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

August 1, 2017

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

Re: **Notice of Exempt Modification – Facility Modification**
1000 Old County Circle, Windsor Locks, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 85-foot level on an existing 101-foot tower at 1000 Old County Circle in Windsor Locks, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of the tower in 2004. Cellco now intends to replace three (3) of its existing antennas with three (3) model QUAD656C0000, 700 MHz antennas, at the same 85-foot level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs") with three (3) newer model RRHs and install three (3) new RRHs, and one (1) HYBRIFLEX™ fiber optic antenna cable inside the monopole. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being sent to J. Christopher Kervick, Windsor Locks First Selectman; Jennifer Rodriguez, Windsor Locks Town Planner; Crown, the tower owner; and Stanley Rafalowski, the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the

existing tower. Cellco's replacement antennas and RRHs will be installed at the 85-foot level on the existing 101-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included in Attachment 2. These Far Field calculations demonstrate that Cellco's modified facility will operate well within the RF emissions safety limits established by the FCC.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

A copy of the parcel map and property owner information is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

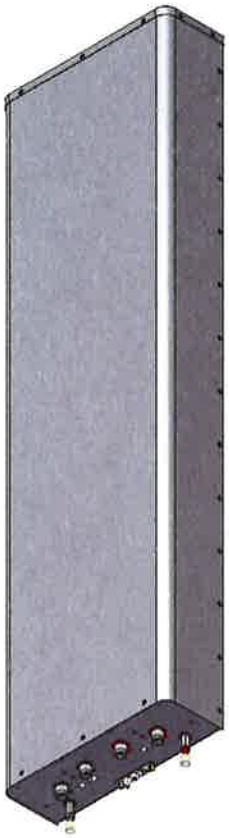
Enclosures
Copy to:
J. Christopher Kervick, Windsor Locks First Selectman
Jennifer Rodriguez, Windsor Locks Town Planner
Stanley Rafalowski
Crown Castle
Tim Parks

ATTACHMENT 1

QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

- Twin band, quad-port panel antenna with variable electrical tilt
- 4x4 MIMO
- Patented internal RET actuator adds no additional length to the antenna



Ordering Options	Model Number
When ordering, replace "x" in the model number with one of the options listed below.	
Manual Electrical Tilt	QUAD656C0000M
Remote Electrical Tilt AISG v2.0 / 3GPP with an MDCU RET Actuator	QUAD656C0000G
Remote Electrical Tilt AISG v2.0 / 3GPP with an MDDU RET Actuator	QUAD656C0000L
Mounting bracket kits and other accessories are ordered separately.	

Electrical Characteristics		(2x) 696-900 MHz	
Frequency Bands		696-806 MHz	806-900 MHz
Polarization		(2x) ±45° (Quad-Pol)	
Horizontal Beamwidth		67°	66°
Vertical Beamwidth		13.6°	12.4°
Gain		14.5 dBi	15.0 dBi
Electrical Downtilt		0-12°	
Impedance		50Ω	
VSWR		≤ 1.5:1	
Upper Sidelobe Suppression		18 dB	18 dB
Front-to-Back Ratio		> 25 dB	> 25 dB
Inband Isolation		25 dB	
Isolation Between Bands		28 dB	
IM3 (2x20W carrier)		< -153 dBc	
Input Power		(4x) 500 W	
Total Number of Connectors		Antennas has 4 connectors located at the bottom	
Connectors Per Band	696-900 MHz	(2x) 7/16-DIN Female	
	696-900 MHz	(2x) 7/16-DIN Female	
Diplexed		No	
Lightning Protection		Direct Ground	
Operating Temperature		-40° to +60° C (-40° to +140° F)	
Mechanical Characteristics			
Dimensions (Length x Width x Depth)		1889 x 520 x 182 mm	74.4 x 20.5 x 7.2 in
Depth with Z-Brackets		227 mm	8.9 in
Weight without Mounting Brackets: MET		24.5 kg	54.0 lbs
Weight without Mounting Brackets: RET		24.8 kg	54.7 lbs
Survival Wind Speed		> 241 km/hr	> 150 mph
Wind Area	Front	0.98 m^2	10.6 ft^2
	Side	0.34 m^2	3.7 ft^2
Wind Loads (160 km/hr or 100 mph)	Front	1200 N	270 lbf
	Side	415 N	93 lbf

Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to products may be made without notice.

QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

Electrical Downtilt Control		
Electrical downtilt for each band can be controlled separately. Tilt indicator(s) are covered by removable transparent cap(s).		
Manual Electrical Tilt (MET) Control	A colored knob at the end of the tilt indicator allows change of the tilt without need of a tool. The knob color is identical to the corresponding connector ring color. To access the knob, remove the cap by turning it counter-clockwise. It is re-installed by opposite rotation. Do not remove the transparent cap(s) from the antenna.	
Remote Electrical Tilt (RET) Control	The remote control of the electrical tilt is managed by either a Multi-Device Control Unit (MDCU) or a Multi-Device Dual Unit (MDDU) inserted in the bottom of the antenna. A single actuator individually controls the tilt of each band (no need for daisy chain cables between the bands). This module does not add any additional length to the antenna. For RET control, the transparent caps must be in place and locked. The tilt angle indicators always remain visible and the antenna still has manual tilt control (manual override).	
RET Actuator	Select one of the following RET actuators when ordering this antenna.	
	Multi-Device Control Unit (MCDU)	The MDCU is an electronic module that allows the remote control of the electrical downtilt (RET) in Amphenol antennas with factory embedded motors. The MDCU is factory installed. Refer to ordering options.
	Multi-Device Dual Unit (MDDU)	The MDDU allows two separate RET Controllers to independently drive the RETs in Amphenol antennas with factory installed motors (for antenna sharing). The MDDU is factory installed. Refer to ordering options.
Important Installation Instructions	In order to operate RET control, the transparent caps covering the tilt adjustment indicators must be engaged and locked. Do not cut them from the antenna.	
	Do not install the antenna with the connectors facing upward.	

Mounting Options	Part Number	Image	Fits Pipe Diameter	Weight
All mounting bracket kits are ordered separately unless otherwise indicated. Select from the options listed below.				
3-Point Mounting and Downtilt Bracket Kit	36210008		40-115 mm 1.6-4.5 in	6.9 kg 15.2 lbs

Configuration Options
This antenna model **cannot** be used with Amphenol's UNICELL 3-sector antenna enclosures.

Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to products may be made without notice.

QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

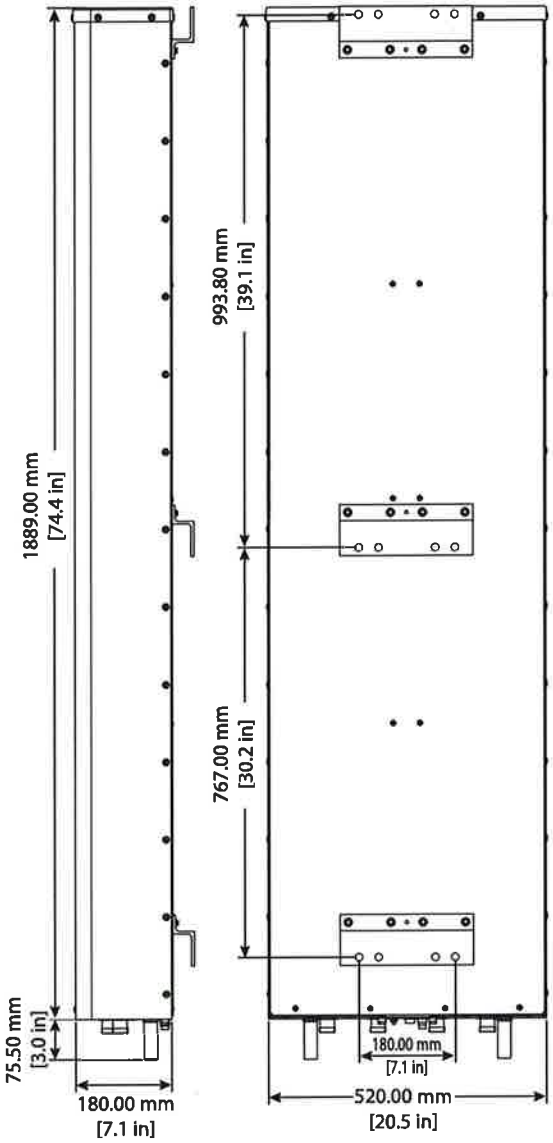
Bottom View of Antenna

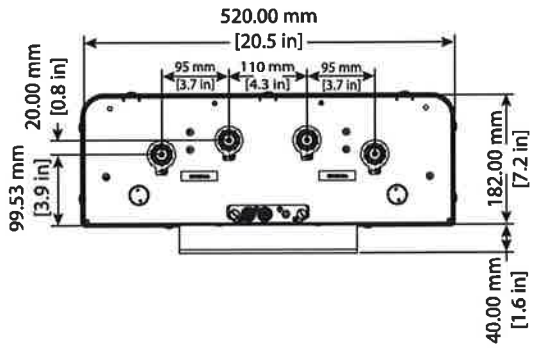
Location of the MDCU or MDDU for RET Control *(MDCU shown)*

Tilt indicators covered by transparent caps.
Manual adjustment is accessed by removing the caps.
Knob colors are the same as the connectors.

In order to operate RET control, the transparent caps covering the tilt adjustment indicators must be engaged and locked. Do not cut them from the antenna.

Dimensions



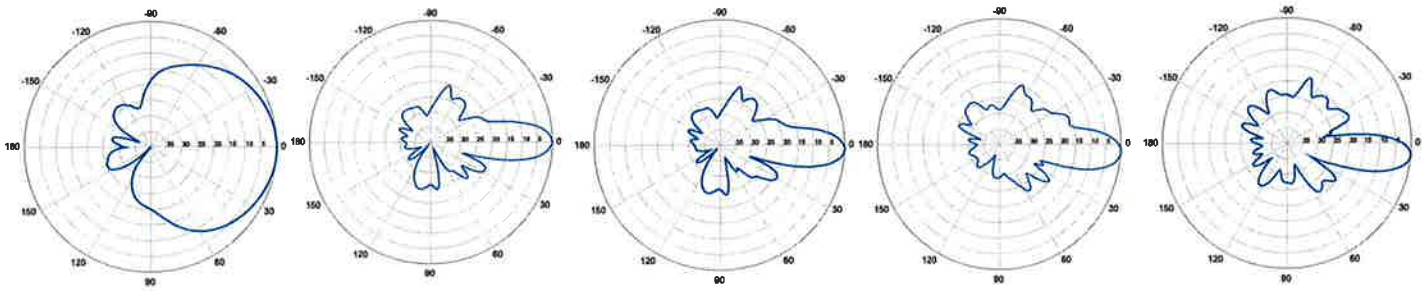


Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to products may be made without notice.

