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

July 23, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
115 North Mountain Road, New Britain, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 90-foot level of the existing 118-foot tower at 115 North Mountain Road in New Britain, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 2008. Cellco now intends to replace one (1) of its existing antennas with one (1) model 800 10735V01 700 MHz antenna, at the same level on the tower. Included in Attachment 1 are the specifications for the replacement antenna.

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 Erin Stewart, Mayor for the City of New Britain. A copy of this letter is also being sent to October 24 Inc., 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 antenna will be located at the same 90-foot level on the 118-foot tower.

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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 modified facility 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 foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report is 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:
Erin Stewart, New Britain Mayor
October 24 Inc.
Sandy M. Carter

ATTACHMENT 1

KATHREIN
SCALA DIVISION

800 10735V01

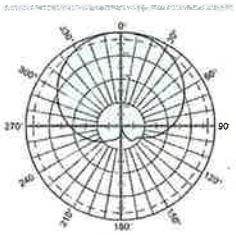
65° Single Band Panel Antenna, 6'

	Antenna
Single Band (MHz)	**698–894**
Dual Polarization	**X**
HPBW	**65°**
Adj. Electrical Downtilt Manual or optional remote control	**0°–10°**

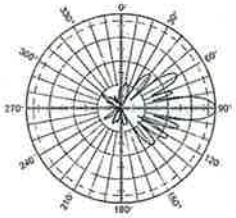
General specifications:

Frequency range	698–894 MHz
VSWR	<1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Maximum input power	500 watts per input (at 50°C)
Connector	2 x 7-16 DIN female (long neck) (bottom mounted)
Isolation	>30 dB
Electrical downtilt	0–10 degrees (continuously adjustable)
See reverse for order information.	

698–894 MHz



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–10° electrical downtilt

Specifications:

	698–806 MHz	824–894 MHz
Gain	15.5 dBi	16 dBi
Front-to-back ratio	>30 dB (co-polar) 35 dB (average)	>30 dB (co-polar) 35 dB (average)
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)
+45° and -45° polarization vertical beamwidth	11.3° (half-power)	10° (half-power)
Min. sidelobe suppression for first sidelobe above main beam average	0° 5° 10° T 16 17 17 dB 16 19 20 dB	0° 5° 10° T 18 17 16 dB 20 20 20 dB
Cross polar ratio Main direction 0° Sector ±60°	25 dB (typical) >11 dB, Average: 15 dB	25 dB (typical) >11 dB, Average: 15 dB

IRT specifications:

Logical interface ex factory[1]	3GPP/AISG 2.0
Protocols	AISG 1.1 and 3GPP/AISG 2.0 compliant
Hardware interface[2]	2 x 8 pin connector acc. IEC 60130-9; according to AISG: – IRT in (male): Control / Daisy chain in – IRT in (female): Daisy chain out
Power supply	10–30 V
Power consumption	<1 watt (standby) <8.5 watts (motor activated)
Adjustment time (full range)	40 sec.
Adjustment cycles	>50,000
Certification	FCC 15.107 Class B Computing Devices

[1] The protocol of the logical interface can be switched from 3GPP/AISG 2.0 to AISG 1.1 and vice versa with a vendor specific command. Start-up operation of the RCU 86010149 is possible in an RET system supporting AISG 1.1 or supporting 3GPP/AISG 2.0 after performing a layer 2 reset before address assignment. The protocol can also be changed as follows: AISG 1.1 to 3GPP: Enter "3GPP" into the additional data filed "Installer's ID" and perform a layer 7 reset or a power reset. 3GPP to AISG 1.1: Enter "AISG 1" into the additional datafield "Installer's ID" and perform a layer 2 reset or a power reset. After switching the protocol any other information can be entered into the "Installer's ID" field.

[2] The tightning torque for fixing the connector must be 0.5 – 1.0 Nm ("hand-tightened"). The connector should be tightened by hand only!

TÜV
11387-D
936.4273/a

RoHS
Lead-Free
Oct 19, 2012

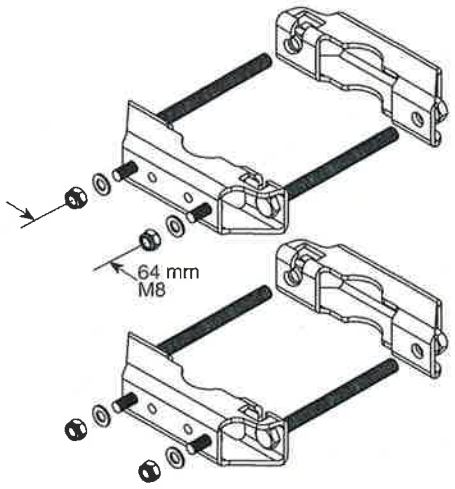
AISG
Antenna Interface Standards Group

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

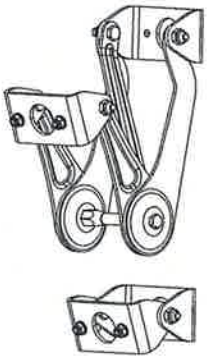
KATHREIN
SCALA DIVISION

800 10735V01

65° Single Band Panel Antenna, 6'



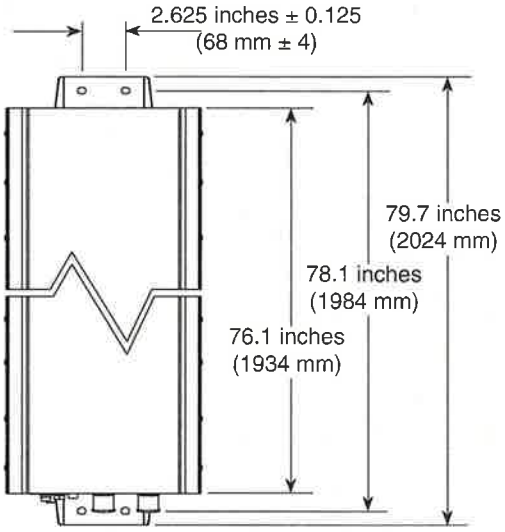
Mounting Brackets
for use with 2-point mount antennas
Mast dia. 2–4.5 inches (50–115 mm)
Weight: 4.4 lb (2 kg)



Mechanical Tilt Brackets
for use with 2-point mount antennas
Weight: 9.5 lb (4.3 kg)
(Model 850 10008)

Mechanical specifications:

Weight	30.9 lb (14 kg)	35.3 lb (16 kg) clamps included
Dimensions H x W x D	76.1 x 11.9 x 3.9 inches (1934 x 303 x 99 mm)	
Wind load Front/Side/Rear Mounting category	at 93 mph (150kph) 203 lbf / 70 lbf / 232 lbf (900 N / 310 N / 1030 N) H (Heavy)	
Wind survival rating*	150 mph (240 kph)	
Shipping dimensions	81.1 x 12.4 x 4.5 inches (2060 x 315 x 115 mm)	
Shipping weight	39.7 lb (18 kg)	
Mounting bracket	2-point hot-dip galvanized with stainless steel hardware for 2 to 4.5 inch (50 to 115 mm) OD masts.	

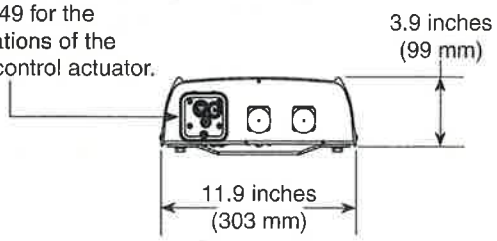


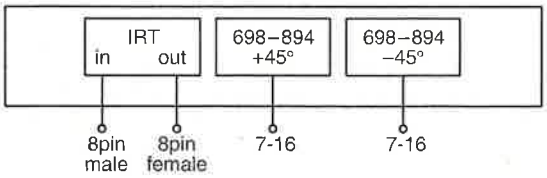
KATHREIN 860 10149

FC Tested To Comply With FCC Standards

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Refer to part number 860 10149 for the specifications of the remote control actuator.





Order Information:

Model	Description
800 10735V01	Antenna with mounting bracket 0°–10° electrical downtilt
800 10735V01K	Antenna with mounting bracket and mechanical tilt bracket 0°–10° electrical downtilt

*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

All specifications are subject to change without notice. The latest specifications are available at www.kathrein-scala.com.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

ATTACHMENT 2

Far Field Approximation
with downtilt variation

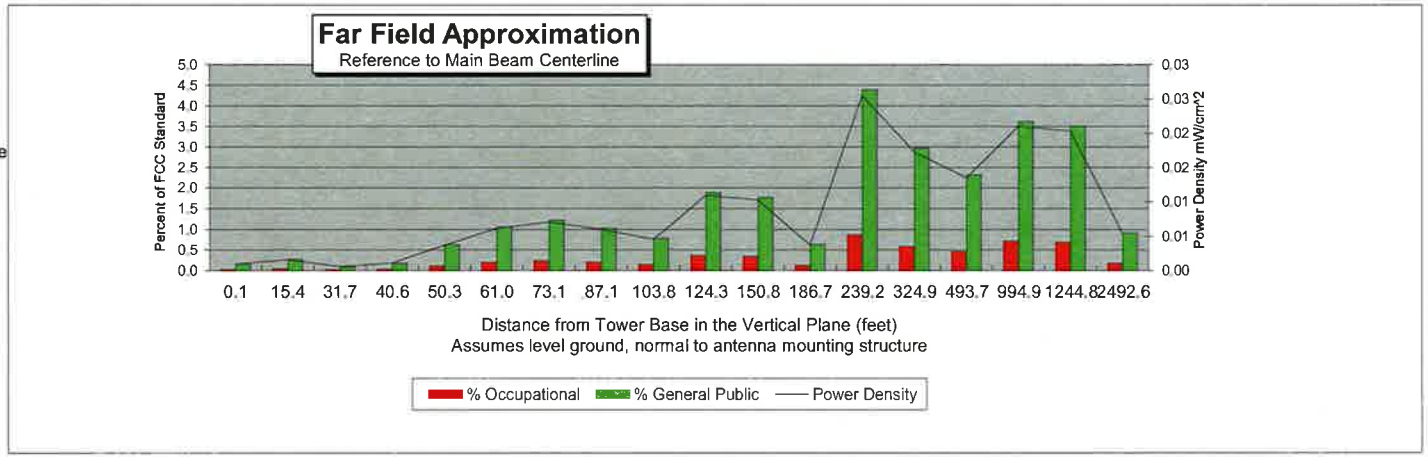
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New Britain NW, CT
Site #:	
Date:	07/09/14
Name:	Mark Brauer
File Name:	New Britain NW, CT - FF Powe

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**90.0**
Antenna Gain (dBi):	**16.0**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3795.0**



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	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6	
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	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.03	0.02	0.01	0.02	0.02	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.4	0.1	0.9	0.6	0.5	0.7	0.7	0.2	
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.6	1.1	1.2	1.0	0.8	1.9	1.8	0.6	4.4	3.0	2.3	3.6	3.5	0.9	

Antenna Type BXA-70040-6CF
Max% 4.40%

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 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

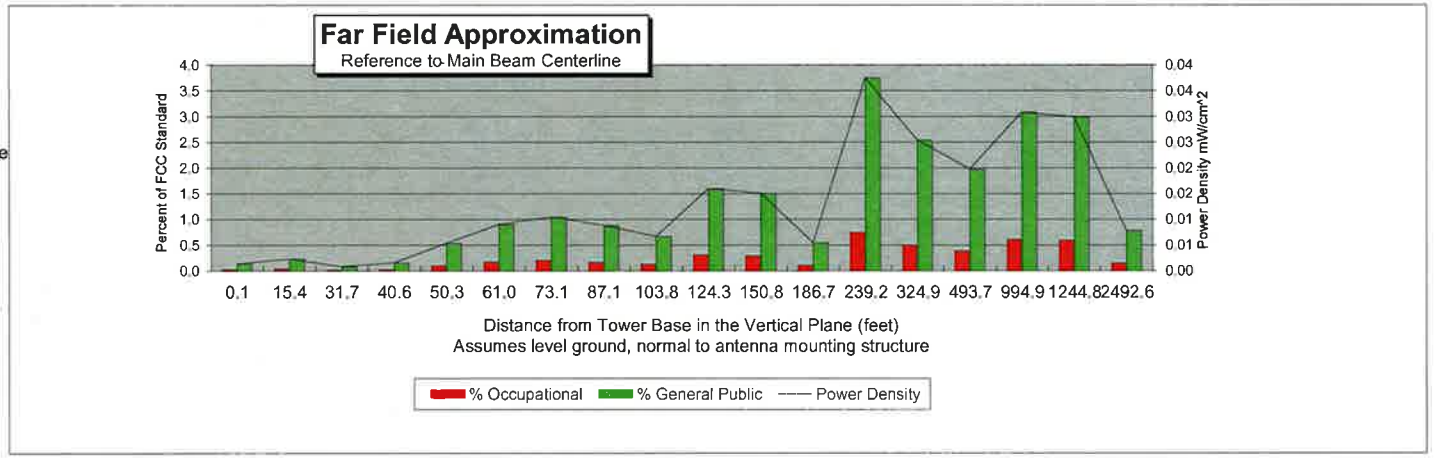
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New Britain NW, CT
Site #:	
Date:	07/09/14
Name:	Mark Brauer
File Name:	New Britain NW, CT - FF Powe

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**90.0**
Antenna Gain (dBi):	**16.3**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**5173.0**



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	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6	
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	0.01	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	0.7	0.5	0.4	0.6	0.6	0.2	
Percent of General Population Standard	0.1	0.2	0.1	0.2	0.5	0.9	1.0	0.9	0.7	1.6	1.5	0.5	3.7	2.5	2.0	3.1	3.0	0.8	

Antenna Type HBX-6517DS
Max% 3.75%

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.

