



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

VIA ELECTRONIC MAIL

November 13, 2018

Jeffrey Barbadora
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-SPRINT-030-181009** – Sprint notice of intent to modify an existing telecommunications facility located at 14 Thompson Hill Road, Columbia, Connecticut.

Dear Mr. Barbadora:

The Connecticut Siting Council (Council) is in receipt of your correspondence of November 10, 2018 submitted in response to the Council's October 24, 2018 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/FC/IN





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Jeffrey Barbadora
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: EM-SPRINT-030-181009 - Sprint notice of intent to modify an existing telecommunications facility located at 14 Thompson Hill Road, Columbia, Connecticut.

Dear Mr. Barbadora:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on October 9, 2018. On October 10, 2018, the Council issued a letter (enclosed) stating that the above referenced request for exempt modification was incomplete because the mount analysis referenced in the Construction Drawings was not provided with the request. The Council requested that Crown Castle provide a mount analysis for the proposed equipment that is stamped and signed by a professional engineer duly licensed in the State of Connecticut and, if applicable, an updated Structural Analysis Report accounting for any required antenna mount modifications.

On October 19, 2018, the Council received a Mount Structural Analysis dated July 17, 2018 prepared by Hudson Design Group and stamped and signed by Daniel Hamm. Staff observed that Section 4.10 on page 4 of the Mount Structural Analysis refers to the installation of a new 12-foot low profile platform mount (RMQ-472). However the Structural Analysis Report dated May 31, 2018 prepared by AW Solutions, Inc. provided with the request indicates a platform reinforcement kit (PRK1245). This is inconsistent with the Mount Structural Analysis provided with the request for exempt modification.

Therefore, the exempt modification request is incomplete at this time. The Council recommends that Crown Castle provide an updated Structural Analysis Report accounting for any required antenna mount modifications on or before November 26, 2018. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to November 26, 2018.

This notice of incompleteness shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

Melanie Bachman (handwritten signature)

Melanie Bachman
Executive Director

MAB/FOC/IN

- c: The Honorable Steven M. Everett, First Selectman, Town of Columbia
Mark Walter, Town Administrator, Town of Columbia
Paula Stahl, Town Planner, Town of Columbia
Joshua and Eileen Lanati, Property Owners





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Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

October 10, 2018

Jeffrey Barbadora
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-SPRINT-030-181009** – Sprint notice of intent to modify an existing telecommunications facility located at 14 Thompson Hill Road, Columbia, Connecticut.

Dear Mr. Barbadora:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on October 9, 2018.

According to Section 16-50j-71 of the Regulations of Connecticut State Agencies, "...any modification, as defined in Section 16-50j-2a of the Regulations of Connecticut State Agencies, to an existing tower site, except as specified in Sections 16-50j-72 and 16-50j-88 of the Regulations of Connecticut State Agencies, may have a substantial adverse environmental effect."

Staff has reviewed this exempt modification request for completeness and has identified a deficiency in the request. The Construction Drawing Sheets A-1 and A-2 prepared by Hudson Design Group, last revised on September 7, 2018, includes a structural note which references a mount analysis prepared by Hudson Design Group and dated July 16, 2018. No mount analysis is included with the request for exempt modification; therefore, it is unclear whether additional reinforcements would be required for the antenna mount, which would alter the proposed loading on the structure and require an updated structural analysis report.

Therefore, the exempt modification request is incomplete at this time. The Council recommends that Crown Castle provide a mount analysis for the proposed equipment that is stamped and signed by a professional engineer duly licensed in the State of Connecticut and, if applicable, an updated Structural Analysis Report accounting for any required antenna mount modifications on or before November 16, 2018. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to November 16, 2018.

This notice of incompleteness shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

Melanie Bachman
Executive Director

MAB/FOC/in

- c: The Honorable Steven M. Everett, First Selectman, Town of Columbia
- Mark Walter, Town Administrator, Town of Columbia
- Paula Stahl, Town Planner, Town of Columbia
- Joshua and Eileen Lanati, Property Owners

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CONNECTICUT SITING COUNCIL

Affirmative Action / Equal Opportunity Employer

Robidoux, Evan

From: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Sent: Saturday, November 10, 2018 11:27 AM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council 2nd Incomplete Letter for EM-SPRINT-030-181009-ThompsonHillRd-Columbia
Attachments: CT33XC571_passing SA revised.pdf; RE: Columbia / Deojay_Sprint-438436_Passing Re-Run in Rev. G LC7 SA_FW: SA - Structural Analysis WO1656324 BU876391 APP438436 Priority 0 SA Only

Good morning Evan,

In response to the 2nd incomplete letter correspondence, attached is an updated structural analysis which includes the mount analysis recommendations. Also, attached is the engineer response stating like for like mounts.

Thanks,

Jeffrey Barbadora
781-970-0053
12 Gill Street, Suite 5800, Woburn, MA 01801
CrownCastle.com

From: Robidoux, Evan
Sent: Thursday, October 25, 2018 4:02 PM
To: Barbadora, Jeff
Cc: CSC-DL Siting Council
Subject: Council 2nd Incomplete Letter for EM-SPRINT-030-181009-ThompsonHillRd-Columbia

Please see the attached correspondence.

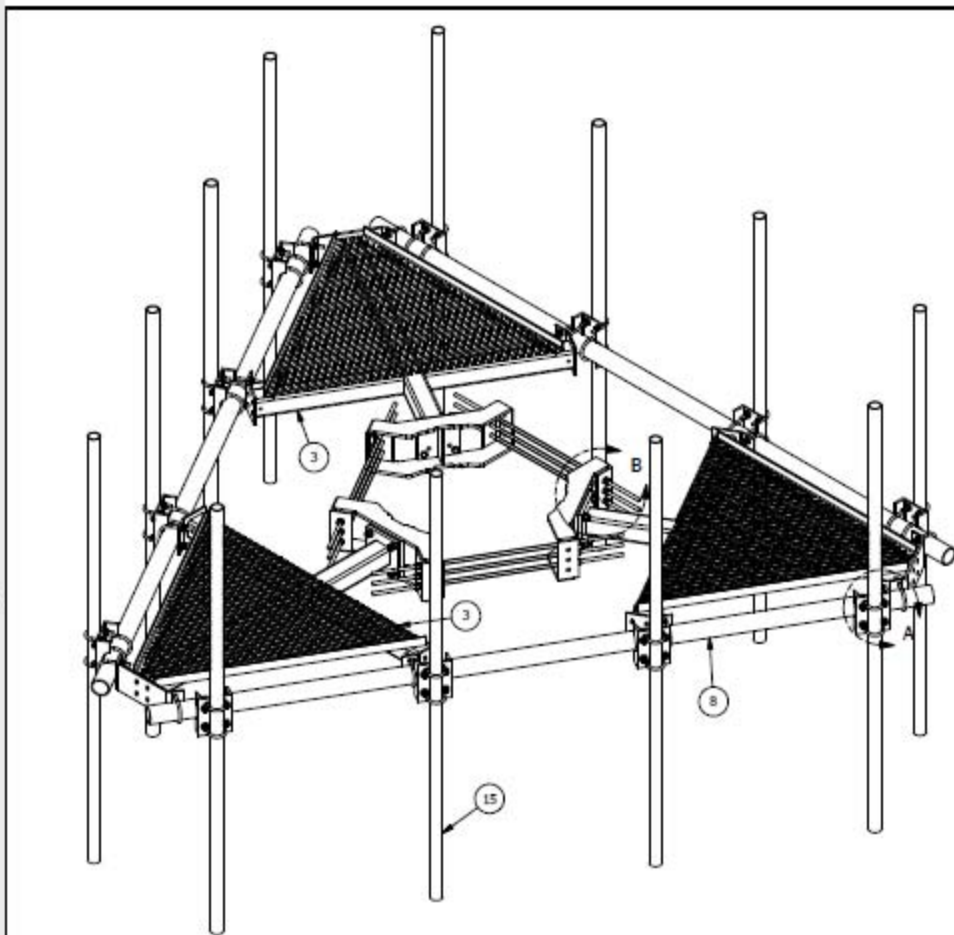
Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

This email may contain confidential or privileged material. Use or disclosure of it by anyone other than the recipient is unauthorized. If you are not an intended recipient, please delete this email.

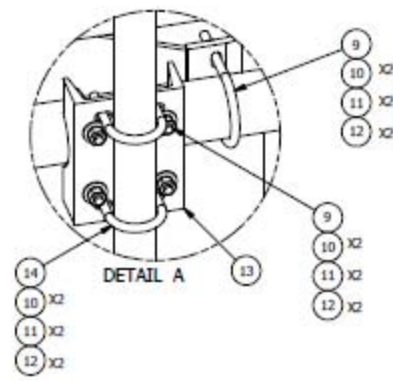
Robidoux, Evan

From: Howell, Timothy <Timothy.Howell@crowncastle.com>
Sent: Wednesday, November 07, 2018 11:06 AM
To: Pelon, Tricia
Cc: Barbadora, Jeff
Subject: RE: Columbia / Deojay_Sprint-438436_Passing Re-Run in Rev. G LC7 SA_FW: SA - Structural Analysis WO1656324 BU876391 APP438436 Priority 0 SA Only
Attachments: Mount Catalog - 1.5_Crown.pdf

Good morning,
Same mount, LP 301-1 is the 12' platform with handrails.
Vendor is using the attached Crown mount catalog, approved for vendors to use with SA & SDD modeling.
Let me know if you have any questions.