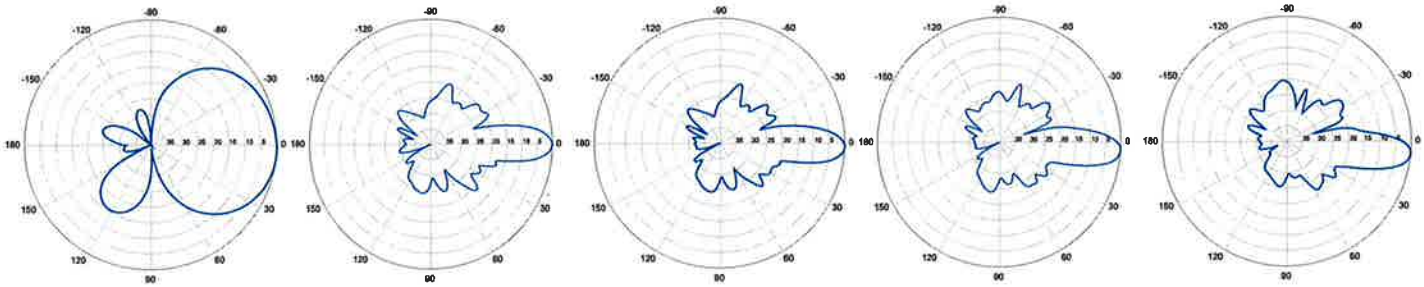
QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

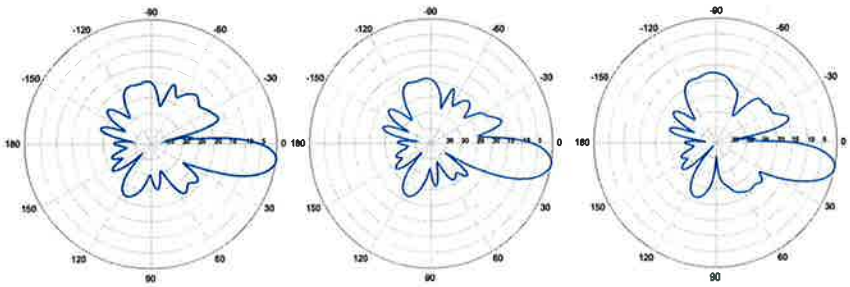
696-900 MHz



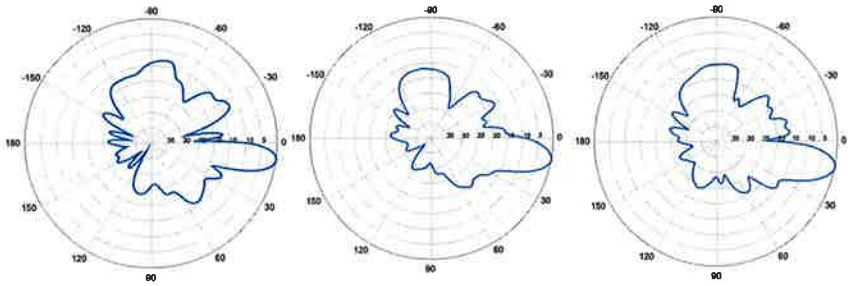
Horizontal | 750 MHz | 0° | Vertical | 750 MHz | 2° | Vertical | 750 MHz | 4° | Vertical | 750 MHz | 6° | Vertical | 750 MHz



Horizontal | 850 MHz | 0° | Vertical | 850 MHz | 2° | Vertical | 850 MHz | 4° | Vertical | 850 MHz | 6° | Vertical | 850 MHz



8° | Vertical | 750 MHz | 10° | Vertical | 750 MHz | 12° | Vertical | 750 MHz



8° | Vertical | 850 MHz | 10° | Vertical | 850 MHz | 12° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to products may be made without notice.

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

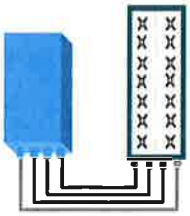
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) **Volume in L** **Weight in kg (lb) (w/o mounting HW)**	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range **DC power consumption**	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions **Wind load (@150km/h or 93mph)**	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein.
Copyright © 2014 Alcatel-Lucent. All Rights Reserved

ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

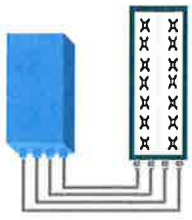
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options (Pole or Wall)



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 2) **RX Diversity scheme**	2.0 dB typ. (<2.5 dB max) 2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.) **Volume (w/ solar shield) in L** **Weight (w/ solar shield) in kg (lb)**	538 x 304 x 182 (21.2" x 12.0" x 7.2") 30 24 (53)
DC voltage range **DC power consumption**	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 580W typical @100% RF load
Environmental conditions **Wind load (@150km/h or 93mph)**	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 4 RF Tx & 4 RF Rx monitor ports 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein.
Copyright © 2014 Alcatel-Lucent. All Rights Reserved

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

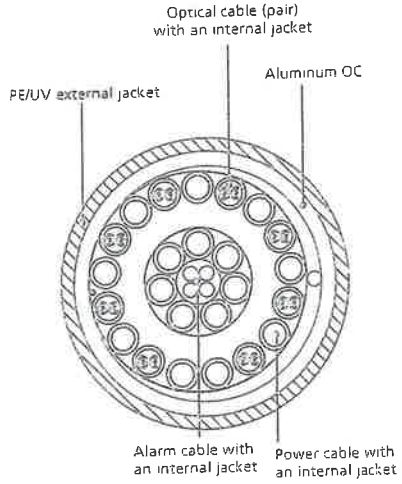


Figure 2: Construction Detail

* This data is provisional and subject to change

All information contained in the present datasheet is subject to confirmation at time of ordering.

ATTACHMENT 2

Far Field Approximation
with downtilt variation

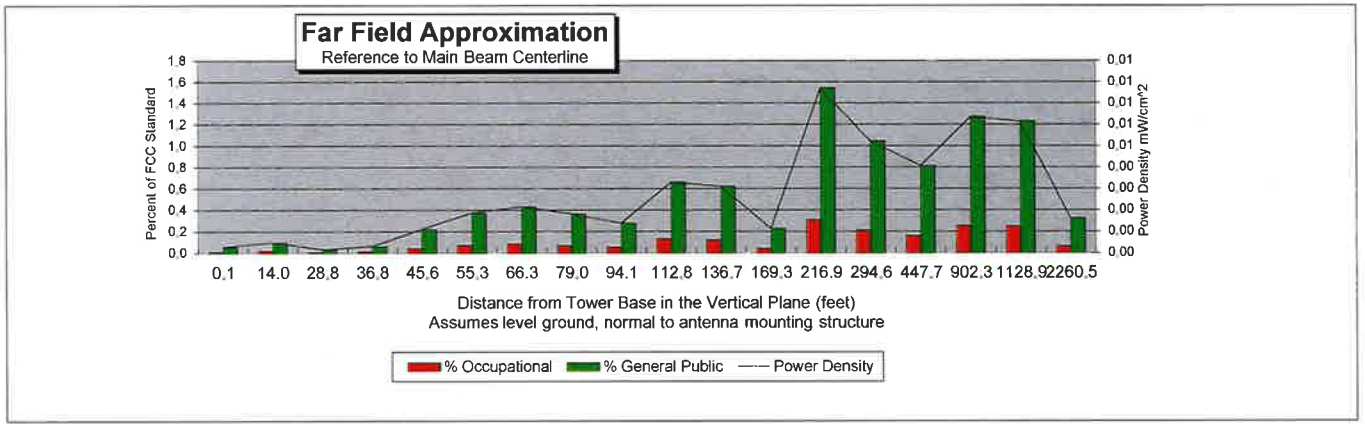
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Windsor Locks 2, CT
Site #:	68394
Date:	07/20/17
Name:	Kelly Lemay
File Name:	Windsor Locks 2, CT - 700 FF Power

Operating Freq. (MHz):	746.0
Antenna Height (ft):	85.0
Antenna Gain (dBi):	14.6
Antenna Size (in.):	74.4
Downtilt (degrees):	0.0
Feedline Loss (dB):	2.0
Power @ J4 (w):	2085.0
Number of Channels	1



Distance in feet below:

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	78.9	80.1	84.0	87.1	91.1	96.4	103.0	111.6	122.8	137.6	157.9	186.8	230.8	305.0	454.6	905.7	1131.7	2261.9	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.0	28.8	36.8	45.6	55.3	66.3	79.0	94.1	112.8	136.7	169.3	216.9	294.6	447.7	902.3	1128.9	2260.5	
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)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	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	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.2	0.3	0.2	0.1	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.4	0.4	0.3	0.7	0.6	0.2	1.5	1.0	0.8	1.3	1.2	0.3	

Antenna Type QUAD656C0000L
Max% 1.55%

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 Power (in
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

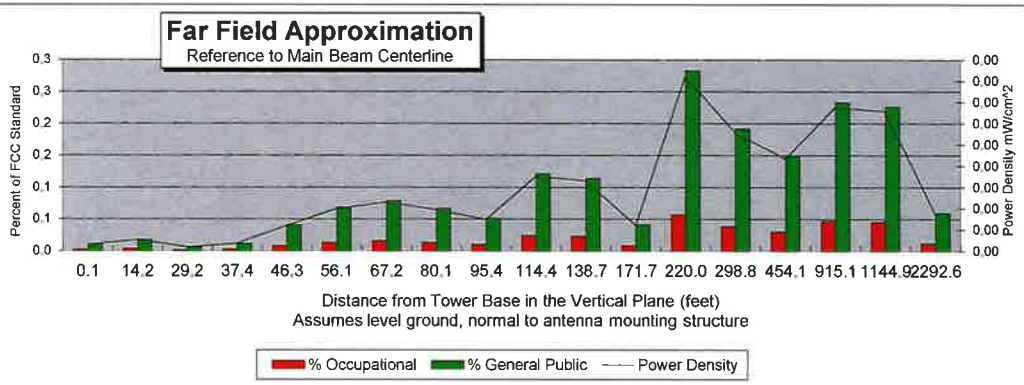
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Windsor Locks 2, CT
Site #:	68394
Date:	07/20/17
Name:	Kelly Lemay
File Name:	Windsor Locks 2, CT - Cellular FF Power