Far Field Approximation
with downtilt variation

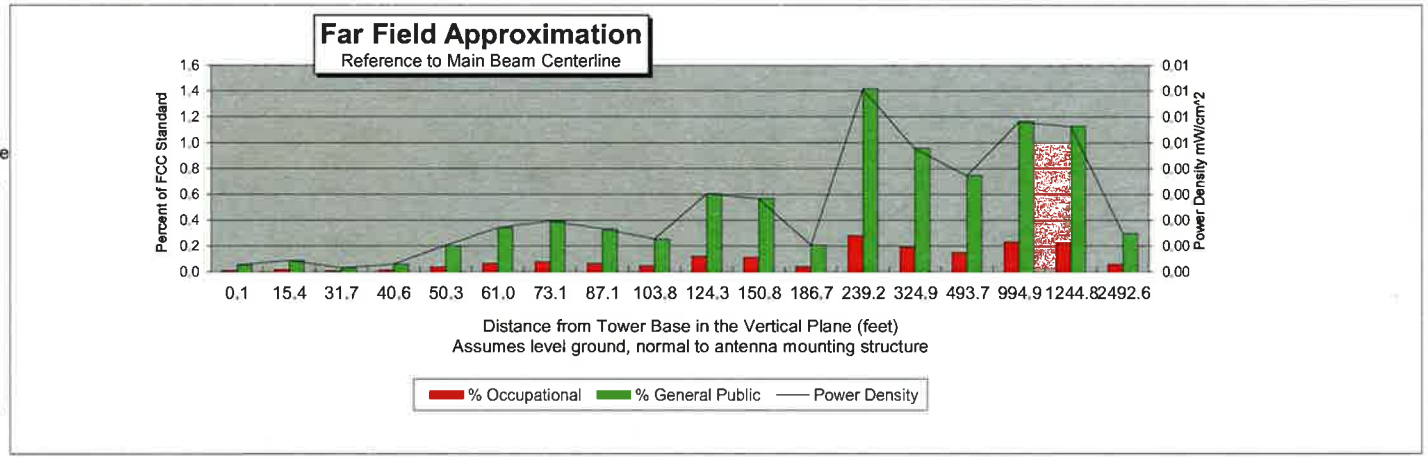
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New Britain NW, CT
Site #:	
Date:	07/09/14
Name:	Mark Brauer
File Name:	New Britain NW, CT - FF Powe

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**90.0**
Antenna Gain (dBi):	**16.0**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1050.0**



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	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6	
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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	0.01	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	0.1	0.2	0.2	0.1	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.3	0.4	0.3	0.3	0.6	0.6	0.2	1.4	1.0	0.7	1.2	1.1	0.3	

Antenna Type BXA-70040-6CF
Max% 1.42%

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)
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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: **November 08, 2013**

Veronica Harris
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430
201.236.9094

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	178090
	Carrier Site Name:	New Britain NW
Crown Castle Designation:	**Crown Castle BU Number:**	876331
	Crown Castle Site Name:	NEW BRITAIN GRAVEL PIT
	Crown Castle JDE Job Number:	248969
	Crown Castle Work Order Number:	671508
	Crown Castle Application Number:	199308 Rev. 1
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37513-0921 R1
Site Data:	**115 North Mountain Rd, NEW BRITAIN, Hartford County, CT** **Latitude *41° 40' 35.72"*, Longitude *-72° 49' 17.09"*** **118 Foot - Monopole Tower**	

Dear Veronica Harris,

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 592314, in accordance with application 199308, revision 1.

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

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 85 mph with no ice, 37.6 mph with 1.0 inch ice thickness and 50 mph under service loads.

All modifications and equipment proposed in this report shall be installed in accordance with the referenced drawings for the determined available structural capacity to be effective.

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:

Joey Meinerding, E.I.
Structural Designer

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

tnxTower Report - version 6.1.3.1

NOV 0 8 2013

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3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
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5) APPENDIX A
tnxTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 118 ft. Monopole tower designed by ROHN in October of 1996. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E.

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 85 mph with no ice, 37.6 mph with 1.0 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
85.0	90.0	1	kathrein	800 10735 K w/ Mount Pipe	--	--	--
	85.0	6	andrew	CBC721-DF			

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
116.0	116.0	2	allgon	7184.05 w/ Mount Pipe	6	1-1/4	3
		2	decibel	DB950F85T2E-M w/ Mount Pipe			
		2	decibel	DB980F65T2E-M w/ Mount Pipe			
		1	rfs celwave	APXV9ERR18-C-A20 w/ Mount Pipe	3	1-1/4	2
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 501-1]	--	--	1
114.0	114.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	2
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 102-3]			
108.0	108.0	3	andrew	ONEBASE TWIN DUAL DUPLEX TMA	12	7/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe			
		3	rfs celwave	APX16PV-16PVL-E w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 802-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98.0	100.0	2	andrew	SBNH-1D6565C w/ Mount Pipe	1 2 12	3/8 3/4 1-1/4	1
		3	communication components inc.	DTMABP7819VG12A			
		3	ericsson	RRUS-11			
		4	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		1	raycap	DC6-48-60-18-8F			
	98.0	1	tower mounts	Platform Mount [LP 712-1]			
85.0	90.0	2	antel	BXA-171063/8CFx2 w/ Mount Pipe	12	1-5/8	1
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		2	antel	LPA-4016 w/ Mount Pipe			
		4	antel	LPA-80063/4CF w/ Mount Pipe			
	86.0	1	antel	BXA-171040/8CF w/ Mount Pipe	--	--	3
	85.0	1	tower mounts	Platform Mount [LP 303-1]	--	--	1
80.0	81.0	1	lucent	KS24019-L112A	1	1/2	1
	80.0	1	tower mounts	Side Arm Mount [SO 701-1]			
72.0	74.0	2	argus technologies	LLPX310R w/ Mount Pipe	3 2 3	1/4 1/2 5/8	1
		1	dragonwave	HORIZON COMPACT			
		1	samsung telecommunications	WIMAX DAP HEAD			
	73.0	1	andrew	VHLP1-23			
		1	samsung telecommunications	WIMAX DAP HEAD			
	72.0	1	argus technologies	LLPX310R w/ Mount Pipe			
		1	dragonwave	A-ANT-18G-2-C			
		1	dragonwave	HORIZON COMPACT			
		1	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Side Arm Mount [SO 101-3]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 07-11435G, 01/23/2008	2192549	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 126879, 03/07/2013	3684848	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn, 34738SW, 10/24/1996	1947809	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn, 34738SW, 10/24/1996	1947800	CCISITES
4-TOWER PROPOSED REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37512-1112 BP R1, 12/13/2012	3399890	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.3.1), 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.
5) The bridge stiffeners take the entire load through the flange connection.
6) Monopole will be reinforced in conformance with the referenced proposed 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 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	118 - 90	Pole	P24x1/4	1	-6.67	589.19	65.8	Pass
L2	90 - 74	Pole	P24x3/8	2	-10.69	934.94	89.5	Pass
L3	74 - 72	Pole	RPS 24" x 0.62537"	3	-11.08	1145.59	80.1	Pass
L4	72 - 64.5	Pole	RPS 24" x 0.77745"	4	-13.29	1396.32	85.5	Pass
L5	64.5 - 64	Pole	RPS 24" x 0.93597"	5	-13.43	1653.27	74.2	Pass
L6	64 - 60	Pole	RPS 24" x 0.77745"	6	-14.38	1396.32	97.0	Pass
L7	60 - 34.5	Pole	RPS 30" x 0.66679"	7	-21.20	1864.07	98.4	Pass
L8	34.5 - 30	Pole	RPS 30" x 0.78318"	8	-22.51	2181.91	91.2	Pass
L9	30 - 19	Pole	RPS 36" x 0.61053"	9	-25.96	1946.26	99.2	Pass
L10	19 - 12.7	Pole	RPS 36" x 0.76575"	10	-28.05	2425.62	87.5	Pass
L11	12.7 - 7.5	Pole	RPS 36" x 0.7688"	11	-29.79	2413.98	94.1	Pass
L12	7.5 - 4	Pole	RPS 36" x 0.76575"	12	-30.96	2425.62	97.7	Pass
L13	4 - 0	Pole	RPS 36" x 0.91772"	13	-32.52	2873.44	87.2	Pass
							Summary	
						Pole (L9)	99.2	Pass
						RATING =	99.2	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	0	94.1	Pass
1	Base Plate	0	84.3	Pass
1	Base Foundation Structural Steel	0	71.5	Pass
1	Base Foundation Soil Interaction	0	63.3	Pass
1	Flange Connection	30	88.1	Pass
1	Flange Connection	60	61.7	Pass
1	Flange Connection	90	28.7	Pass

Structure Rating (max from all components) =	99.2%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Worst case scenario between existing and post installed anchors.

4.1) Recommendations

Install referenced proposed modification drawings.

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:

1) Tower is located in Hartford County, Connecticut.
2) Basic wind speed of 80.0 mph.
3) Nominal ice thickness of 1.00 in.
4) Ice density of 56 pcf.
5) A wind speed of 37.6 mph is used in combination with ice.
6) Temperature drop of 50 °F.
7) Deflections calculated using a wind speed of 50.0 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) 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	

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	118.00-90.00	28.00	P24x1/4	A572-42 (42 ksi)	5.00
L2	85.00-69.00	16.00	P24x3/8	A572-42 (42 ksi)	5.00
L3	69.00-67.00	2.00	RPS 24" x 0.62537"	Reinf 31.19 ksi (31 ksi)	5.00
L4	67.00-59.50	7.50	RPS 24" x 0.77745"	Reinf 30.78 ksi (31 ksi)	5.00
L5	59.50-59.00	0.50	RPS 24" x 0.93597"	Reinf 30.48 ksi (30 ksi)	5.00
L6	59.00-55.00	4.00	RPS 24" x 0.77745"	Reinf 30.78 ksi (31 ksi)	5.00
L7	55.00-29.50	25.50	RPS 30" x 0.66679"	Reinf 37.93 ksi (38 ksi)	5.00

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L8	29.50-25.00	4.50	RPS 30" x 0.78318"	Reinf 37.95 ksi (38 ksi)	5.00
L9	25.00-14.00	11.00	RPS 36" x 0.61053"	Reinf 35.85 ksi (36 ksi)	5.00
L10	14.00-7.70	6.30	RPS 36" x 0.76575"	Reinf 35.78 ksi (36 ksi)	5.00
L11	7.70-2.50	5.20	RPS 36" x 0.7688"	Reinf 35.47 ksi (35 ksi)	5.00
L12	2.50-1.00	3.50	RPS 36" x 0.76575"	Reinf 35.78 ksi (36 ksi)	5.00
L13	1.00-3.00	4.00	RPS 36" x 0.91772"	Reinf 35.52 ksi (36 ksi)	

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 118.00-90.00				1	1	1		
L2 90.00-74.00				1	1	1		
L3 74.00-72.00				1	1	1		
L4 72.00-64.50				1	1	1		
L5 64.50-64.00				1	1	1		
L6 64.00-60.00				1	1	1		
L7 60.00-34.50				1	1	1		
L8 34.50-30.00				1	1	1		
L9 30.00-19.00				1	1	1		
L10 19.00-12.70				1	1	1		
L11 12.70-7.50				1	1	1		
L12 7.50-4.00				1	1	1		
L13 4.00-0.00				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
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	116.00 - 0.00	2	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	72.00 - 0.00	1	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	116.00 - 72.00	1	No Ice	0.15	1.08
						1/2" Ice	0.25	2.33
						1" Ice	0.35	4.18

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
**********								
AL5-50(7/8)	C	No	Inside Pole	108.00 - 0.00	12	No Ice	0.00	0.26
						1/2" Ice	0.00	0.26
						1" Ice	0.00	0.26
**********								
LDF6-50A(1-1/4")	C	No	Inside Pole	98.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
FB-L98B-002-75000(3/8")	C	No	Inside Pole	98.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	98.00 - 0.00	2	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
2" Conduit	C	No	Inside Pole	98.00 - 0.00	1	No Ice	0.00	1.16
						1/2" Ice	0.00	1.16
						1" Ice	0.00	1.16
**********								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	85.00 - 0.00	10	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	85.00 - 0.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
**********								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	80.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
1" Conduit	C	No	CaAa (Out Of Face)	80.00 - 0.00	1	No Ice	0.00	0.46
						1/2" Ice	0.00	1.33
						1" Ice	0.00	2.81
**********								
FSJ1-50A(1/4")	C	No	CaAa (Out Of Face)	72.00 - 0.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.53
						1" Ice	0.00	1.62
FSJ4P-50B-1(1/2")	C	No	CaAa (Out Of Face)	72.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.77
						1" Ice	0.00	2.01
HJ4.5-50(5/8")	C	No	CaAa (Out Of Face)	72.00 - 0.00	3	No Ice	0.00	0.40
						1/2" Ice	0.00	1.24
						1" Ice	0.00	2.69
2" Conduit	C	No	CaAa (Out Of Face)	72.00 - 0.00	1	No Ice	0.00	1.16
						1/2" Ice	0.00	2.53
						1" Ice	0.00	4.51
2" Conduit	C	No	CaAa (Out Of Face)	72.00 - 0.00	1	No Ice	0.17	1.16
						1/2" Ice	0.27	2.53
						1" Ice	0.37	4.51
**********								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	60.00 - 0.00	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	75.00 - 60.00	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	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	118.00-90.00	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	4.004	0.22
L2	90.00-74.00	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	6.945	0.38

