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

April 9, 2015

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
1684 Chamberlain Highway, Berlin, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 94-foot level on an existing 123-foot tower at 1684 Chamberlain Highway in Berlin (the "Property"). The tower is owned Crown Castle. Cellco's use of the tower was approved by the Council in 2001. Cellco now intends to modify its facility by replacing three (3) of its existing antennas with three (3) model LNX-6514DS-VTM, 700 MHz antennas at the same 94-foot level on the tower. Included in Attachment 1 are specifications for Cellco's replacement antennas.

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 letter is being sent to Denise M. McNair, Town Manager for the Town of Berlin. A copy of this letter is also being sent to Ronald L. and Arlene G. Laviana, the owners 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 will be installed on its existing antenna platform at the 94-foot level on the 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.

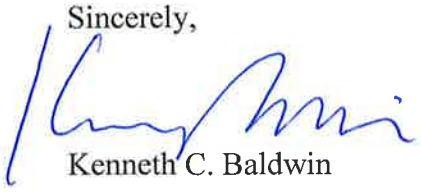
4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included behind Attachment 2. The 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).

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:
Denise M. McNair, Berlin Town Manager
Ronald L. and Arlene G. Laviana
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 15.7	0 ° | 15.9
	5 ° | 15.7	5 ° | 15.8
	10 ° | 15.3	10 ° | 15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®

Product Specifications

LNX-6514DS-VTM

Operating Frequency Band	698 – 896 MHz

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1847.0 mm | 72.7 in
Width	301.0 mm | 11.9 in
Net Weight	14.2 kg | 31.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

ATTACHMENT 2

Far Field Approximation
with downtilt variation

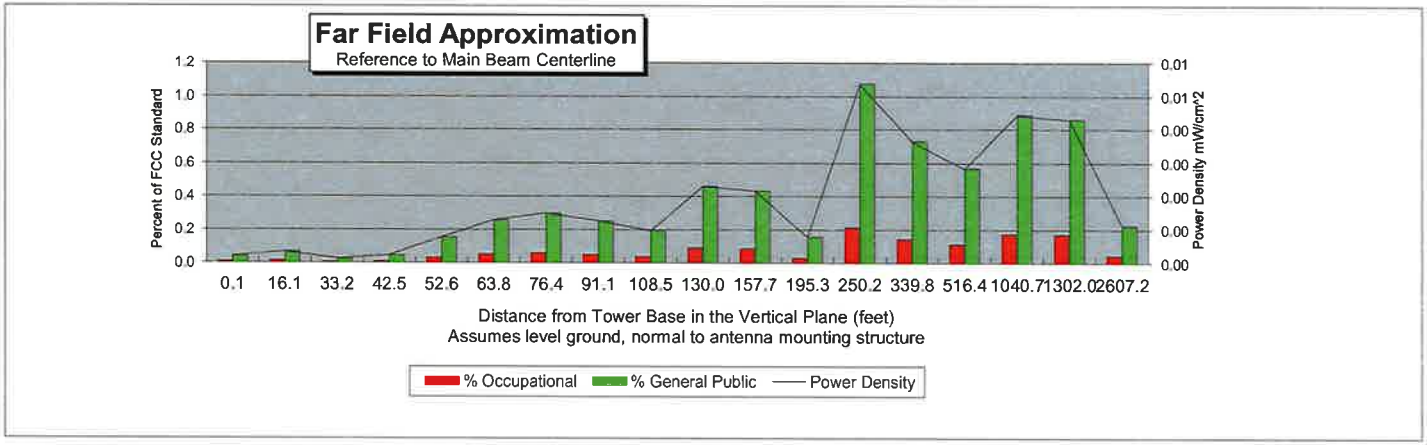
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	BERLIN 3, CT
Site #:	
Date:	03/31/15
Name:	Mark Brauer
File Name:	Berlin 3, CT - FF Power

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**94.0**
Antenna Gain (dBi):	**15.2**
Antenna Size (in.):	**48.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1050.0**
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	91.0	92.4	96.9	100.4	105.1	111.1	118.8	128.7	141.6	158.7	182.1	215.4	266.2	351.8	524.3	1044.6	1305.2	2608.8
Distance from Antenna Structure Base in Horizontal plane	0.1	16.1	33.2	42.5	52.6	63.8	76.4	91.1	108.5	130.0	157.7	195.3	250.2	339.8	516.4	1040.7	1302.0	2607.2
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	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.2	0.2	0.0
Percent of General Population Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.5	0.4	0.2	1.1	0.7	0.6	0.9	0.9	0.2

Antenna Type LNX-6514DS
Max% 1.08%

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

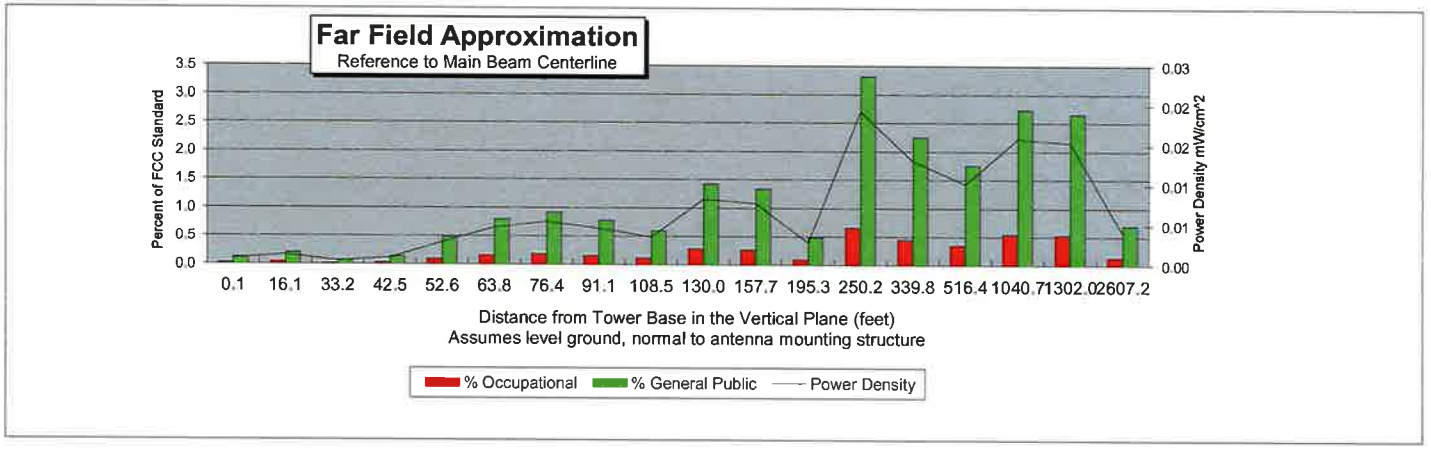
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	BERLIN 3, CT
Site #:	
Date:	03/31/15
Name:	Mark Brauer
File Name:	Berlin 3, CT - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**94.0**
Antenna Gain (dBi):	**15.2**
Antenna Size (in.):	**48.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3773.0**
Number of Channels	**9**



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	91.0	92.4	96.9	100.4	105.1	111.1	118.8	128.7	141.6	158.7	182.1	215.4	266.2	351.8	524.3	1044.6	1305.2	2608.8	
Distance from Antenna Structure Base in Horizontal plane	0.1	16.1	33.2	42.5	52.6	63.8	76.4	91.1	108.5	130.0	157.7	195.3	250.2	339.8	516.4	1040.7	1302.0	2607.2	
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	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.7	0.5	0.4	0.5	0.5	0.1	
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.5	0.8	0.9	0.8	0.6	1.4	1.3	0.5	3.3	2.3	1.8	2.7	2.7	0.7	

Antenna Type BXA-70063-4CF
Max% 3.32%

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

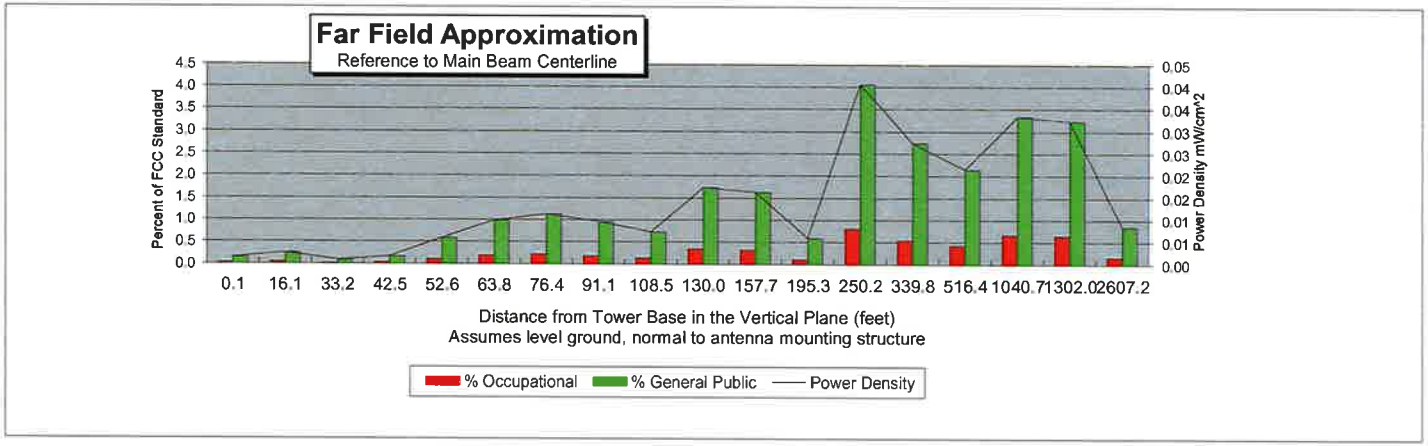
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	BERLIN 3, CT
Site #:	
Date:	03/31/15
Name:	Mark Brauer
File Name:	Berlin 3, CT - FF Power

