power, maximum	1,000 W @ 50 °C

Remote Electrical Tilt (RET) Information, Electrical

Protocol	3GPP/AISG 2.0 (Single RET)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	10 W
Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 3

NHHSS-65B-R2BT4

Internal RET High band (1) | Low band (1)

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	3100–3550	3300–3800	3800–4200
Gain, dBi	14.9	15	17.3	17.7	18	17.7	17.6	17.5
Beamwidth, Horizontal, degrees	65	62	66	63	65	57	64	60
Beamwidth, Vertical, degrees	13.1	11.6	5.5	5.2	4.9	5.6	5.3	4.8
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	4	4	4
USLS (First Lobe), dB	18	17	17	18	19	18	18	19
Front-to-Back Ratio at 180°, dB	26	29	32	30	30	30	36	29
Isolation, Cross Polarization, dB	25	25	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	30	30	30
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	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-140	-140	-140
Input Power per Port at 50° C, maximum, watts	300	300	300	300	300	100	100	100

Electrical Specifications, BASTA

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	3100–3550	3300–3800	3800–4200
Gain by all Beam Tilts, average, dBi	14.6	14.8	17	17.5	17.7	17.3	17.2	17.3
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.4	±0.6	±0.3	±0.4	±0.7	±0.6	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 14.7 7 ° | 14.7 14 ° | 14.5	0 ° | 14.9 7 ° | 15.0 14 ° | 14.5	0 ° | 17.0 3 ° | 17.0 7 ° | 16.9	0 ° | 17.4 3 ° | 17.5 7 ° | 17.4	0 ° | 17.5 3 ° | 17.8 7 ° | 17.6			
Beamwidth, Horizontal Tolerance, degrees	±1.5	±1.5	±7.4	±2.8	±4	±7.2	±8.4	±8
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.7	±0.2	±0.3	±0.4	±0.4	±0.3	±0.4
USLS, beampeak to 20° above beampeak, dB	18	16	14	15	17	14	16	13
Front-to-Back Total Power at 180° ± 30°, dB	21	24	25	26	25	25	26	24
CPR at Boresight, dB	24	18	16	20	20	16	18	15
CPR at Sector, dB	11	6	12	12	9	7	8	7

Mechanical Specifications

NHHSS-65B-R2BT4

Wind Loading at Velocity, frontal	278.0 N @ 150 km/h | 62.7 lbf @ 150 km/h
Wind Loading at Velocity, lateral	230.0 N @ 150 km/h | 51.8 lbf @ 150 km/h
Wind Loading at Velocity, maximum	120.7 lbf @ 150 km/h | 537.0 N @ 150 km/h
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	441 mm | 17.362 in
Depth, packed	337 mm | 13.268 in
Length, packed	1973 mm | 77.677 in
Net Weight, without mounting kit	23.1 kg | 50.927 lb
Weight, gross	35.1 kg | 77.382 lb

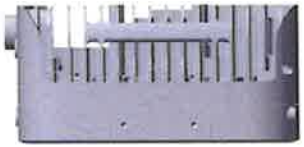
Included Products

BSAMNT-3	—	Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

[CBRS RRH] Spec.



Current Size: 216 x 307 x 105.5 mm (6.99L)
(8.5 x 12.1 x 4.1 inch., excluding Port Guard)
Design is subject to minor change

Item	Specification
Band	Band 48 (3.5 GHz)
Frequency	3550~3700 MHz
IBW	150 MHz
OBW	80 MHz
# of Carriers	5/10/15/20 MHz x 4 carriers
RF Chain	4TX / 4RX
RF Output Power & EIRP	4 path x 5 W (Total: 20 W = 43 dBm) (EIRP: 47 dBm / 10 MHz)
RX Sensitivity	Typical : -101.5 dBm @ 1 Rx (3GPP 36.104, Wide Area)
Modulation	256-QAM support (1024-QAM with 1~2dB power back-off)
Input Power	-48 VDC (-38 to -57 VDC, 1 SKU), with clip-on AC-DC converter (Option)
Power Consumption	About 160 Watt @ 100% RF load, typical conditions
Volume	Under 7L (w/o Antenna), Under 9.6L (with antenna)
Weight	Under 8.0 kg (18.64 lb) (w/o Antenna), Under 10.5 Kg (with ant.)
Operating Temperature	-40°C (-40°F) ~ 55°C (131°F) (W/o solar load)
Cooling	Natural convection
Unwanted Emission	3GPP 36.104 Category A
	[B48] : FCC 47 CFR 96.41 e)
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, duplex or Bi-Di
CPRI Cascade	Not supported
# of Antenna Port	4
External Alarm (UDA)	4
RET	AISG 2.2
TMA & built-in Bias-T I//F and PIM cancellation	Not supported
Mounting Options	Pole, wall, tower, back to back, side by side (for external ant), 3 RRH with Clip-on Antenna on the pole
Antenna Type	Integrated (Clip-on) antenna (Option), External antenna (Option)
NB-IoT	Not Supported (HW Resource reserved for 1 Guard Band NB-IoT per LTE carrier)
Spectrum Analyzer	TX/RX Support
External Alarm (UDA)	4
5G NR	Support with S/W upgrade
XRAN	Support with S/W upgrade

SAMSUNG

Dual-Band Radio Unit
700/850MHz (B13/B5)
RFV01U-D2A

Samsung's RFV01U-D2A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D2A RU targets dual-band support across Band 13 (700MHz) and Band 5 (850MHz), making it an ideal product for broad coverage footprints across multiple common low-end, long-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B13: DL(746-756MHz)/UL(777-787MHz)
B5: DL(869-894MHz)/UL(824-849MHz)
Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 207mm (29.9L)
Weight: 31.9kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit
AWS/PCS (B66/B2)

RFV01U-D1A

Samsung's RFV01U-D1A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D1A RU targets dual-band support across Band 66 (AWS) and Band 2 (PCS), making it an ideal product for broad coverage footprints across multiple common mid-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation
- Built-in Broadcast Auxiliary Services (BAS) filter ensures compliant AWS operation without impacting footprint

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

ATTACHMENT 5

PAUL J. FORD & COMPANY

Report Date: September 4, 2020

Client: On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
Attn: David Weinpahl, P.E.
(201) 456-4624
dweinpahl@onaireng.com

Structure: Existing 120-ft Self Support Tower
Site Name: Southington 4 CT
Site Address: 435 Mill St
City, County, State: Southington, Hartford County, CT
Latitude, Longitude: 41.604592, -72.894336

PJF Project: A42920-0007.002.8700

Paul J. Ford and Company is pleased to submit this "**Structural Analysis Report**" to determine the tower stress level.

Analysis Criteria:
This analysis utilizes an ultimate 3-second gust wind speed of 135 mph (converted to an equivalent 105 mph nominal 3-second gust wind speed per Section 1609.3.1 for use with TIA-222 G) as required by the 2018 Connecticut State Building Code and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Proposed Appurtenance Loads:
The structure was analyzed with the proposed loading configuration shown in Table 1 combined with the other considered equipment shown in Table 2 of this report.

Summary of Analysis Results:

Existing Structure:	Pass – 64.6%
Existing Foundation:	Pass – 54.2%

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and On Air Engineering, LLC. If you have any questions or need further assistance on this or any other projects, please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company

John M. Fawcett

John Fawcett, E.I.
Structural Designer
jfawcett@pauljford.com

JFJ

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

09.04.2020

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 120 ft Self Support tower designed by Valmont.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	III
Wind Speed:	105 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	0.75 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
88.0	88.0	3	commscope	NHH-65B-R2B w/ Mount Pipe	2	6x12 hybrid	-
		3	commscope	NHHSS-65B-R2B w/ Mount Pipe			
		3	commscope	BSAMNT-SBS-1-2 (Mount Bracket)			
		3	samsung	B2/B66A RRH-BR049			
		3	samsung	B5/B13 RRH-BR04C			
		3	samsung	CBRS RRH			
		1	Raycap	RVZDC-6627-PF-48			
		3	tower mounts	Site Pro 1 VFA12-HD			

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
120.0	125.0	1	ericsson	10' Dipole	18	7/8	1
		2	rfi antennas	BA4040-67-DIN			
	122.5	1	commscope	DB404-B			
	120.0	2	andrew	VHLP800-11			
		3	motorola	PTP 49400			
110.0	110.0	3	ericsson	AIR 32 B66AA B2P w/ Mount Pipe	3	1-5/8	1
		3	ericsson	RADIO 4415 B66A			
		3	ericsson	RADIO 4449			
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe			
		3	tower mounts	Site Pro 1 VFA12-HD			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98.0	98.0	3	cci antennas	OPA65R-BU8D w/ Mount Pipe	6 6 2	1-5/8 DC Power 3/8	1
		6	cci antennas	TPA65R-BU8D w/ Mount Pipe			
		2	raycap	DC6-48-60-18-8C-EV			
		3	ericsson	RADIO 4449 B5/B12			
		3	ericsson	RADIO 8843 B2/B66A			
		1	raycap	DC6-48-60-0-8C-EV			
		3	tower mounts	Site Pro 1 VFA12-HD			
		3	ericsson	RADIO 4415 B30	-	-	2
		3	ericsson	RRUS 4478 B14			

Notes:
1) Existing Equipment
2) Reserved Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Evaluation	Tighe & Bond, 7/12/2018	-	On Air Engineering
Tower Manufacturer Drawings	Valmont, 287740T, 12/26/2019	-	On Air Engineering
Tower Manufacturer Calculations	Valmont, 396768, 12/11/2019	-	On Air Engineering
Structural Analysis Report	Tectonic, 9927.CT11239A, 3/27/2020		
Structural Analysis Report	Hudson, 7/21/2020	-	On Air Engineering
Construction Drawings	On Air Engineering, 6/22/2020	-	On Air Engineering
Radio Frequency Data Sheet	Verizon, 6/23/2020	15170439	On Air Engineering