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
L3	74.00-72.00	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	1.350	0.05
L4	72.00-64.50	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	5.213	0.23
L5	64.50-64.00	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	0.348	0.02
L6	64.00-60.00	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	2.780	0.12
L7	60.00-34.50	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	18.785	0.79
L8	34.50-30.00	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	3.315	0.14
L9	30.00-19.00	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	8.103	0.34
L10	19.00-12.70	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	4.641	0.20
L11	12.70-7.50	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	3.831	0.16
L12	7.50-4.00	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	2.578	0.11
L13	4.00-0.00	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	2.947	0.12

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	118.00-90.00	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	9.204	0.47
L2	90.00-74.00	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	14.767	1.03
L3	74.00-72.00	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	2.994	0.17
L4	72.00-64.50	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	11.379	0.83
L5	64.50-64.00	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	0.759	0.06
L6	64.00-60.00	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	6.069	0.44
L7	60.00-34.50	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	39.752	2.82
L8	34.50-30.00	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	7.015	0.50
L9	30.00-19.00	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	17.148	1.21

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
L10	19.00-12.70	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	9.821	0.70
L11	12.70-7.50	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	8.106	0.57
L12	7.50-4.00	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	5.456	0.39
L13	4.00-0.00	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	6.236	0.44

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXV9ERR18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	7.47 8.66 9.56	0.09 0.16 0.24
2.375" OD x 5' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	1.19 1.50 1.81	1.19 1.50 1.81	0.02 0.03 0.04
2.375" OD x 5' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	1.19 1.50 1.81	1.19 1.50 1.81	0.02 0.03 0.04
2.375" OD x 5' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	1.19 1.50 1.81	1.19 1.50 1.81	0.02 0.03 0.04
Platform Mount [LP 501-1]	C	None		0.000	116.00	No Ice 1/2" Ice 1" Ice	32.04 45.28 58.51	32.04 45.28 58.51	0.98 1.28 1.57
**********									
PCS 1900MHz 4x45W-65MHz	A	From Leg	2.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	2.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	2.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
800MHz 2X50W RRH W/FILTER	A	From Leg	2.00 0.00	0.000	114.00	No Ice 1/2"	2.40 2.61	2.25 2.46	0.06 0.09

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
			0.00			Ice	2.83	2.68	0.11
						1" Ice			
800MHz 2X50W RRH W/FILTER	B	From Leg	2.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	2.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
Side Arm Mount [SO 102-3]	C	None		0.000	114.00	No Ice 1/2" Ice 1" Ice	3.00 3.48 3.96	3.00 3.48 3.96	0.08 0.11 0.14
**********									
APX16PV-16PVL-E w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.11 0.16
APX16PV-16PVL-E w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.11 0.16
APX16PV-16PVL-E w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.11 0.16
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.11 0.16
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.11 0.16
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.94 7.44 7.94	3.29 4.00 4.66	0.06 0.11 0.16
ONEBASE TWIN DUAL DUPLEX TMA	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	0.67 0.79 0.91	0.31 0.39 0.49	0.01 0.02 0.02
ONEBASE TWIN DUAL DUPLEX TMA	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	0.67 0.79 0.91	0.31 0.39 0.49	0.01 0.02 0.02
ONEBASE TWIN DUAL DUPLEX TMA	C	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	0.67 0.79 0.91	0.31 0.39 0.49	0.01 0.02 0.02
2.375" OD x 5' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	1.19 1.50 1.81	1.19 1.50 1.81	0.02 0.03 0.04
2.375" OD x 5' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	1.19 1.50 1.81	1.19 1.50 1.81	0.02 0.03 0.04
2.375" OD x 5' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	1.19 1.50 1.81	1.19 1.50 1.81	0.02 0.03 0.04
Sector Mount [SM 802-3]	C	None		0.000	108.00	No Ice 1/2"	24.41 31.39	24.41 31.39	0.93 1.36

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
						Ice	38.37	38.37	1.79
						1" Ice			
**********									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	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	0.000	98.00	No Ice 1/2" Ice 1" Ice	11.56 12.22 12.89	9.72 11.19 12.59	0.10 0.19 0.28
SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	11.56 12.22 12.89	9.72 11.19 12.59	0.10 0.19 0.28
RRUS-11	A	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
RRUS-11	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
RRUS-11	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
(2) LGP13519	A	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.34 0.42 0.51	0.21 0.28 0.36	0.01 0.01 0.01
(2) LGP13519	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.34 0.42 0.51	0.21 0.28 0.36	0.01 0.01 0.01
(2) LGP13519	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.34 0.42 0.51	0.21 0.28 0.36	0.01 0.01 0.01
DTMABP7819VG12A	A	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	1.14 1.28 1.44	0.39 0.49 0.59	0.02 0.03 0.04
DTMABP7819VG12A	B	From Leg	4.00 0.00	0.000	98.00	No Ice 1/2"	1.14 1.28	0.39 0.49	0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00				Ice	1.44	0.59	0.04
							1" Ice			
DTMABP7819VG12A	C	From Leg	4.00		0.000	98.00	No Ice	1.14	0.39	0.02
			0.00				1/2"	1.28	0.49	0.03
			2.00				Ice	1.44	0.59	0.04
							1" Ice			
DC6-48-60-18-8F	A	From Leg	4.00		0.000	98.00	No Ice	2.57	2.57	0.02
			0.00				1/2"	2.80	2.80	0.04
			2.00				Ice	3.04	3.04	0.07
							1" Ice			
Platform Mount [LP 712-1]	C	None			0.000	98.00	No Ice	24.53	24.53	1.34
							1/2"	29.94	29.94	1.65
							Ice	35.35	35.35	1.96
							1" Ice			
**********										
BXA-171063/8CFx2 w/ Mount Pipe	B	From Leg	4.00		0.000	85.00	No Ice	3.14	3.51	0.03
			0.00				1/2"	3.52	4.13	0.06
			5.00				Ice	3.92	4.76	0.10
							1" Ice			
BXA-171063/8CFx2 w/ Mount Pipe	C	From Leg	4.00		0.000	85.00	No Ice	3.14	3.51	0.03
			0.00				1/2"	3.52	4.13	0.06
			5.00				Ice	3.92	4.76	0.10
							1" Ice			
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.00		0.000	85.00	No Ice	7.97	5.80	0.04
			0.00				1/2"	8.61	6.95	0.10
			5.00				Ice	9.22	7.82	0.17
							1" Ice			
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00		0.000	85.00	No Ice	7.97	5.80	0.04
			0.00				1/2"	8.61	6.95	0.10
			5.00				Ice	9.22	7.82	0.17
							1" Ice			
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.00		0.000	85.00	No Ice	7.97	5.80	0.04
			0.00				1/2"	8.61	6.95	0.10
			5.00				Ice	9.22	7.82	0.17
							1" Ice			
(2) LPA-4016 w/ Mount Pipe	A	From Leg	4.00		0.000	85.00	No Ice	10.01	7.46	0.04
			0.00				1/2"	10.52	8.15	0.12
			5.00				Ice	11.04	8.87	0.21
							1" Ice			
(2) LPA-80063/4CF w/ Mount Pipe	B	From Leg	4.00		0.000	85.00	No Ice	7.25	7.26	0.04
			0.00				1/2"	7.72	7.96	0.10
			5.00				Ice	8.20	8.67	0.18
							1" Ice			
(2) LPA-80063/4CF w/ Mount Pipe	C	From Leg	4.00		0.000	85.00	No Ice	7.25	7.26	0.04
			0.00				1/2"	7.72	7.96	0.10
			5.00				Ice	8.20	8.67	0.18
							1" Ice			
800 10735 K w/ Mount Pipe	A	From Leg	4.00		0.000	85.00	No Ice	8.97	5.49	0.06
			0.00				1/2"	9.65	6.71	0.12
			5.00				Ice	10.30	7.69	0.19
							1" Ice			
(2) CBC721-DF	A	From Leg	4.00		0.000	85.00	No Ice	0.45	0.12	0.00
			0.00				1/2"	0.54	0.18	0.01
			0.00				Ice	0.64	0.26	0.01
							1" Ice			
(2) CBC721-DF	B	From Leg	4.00		0.000	85.00	No Ice	0.45	0.12	0.00
			0.00				1/2"	0.54	0.18	0.01
			0.00				Ice	0.64	0.26	0.01
							1" Ice			
(2) CBC721-DF	C	From Leg	4.00		0.000	85.00	No Ice	0.45	0.12	0.00
			0.00				1/2"	0.54	0.18	0.01
			0.00				Ice	0.64	0.26	0.01
							1" Ice			
Platform Mount [LP 303-1]	C	None			0.000	85.00	No Ice	14.66	14.66	1.25
							1/2"	18.87	18.87	1.48

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
						Ice	23.08	23.08	1.71
						1" Ice			
**********									
KS24019-L112A	A	From Leg	3.00 0.00 1.00	0.000	80.00	No Ice 1/2" Ice 1" Ice	0.16 0.22 0.30	0.16 0.22 0.30	0.01 0.01 0.01
Side Arm Mount [SO 701-1]	A	None		0.000	80.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
**********									
LLPX310R w/ Mount Pipe	A	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	4.96 5.35 5.75	2.85 3.37 3.90	0.04 0.08 0.12
LLPX310R w/ Mount Pipe	B	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	4.96 5.35 5.75	2.85 3.37 3.90	0.04 0.08 0.12
LLPX310R w/ Mount Pipe	C	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	4.96 5.35 5.75	2.85 3.37 3.90	0.04 0.08 0.12
WIMAX DAP HEAD	A	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	2.00 0.00 1.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
HORIZON COMPACT	A	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
HORIZON COMPACT	C	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
Side Arm Mount [SO 101-3]	C	None		0.000	72.00	No Ice 1/2" Ice 1" Ice	7.50 8.90 10.30	7.50 8.90 10.30	0.25 0.33 0.41
**********									
Bridge Stiffener (84" x 14.5" x 1.25")	C	None		0.000	90.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53
Bridge Stiffener (84" x 14.5" x 1.25")	C	None		0.000	60.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53
Bridge Stiffener (84" x 14.5" x 1.25")	C	None		0.000	30.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
A-ANT-18G-2-C	A	Paraboloid w/Radome	From Leg	1.00	0.000		72.00	2.17	No Ice	3.72	0.03
				0.00					1/2" Ice	4.01	0.04
				0.00					1" Ice	4.30	0.05
VHLP1-23	B	Paraboloid w/o Radome	From Leg	1.00	0.000		72.00	1.27	No Ice	1.28	0.01
				0.00					1/2" Ice	1.45	0.02
				1.00					1" Ice	1.62	0.03

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 118.00-90.00	104.00	1.388	23	56.000	A	0.000	56.000	56.000	100.00	0.000	0.000
					B	0.000	56.000		100.00	0.000	0.000
					C	0.000	56.000		100.00	0.000	4.004
L2 90.00-74.00	82.00	1.297	21	32.000	A	0.000	32.000	32.000	100.00	0.000	0.000
					B	0.000	32.000		100.00	0.000	0.000
					C	0.000	32.000		100.00	0.000	6.945
L3 74.00-72.00	73.00	1.255	21	4.000	A	0.000	4.000	4.000	100.00	0.000	0.000
					B	0.000	4.000		100.00	0.000	0.000
					C	0.000	4.000		100.00	0.000	1.350
L4 72.00-64.50	68.25	1.231	20	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	0.000	0.000
					C	0.000	15.000		100.00	0.000	5.213
L5 64.50-64.00	64.25	1.21	20	1.000	A	0.000	1.000	1.000	100.00	0.000	0.000
					B	0.000	1.000		100.00	0.000	0.000
					C	0.000	1.000		100.00	0.000	0.348
L6 64.00-60.00	62.00	1.197	20	8.000	A	0.000	8.000	8.000	100.00	0.000	0.000
					B	0.000	8.000		100.00	0.000	0.000
					C	0.000	8.000		100.00	0.000	2.780
L7 60.00-34.50	47.25	1.108	18	63.750	A	0.000	63.750	63.750	100.00	0.000	0.000
					B	0.000	63.750		100.00	0.000	0.000
					C	0.000	63.750		100.00	0.000	18.785
L8 34.50-30.00	32.25	1	16	11.250	A	0.000	11.250	11.250	100.00	0.000	0.000
					B	0.000	11.250		100.00	0.000	0.000
					C	0.000	11.250		100.00	0.000	3.315
L9 30.00-19.00	24.50	1	16	33.000	A	0.000	33.000	33.000	100.00	0.000	0.000
					B	0.000	33.000		100.00	0.000	0.000
					C	0.000	33.000		100.00	0.000	8.103
L10 19.00-12.70	15.85	1	16	18.900	A	0.000	18.900	18.900	100.00	0.000	0.000
					B	0.000	18.900		100.00	0.000	0.000
					C	0.000	18.900		100.00	0.000	4.641
L11 12.70-7.50	10.10	1	16	15.600	A	0.000	15.600	15.600	100.00	0.000	0.000
					B	0.000	15.600		100.00	0.000	0.000
					C	0.000	15.600		100.00	0.000	3.831
L12 7.50-4.00	5.75	1	16	10.500	A	0.000	10.500	10.500	100.00	0.000	0.000
					B	0.000	10.500		100.00	0.000	0.000
					C	0.000	10.500		100.00	0.000	2.578
L13 4.00-0.00	2.00	1	16	12.000	A	0.000	12.000	12.000	100.00	0.000	0.000
					B	0.000	12.000		100.00	0.000	0.000
					C	0.000	12.000		100.00	0.000	2.947