Operating Freq. (MHz)	**1945.0**
Antenna Height (ft):	**94.0**
Antenna Gain (dBi):	**17.1**
Antenna Size (in.):	**48.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**5124.0**
Number of channels:	**11**



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	91.0	92.4	96.9	100.4	105.1	111.1	118.8	128.7	141.6	158.7	182.1	215.4	266.2	351.8	524.3	1044.6	1305.2	2608.8	
Distance from Antenna Structure Base in Horizontal plane	0.1	16.1	33.2	42.5	52.6	63.8	76.4	91.1	108.5	130.0	157.7	195.3	250.2	339.8	516.4	1040.7	1302.0	2607.2	
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	0.04	0.03	0.02	0.03	0.03	0.01	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.8	0.5	0.4	0.7	0.6	0.2	
Percent of General Population Standard	0.1	0.2	0.1	0.2	0.6	1.0	1.1	1.0	0.7	1.7	1.6	0.6	4.0	2.7	2.1	3.3	3.2	0.8	

Antenna Type BXA-171063-8BF
Max% 4.05%

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

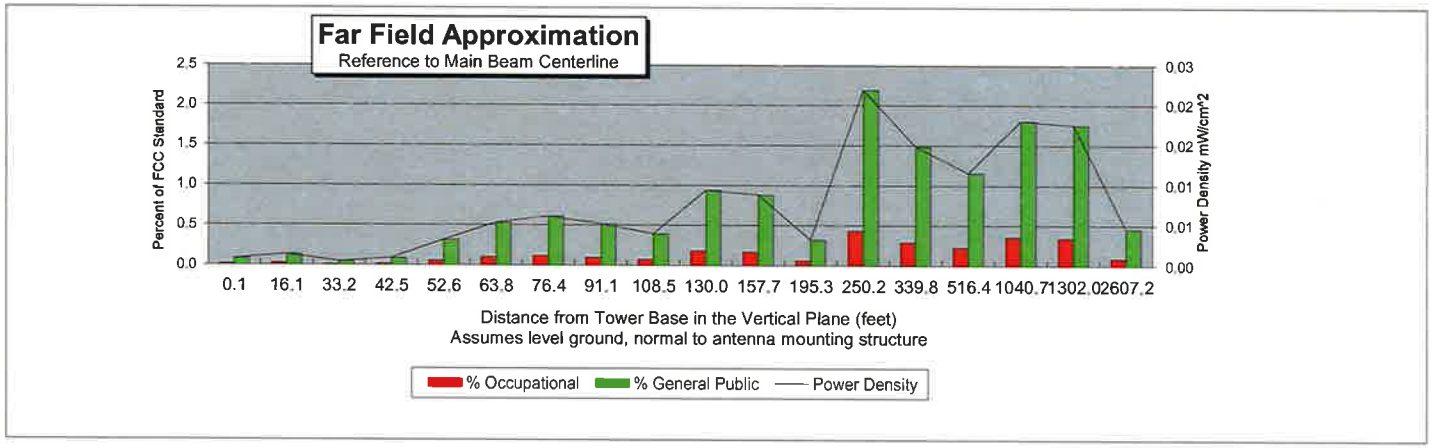
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	BERLIN 3, CT
Site #:	
Date:	03/31/15
Name:	Mark Brauer
File Name:	BERLIN 3, CT - FF Power

Operating Freq. (MHz)	**2145.0**
Antenna Height (ft):	**94.0**
Antenna Gain (dBi):	**19.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1750.0**
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	91.0	92.4	96.9	100.4	105.1	111.1	118.8	128.7	141.6	158.7	182.1	215.4	266.2	351.8	524.3	1044.6	1305.2	2608.8	
Distance from Antenna Structure Base in Horizontal plane	0.1	16.1	33.2	42.5	52.6	63.8	76.4	91.1	108.5	130.0	157.7	195.3	250.2	339.8	516.4	1040.7	1302.0	2607.2	
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	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.4	0.3	0.2	0.4	0.3	0.1	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.6	0.5	0.4	0.9	0.9	0.3	2.2	1.5	1.2	1.8	1.7	0.5	

Antenna Type BXA-171063-12CF
Max% 2.19%

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 Pov
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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **March 06, 2015**

Timothy Howell
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Paul J. Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	37487
	Carrier Site Name:	Berlin 3, CT
Crown Castle Designation:	**Crown Castle BU Number:**	876382
	Crown Castle Site Name:	BERLIN / LAVIANA ORCHARD
	Crown Castle JDE Job Number:	319398
	Crown Castle Work Order Number:	1020223
	Crown Castle Application Number:	275877 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-0149.002.7805
Site Data:	**1684 Chamberlain Highway, BERLIN, Hartford County, CT**	
	Latitude *41° 35' 23.07"*, Longitude *-72° 48' 19.2"*	
	123 Foot - Monopole Tower	

Dear Timothy Howell,

Paul J. Ford and Company 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 762486, in accordance with application 275877, revision 3.

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:

LC4.7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

***The structure has sufficient capacity once the loading changes described in the Recommendations section of this report are completed.**

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

We at *Paul J. Ford and Company* 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:

Christopher Boelking, E.I.
Structural Designer

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER

3.9.15

tnxTower Report - version 6.1.4.1

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **March 06, 2015**

Timothy Howell
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Paul J. Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	37487
	Carrier Site Name:	Berlin 3, CT
Crown Castle Designation:	**Crown Castle BU Number:**	876382
	Crown Castle Site Name:	BERLIN / LAVIANA ORCHARD
	Crown Castle JDE Job Number:	319398
	Crown Castle Work Order Number:	1020223
	Crown Castle Application Number:	275877 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-0149.002.7805
Site Data:	**1684 Chamberlain Highway, BERLIN, Hartford County, CT**	
	Latitude *41° 35' 23.07"*, Longitude *-72° 48' 19.2"*	
	123 Foot - Monopole Tower	

Dear Timothy Howell,

Paul J. Ford and Company 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 762486, in accordance with application 275877, revision 3.

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:

LC4.7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

***The structure has sufficient capacity once the loading changes described in the Recommendations section of this report are completed.**

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

We at *Paul J. Ford and Company* 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:

Christopher Poelking, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 123-ft Monopole tower designed by SUMMIT 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 the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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
93.0	94.0	3	andrew	LNX-6514DS-A1M w/ Mount Pipe	1	1-5/8	-

Table 2 - Existing and Reserved 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
120.0	121.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4	2
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	3	1-1/4	1
	120.0	1	tower mounts	Platform Mount [LP 1201-1]			
118.0	118.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 102-3]			
112.0	113.0	12	decibel	DB844H90E-XY w/Mount Pipe	12	7/8	3
	112.0	1	tower mounts	Platform Mount [LP 713-1]			
100.0	101.0	3	ems wireless	RR65-18-02DP w/ Mount Pipe	6	1-5/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ mount pipe	6	1-5/8	2
		3	rfs celwave	ATMAA1412D-1A20			
		3	rfs celwave	ATMPP1412D-1CWA			
	100.0	1	tower mounts	T-Arm Mount [TA 602-3]	-	-	1

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	94.0	3	alcatel lucent	RRH2X40-AWS	12	1-5/8	1
		3	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe			
		2	antel	BXA-171063-8BF-2 w/ Mount Pipe			
		1	antel	BXA-171085-8BF-EDIN-0 w/ Mount Pipe			
		3	antel	BXA-70063-4CF-EDIN-X w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		6	rfs celwave	FD9R6004/2C-3L			
		2	rfs celwave	APL866513-42T0 w/ Mount Pipe	-	-	3
		1	rfs celwave	APL868013-42T0 w/ Mount Pipe			
	93.0	1	tower mounts	Platform Mount [LP 1201-1]	-	-	1
75.0	75.0	3	rfs celwave	APXV18-206517S-C	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
65.0	66.0	6	powerwave technologies	P65-15-XLH-RR w/ Mount Pipe	1* 2* 12	3/8 3/4 1-5/8	1
		6	powerwave technologies	TT19-08BP111-001			
	65.0	6	ericsson	RRUS-11			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	T-Arm Mount [TA 702-3]			
50.0	51.0	1	lucent	KS24019-L112A	1	1/2	1
	50.0	1	tower mounts	Side Arm Mount [SO 702-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed
*Installed in 2" conduit

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)
-	-	-	-	-	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 05/05/2000	1629353	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 29200-0802, 06/06/2000	1629413	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 29200-0802, 06/06/2000	1629384	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF, 37512-1129, 4/24/2012	3157202	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Vertical Solutions, 080828.04, 12/11/2008	2611098	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 145202, 9/8/2014	5287888	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37508-0979, 10/29/2008	2339268	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), 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) Monopole was reinforced in conformance with the referenced modification 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 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	123 - 82.25	Pole	TP28.114x22x0.1875	1	-8.70	782.55	55.9	Pass
L2	82.25 - 57.75	Pole	TP31.4152x27.2139x0.25	2	-13.51	1285.62	77.7	Pass
L3	57.75 - 40.75	Pole	TP33.966x31.4152x0.4476	3	-16.11	1796.16	71.6	Pass
L4	40.75 - 29.75	Pole	TP35.1164x32.4332x0.4681	4	-20.07	1982.96	81.8	Pass
L5	29.75 - 0	Pole	TP39.58x35.1164x0.487	5	-27.37	2506.49	87.0	Pass
							Summary	
						Pole (L5)	87.0	Pass
						Rating =	87.0	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC4.7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1, 3	Anchor Rods	0	76.3	Pass
1	Base Plate	0	56.9	Pass
1	Base Foundation Structural Steel	0	70.1	Pass
1, 2	Base Foundation Soil Interaction	0	57.6	Pass

Structure Rating (max from all components) =	87.0%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation Analysis Notes: According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report's recommendation, the frost depth of the site or half of the caisson diameter.
3) Worst-case scenario between original anchor rods and post-installed anchor rods.