3.1) Analysis Method

tnxTower (version 8.0.7.5), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were maintained in accordance with the TIA-222 Standard.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	120 - 100	Leg	1 3/4" solid	3	-21.45	86.22	24.9	Pass
T2	100 - 80	Leg	2 1/4" solid	69	-94.18	165.34	57.0	Pass
T3	80 - 60	Leg	#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	135	-126.20	248.43	50.8	Pass
T4	60 - 40	Leg	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	153	-159.06	347.96	45.7	Pass
T5	40 - 20	Leg	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)	166	-179.01	347.96	64.6	Pass
T6	20 - 0	Leg	#12ZG-58 -2.00"-0.875 - DB-0.500"-HP-TR3-(Pirod 196915)	183	-194.21	401.94	48.3	Pass
T1	120 - 100	Diagonal	3/4" solid	17	-2.54	5.92	43.0	Pass
T2	100 - 80	Diagonal	7/8" solid	83	-6.19	11.16	55.5	Pass
T3	80 - 60	Diagonal	L 2.5 x 2.5 x 1/4	149	-7.60	18.78	40.5 48.9 (b)	Pass
T4	60 - 40	Diagonal	L 2.5 x 2.5 x 3/16	158	-4.77	10.79	44.3 48.2 (b)	Pass
T5	40 - 20	Diagonal	L 2.5 x 2.5 x 5/16	174	-6.51	13.50	48.2	Pass
T6	20 - 0	Diagonal	2L3 1/2x3 1/2x1/4x5/8	188	-15.63	51.16	30.6	Pass
T1	120 - 100	Horizontal	3/4" solid	26	-0.20	3.35	5.8	Pass
T2	100 - 80	Horizontal	3/4" solid	85	-1.03	3.42	30.2	Pass
T1	120 - 100	Top Girt	7/8" solid	6	-0.32	6.20	5.1	Pass
T2	100 - 80	Top Girt	1" solid	70	-0.70	10.81	6.5	Pass
T3	80 - 60	Top Girt	L 3 x 3 x 3/16	136	-1.28	23.25	5.5 15.2 (b)	Pass
T1	120 - 100	Bottom Girt	7/8" solid	7	-0.95	6.20	15.4	Pass
T2	100 - 80	Bottom Girt	1" solid	73	-0.62	10.81	5.7	Pass
T1	120 - 100	Mid Girt	7/8" solid	12	-0.42	6.20	6.8	Pass
T2	100 - 80	Mid Girt	1" solid	76	-0.73	10.81	6.7	Pass
							Summary	
						Leg (T5)	64.6	Pass
						Diagonal (T2)	55.5	Pass
						Horizontal (T2)	30.2	Pass
						Top Girt (T3)	15.2	Pass
						Bottom Girt (T1)	15.4	Pass
						Mid Girt (T1)	6.8	Pass
						Bolt Checks	48.9	Pass
						Rating =	64.6	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	36.5	Pass
1	Base Foundation	0	49.9	Pass
1	Base Foundation Soil Interaction	0	54.2	Pass
Structure Rating (max from all components) =				**64.6%**

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

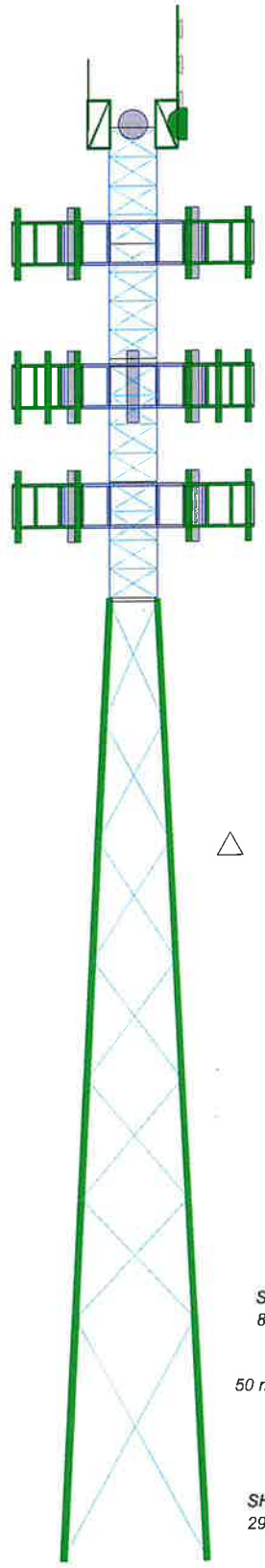
4.1) Recommendations

The tower and its foundations have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	T6	T5	T4	T3	T2	T1
Legs	D	C	B	A	SR 2 1/4" solid	SR 1 3/4" solid
Leg Grade	A500M-58			A572-58		
Diagonals	2L3 1/2x3 1/2x1/4x5/8	L 2.5 x 2.5 x 5/16	L 2.5 x 2.5 x 3/16	L 2.5 x 2.5 x 1/4	SR 7/8" solid	SR 3/4" solid
Diagonal Grade				A572-50		
Top Girts		N.A.		L 3 x 3 x 3/16	SR 1" solid	SR 7/8" solid
Mid Girts			N.A.		SR 1" solid	SR 7/8" solid
Bottom Girts			N.A.		SR 1" solid	SR 7/8" solid
Horizontals			N.A.		SR 3/4" solid	
Face Width (ft)	12	10	8	6		4
# Panels @ (ft)	1 @ 20		6 @ 10		16 @ 2.42708	
Weight (K)	16.3	4.9	3.4	3.0	2.6	1.5 1.0



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	C	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)
B	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	D	#12ZG-58 -2.00"-0.875 -DB-0.500"-HP-TR3-(Pirod 196915)

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-58	58 ksi	70 ksi	A500M-58	58 ksi	70 ksi
A572-50	50 ksi	65 ksi			

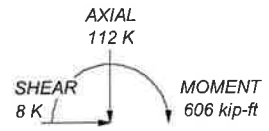
TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 105 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 64.6%

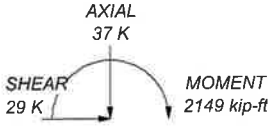
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 219 K
SHEAR: 23 K

UPLIFT: -194 K
SHEAR: 21 K



TORQUE 1 kip-ft
50 mph WIND - 0.7500 in ICE



TORQUE 7 kip-ft
REACTIONS - 105 mph WIND

Paul J. Ford and Company
250 E. Broad St., Ste 600
Columbus, OH 43215
Phone: 614-221-6679
FAX:

Job: Existing 120 ft SST / Southington, CT		
Project: Site CT11239A / PJF 42920-0007		
Client: On Air Engineering	Drawn by: JMF	App'd:
Code: TIA-222-G	Date: 09/02/20	Scale: NTS
Path:		Dwg No. E-1

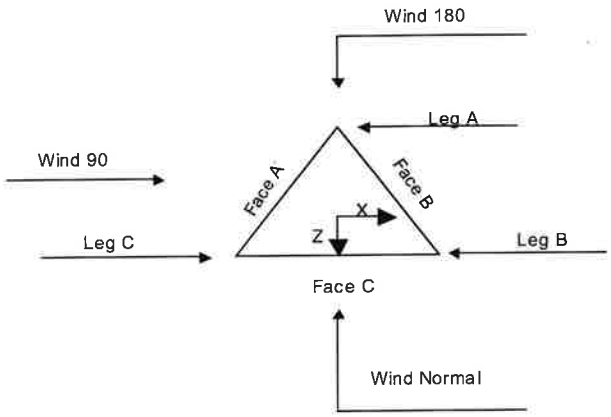
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 120.00 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 12.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Hartford County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 105 mph.
4) Structure Class III.
5) Exposure Category B.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 0.7500 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Deflections calculated using a wind speed of 60 mph.
13) A non-linear (P-delta) analysis was used.
14) Pressures are calculated at each section.
15) Stress ratio used in tower member design is 1.

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	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	120.00-100.00			4.00	1	20.00
T2	100.00-80.00			4.00	1	20.00
T3	80.00-60.00			4.00	1	20.00
T4	60.00-40.00			6.00	1	20.00
T5	40.00-20.00			8.00	1	20.00
T6	20.00-0.00			10.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	120.00-100.00	2.43	X Brace	No	Steps	3.5000	3.5000
T2	100.00-80.00	2.43	X Brace	No	Steps	3.5000	3.5000
T3	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T4	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T5	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T6	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						
T1 120.00-100.00	Solid Round	1 3/4" solid	A572-58 (58 ksi)	Solid Round	3/4" solid	A572-50 (50 ksi)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T2 100.00-80.00	Solid Round	2 1/4" solid	A572-58 (58 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T3 80.00-60.00	Truss Leg	#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	A500M-58 (58 ksi)	Single Angle	L 2.5 x 2.5 x 1/4	A572-50 (50 ksi)
T4 60.00-40.00	Truss Leg	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	A500M-58 (58 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A572-50 (50 ksi)
T5 40.00-20.00	Truss Leg	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)	A500M-58 (58 ksi)	Single Angle	L 2.5 x 2.5 x 5/16	A572-50 (50 ksi)
T6 20.00-0.00	Truss Leg	#12ZG-58 -2.00"-0.875 - DB-0.500"-HP-TR3-(Pirod 196915)	A500M-58 (58 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4x5/8	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 120.00-100.00	Solid Round	7/8" solid	A572-50 (50 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T2 100.00-80.00	Solid Round	1" solid	A572-50 (50 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T3 80.00-60.00	Equal Angle	L 3 x 3 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 120.00-100.00	1	Solid Round	7/8" solid	A572-50 (50 ksi)	Solid Round	3/4" solid	A572-50 (50 ksi)
T2 100.00-80.00	1	Solid Round	1" solid	A572-50 (50 ksi)	Solid Round	3/4" solid	A572-50 (50 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 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T3 80.00-60.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T4 60.00-40.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T5 40.00-20.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T6 20.00-0.00	0.00	0.6250	A36 (36 ksi)	1.03	1	1.1	36.0000	Mid-Pt	Mid-Pt

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 120.00-100.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 100.00-80.00	No	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 80.00-60.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 40.00-20.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 20.00-0.00	Yes	No	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	Truss-Leg K Factors: Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T3 80.00-60.00	1	1	1	1	1	1
T4 60.00-40.00	1	1	1	1	1	1
T5 40.00-20.00	1	1	1	1	1	1
T6 20.00-0.00	1	1	1	1	1	1

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T2 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T3 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
T4 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
T5 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
T6 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 120.00-100.00	Flange	1.2500 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T2 100.00-80.00	Flange	1.0000 A325N	4	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T3 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T4 60.00-40.00	Flange	1.2500 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T5 40.00-20.00	Flange	1.2500 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T6 20.00-0.00	Flange	1.0000 F1554-105	0	0.8750 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
safety line 3/8 *	C	No	No	Ar (CaAa)	120.00 - 0.00	3.0000	-0.03	1	1	0.3750	0.3750		0.22
1.5" flat Cable Ladder Rail	A	No	No	Af (CaAa)	98.00 - 6.00	0.0000	0.38	2	2	24.0000 1.5000	1.5000		1.80
LDF7-50A (1 5/8" foam)	A	No	No	Ar (CaAa)	98.00 - 6.00	0.0000	0.38	6	6	0.5200 1.0000	1.9800		0.92
DC Power	A	No	No	Ar (CaAa)	98.00 - 6.00	0.0000	0.3	6	6	0.9500	0.9500		0.58
FB-L98B-002-100000(3/8") *	A	No	No	Ar (CaAa)	98.00 - 6.00	0.0000	0.25	2	2	0.3937	0.3937		0.06
1.5" flat Cable Ladder Rail	C	No	No	Af (CaAa)	120.00 - 6.00	0.0000	0.38	2	2	24.0000 1.5000	1.5000		1.80
LDF5-50A (7/8" foam) *	C	No	No	Ar (CaAa)	120.00 - 6.00	0.0000	0.38	18	9	1.0900 0.5000	1.0900		0.33
1.5" flat Cable Ladder Rail	B	No	No	Af (CaAa)	110.00 - 6.00	0.0000	0.38	2	2	24.0000 1.5000	1.5000		1.80
LDF7-50A (1 5/8" foam) ***	B	No	No	Ar (CaAa)	110.00 - 6.00	0.0000	0.38	3	3	0.5200 1.0000	1.9800		0.92
1.5" flat Cable Ladder Rail	C	No	No	Af (CaAa)	88.00 - 6.00	0.0000	-0.38	2	2	24.0000 1.5000	1.5000		1.80
HCS 6X12 4AWG(1-5/8") ***	C	No	No	Ar (CaAa)	88.00 - 6.00	0.0000	-0.38	2	2	1.0000 0.5000	1.6600		2.40