ITEM	QTY	PART NO.	PART DESCRIPTION
1	3	X-LWRM	RING MOUNT WEL
2	9	G58R-48	5/8" x 48" THREADED
2	9	G58R-24	5/8" x 24" THREADED
3	3	X-SV196	LOW PROFILE PLATFO
4	12	A58234	5/8" x 2-3/4" HDG A32
5	12	A58FW	5/8" HDG A325 FLAT
6	30	G58LW	5/8" HDG LOCKW
7	30	A58NUT	5/8" HDG A325 H
8	3	P3150	3-1/2" X 150" SCH 40 GAI
9	36	X-UB1306	1/2" X 3-5/8" X 6" X 3" U
10	120	G12FW	1/2" HDG USS FLAT
11	120	G12LW	1/2" HDG LOCKW
12	120	G12NUT	1/2" HDG HEAVY 2H
13	12	X-SF219	SMALL SUPPORT CRG
14	24	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2"
15	12	B	ANTENNA MOUNTI

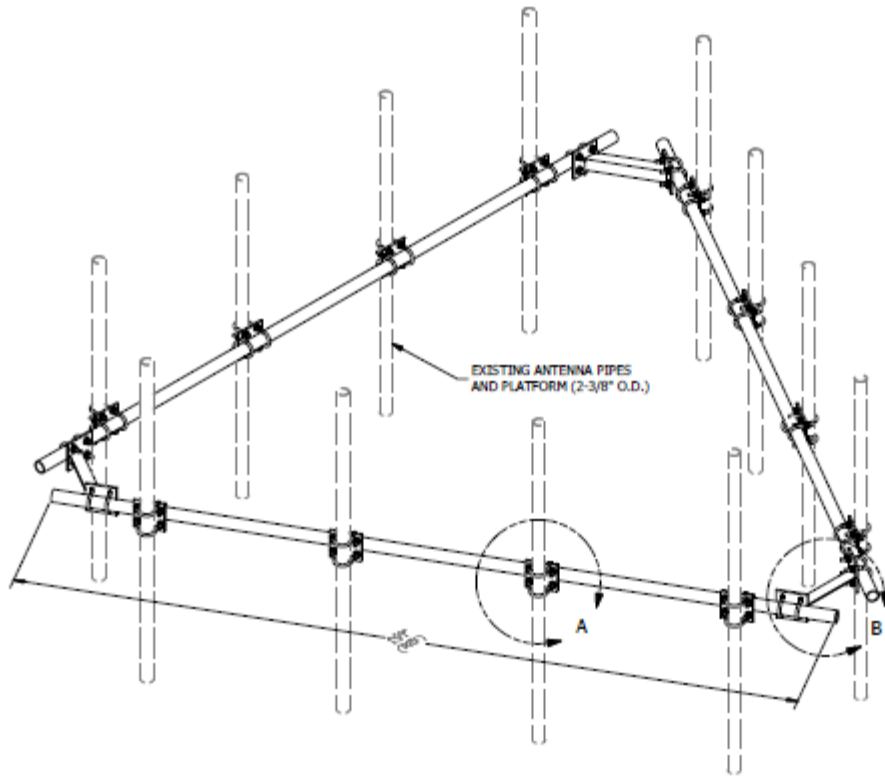


ASSEMBLY NO. "A"	PART NO. "B"	LENGTH, "C"	UNIT
RMCP-463	P263	63"	
RMCP-472	P272	72"	
RMCP-484	P284	84"	
RMCP-496	P296	96"	
RMCP-4126	P2126	126"	

TOLERANCE NOTE				DESCRIPTION	
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE: SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$) DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES BENDS ARE $\pm 1/2$ DEGREE - ALL OTHER MACHINING ($\pm 0.030"$) ALL OTHER ASSEMBLY ($\pm 0.060"$)				LOW PROFILE CO-LOCATION PLATFORM FOR 12 ANTENNAS WITH 12" 6" FACE WIDTH FOR 12" - 36" DIAMETER POLES	
PROPRIETARY NOTE THE DATA AND TOLERANCES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE WRITTEN PERMISSION OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.				DRAWN BY CEK 1/20/2012	CPD NO. semb
A ADDED 10" 6" ANTENNA MOUNTING PIPES REV DESCRIPTION OF REVISIONS REVISION HISTORY		CPD BY CEK	DATE 7/9/2015	CHECKED BY BMC	DRAWING USAGE CUSTOMER 7/9/2015

HAndrial Kit:

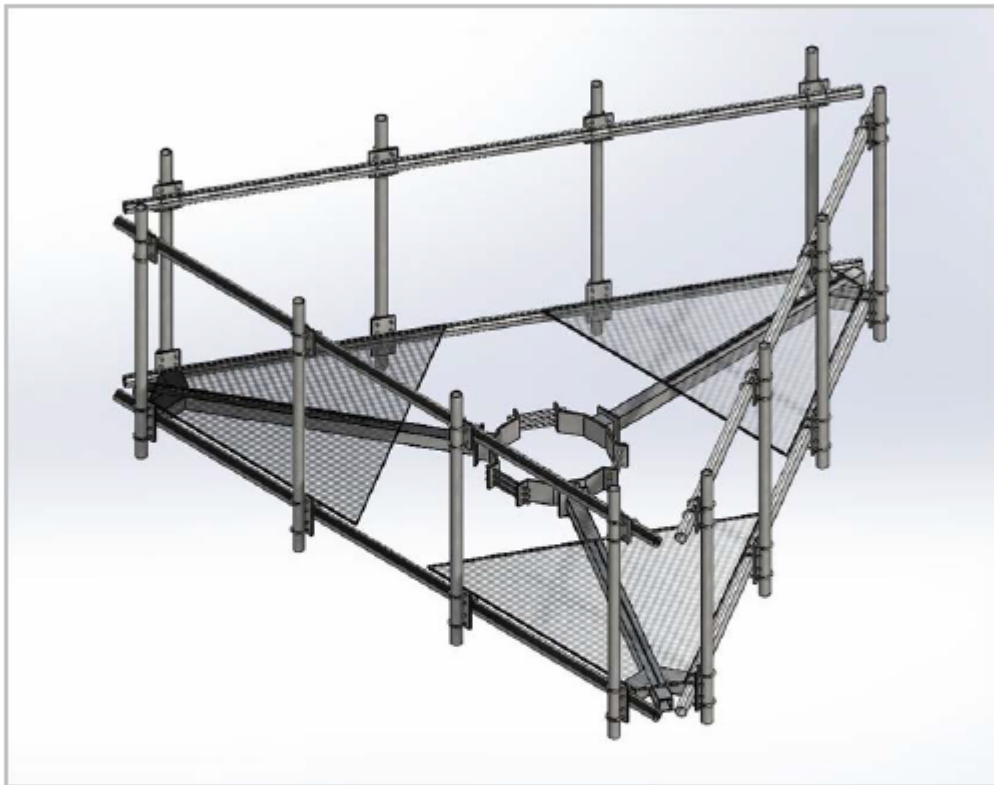
ITEM	QTY	PART NO.	PART DESCRIPTION
1	3	P2150	2-3/8" O.D. X 150" SCH 40 GA
2	3	X-AHCP	ANGLE HANDRAIL CORN
3	12	SCX1	CROSSOVER PLATE 2-3/8"
4	60	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" L
5	120	GL2PW	1/2" HDG USS FLATW
6	120	GL2LW	1/2" HDG LOCKWA
7	120	GL2NUT	1/2" HDG HEAVY 2H F



TOLERANCE NOTES				DESCRIPTION													
<p>TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE: SAWED, SHEARED AND GAS CUT EDGES (± 0.030) DRILLED AND GAS CUT HOLES (± 0.030) - NO CONING OF HOLES LASER CUT EDGES AND HOLES (± 0.010) - NO CONING OF HOLES BENDS ARE $\pm 1/2$ DEGREE ALL OTHER MACHINING (± 0.030) ALL OTHER ASSEMBLY (± 0.030)</p>				<p>HANDRAIL KIT FOR 12'-6" FACE</p>													
<p>PREPARED BY: [blank] THE DATA AND TOLERANCES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.</p>				<p>CPD NO. [blank]</p>	<p>DRAWN BY: KCB 5/30/2012</p>	<p>ENG. APPROVAL [blank]</p>											
<p>REVISION HISTORY</p> <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION OF REVISIONS</th> <th>CPD</th> <th>BY</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>REPLACED HCP WITH X-AHCP</td> <td></td> <td>CEK</td> <td>7/10/2014</td> </tr> </tbody> </table>				REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE	A	REPLACED HCP WITH X-AHCP		CEK	7/10/2014	<p>CLASS: 81</p>	<p>SUB: 01</p>	<p>DRAWING USAGE: CUSTOMER</p>	<p>CHECKED BY: BMC 7/13/2014</p>
REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE													
A	REPLACED HCP WITH X-AHCP		CEK	7/10/2014													

MTS 12.5' and 14.5' Co-Locational Platform with Handrails

LP 301 and LP 302



LP 301-1 (12.5' Platform)

	<u>Without Ice</u>	<u>With ½" Ice</u>
(EPA) _A =	30.10 ft ²	40.80 ft ²
Mount Weight:	1588.5 lbs	2029.18 lbs

Mount Includes:

- (4) Mount pipes per sector
- Handrails
- Round members

TIM HOWELL

TSA-SI Team – ETA

T: (980) 209-8242 | M: (704) 302-6927

CROWN CASTLE

3530 Toringdon Way, Suite 300, Charlotte, NC 28277

CrownCastle.com

From: Pelon, Tricia

Sent: Wednesday, November 7, 2018 10:22 AM

To: Howell, Timothy

Cc: Barbadora, Jeff

Subject: RE: Columbia / Deojay_Sprint-438436_Passing Re-Run in Rev. G LC7 SA_FW: SA - Structural Analysis WO1656324 BU876391 APP438436 Priority 0 SA Only

Importance: High

Tim – the new SA did not include the MA recommendations...sorry can you please rerun SA as it's a CT site so the CSC will question the difference.

4.1) Recommendations

The mount has sufficient capacity to su
modifications:

- **Install new 12' low profile mount**
- **Install new handrail kit, SitePro1**

Thanks Tricia

Patricia Pelon

Project Manager

T: (518) 373-3507 | M: (518) 424-2396

CROWN CASTLE

3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065

CrownCastle.com

Please note new phone # and address.

** Attention all Contractors - Anytime a Crown site is accessed for any reason you must call our NOC at 800-788-7011 upon arrival and departure

From: Howell, Timothy

Sent: Tuesday, November 6, 2018 7:47 AM

To: Pelon, Tricia <Tricia.Pelon@crowncastle.com>; Vadney, Evan <Evan.Vadney@crowncastle.com>

Cc: Vadney, Dan <Dan.Vadney@crowncastle.com>

Subject: Columbia / Deojay_Sprint-438436_Passing Re-Run in Rev. G LC7 SA_FW: SA - Structural Analysis WO1656324 BU876391 APP438436 Priority 0 SA Only

Good morning,

Please find attached the subject passing LC7 Rev. G SA. *No MODs & No Conditions Needed.

I have received PO# 1282606 for \$ 750.

Please let me know if you have any questions.

TIM HOWELL

TSA-SI Team – ETA

T: (980) 209-8242 | M: (704) 302-6927

CROWN CASTLE

3530 Toringdon Way, Suite 300, Charlotte, NC 28277

CrownCastle.com

From: Michael Brown <Michael.Brown@awsolutionsinc.com>

Sent: Monday, November 5, 2018 3:06 PM

To: Howell, Timothy <Timothy.Howell@crowncastle.com>

Subject: SA - Structural Analysis WO1656324 BU876391 APP438436 Priority 0 SA Only

Hey Tim,

The attached documents have been uploaded to CCI sites. Please let me know if you have any questions.

Thanks,

Michael Brown, E.I.