4.1) Recommendations

The tower and foundation have sufficient capacity to carry the existing, reserved, and proposed loading. In order for the results of this analysis to be considered valid the loading modification listed below must be completed.

Loading Changes:

1. Removal of the abandoned equipment at the 112' elevation.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

4) Tower is located in Hartford County, Connecticut.
5) Basic wind speed of 80 mph.
6) Nominal ice thickness of 1.0000 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56.00 pcf.
9) A wind speed of 38 mph is used in combination with ice.
10) Deflections calculated using a wind speed of 50 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) 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	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
√ Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	

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	123.0000-82.2500	40.7500	3.50	18	22.0000	28.1140	0.1875	0.7500	A607-60 (60 ksi)
L2	82.2500-57.7500	28.0000	0.00	18	27.2139	31.4152	0.2500	1.0000	A607-65 (65 ksi)
L3	57.7500-40.7500	17.0000	4.25	18	31.4152	33.9660	0.4476	1.7902	Reinf 48.08 ksi (48 ksi)
L4	40.7500-29.7500	15.2500	0.00	18	32.4332	35.1164	0.4681	1.8725	Reinf 48.16 ksi (48 ksi)
L5	29.7500-0.0000	29.7500		18	35.1164	39.5800	0.4870	1.9481	Reinf 51.86 ksi (52 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

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	22.3394	12.9812	780.3007	7.7434	11.1760	69.8193	1561.6281	6.4918	3.5420	18.891
	28.5477	16.6198	1637.5523	9.9139	14.2819	114.6592	3277.2593	8.3115	4.6181	24.63
L2	28.1670	21.3958	1965.3102	9.5722	13.8246	142.1599	3933.2064	10.6999	4.3496	17.399
	31.8998	24.7296	3034.5518	11.0636	15.9589	190.1476	6073.0965	12.3671	5.0891	20.356
L3	31.8998	43.9913	5329.9163	10.9935	15.9589	333.9771	10666.8458	21.9998	4.7414	10.594
	34.4900	47.6148	6758.4488	11.8990	17.2547	391.6868	13525.7906	23.8119	5.1903	11.597
L4	33.6928	47.4941	6130.9569	11.3476	16.4761	372.1131	12269.9811	23.7516	4.8843	10.434
	35.6581	51.4808	7808.1088	12.3001	17.8391	437.6958	15626.4918	25.7453	5.3566	11.443
L5	35.6581	53.5301	8110.0693	12.2934	17.8391	454.6227	16230.8100	26.7701	5.3233	10.93
	40.1906	60.4300	11667.7604	13.8780	20.1066	580.2939	23350.8735	30.2207	6.1089	12.543

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
L1 123.0000-82.2500				1	1	1		
L2 82.2500-57.7500				1	1	1		
L3 57.7500-40.7500				1	1	1		
L4 40.7500-29.7500				1	1	1		
L5 29.7500-0.0000				1	1	1		

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
LDF6-50A(1-1/4")	C	No	Inside Pole	120.0000 - 0.0000	3	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
HB114-1-08U4-M5J(1 1/4")	C	No	Inside Pole	120.0000 - 0.0000	1	No Ice	0.0000	1.08
						1/2" Ice	0.0000	1.08
						1" Ice	0.0000	1.08
						2" Ice	0.0000	1.08
						4" Ice	0.0000	1.08
***								
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	100.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
AL7-50(1 5/8)	C	No	Inside Pole	100.0000 - 0.0000	6	No Ice	0.0000	0.52
						1/2" Ice	0.0000	0.52
						1" Ice	0.0000	0.52
						2" Ice	0.0000	0.52
						4" Ice	0.0000	0.52
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	93.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	C	No	Inside Pole	93.0000 - 0.0000	12	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
***								
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	75.0000 - 0.0000	5	No Ice	0.0000	0.70
						1/2" Ice	0.0000	2.23
						1" Ice	0.0000	4.38
						2" Ice	0.0000	10.50
						4" Ice	0.0000	30.07
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	75.0000 - 0.0000	1	No Ice	0.2010	0.70
						1/2" Ice	0.3010	2.23
						1" Ice	0.4010	4.38
						2" Ice	0.6010	10.50
						4" Ice	1.0010	30.07
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	65.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF7-50A(1-5/8")	C	No	Inside Pole	65.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
FB-L98B-002-75000(3/8")	C	No	Inside Pole	65.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
						2" Ice	0.0000	0.06
						4" Ice	0.0000	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	65.0000 - 0.0000	2	No Ice	0.0000	0.59
						1/2" Ice	0.0000	0.59
						1" Ice	0.0000	0.59
						2" Ice	0.0000	0.59
						4" Ice	0.0000	0.59
2" (Nominal) Conduit	C	No	Inside Pole	65.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	0.72
						1" Ice	0.0000	0.72
						2" Ice	0.0000	0.72
						4" Ice	0.0000	0.72
***								
LDF4-50A(1/2")	C	No	Inside Pole	50.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
						2" Ice	0.0000	0.15
						4" Ice	0.0000	0.15
********** ********								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	59.5000 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
						2" Ice	0.6528	0.00
						4" Ice	1.0972	0.00

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	123.0000-82.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.128	0.37
L2	82.2500-57.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

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
		C	0.000	0.000	0.000	8.683	0.69
L3	57.7500-40.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.325	0.64
L4	40.7500-29.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.681	0.42
L5	29.7500-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	18.068	1.13

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	123.0000-82.2500	A	1.145	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.591	0.42
L2	82.2500-57.7500	A	1.094	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	18.690	1.47
L3	57.7500-40.7500	A	1.049	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	21.420	1.52
L4	40.7500-29.7500	A	1.008	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.860	0.98
L5	29.7500-0.0000	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	36.580	2.54

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	123.0000-82.2500	-0.0721	0.0417	-0.1392	0.0804
L2	82.2500-57.7500	-0.4064	0.2347	-0.7215	0.4166
L3	57.7500-40.7500	-0.6451	0.3725	-1.0721	0.6190
L4	40.7500-29.7500	-0.6502	0.3754	-1.0882	0.6282
L5	29.7500-0.0000	-0.6601	0.3811	-1.1026	0.6366

Discrete Tower Loads

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
3/4" x 8 ft lightning rod	C	None		0.00	123.0000	No Ice	0.6000	0.6000	0.01
						1/2" Ice	1.4146	1.4146	0.02
						1" Ice	2.2458	2.2458	0.03
						2" Ice	3.6690	3.6690	0.07
						4" Ice	5.7417	5.7417	0.21

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
***									
TD-RRH8x20-25	A	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.7198 5.0138 5.3165 5.9478 7.3141	1.7027 1.9196 2.1453 2.6224 3.6805	0.07 0.10 0.13 0.20 0.40
TD-RRH8x20-25	B	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.7198 5.0138 5.3165 5.9478 7.3141	1.7027 1.9196 2.1453 2.6224 3.6805	0.07 0.10 0.13 0.20 0.40
TD-RRH8x20-25	C	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.7198 5.0138 5.3165 5.9478 7.3141	1.7027 1.9196 2.1453 2.6224 3.6805	0.07 0.10 0.13 0.20 0.40
APXVTM14-C-120 w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.1342 7.6618 8.1830 9.2563 11.5262	4.9591 5.7544 6.4723 8.0099 11.4120	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.1342 7.6618 8.1830 9.2563 11.5262	4.9591 5.7544 6.4723 8.0099 11.4120	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.1342 7.6618 8.1830 9.2563 11.5262	4.9591 5.7544 6.4723 8.0099 11.4120	0.08 0.13 0.19 0.34 0.75
(2) 2.375" OD x 5' Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.1875 1.4956 1.8071 2.4580 3.9194	1.1875 1.4956 1.8071 2.4580 3.9194	0.02 0.03 0.04 0.08 0.20
(2) 2.375" OD x 5' Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.1875 1.4956 1.8071 2.4580 3.9194	1.1875 1.4956 1.8071 2.4580 3.9194	0.02 0.03 0.04 0.08 0.20
(2) 2.375" OD x 5' Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.1875 1.4956 1.8071 2.4580 3.9194	1.1875 1.4956 1.8071 2.4580 3.9194	0.02 0.03 0.04 0.08 0.20
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	8.4975 9.1490 9.7672 11.0311	6.9458 8.1266 9.0212 10.8440	0.08 0.15 0.23 0.41