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Site Pro 1 VFA12-HD	A	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.66 0.80 1.01
Site Pro 1 VFA12-HD	B	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.66 0.80 1.01
Site Pro 1 VFA12-HD	C	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.66 0.80 1.01
(2) TPA65R-BU8D_TIA w/ Mount Pipe	A	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	18.33 19.06 19.81	10.34 11.86 13.41	0.12 0.24 0.38
(2) TPA65R-BU8D_TIA w/ Mount Pipe	B	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	18.33 19.06 19.81	10.34 11.86 13.41	0.12 0.24 0.38
(2) TPA65R-BU8D_TIA w/ Mount Pipe	C	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	18.33 19.06 19.81	10.34 11.86 13.41	0.12 0.24 0.38
OPA65R-BU8D_TIA w/ Mount Pipe	A	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	18.33 19.06 19.81	10.34 11.86 13.41	0.11 0.23 0.37
OPA65R-BU8D_TIA w/ Mount Pipe	B	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	18.33 19.06 19.81	10.34 11.86 13.41	0.11 0.23 0.37
OPA65R-BU8D_TIA w/ Mount Pipe	C	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	18.33 19.06 19.81	10.34 11.86 13.41	0.11 0.23 0.37
RADIO 4449 B5/B12	A	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	0.07 0.09 0.11
RADIO 4449 B5/B12	B	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	0.07 0.09 0.11
RADIO 4449 B5/B12	C	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	0.07 0.09 0.11
RADIO 8843 B2/B66A	A	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.38 1.53 1.69	0.08 0.09 0.11
RADIO 8843 B2/B66A	B	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.38 1.53 1.69	0.08 0.09 0.11
RADIO 8843 B2/B66A	C	From Leg	3.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.38 1.53 1.69	0.08 0.09 0.11
DC6-48-60-18-8C-EV	A	From Leg	1.00	0.0000	98.00	No Ice	2.74	2.74	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2"	2.96	2.96	0.05
			0.00				Ice	3.20	3.20	0.08
							1" Ice			
DC6-48-60-18-8C-EV	B	From Leg	1.00		0.0000	98.00	No Ice	2.74	2.74	0.03
			0.00				1/2"	2.96	2.96	0.05
			0.00				Ice	3.20	3.20	0.08
							1" Ice			
DC6-48-60-0-8C-EV	C	From Leg	1.00		0.0000	98.00	No Ice	2.74	4.78	0.03
			0.00				1/2"	2.96	5.06	0.06
			0.00				Ice	3.20	5.35	0.10
							1" Ice			
RRUS 4478 B14	A	From Leg	3.50		0.0000	98.00	No Ice	2.02	1.25	0.06
			0.00				1/2"	2.20	1.40	0.08
			0.00				Ice	2.39	1.55	0.10
							1" Ice			
RRUS 4478 B14	B	From Leg	3.50		0.0000	98.00	No Ice	2.02	1.25	0.06
			0.00				1/2"	2.20	1.40	0.08
			0.00				Ice	2.39	1.55	0.10
							1" Ice			
RRUS 4478 B14	C	From Leg	3.50		0.0000	98.00	No Ice	2.02	1.25	0.06
			0.00				1/2"	2.20	1.40	0.08
			0.00				Ice	2.39	1.55	0.10
							1" Ice			
RADIO 4415 B30	A	From Leg	3.50		0.0000	98.00	No Ice	1.64	0.64	0.04
			0.00				1/2"	1.80	0.75	0.05
			0.00				Ice	1.97	0.87	0.07
							1" Ice			
RADIO 4415 B30	B	From Leg	3.50		0.0000	98.00	No Ice	1.64	0.64	0.04
			0.00				1/2"	1.80	0.75	0.05
			0.00				Ice	1.97	0.87	0.07
							1" Ice			
RADIO 4415 B30	C	From Leg	3.50		0.0000	98.00	No Ice	1.64	0.64	0.04
			0.00				1/2"	1.80	0.75	0.05
			0.00				Ice	1.97	0.87	0.07
							1" Ice			
***										
BA4040-67-DIN	A	From Leg	2.00		0.0000	120.00	No Ice	3.30	3.30	0.02
			0.00				1/2"	5.90	5.90	0.04
			5.00				Ice	8.50	8.50	0.05
							1" Ice			
BA4040-67-DIN	B	From Leg	2.00		0.0000	120.00	No Ice	3.30	3.30	0.02
			0.00				1/2"	5.90	5.90	0.04
			5.00				Ice	8.50	8.50	0.05
							1" Ice			
DB404-B	C	From Leg	2.00		0.0000	120.00	No Ice	2.28	2.28	0.01
			0.00				1/2"	2.64	2.64	0.03
			2.50				Ice	3.01	3.01	0.05
							1" Ice			
10' Dipole	A	From Leg	2.00		0.0000	120.00	No Ice	5.40	5.40	0.04
			0.00				1/2"	7.40	7.40	0.14
			5.00				Ice	9.40	9.40	0.24
							1" Ice			
PTP 49400	A	From Leg	1.00		0.0000	120.00	No Ice	1.75	0.48	0.01
			0.00				1/2"	1.92	0.58	0.02
			0.00				Ice	2.09	0.69	0.04
							1" Ice			
PTP 49400	B	From Leg	1.00		0.0000	120.00	No Ice	1.75	0.48	0.01
			0.00				1/2"	1.92	0.58	0.02
			0.00				Ice	2.09	0.69	0.04
							1" Ice			
PTP 49400	C	From Leg	1.00		0.0000	120.00	No Ice	1.75	0.48	0.01
			0.00				1/2"	1.92	0.58	0.02
			0.00				Ice	2.09	0.69	0.04
							1" Ice			
Sidearm (1' x 2')	A	From Leg	1.00		0.0000	120.00	No Ice	1.00	2.00	0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2"	2.00	3.00	0.25
			0.00				Ice	3.00	4.00	0.35
							1" Ice			
Sidearm (1' x 2')	B	From Leg	1.00		0.0000	120.00	No Ice	1.00	2.00	0.13
			0.00				1/2"	2.00	3.00	0.25
			0.00				Ice	3.00	4.00	0.35
							1" Ice			
Sidearm (1' x 2')	C	From Leg	1.00		0.0000	120.00	No Ice	1.00	2.00	0.13
			0.00				1/2"	2.00	3.00	0.25
			0.00				Ice	3.00	4.00	0.35
							1" Ice			
Sidearm (1' x 2')	A	From Leg	1.00		0.0000	120.00	No Ice	1.00	2.00	0.13
			0.00				1/2"	2.00	3.00	0.25
			0.00				Ice	3.00	4.00	0.35
							1" Ice			
Pipe Mount (4' x 4" Sch 40)	A	From Leg	0.50		0.0000	120.00	No Ice	1.16	1.16	0.04
			0.00				1/2"	1.58	1.58	0.06
			0.00				Ice	1.84	1.84	0.07
							1" Ice			
Pipe Mount (4' x 4" Sch 40)	B	From Leg	0.50		0.0000	120.00	No Ice	1.16	1.16	0.04
			0.00				1/2"	1.58	1.58	0.06
			0.00				Ice	1.84	1.84	0.07
							1" Ice			
***										
Site Pro 1 VFA12-HD	A	From Leg	2.00		0.0000	110.00	No Ice	13.20	9.20	0.66
			0.00				1/2"	19.50	14.60	0.80
			0.00				Ice	25.80	19.50	1.01
							1" Ice			
Site Pro 1 VFA12-HD	B	From Leg	2.00		0.0000	110.00	No Ice	13.20	9.20	0.66
			0.00				1/2"	19.50	14.60	0.80
			0.00				Ice	25.80	19.50	1.01
							1" Ice			
Site Pro 1 VFA12-HD	C	From Leg	2.00		0.0000	110.00	No Ice	13.20	9.20	0.66
			0.00				1/2"	19.50	14.60	0.80
			0.00				Ice	25.80	19.50	1.01
							1" Ice			
APXVAARR24_43-U-NA20_TIA w/ Mount Pipe	A	From Leg	3.50		0.0000	110.00	No Ice	20.48	11.02	0.19
			0.00				1/2"	21.23	12.55	0.32
			0.00				Ice	21.99	14.10	0.47
							1" Ice			
APXVAARR24_43-U-NA20_TIA w/ Mount Pipe	B	From Leg	3.50		0.0000	110.00	No Ice	20.48	11.02	0.19
			0.00				1/2"	21.23	12.55	0.32
			0.00				Ice	21.99	14.10	0.47
							1" Ice			
APXVAARR24_43-U-NA20_TIA w/ Mount Pipe	C	From Leg	3.50		0.0000	110.00	No Ice	20.48	11.02	0.19
			0.00				1/2"	21.23	12.55	0.32
			0.00				Ice	21.99	14.10	0.47
							1" Ice			
AIR 32 B66AA B2P w/ Mount Pipe	A	From Leg	3.50		0.0000	110.00	No Ice	7.09	6.37	0.13
			0.00				1/2"	7.56	7.23	0.19
			0.00				Ice	8.02	7.97	0.26
							1" Ice			
AIR 32 B66AA B2P w/ Mount Pipe	B	From Leg	3.50		0.0000	110.00	No Ice	7.09	6.37	0.13
			0.00				1/2"	7.56	7.23	0.19
			0.00				Ice	8.02	7.97	0.26
							1" Ice			
AIR 32 B66AA B2P w/ Mount Pipe	C	From Leg	3.50		0.0000	110.00	No Ice	7.09	6.37	0.13
			0.00				1/2"	7.56	7.23	0.19
			0.00				Ice	8.02	7.97	0.26
							1" Ice			
RADIO 4415 B66A	A	From Leg	3.50		0.0000	110.00	No Ice	1.86	0.87	0.05
			0.00				1/2"	2.03	1.00	0.06
			0.00				Ice	2.20	1.13	0.08
							1" Ice			
RADIO 4415 B66A	B	From Leg	3.50		0.0000	110.00	No Ice	1.86	0.87	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00					1/2"	2.03	1.00	0.06
			0.00					Ice	2.20	1.13	0.08
								1" Ice			
RADIO 4415 B66A	C	From Leg	3.50			0.0000	110.00	No Ice	1.86	0.87	0.05
			0.00					1/2"	2.03	1.00	0.06
			0.00					Ice	2.20	1.13	0.08
								1" Ice			
RADIO 4449	A	From Leg	3.50			0.0000	110.00	No Ice	3.50	2.36	0.09
			0.00					1/2"	3.74	2.57	0.11
			0.00					Ice	3.99	2.78	0.15
								1" Ice			
RADIO 4449	B	From Leg	3.50			0.0000	110.00	No Ice	3.50	2.36	0.09
			0.00					1/2"	3.74	2.57	0.11
			0.00					Ice	3.99	2.78	0.15
								1" Ice			
RADIO 4449	C	From Leg	3.50			0.0000	110.00	No Ice	3.50	2.36	0.09
			0.00					1/2"	3.74	2.57	0.11
			0.00					Ice	3.99	2.78	0.15
								1" Ice			
***											
Site Pro 1 VFA12-HD	A	From Leg	2.00			0.0000	88.00	No Ice	13.20	9.20	0.66
			0.00					1/2"	19.50	14.60	0.80
			0.00					Ice	25.80	19.50	1.01
								1" Ice			
Site Pro 1 VFA12-HD	B	From Leg	2.00			0.0000	88.00	No Ice	13.20	9.20	0.66
			0.00					1/2"	19.50	14.60	0.80
			0.00					Ice	25.80	19.50	1.01
								1" Ice			
Site Pro 1 VFA12-HD	C	From Leg	2.00			0.0000	88.00	No Ice	13.20	9.20	0.66
			0.00					1/2"	19.50	14.60	0.80
			0.00					Ice	25.80	19.50	1.01
								1" Ice			
NHH-65B-R2B_TIA w/ Mount Pipe	A	From Leg	3.50			0.0000	88.00	No Ice	8.32	7.00	0.07
			0.00					1/2"	8.88	8.19	0.14
			0.00					Ice	9.40	9.08	0.21
								1" Ice			
NHH-65B-R2B_TIA w/ Mount Pipe	B	From Leg	3.50			0.0000	88.00	No Ice	8.32	7.00	0.07
			0.00					1/2"	8.88	8.19	0.14
			0.00					Ice	9.40	9.08	0.21
								1" Ice			
NHH-65B-R2B_TIA w/ Mount Pipe	C	From Leg	3.50			0.0000	88.00	No Ice	8.32	7.00	0.07
			0.00					1/2"	8.88	8.19	0.14
			0.00					Ice	9.40	9.08	0.21
								1" Ice			
NHHSS-65B-R2B_TIA w/ Mount Pipe	A	From Leg	3.50			0.0000	88.00	No Ice	8.32	7.00	0.09
			0.00					1/2"	8.88	8.19	0.16
			0.00					Ice	9.40	9.08	0.24
								1" Ice			
NHHSS-65B-R2B_TIA w/ Mount Pipe	B	From Leg	3.50			0.0000	88.00	No Ice	8.32	7.00	0.09
			0.00					1/2"	8.88	8.19	0.16
			0.00					Ice	9.40	9.08	0.24
								1" Ice			
NHHSS-65B-R2B_TIA w/ Mount Pipe	C	From Leg	3.50			0.0000	88.00	No Ice	8.32	7.00	0.09
			0.00					1/2"	8.88	8.19	0.16
			0.00					Ice	9.40	9.08	0.24
								1" Ice			
BSAMNT-SBS-1-2 (Mount Bracket)	A	From Leg	3.50			0.0000	88.00	No Ice	0.00	0.00	0.03
			0.00					1/2"	0.00	0.00	0.05
			0.00					Ice	0.00	0.00	0.07
								1" Ice			
BSAMNT-SBS-1-2 (Mount Bracket)	B	From Leg	3.50			0.0000	88.00	No Ice	0.00	0.00	0.03
			0.00					1/2"	0.00	0.00	0.05
			0.00					Ice	0.00	0.00	0.07
								1" Ice			