Operating Freq. (MHz):	869.0
Antenna Height (ft):	85.0
Antenna Gain (dBi):	15.2
Antenna Size (in.):	47.4
Downtilt (degrees):	0.0
Feedline Loss (dB):	2.0
Power @ J4 (w):	399.0
Number of Channels	1



Distance in feet below:

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	80.0	81.3	85.2	88.3	92.4	97.7	104.5	113.2	124.5	139.6	160.1	189.4	234.1	309.3	461.0	918.6	1147.7	2294.0	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.2	29.2	37.4	46.3	56.1	67.2	80.1	95.4	114.4	138.7	171.7	220.0	298.8	454.1	915.1	1144.9	2292.6	
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)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	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	0.00	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	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.1	0.2	0.2	0.1	

Antenna Type BXA-80063/4CF
Max% 0.28%

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 Power (in wat
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

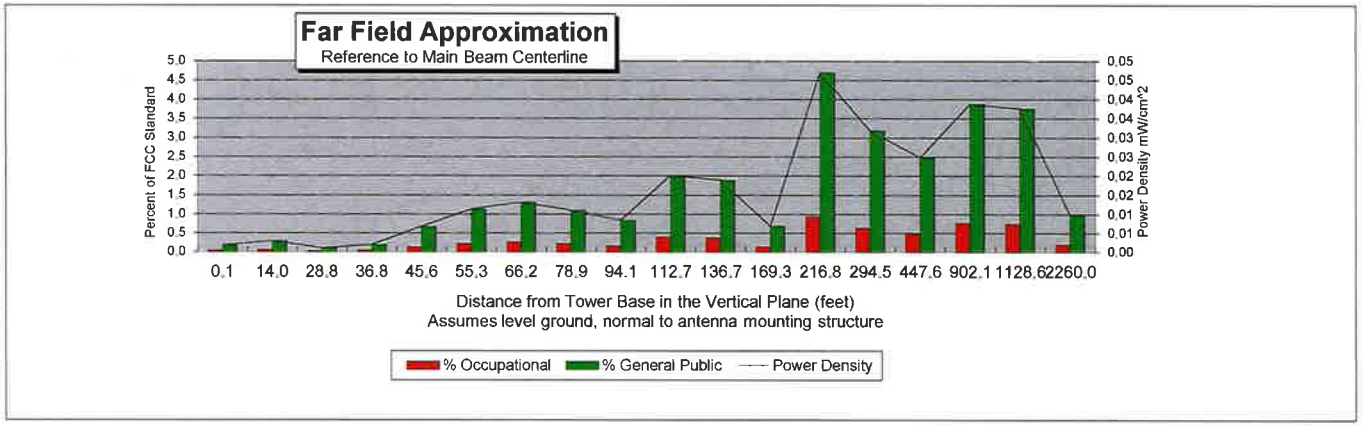
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Windsor Locks 2, CT
Site #:	68394
Date:	07/20/17
Name:	Kelly Lemay
File Name:	Windsor Locks 2, CT - PCS FF Power

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**85.0**
Antenna Gain (dBi):	**18.5**
Antenna Size (in.):	**74.9**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**5154.0**
Number of Channels	**1**



Distance in feet below:

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	78.9	80.1	84.0	87.1	91.1	96.3	103.0	111.6	122.8	137.6	157.8	186.7	230.7	304.9	454.5	905.5	1131.4	2261.4	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.0	28.8	36.8	45.6	55.3	66.2	78.9	94.1	112.7	136.7	169.3	216.8	294.5	447.6	902.1	1128.6	2260.0	
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)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	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	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.05	0.03	0.02	0.04	0.04	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.4	0.4	0.1	0.9	0.6	0.5	0.8	0.8	0.2	
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.7	1.1	1.3	1.1	0.8	2.0	1.9	0.7	4.7	3.2	2.5	3.9	3.8	1.0	

Antenna Type HBXX-6517DS-A2M
Max% 4.70%

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 Power (in wat
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

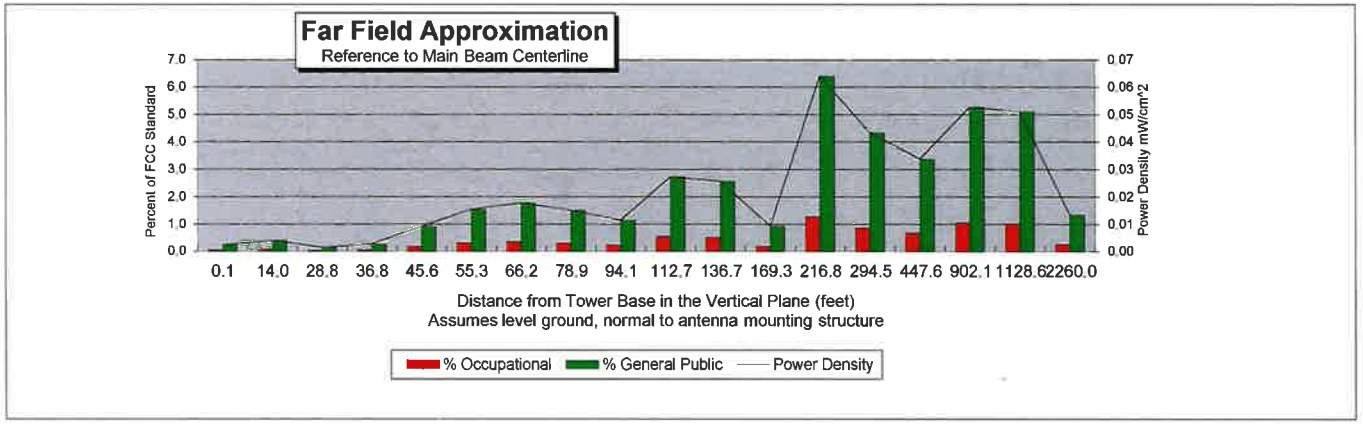
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Windsor Locks 2, CT
Site #:	68394
Date:	07/21/17
Name:	Kelly Lemay
File Name:	Windsor Locks 2, CT - AWS FF Power

Operating Freq. (MHz):	2145.0
Antenna Height (ft):	85.0
Antenna Gain (dBi):	19.2
Antenna Size (in.):	74.9
Downtilt (degrees):	0.0
Feedline Loss (dB):	2.0
Power @ J4 (w):	6014.0
Number of Channels	1



Distance in feet below:

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	78.9	80.1	84.0	87.1	91.1	96.3	103.0	111.6	122.8	137.6	157.8	186.7	230.7	304.9	454.5	905.5	1131.4	2261.4	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.0	28.8	36.8	45.6	55.3	66.2	78.9	94.1	112.7	136.7	169.3	216.8	294.5	447.6	902.1	1128.6	2260.0	
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)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	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	0.01	0.02	0.02	0.02	0.01	0.03	0.03	0.01	0.06	0.04	0.03	0.05	0.05	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.1	0.2	0.3	0.4	0.3	0.2	0.5	0.5	0.2	1.3	0.9	0.7	1.1	1.0	0.3	
Percent of General Population Standard	0.2	0.4	0.1	0.3	0.9	1.5	1.8	1.5	1.1	2.7	2.6	0.9	6.4	4.3	3.4	5.3	5.1	1.3	

Antenna Type HBXX-6517DS-A2M
Max% 6.40%

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 Power (in w
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 3

Date: **October 04, 2016**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

JACOBS
Jacobs Engineering Group, Inc.
5449 Bells Ferry Road
Acworth, GA 30102
770-701-2500

Subject: **Structural Analysis Report**

Carrier Designation:

***Verizon Wireless* Co-Locate**
Carrier Site Number: 119607
Carrier Site Name: Windsor Locks 2 CT

Crown Castle Designation:

Crown Castle BU Number: 842876
Crown Castle Site Name: WINDSOR LOCKS
Crown Castle JDE Job Number: 399528
Crown Castle Work Order Number: 1305317
Crown Castle Application Number: 363559 Rev. 0

Engineering Firm Designation: **Jacobs Engineering Group, Inc. Project Number:** 1305317

Site Data:

1000 OLD COUNTY CIRCLE, WINDSOR LOCKS, Hartford County, CT
Latitude *41° 54' 36.88"*, Longitude *-72° 39' 42.43"*
101 Foot - Monopole Tower

Dear Charles McGuirt,

Jacobs Engineering Group, Inc. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 842876, in accordance with 363559, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 121 mph converted to a nominal 3-second gust wind speed of 94 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

We at *Jacobs Engineering Group, Inc.* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Philip Lin
Tower Structural Engineer

Reviewed By:

Matthew E. Watkins, P.E.
Engineering Project Manager

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Antenna and Cable Information
Table 2 - Existing Antenna and Cable Information
Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE
Table 4 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 5 - Section Capacity (Summary)
Table 6 – Tower Components vs. Capacity
4.1) Recommendations