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 118.00-90.00	104.00	1.388	5	1.00	60.667	A	0.000	60.667	60.667	100.00	0.000	0.000
						B	0.000	60.667		100.00	0.000	0.000
						C	0.000	60.667		100.00	0.000	9.204
L2 90.00-74.00	82.00	1.297	5	1.00	34.667	A	0.000	34.667	34.667	100.00	0.000	0.000
						B	0.000	34.667		100.00	0.000	0.000
						C	0.000	34.667		100.00	0.000	14.767
L3 74.00-72.00	73.00	1.255	5	1.00	4.333	A	0.000	4.333	4.333	100.00	0.000	0.000
						B	0.000	4.333		100.00	0.000	0.000
						C	0.000	4.333		100.00	0.000	2.994
L4 72.00-64.50	68.25	1.231	4	1.00	16.250	A	0.000	16.250	16.250	100.00	0.000	0.000
						B	0.000	16.250		100.00	0.000	0.000
						C	0.000	16.250		100.00	0.000	11.379
L5 64.50-64.00	64.25	1.21	4	1.00	1.083	A	0.000	1.083	1.083	100.00	0.000	0.000
						B	0.000	1.083		100.00	0.000	0.000
						C	0.000	1.083		100.00	0.000	0.759
L6 64.00-60.00	62.00	1.197	4	1.00	8.667	A	0.000	8.667	8.667	100.00	0.000	0.000
						B	0.000	8.667		100.00	0.000	0.000
						C	0.000	8.667		100.00	0.000	6.069
L7 60.00-34.50	47.25	1.108	4	1.00	68.000	A	0.000	68.000	68.000	100.00	0.000	0.000
						B	0.000	68.000		100.00	0.000	0.000
						C	0.000	68.000		100.00	0.000	39.752
L8 34.50-30.00	32.25	1	4	1.00	12.000	A	0.000	12.000	12.000	100.00	0.000	0.000
						B	0.000	12.000		100.00	0.000	0.000
						C	0.000	12.000		100.00	0.000	7.015
L9 30.00-19.00	24.50	1	4	1.00	34.833	A	0.000	34.833	34.833	100.00	0.000	0.000
						B	0.000	34.833		100.00	0.000	0.000
						C	0.000	34.833		100.00	0.000	17.148
L10 19.00-12.70	15.85	1	4	1.00	19.950	A	0.000	19.950	19.950	100.00	0.000	0.000
						B	0.000	19.950		100.00	0.000	0.000
						C	0.000	19.950		100.00	0.000	9.821
L11 12.70-7.50	10.10	1	4	1.00	16.467	A	0.000	16.467	16.467	100.00	0.000	0.000
						B	0.000	16.467		100.00	0.000	0.000
						C	0.000	16.467		100.00	0.000	8.106
L12 7.50-4.00	5.75	1	4	1.00	11.083	A	0.000	11.083	11.083	100.00	0.000	0.000
						B	0.000	11.083		100.00	0.000	0.000
						C	0.000	11.083		100.00	0.000	5.456
L13 4.00-0.00	2.00	1	4	1.00	12.667	A	0.000	12.667	12.667	100.00	0.000	0.000
						B	0.000	12.667		100.00	0.000	0.000
						C	0.000	12.667		100.00	0.000	6.236

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 118.00-90.00	104.00	1.388	9	56.000	A	0.000	56.000	56.000	100.00	0.000	0.000
					B	0.000	56.000		100.00	0.000	0.000
					C	0.000	56.000		100.00	0.000	4.004
L2 90.00-74.00	82.00	1.297	8	32.000	A	0.000	32.000	32.000	100.00	0.000	0.000
					B	0.000	32.000		100.00	0.000	0.000
					C	0.000	32.000		100.00	0.000	6.945
L3 74.00-72.00	73.00	1.255	8	4.000	A	0.000	4.000	4.000	100.00	0.000	0.000
					B	0.000	4.000		100.00	0.000	0.000
					C	0.000	4.000		100.00	0.000	1.350
L4 72.00-64.50	68.25	1.231	8	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	0.000	0.000
					C	0.000	15.000		100.00	0.000	5.213
L5 64.50-	64.25	1.21	8	1.000	A	0.000	1.000	1.000	100.00	0.000	0.000

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
64.00					B	0.000	1.000		100.00	0.000	0.000
					C	0.000	1.000		100.00	0.000	0.348
L6 64.00-60.00	62.00	1.197	8	8.000	A	0.000	8.000	8.000	100.00	0.000	0.000
					B	0.000	8.000		100.00	0.000	0.000
					C	0.000	8.000		100.00	0.000	2.780
L7 60.00-34.50	47.25	1.108	7	63.750	A	0.000	63.750	63.750	100.00	0.000	0.000
					B	0.000	63.750		100.00	0.000	0.000
					C	0.000	63.750		100.00	0.000	18.785
L8 34.50-30.00	32.25	1	6	11.250	A	0.000	11.250	11.250	100.00	0.000	0.000
					B	0.000	11.250		100.00	0.000	0.000
					C	0.000	11.250		100.00	0.000	3.315
L9 30.00-19.00	24.50	1	6	33.000	A	0.000	33.000	33.000	100.00	0.000	0.000
					B	0.000	33.000		100.00	0.000	0.000
					C	0.000	33.000		100.00	0.000	8.103
L10 19.00-12.70	15.85	1	6	18.900	A	0.000	18.900	18.900	100.00	0.000	0.000
					B	0.000	18.900		100.00	0.000	0.000
					C	0.000	18.900		100.00	0.000	4.641
L11 12.70-7.50	10.10	1	6	15.600	A	0.000	15.600	15.600	100.00	0.000	0.000
					B	0.000	15.600		100.00	0.000	0.000
					C	0.000	15.600		100.00	0.000	3.831
L12 7.50-4.00	5.75	1	6	10.500	A	0.000	10.500	10.500	100.00	0.000	0.000
					B	0.000	10.500		100.00	0.000	0.000
					C	0.000	10.500		100.00	0.000	2.578
L13 4.00-0.00	2.00	1	6	12.000	A	0.000	12.000	12.000	100.00	0.000	0.000
					B	0.000	12.000		100.00	0.000	0.000
					C	0.000	12.000		100.00	0.000	2.947

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+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
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

Comb. No.	Description
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	118 - 90	Pole	Max Tension	27	0.00	0	0
			Max. Compression	14	-13.57	0	1
			Max. Mx	5	-6.68	-185	0
			Max. My	2	-6.67	0	185
			Max. Vy	5	11.21	-185	0
			Max. Vx	2	-11.22	0	185
			Max. Torque	12			-1
L2	90 - 74	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-21.03	0	1
			Max. Mx	5	-10.72	-432	0
			Max. My	2	-10.69	0	438
			Max. Vy	11	-16.18	432	1
			Max. Vx	2	-16.52	0	438
			Max. Torque	12			-1
L3	74 - 72	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-21.61	0	1
			Max. Mx	5	-11.11	-465	0
			Max. My	2	-11.08	0	472
			Max. Vy	11	-16.37	465	1
			Max. Vx	2	-16.70	0	472
			Max. Torque	12			-1
L4	72 - 64.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-25.17	-1	1
			Max. Mx	5	-13.33	-597	0
			Max. My	2	-13.29	1	607
			Max. Vy	11	-17.78	597	1
			Max. Vx	8	18.16	-1	-606
			Max. Torque	12			-2
L5	64.5 - 64	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-25.36	-1	1
			Max. Mx	5	-13.46	-606	0
			Max. My	2	-13.43	1	616
			Max. Vy	11	-17.81	606	1
			Max. Vx	8	18.19	-1	-615
			Max. Torque	12			-2
L6	64 - 60	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-26.69	-1	1
			Max. Mx	5	-14.40	-678	0
			Max. My	2	-14.38	1	689
			Max. Vy	11	-18.05	677	1
			Max. Vx	8	18.43	-1	-688
			Max. Torque	12			-2
L7	60 - 34.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-36.34	-1	1
			Max. Mx	11	-21.22	1169	2
			Max. My	2	-21.20	3	1190
			Max. Vy	11	-20.07	1169	2
			Max. Vx	8	20.44	-2	-1190
			Max. Torque	12			-2
L8	34.5 - 30	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-38.11	-1	1
			Max. Mx	11	-22.53	1260	3
			Max. My	2	-22.51	4	1283
			Max. Vy	11	-20.29	1260	3
			Max. Vx	8	20.67	-2	-1282
			Max. Torque	12			-2
L9	30 - 19	Pole	Max Tension	1	0.00	0	0

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-42.89	-1	1
			Max. Mx	11	-25.97	1490	3
			Max. My	2	-25.96	5	1517
			Max. Vy	11	-21.26	1490	3
			Max. Vx	8	21.63	-2	-1517
			Max. Torque	12			-2
L10	19 - 12.7	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-45.69	-1	1
			Max. Mx	11	-28.06	1625	3
			Max. My	2	-28.05	5	1655
			Max. Vy	11	-21.61	1625	3
			Max. Vx	8	21.99	-3	-1654
			Max. Torque	12			-2
L11	12.7 - 7.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-48.00	-1	1
			Max. Mx	11	-29.80	1738	4
			Max. My	2	-29.79	6	1770
			Max. Vy	11	-21.89	1738	4
			Max. Vx	8	22.26	-3	-1769
			Max. Torque	12			-2
L12	7.5 - 4	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-49.56	-1	1
			Max. Mx	11	-30.96	1815	4
			Max. My	2	-30.96	6	1848
			Max. Vy	11	-22.07	1815	4
			Max. Vx	8	22.44	-3	-1847
			Max. Torque	12			-2
L13	4 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-51.56	-1	1
			Max. Mx	11	-32.52	1904	4
			Max. My	2	-32.52	6	1938
			Max. Vy	11	-22.27	1904	4
			Max. Vx	8	22.64	-3	-1937
			Max. Torque	12			-2

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	51.56	0.00	-0.00
	Max. H_x	11	32.53	22.26	0.05
	Max. H_z	2	32.53	0.09	22.63
	Max. M_x	2	1938	0.09	22.63
	Max. M_z	5	1903	-22.24	-0.05
	Max. Torsion	6	1	-19.30	-11.35
	Min. Vert	2	32.53	0.09	22.63
	Min. H_x	5	32.53	-22.24	-0.05
	Min. H_z	8	32.53	-0.04	-22.63
	Min. M_x	8	-1937	-0.04	-22.63
	Min. M_z	11	-1904	22.26	0.05
	Min. Torsion	12	-2	19.30	11.33

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	32.53	0.00	-0.00	0	0	0
Dead+Wind 0 deg - No Ice	32.53	-0.09	-22.63	-1938	6	1
Dead+Wind 30 deg - No Ice	32.53	11.09	-19.55	-1675	-949	0

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 60 deg - No Ice	32.53	19.24	-11.25	-964	-1646	-1
Dead+Wind 90 deg - No Ice	32.53	22.24	0.05	3	-1903	-1
Dead+Wind 120 deg - No Ice	32.53	19.30	11.35	971	-1651	-1
Dead+Wind 150 deg - No Ice	32.53	11.17	19.62	1680	-956	-1
Dead+Wind 180 deg - No Ice	32.53	0.04	22.63	1937	-3	-1
Dead+Wind 210 deg - No Ice	32.53	-11.11	19.58	1676	950	0
Dead+Wind 240 deg - No Ice	32.53	-19.30	11.25	963	1650	1
Dead+Wind 270 deg - No Ice	32.53	-22.26	-0.05	-4	1904	1
Dead+Wind 300 deg - No Ice	32.53	-19.30	-11.33	-970	1650	2
Dead+Wind 330 deg - No Ice	32.53	-11.19	-19.59	-1678	957	1
Dead+Ice+Temp	51.56	-0.00	0.00	-1	-1	0
Dead+Wind 0 deg+Ice+Temp	51.56	-0.02	-6.66	-584	1	0
Dead+Wind 30 deg+Ice+Temp	51.56	3.28	-5.76	-505	-288	0
Dead+Wind 60 deg+Ice+Temp	51.56	5.69	-3.32	-292	-498	0
Dead+Wind 90 deg+Ice+Temp	51.56	6.58	0.01	-1	-576	0
Dead+Wind 120 deg+Ice+Temp	51.56	5.71	3.34	290	-499	0
Dead+Wind 150 deg+Ice+Temp	51.56	3.30	5.77	504	-289	0
Dead+Wind 180 deg+Ice+Temp	51.56	0.01	6.66	581	-1	0
Dead+Wind 210 deg+Ice+Temp	51.56	-3.29	5.76	503	287	0
Dead+Wind 240 deg+Ice+Temp	51.56	-5.71	3.32	289	499	0
Dead+Wind 270 deg+Ice+Temp	51.56	-6.58	-0.01	-2	575	0
Dead+Wind 300 deg+Ice+Temp	51.56	-5.71	-3.33	-293	498	0
Dead+Wind 330 deg+Ice+Temp	51.56	-3.31	-5.77	-506	288	0
Dead+Wind 0 deg - Service	32.53	-0.03	-8.84	-758	2	0
Dead+Wind 30 deg - Service	32.53	4.33	-7.63	-655	-371	0
Dead+Wind 60 deg - Service	32.53	7.52	-4.39	-377	-644	0
Dead+Wind 90 deg - Service	32.53	8.69	0.02	1	-744	-1
Dead+Wind 120 deg - Service	32.53	7.54	4.43	379	-645	-1
Dead+Wind 150 deg - Service	32.53	4.36	7.67	656	-374	0
Dead+Wind 180 deg - Service	32.53	0.01	8.84	757	-1	0
Dead+Wind 210 deg - Service	32.53	-4.34	7.65	655	371	0
Dead+Wind 240 deg - Service	32.53	-7.54	4.39	376	645	0
Dead+Wind 270 deg - Service	32.53	-8.69	-0.02	-2	744	1
Dead+Wind 300 deg - Service	32.53	-7.54	-4.42	-379	645	1
Dead+Wind 330 deg - Service	32.53	-4.37	-7.65	-656	374	0