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
BSAMNT-SBS-1-2 (Mount Bracket)	C	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.03 0.05 0.07
B2/B66A RRH-BR049	A	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH-BR049	B	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH-BR049	C	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	A	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	B	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	C	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
CBRS	A	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.53 1.69 1.85	0.75 0.87 0.99	0.02 0.04 0.05
CBRS	B	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.53 1.69 1.85	0.75 0.87 0.99	0.02 0.04 0.05
CBRS	C	From Leg	3.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	1.53 1.69 1.85	0.75 0.87 0.99	0.02 0.04 0.05
RVZDC-6627-PF-48	A	From Leg	1.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice 1" Ice	3.79 4.04 4.30	2.51 2.73 2.95	0.03 0.06 0.10
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
Andrew VHLP800-11	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	0.0000		120.00	2.60	No Ice 1/2" Ice 1" Ice	5.31 5.66 6.00	0.05 0.03 0.00
Andrew VHLP800-11	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	0.0000		120.00	2.60	No Ice 1/2" Ice 1" Ice	5.31 5.66 6.00	0.05 0.03 0.00

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	2011.7106	5813.4913	0.65	1.52	6.9851	20.1857	5.3014
#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	2035.9652	6802.8982	0.83	1.50	7.0693	23.6212	7.2158
#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)	2035.9652	6652.6695	0.83	1.39	7.0693	23.0995	7.2158
#12ZG-58 -2.00"-0.875 -DB-0.500"-HP-TR3-(Pirod 196915)	2339.7677	5822.4056	1.04	1.19	8.1242	20.2167	9.4248

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
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service

Comb. No.	Description
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 Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	204.79	18.95	-10.89
	Max. H_x	18	204.79	18.95	-10.89
	Max. H_z	7	-181.94	-16.59	9.53
	Min. Vert	7	-181.94	-16.59	9.53
	Min. H_x	7	-181.94	-16.59	9.53
	Min. H_z	18	204.79	18.95	-10.89
Leg B	Max. Vert	10	209.41	-19.37	-11.29
	Max. H_x	23	-185.72	16.95	9.91
	Max. H_z	23	-185.72	16.95	9.91
	Min. Vert	23	-185.72	16.95	9.91
	Min. H_x	10	209.41	-19.37	-11.29
	Min. H_z	10	209.41	-19.37	-11.29
Leg A	Max. Vert	2	219.14	-0.25	23.41
	Max. H_x	6	108.10	2.39	11.53
	Max. H_z	2	219.14	-0.25	23.41
	Min. Vert	15	-194.41	0.24	-20.55
	Min. H_x	18	-83.82	-2.34	-8.78
	Min. H_z	15	-194.41	0.24	-20.55

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	30.95	0.00	0.00	-0.06	-0.87	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	37.13	-0.14	-28.74	-2148.78	15.10	-4.56
0.9 Dead+1.6 Wind 0 deg - No Ice	27.85	-0.14	-28.74	-2144.67	15.32	-4.57
1.2 Dead+1.6 Wind 30 deg - No Ice	37.13	13.36	-23.26	-1773.92	-1017.80	2.58
0.9 Dead+1.6 Wind 30 deg - No Ice	27.85	13.36	-23.26	-1770.47	-1015.57	2.58
1.2 Dead+1.6 Wind 60 deg - No Ice	37.13	22.72	-13.12	-994.77	-1725.05	0.91
0.9 Dead+1.6 Wind 60 deg - No Ice	27.85	22.72	-13.12	-992.83	-1721.46	0.91
1.2 Dead+1.6 Wind 90 deg - No Ice	37.13	25.39	0.06	6.87	-1927.71	-6.97
0.9 Dead+1.6 Wind 90 deg - No Ice	27.85	25.39	0.06	6.88	-1923.73	-6.97
1.2 Dead+1.6 Wind 120 deg - No Ice	37.13	23.71	13.85	1036.78	-1765.82	-2.67
0.9 Dead+1.6 Wind 120 deg - No Ice	27.85	23.71	13.85	1034.83	-1762.20	-2.66
1.2 Dead+1.6 Wind 150 deg - No Ice	37.13	14.12	24.49	1835.45	-1059.46	5.63
0.9 Dead+1.6 Wind 150 deg - No Ice	27.85	14.12	24.49	1831.96	-1057.18	5.63

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 180 deg - No Ice	37.13	0.09	28.13	2120.85	-11.97	4.47
0.9 Dead+1.6 Wind 180 deg - No Ice	27.85	0.09	28.13	2116.80	-11.67	4.47
1.2 Dead+1.6 Wind 210 deg - No Ice	37.13	-13.28	23.22	1771.28	1006.72	-2.59
0.9 Dead+1.6 Wind 210 deg - No Ice	27.85	-13.28	23.22	1767.87	1005.05	-2.59
1.2 Dead+1.6 Wind 240 deg - No Ice	37.13	-23.09	13.33	999.73	1731.79	-0.91
0.9 Dead+1.6 Wind 240 deg - No Ice	27.85	-23.09	13.33	997.84	1728.74	-0.91
1.2 Dead+1.6 Wind 270 deg - No Ice	37.13	-25.32	-0.12	-13.57	1918.96	6.99
0.9 Dead+1.6 Wind 270 deg - No Ice	27.85	-25.32	-0.12	-13.51	1915.52	6.99
1.2 Dead+1.6 Wind 300 deg - No Ice	37.13	-23.31	-13.57	-1024.59	1752.71	2.76
0.9 Dead+1.6 Wind 300 deg - No Ice	27.85	-23.31	-13.57	-1022.60	1749.61	2.76
1.2 Dead+1.6 Wind 330 deg - No Ice	37.13	-14.15	-24.47	-1833.88	1060.33	-5.63
0.9 Dead+1.6 Wind 330 deg - No Ice	27.85	-14.15	-24.47	-1830.36	1058.56	-5.64
1.2 Dead+1.0 Ice	112.03	0.00	0.00	1.03	3.27	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	112.03	-0.02	-7.87	-605.89	6.13	-0.04
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	112.03	3.78	-6.56	-511.21	-291.12	0.85
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	112.03	6.55	-3.78	-293.17	-506.38	0.30
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	112.03	7.47	0.01	2.22	-577.96	-1.43
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	112.03	6.65	3.87	295.77	-501.71	-1.22
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	112.03	3.81	6.61	507.16	-288.64	0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	112.03	0.02	7.64	587.62	1.42	0.02
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	112.03	-3.68	6.42	498.20	287.72	-0.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	112.03	-6.44	3.72	286.95	498.68	-0.30
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	112.03	-7.30	-0.02	-1.32	566.53	1.43
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	112.03	-6.61	-3.83	-292.27	507.66	1.24
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	112.03	-3.82	-6.61	-504.81	295.77	-0.00
Dead+Wind 0 deg - Service	30.95	-0.03	-5.87	-438.03	2.41	-0.93
Dead+Wind 30 deg - Service	30.95	2.73	-4.75	-361.62	-208.11	0.52
Dead+Wind 60 deg - Service	30.95	4.64	-2.68	-202.80	-352.26	0.19
Dead+Wind 90 deg - Service	30.95	5.18	0.01	1.36	-393.58	-1.42
Dead+Wind 120 deg - Service	30.95	4.84	2.83	211.28	-360.59	-0.54
Dead+Wind 150 deg - Service	30.95	2.88	5.00	374.06	-216.62	1.14
Dead+Wind 180 deg - Service	30.95	0.02	5.74	432.23	-3.10	0.91
Dead+Wind 210 deg - Service	30.95	-2.71	4.74	360.98	204.54	-0.52
Dead+Wind 240 deg - Service	30.95	-4.71	2.72	203.73	352.33	-0.19
Dead+Wind 270 deg - Service	30.95	-5.17	-0.02	-2.80	390.47	1.42
Dead+Wind 300 deg - Service	30.95	-4.76	-2.77	-208.88	356.58	0.56
Dead+Wind 330 deg - Service	30.95	-2.89	-4.99	-373.84	215.45	-1.14

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	120 - 100	2.871	39	0.2174	0.0321
T2	100 - 80	1.962	39	0.2045	0.0232
T3	80 - 60	1.150	39	0.1564	0.0164
T4	60 - 40	0.595	39	0.0998	0.0083
T5	40 - 20	0.242	39	0.0611	0.0034
T6	20 - 0	0.048	39	0.0242	0.0013