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
						2" Ice	13.6786	14.8507	0.91
						4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	8.4975	6.9458	0.08
						1/2" Ice	9.1490	8.1266	0.15
							9.7672	9.0212	0.23
						1" Ice	11.0311	10.8440	0.41
						2" Ice	13.6786	14.8507	0.91
						4" Ice			
Platform Mount [LP 1201-1]	C	None		0.00	120.0000	No Ice	23.1000	23.1000	2.10
						1/2" Ice	26.8000	26.8000	2.50
							30.5000	30.5000	2.90
						1" Ice	37.9000	37.9000	3.70
						2" Ice	52.7000	52.7000	5.30
						4" Ice			
**									
800MHz 2X50W RRH W/FILTER	A	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.4014	2.2536	0.06
						1/2" Ice	2.6131	2.4602	0.09
							2.8335	2.6753	0.11
						1" Ice	3.3002	3.1316	0.17
						2" Ice	4.3372	4.1479	0.34
						4" Ice			
800MHz 2X50W RRH W/FILTER	B	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.4014	2.2536	0.06
						1/2" Ice	2.6131	2.4602	0.09
							2.8335	2.6753	0.11
						1" Ice	3.3002	3.1316	0.17
						2" Ice	4.3372	4.1479	0.34
						4" Ice			
800MHz 2X50W RRH W/FILTER	C	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.4014	2.2536	0.06
						1/2" Ice	2.6131	2.4602	0.09
							2.8335	2.6753	0.11
						1" Ice	3.3002	3.1316	0.17
						2" Ice	4.3372	4.1479	0.34
						4" Ice			
PCS 1900MHz 4x45W-65MHz	A	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.7087	2.6111	0.06
						1/2" Ice	2.9477	2.8475	0.08
							3.1953	3.0925	0.11
						1" Ice	3.7164	3.6084	0.17
						2" Ice	4.8623	4.7439	0.35
						4" Ice			
PCS 1900MHz 4x45W-65MHz	B	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.7087	2.6111	0.06
						1/2" Ice	2.9477	2.8475	0.08
							3.1953	3.0925	0.11
						1" Ice	3.7164	3.6084	0.17
						2" Ice	4.8623	4.7439	0.35
						4" Ice			
PCS 1900MHz 4x45W-65MHz	C	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.7087	2.6111	0.06
						1/2" Ice	2.9477	2.8475	0.08
							3.1953	3.0925	0.11
						1" Ice	3.7164	3.6084	0.17
						2" Ice	4.8623	4.7439	0.35
						4" Ice			
Side Arm Mount [SO 102-3]	C	None		0.00	118.0000	No Ice	3.0000	3.0000	0.08
						1/2" Ice	3.4800	3.4800	0.11
							3.9600	3.9600	0.14
						1" Ice	4.9200	4.9200	0.20
						2" Ice	6.8400	6.8400	0.32
						4" Ice			
**									
***									
APX16DWV-16DWV-S-E-A20 w/ mount pipe	A	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice	7.4657	3.4938	0.06
						1/2" Ice	7.9944	4.2631	0.11
							8.5176	4.9598	0.16
						1" Ice	9.5949	6.4031	0.30
						2" Ice	11.8728	9.4897	0.68
						4" 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
APX16DWV-16DWV-S-E-A20 w/ mount pipe	B	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.4657 7.9944 8.5176 9.5949 11.8728	3.4938 4.2631 4.9598 6.4031 9.4897	0.06 0.11 0.16 0.30 0.68
APX16DWV-16DWV-S-E-A20 w/ mount pipe	C	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.4657 7.9944 8.5176 9.5949 11.8728	3.4938 4.2631 4.9598 6.4031 9.4897	0.06 0.11 0.16 0.30 0.68
ATMAA1412D-1A20	A	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.4667 0.5747 0.6914 0.9506 1.5728	1.1667 1.3136 1.4691 1.8062 2.5840	0.01 0.02 0.03 0.06 0.14
ATMAA1412D-1A20	B	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.4667 0.5747 0.6914 0.9506 1.5728	1.1667 1.3136 1.4691 1.8062 2.5840	0.01 0.02 0.03 0.06 0.14
ATMAA1412D-1A20	C	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.4667 0.5747 0.6914 0.9506 1.5728	1.1667 1.3136 1.4691 1.8062 2.5840	0.01 0.02 0.03 0.06 0.14
ATMPP1412D-1CWA	A	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.1672 1.3174 1.4762 1.8197 2.6105	0.4159 0.5298 0.6523 0.9232 1.5688	0.01 0.02 0.03 0.05 0.13
ATMPP1412D-1CWA	B	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.1672 1.3174 1.4762 1.8197 2.6105	0.4159 0.5298 0.6523 0.9232 1.5688	0.01 0.02 0.03 0.05 0.13
ATMPP1412D-1CWA	C	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.1672 1.3174 1.4762 1.8197 2.6105	0.4159 0.5298 0.6523 0.9232 1.5688	0.01 0.02 0.03 0.05 0.13
RR65-18-02DP w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5931 5.0883 5.5778 6.5876 8.7306	3.3194 4.0888 4.7844 6.2255 9.3076	0.03 0.07 0.12 0.22 0.56
RR65-18-02DP w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5931 5.0883 5.5778 6.5876 8.7306	3.3194 4.0888 4.7844 6.2255 9.3076	0.03 0.07 0.12 0.22 0.56
RR65-18-02DP w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5931 5.0883 5.5778 6.5876 8.7306	3.3194 4.0888 4.7844 6.2255 9.3076	0.03 0.07 0.12 0.22 0.56

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
						4" Ice			
T-Arm Mount [TA 602-3]	C	None		0.00	100.0000	No Ice	11.5900	11.5900	0.77
						1/2" Ice	15.4400	15.4400	0.99
							19.2900	19.2900	1.21
						1" Ice	26.9900	26.9900	1.64
						2" Ice	42.3900	42.3900	2.50
						4" Ice			
***									
BXA-70063-4CF-EDIN-X w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.3988	3.6927	0.03
						1/2" Ice	5.8435	4.2947	0.07
							6.2986	4.9133	0.12
						1" Ice	7.2405	6.2583	0.23
						2" Ice	9.2612	9.2851	0.58
						4" Ice			
BXA-70063-4CF-EDIN-X w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.3988	3.6927	0.03
						1/2" Ice	5.8435	4.2947	0.07
							6.2986	4.9133	0.12
						1" Ice	7.2405	6.2583	0.23
						2" Ice	9.2612	9.2851	0.58
						4" Ice			
BXA-70063-4CF-EDIN-X w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.3988	3.6927	0.03
						1/2" Ice	5.8435	4.2947	0.07
							6.2986	4.9133	0.12
						1" Ice	7.2405	6.2583	0.23
						2" Ice	9.2612	9.2851	0.58
						4" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.0290	5.2887	0.04
						1/2" Ice	5.5830	6.4594	0.09
							6.1033	7.3479	0.14
						1" Ice	7.1662	9.1478	0.27
						2" Ice	9.4380	12.9475	0.68
						4" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.0290	5.2887	0.04
						1/2" Ice	5.5830	6.4594	0.09
							6.1033	7.3479	0.14
						1" Ice	7.1662	9.1478	0.27
						2" Ice	9.4380	12.9475	0.68
						4" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.0290	5.2887	0.04
						1/2" Ice	5.5830	6.4594	0.09
							6.1033	7.3479	0.14
						1" Ice	7.1662	9.1478	0.27
						2" Ice	9.4380	12.9475	0.68
						4" Ice			
BXA-171063-8BF-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
							3.9637	4.5951	0.10
						1" Ice	4.8533	5.8933	0.19
						2" Ice	6.7671	8.8855	0.49
						4" Ice			
BXA-171063-8BF-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
							3.9637	4.5951	0.10
						1" Ice	4.8533	5.8933	0.19
						2" Ice	6.7671	8.8855	0.49
						4" Ice			
BXA-171085-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
							3.9637	4.5951	0.10
						1" Ice	4.8533	5.8933	0.19
						2" Ice	6.7671	8.8855	0.49
						4" Ice			
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice	5.6000	2.3333	0.04
						1/2" Ice	5.9154	2.5580	0.08
							6.2395	2.7914	0.12

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
						1" Ice	6.9136	3.2840	0.21
						2" Ice	8.3654	4.3728	0.45
						4" Ice			
(2) FD9R6004/2C-3L	A	From Leg	4.0000	0.00	93.0000	No Ice	0.3665	0.0846	0.00
			0.00			1/2" Ice	0.4506	0.1362	0.01
			1.00			1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(2) FD9R6004/2C-3L	B	From Leg	4.0000	0.00	93.0000	No Ice	0.3665	0.0846	0.00
			0.00			1/2" Ice	0.4506	0.1362	0.01
			1.00			1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(2) FD9R6004/2C-3L	C	From Leg	4.0000	0.00	93.0000	No Ice	0.3665	0.0846	0.00
			0.00			1/2" Ice	0.4506	0.1362	0.01
			1.00			1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
RRH2X40-AWS	A	From Leg	4.0000	0.00	93.0000	No Ice	2.5217	1.5894	0.04
			0.00			1/2" Ice	2.7530	1.7953	0.06
			1.00			1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
RRH2X40-AWS	B	From Leg	4.0000	0.00	93.0000	No Ice	2.5217	1.5894	0.04
			0.00			1/2" Ice	2.7530	1.7953	0.06
			1.00			1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
RRH2X40-AWS	C	From Leg	4.0000	0.00	93.0000	No Ice	2.5217	1.5894	0.04
			0.00			1/2" Ice	2.7530	1.7953	0.06
			1.00			1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.0000	0.00	93.0000	No Ice	8.6485	7.0817	0.06
			0.00			1/2" Ice	9.3051	8.2729	0.13
			1.00			1" Ice	9.9298	9.1847	0.21
						2" Ice	11.2040	11.0232	0.39
						4" Ice	13.8719	15.0629	0.90
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.0000	0.00	93.0000	No Ice	8.6485	7.0817	0.06
			0.00			1/2" Ice	9.3051	8.2729	0.13
			1.00			1" Ice	9.9298	9.1847	0.21
						2" Ice	11.2040	11.0232	0.39
						4" Ice	13.8719	15.0629	0.90
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.0000	0.00	93.0000	No Ice	8.6485	7.0817	0.06
			0.00			1/2" Ice	9.3051	8.2729	0.13
			1.00			1" Ice	9.9298	9.1847	0.21
						2" Ice	11.2040	11.0232	0.39
						4" Ice	13.8719	15.0629	0.90
Platform Mount [LP 1201-1]	C	None		0.00	93.0000	No Ice	23.1000	23.1000	2.10
						1/2" Ice	26.8000	26.8000	2.50
						1" Ice	30.5000	30.5000	2.90
						2" Ice	37.9000	37.9000	3.70
						4" Ice	52.7000	52.7000	5.30
***									
APXV18-206517S-C	A	From Face	1.0000	0.00	75.0000	No Ice	5.1667	3.0375	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	5.6182 6.0772 7.0173 9.1225	3.4693 3.9086 4.8093 6.6995	0.05 0.09 0.17 0.40
APXV18-206517S-C	B	From Face	1.0000 0.00 0.00	0.00	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.1667 5.6182 6.0772 7.0173 9.1225	3.0375 3.4693 3.9086 4.8093 6.6995	0.03 0.05 0.09 0.17 0.40
APXV18-206517S-C	C	From Face	1.0000 0.00 0.00	0.00	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.1667 5.6182 6.0772 7.0173 9.1225	3.0375 3.4693 3.9086 4.8093 6.6995	0.03 0.05 0.09 0.17 0.40
Pipe Mount [PM 601-3]	C	None		0.00	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.3900 5.4800 6.5700 8.7500 13.1100	4.3900 5.4800 6.5700 8.7500 13.1100	0.20 0.24 0.28 0.36 0.53
***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
(2) RRUS-11	C	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	B	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	A	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
DC6-48-60-18-8F	A	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4667 1.6667 1.8778 2.3333 3.3778	1.4667 1.6667 1.8778 2.3333 3.3778	0.02 0.04 0.06 0.11 0.24