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	-32.53	0.00	-0.00	32.53	0.00	0.000%
2	-0.09	-32.53	-22.63	0.09	32.53	22.63	0.004%
3	11.09	-32.53	-19.55	-11.09	32.53	19.55	0.000%
4	19.24	-32.53	-11.25	-19.24	32.53	11.25	0.000%
5	22.24	-32.53	0.05	-22.24	32.53	-0.05	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
6	19.30	-32.53	11.35	-19.30	32.53	-11.35	0.000%
7	11.17	-32.53	19.62	-11.17	32.53	-19.62	0.000%
8	0.04	-32.53	22.63	-0.04	32.53	-22.63	0.004%
9	-11.11	-32.53	19.58	11.11	32.53	-19.58	0.000%
10	-19.30	-32.53	11.25	19.30	32.53	-11.25	0.000%
11	-22.26	-32.53	-0.05	22.26	32.53	0.05	0.001%
12	-19.30	-32.53	-11.33	19.30	32.53	11.33	0.000%
13	-11.19	-32.53	-19.59	11.19	32.53	19.59	0.000%
14	0.00	-51.56	0.00	0.00	51.56	-0.00	0.001%
15	-0.02	-51.56	-6.66	0.02	51.56	6.66	0.000%
16	3.29	-51.56	-5.76	-3.28	51.56	5.76	0.000%
17	5.69	-51.56	-3.32	-5.69	51.56	3.32	0.000%
18	6.58	-51.56	0.01	-6.58	51.56	-0.01	0.000%
19	5.71	-51.56	3.34	-5.71	51.56	-3.34	0.000%
20	3.30	-51.56	5.77	-3.30	51.56	-5.77	0.000%
21	0.01	-51.56	6.66	-0.01	51.56	-6.66	0.000%
22	-3.29	-51.56	5.76	3.29	51.56	-5.76	0.000%
23	-5.71	-51.56	3.32	5.71	51.56	-3.32	0.000%
24	-6.58	-51.56	-0.01	6.58	51.56	0.01	0.000%
25	-5.71	-51.56	-3.33	5.71	51.56	3.33	0.000%
26	-3.31	-51.56	-5.77	3.31	51.56	5.77	0.000%
27	-0.03	-32.53	-8.84	0.03	32.53	8.84	0.005%
28	4.33	-32.53	-7.63	-4.33	32.53	7.63	0.002%
29	7.52	-32.53	-4.39	-7.52	32.53	4.39	0.001%
30	8.69	-32.53	0.02	-8.69	32.53	-0.02	0.005%
31	7.54	-32.53	4.43	-7.54	32.53	-4.43	0.002%
32	4.36	-32.53	7.67	-4.36	32.53	-7.67	0.001%
33	0.01	-32.53	8.84	-0.01	32.53	-8.84	0.005%
34	-4.34	-32.53	7.65	4.34	32.53	-7.65	0.002%
35	-7.54	-32.53	4.39	7.54	32.53	-4.39	0.002%
36	-8.70	-32.53	-0.02	8.69	32.53	0.02	0.005%
37	-7.54	-32.53	-4.42	7.54	32.53	4.42	0.001%
38	-4.37	-32.53	-7.65	4.37	32.53	7.65	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	13	0.00004617	0.00009042
3	Yes	16	0.00000001	0.00011749
4	Yes	16	0.00000001	0.00012150
5	Yes	14	0.00000001	0.00007246
6	Yes	16	0.00000001	0.00011360
7	Yes	16	0.00000001	0.00012423
8	Yes	13	0.00004617	0.00010727
9	Yes	16	0.00000001	0.00011878
10	Yes	16	0.00000001	0.00011456
11	Yes	14	0.00000001	0.00008017
12	Yes	16	0.00000001	0.00012497
13	Yes	16	0.00000001	0.00011467
14	Yes	6	0.00000001	0.00001834
15	Yes	15	0.00000001	0.00006775
16	Yes	15	0.00000001	0.00008026
17	Yes	15	0.00000001	0.00008030
18	Yes	15	0.00000001	0.00006690
19	Yes	15	0.00000001	0.00007907
20	Yes	15	0.00000001	0.00008023
21	Yes	15	0.00000001	0.00006709
22	Yes	15	0.00000001	0.00007939
23	Yes	15	0.00000001	0.00007878
24	Yes	15	0.00000001	0.00006669
25	Yes	15	0.00000001	0.00008046
26	Yes	15	0.00000001	0.00007992
27	Yes	12	0.00012444	0.00009175

28	Yes	13	0.00000001	0.00014321
29	Yes	14	0.00000001	0.00006606
30	Yes	12	0.00012449	0.00011325
31	Yes	13	0.00000001	0.00012968
32	Yes	14	0.00000001	0.00006942
33	Yes	12	0.00012443	0.00009336
34	Yes	13	0.00000001	0.00014729
35	Yes	13	0.00000001	0.00013330
36	Yes	12	0.00012448	0.00011635
37	Yes	14	0.00000001	0.00007068
38	Yes	13	0.00000001	0.00013260

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 90	22.11	27	1.580	0.004
L2	90 - 74	13.08	27	1.426	0.004
L3	74 - 72	8.70	27	1.144	0.002
L4	72 - 64.5	8.23	27	1.112	0.002
L5	64.5 - 64	6.57	27	0.994	0.002
L6	64 - 60	6.47	27	0.987	0.002
L7	60 - 34.5	5.67	27	0.911	0.002
L8	34.5 - 30	1.79	27	0.509	0.001
L9	30 - 19	1.34	27	0.428	0.001
L10	19 - 12.7	0.54	27	0.267	0.000
L11	12.7 - 7.5	0.24	27	0.183	0.000
L12	7.5 - 4	0.08	27	0.108	0.000
L13	4 - 0	0.02	27	0.054	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.00	APXVSPP18-C-A20 w/ Mount Pipe	27	21.44	1.577	0.004	27444
114.00	PCS 1900MHz 4x45W-65MHz	27	20.77	1.575	0.004	27444
108.00	APX16PV-16PVL-E w/ Mount Pipe	27	18.78	1.563	0.004	13722
98.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	27	15.54	1.513	0.004	6860
90.00	Bridge Stiffener (84" x 14.5" x 1.25")	27	13.08	1.426	0.004	4790
85.00	BXA-171063/8CFx2 w/ Mount Pipe	27	11.61	1.345	0.003	3724
80.00	KS24019-L112A	27	10.23	1.252	0.003	3004
73.00	VHLP1-23	27	8.46	1.128	0.002	3102
72.00	A-ANT-18G-2-C	27	8.23	1.112	0.002	3342
60.00	Bridge Stiffener (84" x 14.5" x 1.25")	27	5.67	0.911	0.002	3923
30.00	Bridge Stiffener (84" x 14.5" x 1.25")	27	1.34	0.428	0.001	3606

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 90	56.47	2	4.036	0.011
L2	90 - 74	33.42	2	3.644	0.010
L3	74 - 72	22.25	2	2.925	0.006
L4	72 - 64.5	21.04	2	2.842	0.006
L5	64.5 - 64	16.80	2	2.542	0.005
L6	64 - 60	16.54	2	2.523	0.004
L7	60 - 34.5	14.50	2	2.329	0.004
L8	34.5 - 30	4.57	2	1.301	0.002
L9	30 - 19	3.44	2	1.095	0.001
L10	19 - 12.7	1.38	2	0.683	0.001
L11	12.7 - 7.5	0.62	2	0.467	0.001
L12	7.5 - 4	0.21	2	0.275	0.000
L13	4 - 0	0.06	2	0.138	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.00	APXVSPP18-C-A20 w/ Mount Pipe	2	54.77	4.030	0.011	10843
114.00	PCS 1900MHz 4x45W-65MHz	2	53.06	4.024	0.011	10843
108.00	APX16PV-16PVL-E w/ Mount Pipe	2	47.98	3.994	0.011	5420
98.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	2	39.72	3.867	0.011	2709
90.00	Bridge Stiffener (84" x 14.5" x 1.25")	2	33.42	3.644	0.010	1890
85.00	BXA-171063/8CFx2 w/ Mount Pipe	2	29.68	3.436	0.009	1468
80.00	KS24019-L112A	2	26.15	3.200	0.007	1183
73.00	VHLP1-23	2	21.64	2.883	0.006	1220
72.00	A-ANT-18G-2-C	2	21.04	2.842	0.006	1315
60.00	Bridge Stiffener (84" x 14.5" x 1.25")	2	14.50	2.329	0.004	1540
30.00	Bridge Stiffener (84" x 14.5" x 1.25")	2	3.44	1.095	0.001	1412

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	118 - 90 (1)	P24x1/4	28.00	0.00	0.0	23.70	18.65	-6.67	442.00	0.015
L2	90 - 74 (2)	P24x3/8	16.00	0.00	0.0	25.20	27.83	-10.69	701.38	0.015
L3	74 - 72 (3)	RPS 24" x 0.62537"	2.00	0.00	0.0	18.71	45.92	-11.08	859.41	0.013
L4	72 - 64.5 (4)	RPS 24" x 0.77745"	7.50	0.00	0.0	18.47	56.72	-13.29	1047.50	0.013
L5	64.5 - 64 (5)	RPS 24" x 0.93597"	0.50	0.00	0.0	18.29	67.82	-13.43	1240.26	0.011
L6	64 - 60 (6)	RPS 24" x 0.77745"	4.00	0.00	0.0	18.47	56.72	-14.38	1047.50	0.014
L7	60 - 34.5 (7)	RPS 30" x 0.66679"	25.50	0.00	0.0	22.76	61.45	-21.20	1398.40	0.015
L8	34.5 - 30 (8)	RPS 30" x 0.78318"	4.50	0.00	0.0	22.77	71.89	-22.51	1636.84	0.014
L9	30 - 19 (9)	RPS 36" x 0.61053"	11.00	0.00	0.0	21.51	67.88	-25.96	1460.06	0.018
L10	19 - 12.7 (10)	RPS 36" x 0.76575"	6.30	0.00	0.0	21.47	84.76	-28.05	1819.67	0.015
L11	12.7 - 7.5 (11)	RPS 36" x 0.7688"	5.20	0.00	0.0	21.28	85.09	-29.79	1810.94	0.016
L12	7.5 - 4 (12)	RPS 36" x 0.76575"	3.50	0.00	0.0	21.47	84.76	-30.96	1819.67	0.017
L13	4 - 0 (13)	RPS 36" x 0.91772"	4.00	0.00	0.0	21.31	101.15	-32.52	2155.62	0.015