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	Andrew VHLP800-11	39	2.871	0.2174	0.0321	292731
110.00	Site Pro 1 VFA12-HD	39	2.412	0.2141	0.0274	146365
98.00	Site Pro 1 VFA12-HD	39	1.874	0.2012	0.0225	51652
88.00	Site Pro 1 VFA12-HD	39	1.451	0.1790	0.0192	21885

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	120 - 100	14.032	2	1.0578	0.1578
T2	100 - 80	9.599	2	0.9988	0.1142
T3	80 - 60	5.632	2	0.7648	0.0804
T4	60 - 40	2.916	2	0.4886	0.0406
T5	40 - 20	1.187	2	0.2992	0.0166
T6	20 - 0	0.237	2	0.1187	0.0062

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	Andrew VHLP800-11	2	14.032	1.0578	0.1578	63266
110.00	Site Pro 1 VFA12-HD	2	11.797	1.0441	0.1348	31633
98.00	Site Pro 1 VFA12-HD	2	9.168	0.9833	0.1106	10929
88.00	Site Pro 1 VFA12-HD	2	7.101	0.8750	0.0942	4504

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	120	Leg	A325N	1.2500	2	9.87	82.83	0.119	1	Bolt Tension
T2	100	Leg	A325N	1.0000	4	22.30	53.01	0.421	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T3	80	Leg	A325N	1.0000	6	18.98	53.01	0.358	1	Bolt Tension
		Diagonal	A325N	1.0000	1	6.71	13.71	0.489	1	Member Block Shear
		Top Girt	A325N	1.0000	1	1.54	10.16	0.152	1	Member Block Shear
T4	60	Leg	A325N	1.2500	6	23.90	82.83	0.289	1	Bolt Tension
		Diagonal	A325N	1.0000	1	4.96	10.28	0.482	1	Member Block Shear
T5	40	Leg	A325N	1.2500	6	28.56	82.83	0.345	1	Bolt Tension
		Diagonal	A325N	1.0000	1	7.23	17.14	0.422	1	Member Block Shear
T6	20	Diagonal	A325N	0.8750	2	6.96	30.01	0.232	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	120 - 100	1 3/4" solid	20.00	2.43	66.6 K=1.00	2.4053	-21.45	86.22	0.249 [1]
T2	100 - 80	2 1/4" solid	20.00	2.43	51.8 K=1.00	3.9761	-94.18	165.34	0.570 [1]
T3	80 - 60	#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	20.03	10.02	35.7 K=1.00	5.3014	-126.20	248.43	0.508 [1]
T4	60 - 40	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	20.03	10.02	30.6 K=1.00	7.2158	-159.06	347.96	0.457 [1]
T5	40 - 20	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)	20.03	10.02	30.6 K=1.00	7.2158	-191.24	347.96	0.550 [1]
T6	20 - 0	#12ZG-58 -2.00"-0.875 - DB-0.500"-HP-TR3-(Pirod 196915)	20.03	20.03	48.8 K=1.00	9.4248	-194.21	401.94	0.483 [1]

[1] $P_u / \phi P_n$ controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T3	80 - 60	0.5	1.42	136.0	276.74	0.1963	1.13	2.77	0.407
T4	60 - 40	0.5	1.40	134.8	376.67	0.1963	0.53	2.83	0.189
T5	40 - 20	0.5	1.40	134.8	376.67	0.1963	1.82	2.83	0.646
T6	20 - 0	0.5	1.39	133.2	491.97	0.1963	0.94	2.90	0.326

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	120 - 100	3/4" solid	4.68	2.25	129.8 K=0.90	0.4418	-2.54	5.92	0.430 [1]
T2	100 - 80	7/8" solid	4.68	2.23	110.1 K=0.90	0.6013	-6.19	11.16	0.555 [1]
T3	80 - 60	L 2.5 x 2.5 x 1/4	10.97	4.89	119.7 K=1.00	1.1900	-7.60	18.78	0.405 [1]
T4	60 - 40	L 2.5 x 2.5 x 3/16	12.50	5.67	137.4 K=1.00	0.9020	-4.77	10.79	0.443 [1]
T5	40 - 20	L 2.5 x 2.5 x 5/16	13.80	6.37	156.3 K=1.00	1.4600	-6.51	13.50	0.482 [1]
T6	20 - 0	2L3 1/2x3 1/2x1/4x5/8	22.83	11.16	122.1 K=1.00	3.3750	-15.63	51.16	0.306 [1]

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	120 - 100	3/4" solid	4.00	3.85	172.7 K=0.70	0.4418	-0.20	3.35	0.058 [1]
T2	100 - 80	3/4" solid	4.00	3.81	170.8 K=0.70	0.4418	-1.03	3.42	0.302 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	120 - 100	7/8" solid	4.00	3.85	148.0 K=0.70	0.6013	-0.32	6.20	0.051 [1]
T2	100 - 80	1" solid	4.00	3.81	128.1 K=0.70	0.7854	-0.70	10.81	0.065 [1]
T3	80 - 60	L 3 x 3 x 3/16	4.00	2.67	86.8 K=1.62	1.0900	-1.28	23.25	0.055 [1]

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	120 - 100	7/8" solid	4.00	3.85	148.0 K=0.70	0.6013	-0.95	6.20	0.154 [1]
T2	100 - 80	1" solid	4.00	3.81	128.1 K=0.70	0.7854	-0.62	10.81	0.057 [1]

[1] $P_u / \phi P_n$ controls

Mid 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	120 - 100	7/8" solid	4.00	3.85	148.0 K=0.70	0.6013	-0.42	6.20	0.068 [1]
T2	100 - 80	1" solid	4.00	3.81	128.1 K=0.70	0.7854	-0.73	10.81	0.067 [1]

[1] $P_u / \phi P_n$ controls

p

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	120 - 100	1 3/4" solid	20.00	0.29	8.0	2.4053	19.73	125.56	0.157 [1]
T2	100 - 80	2 1/4" solid	20.00	0.29	6.2	3.9761	89.18	207.55	0.430 [1]
T3	80 - 60	#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	20.03	10.02	35.7	5.3014	113.88	276.74	0.412 [1]
T4	60 - 40	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	20.03	10.02	30.6	7.2158	143.41	376.67	0.381 [1]
T5	40 - 20	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)	20.03	10.02	30.6	7.2158	171.37	376.67	0.455 [1]
T6	20 - 0	#12ZG-58 -2.00"-0.875 - DB-0.500"-HP-TR3-(Pirod 196915)	20.03	20.03	48.8	9.4248	175.24	491.97	0.356 [1]

[1] $P_u / \phi P_n$ controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T3	80 - 60	0.5	1.42	136.0	276.74	0.1963	1.13	2.77	0.407
T4	60 - 40	0.5	1.40	134.8	376.67	0.1963	0.53	2.83	0.189
T5	40 - 20	0.5	1.40	134.8	376.67	0.1963	1.82	2.83	0.646
T6	20 - 0	0.5	1.39	133.2	491.97	0.1963	0.94	2.90	0.326

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 $\frac{P_u}{\phi P_n}$
T1	120 - 100	3/4" solid	4.68	2.25	144.3	0.4418	2.53	19.88	0.127 [1]
T2	100 - 80	7/8" solid	4.68	2.23	122.3	0.6013	6.06	27.06	0.224 [1]
T3	80 - 60	L 2.5 x 2.5 x 1/4	10.97	4.89	79.0	0.6816	6.71	33.23	0.202 [1]
T4	60 - 40	L 2.5 x 2.5 x 3/16	11.93	5.42	86.2	0.5183	4.96	25.27	0.196 [1]
T5	40 - 20	L 2.5 x 2.5 x 5/16	13.80	6.37	102.8	0.8313	7.23	40.53	0.178 [1]
T6	20 - 0	2L3 1/2x3 1/2x1/4x5/8	22.83	11.16	125.5	2.1563	13.91	105.12	0.132 [1]

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	120 - 100	3/4" solid	4.00	3.85	246.7	0.4418	0.31	19.88	0.016 [1]
T2	100 - 80	3/4" solid	4.00	3.81	244.0	0.4418	1.37	19.88	0.069 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	120 - 100	7/8" solid	4.00	3.85	211.4	0.6013	0.29	27.06	0.011 [1]
T2	100 - 80	1" solid	4.00	3.81	183.0	0.7854	0.78	35.34	0.022 [1]
T3	80 - 60	L 3 x 3 x 3/16	4.00	2.67	38.3	0.6593	1.54	28.68	0.054 [1]

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	120 - 100	7/8" solid	4.00	3.85	211.4	0.6013	1.03	27.06	0.038 [1]
T2	100 - 80	1" solid	4.00	3.81	183.0	0.7854	0.57	35.34	0.016 [1]

[1] $P_u / \phi P_n$ controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	120 - 100	7/8" solid	4.00	3.85	211.4	0.6013	0.44	27.06	0.016 [1]
T2	100 - 80	1" solid	4.00	3.81	183.0	0.7854	0.93	35.34	0.026 [1]

