



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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VIA ELECTRONIC MAIL

May 22, 2018

Anne Marie Zsamba, Esq.
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-SPRINT-020-180502** - Sprint notice of intent to modify an existing telecommunications facility located at 12 Nepaug Road, Burlington, Connecticut.

Dear Attorney Zsamba:

The Connecticut Siting Council (Council) is in receipt of your email correspondence of May 22, 2018 submitted in response to the Council's May 15, 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

MB/FOC/jmb



From: Zsamba, Anne Marie (Contractor)
[mailto:AnneMarie.Zsamba.Contractor@crowncastle.com]
Sent: Tuesday, May 22, 2018 9:30 AM
To: Fontaine, Lisa <Lisa.Fontaine@ct.gov>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: RE: 2nd Incomplete Letter for EM-SPRINT-020-180502 Nepaug Road

Please see the attached correspondence. Hard copy to follow via Fedex. Thank you.

ANNE MARIE ZSAMBA
Real Estate Specialist
T: (201) 236-9224 | M: (518) 350-3639

CROWN CASTLE
3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065
CrownCastle.com

Date: **May 18, 2018**

Chanhdara Ratsavong
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation: **Sprint PCS Co-Locate**
Carrier Site Number: CT54XC708
Carrier Site Name: BURLINGTON-NEPAUG ROAD

Crown Castle Designation: **Crown Castle BU Number:** 845993
Crown Castle Site Name: BURLINGTON-NEPAUG ROAD
Crown Castle JDE Job Number: 474268
Crown Castle Work Order Number: 1576415
Crown Castle Order Number: 418450 Rev. 1

Engineering Firm Designation: **Crown Castle Project Number:** 1576415

Site Data: **12 NEPAUG ROAD, BURLINGTON, Hartford County, CT**
Latitude 41° 46' 56.86", Longitude -72° 59' 22.68"
120 Foot - Monopole Tower

Dear Chanhdara Ratsavong,

Crown Castle 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 1576415, in accordance with order 418450, 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:

LC7: Existing + Reserved + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

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

We at *Crown Castle* 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.

Structural analysis prepared by: Rohit R. Soni / VDL

Respectfully submitted by:

Maham Barimani, P.E.
Senior Project Engineer

tnxTower Report - version 7.0.5.1



05-18-2018

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1) INTRODUCTION

This tower is a 120 ft Monopole tower mapped by FDH Velocitel. In February of 2016. The original design standard and wind speed are unavailable.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 93 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category B.

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
109.0	110.0	3	alcatel lucent	PCS 1900MHZ 4X45W 65MHZ	3 1	1-1/4 7/8	-
		6	alcatel lucent	RRH2X50-800			
		3	alcatel lucent	TD-RRH8X20-25			
		3	kmw communications	ETCR-654L12H6 w/ Mount Pipe			
	109.0	1	sitepro1	PRK-1245			

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
119.0	119.0	3	ericsson	RRUS-11	12 2 2	1-5/8 7/8 1/2	1
		1	gps	GPS_A			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		6	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 1201-1]			
109.0	109.0	6	andrew	950F85T2E-M w/ Mount Pipe	6	1-5/8	3
		1	tower mounts	Platform Mount [LP 1201-1]	-	-	1
99.0	99.0	3	alcatel lucent	RRH2x60-700	2	1-5/8	2
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	commscope	JAHH-65B-R3B			
		3	nokia	AIRSCALE RRH 4T4R B5 160W			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	tower mounts	Platform Mount [LP 1301-1]			
		6	antel	LPA-80080/4CF			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
88.0	90.0	3	commscope	LNx-6515DS-A1M w/ Mount Pipe	7	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
	88.0	1	tower mounts	T-Arm Mount [TA 602-3]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment To Be Removed; Not Considered In This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
<i>Information Not Available</i>						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Jaworski Geotech, Inc.	4551029	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH	6171674	CCISITES
4-TOWER MANUFACTURER DRAWINGS	FDH (Mapping)	6172249	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	URS	5072131	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 97	Pole	TP28.93x22.69x0.1875	1	-8.97	1079.70	18.3	Pass
L2	97 - 48	Pole	TP39.7x27.5729x0.25	2	-21.60	1957.24	58.4	Pass
L3	48 - 0	Pole	TP51.04x38.0569x0.3125	3	-34.00	3154.51	59.7	Pass
							Summary	
						Pole (L3)	59.7	Pass
						Rating =	59.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	52.0	Pass
1	Base Plate	0	68.0	Pass
1	Base Foundation (Structural)	0	51.1	Pass
1	Base Foundation (Soil Interaction)	0	44.2	Pass