5) APPENDIX A
tnxTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 101 ft Monopole tower designed by Engineered Endeavors, Inc. in July of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas using a 3-second gust wind speed of 94 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category C with topographic category 1 and crest height of 0 feet.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
86.0	85.0	3	alcatel lucent	B13 RRH 4X30	1	1-5/8	
		3	alcatel lucent	B25 RRH4X30			
		3	amphenol	QUAD656C0000X w/ Mount Pipe			
		2	raycap	RXXDC-3315-PF-48			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
93.0	95.0	1	andrew	SBNH-1D6565C w/ Mount Pipe	1 1 2 12	1/8 3/8 3/4 7/8	1
		6	ericsson	RRUS 11			
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		12	powerwave technologies	LGP21401			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
	93.0	1	crown mounts	Platform Mount [LP 601-1]			
86.0	86.0	1	crown mounts	Platform Mount [LP 601-1]	13	1-5/8	1
	85.0	2	antel	BXA-70080-4CF-2 w/ Mount Pipe			
		1	antel	BXA-80063-4CF-EDIN-2 w/ Mount Pipe			
		6	andrew	HBXX-6517DS-A2M w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		3	alcatel lucent	RRH2X60-AWS			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe	-	-	2
		3	alcatel lucent	RRH2X60-PCS			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
63.0	65.0	6	ericsson	KRY 112 144/1	1 18	1/8 7/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe			
		6	rfs celwave	APXV18-206516S-C-ACU w/ Mount Pipe			
	63.0	1	crown mounts	Platform Mount [LP 303-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed; Not Considered in this Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
98.0	98.0	12	Swedcom	ALP 11011-N	-	-
88.0	88.0	12	Swedcom	ALP 11011-N	-	-
78.0	78.0	12	Swedcom	ALP 11011-N	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	4291693	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	4713155	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	4713154	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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 built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) The existing base plate grout has not been considered in this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. Jacobs Engineering Group, Inc. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	101 - 83.62	Pole	TP17.41x13x0.1875	1	-2.84	730.64	16.4	Pass
L2	83.62 - 45.58	Pole	TP26.56x16.3372x0.25	2	-11.32	1489.34	64.4	Pass
L3	45.58 - 0	Pole	TP37.5x25.0976x0.3125	3	-20.30	2610.26	64.8	Pass
							Summary	
						Pole (L3)	64.8	Pass
						Rating =	64.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	53.3	Pass
1	Base Plate	0	99.4	Pass
1	Base Foundation Structural	0	42.8	Pass
1	Base Foundation Soil Interaction	0	31.1	Pass

Structure Rating (max from all components) =	99.4%

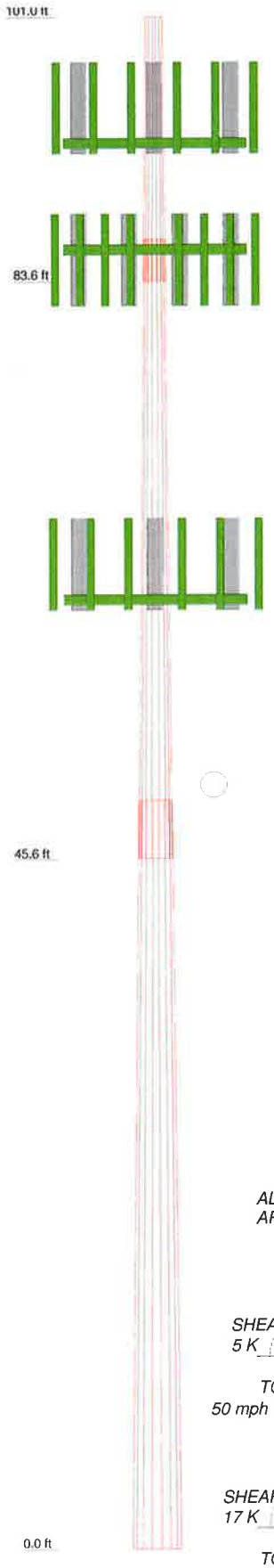
Notes:
1) See additional documentation in "Appendix C- Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



Section	1	2	3
Length (ft)	17.38	40.79	49.42
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.3125
Socket Length (ft)	2.75	3.84	
Top Dia (in)	13.0000	16.3372	25.0976
Bot Dia (in)	17.4100	26.5600	37.5000
Grade	A572-65		
Weight (K)	0.5	2.3	5.2

8.0

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	93	B25 RRH4X30	86
(2) 7770.00 w/ Mount Pipe	93	B25 RRH4X30	86
(2) 7770.00 w/ Mount Pipe	93	B25 RRH4X30	86
SBNH-1D6565C w/ Mount Pipe	93	RXXDC-3315-PF-48	86
AM-X-CD-16-65-00T-RET w/ Mount Pipe	93	RXXDC-3315-PF-48	86
		(2) FD9R6004/2C-3L	86
P65-17-XLH-RR w/ Mount Pipe	93	(2) FD9R6004/2C-3L	86
(4) LGP21401	93	(2) FD9R6004/2C-3L	86
(4) LGP21401	93	RRH2X60-AWS	86
(4) LGP21401	93	RRH2X60-AWS	86
(2) RRUS 11	93	RRH2X60-AWS	86
(2) RRUS 11	93	Platform Mount [LP 601-1]	86
(2) RRUS 11	93	(2) APXV18-206516S-C-ACU w/ Mount Pipe	63
DC6-48-60-18-8F	93		
6' x 2" STD Pipe	93	(2) APXV18-206516S-C-ACU w/ Mount Pipe	63
6' x 2" STD Pipe	93		
6' x 2" STD Pipe	93	(2) APXV18-206516S-C-ACU w/ Mount Pipe	63
Platform Mount [LP 601-1]	93		
QUAD656C0000X w/ Mount Pipe	86	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	63
QUAD656C0000X w/ Mount Pipe	86	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	63
QUAD656C0000X w/ Mount Pipe	86	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	63
BXA-70080-4CF-2 w/ Mount Pipe	86		
BXA-70080-4CF-2 w/ Mount Pipe	86	(3) KRY 112 144/1	63
BXA-80063-4CF-EDIN-2 w/ Mount Pipe	86	(3) KRY 112 144/1	63
(2) HBXX-6517DS-A2M w/ Mount Pipe	86	6' x 2" STD Pipe	63
(2) HBXX-6517DS-A2M w/ Mount Pipe	86	6' x 2" STD Pipe	63
(2) HBXX-6517DS-A2M w/ Mount Pipe	86	6' x 2" STD Pipe	63
B13 RRH 4X30	86	Platform Mount [LP 303-1]	63
B13 RRH 4X30	86		
B13 RRH 4X30	86		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 94 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 64.8%

ALL REACTIONS ARE FACTORED

AXIAL 48 K

SHEAR 5 K — *MOMENT 427 kip-ft*

TORQUE 0 kip-ft

50 mph WIND - 1.0000 in ICE

AXIAL 20 K

SHEAR 17 K — *MOMENT 1277 kip-ft*

TORQUE 0 kip-ft

REACTIONS - 94 mph WIND

JACOBS

Jacobs Engineering Group, Inc.

5449 Bells Ferry Road
Acworth, GA 30102
Phone: 770-701-2500
FAX: 770-701-2501

Job:	***WINDSOR LOCKS***		
Project:	***BU842876_WO1305317***		
Client:	Crown Castle	Drawn by: LinPA	App'd:
Code:	TIA-222-G	Date: 10/04/16	Scale: N
Path:	T:\842876 WINDSOR LOCKS\1305317\Analysis\Model\BU842876_WO1305317.eri		Dwg No.

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Hartford County, Connecticut.
2) Basic wind speed of 94 mph.
3) Structure Class II.
4) Exposure Category C.
5) Topographic Category 1.
6) Crest Height 0.00 ft.
7) Nominal ice thickness of 1.0000 in.
8) Ice thickness is considered to increase with height.
9) Ice density of 56 pcf.
10) A wind speed of 50 mph is used in combination with ice.
11) Temperature drop of 50 °F.
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 pole design is 1.
16) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	101.00-83.62	17.38	2.75	18	13.0000	17.4100	0.1875	0.7500	A572-65 (65 ksi)
L2	83.62-45.58	40.79	3.84	18	16.3372	26.5600	0.2500	1.0000	A572-65 (65 ksi)
L3	45.58-0.00	49.42		18	25.0976	37.5000	0.3125	1.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	13.2005	7.6250	158.1420	4.5484	6.6040	23.9464	316.4921	3.8132	1.9580	10.443
	17.6786	10.2495	384.0911	6.1140	8.8443	43.4282	768.6876	5.1257	2.7342	14.582
L2	17.2891	12.7652	417.3755	5.7110	8.2993	50.2904	835.3002	6.3838	2.4353	9.741
	26.9697	20.8770	1825.7736	9.3400	13.4925	135.3179	3653.9496	10.4405	4.2346	16.938
L3	26.4633	24.5837	1907.9521	8.7987	12.7496	149.6481	3818.4148	12.2942	3.8672	12.375
	38.0785	36.8854	6444.4424	13.2016	19.0500	338.2909	12897.3645	18.4462	6.0500	19.36

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 101.00-83.62				1	1	1			
L2 83.62-45.58				1	1	1			
L3 45.58-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
63									
1266A(1/8")	A	Surface Ar (CaAa)	63.00 - 0.00	1	1	0.200 0.200	0.1430		0.14
LDF5-50A(7/8")	A	Surface Ar (CaAa)	63.00 - 0.00	18	9	0.100 0.300	1.0900		0.33
misc									
Safety Line 3/8	C	Surface Ar (CaAa)	101.00 - 0.00	1	1	0.000 0.000	0.3750		0.22

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
93								
1266A(1/8")	C	No	Inside Pole	93.00 - 0.00	1	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
FSJ2-50(3/8")	C	No	Inside Pole	93.00 - 0.00	1	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
WR-VG86T(3/4")	C	No	Inside Pole	93.00 - 0.00	2	No Ice	0.00	0.53
						1/2" Ice	0.00	0.53
						1" Ice	0.00	0.53
AL5-50(7/8)	C	No	Inside Pole	93.00 - 0.00	12	No Ice	0.00	0.26
						1/2" Ice	0.00	0.26
						1" Ice	0.00	0.26
2" Rigid Conduit	C	No	Inside Pole	93.00 - 0.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
86								
HJ7-50A(1-5/8")	B	No	Inside Pole	86.00 - 0.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
HB158-1-08U8-S8J18(1-5/8)	B	No	Inside Pole	86.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HB158-1-08U8-S8J18(1-5/8)	B	No	Inside Pole	86.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	101.00-83.62	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.04
		C	0.000	0.000	0.652	0.000	0.07
L2	83.62-45.58	A	0.000	0.000	17.338	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.57
		C	0.000	0.000	1.427	0.000	0.28
L3	45.58-0.00	A	0.000	0.000	45.366	0.000	0.28
		B	0.000	0.000	0.000	0.000	0.69
		C	0.000	0.000	1.709	0.000	0.34