[1] $P_u / \phi P_n$ controls

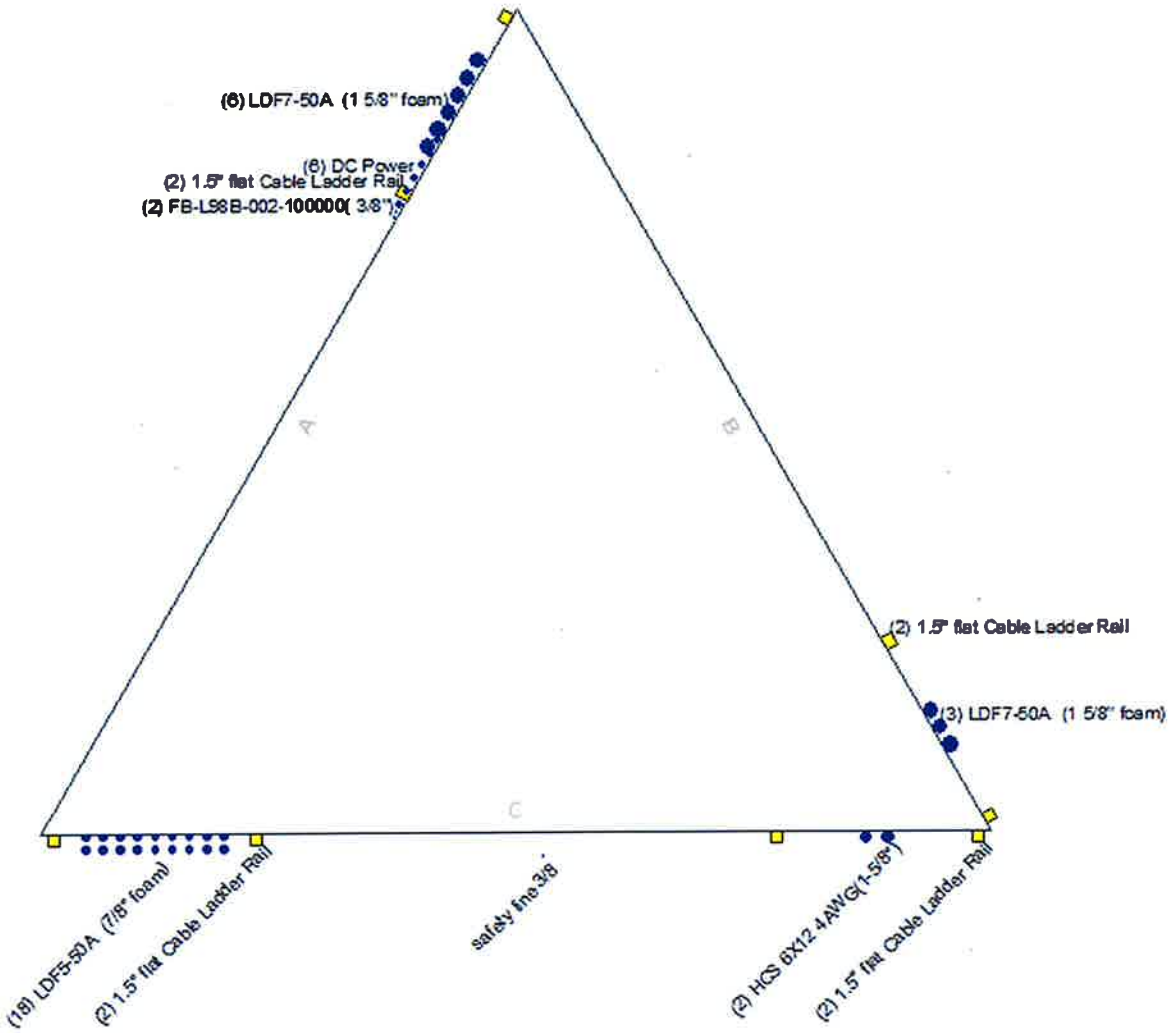
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	120 - 100	Leg	1 3/4" solid	3	-21.45	86.22	24.9	Pass
T2	100 - 80	Leg	2 1/4" solid	69	-94.18	165.34	57.0	Pass
T3	80 - 60	Leg	#12ZG-58 - 1.50" - 1.00" conn. (Pirod 194651)	135	-126.20	248.43	50.8	Pass
T4	60 - 40	Leg	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	153	-159.06	347.96	45.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T5	40 - 20	Leg	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)	166	-179.01	347.96	64.6	Pass
T6	20 - 0	Leg	#12ZG-58 -2.00"-0.875 -DB-0.500"-HP-TR3-(Pirod 196915)	183	-194.21	401.94	48.3	Pass
T1	120 - 100	Diagonal	3/4" solid	17	-2.54	5.92	43.0	Pass
T2	100 - 80	Diagonal	7/8" solid	83	-6.19	11.16	55.5	Pass
T3	80 - 60	Diagonal	L 2.5 x 2.5 x 1/4	149	-7.60	18.78	40.5 48.9 (b)	Pass
T4	60 - 40	Diagonal	L 2.5 x 2.5 x 3/16	158	-4.77	10.79	44.3 48.2 (b)	Pass
T5	40 - 20	Diagonal	L 2.5 x 2.5 x 5/16	174	-6.51	13.50	48.2	Pass
T6	20 - 0	Diagonal	2L3 1/2x3 1/2x1/4x5/8	188	-15.63	51.16	30.6	Pass
T1	120 - 100	Horizontal	3/4" solid	26	-0.20	3.35	5.8	Pass
T2	100 - 80	Horizontal	3/4" solid	85	-1.03	3.42	30.2	Pass
T1	120 - 100	Top Girt	7/8" solid	6	-0.32	6.20	5.1	Pass
T2	100 - 80	Top Girt	1" solid	70	-0.70	10.81	6.5	Pass
T3	80 - 60	Top Girt	L 3 x 3 x 3/16	136	-1.28	23.25	5.5 15.2 (b)	Pass
T1	120 - 100	Bottom Girt	7/8" solid	7	-0.95	6.20	15.4	Pass
T2	100 - 80	Bottom Girt	1" solid	73	-0.62	10.81	5.7	Pass
T1	120 - 100	Mid Girt	7/8" solid	12	-0.42	6.20	6.8	Pass
T2	100 - 80	Mid Girt	1" solid	76	-0.73	10.81	6.7	Pass
							Summary	
						Leg (T5)	64.6	Pass
						Diagonal (T2)	55.5	Pass
						Horizontal (T2)	30.2	Pass
						Top Girt (T3)	15.2	Pass
						Bottom Girt (T1)	15.4	Pass
						Mid Girt (T1)	6.8	Pass
						Bolt Checks	48.9	Pass
						RATING =	**64.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(6) LDF7-50A (1 5/8" foam)
(6) DC Power
(2) 1.5" flat Cable Ladder Rail
(2) FB-L98B-002-100000(3/8")
A
B
C
(2) 1.5" flat Cable Ladder Rail
(3) LDF7-50A (1 5/8" foam)
(18) LDF5-50A (7/8" foam)
(2) 1.5" flat Cable Ladder Rail
safety line 3/8
(2) HCS 6X12 4AWG(1-5/8")
(2) 1.5" flat Cable Ladder Rail

APPENDIX C

ADDITIONAL CALCULATIONS

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

By JMF Date 8/31/2020
Project # 42920-0007.002.8700

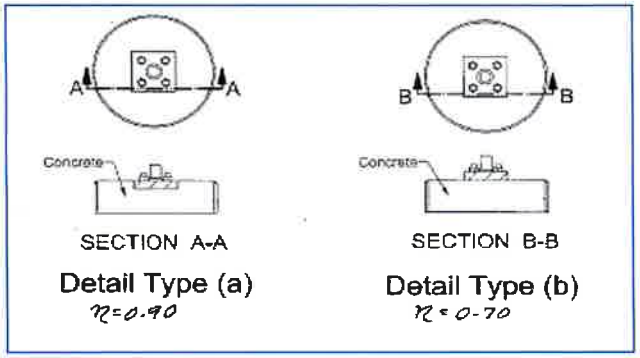
Self-Support Tower Anchor Rod Capacity - TIA-G

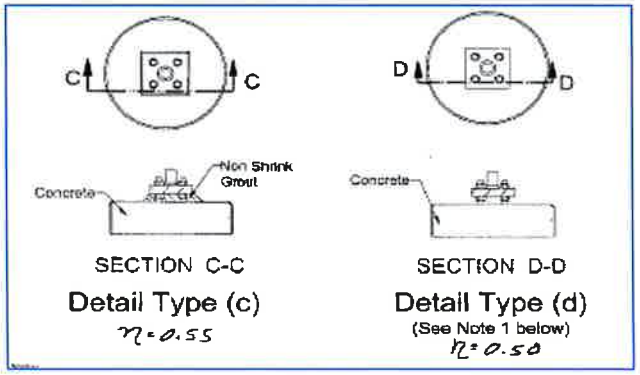
Loads

Compression :	219	kips	Tension :	194	kips	Code:	TIA-G
Comp. Shear :	23	kips	Ten.Shear :	21	kips	Maximum Ratio:	1.00

Existing Anchor Rods

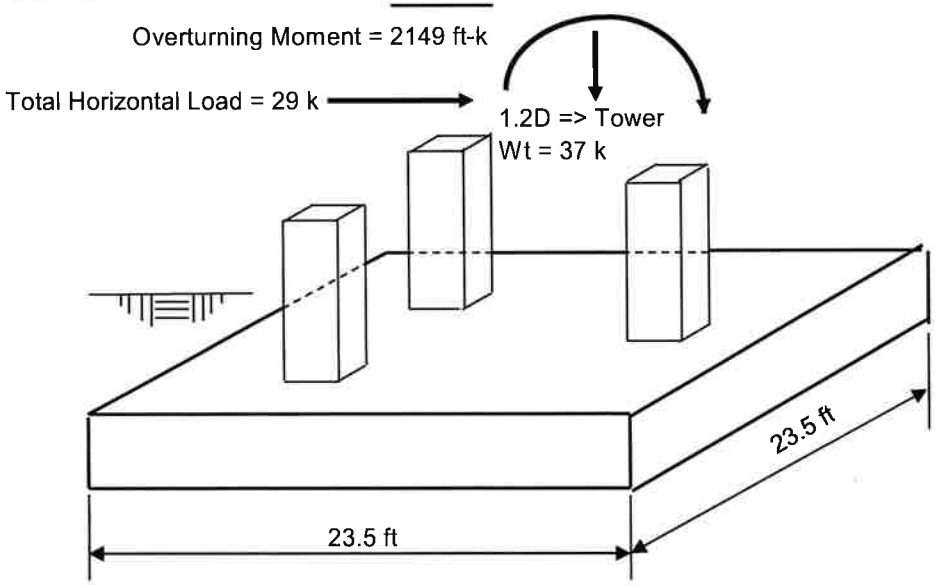
Anchor Rod Condition (n) :	0.5				
Anchor Rod ø :	1	in	l_{ar} :	1	inches
Anchor Rod Quantity :	12		Comp. M_u :	14.95	k-in
Anchor Rod Grade :	F1554 Gr. 105				
F_y :	105	ksi	ϕ_v :	0.75	
F_u :	125	ksi	ϕ_f :	0.90	
Threads per Inch	8		$\phi_v R_{nv}$:	397.61	kips
Net Tensile Area	0.61	in^2	$\phi_f R_{nm}$:	120.65	k-in
ϕ_t :	0.80				
$\phi_t R_{nt}$:	726.89	kip			
Anchor Rod Ratio :	0.365				

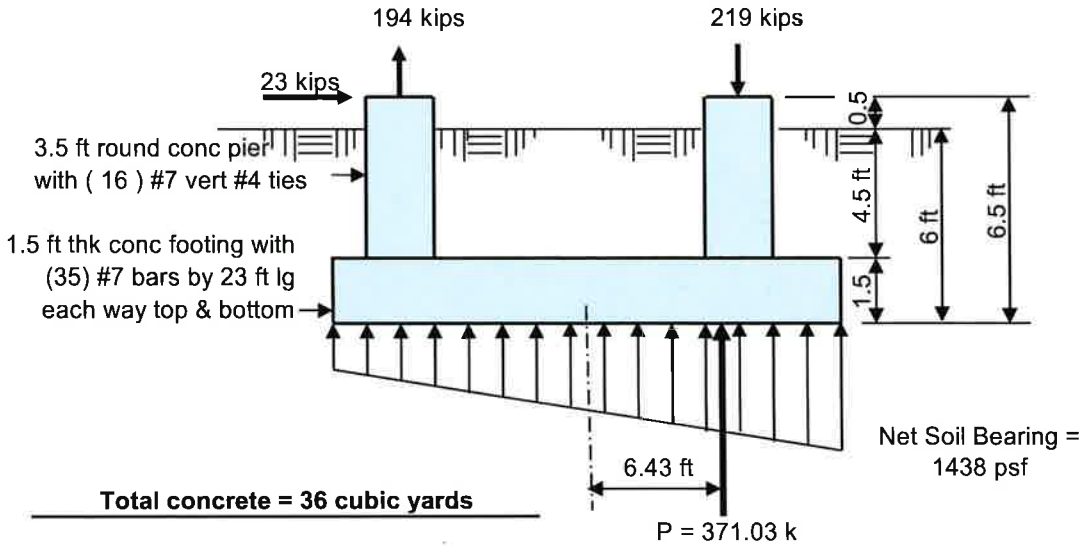




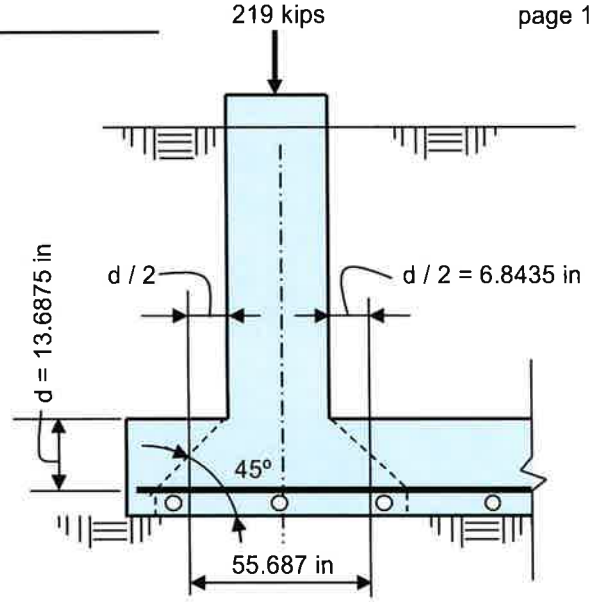
Combined Footing Foundation

Concrete strength F'c =	**4.5**	(ksi)
Rebar Strength Fy =	**60**	(ksi)
Soil Density =	**100**	(pcf)
Depth to Water Table =	**10.5**	(ft)
minimum cover over vert rebar =	**3**	inches