Structural Engineer

AW Solutions

300 Crown Oak Centre Drive

Longwood FL, 32750

Office: 407-260-0231 ext.142



Date: **November 05, 2018**

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

AW Solutions
300 Crown Oak Centre Drive
Longwood, FL 32750
(407) 260-0231

Subject: **Structural Analysis Report**

Carrier Designation: **Sprint PCS Co-Locate**
Carrier Site Number: CT33XC571

Crown Castle Designation: **Crown Castle BU Number:** 876391
Crown Castle Site Name: COLUMBIA / DEOJAY
Crown Castle JDE Job Number: 501752
Crown Castle Work Order Number: 1656324
Crown Castle Order Number: 438436 Rev. 0

Engineering Firm Designation: **AW Solutions Project Number:** 876391

Site Data: **14 Thompson Hill Rd, COLUMBIA, Tolland County, CT**
Latitude 41° 43' 3.44", Longitude -72° 17' 59.09"
180 Foot - Monopole Tower

Mr. Howell,

AW Solutions is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned tower.

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:

LC7: Proposed Equipment Configuration

Sufficient Capacity

This analysis utilizes an ultimate 3-second gust wind speed of 130 mph (converted to an equivalent 101 mph nominal 3-second gust wind speed per Section 1609.3.1 for use with TIA-222 G) as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Michael Brown, EI / AL

Respectfully submitted by:



11/05/18

Alan Lockrem, PE
Director of Engineering

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1) INTRODUCTION

This tower is a 180 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	II
Wind Speed:	101 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	0.75 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180.0	181.0	3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ	4	1-1/4
		6	alcatel lucent	RRH2X50-800		
		3	alcatel lucent	TD-RRH8X20-25		
		3	commscope	NNVV-65B-R4		
		3	rfs celwave	APXVTM14-ALU-I20		
	180.0	1	tower mounts	Platform Mount [LP 301-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
161.0	161.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	7	1-5/8
		3	ericsson	Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe		
		3	ericsson	KRY 112 144/2		
		3	ericsson	RRUS 11 B12		
		1	tower mounts	Platform Mount [LP 305-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
147.0	150.0	3	alcatel lucent	RRH2X60-AWS	1 14	1/2 1-5/8
		3	alcatel lucent	RRH2X60-PCS		
		6	andrew	HBXX-6517DS-A2M w/ Mount Pipe		
		6	andrew	LNX-6514DS-A1M w/ Mount Pipe		
		1	lucent	KS24019-L112A		
		2	rfs celwave	DB-T1-6Z-8AB-0Z		
	6	rfs celwave	FD9R6004/1C-3L			
	147.0	1	tower mounts	Platform Mount [LP 712-1]		
141.0	141.0	3	ericsson	RRUS 11	-	-
		1	tower mounts	Pipe Mount [PM 601-3]		
140.0	140.0	3	cci antennas	HPA-65R-BUU-H6	2 4 12 1	3/8 7/16 1-5/8 2
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 32 B2		
		3	ericsson	RRUS 4478 B14		
		3	kmw communications	EPBQ-654L8H6-L2		
		3	powerwave technologies	1001983		
		12	powerwave technologies	7020.00		
		6	powerwave technologies	7770.00		
		6	powerwave technologies	LGP 17201		
		6	powerwave technologies	LGP21901		
		2	raycap	DC6-48-60-18-8F		
		1	tower mounts	Platform Mount [LP 1301-1]		
83.0	84.0	2	kathrein	OG-860/1920/GPS-A	2	1/2
	83.0	2	tower mounts	Side Arm Mount [SO 701-1]	2	1-1/4
78.0	79.0	1	kathrein	OG-860/1920/GPS-A	1	1/2
	78.0	1	tower mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Goodkind & O'Dea, Inc	1613526	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEL	1613632	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEL	1614546	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.4.0), 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 and maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary) (Monopole Tower)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	180 - 131.75	Pole	TP31.39x21x0.25	1	-14.42	1686.69	56.8	Pass
L2	131.75 - 86.71	Pole	TP40.46x29.921x0.375	2	-24.94	3408.11	75.8	Pass
L3	86.71 - 43.16	Pole	TP48.96x38.5229x0.4375	3	-39.70	4767.07	80.3	Pass
L4	43.16 - 0	Pole	TP57.25x46.668x0.5	4	-62.03	6465.70	77.8	Pass
							Summary	
						Pole (L3)	80.3	Pass
						Rating =	80.3	Pass

Table 5 - Tower Component Stresses vs. Capacity (Monopole Tower) - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	83.9	Pass
1	Base Plate	0	91.7	Pass
1	Base Foundation Structural	0	95.5	Pass
1	Base Foundation Soil Interaction	0	93.6	Pass

Structure Rating (max from all components) =	95.5%
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Notes:

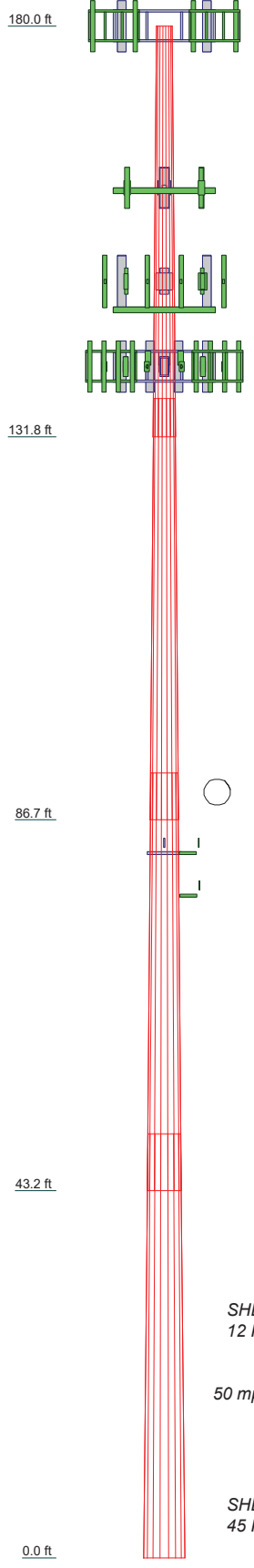
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3	4		
Length (ft)	48.2500	49.5400	49.1300	49.8300		
Number of Sides	18	18	18	18		
Thickness (in)	0.2500	0.3750	0.4375	0.5000		
Socket Length (ft)	4.5000	5.5800	6.6700	6.6680		
Top Dia (in)	21.0000	29.9210	38.5229	46.6680		
Bot Dia (in)	31.3900	40.4600	48.9600	57.2500		
Grade	A572-65					
Weight (K)	3.4	7.0	10.1	13.8		



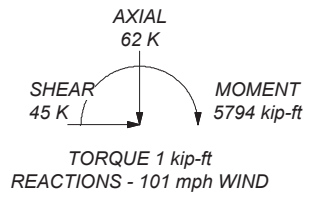
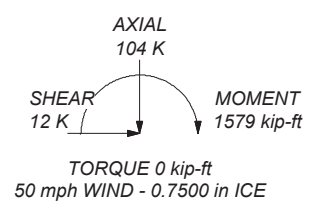
MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TOWER RATING: 80.3%

ALL REACTIONS ARE FACTORED



AW Solutions 300 Crown Oak Centre Drive Longwood, FL 32750 Phone: (407) 260-0231 FAX: (407) 260-0749		Job: BU876391
		Project: WO1656324
Client: Crown Castle	Drawn by: Michael Brown	App'd:
Code: TIA-222-G	Date: 11/05/18	Scale: NTS
Path:		Dwg No. E-1

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Tower Input Data

The tower is a monopole.

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

The following design criteria apply:

- 1) Tower is located in Tolland County, Connecticut.
- 2) Basic wind speed of 101 mph.
- 3) Structure Class II.
- 4) Exposure Category C.
- 5) Topographic Category 1.
- 6) Crest Height 0.0000 ft.
- 7) Nominal ice thickness of 0.7500 in.
- 8) Ice thickness is considered to increase with height.
- 9) Ice density of 56.00 pcf.
- 10) A wind speed of 50 mph is used in combination with ice.
- 11) Temperature drop of 50 °F.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) A non-linear (P-delta) analysis was used.
- 14) Pressures are calculated at each section.
- 15) Stress ratio used in pole design is 1.
- 16) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
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Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	180.0000- 131.7500	48.2500	4.50	18	21.0000	31.3900	0.2500	1.0000	A572-65 (65 ksi)
L2	131.7500- 86.7100	49.5400	5.58	18	29.9210	40.4600	0.3750	1.5000	A572-65 (65 ksi)
L3	86.7100- 43.1600	49.1300	6.67	18	38.5229	48.9600	0.4375	1.7500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	43.1600- 0.0000	49.8300		18	46.6680	57.2500	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	21.2854 31.8357	16.4651 24.7096	895.6507 3027.1937	7.3663 11.0547	10.6680 15.9461	83.9568 189.8389	1792.4800 6058.3706	8.2341 12.3571	3.2560 5.0846	13.024 20.339
L2	31.2968 41.0263	35.1671 47.7112	3878.5645 9685.4835	10.4888 14.2302	15.1999 20.5537	255.1711 471.2287	7762.2325 19383.711	17.5869 23.8601	4.6061 6.4610	12.283 17.229
L3	40.2534 49.6478	52.8864 67.3796	9691.6752 20042.502	13.5203 17.2255	19.5696 24.8717	495.2402 805.8363	19396.102 40111.376	26.4482 33.6962	6.0100 7.8470	13.737 17.936
L4	48.7491 58.0560	73.2687 90.0622	19730.525 36644.767	16.3897 20.1462	23.7074 29.0830	832.2531 1260.0065	39487.013 73337.753	36.6413 45.0397	7.3336 9.1960	14.667 18.392

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 180.0000- 131.7500				1	1	1			
L2 131.7500- 86.7100				1	1	1			
L3 86.7100- 43.1600				1	1	1			
L4 43.1600- 0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	Number Per Row	Start/En d Position	Width or Diamete r in	Perimete r in	Weight plf
LCF158-50J(1-5/8)	B	No	Surface Ar (CaAa)	161.0000 - 0.0000	6	6	-0.250 0.000	2.0100		0.92
HB158-1-08U8- S8J18(1-5/8) *83*	A	No	Surface Ar (CaAa)	147.0000 - 0.0000	2	2	0.000 0.100	1.9800		1.30
LDF4-50A(1/2)	C	No	Surface Ar (CaAa)	83.0000 - 0.0000	2	2	-0.500 -0.480	0.6250		0.15
LDF6-50A(1-1/4) *78*	C	No	Surface Ar (CaAa)	83.0000 - 0.0000	2	2	-0.480 -0.450	1.5500		0.60
LDF4-50A(1/2)	B	No	Surface Ar (CaAa)	78.0000 - 0.0000	1	1	-0.480 -0.480	0.6250		0.15