Structure Rating (max from all components) =	68.0%
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Notes:

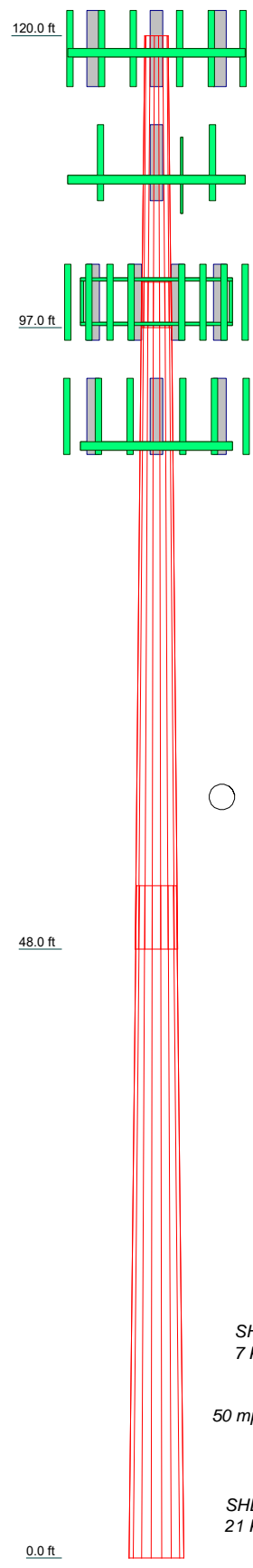
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

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
Length (ft)	23.00	52.62	52.96
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.3125
Socket Length (ft)	3.62	4.96	
Top Dia (in)	22.6900	27.5729	38.0569
Bot Dia (in)	28.9300	39.7000	51.0400
Grade		A572-65	
Weight (K)	1.2	4.7	7.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	119	(3) 6' x 2" Mount Pipe	109
(2) 7770.00 w/ Mount Pipe	119	(3) 6' x 2" Mount Pipe	109
(2) 7770.00 w/ Mount Pipe	119	(3) 6' x 2" Mount Pipe	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	Platform Mount [LP 1201-1]	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	Miscellaneous [NA 509-3]	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(2) LPA-80080/4CF	99
GPS_A	119	(2) LPA-80080/4CF	99
(2) LGP21401	119	(2) LPA-80080/4CF	99
(2) LGP21401	119	(2) JAHH-65B-R3B	99
(2) LGP21401	119	(2) JAHH-65B-R3B	99
DC6-48-60-18-8F	119	RRH2x60-700	99
(2) LGP13519	119	RRH2x60-700	99
(2) LGP13519	119	RRH2x60-700	99
(2) LGP13519	119	RRH4X45-AWS4 B66	99
(2) LGP13519	119	RRH4X45-AWS4 B66	99
RRUS-11	119	RRH4X45-AWS4 B66	99
RRUS-11	119	AIRSCALE RRH 4T4R B5 160W	99
RRUS-11	119	AIRSCALE RRH 4T4R B5 160W	99
6' x 2" Mount Pipe	119	AIRSCALE RRH 4T4R B5 160W	99
6' x 2" Mount Pipe	119	(2) DB-T1-6Z-8AB-0Z	99
4' x 3" Pipe Mount	119	Platform Mount [LP 1301-1]	99
4' x 3" Pipe Mount	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
4' x 3" Pipe Mount	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
Platform Mount [LP 1201-1]	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
ETCR-654L 12H6 w/ Mount Pipe	109	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
ETCR-654L 12H6 w/ Mount Pipe	109	LNX-6515DS-A1M w/ Mount Pipe	88
ETCR-654L 12H6 w/ Mount Pipe	109	LNX-6515DS-A1M w/ Mount Pipe	88
(2) RRH2X50-800	109	LNX-6515DS-A1M w/ Mount Pipe	88
(2) RRH2X50-800	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
(2) RRH2X50-800	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
TD-RRH8X20-25	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
TD-RRH8X20-25	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
TD-RRH8X20-25	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
PCS 1900MHZ 4X45W 65MHZ	109	T-Arm Mount [TA 602-3]	88
PCS 1900MHZ 4X45W 65MHZ	109		
PCS 1900MHZ 4X45W 65MHZ	109		