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	101.00-83.62	A	2.216	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.04
		C		0.000	0.000	8.353	0.000	0.19
L2	83.62-45.58	A	2.135	0.000	0.000	38.979	0.000	0.70
		B		0.000	0.000	0.000	0.000	0.57
		C		0.000	0.000	18.283	0.000	0.55
L3	45.58-0.00	A	1.924	0.000	0.000	100.342	0.000	1.75
		B		0.000	0.000	0.000	0.000	0.69
		C		0.000	0.000	21.175	0.000	0.64

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	101.00-83.62	0.0000	0.0552	0.0000	0.4381
L2	83.62-45.58	-0.3801	-0.4787	-0.4878	-0.3413
L3	45.58-0.00	-0.6667	-0.8771	-0.8505	-0.8779

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	15	Safety Line 3/8	83.62 - 101.00	1.0000	1.0000
L1	12	1266A(1/8")	83.62 - 63.00	1.0000	1.0000
L1	13	LDF5-50A(7/8")	83.62 - 63.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L2	12	1266A(1/8")	45.58 - 63.00	1.0000	1.0000
L2	13	LDF5-50A(7/8")	45.58 - 63.00	1.0000	1.0000
L2	15	Safety Line 3/8	45.58 - 83.62	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
93									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
SBNH-1D6565C w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.10 0.19 0.29
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.30 7.48 8.37	0.07 0.14 0.21
P65-17-XLH-RR w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	11.70 12.42 13.15	8.94 10.45 11.99	0.09 0.18 0.27
(4) LGP21401	A	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
(4) LGP21401	B	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
(4) LGP21401	C	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
(2) RRUS 11	A	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.19 1.33 1.49	0.05 0.07 0.10
(2) RRUS 11	B	From Leg	4.00 0.00 2.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.19 1.33 1.49	0.05 0.07 0.10
(2) RRUS 11	C	From Leg	4.00	0.0000	93.00	No Ice	0.00	1.19	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	0.00	1.33	0.07
			2.00			Ice	0.00	1.49	0.10
						1" Ice			
DC6-48-60-18-8F	C	From Leg	4.00	0.0000	93.00	No Ice	0.92	0.92	0.03
			0.00			1/2"	1.46	1.46	0.05
			2.00			Ice	1.64	1.64	0.07
						1" Ice			
6' x 2" STD Pipe	A	From Leg	4.00	0.0000	93.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			2.00			Ice	2.29	2.29	0.05
						1" Ice			
6' x 2" STD Pipe	B	From Leg	4.00	0.0000	93.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			2.00			Ice	2.29	2.29	0.05
						1" Ice			
6' x 2" STD Pipe	C	From Leg	4.00	0.0000	93.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
Platform Mount [LP 601-1]	C	None		0.0000	93.00	No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice			
86									
QUAD656C0000X w/ Mount Pipe	A	From Leg	4.00	0.0000	86.00	No Ice	13.48	7.33	0.08
			0.00			1/2"	14.10	8.55	0.17
			-1.00			Ice	14.68	9.50	0.28
						1" Ice			
QUAD656C0000X w/ Mount Pipe	B	From Leg	4.00	0.0000	86.00	No Ice	13.48	7.33	0.08
			0.00			1/2"	14.10	8.55	0.17
			-1.00			Ice	14.68	9.50	0.28
						1" Ice			
QUAD656C0000X w/ Mount Pipe	C	From Leg	4.00	0.0000	86.00	No Ice	13.48	7.33	0.08
			0.00			1/2"	14.10	8.55	0.17
			-1.00			Ice	14.68	9.50	0.28
						1" Ice			
BXA-70080-4CF-2 w/ Mount Pipe	A	From Leg	4.00	0.0000	86.00	No Ice	4.96	3.32	0.03
			0.00			1/2"	5.34	3.91	0.07
			-1.00			Ice	5.72	4.53	0.12
						1" Ice			
BXA-70080-4CF-2 w/ Mount Pipe	B	From Leg	4.00	0.0000	86.00	No Ice	4.96	3.32	0.03
			0.00			1/2"	5.34	3.91	0.07
			-1.00			Ice	5.72	4.53	0.12
						1" Ice			
BXA-80063-4CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00	0.0000	86.00	No Ice	4.95	3.69	0.03
			0.00			1/2"	5.32	4.29	0.07
			-1.00			Ice	5.71	4.91	0.12
						1" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.00	0.0000	86.00	No Ice	8.77	6.96	0.07
			0.00			1/2"	9.34	8.18	0.14
			-1.00			Ice	9.89	9.14	0.21
						1" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.00	0.0000	86.00	No Ice	8.77	6.96	0.07
			0.00			1/2"	9.34	8.18	0.14
			-1.00			Ice	9.89	9.14	0.21
						1" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.00	0.0000	86.00	No Ice	8.77	6.96	0.07
			0.00			1/2"	9.34	8.18	0.14
			-1.00			Ice	9.89	9.14	0.21
						1" Ice			
B13 RRH 4X30	A	From Leg	4.00	0.0000	86.00	No Ice	0.00	1.32	0.06
			0.00			1/2"	0.00	1.48	0.07
			-1.00			Ice	0.00	1.64	0.09
						1" Ice			
B13 RRH 4X30	B	From Leg	4.00	0.0000	86.00	No Ice	0.00	1.32	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 -1.00			1/2" Ice 1" Ice	0.00 0.00	1.48 1.64	0.07 0.09
B13 RRH 4X30	C	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.32 1.48 1.64	0.06 0.07 0.09
B25 RRH4X30	A	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.74 1.92 2.11	0.06 0.08 0.10
B25 RRH4X30	B	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.74 1.92 2.11	0.06 0.08 0.10
B25 RRH4X30	C	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.74 1.92 2.11	0.06 0.08 0.10
RXXDC-3315-PF-48	A	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.64 1.81 1.98	0.03 0.05 0.08
RXXDC-3315-PF-48	B	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.64 1.81 1.98	0.03 0.05 0.08
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
RRH2X60-AWS	A	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2X60-AWS	B	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2X60-AWS	C	From Leg	4.00 0.00 -1.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
Platform Mount [LP 601-1]	C	None		0.0000	86.00	No Ice 1/2" Ice 1" Ice	28.47 33.59 38.71	28.47 33.59 38.71	1.12 1.51 1.91
63 (2) APXV18-206516S-C-ACU w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	63.00	No Ice 1/2" Ice 1" Ice	3.81 4.22 4.62	3.29 4.00 4.66	0.04 0.07 0.11
(2) APXV18-206516S-C-ACU w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	63.00	No Ice 1/2" Ice 1" Ice	3.81 4.22 4.62	3.29 4.00 4.66	0.04 0.07 0.11
(2) APXV18-206516S-C-	C	From Leg	4.00	0.0000	63.00	No Ice	3.81	3.29	0.04

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
ACU w/ Mount Pipe			0.00			1/2" Ice	4.22	4.00	0.07
			2.00			1" Ice	4.62	4.66	0.11
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	A	From Leg	4.00	0.0000	63.00	No Ice	6.31	3.29	0.06
			0.00			1/2" Ice	6.74	4.00	0.11
			2.00			1" Ice	7.17	4.66	0.16
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	B	From Leg	4.00	0.0000	63.00	No Ice	6.31	3.29	0.06
			0.00			1/2" Ice	6.74	4.00	0.11
			2.00			1" Ice	7.17	4.66	0.16
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	C	From Leg	4.00	0.0000	63.00	No Ice	6.31	3.29	0.06
			0.00			1/2" Ice	6.74	4.00	0.11
			2.00			1" Ice	7.17	4.66	0.16
(3) KRY 112 144/1	B	From Leg	4.00	0.0000	63.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			2.00			1" Ice	0.51	0.28	0.02
(3) KRY 112 144/1	C	From Leg	4.00	0.0000	63.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			2.00			1" Ice	0.51	0.28	0.02
6' x 2" STD Pipe	A	From Leg	4.00	0.0000	63.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			2.00			1" Ice	2.29	2.29	0.05
6' x 2" STD Pipe	B	From Leg	4.00	0.0000	63.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			2.00			1" Ice	2.29	2.29	0.05
6' x 2" STD Pipe	C	From Leg	4.00	0.0000	63.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			2.00			1" Ice	2.29	2.29	0.05
Platform Mount [LP 303-1]	C	None		0.0000	63.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
***									

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

Comb. No.	Description
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	101 - 83.62	Pole	Max Tension	35	0.60	6.43	-3.39
			Max. Compression	26	-10.54	1.11	0.05
			Max. Mx	20	-2.85	39.61	-0.12
			Max. My	2	-2.85	0.07	39.22
			Max. Vy	20	-5.58	28.78	-0.06
			Max. Vx	14	5.55	0.14	-28.56
			Max. Torque	5			0.61
L2	83.62 - 45.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33.45	1.08	0.29
			Max. Mx	20	-11.32	491.74	-1.36
			Max. My	2	-11.32	-1.22	489.47
			Max. Vy	20	-14.65	491.74	-1.36
			Max. Vx	2	-14.58	-1.22	489.47
			Max. Torque	19			-0.53
L3	45.58 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-47.71	2.66	1.99
			Max. Mx	20	-20.30	1275.90	-2.67
			Max. My	2	-20.30	-2.62	1270.52
			Max. Vy	20	-17.02	1275.90	-2.67
			Max. Vx	2	-16.96	-2.62	1270.52
			Max. Torque	5			0.46

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	47.71	5.42	-0.01
	Max. H_x	20	20.32	17.00	-0.03
	Max. H_z	2	20.32	-0.03	16.93
	Max. M_x	2	1270.52	-0.03	16.93
	Max. M_z	8	1274.96	-17.00	0.03
	Max. Torsion	5	0.45	-8.53	14.68
	Min. Vert	13	15.24	-8.47	-14.65
	Min. H_x	8	20.32	-17.00	0.03
	Min. H_z	14	20.32	0.03	-16.93
	Min. M_x	14	-1269.70	0.03	-16.93
	Min. M_z	20	-1275.90	17.00	-0.03
	Min. Torsion	17	-0.45	8.53	-14.68