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 $\frac{P}{P_a}$

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	118 - 90 (1)	P24x1/4	185	20.28	23.70	0.856	0	0.00	23.70	0.000
L2	90 - 74 (2)	P24x3/8	438	32.50	27.72	1.173	0	0.00	27.72	0.000
L3	74 - 72 (3)	RPS 24" x 0.62537"	472	21.64	20.59	1.051	0	0.00	20.59	0.000
L4	72 - 64.5 (4)	RPS 24" x 0.77745"	607	22.83	20.31	1.124	0	0.00	20.31	0.000
L5	64.5 - 64 (5)	RPS 24" x 0.93597"	616	19.63	20.12	0.976	0	0.00	20.12	0.000
L6	64 - 60 (6)	RPS 24" x 0.77745"	689	25.92	20.31	1.276	0	0.00	20.31	0.000
L7	60 - 34.5 (7)	RPS 30" x 0.66679"	1190	32.41	25.03	1.294	0	0.00	25.03	0.000
L8	34.5 - 30 (8)	RPS 30" x 0.78318"	1283	30.08	25.05	1.201	0	0.00	25.05	0.000
L9	30 - 19 (9)	RPS 36" x 0.61053"	1517	30.83	23.66	1.303	0	0.00	23.66	0.000
L10	19 - 12.7 (10)	RPS 36" x 0.76575"	1655	27.16	23.61	1.150	0	0.00	23.61	0.000
L11	12.7 - 7.5 (11)	RPS 36" x 0.7688"	1770	28.94	23.41	1.236	0	0.00	23.41	0.000
L12	7.5 - 4 (12)	RPS 36" x 0.76575"	1848	30.33	23.61	1.284	0	0.00	23.61	0.000
L13	4 - 0 (13)	RPS 36" x 0.91772"	1938	26.88	23.44	1.147	0	0.00	23.44	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	118 - 90 (1)	P24x1/4	11.23	1.20	16.80	0.072	1	0.04	11.90	0.004
L2	90 - 74 (2)	P24x3/8	16.52	1.19	16.80	0.071	0	0.02	16.80	0.001
L3	74 - 72 (3)	RPS 24" x 0.62537"	16.70	0.73	12.48	0.058	0	0.01	12.48	0.001
L4	72 - 64.5 (4)	RPS 24" x 0.77745"	18.16	0.64	12.31	0.052	1	0.01	12.31	0.001
L5	64.5 - 64 (5)	RPS 24" x 0.93597"	18.19	0.54	12.19	0.044	1	0.01	12.19	0.001
L6	64 - 60 (6)	RPS 24" x 0.77745"	18.43	0.65	12.31	0.053	1	0.01	12.31	0.001
L7	60 - 34.5 (7)	RPS 30" x 0.66679"	20.44	0.67	15.17	0.044	1	0.01	15.17	0.001
L8	34.5 - 30 (8)	RPS 30" x 0.78318"	20.66	0.57	15.18	0.038	1	0.01	15.18	0.000
L9	30 - 19 (9)	RPS 36" x 0.61053"	21.63	0.64	14.34	0.044	1	0.01	14.34	0.000
L10	19 - 12.7 (10)	RPS 36" x 0.76575"	21.98	0.52	14.31	0.036	1	0.00	14.31	0.000
L11	12.7 - 7.5 (11)	RPS 36" x 0.7688"	22.26	0.52	14.19	0.037	1	0.00	14.19	0.000
L12	7.5 - 4 (12)	RPS 36" x 0.76575"	22.44	0.53	14.31	0.037	1	0.00	14.31	0.000
L13	4 - 0 (13)	RPS 36" x 0.91772"	22.64	0.45	14.21	0.032	1	0.00	14.21	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	118 - 90 (1)	0.015	0.856	0.000	0.072	0.004	0.877 ✔	1.333	H1-3+VT ✔
L2	90 - 74 (2)	0.015	1.173	0.000	0.071	0.001	1.193 ✔	1.333	H1-3+VT ✔
L3	74 - 72 (3)	0.013	1.051	0.000	0.058	0.001	1.067 ✔	1.333	H1-3+VT ✔
L4	72 - 64.5 (4)	0.013	1.124	0.000	0.052	0.001	1.139 ✔	1.333	H1-3+VT ✔
L5	64.5 - 64 (5)	0.011	0.976	0.000	0.044	0.001	0.989 ✔	1.333	H1-3+VT ✔

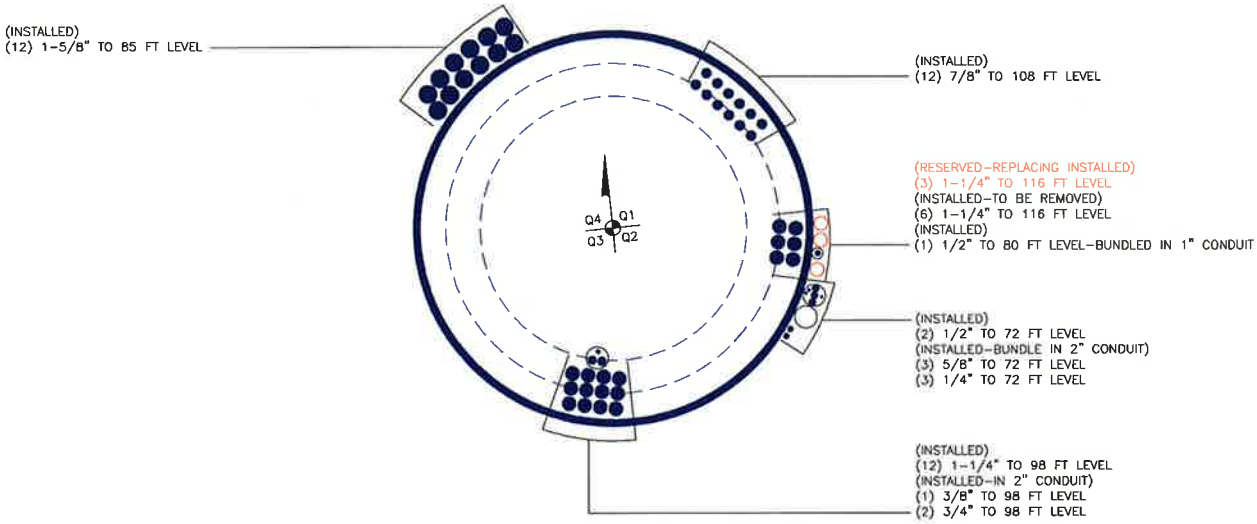
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L6	64 - 60 (6)	0.014	1.276	0.000	0.053	0.001	1.293 ✔	1.333	H1-3+VT ✔
L7	60 - 34.5 (7)	0.015	1.294	0.000	0.044	0.001	1.312 ✔	1.333	H1-3+VT ✔
L8	34.5 - 30 (8)	0.014	1.201	0.000	0.038	0.000	1.216 ✔	1.333	H1-3+VT ✔
L9	30 - 19 (9)	0.018	1.303	0.000	0.044	0.000	1.323 ✔	1.333	H1-3+VT ✔
L10	19 - 12.7 (10)	0.015	1.150	0.000	0.036	0.000	1.167 ✔	1.333	H1-3+VT ✔
L11	12.7 - 7.5 (11)	0.016	1.236	0.000	0.037	0.000	1.254 ✔	1.333	H1-3+VT ✔
L12	7.5 - 4 (12)	0.017	1.284	0.000	0.037	0.000	1.303 ✔	1.333	H1-3+VT ✔
L13	4 - 0 (13)	0.015	1.147	0.000	0.032	0.000	1.163 ✔	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	118 - 90	Pole	P24x1/4	1	-6.67	589.19	65.8	Pass
L2	90 - 74	Pole	P24x3/8	2	-10.69	934.94	89.5	Pass
L3	74 - 72	Pole	RPS 24" x 0.62537"	3	-11.08	1145.59	80.1	Pass
L4	72 - 64.5	Pole	RPS 24" x 0.77745"	4	-13.29	1396.32	85.5	Pass
L5	64.5 - 64	Pole	RPS 24" x 0.93597"	5	-13.43	1653.27	74.2	Pass
L6	64 - 60	Pole	RPS 24" x 0.77745"	6	-14.38	1396.32	97.0	Pass
L7	60 - 34.5	Pole	RPS 30" x 0.66679"	7	-21.20	1864.07	98.4	Pass
L8	34.5 - 30	Pole	RPS 30" x 0.78318"	8	-22.51	2181.91	91.2	Pass
L9	30 - 19	Pole	RPS 36" x 0.61053"	9	-25.96	1946.26	99.2	Pass
L10	19 - 12.7	Pole	RPS 36" x 0.76575"	10	-28.05	2425.62	87.5	Pass
L11	12.7 - 7.5	Pole	RPS 36" x 0.7688"	11	-29.79	2413.98	94.1	Pass
L12	7.5 - 4	Pole	RPS 36" x 0.76575"	12	-30.96	2425.62	97.7	Pass
L13	4 - 0	Pole	RPS 36" x 0.91772"	13	-32.52	2873.44	87.2	Pass
							Summary	
						Pole (L9)	99.2	Pass
						RATING =	**99.2**	**Pass**

APPENDIX B

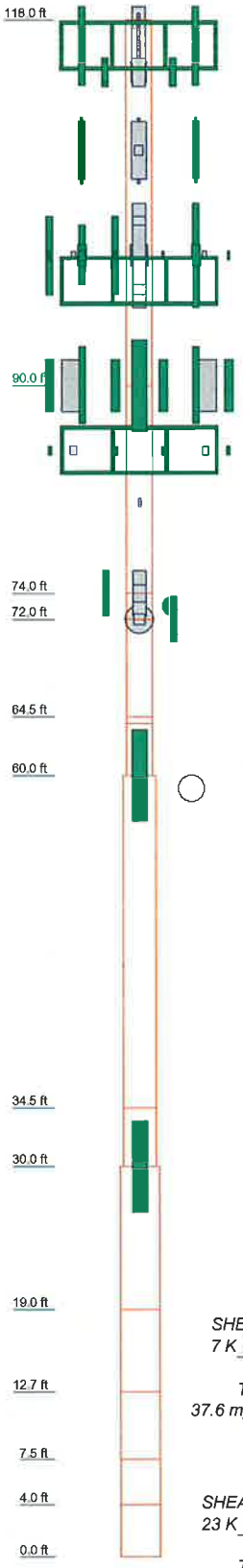
BASE LEVEL DRAWING

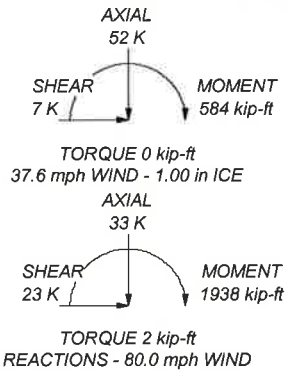

(INSTALLED)
(12) 1-5/8" TO 85 FT LEVEL
(INSTALLED)
(12) 7/8" TO 108 FT LEVEL
(RESERVED-REPLACING INSTALLED)
(3) 1-1/4" TO 116 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-1/4" TO 116 FT LEVEL
(INSTALLED)
(1) 1/2" TO 80 FT LEVEL-BUNDLED IN 1" CONDUIT
(INSTALLED)
(2) 1/2" TO 72 FT LEVEL
(INSTALLED-BUNDLE IN 2" CONDUIT)
(3) 5/8" TO 72 FT LEVEL
(3) 1/4" TO 72 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 98 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 98 FT LEVEL
(2) 3/4" TO 98 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12	13
Size	P24x1/4	P24x3/8	0.62537"				RPS 30" x 0.66679"	0.74318"	RPS 36" x 0.61058"	RPS 36" x 0.76575"			RPS 36" x 0.91
Length (ft)	28.00	16.00	2.00	7.50		4.00	25.50	4.50	11.00	6.30	5.20	3.50	4.00
Socket Length (ft)	5.00	5.00	5.00	5.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
Grade	A572-42		Reinf 31.19 ksi				Reinf 37.93 ksi	Reinf 37.95 ksi	Reinf 35.85 ksi	Reinf 35.78 ksi			
Weight (K)	1.8	1.5	0.3	1.4	0.1	0.8	5.3	1.1	2.5	1.8	1.5	1.0	1.4
													20.6





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	116	RRUS-11	98
APXVSPP18-C-A20 w/ Mount Pipe	116	RRUS-11	98
APXV9ERR18-C-A20 w/ Mount Pipe	116	RRUS-11	98
2.375" OD x 5' Mount Pipe	116	(2) LGP13519	98
2.375" OD x 5' Mount Pipe	116	(2) LGP13519	98
2.375" OD x 5' Mount Pipe	116	(2) LGP13519	98
Platform Mount [LP 501-1]	116	DTMABP7819VG12A	98
PCS 1900MHz 4x45W-65MHz	114	DTMABP7819VG12A	98
PCS 1900MHz 4x45W-65MHz	114	DTMABP7819VG12A	98
PCS 1900MHz 4x45W-65MHz	114	DC6-48-60-18-8F	98
800MHz 2X50W RRH W/FILTER	114	Platform Mount [LP 712-1]	98
800MHz 2X50W RRH W/FILTER	114	Bridge Stiffener (84" x 14.5" x 1.25")	90
800MHz 2X50W RRH W/FILTER	114	BXA-171063/8CFx2 w/ Mount Pipe	85
Side Arm Mount [SO 102-3]	114	BXA-70063-6CF-2 w/ Mount Pipe	85
APX16PV-16PVL-E w/ Mount Pipe	108	BXA-70063-6CF-2 w/ Mount Pipe	85
APX16PV-16PVL-E w/ Mount Pipe	108	BXA-70063-6CF-2 w/ Mount Pipe	85
APX16PV-16PVL-E w/ Mount Pipe	108	(2) LPA-4016 w/ Mount Pipe	85
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	108	(2) LPA-80063/4CF w/ Mount Pipe	85
		(2) LPA-80063/4CF w/ Mount Pipe	85
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	108	800 10735 K w/ Mount Pipe	85
		(2) CBC721-DF	85
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	108	(2) CBC721-DF	85
		(2) CBC721-DF	85
ONEBASE TWIN DUAL DUPLEX TMA	108	Platform Mount [LP 303-1]	85
ONEBASE TWIN DUAL DUPLEX TMA	108	BXA-171063/8CFx2 w/ Mount Pipe	85
ONEBASE TWIN DUAL DUPLEX TMA	108	Side Arm Mount [SO 701-1]	80
2.375" OD x 5' Mount Pipe	108	KS24019-L112A	80
2.375" OD x 5' Mount Pipe	108	LLPX310R w/ Mount Pipe	72
2.375" OD x 5' Mount Pipe	108	LLPX310R w/ Mount Pipe	72
Sector Mount [SM 802-3]	108	WIMAX DAP HEAD	72
AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	WIMAX DAP HEAD	72
		WIMAX DAP HEAD	72
AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	HORIZON COMPACT	72
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	HORIZON COMPACT	72
		Side Arm Mount [SO 101-3]	72
7770.00 w/ Mount Pipe	98	LLPX310R w/ Mount Pipe	72
7770.00 w/ Mount Pipe	98	A-ANT-18G-2-C	72
7770.00 w/ Mount Pipe	98	VHLP1-23	72
SBNH-1D6565C w/ Mount Pipe	98	Bridge Stiffener (84" x 14.5" x 1.25")	60
SBNH-1D6565C w/ Mount Pipe	98	Bridge Stiffener (84" x 14.5" x 1.25")	30