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight plf
180									
HB114-1-0813U4-M5J(1-1/4)	A	No	No	Inside Pole	180.0000 - 0.0000	4	No Ice	0.0000	1.20
							1/2" Ice	0.0000	1.20
							1" Ice	0.0000	1.20
161									
MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	B	No	No	Inside Pole	161.0000 - 0.0000	1	No Ice	0.0000	1.07
							1/2" Ice	0.0000	1.07
							1" Ice	0.0000	1.07
147									
LDF4-50A(1/2)	A	No	No	Inside Pole	147.0000 - 0.0000	1	No Ice	0.0000	0.15
							1/2" Ice	0.0000	0.15
							1" Ice	0.0000	0.15
LDF7-50A(1-5/8)	A	No	No	Inside Pole	147.0000 - 0.0000	12	No Ice	0.0000	0.82
							1/2" Ice	0.0000	0.82
							1" Ice	0.0000	0.82
140									
2" Rigid Conduit	C	No	No	Inside Pole	140.0000 - 0.0000	1	No Ice	0.0000	2.80
							1/2" Ice	0.0000	2.80
							1" Ice	0.0000	2.80
FB-L98B-034-XXX(3/8)	C	No	No	Inside Pole	140.0000 - 0.0000	1	No Ice	0.0000	0.06
							1/2" Ice	0.0000	0.06
							1" Ice	0.0000	0.06
WR-VG122ST-BRDA(7/16)	C	No	No	Inside Pole	140.0000 - 0.0000	2	No Ice	0.0000	0.14
							1/2" Ice	0.0000	0.14
							1" Ice	0.0000	0.14
FB-L98B-034-XXX(3/8)	C	No	No	Inside Pole	140.0000 - 0.0000	1	No Ice	0.0000	0.06
							1/2" Ice	0.0000	0.06
							1" Ice	0.0000	0.06
WR-VG122ST-BRDA(7/16)	C	No	No	Inside Pole	140.0000 - 0.0000	2	No Ice	0.0000	0.14
							1/2" Ice	0.0000	0.14
							1" Ice	0.0000	0.14
LDF7-50A(1-5/8)	C	No	No	Inside Pole	140.0000 - 0.0000	12	No Ice	0.0000	0.82
							1/2" Ice	0.0000	0.82
							1" Ice	0.0000	0.82
ICE 200(2)	C	No	No	Inside Pole	140.0000 - 0.0000	1	No Ice	0.0000	0.23
							1/2" Ice	0.0000	0.23
							1" Ice	0.0000	0.23

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	180.0000-131.7500	A	0.000	0.000	6.039	0.000	0.42
		B	0.000	0.000	35.276	0.000	0.19
		C	0.000	0.000	0.000	0.000	0.11
L2	131.7500-86.7100	A	0.000	0.000	17.836	0.000	0.78
		B	0.000	0.000	54.318	0.000	0.30
		C	0.000	0.000	0.000	0.000	0.61
L3	86.7100-43.1600	A	0.000	0.000	17.246	0.000	0.76
		B	0.000	0.000	54.699	0.000	0.29
		C	0.000	0.000	17.330	0.000	0.65
L4	43.1600-0.0000	A	0.000	0.000	17.091	0.000	0.75
		B	0.000	0.000	54.748	0.000	0.29
		C	0.000	0.000	18.775	0.000	0.65

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	180.0000-131.7500	A	1.750	0.000	0.000	14.222	0.000	0.59
		B		0.000	0.000	56.894	0.000	0.88
		C		0.000	0.000	0.000	0.000	0.11
L2	131.7500-86.7100	A	1.690	0.000	0.000	42.004	0.000	1.28
		B		0.000	0.000	87.607	0.000	1.35
		C		0.000	0.000	0.000	0.000	0.61
L3	86.7100-43.1600	A	1.604	0.000	0.000	39.952	0.000	1.21
		B		0.000	0.000	97.997	0.000	1.44
		C		0.000	0.000	55.319	0.000	1.23
L4	43.1600-0.0000	A	1.439	0.000	0.000	38.673	0.000	1.17
		B		0.000	0.000	98.917	0.000	1.40
		C		0.000	0.000	58.085	0.000	1.23

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	180.0000-131.7500	2.7072	-3.9157	1.7262	-3.0034
L2	131.7500-86.7100	2.8182	-5.7425	1.4248	-4.4088
L3	86.7100-43.1600	4.4674	-4.7416	3.3680	-3.0592
L4	43.1600-0.0000	4.8935	-4.9855	3.8105	-3.3241