Total concrete = 36 cubic yards



Ftg Overturning Resistance = 4311.5 ft-kips
Total Overturning Moment = 2337.5 ft-kips
Required Overturning Safety Factor = 1
Overturning Safety Factor = 1.84
Ratio = 0.54 OK

Maximum Net Soil Bearing = 2.024 ksf
Ultimate Net Soil Bearing = 12 ksf
Soil Bearing Stress Ratio = 0.17 OK

Ult Punching Shear Capacity = 268 psi
Ult Punching Shear Force = 114 psi
Punching Shear Stress Ratio = 0.42 OK

Pad Bending Moment Capacity= 711 ft-k
Pad Bending Moment = 354 ft-k
Bending Moment Stress Ratio = 0.5 OK

Pier Rebar Capacity = -518.4 kips
Pier Rebar Required = -194 kips
Pier Rebar Stress Ratio = 0.37 OK

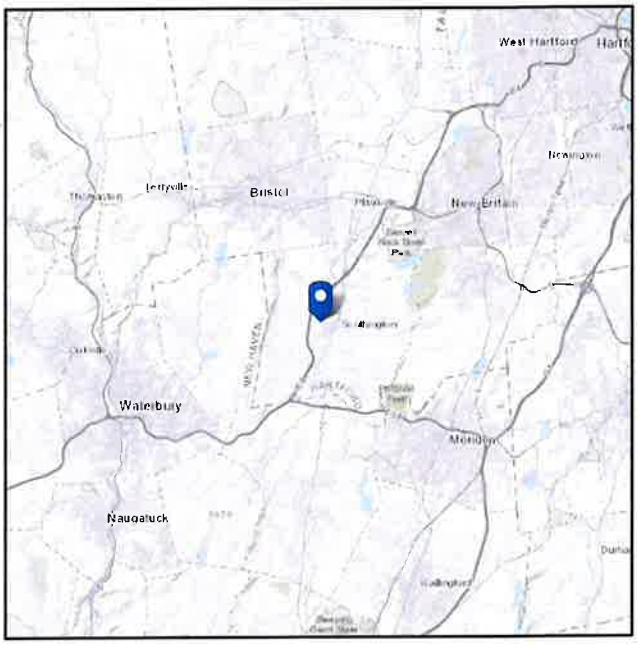
Pad Bending Shear Capacity= 388 kips
Pad Bending Shear = 98 kips
Bending Shear Stress Ratio = 0.25 OK

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: III
Soil Class: C - Very Dense Soil and Soft Rock

Elevation: 312.85 ft (NAVD 88)
Latitude: 41.604706
Longitude: -72.893897



Wind

Results:

Wind Speed:	131 Vmph ← 135 Vmph REQUIRED BY JURISDICTION
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	92 Vmph
100-year MRI	99 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1B and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Fri Sep 04 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

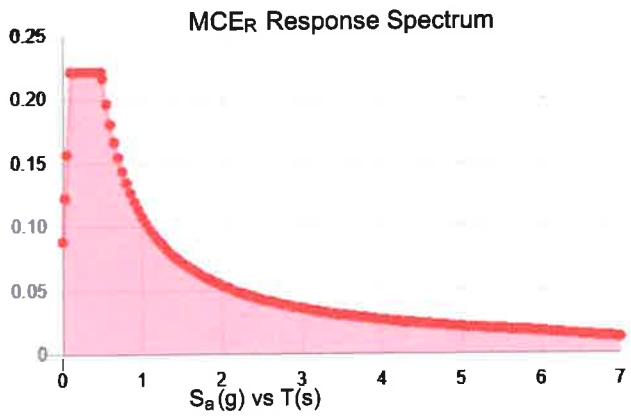
Seismic

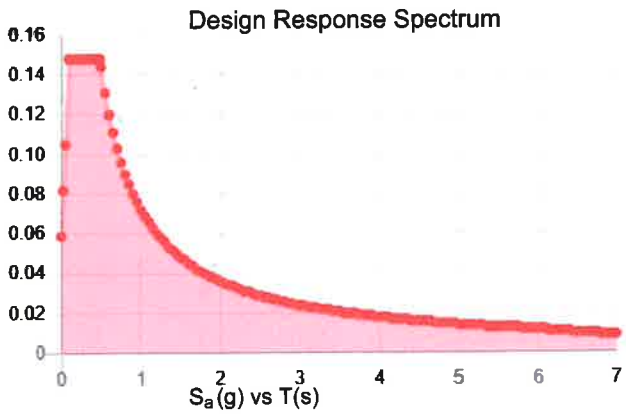
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

S_S :	0.185	S_{DS} :	0.148
S_1 :	0.064	S_{D1} :	0.072
F_a :	1.2	T_L :	6
F_v :	1.7	PGA :	0.095
S_{MS} :	0.222	PGA_M :	0.114
S_{M1} :	0.108	F_{PGA} :	1.2
		I_e :	1.25

Seismic Design Category B





Data Accessed: Fri Sep 04 2020

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Fri Sep 04 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1) Paul J. Ford and Company has not made a field inspection to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

4) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

5) The enclosed sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

ATTACHMENT 6

Far Field Approximation
with downtilt variation

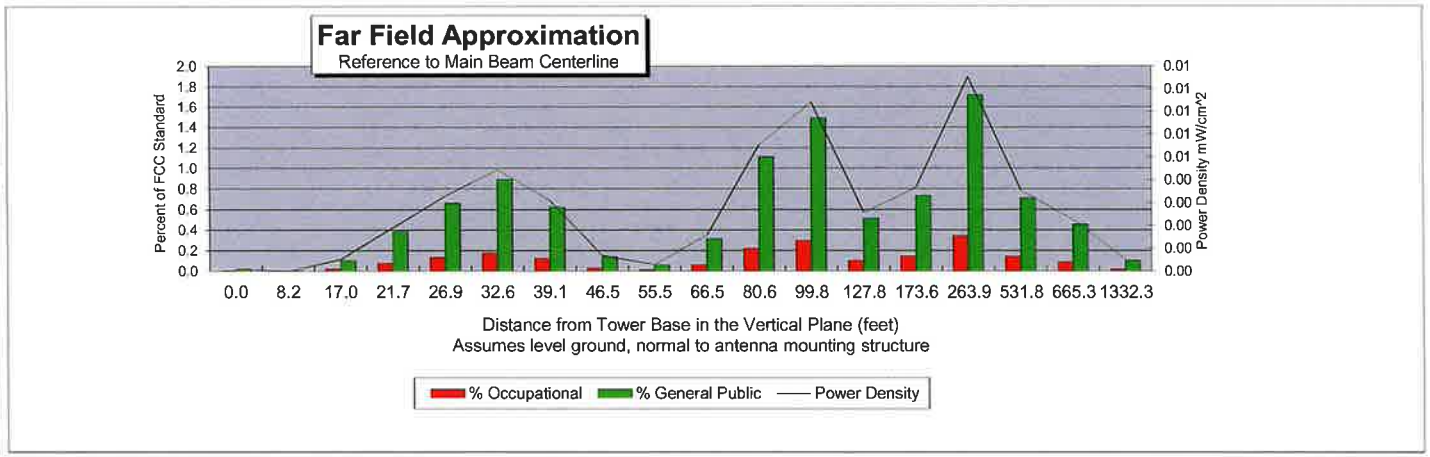
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hartford 15, CT
Site #:	
Date:	07/27/20
Name:	Mark Brauer
File Name:	Hartford 15, CT - FF Power

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**49.5**
Antenna Gain (dBi):	**14.6**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**160.0**
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	46.5	47.2	49.5	51.3	53.7	56.8	60.7	65.8	72.4	81.1	93.0	110.1	136.0	179.8	267.9	533.8	666.9	1333.1	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.2	17.0	21.7	26.9	32.6	39.1	46.5	55.5	66.5	80.6	99.8	127.8	173.6	263.9	531.8	665.3	1332.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.77	54.56	29	23.03	20.27	18.5	19.44	25.34	28.12	19.89	13.25	10.52	13.27	9.32	2.18	0	0.02	0.49	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.2	0.3	0.1	0.1	0.3	0.1	0.1	0.0	
Percent of General Population Standard	0.0	0.0	0.1	0.4	0.7	0.9	0.6	0.1	0.1	0.3	1.1	1.5	0.5	0.7	1.7	0.7	0.5	0.1	

Antenna Type NHH-65B-R2B
Max% 1.72%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

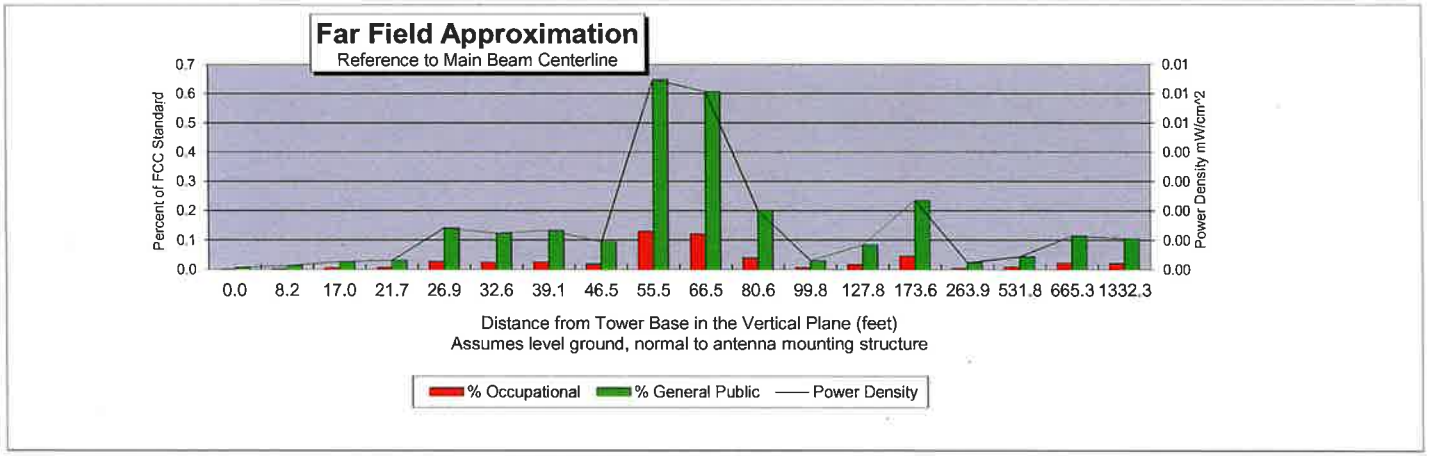
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hartford 15, CT
Site #:	
Date:	07/27/20
Name:	Mark Brauer
File Name:	Hartford 15, CT - FF Power