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-42	42 ksi	60 ksi	Reinf 37.95 ksi	38 ksi	48 ksi
Reinf 31.19 ksi	31 ksi	39 ksi	Reinf 35.85 ksi	36 ksi	45 ksi
Reinf 30.78 ksi	31 ksi	39 ksi	Reinf 35.78 ksi	36 ksi	45 ksi
Reinf 30.48 ksi	30 ksi	39 ksi	Reinf 35.47 ksi	35 ksi	45 ksi
Reinf 37.93 ksi	38 ksi	48 ksi	Reinf 35.52 ksi	36 ksi	45 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.0 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.6 mph basic wind with 1.00 in ice.
4. Deflections are based upon a 50.0 mph wind.
5. TOWER RATING: 99.2%

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

Job:	*Ex 118 ft Monopole / Great Britain Gravel Pit*		
Project:	*PJF 37513-0921 / BU 876331*		
Client: CCI	Drawn by: Joey Meinerding	App'd:	
Code: TIA/EIA-222-F	Date: 11/08/13	Scale: NTS	
Path:		Dwg No. E-1	

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

v2.0, Effective Date: 1-12-12

Date: 11/7/2013
Project No: 37513-0921
Site Name: New Britain Gravel Pit
Site Number/BUN: 876331
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA/EIA-222-F & AISC 9th Ed. (Green)

General Parameters and Loading:

Flange Elevation:	90.00	ft
TIA Reference Standard:	TIA/EIA-222-F	
AISC Manual:	9th Ed. (Green)	
Method:	ASD	
ASD Stress Increase, ASIF:	1.333333333	
Moment, Mf:	185.0	k-ft
Axial, Pf:	6.7	kips
Shear, Vf:	11.2	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	24.00	24.00	in
Pole Thickness, tp:	0.2500	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	32.00	32.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	0	
Upper Weld Length, L1:	39.00	0.00	in
Lower Weld Length, L2:	39.00	0.00	in
Weld Size, w:	0.3750	0.0000	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	4.50	0.00	in
Stiffener Thickness, ts:	1.25	0.00	in
Notch, n:	0.50	0.00	in
Stiffener Fy:	65	0	ksi
Stiffener Fu:	80	0	ksi
Unbraced Length, L:	4.63	0.00	in
K:	0.80	0.00	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	37.50	32.00	in = Df + 2 n + Ws
Upper Eccentricity, e1:	6.75	4.00	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	6.75	4.00	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.00	0.00	in
Bolt Circle:	29.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Table XIX & pg. 4-72:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	0	Num. of Sixteenths in Weld
a:	0.1731	0.0000	= e1 / L1
k:	0	0	
C:	1.4546	0.0000	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	81.4	0.0	kips
Allowable Axial, Pa:	453.8	0.0	kips = ASIF C C1 D L
Ratio:	17.9%	0.0%	
Lower Pole			
D:	6	0	Num. of Sixteenths in Weld
a:	0.1731	0.0000	= e2 / L2
k:	0	0	
C:	1.4546	0.0000	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	81.4	0.0	kips
Allowable Axial, Pa:	453.8	0.0	kips = ASIF C C1 D L
Ratio:	17.9%	0.0%	

Pole Analysis per AISC Sect. F4:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, P:	81.4	0.0	kips
Effective Throat, te:	0.2651	0.0000	in = 0.707 w
Shear Stress, fv:	1.0	0.0	kips/in= P / (2 L1)
Section Modulus, S:	507.0	0.0	in^2 = $L1^2$ / 3
Bending Stress, fb:	1.1	0.0	kips/in = P e1 / S
Combined Stress, f:	1.5	0.0	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	0.0000	
Allowable Stress, F:	5.6	0.0	kips/in = ASIF (0.4 Fy) tp
Ratio:	26.9%	0.0%	
Lower Pole			
Stiffener Axial, P:	81.4	0.0	kips
Effective Throat, te:	0.2651	0.0000	in = 0.707 w
Shear Stress, fv:	1.0	0.0	ksi = P / (2 L2)
Section Modulus, S:	507.0	0.0	in^2 = $L2^2$ / 3
Bending Stress, fb:	1.1	0.0	ksi = P e2 / S
Combined Stress, f:	1.5	0.0	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	0.0000	
Allowable Stress, F:	8.4	0.0	kips/in = ASIF (0.4 Fy) tp
Ratio:	17.9%	0.0%	

Stiffener 1 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 1	
Gross Area, Ag:	5.6250	in^2
Net Area, An:	5.6250	in^2
Stiffener Axial, P:	81.4	kips
Stiffener Stress, f:	14.5	ksi = P / Ag
b:	9.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	7.2000	in
Q, Where Qa = 1.0:	1.0000	
r:	0.3608	in^3
K L / r:	10.2537	
ASIF:	1.3333	
Allowable Axial, Fa:	50.45	ksi = ASIF [1 - (K L / r) / 2 Cc^2] Fy / [5/3 + 3(K L / r) / 8 Cc - (K L / r)^3 / 8 Cc^3]
ASIF:	1.3333	
Allowable Bending, Fb:	52.00	ksi = ASIF 0.6 Fy
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	28.7%	

Stiffener 2 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 2	
Gross Area, Ag:	0.0000	in^2
Net Area, An:	0.0000	in^2
Stiffener Axial, P:	0.0	kips
Stiffener Stress, f:	0.0	ksi = P / Ag
b:	0.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	0.0000	in
Q, Where Qa = 1.0:	0.0000	
r:	0.0000	in^3
K L / r:	0.0000	
ASIF:	0.0000	
Allowable Axial, Fa:	0.00	ksi = ASIF [1 - (K L / r) / 2 Cc^2] Fy / [5/3 + 3(K L / r) / 8 Cc - (K L / r)^3 / 8 Cc^3]
ASIF:	0.0000	
Allowable Bending, Fb:	0.00	ksi = ASIF 0.6 Fy
ASIF:	0.0000	
Allowable Net Tension, Ft:	0.00	ksi = ASIF 0.5 Fu
Ratio:	0.0%	

Analysis Summary:

Bridge Stiffener Type 1
Weld Analysis Ratio: 17.9% PASS
Pole Analysis Ratio: 26.9% PASS
Stiffener Analysis Ratio: 28.7% PASS

Bridge Stiffener Type 2
Weld Analysis Ratio: 0.0% PASS
Pole Analysis Ratio: 0.0% PASS
Stiffener Analysis Ratio: 0.0% PASS

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

v2.0, Effective Date: 1-12-12

Date: 11/7/2013
Project No: 37513-0921
Site Name: New Britain Gravel Plt
Site Number/BUN: 876331
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA/EIA-222-F & AISC 9th Ed. (Green)

General Parameters and Loading:

Flange Elevation:	60.00	ft
TIA Reference Standard:	TIA/EIA-222-F	
AISC Manual:	9th Ed. (Green)	
Method:	ASD	
ASD Stress Increase, ASIF:	1.333333333	
Moment, Mf:	689.0	k-ft
Axial, Pf:	14.4	kips
Shear, Vf:	18.4	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	24.00	30.00	in
Pole Thickness, tp:	0.3750	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	41.00	41.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	3	
Upper Weld Length, L1:	39.00	23.25	in
Lower Weld Length, L2:	39.00	20.00	in
Weld Size, w:	0.3750	0.3750	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	4.50	3.00	in
Stiffener Thickness, ts:	1.25	1.00	in
Notch, n:	0.50	0.50	in
Stiffener Fy:	65	65	ksi
Stiffener Fu:	80	80	ksi
Unbraced Length, L:	5.63	5.63	in
K:	0.80	0.80	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	46.50	45.00	in = Df + 2 n + Ws
Upper Eccentricity, e1:	11.25	10.50	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	8.25	7.50	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.50	0.00	in
Bolt Circle:	35.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Table XIX & pg. 4-72:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	6	Num. of Sixteenths in Weld
a:	0.2885	0.4516	= e1 / L1
k:	0	0	
C:	1.1677	0.8605	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	161.4	83.4	kips
Allowable Axial, Pa:	364.3	160.1	kips = ASIF C C1 D L
Ratio:	44.3%	52.1%	

Lower Pole			
D:	6	6	Num. of Sixteenths in Weld
a:	0.2115	0.3750	= e2 / L2
k:	0	0	
C:	1.3600	0.9893	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	161.4	83.4	kips
Allowable Axial, Pa:	424.3	158.3	kips = ASIF C C1 D L
Ratio:	38.0%	52.7%	

Pole Analysis per AISC Sect. F4:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, P:	161.4	83.4	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	2.1	1.8	kips/in= P / (2 L1)
Section Modulus, S:	507.0	180.2	in^2 = $L1^2$ / 3
Bending Stress, fb:	3.6	4.9	kips/in = P e1 / S
Combined Stress, f:	4.1	5.2	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	49.2%	61.6%	

Lower Pole			
Stiffener Axial, P:	161.4	83.4	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	2.1	2.1	ksi = P / (2 L2)
Section Modulus, S:	507.0	133.3	in^2 = $L2^2$ / 3
Bending Stress, fb:	2.6	4.7	ksi = P e2 / S
Combined Stress, f:	3.3	5.1	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	39.8%	61.1%	

Stiffener 1 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 1	
Gross Area, Ag:	5.6250	in^2
Net Area, An:	5.6250	in^2
Stiffener Axial, P:	161.4	kips
Stiffener Stress, f:	28.7	ksi = P / Ag
b:	13.5000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	10.8000	in
Q, Where Qa = 1.0:	0.9508	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.3608	in^3
K L / r:	12.4708	
ASIF:	1.3333	
Allowable Axial, Fa:	47.64	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc^3]
ASIF:	1.3333	
Allowable Bending, Fb:	49.44	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	60.2%	

Stiffener 2 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 2	
Gross Area, Ag:	3.0000	in^2
Net Area, An:	3.0000	in^2
Stiffener Axial, P:	83.4	kips
Stiffener Stress, f:	27.8	ksi = P / Ag
b:	12.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	12.0000	in
Q, Where Qa = 1.0:	0.9075	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.2887	in^3
K L / r:	15.5885	
ASIF:	1.3333	
Allowable Axial, Fa:	45.01	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc^3]
ASIF:	1.3333	
Allowable Bending, Fb:	47.19	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	61.7%	

Analysis Summary:

Bridge Stiffener Type 1
Weld Analysis Ratio: 44.3% PASS
Pole Analysis Ratio: 49.2% PASS
Stiffener Analysis Ratio: 60.2% PASS

Bridge Stiffener Type 2
Weld Analysis Ratio: 52.7% PASS
Pole Analysis Ratio: 61.6% PASS
Stiffener Analysis Ratio: 61.7% PASS

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

v2.0, Effective Date: 1-12-12

Date: 11/7/2013
Project No: 37513-0921
Site Name: New Britain Gravel Pit
Site Number/BUN: 876331
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA/EIA-222-F & AISC 9th Ed. (Green)

General Parameters and Loading:

Flange Elevation:	30.00	ft
TIA Reference Standard:	TIA/EIA-222-F	
AISC Manual:	9th Ed. (Green)	
Method:	ASD	
ASD Stress Increase, ASIF:	1.333333333	
Moment, Mf:	1283.0	k-ft
Axial, Pf:	22.5	kips
Shear, Vf:	20.7	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	30.00	36.00	in
Pole Thickness, tp:	0.3750	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	47.00	47.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	3	
Upper Weld Length, L1:	39.00	32.25	in
Lower Weld Length, L2:	39.00	28.25	in
Weld Size, w:	0.3750	0.3750	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	4.50	5.50	in
Stiffener Thickness, ts:	1.25	1.00	in
Notch, n:	0.50	0.50	in
Stiffener Fy:	65	65	ksi
Stiffener Fu:	80	80	ksi
Unbraced Length, L:	5.63	5.63	in
K:	0.80	0.80	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	52.50	53.50	in = Df + 2 n + Ws
Upper Eccentricity, e1:	11.25	11.75	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	8.25	8.75	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.50	0.00	in
Bolt Circle:	41.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Table XIX & pg. 4-72:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	6	Num. of Sixteenths in Weld
e:	0.2885	0.3643	= e1 / L1
k:	0	0	
C:	1.1677	1.0107	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	197.9	197.1	kips
Allowable Axial, Pa:	364.3	260.8	kips = ASIF C C1 D L
Ratio:	54.3%	75.6%	
Lower Pole			
D:	6	6	Num. of Sixteenths in Weld
e:	0.2115	0.3097	= e2 / L2
k:	0	0	
C:	1.3600	1.1204	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	197.9	197.1	kips
Allowable Axial, Pa:	424.3	253.2	kips = ASIF C C1 D L
Ratio:	46.6%	77.8%	