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	16.94	0.00	0.00	-0.33	0.38	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	20.32	0.03	-16.93	-1270.52	-2.62	-0.33
0.9 Dead+1.6 Wind 0 deg - No Ice	15.24	0.03	-16.93	-1258.33	-2.70	-0.33
1.2 Dead+1.6 Wind 30 deg - No Ice	20.32	8.53	-14.68	-1101.89	-639.92	-0.45
0.9 Dead+1.6 Wind 30 deg - No Ice	15.24	8.53	-14.68	-1091.30	-633.94	-0.45
1.2 Dead+1.6 Wind 60 deg - No Ice	20.32	14.74	-8.50	-638.12	-1105.63	-0.45
0.9 Dead+1.6 Wind 60 deg - No Ice	15.24	14.74	-8.50	-631.94	-1095.21	-0.45
1.2 Dead+1.6 Wind 90 deg - No Ice	20.32	17.00	-0.03	-3.49	-1274.96	-0.33
0.9 Dead+1.6 Wind 90 deg - No Ice	15.24	17.00	-0.03	-3.35	-1262.94	-0.33
1.2 Dead+1.6 Wind 120 deg - No Ice	20.32	14.70	8.44	631.98	-1102.56	-0.12
0.9 Dead+1.6 Wind 120 deg - No Ice	15.24	14.70	8.44	626.06	-1092.18	-0.12
1.2 Dead+1.6 Wind 150 deg - No Ice	20.32	8.47	14.65	1098.00	-634.59	0.12
0.9 Dead+1.6 Wind 150 deg - No Ice	15.24	8.47	14.65	1087.65	-628.67	0.12
1.2 Dead+1.6 Wind 180 deg - No Ice	20.32	-0.03	16.93	1269.70	3.55	0.33
0.9 Dead+1.6 Wind 180 deg - No Ice	15.24	-0.03	16.93	1257.71	3.40	0.33
1.2 Dead+1.6 Wind 210 deg - No Ice	20.32	-8.53	14.68	1101.07	640.85	0.45
0.9 Dead+1.6 Wind 210 deg - No Ice	15.24	-8.53	14.68	1090.69	634.63	0.45
1.2 Dead+1.6 Wind 240 deg - No Ice	20.32	-14.74	8.50	637.31	1106.56	0.45
0.9 Dead+1.6 Wind 240 deg - No Ice	15.24	-14.74	8.50	631.34	1095.91	0.45
1.2 Dead+1.6 Wind 270 deg - No Ice	20.32	-17.00	0.03	2.67	1275.90	0.33
0.9 Dead+1.6 Wind 270 deg - No Ice	15.24	-17.00	0.03	2.75	1263.63	0.33
1.2 Dead+1.6 Wind 300 deg - No Ice	20.32	-14.70	-8.44	-632.80	1103.50	0.12
0.9 Dead+1.6 Wind 300 deg	15.24	-14.70	-8.44	-626.67	1092.87	0.12

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
- No Ice 1.2 Dead+1.6 Wind 330 deg	20.32	-8.47	-14.65	-1098.83	635.53	-0.12
- No Ice 0.9 Dead+1.6 Wind 330 deg	15.24	-8.47	-14.65	-1088.26	629.36	-0.12
- No Ice 1.2 Dead+1.0 Ice+1.0 Temp	47.71	-0.00	-0.00	-1.99	2.66	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	47.71	0.01	-5.40	-424.45	2.19	-0.10
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	47.71	2.71	-4.68	-368.12	-209.81	-0.11
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	47.71	4.70	-2.70	-213.70	-364.86	-0.09
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	47.71	5.42	-0.01	-2.56	-421.42	-0.05
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	47.71	4.69	2.70	208.72	-364.33	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	47.71	2.70	4.67	363.53	-208.89	0.06
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	47.71	-0.01	5.40	420.38	3.25	0.10
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	47.71	-2.71	4.68	364.05	215.25	0.11
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	47.71	-4.70	2.70	209.63	370.31	0.09
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	47.71	-5.42	0.01	-1.51	426.87	0.05
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	47.71	-4.69	-2.70	-212.79	369.78	-0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	47.71	-2.70	-4.67	-367.59	214.34	-0.06
Dead+Wind 0 deg - Service	16.94	0.01	-3.86	-288.30	-0.31	-0.08
Dead+Wind 30 deg - Service	16.94	1.94	-3.35	-250.07	-144.80	-0.10
Dead+Wind 60 deg - Service	16.94	3.36	-1.94	-144.93	-250.39	-0.10
Dead+Wind 90 deg - Service	16.94	3.87	-0.01	-1.04	-288.78	-0.08
Dead+Wind 120 deg - Service	16.94	3.35	1.92	143.03	-249.69	-0.03
Dead+Wind 150 deg - Service	16.94	1.93	3.34	248.69	-143.59	0.03
Dead+Wind 180 deg - Service	16.94	-0.01	3.86	287.62	1.09	0.08
Dead+Wind 210 deg - Service	16.94	-1.94	3.35	249.39	145.58	0.10
Dead+Wind 240 deg - Service	16.94	-3.36	1.94	144.24	251.17	0.10
Dead+Wind 270 deg - Service	16.94	-3.87	0.01	0.36	289.56	0.08
Dead+Wind 300 deg - Service	16.94	-3.35	-1.92	-143.72	250.47	0.03
Dead+Wind 330 deg - Service	16.94	-1.93	-3.34	-249.37	144.37	-0.03

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-16.94	0.00	0.00	16.94	0.00	0.000%
2	0.03	-20.32	-16.93	-0.03	20.32	16.93	0.000%
3	0.03	-15.24	-16.93	-0.03	15.24	16.93	0.000%
4	8.53	-20.32	-14.68	-8.53	20.32	14.68	0.000%
5	8.53	-15.24	-14.68	-8.53	15.24	14.68	0.000%
6	14.74	-20.32	-8.50	-14.74	20.32	8.50	0.000%
7	14.74	-15.24	-8.50	-14.74	15.24	8.50	0.000%
8	17.00	-20.32	-0.03	-17.00	20.32	0.03	0.000%
9	17.00	-15.24	-0.03	-17.00	15.24	0.03	0.000%
10	14.70	-20.32	8.44	-14.70	20.32	-8.44	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
11	14.70	-15.24	8.44	-14.70	15.24	-8.44	0.000%
12	8.47	-20.32	14.65	-8.47	20.32	-14.65	0.000%
13	8.47	-15.24	14.65	-8.47	15.24	-14.65	0.000%
14	-0.03	-20.32	16.93	0.03	20.32	-16.93	0.000%
15	-0.03	-15.24	16.93	0.03	15.24	-16.93	0.000%
16	-8.53	-20.32	14.68	8.53	20.32	-14.68	0.000%
17	-8.53	-15.24	14.68	8.53	15.24	-14.68	0.000%
18	-14.74	-20.32	8.50	14.74	20.32	-8.50	0.000%
19	-14.74	-15.24	8.50	14.74	15.24	-8.50	0.000%
20	-17.00	-20.32	0.03	17.00	20.32	-0.03	0.000%
21	-17.00	-15.24	0.03	17.00	15.24	-0.03	0.000%
22	-14.70	-20.32	-8.44	14.70	20.32	8.44	0.000%
23	-14.70	-15.24	-8.44	14.70	15.24	8.44	0.000%
24	-8.47	-20.32	-14.65	8.47	20.32	14.65	0.000%
25	-8.47	-15.24	-14.65	8.47	15.24	14.65	0.000%
26	0.00	-47.71	0.00	0.00	47.71	0.00	0.000%
27	0.01	-47.71	-5.40	-0.01	47.71	5.40	0.000%
28	2.71	-47.71	-4.68	-2.71	47.71	4.68	0.000%
29	4.70	-47.71	-2.70	-4.70	47.71	2.70	0.000%
30	5.42	-47.71	-0.01	-5.42	47.71	0.01	0.000%
31	4.69	-47.71	2.70	-4.69	47.71	-2.70	0.000%
32	2.70	-47.71	4.67	-2.70	47.71	-4.67	0.000%
33	-0.01	-47.71	5.40	0.01	47.71	-5.40	0.000%
34	-2.71	-47.71	4.68	2.71	47.71	-4.68	0.000%
35	-4.70	-47.71	2.70	4.70	47.71	-2.70	0.000%
36	-5.42	-47.71	0.01	5.42	47.71	-0.01	0.000%
37	-4.69	-47.71	-2.70	4.69	47.71	2.70	0.000%
38	-2.70	-47.71	-4.67	2.70	47.71	4.67	0.000%
39	0.01	-16.94	-3.86	-0.01	16.94	3.86	0.000%
40	1.94	-16.94	-3.35	-1.94	16.94	3.35	0.000%
41	3.36	-16.94	-1.94	-3.36	16.94	1.94	0.000%
42	3.87	-16.94	-0.01	-3.87	16.94	0.01	0.000%
43	3.35	-16.94	1.92	-3.35	16.94	-1.92	0.000%
44	1.93	-16.94	3.34	-1.93	16.94	-3.34	0.000%
45	-0.01	-16.94	3.86	0.01	16.94	-3.86	0.000%
46	-1.94	-16.94	3.35	1.94	16.94	-3.35	0.000%
47	-3.36	-16.94	1.94	3.36	16.94	-1.94	0.000%
48	-3.87	-16.94	0.01	3.87	16.94	-0.01	0.000%
49	-3.35	-16.94	-1.92	3.35	16.94	1.92	0.000%
50	-1.93	-16.94	-3.34	1.93	16.94	3.34	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00062556
3	Yes	4	0.00000001	0.00035754
4	Yes	5	0.00000001	0.00068883
5	Yes	5	0.00000001	0.00028165
6	Yes	5	0.00000001	0.00073355
7	Yes	5	0.00000001	0.00030252
8	Yes	4	0.00000001	0.00080862
9	Yes	4	0.00000001	0.00047021
10	Yes	5	0.00000001	0.00069666
11	Yes	5	0.00000001	0.00028650
12	Yes	5	0.00000001	0.00069615
13	Yes	5	0.00000001	0.00028630
14	Yes	4	0.00000001	0.00082320
15	Yes	4	0.00000001	0.00048265
16	Yes	5	0.00000001	0.00073316
17	Yes	5	0.00000001	0.00030241
18	Yes	5	0.00000001	0.00068936
19	Yes	5	0.00000001	0.00028171
20	Yes	4	0.00000001	0.00060865