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
						4" Ice			
(2) P65-15-XLH-RR w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0666 6.5095 6.9621 7.8961 9.8876	4.1885 4.8037 5.4357 6.8365 9.9536	0.06 0.11 0.16 0.29 0.65
(2) P65-15-XLH-RR w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0666 6.5095 6.9621 7.8961 9.8876	4.1885 4.8037 5.4357 6.8365 9.9536	0.06 0.11 0.16 0.29 0.65
(2) P65-15-XLH-RR w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0666 6.5095 6.9621 7.8961 9.8876	4.1885 4.8037 5.4357 6.8365 9.9536	0.06 0.11 0.16 0.29 0.65
(2) TT19-08BP111-001	A	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6449 0.7568 0.8773 1.1444 1.7822	0.5198 0.6232 0.7354 0.9856 1.5896	0.02 0.02 0.03 0.05 0.12
(2) TT19-08BP111-001	B	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6449 0.7568 0.8773 1.1444 1.7822	0.5198 0.6232 0.7354 0.9856 1.5896	0.02 0.02 0.03 0.05 0.12
(2) TT19-08BP111-001	C	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6449 0.7568 0.8773 1.1444 1.7822	0.5198 0.6232 0.7354 0.9856 1.5896	0.02 0.02 0.03 0.05 0.12
T-Arm Mount [TA 702-3]	C	None		0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6400 6.5500 7.4600 9.2800 12.9200	5.6400 6.5500 7.4600 9.2800 12.9200	0.34 0.43 0.52 0.70 1.06
***									
KS24019-L112A	C	From Face	2.0000 0.00 1.00	0.00	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1556 0.2247 0.3025 0.4840 0.9506	0.1556 0.2247 0.3025 0.4840 0.9506	0.01 0.01 0.01 0.02 0.06
Side Arm Mount [SO 702-1]	C	None		0.00	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.0000 1.0000 1.0000 1.0000 1.0000	1.4300 2.0500 2.6700 3.9100 6.3900	0.03 0.04 0.05 0.07 0.12
****									

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.0000-82.2500	102.0855	1.381	22.582	85.089	A	0.000	85.089	85.089	100.00	0.000	0.000
					B	0.000	85.089		100.00	0.000	0.000
					C	0.000	85.089		100.00	0.000	2.128
L2 82.2500-57.7500	69.7462	1.238	20.290	60.387	A	0.000	60.387	60.387	100.00	0.000	0.000
					B	0.000	60.387		100.00	0.000	0.000
					C	0.000	60.387		100.00	0.000	8.683
L3 57.7500-40.7500	49.1395	1.12	18.358	46.312	A	0.000	46.312	46.312	100.00	0.000	0.000
					B	0.000	46.312		100.00	0.000	0.000
					C	0.000	46.312		100.00	0.000	10.325
L4 40.7500-29.7500	35.1980	1.019	16.689	31.303	A	0.000	31.303	31.303	100.00	0.000	0.000
					B	0.000	31.303		100.00	0.000	0.000
					C	0.000	31.303		100.00	0.000	6.681
L5 29.7500-0.0000	14.5787	1	16.384	92.592	A	0.000	92.592	92.592	100.00	0.000	0.000
					B	0.000	92.592		100.00	0.000	0.000
					C	0.000	92.592		100.00	0.000	18.068

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.0000-82.2500	102.0855	1.381	4.988	1.1451	92.867	A	0.000	92.867	92.867	100.00	0.000	0.000
						B	0.000	92.867		100.00	0.000	0.000
						C	0.000	92.867		100.00	0.000	4.591
L2 82.2500-57.7500	69.7462	1.238	4.482	1.0940	65.063	A	0.000	65.063	65.063	100.00	0.000	0.000
						B	0.000	65.063		100.00	0.000	0.000
						C	0.000	65.063		100.00	0.000	18.690
L3 57.7500-40.7500	49.1395	1.12	4.055	1.0489	49.284	A	0.000	49.284	49.284	100.00	0.000	0.000
						B	0.000	49.284		100.00	0.000	0.000
						C	0.000	49.284		100.00	0.000	21.420
L4 40.7500-29.7500	35.1980	1.019	3.687	1.0078	33.226	A	0.000	33.226	33.226	100.00	0.000	0.000
						B	0.000	33.226		100.00	0.000	0.000
						C	0.000	33.226		100.00	0.000	13.860
L5 29.7500-0.0000	14.5787	1	3.619	1.0000	97.551	A	0.000	97.551	97.551	100.00	0.000	0.000
						B	0.000	97.551		100.00	0.000	0.000
						C	0.000	97.551		100.00	0.000	36.580

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.0000-82.2500	102.0855	1.381	8.821	85.089	A	0.000	85.089	85.089	100.00	0.000	0.000
					B	0.000	85.089		100.00	0.000	0.000
					C	0.000	85.089		100.00	0.000	2.128
L2 82.2500-57.7500	69.7462	1.238	7.926	60.387	A	0.000	60.387	60.387	100.00	0.000	0.000
					B	0.000	60.387		100.00	0.000	0.000
					C	0.000	60.387		100.00	0.000	8.683
L3 57.7500-40.7500	49.1395	1.12	7.171	46.312	A	0.000	46.312	46.312	100.00	0.000	0.000
					B	0.000	46.312		100.00	0.000	0.000
					C	0.000	46.312		100.00	0.000	10.325

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L4 40.7500-29.7500	35.1980	1.019	6.519	31.303	A	0.000	31.303	31.303	100.00	0.000	0.000
					B	0.000	31.303		100.00	0.000	0.000
					C	0.000	31.303		100.00	0.000	6.681
L5 29.7500-0.0000	14.5787	1	6.400	92.592	A	0.000	92.592	92.592	100.00	0.000	0.000
					B	0.000	92.592		100.00	0.000	0.000
					C	0.000	92.592		100.00	0.000	18.068

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	123 - 82.25	Pole	Max Tension	24	0.00	-0.00	-0.00
			Max. Compression	14	-17.47	0.11	0.65
			Max. Mx	11	-8.71	240.35	0.19
			Max. My	2	-8.70	0.02	241.62
			Max. Vy	11	-11.81	240.35	0.19
			Max. Vx	2	-11.93	0.02	241.62
			Max. Torque	5			0.43

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	82.25 - 57.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.28	1.46	0.22
			Max. Mx	11	-13.52	626.46	0.17
			Max. My	2	-13.51	0.25	630.98
			Max. Vy	11	-16.83	626.46	0.17
			Max. Vx	8	16.96	0.25	-630.63
			Max. Torque	10			-0.60
L3	57.75 - 40.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.01	2.43	-0.36
			Max. Mx	11	-16.11	847.05	0.07
			Max. My	2	-16.11	0.40	852.91
			Max. Vy	11	-17.77	847.05	0.07
			Max. Vx	8	17.90	0.40	-852.77
			Max. Torque	10			-0.60
L4	40.75 - 29.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.47	3.58	-1.02
			Max. Mx	11	-20.08	1126.41	-0.04
			Max. My	8	-20.07	0.59	-1133.97
			Max. Vy	11	-18.79	1126.41	-0.04
			Max. Vx	8	18.92	0.59	-1133.97
			Max. Torque	10			-0.59
L5	29.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.19	5.88	-2.35
			Max. Mx	11	-27.37	1711.64	-0.27
			Max. My	8	-27.37	1.00	-1722.71
			Max. Vy	11	-20.54	1711.64	-0.27
			Max. Vx	8	20.66	1.00	-1722.71
			Max. Torque	9			-0.64

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	22	45.19	2.92	-5.09
	Max. H_x	11	27.38	20.52	0.00
	Max. H_z	2	27.38	0.00	20.64
	Max. M_x	2	1722.17	0.00	20.64
	Max. M_z	5	1709.65	-20.52	0.00
	Max. Torsion	3	0.64	-10.26	17.88
	Min. Vert	1	27.38	0.00	0.00
	Min. H_x	5	27.38	-20.52	0.00
	Min. H_z	8	27.38	0.00	-20.64
	Min. M_x	8	-1722.71	0.00	-20.64
	Min. M_z	11	-1711.64	20.52	0.00
	Min. Torsion	9	-0.64	10.26	-17.88

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	27.38	0.00	0.00	0.27	0.97	0.00
Dead+Wind 0 deg - No Ice	27.38	-0.00	-20.64	-1722.17	0.99	-0.52
Dead+Wind 30 deg - No Ice	27.38	10.26	-17.88	-1491.41	-854.32	-0.64
Dead+Wind 60 deg - No Ice	27.38	17.77	-10.32	-860.96	-1480.47	-0.59
Dead+Wind 90 deg - No Ice	27.38	20.52	-0.00	0.27	-1709.65	-0.38
Dead+Wind 120 deg - No Ice	27.38	17.77	10.32	861.50	-1480.47	-0.07