Operating Freq. (MHz)	**2110.0**
Antenna Height (ft):	**49.5**
Antenna Gain (dBi):	**18.4**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**160.0**
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	46.5	47.2	49.5	51.3	53.7	56.8	60.7	65.8	72.4	81.1	93.0	110.1	136.0	179.8	267.9	533.8	666.9	1333.1	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.2	17.0	21.7	26.9	32.6	39.1	46.5	55.5	66.5	80.6	99.8	127.8	173.6	263.9	531.8	665.3	1332.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	42.3	39	35.6	34.5	27.7	27.8	26.9	27.7	18.5	17.8	21.4	28.1	21.9	15	21.5	12.8	6.7	1.1	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.6	0.6	0.2	0.0	0.1	0.2	0.0	0.0	0.1	0.1	

Antenna Type NHHSS-65B-R2B
Max% 0.65%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

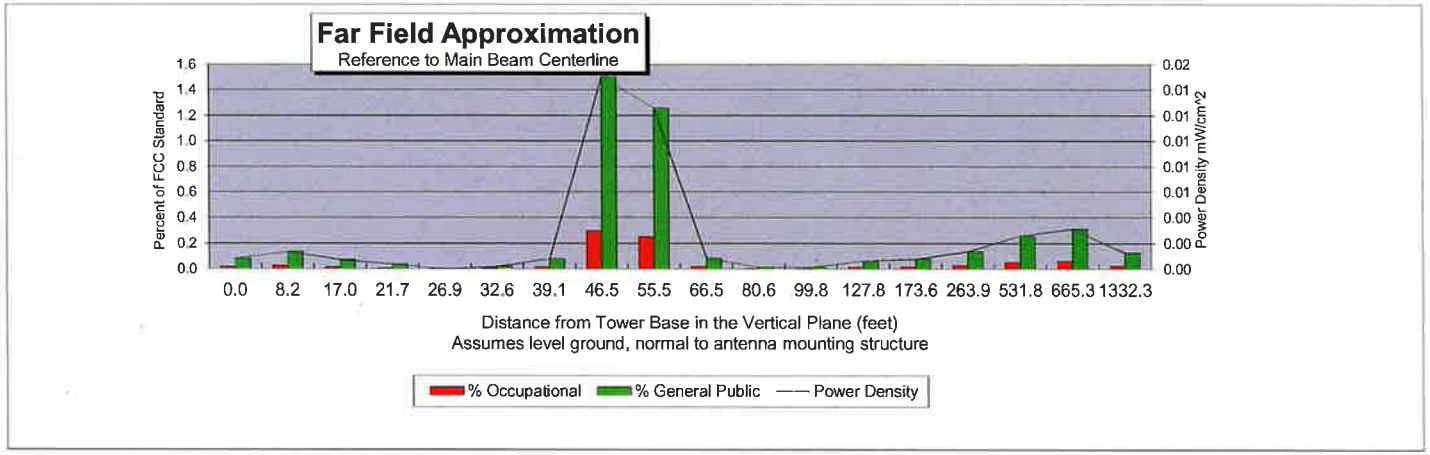
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hartford 15, CT
Site #:	
Date:	07/27/20
Name:	Mark Brauer
File Name:	Hartford 15, CT - FF Power

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**49.5**
Antenna Gain (dBi):	**18.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**160.0**
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	46.5	47.2	49.5	51.3	53.7	56.8	60.7	65.8	72.4	81.1	93.0	110.1	136.0	179.8	267.9	533.8	666.9	1333.1
Distance from Antenna Structure Base in Horizontal plane	0.0	8.2	17.0	21.7	26.9	32.6	39.1	46.5	55.5	66.5	80.6	99.8	127.8	173.6	263.9	531.8	665.3	1332.3
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	30.91	28.74	31.02	33.68	49.87	35.54	28.76	15.38	15.32	26.03	33.37	31.67	22.88	19.53	13.62	4.81	2.09	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Percent of General Population Standard	0.1	0.1	0.1	0.0	0.0	0.0	0.1	1.5	1.3	0.1	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.1

Antenna Type NHH-65B-R2B
Max% 1.50%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

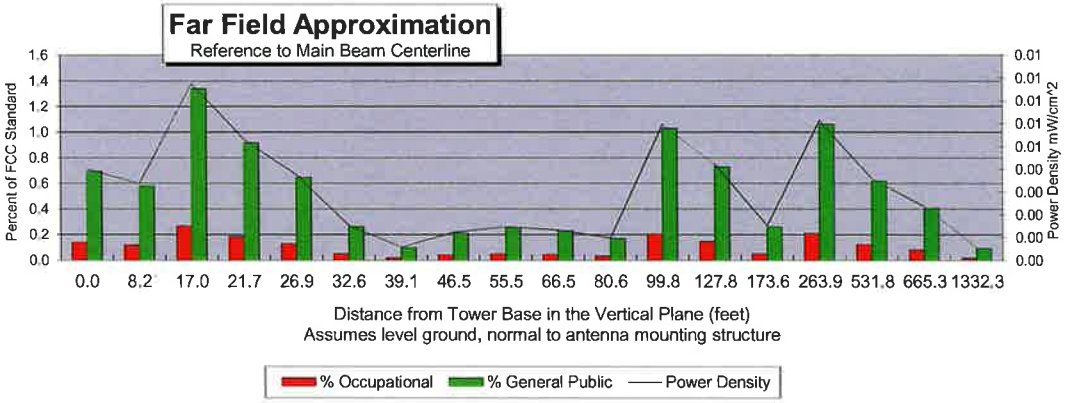
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hartford 15, CT
Site #:	
Date:	07/27/20
Name:	Mark Brauer
File Name:	Hartford 15, CT - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**49.5**
Antenna Gain (dBi):	**14.8**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**160.0**
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	46.5	47.2	49.5	51.3	53.7	56.8	60.7	65.8	72.4	81.1	93.0	110.1	136.0	179.8	267.9	533.8	666.9	1333.1	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.2	17.0	21.7	26.9	32.6	39.1	46.5	55.5	66.5	80.6	99.8	127.8	173.6	263.9	531.8	665.3	1332.3	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	20.83	21.48	17.44	18.77	19.88	23.31	26.95	22.97	21.34	20.8	20.95	11.64	11.3	13.3	3.79	0.13	0	0.31	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	
Percent of Occupational Standard	0.1	0.1	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.1	0.2	0.1	0.1	0.0	
Percent of General Population Standard	0.7	0.6	1.3	0.9	0.6	0.3	0.1	0.2	0.3	0.2	0.2	1.0	0.7	0.3	1.1	0.6	0.4	0.1	

Antenna Type NHH-65B-R2B
Max% 1.34%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

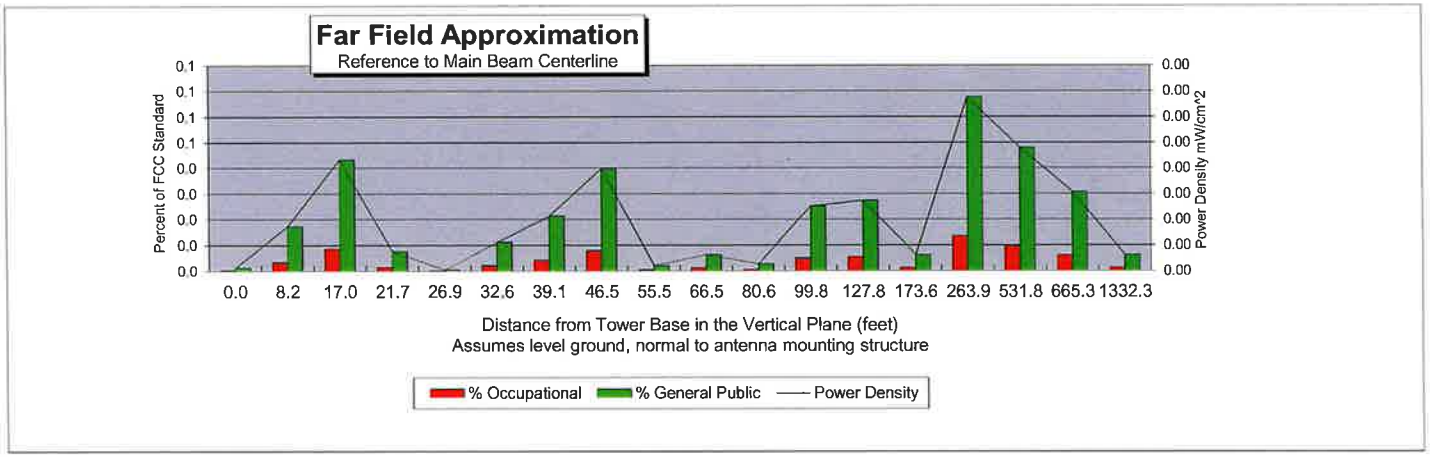
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hartford 15, CT
Site #:	
Date:	07/27/20
Name:	Mark Brauer
File Name:	Hartford 15, CT - FF Power

Operating Freq. (MHz)	**3660.0**
Antenna Height (ft):	**49.5**
Antenna Gain (dBi):	**14.9**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**20.0**
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	46.5	47.2	49.5	51.3	53.7	56.8	60.7	65.8	72.4	81.1	93.0	110.1	136.0	179.8	267.9	533.8	666.9	1333.1
Distance from Antenna Structure Base in Horizontal plane	0.0	8.2	17.0	21.7	26.9	32.6	39.1	46.5	55.5	66.5	80.6	99.8	127.8	173.6	263.9	531.8	665.3	1332.3
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.9	25.5	21.1	28.3	39.6	25.8	22.4	19	30.9	25.1	27.6	16.5	14.3	18.3	4.5	0	0	0.9
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

Antenna Type NHHSS-65B-R2B
Max% 0.07%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 7

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here ***Postmark with Date of Receipt.***
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 10/05/2020 US POSTAGE $002.84⁰ ZIP 06103 041L12203637
	Postmaster, per *(name of receiving employee)* V.P.		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Mark Sciota, Town Manager Town of Southington 75 Main Street Cheshire, CT 06410				
2.	Rob Phillips, Town Planner Town of Southington 196 North Main Street Southington, CT 06489				
3.	Southington Water Department Attn: Bill Casarella 605 West Queen Street Southington, CT 06489				
4.					
5.					
6.					

OLD STATE HOUSE STATION 06106
OCT - 5 2020
USPS