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L1	6	LCF158-50J(1-5/8)	131.75 - 161.00	1.0000	1.0000
L1	10	HB158-1-08U8-S8J18(1-5/8)	131.75 - 147.00	1.0000	1.0000
L2	6	LCF158-50J(1-5/8)	86.71 - 131.75	1.0000	1.0000
L2	10	HB158-1-08U8-S8J18(1-5/8)	86.71 - 131.75	1.0000	1.0000
L2	20	LDF4-50A(1/2)	86.71 - 83.00	1.0000	1.0000
L2	21	LDF6-50A(1-1/4)	86.71 - 83.00	1.0000	1.0000
L2	23	LDF4-50A(1/2)	86.71 - 78.00	1.0000	1.0000
L3	6	LCF158-50J(1-5/8)	43.16 - 86.71	1.0000	1.0000
L3	10	HB158-1-08U8-S8J18(1-5/8)	43.16 - 86.71	1.0000	1.0000
L3	20	LDF4-50A(1/2)	43.16 - 83.00	1.0000	1.0000
L3	21	LDF6-50A(1-1/4)	43.16 - 83.00	1.0000	1.0000
L3	23	LDF4-50A(1/2)	43.16 - 78.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		CAAA Front ft ²	CAAA Side ft ²	Weight K
180									
*									
180 P									
APXVTM14-ALU-I20	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	6.3424 6.7164 7.0974	3.6074 3.9666 4.3332	0.06 0.10 0.14
APXVTM14-ALU-I20	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	6.3424 6.7164 7.0974	3.6074 3.9666 4.3332	0.06 0.10 0.14
APXVTM14-ALU-I20	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	6.3424 6.7164 7.0974	3.6074 3.9666 4.3332	0.06 0.10 0.14
NNVV-65B-R4	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	12.2711 12.7660 13.2679	5.7500 6.2069 6.6713	0.08 0.15 0.23
NNVV-65B-R4	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	12.2711 12.7660 13.2679	5.7500 6.2069 6.6713	0.08 0.15 0.23
NNVV-65B-R4	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	12.2711 12.7660 13.2679	5.7500 6.2069 6.6713	0.08 0.15 0.23
PCS 1900MHZ 4X45W-65MHZ	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
PCS 1900MHZ 4X45W-65MHZ	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
PCS 1900MHZ 4X45W-65MHZ	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
(2) RRH2X50-800	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	1.7008 1.8640 2.0345	1.2822 1.4275 1.5803	0.05 0.07 0.09
(2) RRH2X50-800	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	1.7008 1.8640 2.0345	1.2822 1.4275 1.5803	0.05 0.07 0.09
(2) RRH2X50-800	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	1.7008 1.8640 2.0345	1.2822 1.4275 1.5803	0.05 0.07 0.09
TD-RRH8X20-25	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8X20-25	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
TD-RRH8X20-25	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	1" Ice	4.0455	1.5345	0.07
						No Ice	4.2975	1.7142	0.10
						1/2"	4.5570	1.9008	0.13
						Ice			
* Platform Mount [LP 301-1]	C	None		0.00	180.0000	1" Ice	30.1000	30.1000	1.59
						No Ice	40.8000	40.8000	2.03
						1/2"	51.5000	51.5000	2.47
						Ice			
161 ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	6.3292	5.6424	0.11
						No Ice	6.7751	6.4259	0.17
						1/2"	7.2137	7.1313	0.23
						Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	6.3292	5.6424	0.11
						No Ice	6.7751	6.4259	0.17
						1/2"	7.2137	7.1313	0.23
						Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	6.3292	5.6424	0.11
						No Ice	6.7751	6.4259	0.17
						1/2"	7.2137	7.1313	0.23
						Ice			
Ericsson Air 21 B4A B12P- B8P 4FT w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	7.8693	6.6765	0.15
						No Ice	8.3424	7.5134	0.21
						1/2"	8.8056	8.2518	0.29
						Ice			
Ericsson Air 21 B4A B12P- B8P 4FT w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	7.8693	6.6765	0.15
						No Ice	8.3424	7.5134	0.21
						1/2"	8.8056	8.2518	0.29
						Ice			
Ericsson Air 21 B4A B12P- B8P 4FT w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	7.8693	6.6765	0.15
						No Ice	8.3424	7.5134	0.21
						1/2"	8.8056	8.2518	0.29
						Ice			
KRY 112 144/2	A	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	0.4794	0.2317	0.01
						No Ice	0.5681	0.2994	0.01
						1/2"	0.6642	0.3763	0.02
						Ice			
KRY 112 144/2	B	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	0.4794	0.2317	0.01
						No Ice	0.5681	0.2994	0.01
						1/2"	0.6642	0.3763	0.02
						Ice			
KRY 112 144/2	C	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	0.4794	0.2317	0.01
						No Ice	0.5681	0.2994	0.01
						1/2"	0.6642	0.3763	0.02
						Ice			
RRUS 11 B12	A	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	2.8333	1.1821	0.05
						No Ice	3.0426	1.3299	0.07
						1/2"	3.2593	1.4848	0.10
						Ice			
RRUS 11 B12	B	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	2.8333	1.1821	0.05
						No Ice	3.0426	1.3299	0.07
						1/2"	3.2593	1.4848	0.10
						Ice			
RRUS 11 B12	C	From Leg	4.0000 0.00 0.00	0.00	161.0000	1" Ice	2.8333	1.1821	0.05
						No Ice	3.0426	1.3299	0.07
						1/2"	3.2593	1.4848	0.10
						Ice			
* Platform Mount [LP 305-1]	C	None		0.00	161.0000	1" Ice	18.0100	18.0100	1.12
						No Ice	23.3300	23.3300	1.35
						1/2"	28.6500	28.6500	1.58
						Ice			
6' x 2" Mount Pipe	A	From Leg	4.0000	0.00	161.0000	No Ice	1.4250	1.4250	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			0.00			1/2"	1.9250	1.9250	0.03
			0.00			Ice	2.2939	2.2939	0.05
6' x 2" Mount Pipe	B	From Leg	4.0000	0.00	161.0000	1" Ice	1.4250	1.4250	0.02
			0.00			No Ice	1.9250	1.9250	0.03
			0.00			1/2"	1.9250	1.9250	0.03
						Ice	2.2939	2.2939	0.05
6' x 2" Mount Pipe	C	From Leg	4.0000	0.00	161.0000	1" Ice	1.4250	1.4250	0.02
			0.00			No Ice	1.9250	1.9250	0.03
			0.00			1/2"	1.9250	1.9250	0.03
						Ice	2.2939	2.2939	0.05
						1" Ice			
147									
(2) LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.0000	0.00	147.0000	No Ice	8.4106	7.0817	0.06
			0.00			1/2"	8.9745	8.2729	0.13
			3.00			Ice	9.5048	9.1847	0.21
						1" Ice			
(2) LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.0000	0.00	147.0000	No Ice	8.4106	7.0817	0.06
			0.00			1/2"	8.9745	8.2729	0.13
			3.00			Ice	9.5048	9.1847	0.21
						1" Ice			
(2) LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.0000	0.00	147.0000	No Ice	8.4106	7.0817	0.06
			0.00			1/2"	8.9745	8.2729	0.13
			3.00			Ice	9.5048	9.1847	0.21
						1" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.0000	0.00	147.0000	No Ice	8.7655	6.9629	0.07
			0.00			1/2"	9.3417	8.1817	0.14
			3.00			Ice	9.8885	9.1436	0.21
						1" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.0000	0.00	147.0000	No Ice	8.7655	6.9629	0.07
			0.00			1/2"	9.3417	8.1817	0.14
			3.00			Ice	9.8885	9.1436	0.21
						1" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.0000	0.00	147.0000	No Ice	8.7655	6.9629	0.07
			0.00			1/2"	9.3417	8.1817	0.14
			3.00			Ice	9.8885	9.1436	0.21
						1" Ice			
KS24019-L112A	B	From Leg	4.0000	0.00	147.0000	No Ice	0.1407	0.1407	0.01
			0.00			1/2"	0.1979	0.1979	0.01
			3.00			Ice	0.2621	0.2621	0.01
						1" Ice			
(2) FD9R6004/1C-3L	A	From Leg	4.0000	0.00	147.0000	No Ice	0.3142	0.0762	0.00
			0.00			1/2"	0.3862	0.1189	0.00
			3.00			Ice	0.4656	0.1685	0.01
						1" Ice			
(2) FD9R6004/1C-3L	B	From Leg	4.0000	0.00	147.0000	No Ice	0.3142	0.0762	0.00
			0.00			1/2"	0.3862	0.1189	0.00
			3.00			Ice	0.4656	0.1685	0.01
						1" Ice			
(2) FD9R6004/1C-3L	C	From Leg	4.0000	0.00	147.0000	No Ice	0.3142	0.0762	0.00
			0.00			1/2"	0.3862	0.1189	0.00
			3.00			Ice	0.4656	0.1685	0.01
						1" Ice			
RRH2X60-AWS	A	From Leg	4.0000	0.00	147.0000	No Ice	3.5002	1.8157	0.06
			0.00			1/2"	3.7609	2.0519	0.08
			3.00			Ice	4.0285	2.2894	0.11
						1" Ice			
RRH2X60-AWS	B	From Leg	4.0000	0.00	147.0000	No Ice	3.5002	1.8157	0.06
			0.00			1/2"	3.7609	2.0519	0.08
			3.00			Ice	4.0285	2.2894	0.11
						1" Ice			
RRH2X60-AWS	C	From Leg	4.0000	0.00	147.0000	No Ice	3.5002	1.8157	0.06
			0.00			1/2"	3.7609	2.0519	0.08
			3.00			Ice	4.0285	2.2894	0.11
						1" Ice			
DB-T1-6Z-8AB-OZ	A	From Leg	4.0000	0.00	147.0000	No Ice	4.8000	2.0000	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K	
			0.00			1/2"	5.0704	2.1926	0.08
			3.00			Ice	5.3481	2.3926	0.12
DB-T1-6Z-8AB-0Z	B	From Leg	4.0000	0.00	147.0000	1" Ice	4.8000	2.0000	0.04
			0.00			No Ice	5.0704	2.1926	0.08
			3.00			Ice	5.3481	2.3926	0.12
RRH2X60-PCS	A	From Leg	4.0000	0.00	147.0000	1" Ice	2.2000	1.7233	0.06
			0.00			No Ice	2.3926	1.9015	0.08
			3.00			Ice	2.5926	2.0870	0.10
RRH2X60-PCS	B	From Leg	4.0000	0.00	147.0000	1" Ice	2.2000	1.7233	0.06
			0.00			No Ice	2.3926	1.9015	0.08
			3.00			Ice	2.5926	2.0870	0.10
RRH2X60-PCS	C	From Leg	4.0000	0.00	147.0000	1" Ice	2.2000	1.7233	0.06
			0.00			No Ice	2.3926	1.9015	0.08
			3.00			Ice	2.5926	2.0870	0.10
*						1" Ice			
Platform Mount [LP 712-1]	C	None		0.00	147.0000	No Ice	24.5300	24.5300	1.34
						1/2"	29.9400	29.9400	1.65
						Ice	35.3500	35.3500	1.96
						1" Ice			
141									
*									
Pipe Mount [PM 601-3]	C	None		0.00	141.0000	No Ice	4.3900	4.3900	0.20
						1/2"	5.4800	5.4800	0.24
						Ice	6.5700	6.5700	0.28
						1" Ice			
141 P									
RRUS 11	A	From Leg	1.0000	0.00	141.0000	No Ice	2.7845	1.1872	0.05
			0.00			1/2"	2.9919	1.3342	0.07
			0.00			Ice	3.2066	1.4897	0.10
						1" Ice			
RRUS 11	B	From Leg	1.0000	0.00	141.0000	No Ice	2.7845	1.1872	0.05
			0.00			1/2"	2.9919	1.3342	0.07
			0.00			Ice	3.2066	1.4897	0.10
						1" Ice			
RRUS 11	C	From Leg	1.0000	0.00	141.0000	No Ice	2.7845	1.1872	0.05
			0.00			1/2"	2.9919	1.3342	0.07
			0.00			Ice	3.2066	1.4897	0.10
						1" Ice			
140									
(2) 7770.00	A	From Leg	4.0000	0.00	140.0000	No Ice	5.5085	2.9282	0.04
			0.00			1/2"	5.8673	3.2730	0.07
			0.00			Ice	6.2332	3.6252	0.11
						1" Ice			
(2) 7770.00	B	From Leg	4.0000	0.00	140.0000	No Ice	5.5085	2.9282	0.04
			0.00			1/2"	5.8673	3.2730	0.07
			0.00			Ice	6.2332	3.6252	0.11
						1" Ice			
(2) 7770.00	C	From Leg	4.0000	0.00	140.0000	No Ice	5.5085	2.9282	0.04
			0.00			1/2"	5.8673	3.2730	0.07
			0.00			Ice	6.2332	3.6252	0.11
						1" Ice			
HPA-65R-BUU-H6	A	From Leg	4.0000	0.00	140.0000	No Ice	9.6578	6.4500	0.05
			0.00			1/2"	10.1285	6.9134	0.11
			0.00			Ice	10.6062	7.3843	0.18
						1" Ice			
HPA-65R-BUU-H6	B	From Leg	4.0000	0.00	140.0000	No Ice	9.6578	6.4500	0.05
			0.00			1/2"	10.1285	6.9134	0.11
			0.00			Ice	10.6062	7.3843	0.18
						1" Ice			
HPA-65R-BUU-H6	C	From Leg	4.0000	0.00	140.0000	No Ice	9.6578	6.4500	0.05

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustmen t °	Placement ft	C _{AA} Front	C _{AA} Side	Weight K
			Horz Lateral Vert ft ft ft				ft ²	ft ²	
(2) LGP 17201	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	10.1285	6.9134	0.11
						Ice	10.6062	7.3843	0.18
						1" Ice			
						No Ice	1.6680	0.4669	0.03
(2) LGP 17201	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	1.8289	0.5676	0.04
						Ice	1.9973	0.6752	0.06
						1" Ice			
						No Ice	1.6680	0.4669	0.03
(2) LGP 17201	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	1.8289	0.5676	0.04
						Ice	1.9973	0.6752	0.06
						1" Ice			
						No Ice	1.6680	0.4669	0.03
RRUS 32 B2	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	2.9531	1.8552	0.07
						Ice	3.1823	2.0493	0.10
						1" Ice			
						No Ice	2.7313	1.6681	0.05
RRUS 32 B2	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	2.9531	1.8552	0.07
						Ice	3.1823	2.0493	0.10
						1" Ice			
						No Ice	2.7313	1.6681	0.05
1001983	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.0861	0.2317	0.01
						Ice	0.1272	0.2950	0.01
						1" Ice			
						No Ice	0.0524	0.1757	0.00
1001983	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.0861	0.2317	0.01
						Ice	0.1272	0.2950	0.01
						1" Ice			
						No Ice	0.0524	0.1757	0.00
1001983	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.0861	0.2317	0.01
						Ice	0.1272	0.2950	0.01
						1" Ice			
						No Ice	0.0524	0.1757	0.00
(2) LGP21901	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.2941	0.2129	0.01
						Ice	0.3647	0.2756	0.01
						1" Ice			
						No Ice	0.2310	0.1575	0.01
(2) LGP21901	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.2941	0.2129	0.01
						Ice	0.3647	0.2756	0.01
						1" Ice			
						No Ice	0.2310	0.1575	0.01
(2) LGP21901	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.2941	0.2129	0.01
						Ice	0.3647	0.2756	0.01
						1" Ice			
						No Ice	0.2310	0.1575	0.01
*									
140 P									
EPBQ-654L8H6-L2	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	13.7443	5.4142	0.16
						Ice	14.2587	5.8761	0.23
						1" Ice			
						No Ice	13.2369	4.9596	0.08
EPBQ-654L8H6-L2	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	13.7443	5.4142	0.16
						Ice	14.2587	5.8761	0.23
						1" Ice			
						No Ice	13.2369	4.9596	0.08
EPBQ-654L8H6-L2	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	13.7443	5.4142	0.16
						Ice	14.2587	5.8761	0.23
						1" Ice			
						No Ice	13.2369	4.9596	0.08
(4) 7020.00	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	1/2"	0.1469	0.2393	0.01
						Ice	0.1991	0.3109	0.01
						1" Ice			
						No Ice	0.1021	0.1750	0.00