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+Wind 150 deg - No Ice	27.38	10.26	17.88	1491.95	-854.32	0.26
Dead+Wind 180 deg - No Ice	27.38	-0.00	20.64	1722.71	0.99	0.52
Dead+Wind 210 deg - No Ice	27.38	-10.26	17.88	1491.95	856.31	0.64
Dead+Wind 240 deg - No Ice	27.38	-17.77	10.32	861.50	1482.46	0.59
Dead+Wind 270 deg - No Ice	27.38	-20.52	-0.00	0.27	1711.64	0.38
Dead+Wind 300 deg - No Ice	27.38	-17.77	-10.32	-860.96	1482.46	0.07
Dead+Wind 330 deg - No Ice	27.38	-10.26	-17.88	-1491.41	856.31	-0.26
Dead+Ice	45.19	-0.00	0.00	2.35	5.88	-0.00
Dead+Wind 0 deg+Ice	45.19	-0.00	-5.87	-501.27	5.96	-0.21
Dead+Wind 30 deg+Ice	45.19	2.92	-5.09	-433.79	-244.44	-0.21
Dead+Wind 60 deg+Ice	45.19	5.06	-2.94	-249.45	-427.75	-0.16
Dead+Wind 90 deg+Ice	45.19	5.85	0.00	2.38	-494.84	-0.06
Dead+Wind 120 deg+Ice	45.19	5.06	2.94	254.20	-427.75	0.05
Dead+Wind 150 deg+Ice	45.19	2.92	5.09	438.55	-244.44	0.15
Dead+Wind 180 deg+Ice	45.19	-0.00	5.87	506.02	5.96	0.21
Dead+Wind 210 deg+Ice	45.19	-2.92	5.09	438.55	256.36	0.21
Dead+Wind 240 deg+Ice	45.19	-5.06	2.94	254.20	439.66	0.16
Dead+Wind 270 deg+Ice	45.19	-5.85	0.00	2.38	506.76	0.06
Dead+Wind 300 deg+Ice	45.19	-5.06	-2.94	-249.45	439.66	-0.05
Dead+Wind 330 deg+Ice	45.19	-2.92	-5.09	-433.79	256.36	-0.15
Dead+Wind 0 deg - Service	27.38	-0.00	-8.06	-673.02	1.00	-0.20
Dead+Wind 30 deg - Service	27.38	4.01	-6.98	-582.81	-333.34	-0.25
Dead+Wind 60 deg - Service	27.38	6.94	-4.03	-336.37	-578.09	-0.23
Dead+Wind 90 deg - Service	27.38	8.02	0.00	0.27	-667.67	-0.15
Dead+Wind 120 deg - Service	27.38	6.94	4.03	336.91	-578.09	-0.03
Dead+Wind 150 deg - Service	27.38	4.01	6.98	583.35	-333.34	0.10
Dead+Wind 180 deg - Service	27.38	-0.00	8.06	673.55	1.00	0.20
Dead+Wind 210 deg - Service	27.38	-4.01	6.98	583.35	335.33	0.25
Dead+Wind 240 deg - Service	27.38	-6.94	4.03	336.91	580.08	0.23
Dead+Wind 270 deg - Service	27.38	-8.02	0.00	0.27	669.66	0.15
Dead+Wind 300 deg - Service	27.38	-6.94	-4.03	-336.37	580.08	0.03
Dead+Wind 330 deg - Service	27.38	-4.01	-6.98	-582.81	335.33	-0.10

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-27.38	0.00	0.00	27.38	0.00	0.000%
2	0.00	-27.38	-20.64	0.00	27.38	20.64	0.000%
3	10.26	-27.38	-17.88	-10.26	27.38	17.88	0.000%
4	17.77	-27.38	-10.32	-17.77	27.38	10.32	0.000%
5	20.52	-27.38	0.00	-20.52	27.38	0.00	0.000%
6	17.77	-27.38	10.32	-17.77	27.38	-10.32	0.000%
7	10.26	-27.38	17.88	-10.26	27.38	-17.88	0.000%
8	0.00	-27.38	20.64	0.00	27.38	-20.64	0.000%
9	-10.26	-27.38	17.88	10.26	27.38	-17.88	0.000%
10	-17.77	-27.38	10.32	17.77	27.38	-10.32	0.000%
11	-20.52	-27.38	0.00	20.52	27.38	0.00	0.000%
12	-17.77	-27.38	-10.32	17.77	27.38	10.32	0.000%
13	-10.26	-27.38	-17.88	10.26	27.38	17.88	0.000%
14	0.00	-45.19	0.00	0.00	45.19	-0.00	0.000%
15	0.00	-45.19	-5.87	0.00	45.19	5.87	0.000%
16	2.92	-45.19	-5.09	-2.92	45.19	5.09	0.000%
17	5.06	-45.19	-2.94	-5.06	45.19	2.94	0.000%
18	5.85	-45.19	0.00	-5.85	45.19	0.00	0.000%
19	5.06	-45.19	2.94	-5.06	45.19	-2.94	0.000%
20	2.92	-45.19	5.09	-2.92	45.19	-5.09	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
21	0.00	-45.19	5.87	0.00	45.19	-5.87	0.000%
22	-2.92	-45.19	5.09	2.92	45.19	-5.09	0.000%
23	-5.06	-45.19	2.94	5.06	45.19	-2.94	0.000%
24	-5.85	-45.19	0.00	5.85	45.19	0.00	0.000%
25	-5.06	-45.19	-2.94	5.06	45.19	2.94	0.000%
26	-2.92	-45.19	-5.09	2.92	45.19	5.09	0.000%
27	0.00	-27.38	-8.06	0.00	27.38	8.06	0.000%
28	4.01	-27.38	-6.98	-4.01	27.38	6.98	0.000%
29	6.94	-27.38	-4.03	-6.94	27.38	4.03	0.000%
30	8.02	-27.38	0.00	-8.02	27.38	0.00	0.000%
31	6.94	-27.38	4.03	-6.94	27.38	-4.03	0.000%
32	4.01	-27.38	6.98	-4.01	27.38	-6.98	0.000%
33	0.00	-27.38	8.06	0.00	27.38	-8.06	0.000%
34	-4.01	-27.38	6.98	4.01	27.38	-6.98	0.000%
35	-6.94	-27.38	4.03	6.94	27.38	-4.03	0.000%
36	-8.02	-27.38	0.00	8.02	27.38	0.00	0.000%
37	-6.94	-27.38	-4.03	6.94	27.38	4.03	0.000%
38	-4.01	-27.38	-6.98	4.01	27.38	6.98	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	0.00028295
3	Yes	5	0.00000001	0.00032165
4	Yes	5	0.00000001	0.00033490
5	Yes	4	0.00000001	0.00033519
6	Yes	5	0.00000001	0.00032474
7	Yes	5	0.00000001	0.00032727
8	Yes	4	0.00000001	0.00028292
9	Yes	5	0.00000001	0.00033535
10	Yes	5	0.00000001	0.00032141
11	Yes	4	0.00000001	0.00033545
12	Yes	5	0.00000001	0.00033118
13	Yes	5	0.00000001	0.00032935
14	Yes	4	0.00000001	0.00000337
15	Yes	4	0.00000001	0.00024143
16	Yes	4	0.00000001	0.00072522
17	Yes	4	0.00000001	0.00078304
18	Yes	4	0.00000001	0.00023017
19	Yes	4	0.00000001	0.00075497
20	Yes	4	0.00000001	0.00074557
21	Yes	4	0.00000001	0.00024210
22	Yes	4	0.00000001	0.00082060
23	Yes	4	0.00000001	0.00075851
24	Yes	4	0.00000001	0.00023464
25	Yes	4	0.00000001	0.00078242
26	Yes	4	0.00000001	0.00079492
27	Yes	4	0.00000001	0.00010037
28	Yes	4	0.00000001	0.00076496
29	Yes	4	0.00000001	0.00082914
30	Yes	4	0.00000001	0.00010664
31	Yes	4	0.00000001	0.00077862
32	Yes	4	0.00000001	0.00079050
33	Yes	4	0.00000001	0.00010032
34	Yes	4	0.00000001	0.00083212
35	Yes	4	0.00000001	0.00076478
36	Yes	4	0.00000001	0.00010688
37	Yes	4	0.00000001	0.00081093
38	Yes	4	0.00000001	0.00080211

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	123 - 82.25	24.45	27	1.66	0.00
L2	85.75 - 57.75	12.23	27	1.37	0.00
L3	57.75 - 40.75	5.49	33	0.87	0.00
L4	45 - 29.75	3.41	33	0.69	0.00
L5	29.75 - 0	1.51	33	0.48	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.0000	3/4" x 8 ft lightning rod	27	24.45	1.66	0.00	28979
120.0000	TD-RRH8x20-25	27	23.41	1.64	0.00	28979
118.0000	800MHz 2X50W RRH W/FILTER	27	22.71	1.64	0.00	28979
100.0000	APX16DWV-16DWV-S-E-A20 w/ mount pipe	27	16.63	1.53	0.00	6299
93.0000	BXA-70063-4CF-EDIN-X w/ Mount Pipe	27	14.40	1.46	0.00	4829
75.0000	APXV18-206517S-C	33	9.30	1.18	0.00	3360
65.0000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	33	6.95	0.99	0.00	2983
50.0000	KS24019-L112A	33	4.17	0.75	0.00	4244