21	Yes	4	0.00000001	0.00034334
22	Yes	5	0.00000001	0.00071020
23	Yes	5	0.00000001	0.00029241
24	Yes	5	0.00000001	0.00070980
25	Yes	5	0.00000001	0.00029244
26	Yes	4	0.00000001	0.00002488
27	Yes	5	0.00000001	0.00041175
28	Yes	5	0.00000001	0.00080666
29	Yes	5	0.00000001	0.00083831
30	Yes	5	0.00000001	0.00040746
31	Yes	5	0.00000001	0.00080683
32	Yes	5	0.00000001	0.00079980
33	Yes	5	0.00000001	0.00040900
34	Yes	5	0.00000001	0.00084930
35	Yes	5	0.00000001	0.00081897
36	Yes	5	0.00000001	0.00041297
37	Yes	5	0.00000001	0.00083983
38	Yes	5	0.00000001	0.00084532
39	Yes	4	0.00000001	0.00004728
40	Yes	4	0.00000001	0.00025996
41	Yes	4	0.00000001	0.00031876
42	Yes	4	0.00000001	0.00004916
43	Yes	4	0.00000001	0.00027095
44	Yes	4	0.00000001	0.00027018
45	Yes	4	0.00000001	0.00005030
46	Yes	4	0.00000001	0.00031892
47	Yes	4	0.00000001	0.00026105
48	Yes	4	0.00000001	0.00004615
49	Yes	4	0.00000001	0.00029033
50	Yes	4	0.00000001	0.00029008

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	101 - 83.62	15.694	47	1.3198	0.0034
L2	86.37 - 45.58	11.672	47	1.2849	0.0024
L3	49.42 - 0	3.638	47	0.7094	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
93.00	(2) 7770.00 w/ Mount Pipe	47	13.471	1.3123	0.0028	12993
86.00	QUAD656C0000X w/ Mount Pipe	47	11.573	1.2824	0.0023	7081
63.00	(2) APXV18-206516S-C-ACU w/ Mount Pipe	47	6.069	0.9629	0.0010	3381

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	101 - 83.62	69.126	18	5.8209	0.0150
L2	86.37 - 45.58	51.433	18	5.6707	0.0104
L3	49.42 - 0	16.046	18	3.1306	0.0023

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
93.00	(2) 7770.00 w/ Mount Pipe	18	59.351	5.7901	0.0123	3030
86.00	QUAD656C0000X w/ Mount Pipe	18	50.999	5.6599	0.0102	1648
63.00	(2) APXV18-206516S-C-ACU w/ Mount Pipe	18	26.758	4.2503	0.0046	775

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	101 - 83.62 (1)	TP17.41x13x0.1875	17.38	0.00	0.0	9.8343	-2.84	730.64	0.004
L2	83.62 - 45.58 (2)	TP26.56x16.3372x0.25	40.79	0.00	0.0	20.1133	-11.32	1489.34	0.008
L3	45.58 - 0 (3)	TP37.5x25.0976x0.3125	49.42	0.00	0.0	36.8854	-20.30	2610.26	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	101 - 83.62 (1)	TP17.41x13x0.1875	39.63	247.42	0.160	0.00	247.42	0.000
L2	83.62 - 45.58 (2)	TP26.56x16.3372x0.25	492.37	774.75	0.636	0.00	774.75	0.000
L3	45.58 - 0 (3)	TP37.5x25.0976x0.3125	1276.97	1994.98	0.640	0.00	1994.98	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	101 - 83.62 (1)	TP17.41x13x0.1875	5.07	365.32	0.014	0.53	495.44	0.001
L2	83.62 - 45.58 (2)	TP26.56x16.3372x0.25	14.66	744.67	0.020	0.45	1551.39	0.000
L3	45.58 - 0 (3)	TP37.5x25.0976x0.3125	17.03	1305.13	0.013	0.45	3994.84	0.000

Pole Interaction Design Data

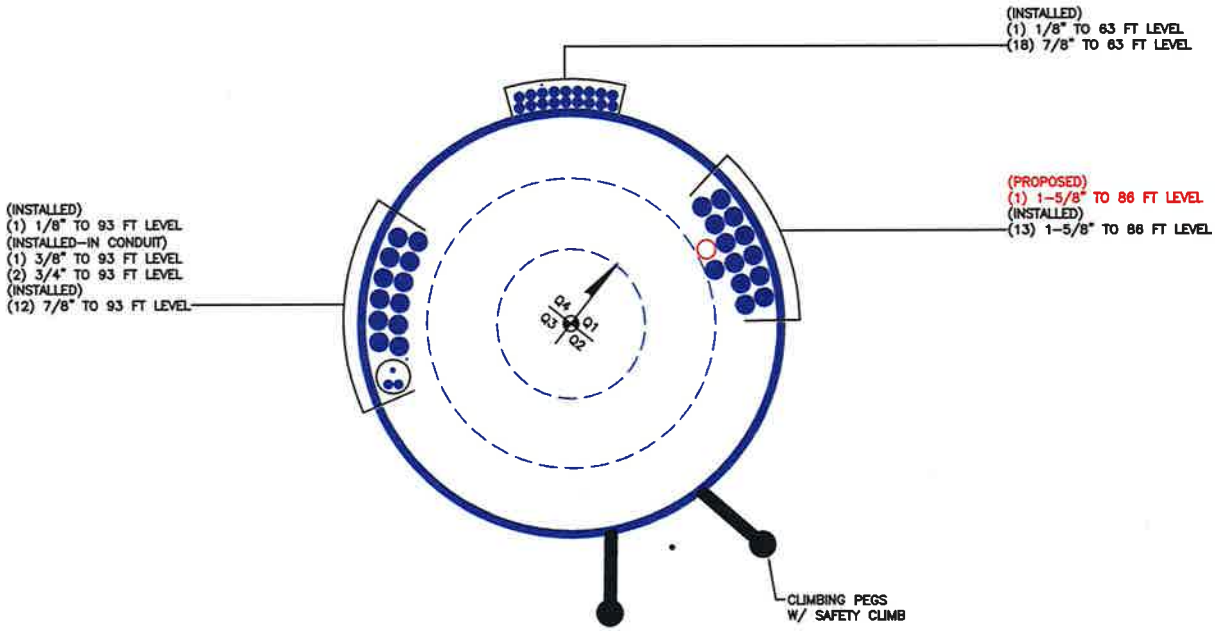
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	101 - 83.62 (1)	0.004	0.160	0.000	0.014	0.001	0.164 ✔	1.000	4.8.2 ✔
L2	83.62 - 45.58 (2)	0.008	0.636	0.000	0.020	0.000	0.644 ✔	1.000	4.8.2 ✔
L3	45.58 - 0 (3)	0.008	0.640	0.000	0.013	0.000	0.648 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	101 - 83.62	Pole	TP17.41x13x0.1875	1	-2.84	730.64	16.4	Pass
L2	83.62 - 45.58	Pole	TP26.56x16.3372x0.25	2	-11.32	1489.34	64.4	Pass
L3	45.58 - 0	Pole	TP37.5x25.0976x0.3125	3	-20.30	2610.26	64.8	Pass
							Summary	
						Pole (L3)	64.8	Pass
						RATING =	**64.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 842876 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *842876*
Site Name: *WINDSOR LOCKS*
App #: *363559 Rev. 0*

Pole Manufacturer:	Other

Anchor Rod Data		
Qty:	10	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	46	in

Plate Data		
Diam:	52	in
Thick:	1.5	in
Grade:	60	ksi
Single-Rod B-eff:	11.90	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	37.5	in
Thick:	0.3125	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions		
Mu:	1277	ft-kips
Axial, Pu:	20	kips
Shear, Vu:	17	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

If No stiffeners, Criteria:	AISC LRFD	<-Only Applcable to Unstiffened Cases

Anchor Rod Results

		Non-Rigid
Max Rod (Cu+ Vu/ή):	138.7 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	53.3% Pass	

Base Plate Results

	Flexural Check	Non-Rigid
Base Plate Stress:	53.7 ksi	AISC LRFD
Allowable Plate Stress:	54.0 ksi	φ*Fy
Base Plate Stress Ratio:	99.4% Pass	Y.L. Length: 26.64

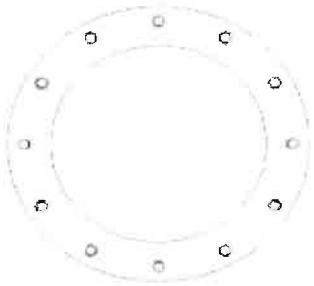
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 10/4/2016

BU:	842876
Site Name:	WINDSOR LOCKS
App Number:	363559 Rev 0
Work Order:	1305317

CROWN CASTLE

Monopole Drilled Pier

Input

Criteria

TIA Revision:	G
ACI 318 Revision:	2008
Seismic Category:	B

Forces

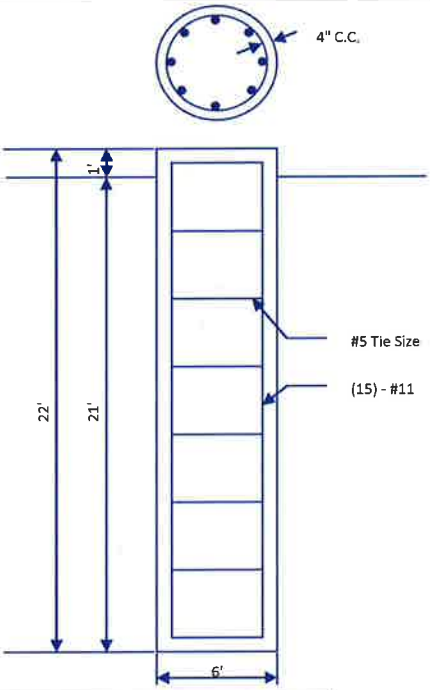
Compression	20 kips
Shear	17 kips
Moment	1277 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	6 ft
Ext. above grade:	1 ft
Depth below grade:	21 ft

Material Properties

Number of Rebar:	15
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	4000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	4 in



Soil Profile: 842876 soil

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.33	0	3.33	125					0	
2	1.67	3.33	5	125		34	0	0	0	
3	10	5	15	125		34	0.8	0.8	0	
4	6	15	21	125		34	1.6	1.6	60	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	5.42 ft
Max Moment, Mu:	1366.88 k-ft
Soil Safety Factor:	4.28
Safety Factor Req'd:	1.33
RATING:	31.1%