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft ²	ft ²	K	
(4) 7020.00	B	From Leg	4.0000		0.00	140.0000	No Ice	0.1021	0.1750	0.00
			0.00				1/2"	0.1469	0.2393	0.01
			0.00				Ice	0.1991	0.3109	0.01
(4) 7020.00	C	From Leg	4.0000		0.00	140.0000	No Ice	0.1021	0.1750	0.00
			0.00				1/2"	0.1469	0.2393	0.01
			0.00				Ice	0.1991	0.3109	0.01
RRUS 4478 B14	A	From Leg	4.0000		0.00	140.0000	No Ice	1.8425	1.0588	0.06
			0.00				1/2"	2.0123	1.1969	0.08
			0.00				Ice	2.1895	1.3425	0.09
RRUS 4478 B14	B	From Leg	4.0000		0.00	140.0000	No Ice	1.8425	1.0588	0.06
			0.00				1/2"	2.0123	1.1969	0.08
			0.00				Ice	2.1895	1.3425	0.09
RRUS 4478 B14	C	From Leg	4.0000		0.00	140.0000	No Ice	1.8425	1.0588	0.06
			0.00				1/2"	2.0123	1.1969	0.08
			0.00				Ice	2.1895	1.3425	0.09
RRUS 32	A	From Leg	4.0000		0.00	140.0000	No Ice	2.8571	1.7766	0.06
			0.00				1/2"	3.0830	1.9677	0.08
			0.00				Ice	3.3163	2.1658	0.10
RRUS 32	B	From Leg	4.0000		0.00	140.0000	No Ice	2.8571	1.7766	0.06
			0.00				1/2"	3.0830	1.9677	0.08
			0.00				Ice	3.3163	2.1658	0.10
RRUS 32	C	From Leg	4.0000		0.00	140.0000	No Ice	2.8571	1.7766	0.06
			0.00				1/2"	3.0830	1.9677	0.08
			0.00				Ice	3.3163	2.1658	0.10
RRUS 32 B2	A	From Leg	4.0000		0.00	140.0000	No Ice	2.7313	1.6681	0.05
			0.00				1/2"	2.9531	1.8552	0.07
			0.00				Ice	3.1823	2.0493	0.10
(2) DC6-48-60-18-8F	A	From Leg	4.0000		0.00	140.0000	No Ice	0.7915	0.7915	0.02
			0.00				1/2"	1.2743	1.2743	0.04
			0.00				Ice	1.4503	1.4503	0.05
Platform Mount [LP 1301-1]	C	None			0.00	140.0000	No Ice	51.7000	51.7000	2.26
							1/2"	62.7000	62.7000	2.94
							Ice	73.7000	73.7000	3.61
83 OG-860/1920/GPS-A	A	From Leg	3.0000		0.00	83.0000	No Ice	0.3077	0.3667	0.00
			0.00				1/2"	0.3952	0.4572	0.01
			1.00				Ice	0.4897	0.5548	0.01
OG-860/1920/GPS-A	B	From Leg	3.0000		0.00	83.0000	No Ice	0.3077	0.3667	0.00
			0.00				1/2"	0.3952	0.4572	0.01
			1.00				Ice	0.4897	0.5548	0.01
* Side Arm Mount [SO 701-1]	A	From Leg	1.5000		0.00	83.0000	No Ice	0.8500	1.6700	0.07
			0.00				1/2"	1.1400	2.3400	0.08
			0.00				Ice	1.4300	3.0100	0.09
Side Arm Mount [SO 701-1]	B	From Leg	1.5000		0.00	83.0000	No Ice	0.8500	1.6700	0.07
			0.00				1/2"	1.1400	2.3400	0.08
			0.00				Ice	1.4300	3.0100	0.09
78 OG-860/1920/GPS-A	B	From Leg	3.0000		0.00	78.0000	No Ice	0.3077	0.3667	0.00
			0.00				1/2"	0.3952	0.4572	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			1.00			Ice 1" Ice	0.4897 0.5548	0.01
* Side Arm Mount [SO 701-1]	B	From Leg	1.5000 0.00 0.00	0.00	78.0000	No Ice 1/2" Ice 1" Ice	0.8500 1.1400 1.4300 3.0100	0.07 0.08 0.09

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service

Comb. No.	Description
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Sectio n No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 131.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.47	-1.78	2.20
			Max. Mx	8	-14.44	-582.88	-0.40
			Max. My	2	-14.43	0.49	583.98
			Max. Vy	8	30.63	-582.88	-0.40
			Max. Vx	2	-30.70	0.49	583.98
			Max. Torque	11			0.76
L2	131.75 - 86.71	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-55.22	-3.03	3.98
			Max. Mx	8	-24.95	-2036.69	-2.72
			Max. My	2	-24.94	2.91	2041.02
			Max. Vy	8	35.48	-2036.69	-2.72
			Max. Vx	2	-35.55	2.91	2041.02
			Max. Torque	11			0.76
L3	86.71 - 43.16	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.30	-5.37	4.93
			Max. Mx	8	-39.70	-3653.84	-3.76
			Max. My	2	-39.70	3.56	3660.63
			Max. Vy	8	40.37	-3653.84	-3.76
			Max. Vx	2	-40.44	3.56	3660.63
			Max. Torque	13			1.25
L4	43.16 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-103.91	-7.24	5.79
			Max. Mx	8	-62.03	-5782.18	-4.35
			Max. My	2	-62.03	4.15	5792.40
			Max. Vy	8	44.65	-5782.18	-4.35
			Max. Vx	2	-44.72	4.15	5792.40
			Max. Torque	13			1.24

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	103.91	-0.01	11.85
	Max. H _x	21	46.56	44.59	0.02
	Max. H _z	3	46.56	0.02	44.66
	Max. M _x	2	5792.40	0.02	44.66
	Max. M _z	8	5782.18	-44.59	-0.02
	Max. Torsion	13	1.24	-22.31	-38.69
	Min. Vert	11	46.56	-38.63	-22.35
	Min. H _x	9	46.56	-44.59	-0.02
	Min. H _z	15	46.56	-0.02	-44.66
	Min. M _x	14	-5789.35	-0.02	-44.66
	Min. M _z	20	-5778.73	44.59	0.02
	Min. Torsion	25	-1.24	22.31	38.69

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	51.73	0.00	0.00	-1.21	-1.37	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	62.07	-0.02	-44.66	-5792.40	4.15	1.09
0.9 Dead+1.6 Wind 0 deg - No Ice	46.56	-0.02	-44.66	-5716.77	4.50	1.09
1.2 Dead+1.6 Wind 30 deg - No Ice	62.07	22.28	-38.67	-5013.69	-2886.86	0.65
0.9 Dead+1.6 Wind 30 deg - No Ice	46.56	22.28	-38.67	-4948.19	-2848.96	0.65
1.2 Dead+1.6 Wind 60 deg - No Ice	62.07	38.61	-22.31	-2891.92	-5004.83	0.03
0.9 Dead+1.6 Wind 60 deg - No Ice	46.56	38.61	-22.31	-2854.00	-4939.41	0.02
1.2 Dead+1.6 Wind 90 deg - No Ice	62.07	44.59	0.02	4.35	-5782.18	-0.60
0.9 Dead+1.6 Wind 90 deg - No Ice	46.56	44.59	0.02	4.65	-5706.64	-0.61
1.2 Dead+1.6 Wind 120 deg - No Ice	62.07	38.63	22.35	2899.01	-5010.64	-1.06
0.9 Dead+1.6 Wind 120 deg - No Ice	46.56	38.63	22.35	2861.71	-4945.12	-1.07
1.2 Dead+1.6 Wind 150 deg - No Ice	62.07	22.31	38.69	5016.44	-2897.00	-1.23
0.9 Dead+1.6 Wind 150 deg - No Ice	46.56	22.31	38.69	4951.65	-2858.92	-1.24
1.2 Dead+1.6 Wind 180 deg - No Ice	62.07	0.02	44.66	5789.35	-7.60	-1.07
0.9 Dead+1.6 Wind 180 deg - No Ice	46.56	0.02	44.66	5714.52	-7.05	-1.08
1.2 Dead+1.6 Wind 210 deg - No Ice	62.07	-22.28	38.67	5010.64	2883.41	-0.63
0.9 Dead+1.6 Wind 210 deg - No Ice	46.56	-22.28	38.67	4945.94	2846.41	-0.63
1.2 Dead+1.6 Wind 240 deg - No Ice	62.07	-38.61	22.31	2888.87	5001.38	-0.02
0.9 Dead+1.6 Wind 240 deg - No Ice	46.56	-38.61	22.31	2851.74	4936.86	-0.02
1.2 Dead+1.6 Wind 270 deg - No Ice	62.07	-44.59	-0.02	-7.41	5778.73	0.59
0.9 Dead+1.6 Wind 270 deg - No Ice	46.56	-44.59	-0.02	-6.90	5704.09	0.59
1.2 Dead+1.6 Wind 300 deg - No Ice	62.07	-38.63	-22.35	-2902.06	5007.18	1.05
0.9 Dead+1.6 Wind 300 deg - No Ice	46.56	-38.63	-22.35	-2863.96	4942.57	1.05
1.2 Dead+1.6 Wind 330 deg - No Ice	62.07	-22.31	-38.69	-5019.49	2893.55	1.23
0.9 Dead+1.6 Wind 330 deg - No Ice	46.56	-22.31	-38.69	-4953.90	2856.37	1.24
1.2 Dead+1.0 Ice+1.0 Temp	103.91	0.00	-0.00	-5.79	-7.24	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	103.91	0.01	-11.85	-1576.92	-7.06	0.31
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	103.91	5.93	-10.27	-1366.31	-791.71	0.19
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	103.91	10.26	-5.93	-791.14	-1366.20	0.02
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	103.91	11.84	-0.01	-5.58	-1576.57	-0.16
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	103.91	10.25	5.92	779.89	-1366.57	-0.29
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	103.91	5.92	10.26	1354.79	-792.34	-0.35
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	103.91	-0.01	11.85	1565.04	-7.80	-0.31
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	103.91	-5.93	10.27	1354.42	776.85	-0.19
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	103.91	-10.26	5.93	779.25	1351.35	-0.02
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	103.91	-11.84	0.01	-6.31	1561.72	0.16

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
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 330	103.91	-10.25	-5.92	-791.78	1351.71	0.29
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 330	103.91	-5.92	-10.26	-1366.68	777.48	0.35
deg+1.0 Ice+1.0 Temp Dead+Wind 0 deg - Service	51.73	-0.00	-8.81	-1137.36	-0.29	0.22
Dead+Wind 30 deg - Service	51.73	4.40	-7.63	-984.57	-567.46	0.13
Dead+Wind 60 deg - Service	51.73	7.62	-4.40	-568.32	-982.96	0.00
Dead+Wind 90 deg - Service	51.73	8.80	0.00	-0.12	-1135.47	-0.12
Dead+Wind 120 deg - Service	51.73	7.62	4.41	567.77	-984.11	-0.21
Dead+Wind 150 deg - Service	51.73	4.40	7.63	983.18	-569.45	-0.25
Dead+Wind 180 deg - Service	51.73	0.00	8.81	1134.81	-2.59	-0.22
Dead+Wind 210 deg - Service	51.73	-4.40	7.63	982.03	564.58	-0.13
Dead+Wind 240 deg - Service	51.73	-7.62	4.40	565.77	980.08	-0.00
Dead+Wind 270 deg - Service	51.73	-8.80	-0.00	-2.42	1132.59	0.12
Dead+Wind 300 deg - Service	51.73	-7.62	-4.41	-570.31	981.23	0.21
Dead+Wind 330 deg - Service	51.73	-4.40	-7.63	-985.73	566.57	0.25