Pole Analysis per AISC Sect. F4:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, P:	197.9	197.1	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	2.5	3.1	kips/in= P / (2 L1)
Section Modulus, S:	507.0	346.7	in^2 = $L1^2$ / 3
Bending Stress, fb:	4.4	6.7	kips/in = P e1 / S
Combined Stress, f:	5.1	7.3	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	60.4%	87.5%	
Lower Pole			
Stiffener Axial, P:	197.9	197.1	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	2.5	3.5	ksi = P / (2 L2)
Section Modulus, S:	507.0	266.0	in^2 = $L2^2$ / 3
Bending Stress, fb:	3.2	6.5	ksi = P e2 / S
Combined Stress, f:	4.1	7.4	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	48.8%	87.6%	

Stiffener 1 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 1	
Gross Area, Ag:	5.6250	in^2
Net Area, An:	5.6250	in^2
Stiffener Axial, P:	197.9	kips
Stiffener Stress, f:	35.2	ksi = P / Ag
b:	13.5000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	10.8000	in
Q, Where Qa = 1.0:	0.9508	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.3608	in^3
K L / r:	12.4708	
ASIF:	1.3333	
Allowable Axial, Fa:	47.64	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc^3]
ASIF:	1.3333	
Allowable Bending, Fb:	49.44	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	73.8%	

Stiffener 2 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 2	
Gross Area, Ag:	5.5000	in^2
Net Area, An:	5.5000	in^2
Stiffener Axial, P:	197.1	kips
Stiffener Stress, f:	35.8	ksi = P / Ag
b:	14.5000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	14.5000	in
Q, Where Qa = 1.0:	0.8174	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.2887	in^3
K L / r:	15.5885	
ASIF:	1.3333	
Allowable Axial, Fa:	40.66	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc^3]
ASIF:	1.3333	
Allowable Bending, Fb:	42.51	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	88.1%	

Analysis Summary:

Bridge Stiffener Type 1
Weld Analysis Ratio: 54.3% PASS
Pole Analysis Ratio: 60.4% PASS
Stiffener Analysis Ratio: 73.8% PASS

Bridge Stiffener Type 2
Weld Analysis Ratio: 77.8% PASS
Pole Analysis Ratio: 87.6% PASS
Stiffener Analysis Ratio: 88.1% PASS

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STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

v4.4 - Effective 7-12-13

Date: 11/8/2013
PJF Project: 37513-0921
Client Ref. # 876331
Site Name: Great Britain Gravel Pit
Description: 118' Pole
Owner: CCI
Engineer: JWM

Asymmetric Anchor Rod Analysis

Moment =	1938	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	33.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	23.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	20							

** 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	1.500	A354 Gr BC	109	125	0.0	41.00	0.00	1.77	92.55	89.57	89.57	0.00	97.19	92.2%
2	1.500	A354 Gr BC	109	125	22.5	41.00	0.00	1.77	92.95	89.97	89.97	0.00	97.19	92.6%
3	1.500	A354 Gr BC	109	125	45.0	41.00	0.00	1.77	91.49	88.51	88.51	0.00	97.19	91.1%
4	1.500	A354 Gr BC	109	125	67.5	41.00	0.00	1.77	89.06	86.08	86.08	0.00	97.19	88.6%
5	1.500	A354 Gr BC	109	125	90.0	41.00	0.00	1.77	87.15	84.17	84.17	0.00	97.19	86.6%
6	1.500	A354 Gr BC	109	125	112.5	41.00	0.00	1.77	87.03	84.05	84.05	0.00	97.19	86.5%
7	1.500	A354 Gr BC	109	125	135.0	41.00	0.00	1.77	88.86	85.88	85.88	0.00	97.19	88.4%
8	1.500	A354 Gr BC	109	125	157.5	41.00	0.00	1.77	91.55	88.56	88.56	0.00	97.19	91.1%
9	1.500	A354 Gr BC	109	125	180.0	41.00	0.00	1.77	93.52	90.54	90.54	0.00	97.19	93.2%
10	1.500	A354 Gr BC	109	125	202.5	41.00	0.00	1.77	93.68	90.69	90.69	0.00	97.19	93.3%
11	1.500	A354 Gr BC	109	125	225.0	41.00	0.00	1.77	91.88	88.90	88.90	0.00	97.19	91.5%
12	1.500	A354 Gr BC	109	125	247.5	41.00	0.00	1.77	89.04	86.06	86.06	0.00	97.19	88.5%
13	1.500	A354 Gr BC	109	125	270.0	41.00	0.00	1.77	86.70	83.72	83.72	0.00	97.19	86.1%
14	1.500	A354 Gr BC	109	125	292.5	41.00	0.00	1.77	86.22	83.24	83.24	0.00	97.19	85.6%
15	1.500	A354 Gr BC	109	125	315.0	41.00	0.00	1.77	87.83	84.85	84.85	0.00	97.19	87.3%
16	1.500	A354 Gr BC	109	125	337.5	41.00	0.00	1.77	90.47	87.49	87.49	0.00	97.19	90.0%
17	1.750	Dywidag (150 ksi)	127.7	150	60.0	51.50	0.00	2.71	172.72	168.14	168.14	0.00	178.99	93.9%
18	1.750	Dywidag (150 ksi)	127.7	150	146.0	51.50	0.00	2.71	173.02	168.44	168.44	0.00	178.99	94.1%
19	1.750	Dywidag (150 ksi)	127.7	150	244.0	51.50	0.00	2.71	171.91	167.33	167.33	0.00	178.99	93.5%
20	1.750	Dywidag (150 ksi)	127.7	150	326.0	51.50	0.00	2.71	171.37	166.79	166.79	0.00	178.99	93.2%
								39.12						

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

TIA Rev F

Site Data

BU#: *876331*
Site Name: *Great Britain Gravel Pit*
App #:

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	16	
Diam:	1.5	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	109	ksi
Bolt Circle:	41	in

Plate Data		
Diam:	47	in
Thick:	2	in
Grade:	36	ksi
Single-Rod B-eff:	7.07	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:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	1259	ft-kips
Axial:	23.8	kips
Shear:	16.6	kips

Reactions adjusted to account for additional anchor rods.

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

Anchor Rod Results

Maximum Rod Tension:	90.6 Kips	Rigid
Allowable Tension:	97.2 Kips	Service, ASD
Anchor Rod Stress Ratio:	93.3% **Pass**	Fty*ASIF

Base Plate Results — Flexural Check

Base Plate Stress:	30.3 ksi	Rigid
Allowable Plate Stress:	36.0 ksi	Service ASD
Base Plate Stress Ratio:	84.3% **Pass**	0.75*Fy*ASIF
		Y.L. Length: 19.62

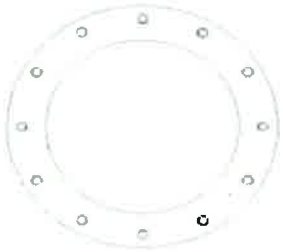
n/a

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

CURRENT MOMENT : 1938 K-ft

BY COMPARISON, THE CAPACITIES ARE :

$\left(\frac{1938}{2024}\right) 66.1 = \boxed{63.3\%}$ $\left(\frac{1938}{2024}\right) 74.7 = \boxed{71.5\%}$

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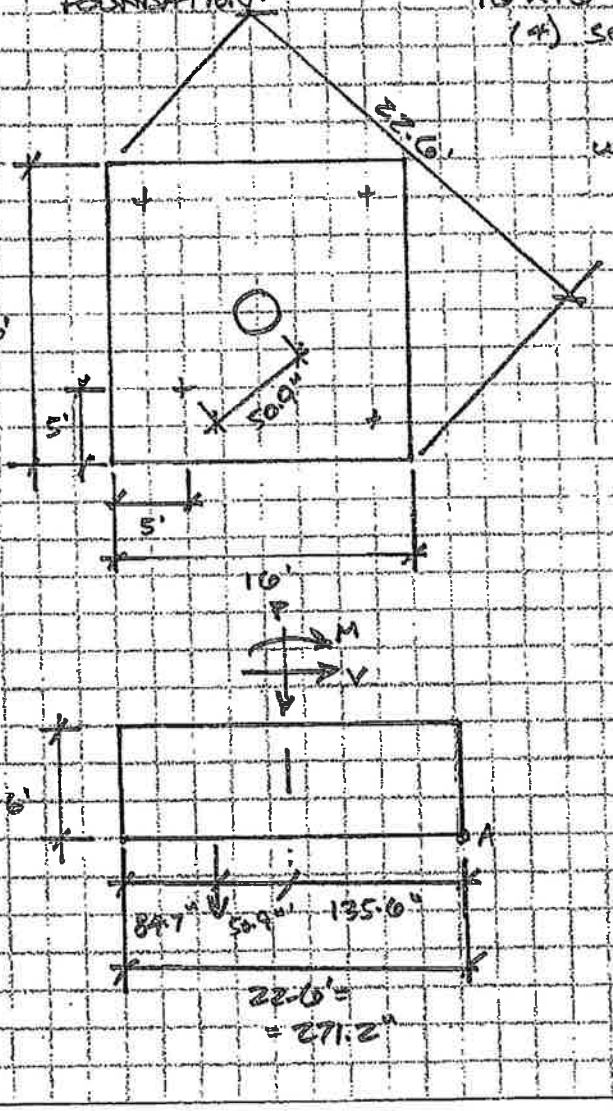
250 E. BROAD ST. SUITE 1500
COLUMBUS, OH 43215

PAGE 1 OF 5
BY RMK DATE 10/18/2012
PROJECT 118' MONOPOLE
CLIENT ECI PROJ # 37512-1112

FOUNDATION ANALYSIS

BASE REACTIONS : M = 2024 ft-k
V = 23 kips
P = 33 kips

FOUNDATION : 16'x16'x6' DP. MAT W/ (4) SOIL ANCHORS



WT. MAT = (16)(16)(6)(0.15 k/cf) = 222.7 kips

P ALLOW SOIL = 130 kips ANCHOR

ALLOW. SOIL BRG PRESSURE = 10 k/sf

$M_{@T} = 2024 + 23(6) =$

$= 2162$ ft-k $= 25944$ in-k

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FOUNDATION ANALYSIS CONT.

$M_{RESIST_{WT}} = (33 + 222.7)(135.6) = 34672.92$ K-ft

$M_{RESIST_{SOIL\ ANCHOR}} = (130)(135.64\ 50.9) = 24245$ K-ft

$M_{RESIST_{TOT}} = 34672.92 + 24245 = 58917.92$ K-ft

$F.S. = \frac{58917.92}{25944} = 2.27$

$F.S._{REQ'D} = 1.5$

STRESS RATIO = $\frac{1.5}{2.27} = 66.1\%$ OK

NOTE: F.S. W/O SOIL ANCHOR = $\frac{34672.92}{25944} = 1.34$ NOT OK

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FOUNDATION ANALYSIS CONT.

CHECK OVERTURNING ACROSS MAJOR AXIS (X,Y):

$M_{RESIST\ WT} = (133 + 222.7)\left(\frac{(16)(18)}{2}\right) = 24547.2^{k}$

$M_{RESIST\ SOIL\ ANCHOR} = [(130)(16-5) + (130)(16-2)](12) = 39000^{k}$

$M_{RESIST\ TOT} = 24547.2 + 39000 = 63547.2^{k}$

$F.S. = \frac{63547.2}{25944} = 2.45$

$STRESS\ RATIO = \frac{1.5}{2.45} = 61.2\ \%$

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FOUNDATION ANALYSIS CONT:

CHECK REINF. STL. IN MAT.:

BRG. PRESSURE FROM WEIGHT: $\left(\frac{133 + 222.2}{16^2}\right) = 1$ ksf

THAT LEAVES ± 9 ksf ALLOW. BRG PRESSURE REMAINING

AREA OF SOIL REQ'D TO SUPPORT (2) SOIL ANCHORS*:
* ASSUMES SOIL ANCHORS FULLY EFFECTIVE

$\frac{2600 \text{ kips}}{9 \text{ ksf}} = 28.89 \text{ ft}^2$

LENGTH = $\frac{28.89}{10} = 1.806'$

M MAT'L:

1. AXIAL LOAD DOESN'T CONTRIBUTE TOO MUCH MOMENT TO MAT SO IT WAS NOT CONSIDERED.
2. CONSERVATIVELY CONSIDERS SOIL ANCHORS TO BE FULLY EFFECTIVE
3. CONSERVATIVELY TAKES MOMENT ABOUT ℄ OF MONOPOLE

$M_u = (1.3)(2600)\left(\frac{16'}{2} - \frac{1.806}{2}\right) = 3009^{TK} = 36110^{IK}$

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BY RMK DATE 10/18/2012
PROJECT 118' MONOPOLE
CLIENT CMC PROJ # 37512-1112

FOUNDATION ANALYSIS CONT:

CHECK REINF STL IN MAT CONT:

MAT HAS (17) #8 BARS TOP & BTM.

$A_s = 13.43\ in^2$

$b = (10)(12) = 192"$

$d = (6)(12) - 3 - (1.5)(1) = 67.5"$

$f'c = 3\ ksi$

$$a = \frac{A_s f_y}{(0.85)(f'c)\,b} = \frac{(13.43)(60)}{(0.85)(3)(192)} = 1.0496"$$

$$\therefore\ d - \frac{a}{2} = 67.5 - \frac{1.0496}{2} = 66.6077"$$

$$\phi M_n = (0.9)(13.43)(60)(66.677) = 48355\ ^{k}/_{ft}$$

OR

$$(0.9)(0.85)(3)(1.0496)(192)(66.677) = 48360\ ^{k}/_{ft}$$

$$\text{STRESS RATIO} = \frac{36110}{48355} = 74.7\%$$