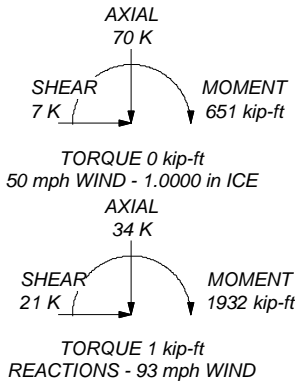
MATERIAL STRENGTH


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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 59.7%

ALL REACTIONS ARE FACTORED





CROWN CASTLE
The Pathway to Possible

Crown Castle
2000 Corporate Dr.
Canonsburg, PA 15317
Phone: (724) 416 - 2000
FAX:

Job: **BU 845993**

Project:	Client: Crown Castle USA, Inc.	Drawn by: vlarson	App'd:
Code: TIA-222-G	Date: 05/18/18	Scale: NTS	
Path:			Dwg No. E-1

Tower Input Data

There is a pole section.

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

The following design criteria apply:

- 4) Tower is located in Hartford County, Connecticut.
- 5) Basic wind speed of 93 mph.
- 6) Structure Class II.
- 7) Exposure Category B.
- 8) Topographic Category 1.
- 9) Crest Height 0.00 ft.
- 10) Nominal ice thickness of 1.0000 in.
- 11) Ice thickness is considered to increase with height.
- 12) Ice density of 56 pcf.
- 13) A wind speed of 50 mph is used in combination with ice.
- 14) Temperature drop of 50 °F.
- 15) Deflections calculated using a wind speed of 60 mph.
- 16) A non-linear (P-delta) analysis was used.
- 17) Pressures are calculated at each section.
- 18) Stress ratio used in pole design is 1.
- 19) 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 | 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 |
|--|--|---|

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	120.00-97.00	23.00	3.62	18	22.6900	28.9300	0.1875	0.7500	A572-65 (65 ksi)
L2	97.00-48.00	52.62	4.96	18	27.5729	39.7000	0.2500	1.0000	A572-65 (65 ksi)
L3	48.00-0.00	52.96		18	38.0569	51.0400	0.3125	1.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	23.0400	13.3918	856.7181	7.9884	11.5265	74.3258	1714.5635	6.6972	3.6634	19.538
	29.3763	17.1054	1785.3331	10.2036	14.6964	121.4807	3573.0155	8.5543	4.7617	25.396
L2	28.8454	21.6807	2044.8606	9.6996	14.0070	145.9882	4092.4119	10.8424	4.4128	17.651
	40.3124	31.3036	6154.9624	14.0048	20.1676	305.1906	12318.023	15.6548	6.5472	26.189
L3	39.8787	37.4377	6738.3194	13.3993	19.3329	348.5416	13485.505	18.7224	6.1480	19.674
	51.8274	50.3153	16357.795	18.0083	25.9283	630.8853	32737.114	25.1625	8.4330	26.986

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 120.00-97.00				1	1	1			
L2 97.00-48.00				1	1	1			
L3 48.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	Number Per Row	Clear Spacing	Width or Diameter	Perimeter	Weight
				ft			in	r in	r in	plf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C _A A _A	Weight
				ft		ft ² /ft	plf
119							
LDF4-50A(1/2)	A	No	Inside Pole	119.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.15
LDF5-50A(7/8)	A	No	Inside Pole	119.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.33
LDF7-50A(1-5/8)	A	No	Inside Pole	119.00 - 4.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.82
109 P							
HB114-08U3M12-XXXF(7/8)	A	No	Inside Pole	109.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.68
HB114-1-08U4-M5F(1-1/4)	A	No	Inside Pole	109.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 1.30
*** 99 R***							
LDF7-50A(1-5/8)	C	No	Inside Pole	99.00 - 4.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	99.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 1.30

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _{AA} A _{AA} ft ² /ft	Weight plf
88 LDF7-50A(1-5/8)	B	No	Inside Pole	88.00 - 4.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	B	No	Inside Pole	88.00 - 4.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} A _{AA} In Face ft ²	C _{AA} A _{AA} Out Face ft ²	Weight K
L1	120.00-97.00	A	0.000	0.000	0.000	0.000	0.29
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.02
L2	97.00-48.00	A	0.000	0.000	0.000	0.000	0.75
		B	0.000	0.000	0.000	0.000	0.24
		C	0.000	0.000	0.000	0.000	0.37
L3	48.00-0.00	A	0.000	0.000	0.000	0.000	0.70
		B	0.000	0.000	0.000	0.000	0.26
		C	0.000	0.000	0.000	0.000	0.33