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	123 - 82.25	62.47	2	4.23	0.00
L2	85.75 - 57.75	31.26	2	3.50	0.00
L3	57.75 - 40.75	14.05	8	2.22	0.00
L4	45 - 29.75	8.73	8	1.76	0.00
L5	29.75 - 0	3.85	8	1.23	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.0000	3/4" x 8 ft lightning rod	2	62.47	4.23	0.00	11453
120.0000	TD-RRH8x20-25	2	59.82	4.20	0.00	11453
118.0000	800MHz 2X50W RRH W/FILTER	2	58.05	4.18	0.00	11453
100.0000	APX16DWV-16DWV-S-E-A20 w/ mount pipe	2	42.51	3.91	0.00	2487
93.0000	BXA-70063-4CF-EDIN-X w/ Mount Pipe	2	36.82	3.74	0.00	1906
75.0000	APXV18-206517S-C	8	23.78	3.03	0.00	1322
65.0000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	8	17.77	2.54	0.00	1172
50.0000	KS24019-L112A	8	10.66	1.93	0.00	1664

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	123 - 82.25 (1)	TP28.114x22x0.1875	40.7500	0.0000	0.0	36.00	16.3072	-8.70	587.06	0.015
L2	82.25 - 57.75 (2)	TP31.4152x27.2139x0.25	28.0000	0.0000	0.0	39.00	24.7296	-13.51	964.45	0.014
L3	57.75 - 40.75 (3)	TP33.966x31.4152x0.4476	17.0000	0.0000	0.0	28.85	46.7089	-16.11	1347.46	0.012
L4	40.75 - 29.75 (4)	TP35.1164x32.4332x0.4681	15.2500	0.0000	0.0	28.90	51.4808	-20.07	1487.59	0.013
L5	29.75 - 0 (5)	TP39.58x35.1164x0.487	29.7500	0.0000	0.0	31.12	60.4300	-27.37	1880.34	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	123 - 82.25 (1)	TP28.114x22x0.1875	241.62	26.27	36.00	0.730	0.00	0.00	36.00	0.000
L2	82.25 - 57.75 (2)	TP31.4152x27.2139x0.25	630.98	39.82	39.00	1.021	0.00	0.00	39.00	0.000
L3	57.75 - 40.75 (3)	TP33.966x31.4152x0.4476	852.92	27.16	28.85	0.942	0.00	0.00	28.85	0.000
L4	40.75 - 29.75 (4)	TP35.1164x32.4332x0.4681	1133.97	31.09	28.90	1.076	0.00	0.00	28.90	0.000
L5	29.75 - 0 (5)	TP39.58x35.1164x0.487	1722.71	35.62	31.12	1.145	0.00	0.00	31.12	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	123 - 82.25 (1)	TP28.114x22x0.1875	11.93	0.73	24.00	0.061	0.01	0.00	24.00	0.000
L2	82.25 - 57.75 (2)	TP31.4152x27.2139x0.25	16.96	0.69	26.00	0.053	0.29	0.01	26.00	0.000
L3	57.75 - 40.75 (3)	TP33.966x31.4152x0.4476	17.90	0.38	19.23	0.040	0.34	0.01	19.23	0.000
L4	40.75 - 29.75 (4)	TP35.1164x32.4332x0.4681	18.92	0.37	19.26	0.038	0.40	0.01	19.26	0.000
L5	29.75 - 0 (5)	TP39.58x35.1164x0.487	20.66	0.34	20.74	0.033	0.52	0.01	20.74	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	123 - 82.25 (1)	0.015	0.730	0.000	0.061	0.000	0.745 ✔	1.333	H1-3+VT ✔

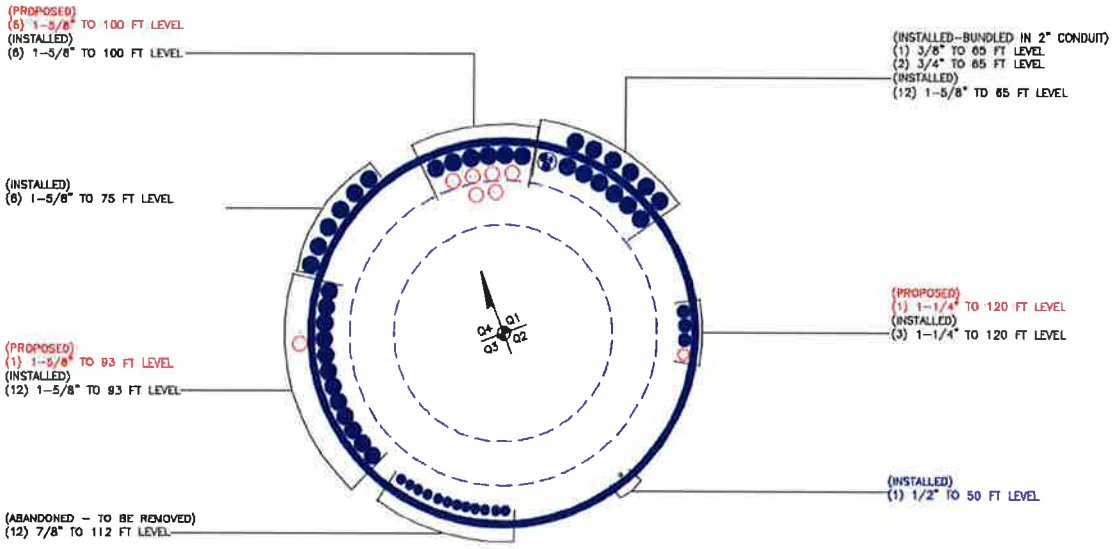
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	82.25 - 57.75 (2)	0.014	1.021	0.000	0.053	0.000	1.036 ✔	1.333	H1-3+VT ✔
L3	57.75 - 40.75 (3)	0.012	0.942	0.000	0.040	0.000	0.954 ✔	1.333	H1-3+VT ✔
L4	40.75 - 29.75 (4)	0.013	1.076	0.000	0.038	0.000	1.090 ✔	1.333	H1-3+VT ✔
L5	29.75 - 0 (5)	0.015	1.145	0.000	0.033	0.000	1.160 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	123 - 82.25	Pole	TP28.114x22x0.1875	1	-8.70	782.55	55.9	Pass
L2	82.25 - 57.75	Pole	TP31.4152x27.2139x0.25	2	-13.51	1285.62	77.7	Pass
L3	57.75 - 40.75	Pole	TP33.966x31.4152x0.4476	3	-16.11	1796.16	71.6	Pass
L4	40.75 - 29.75	Pole	TP35.1164x32.4332x0.4681	4	-20.07	1982.96	81.8	Pass
L5	29.75 - 0	Pole	TP39.58x35.1164x0.487	5	-27.37	2506.49	87.0	Pass
							Summary	
							Pole (L5) 87.0	Pass
							RATING = **87.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

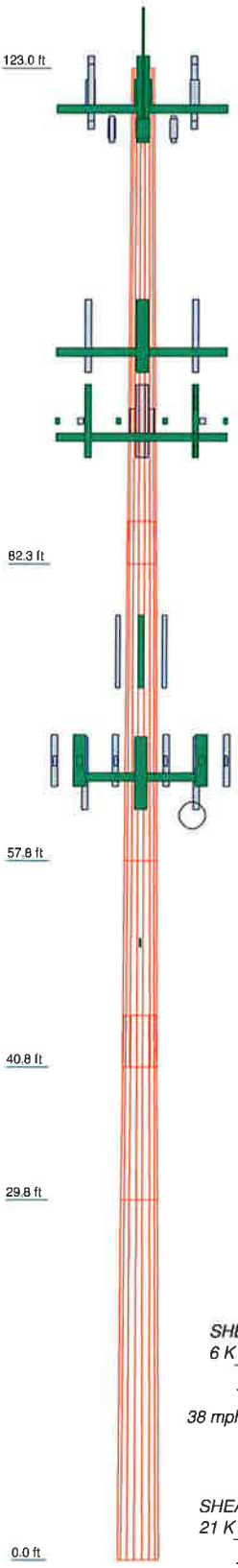

(PROPOSED)
(6) 1-5/8" TO 100 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 100 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 75 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 93 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 93 FT LEVEL
(ABANDONED - TO BE REMOVED)
(12) 7/8" TO 112 FT LEVEL
(INSTALLED--BUNDLED IN 2" CONDUIT)
(1) 3/8" TO 65 FT LEVEL
(2) 3/4" TO 65 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 65 FT LEVEL
(PROPOSED)
(1) 1-1/4" TO 120 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 120 FT LEVEL
(INSTALLED)
(1) 1/2" TO 50 FT LEVEL
Q1
Q2
Q3
Q4

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5
Length (ft)	40.7500	28.0000	17.0000	15.2500	29.7500
Number of Sides	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.4476	0.4681	0.4870
Socket Length (ft)	3.5000		4.2500		
Top Dia (in)	22.0000	27.2139	31.4152	32.4332	35.1164
Bot Dia (in)	28.1140	31.4152	33.9660	35.1164	39.5800
Grade	A607-60	A607-65	Reinf 48.08 ksi	Reinf 48.16 ksi	Reinf 51.86 ksi
Weight (K)	2.1	2.2	2.6	2.6	5.8