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-51.73	0.00	0.00	51.73	0.00	0.000%
2	-0.02	-62.07	-44.66	0.02	62.07	44.66	0.000%
3	-0.02	-46.56	-44.66	0.02	46.56	44.66	0.000%
4	22.28	-62.07	-38.67	-22.28	62.07	38.67	0.000%
5	22.28	-46.56	-38.67	-22.28	46.56	38.67	0.000%
6	38.61	-62.07	-22.31	-38.61	62.07	22.31	0.000%
7	38.61	-46.56	-22.31	-38.61	46.56	22.31	0.000%
8	44.59	-62.07	0.02	-44.59	62.07	-0.02	0.000%
9	44.59	-46.56	0.02	-44.59	46.56	-0.02	0.000%
10	38.63	-62.07	22.35	-38.63	62.07	-22.35	0.000%
11	38.63	-46.56	22.35	-38.63	46.56	-22.35	0.000%
12	22.31	-62.07	38.69	-22.31	62.07	-38.69	0.000%
13	22.31	-46.56	38.69	-22.31	46.56	-38.69	0.000%
14	0.02	-62.07	44.66	-0.02	62.07	-44.66	0.000%
15	0.02	-46.56	44.66	-0.02	46.56	-44.66	0.000%
16	-22.28	-62.07	38.67	22.28	62.07	-38.67	0.000%
17	-22.28	-46.56	38.67	22.28	46.56	-38.67	0.000%
18	-38.61	-62.07	22.31	38.61	62.07	-22.31	0.000%
19	-38.61	-46.56	22.31	38.61	46.56	-22.31	0.000%
20	-44.59	-62.07	-0.02	44.59	62.07	0.02	0.000%
21	-44.59	-46.56	-0.02	44.59	46.56	0.02	0.000%
22	-38.63	-62.07	-22.35	38.63	62.07	22.35	0.000%
23	-38.63	-46.56	-22.35	38.63	46.56	22.35	0.000%
24	-22.31	-62.07	-38.69	22.31	62.07	38.69	0.000%
25	-22.31	-46.56	-38.69	22.31	46.56	38.69	0.000%
26	0.00	-103.91	0.00	-0.00	103.91	0.00	0.000%
27	0.01	-103.91	-11.85	-0.01	103.91	11.85	0.000%
28	5.93	-103.91	-10.27	-5.93	103.91	10.27	0.000%
29	10.26	-103.91	-5.93	-10.26	103.91	5.93	0.000%
30	11.84	-103.91	-0.01	-11.84	103.91	0.01	0.000%
31	10.25	-103.91	5.92	-10.25	103.91	-5.92	0.000%
32	5.92	-103.91	10.26	-5.92	103.91	-10.26	0.000%
33	-0.01	-103.91	11.85	0.01	103.91	-11.85	0.000%
34	-5.93	-103.91	10.27	5.93	103.91	-10.27	0.000%
35	-10.26	-103.91	5.93	10.26	103.91	-5.93	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
36	-11.84	-103.91	0.01	11.84	103.91	-0.01	0.000%
37	-10.25	-103.91	-5.92	10.25	103.91	5.92	0.000%
38	-5.92	-103.91	-10.26	5.92	103.91	10.26	0.000%
39	-0.00	-51.73	-8.81	0.00	51.73	8.81	0.000%
40	4.40	-51.73	-7.63	-4.40	51.73	7.63	0.000%
41	7.62	-51.73	-4.40	-7.62	51.73	4.40	0.000%
42	8.80	-51.73	0.00	-8.80	51.73	-0.00	0.000%
43	7.62	-51.73	4.41	-7.62	51.73	-4.41	0.000%
44	4.40	-51.73	7.63	-4.40	51.73	-7.63	0.000%
45	0.00	-51.73	8.81	-0.00	51.73	-8.81	0.000%
46	-4.40	-51.73	7.63	4.40	51.73	-7.63	0.000%
47	-7.62	-51.73	4.40	7.62	51.73	-4.40	0.000%
48	-8.80	-51.73	-0.00	8.80	51.73	0.00	0.000%
49	-7.62	-51.73	-4.41	7.62	51.73	4.41	0.000%
50	-4.40	-51.73	-7.63	4.40	51.73	7.63	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00002850
3	Yes	4	0.00000001	0.00040709
4	Yes	6	0.00000001	0.00016019
5	Yes	6	0.00000001	0.00004489
6	Yes	6	0.00000001	0.00015982
7	Yes	6	0.00000001	0.00004477
8	Yes	5	0.00000001	0.00002234
9	Yes	4	0.00000001	0.00035870
10	Yes	6	0.00000001	0.00015878
11	Yes	6	0.00000001	0.00004432
12	Yes	6	0.00000001	0.00016145
13	Yes	6	0.00000001	0.00004523
14	Yes	5	0.00000001	0.00004626
15	Yes	4	0.00000001	0.00056218
16	Yes	6	0.00000001	0.00015893
17	Yes	6	0.00000001	0.00004451
18	Yes	6	0.00000001	0.00015925
19	Yes	6	0.00000001	0.00004462
20	Yes	5	0.00000001	0.00003936
21	Yes	4	0.00000001	0.00049735
22	Yes	6	0.00000001	0.00016130
23	Yes	6	0.00000001	0.00004519
24	Yes	6	0.00000001	0.00015870
25	Yes	6	0.00000001	0.00004428
26	Yes	4	0.00000001	0.00005201
27	Yes	5	0.00000001	0.00079492
28	Yes	6	0.00000001	0.00017081
29	Yes	6	0.00000001	0.00017058
30	Yes	5	0.00000001	0.00079377
31	Yes	6	0.00000001	0.00016752
32	Yes	6	0.00000001	0.00016930
33	Yes	5	0.00000001	0.00078596
34	Yes	6	0.00000001	0.00016522
35	Yes	6	0.00000001	0.00016532
36	Yes	5	0.00000001	0.00078496
37	Yes	6	0.00000001	0.00016922
38	Yes	6	0.00000001	0.00016757
39	Yes	4	0.00000001	0.00008080
40	Yes	4	0.00000001	0.00067351
41	Yes	4	0.00000001	0.00066865
42	Yes	4	0.00000001	0.00007834
43	Yes	4	0.00000001	0.00065207
44	Yes	4	0.00000001	0.00068580
45	Yes	4	0.00000001	0.00008186

46	Yes	4	0.00000001	0.00065171
47	Yes	4	0.00000001	0.00065520
48	Yes	4	0.00000001	0.00007915
49	Yes	4	0.00000001	0.00068388
50	Yes	4	0.00000001	0.00065150

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	180 - 131.75 (1)	TP31.39x21x0.25	48.250 0	0.0000	0.0	23.940 7	-14.42	1686.69	0.009
L2	131.75 - 86.71 (2)	TP40.46x29.921x0.375	49.540 0	0.0000	0.0	46.298 3	-24.94	3408.11	0.007
L3	86.71 - 43.16 (3)	TP48.96x38.5229x0.4375	49.130 0	0.0000	0.0	65.411 9	-39.70	4767.07	0.008
L4	43.16 - 0 (4)	TP57.25x46.668x0.5	49.830 0	0.0000	0.0	90.062 2	-62.03	6465.70	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	180 - 131.75 (1)	TP31.39x21x0.25	584.20	1046.01	0.559	0.00	1046.01	0.000
L2	131.75 - 86.71 (2)	TP40.46x29.921x0.375	2042.62	2721.23	0.751	0.00	2721.23	0.000
L3	86.71 - 43.16 (3)	TP48.96x38.5229x0.4375	3662.27	4611.06	0.794	0.00	4611.06	0.000
L4	43.16 - 0 (4)	TP57.25x46.668x0.5	5793.78	7538.14	0.769	0.00	7538.14	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	180 - 131.75 (1)	TP31.39x21x0.25	30.74	843.35	0.036	0.69	2097.19	0.000
L2	131.75 - 86.71 (2)	TP40.46x29.921x0.375	35.59	1704.05	0.021	0.68	5457.03	0.000
L3	86.71 - 43.16 (3)	TP48.96x38.5229x0.4375	40.44	2383.53	0.017	1.24	9246.33	0.000
L4	43.16 - 0 (4)	TP57.25x46.668x0.5	44.71	3232.85	0.014	1.23	15114.75	0.000