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} A _{AA} In Face ft ²	C _{AA} A _{AA} Out Face ft ²	Weight K
L1	120.00-97.00	A	2.252	0.000	0.000	0.000	0.000	0.29
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.02
L2	97.00-48.00	A	2.162	0.000	0.000	0.000	0.000	0.75
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.37
L3	48.00-0.00	A	1.931	0.000	0.000	0.000	0.000	0.70
		B		0.000	0.000	0.000	0.000	0.26
		C		0.000	0.000	0.000	0.000	0.33

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
L1	120.00-97.00	0.0000	0.0000	0.0000	0.0000
L2	97.00-48.00	0.0000	0.0000	0.0000	0.0000
L3	48.00-0.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice

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	
119									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
GPS_A	A	From Leg	4.00	0.0000	119.00	No Ice	0.26	0.26	0.00
			0.00			1/2"	0.32	0.32	0.00
			0.00			Ice	0.39	0.39	0.01
(2) LGP21401	A	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
(2) LGP21401	B	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
(2) LGP21401	C	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
DC6-48-60-18-8F	A	From Leg	4.00	0.0000	119.00	No Ice	0.79	0.79	0.02
			0.00			1/2"	1.27	1.27	0.04
			0.00			Ice	1.45	1.45	0.05
(2) LGP13519	A	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
(2) LGP13519	B	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
(2) LGP13519	C	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
RRUS-11	A	From Leg	1.00	0.0000	119.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			0.00			Ice	3.21	1.49	0.09
RRUS-11	B	From Leg	1.00	0.0000	119.00	No Ice	2.78	1.19	0.05

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						ft
			0.00				1/2"	2.99	1.33	0.07
			0.00				Ice	3.21	1.49	0.09
RRUS-11	C	From Leg	1.00		0.0000	119.00	1" Ice	2.78	1.19	0.05
			0.00				No Ice	2.99	1.33	0.07
			0.00				1/2"	3.21	1.49	0.09
			0.00				Ice			
6' x 2" Mount Pipe	A	From Leg	4.00		0.0000	119.00	1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				1/2"	2.29	2.29	0.05
			0.00				Ice			
6' x 2" Mount Pipe	B	From Leg	4.00		0.0000	119.00	1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				1/2"	2.29	2.29	0.05
			0.00				Ice			
6' x 2" Mount Pipe	C	From Leg	4.00		0.0000	119.00	1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				1/2"	2.29	2.29	0.05
			0.00				Ice			
4' x 3" Pipe Mount	A	From Leg	0.50		0.0000	119.00	1" Ice	1.00	1.00	0.03
			0.00				No Ice	1.25	1.25	0.04
			0.00				1/2"	1.50	1.50	0.05
			0.00				Ice			
4' x 3" Pipe Mount	B	From Leg	0.50		0.0000	119.00	1" Ice	1.00	1.00	0.03
			0.00				No Ice	1.25	1.25	0.04
			0.00				1/2"	1.50	1.50	0.05
			0.00				Ice			
4' x 3" Pipe Mount	C	From Leg	0.50		0.0000	119.00	1" Ice	1.00	1.00	0.03
			0.00				No Ice	1.25	1.25	0.04
			0.00				1/2"	1.50	1.50	0.05
			0.00				Ice			
Platform Mount [LP 1201-1]	B	None			0.0000	119.00	1" Ice	23.10	23.10	2.10
							No Ice	26.80	26.80	2.50
							1/2"	30.50	30.50	2.90
							Ice			
							1" Ice			
*** 109 P ***										
ETCR-654L12H6 w/ Mount Pipe	A	From Leg	4.00		0.0000	109.00	No Ice	13.27	6.54	0.10
			0.00				1/2"	13.88	7.71	0.19
			1.00				Ice	14.45	8.61	0.29
			1.00				1" Ice			
ETCR-654L12H6 w/ Mount Pipe	B	From Leg	4.00		0.0000	109.00	No Ice	13.27	6.54	0.10
			0.00				1/2"	13.88	7.71	0.19
			1.00				Ice	14.45	8.61	0.29
			1.00				1" Ice			
ETCR-654L12H6 w/ Mount Pipe	C	From Leg	4.00		0.0000	109.00	No Ice	13.27	6.54	0.10
			0.00				1/2"	13.88	7.71	0.19
			1.00				Ice	14.45	8.61	0.29
			1.00				1" Ice			
(2) RRH2X50-800	A	From Leg	4.00		0.0000	109.00	No Ice	1.70	1.28	0.05
			0.00				1/2"	1.86	1.43	0.07
			1.00				Ice	2.03	1.58	0.09
			1.00				1" Ice			
(2) RRH2X50-800	B	From Leg	4.00		0.0000	109.00	No Ice	1.70	1.28	0.05
			0.00				1/2"	1.86	1.43	0.07
			1.00				Ice	2.03	1.58	0.09
			1.00				1" Ice			
(2) RRH2X50-800	C	From Leg	4.00		0.0000	109.00	No Ice	1.70	1.28	0.05
			0.00				1/2"	1.86	1.43	0.07
			1.00				Ice	2.03	1.58	0.09
			1.00				1" Ice			
TD-RRH8X20-25	A	From Leg	4.00		0.0000	109.00	No Ice	4.05	1.53	0.07
			0.00				1/2"	4.30	1.71	0.10
			1.00				Ice	4.56	1.90	0.13
			1.00				1" Ice			
TD-RRH8X20-25	B	From Leg	4.00		0.0000	109.00	No Ice	4.05	1.53	0.07