Total Weight (K) 15.2



AXIAL
45 K

SHEAR
6 K

MOMENT
508 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 1.0000 in ICE

AXIAL
27 K

SHEAR
21 K

MOMENT
1723 kip-ft

TORQUE 1 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3/4" x 8 ft lightning rod	123	BXA-171063-12CF-EDIN-X w/ Mount Pipe	93
TD-RRH8x20-25	120	BXA-171063-12CF-EDIN-X w/ Mount Pipe	93
TD-RRH8x20-25	120	BXA-171063-8BF-2 w/ Mount Pipe	93
TD-RRH8x20-25	120	BXA-171063-8BF-2 w/ Mount Pipe	93
APXVTM14-C-120 w/ Mount Pipe	120	BXA-171085-8BF-EDIN-0 w/ Mount Pipe	93
APXVTM14-C-120 w/ Mount Pipe	120	DB-T1-6Z-8AB-0Z	93
APXVTM14-C-120 w/ Mount Pipe	120	(2) FD9R6004/2C-3L	93
(2) 2.375" OD x 5' Mount Pipe	120	(2) FD9R6004/2C-3L	93
(2) 2.375" OD x 5' Mount Pipe	120	(2) FD9R6004/2C-3L	93
(2) 2.375" OD x 5' Mount Pipe	120	RRH2X40-AWS	93
APXVSPP18-C-A20 w/ Mount Pipe	120	RRH2X40-AWS	93
APXVSPP18-C-A20 w/ Mount Pipe	120	RRH2X40-AWS	93
APXVSPP18-C-A20 w/ Mount Pipe	120	LNX-6514DS-A1M w/ Mount Pipe	93
Platform Mount [LP 1201-1]	120	LNX-6514DS-A1M w/ Mount Pipe	93
800MHz 2X50W RRH W/FILTER	118	LNX-6514DS-A1M w/ Mount Pipe	93
800MHz 2X50W RRH W/FILTER	118	Platform Mount [LP 1201-1]	93
800MHz 2X50W RRH W/FILTER	118	APXV18-206517S-C	75
PCS 1900MHz 4x45W-65MHz	118	APXV18-206517S-C	75
PCS 1900MHz 4x45W-65MHz	118	APXV18-206517S-C	75
PCS 1900MHz 4x45W-65MHz	118	Pipe Mount [PM 601-3]	75
Side Arm Mount [SO 102-3]	118	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
APX16DWV-16DWV-S-E-A20 w/ mount pipe	100	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
APX16DWV-16DWV-S-E-A20 w/ mount pipe	100	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
APX16DWV-16DWV-S-E-A20 w/ mount pipe	100	(2) RRUS-11	65
ATMAA1412D-1A20	100	(2) RRUS-11	65
ATMAA1412D-1A20	100	(2) RRUS-11	65
ATMAA1412D-1A20	100	DC6-48-60-18-8F	65
ATMPP1412D-1CWA	100	(2) P65-15-XLH-RR w/ Mount Pipe	65
ATMPP1412D-1CWA	100	(2) P65-15-XLH-RR w/ Mount Pipe	65
ATMPP1412D-1CWA	100	(2) P65-15-XLH-RR w/ Mount Pipe	65
RR65-18-02DP w/ Mount Pipe	100	(2) TT19-08BP111-001	65
RR65-18-02DP w/ Mount Pipe	100	(2) TT19-08BP111-001	65
RR65-18-02DP w/ Mount Pipe	100	(2) TT19-08BP111-001	65
T-Arm Mount [TA 602-3]	100	T-Arm Mount [TA 702-3]	65
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93	KS24019-L112A	50
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93	Side Arm Mount [SO 702-1]	50
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93		
BXA-171063-12CF-EDIN-X w/ Mount Pipe	93		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	Reinf 48.16 ksi	48 ksi	61 ksi
A607-65	65 ksi	80 ksi	Reinf 51.86 ksi	52 ksi	65 ksi
Reinf 48.08 ksi	48 ksi	61 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 87%

Paul J. Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: 123' Monopole / Berlin / Laviana Orchard			
Project: PJF# 37515-0149.002.7805 / BU# 876382			
Client: Crown Castle International	Drawn by: Chris Poelking	App'd:	
Code: TIA/EIA-222-F	Date: 03/06/15	Scale: NTS	
Path:		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

v4.4 - Effective 7-12-13

Date: 3/6/2015
PJF Project: 37515-0149.001.7805
Client Ref. # BU 876382
Site Name: Berlin/ Laviana Orchard
Description: 123 ft MP
Owner: CCI
Engineer: CP

Asymmetric Anchor Rod Analysis

Moment =	1723	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	27.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	21.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	12							

** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. **

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	37.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
2	2.250	#18J A615 Gr 75	75	100	52.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
3	2.250	#18J A615 Gr 75	75	100	127.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
4	2.250	#18J A615 Gr 75	75	100	142.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
5	2.250	#18J A615 Gr 75	75	100	217.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
6	2.250	#18J A615 Gr 75	75	100	232.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
7	2.250	#18J A615 Gr 75	75	100	307.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
8	2.250	#18J A615 Gr 75	75	100	322.5	46.00	0.00	3.98	149.37	144.87	144.87	0.00	195.00	74.3%
9	2.250	#18J A615 Gr 75	75	100	0.0	47.25	0.00	3.98	153.37	148.87	148.87	0.00	195.00	76.3%
10	2.250	#18J A615 Gr 75	75	100	90.0	47.25	0.00	3.98	153.37	148.87	148.87	0.00	195.00	76.3%
11	2.250	#18J A615 Gr 75	75	100	180.0	47.25	0.00	3.98	153.37	148.87	148.87	0.00	195.00	76.3%
12	2.250	#18J A615 Gr 75	75	100	270.0	47.25	0.00	3.98	153.37	148.87	148.87	0.00	195.00	76.3%
								47.76						

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *876382*
Site Name: *Berlin / Laviana Orchard*
App #:

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	46	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	44	in
Thick:	2.75	in
Grade:	55	ksi
Clip Distance:	5	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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:	39.58	in
Thick:	0.2812	in
Grade:	65	ksi
# of Sides:	0	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	1128	ft-kips
Unfactored Axial, P:	18	kips
Unfactored Shear, V:	14	kips

Reactions adjusted to account for post installed anchor rods

Anchor Rod Results

TIA F --> Maximum Rod Tension	144.9 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	74.3% Pass

Refer to "Asymmetric Anchor Rod Analysis" spreadsheet for post-installed anchor capacities.

Base Plate Results	Flexural Check
Base Plate Stress:	31.3 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	56.9% Pass

PL Ref. Data	
Yield Line (in):	22.65
Max PL Length:	22.65

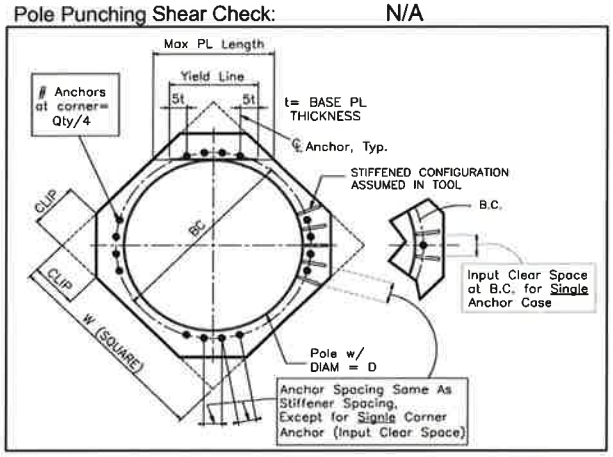
N/A - Unstiffened

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



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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Job Number: 37515-0149.001.7805
Site Number: 876382
Site Name: Berlin/Laviana Orchard

Page: 1
By: CP
Date: 3/6/2015

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	1723.0		k-ft
Shear, V =	21.0		kips
Axial Load, P =	27.0		kips
OTM =	1733.5	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	6	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	20	ft
fc' =	3	ksi
εc =	0.003	in/in
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
+ Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	16	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Soil Parameters

Water Table Depth =	15.00	ft
Depth to Ignore Soil =	3.33	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strength = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	135		38	Sand				5
2	10	135		38	Sand		600		15
3	5	135		38	Sand	40000	600		20
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	14.38	ft, from Grade	Shear, V =	21.00	kips
Bending Moment, M =	2035.57	k-ft, from COR	Resisting Shear, Va =	36.44	kips
Resisting Moment, Ma =	3532.49	k-ft, from COR			
MOMENT RATIO =	**57.6%**	**OK**	**SHEAR RATIO =**	**57.6%**	**OK**

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	62.50	kips
UPLIFT RATIO =	**0.0%**	**OK**

Soil Results: Compression

Compression, C =	27.00	kips
Allowable Comp. Cap., Ca =	639.71	kips
COMPRESSION RATIO =	**4.2%**	**OK**

Steel Results (ACI 318-02):

Minimum Steel Area =	13.57	sq in	Axial Load, P =	48.21	kips @ 4.50 ft Below Grade
Actual Steel Area =	24.96	sq in	Moment, M =	1820.51	k-ft @ 4.50 ft Below Grade
			Allowable Moment, Ma =	2596.26	k-ft
Allowable Min Axial, Pa =	-1036.80	kips, Where Ma = 0 k-ft	**MOMENT RATIO =**	**70.1%**	**OK**
Allowable Max Axial, Pa =	4726.51	kips, Where Ma = 0 k-ft			

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *876382*
Site Name: *Berlin/Laviana Orchard*
App #:

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	6.0	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	5.11	ft
Vert. Cage Diameter =	61.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	16	
As Total=	24.96	in^2
A s/ Aconc, Rho:	0.0061	0.61%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:
Actual Req'd Min. Rho: 0.33% Flexural
Provided Rho: 0.61% OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	6144.47	kips
at Mu=(ϕ=0.65)Mn=	3164.92	ft-kips
Max Tu, (φ=0.9) Tn =	1347.84	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	1820.51	ft-kips **(* Note)**
Max. Service Shaft P:	48.21	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	2366.663	ft-kips
1.30	Pu:	62.673	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

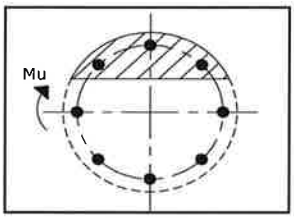
Seismic Properties

Seismic Design Category = D
Seismic Risk = **High**

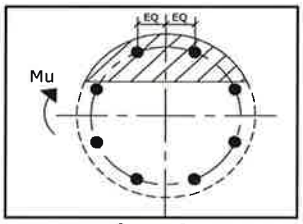
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis: **12.63** in
Extreme Steel Strain, εt: **0.0127**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	62.67	kips
Drilled Shaft Moment Capacity, φMn:	**3375.16**	ft-kips
Drilled Shaft Superimposed Mu:	**2366.66**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**70.1%**