Soil Axial Capacity

Skin Friction (k):	248.81 kips
End Bearing (k):	1272.34 kips
Comp. Capacity (k), ϕCn:	1521.16 kips
Comp. (k), Cu:	20.00 kips
RATING:	1.3%

Concrete/Steel Check

Mu (from soil analysis)	1366.88 k-ft
ϕMn	3193.88 k-ft
RATING:	42.8%

rho provided	0.57
rho required	0.33 OK
Rebar Spacing	11.44
Spacing required	22.56 OK
Dev. Length required	15.25
Dev. Length provided	53.51 OK

Overall Foundation Rating: 42.8%

ATTACHMENT 4

s://windsorlocksct.mapgeo.io/properties/051-125-013?latlng=41.910348%2C-72.661435&panel=search&selected=051-125-013&zoom=18

Locks, Conn... | 1000 OLD COUNTY CIRCLE ... × | Registration Status | NADA Used Cars/Trucks

COUNTY CIRCLE #98

ections | Zoom

k

Card

000 OLD COUNTY CIRCLE
98

51-125-013

AFALOWSKI MARIA

000 OLD COUNTY CIRCLE
8 WINDSOR LOCKS, CT
6096

86,000

0

202,000 on 2002-04-09

85/266

ND1

Town of Windsor Locks, CT

Property Location 1000 OLD COUNTY CIRCLE # 105 | Map ID 51/ 125/ 13/ / | Bldg Name | State Use 305
Vision ID 966 | Account # 00324200 | Bldg # 1 | Sec # 1 of 1 | Card # 1 of 1 | Print Date 07-31-2017 1:42:31 P

CURRENT OWNER	TOPO	UTILITIES	STRT / ROAD	LOCATION
RAFALOWSKI STANLEY AKA STANIS				
1000 OLD COUNTY CIRCLE #105				
WINDSOR LOCKS CT 06096				

SUPPLEMENTAL DATA

?ID	28-64-33EF-105	Call Back CB Section	
CENSUS	4763	UID	00324200
Wrong Image			
Gis MBLU	051-125-013	ASSOC PID#	

CURRENT ASSESSMENT

Description	Code	Assessed	Assessed
Ind Condo	3-4	119,400	83,600
	Total	119,400	83,600

6165
WINDSOR LOCKS, CT

RECORD OF OWNERSHIP

RECORD OF OWNERSHIP	BK-VOL/PAGE		SALE DATE	Q/U	V/I	SALE PRICE	VC
RAFALOWSKI STANLEY AKA STANISLAW &	196	765	09-17-1990			0	

PREVIOUS ASSESSMENTS (HISTORY)

Year	Code	Assessed	Year	Code	Assessed V	Year	Code	Assessed
2016	3-4	83,400	2013	3-4	83,400	2012	300	88,900
	Total	83,400		Total	83,400		Total	88,900

EXEMPTIONS

Year	Code	Description	Amount
		Total	0.00

OTHER ASSESSMENTS

Code	Description	Number	Amount	Comm Int

This signature acknowledges a visit by a Data Collector or Assessor

ASSESSING NEIGHBORHOOD

NBHD	NBHD Name	Street Index Name	Tracing	Batch
0001				

NOTES

QUICK TURN MACHINE CO 1986
(860) 623-2569 info@quickturnmfg.com

EXT=MKT

APPRAISED VALUE SUMMARY

Appraised Bldg. Value (Card)	113,400
Appraised XF (B) Value (Bldg)	6,000
Appraised OB (B) Value (Bldg)	0
Appraised Land Value (Bldg)	0
Special Land Value	0
Total Appraised Parcel Value	119,400
Valuation Method	C
Exemption	0
Adjustments	
	83,600

BUILDING PERMIT RECORD

Permit ID	Issue Date	Type	Description	Amount	Insp Date	% Comp	Date Comp	Comments

VISIT / CHANGE HISTORY

Date	Type	IS	ID	Cd	Purpost/Result
01-02-2008			JF	00	

LAND LINE VALUATION SECTION

Bl	Use co	Description	Zone	D	Front	Depth	Units		Unit Price	I. Fact	S.A.	Ac Di	C. Fact	St. I	Adj	Notes	Special Pricing			Adj Unit P	Land Value
1	305	Ind Condo	IND1		0	0	0	S	0.00	1.000	5	1.000	1.00		1.00			0	0.000	0.00	0
							Total Card Land Units	0.000	A	Parcel Total Land Area	0.0000								Total Land Value		0

Property Location 1000 OLD COUNTY CIRCLE # 105 | Map ID 51/ 125/ 13/ / | Bldg Name | State Use 305
Vision ID 966 | Account # 00324200 | Bldg # 1 | Sec # 1 of 1 | Card # 1 of 1 | Print Date 07-31-2017 1:42:31 P

CONSTRUCTION DETAIL

Element	Cd	Description
Style	98	Indust Condo
Model	06	Com Condo
Grade	03	Average
Stories:	1	1 Story
Occupancy	1	
Interior Wall A	01	Minim/Masonry
Interior Floor A	03	Concrete
Interior Floor B		
Heat Fuel:	03	Gas
Heat Type:	04	Forced Air-Duc
AC Type:	01	None
Total Bedrooms	00	No Bedrooms
Total Bathroom	0	
Total Half Baths	0	
Total Rooms:		
Bath Style:		
Kitchen Style:		
	00	
	00	
	00	
Fireplace Gas		
Fin. Basement		
	N	
Cath. Ceiling		
	N	
Basement Gar.		
Whirlpool		
Fireplace Types		

CONSTRUCTION DETAIL (CONTINUED)

Element	Cd	Description
Fireplaces		
	98	

CONDO DATA

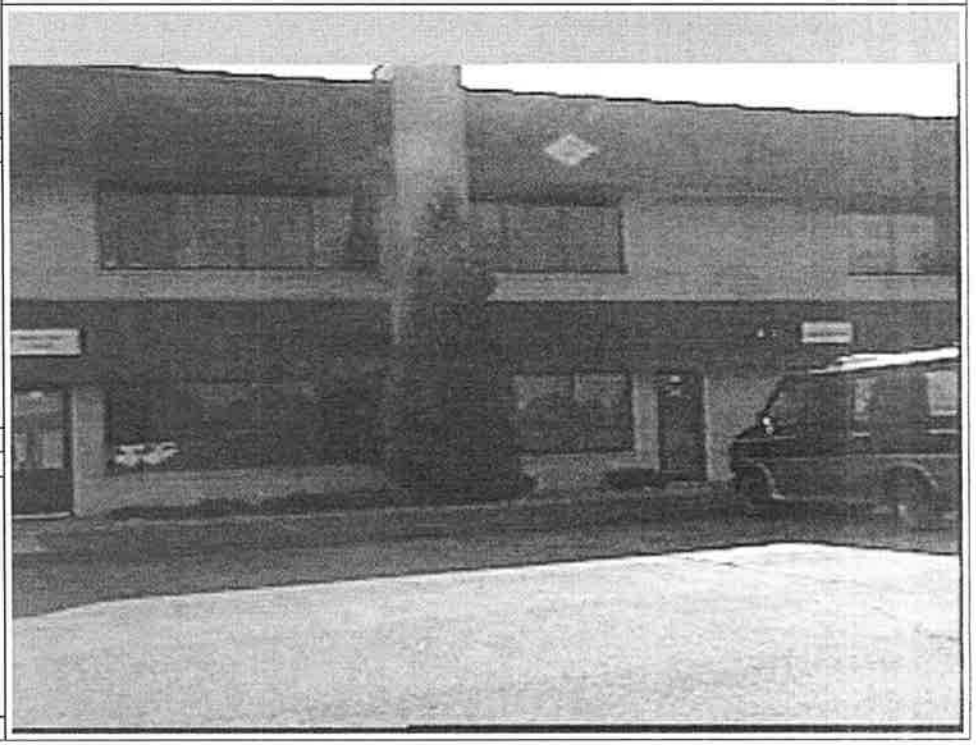
Parcel ID	183781	C	21	Owne	0.0		
	Old County Cir			B	1	S	1

Adjust Type	Code	Description	Factor%
Unit Type C			
Unit Locatio			

COST / MARKET VALUATION

	Base Rate
Base Rate	
Replace Cost	151,247
Net Other Adj	
Replace Cost	151,247
Year Built	1989
Effective Year Built	1993
Depreciation Code	A
Remodel Rating	
Year Remodeled	
Depreciation %	20
Functional Obsol	0
Economic Obsol	5
Cost Trend Factor	1
Condition	
Percent Complete	
Overall % Condition	75
Deprec Value	113,400
Dep % Ovr	
Dep Ovr Comment	
Misc Imp Ovr	
Misc Imp Ovr Comment	
Cost to Cure Ovr	
Cost to Cure Ovr Comment	

BAS
(3,375 sf)



OB - OUTBUILDING & YARD ITEMS(L) / XF - BUILDING EXTRA FEATURES(B)

Code	Description	Su	Descriptio	Lan	Units	Unit Pric	Ye	Pct	Depre	Con	Qual		Appr Ovr
MEZ	Mezzanine	U	Unfinishe	B	300	15.00	199	80	1.00			0.00	3,600
SPRK	Sprinklers	D	Dry	B	3,37	0.90	199	80	1.00			0.00	2,400

BUILDING SUB-AREA SUMMARY SECTION

Subarea	Description	Living	Gross	Eff Area	Unit Cost	Undeprec Value
BAS	First Floor	3,375	3,375	3,375	44.81	151,247
	Ttl Gross Liv / Lease Area	3,375	3,375	3,375		

ATTACHMENT 5

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	OLD STATE HOUSE STATION 06103 08/01/2017 AUG 01 2017 US POSTAGE $002.38[illegible] ZIP 06103 1L12203360 USPS
	Postmaster, per *(name of receiving employee)*		

	USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.		J. Christopher Kervick, First Selectman Town of Windsor Locks 50 Church Street Windsor Locks, CT 06096				
2.		Jennifer Rodriguez, Town Planner Town of Windsor Locks 50 Church Street Windsor Locks, CT 06096				
3.		Stanley Rafalowski 1000 Old Country Circle #105 Windsor Locks, CT 06096				
4.		[illegible]				
5.		[illegible]				
6.		[illegible]				

OLD STATE HOUSE STATION 06103 AUG 01 2017 USPS