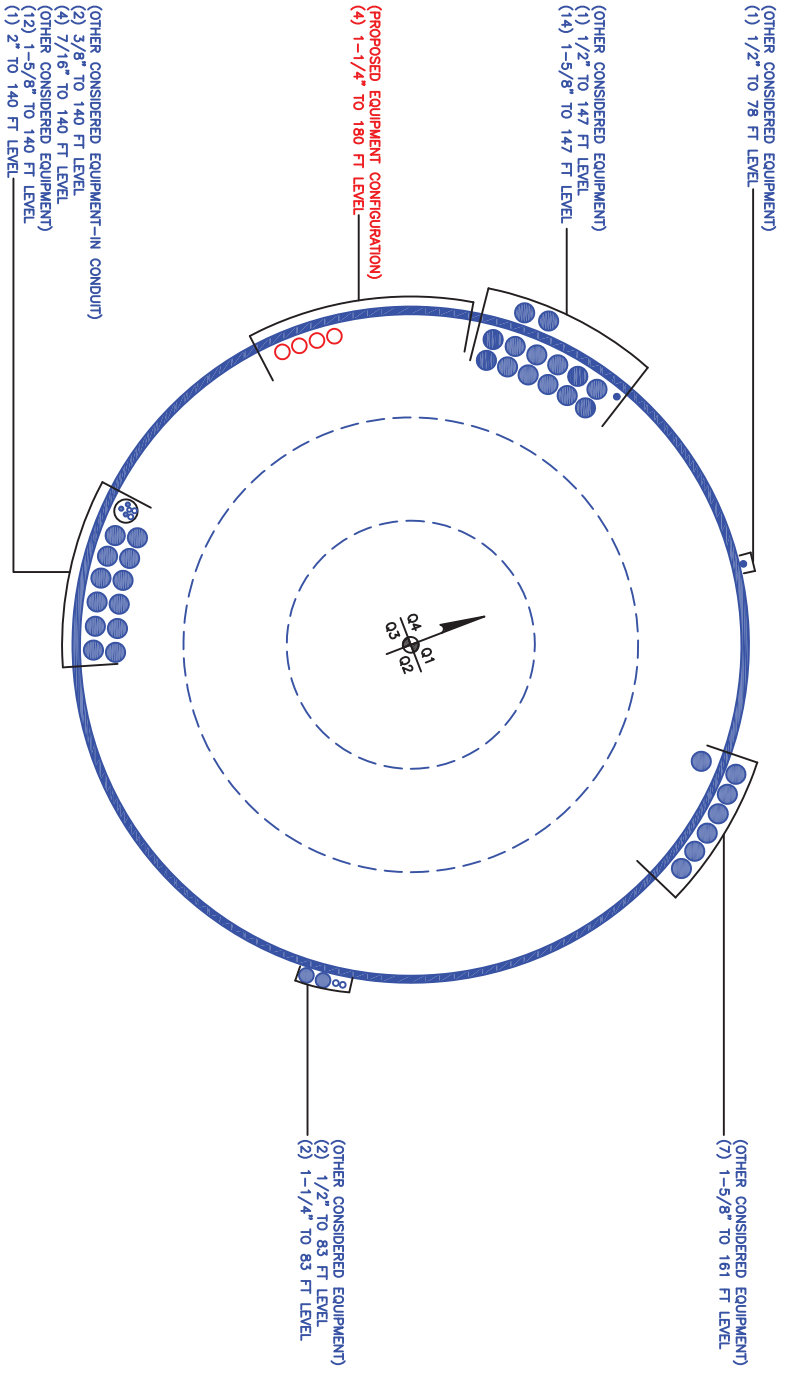
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		ϕP_n	ϕM_{nx}	ϕM_{ny}	ϕV_n	ϕT_n			
L1	180 - 131.75 (1)	0.009	0.559	0.000	0.036	0.000	0.568	1.000	4.8.2
L2	131.75 - 86.71 (2)	0.007	0.751	0.000	0.021	0.000	0.758	1.000	4.8.2
L3	86.71 - 43.16 (3)	0.008	0.794	0.000	0.017	0.000	0.803	1.000	4.8.2
L4	43.16 - 0 (4)	0.010	0.769	0.000	0.014	0.000	0.778	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	180 - 131.75	Pole	TP31.39x21x0.25	1	-14.42	1686.69	56.8	Pass	
L2	131.75 - 86.71	Pole	TP40.46x29.921x0.375	2	-24.94	3408.11	75.8	Pass	
L3	86.71 - 43.16	Pole	TP48.96x38.5229x0.4375	3	-39.70	4767.07	80.3	Pass	
L4	43.16 - 0	Pole	TP57.25x46.668x0.5	4	-62.03	6465.70	77.8	Pass	
							Summary		
							Pole (L3)	80.3	Pass
							RATING =	80.3	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

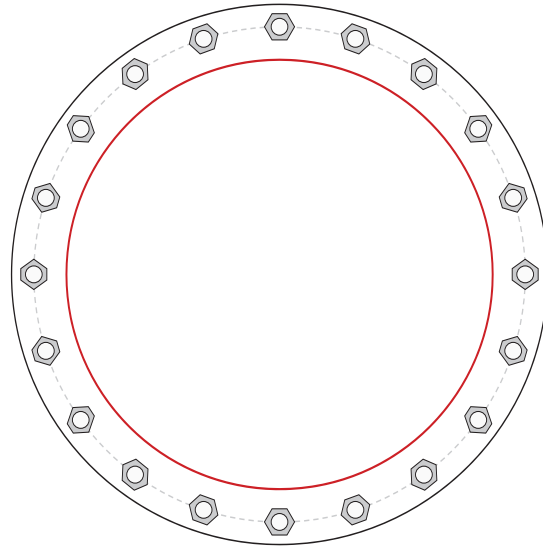
Monopole Base Plate Connection



Site Info	
BU #	876391
Site Name	COLUMBIA / DEOJAY
Order #	438436 Rev. 0

Analysis Considerations	
TIA-222 Revision	G
Grout Considered:	No
I_{ar} (in)	0.5
Eta Factor, η	0.5

Applied Loads	
Moment (kip-ft)	5793.78
Axial Force (kips)	62.03
Shear Force (kips)	44.71



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data	
(20) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 66" BC	
Base Plate Data	
72" OD x 2.25" Plate (A572-60; $F_y=60$ ksi, $F_u=75$ ksi)	
Stiffener Data	
N/A	
Pole Data	
57.25" x 0.5" 18-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)	

Anchor Rod Summary		
$Pu_c = 213.68$	$\phi Pn_t = 260$	Stress Rating
$Vu = 2.24$	$\phi Vn = n/a$	83.9%
$Mu = n/a$	$\phi Mn = n/a$	Pass
Base Plate Summary		
Max Stress (ksi):	49.5	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	91.7%	Pass

Pier and Pad Foundation



BU # : 876391
Site Name: COLUMBIA / DEO.
App. Number: 438436 Rev. 0

TIA-222 Revision: G
Tower Type: Monopole

Block Foundation?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	62	kips
Base Shear, V_{u_comp} :	45	kips
Moment, M_u :	5794	ft-kips
Tower Height, H :	180	ft
BP Dist. Above Fdn, bp_{dist} :	2.75	in

Foundation Analysis Checks				
	Capacity	Demand	Rating	Check
<i>Lateral (Sliding) (kips)</i>	229.53	45.00	19.6%	Pass
<i>Bearing Pressure (ksf)</i>	9.00	5.32	59.2%	Pass
<i>Overtuning (kip*ft)</i>	6585.30	6164.31	93.6%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	6302.39	6019.00	95.5%	Pass
<i>Pier Compression (kip)</i>	31187.52	106.10	0.3%	Pass
<i>Pad Flexure (kip*ft)</i>	4775.11	3637.54	76.2%	Pass
<i>Pad Shear - 1-way (kips)</i>	926.68	409.04	44.1%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.190	0.000	0.0%	Pass

Pier Properties		
Pier Shape:	Square	
Pier Diameter, $dpier$:	7	ft
Ext. Above Grade, E :	1	ft
Pier Rebar Size, S_c :	9	
Pier Rebar Quantity, mc :	39	
Pier Tie/Spiral Size, St :	4	
Pier Tie/Spiral Quantity, mt :	6	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Soil Rating:	93.6%
Structural Rating:	95.5%

Pad Properties		
Depth, D :	7	ft
Pad Width, W :	26	ft
Pad Thickness, T :	3	ft
Pad Rebar Size, Sp :	9	
Pad Rebar Quantity, mp :	35	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties		
Rebar Grade, F_y :	60000	psi
Concrete Compressive Strength, F'_c :	4000	psi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	100	pcf
Ultimate Gross Bearing, Q_{ult} :	12.000	ksf
Cohesion, C_u :		ksf
Friction Angle, ϕ :	30	degrees
SPT Blow Count, N_{blows} :	20	
Base Friction, μ :		
Neglected Depth, N :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	5	ft

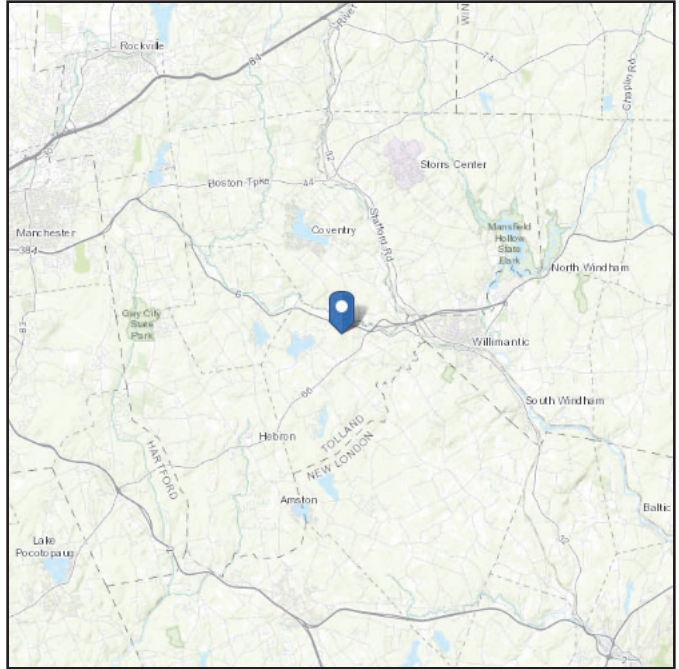
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ASCE 7 Hazards Report

Address:
No Address at This
Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 560.51 ft (NAVD 88)
Latitude: 41.717622
Longitude: -72.299747

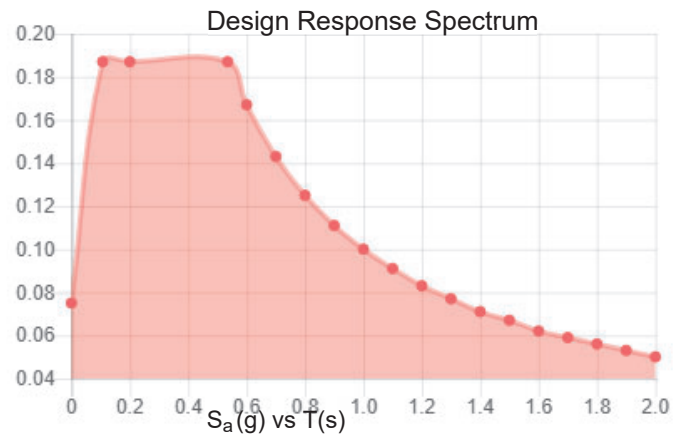
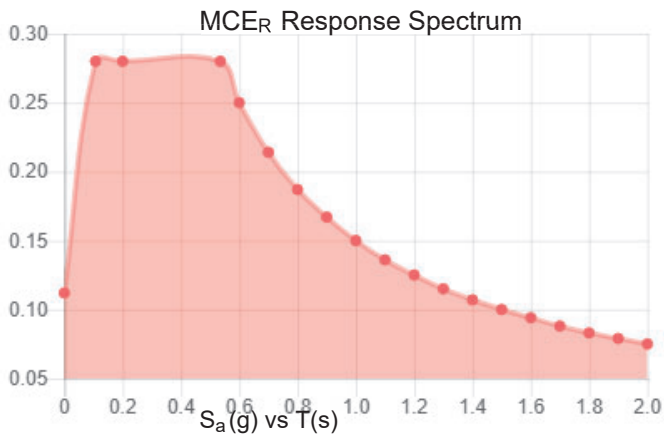


Site Soil Class: D - Stiff Soil

Results:

S_S :	0.175	S_{DS} :	0.187
S_1 :	0.062	S_{D1} :	0.100
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.088
S_{MS} :	0.280	PGA _M :	0.140
S_{M1} :	0.150	F _{PGA} :	1.600
		I_e :	1

Seismic Design Category B



Data Accessed:

Thu Nov 01 2018

Date Source:

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

Ice

Results:

Ice Thickness: 0.75 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Thu Nov 01 2018

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

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

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