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	CAAA	CAAA	Weight
			Horz	Lateral	Vert			Front	Side	
			ft	ft	ft	ft	ft ²	ft ²	K	
			0.00				1/2"	4.30	1.71	0.10
			1.00				Ice	4.56	1.90	0.13
TD-RRH8X20-25	C	From Leg	4.00	0.0000	109.00		1" Ice	4.05	1.53	0.07
			0.00				No Ice	4.30	1.71	0.10
			1.00				Ice	4.56	1.90	0.13
PCS 1900MHZ 4X45W 65MHZ	A	From Leg	4.00	0.0000	109.00		1" Ice	2.31	2.23	0.06
			0.00				No Ice	2.52	2.43	0.08
			1.00				Ice	2.73	2.64	0.11
PCS 1900MHZ 4X45W 65MHZ	B	From Leg	4.00	0.0000	109.00		1" Ice	2.31	2.23	0.06
			0.00				No Ice	2.52	2.43	0.08
			1.00				Ice	2.73	2.64	0.11
PCS 1900MHZ 4X45W 65MHZ	C	From Leg	4.00	0.0000	109.00		1" Ice	2.31	2.23	0.06
			0.00				No Ice	2.52	2.43	0.08
			1.00				Ice	2.73	2.64	0.11
(3) 6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	109.00		1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
(3) 6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	109.00		1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
(3) 6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	109.00		1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
Platform Mount [LP 1201-1]	B	None		0.0000	109.00		1" Ice	23.10	23.10	2.10
							No Ice	26.80	26.80	2.50
							Ice	30.50	30.50	2.90
Miscellaneous [NA 509-3]	B	None		0.0000	109.00		1" Ice	11.84	11.84	0.28
							No Ice	16.96	16.96	0.30
							Ice	22.08	22.08	0.32
*** 99 R ***							1" Ice			
(2) LPA-80080/4CF	A	From Leg	4.00	0.0000	99.00		No Ice	2.62	5.40	0.01
			0.00				1/2"	2.92	5.73	0.05
			0.00				Ice	3.23	6.06	0.08
(2) LPA-80080/4CF	B	From Leg	4.00	0.0000	99.00		1" Ice	2.62	5.40	0.01
			0.00				No Ice	2.92	5.73	0.05
			0.00				Ice	3.23	6.06	0.08
(2) LPA-80080/4CF	C	From Leg	4.00	0.0000	99.00		1" Ice	2.62	5.40	0.01
			0.00				No Ice	2.92	5.73	0.05
			0.00				Ice	3.23	6.06	0.08
(2) JAHH-65B-R3B	A	From Leg	4.00	0.0000	99.00		1" Ice	9.11	5.98	0.06
			0.00				No Ice	9.58	6.44	0.12
			0.00				Ice	10.05	6.91	0.18
(2) JAHH-65B-R3B	B	From Leg	4.00	0.0000	99.00		1" Ice	9.11	5.98	0.06
			0.00				No Ice	9.58	6.44	0.12
			0.00				Ice	10.05	6.91	0.18
(2) JAHH-65B-R3B	C	From Leg	4.00	0.0000	99.00		1" Ice	9.11	5.98	0.06
			0.00				No Ice	9.58	6.44	0.12
			0.00				Ice	10.05	6.91	0.18
RRH2x60-700	A	From Leg	4.00	0.0000	99.00		1" Ice	3.50	1.82	0.06
							No Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight
			Horz	Lateral			Front	Side	
			ft	ft	°	ft	ft ²	ft ²	K
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
RRH2x60-700	B	From Leg	4.00		0.0000	99.00	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2x60-700	C	From Leg	4.00		0.0000	99.00	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH4X45-AWS4 B66	A	From Leg	4.00		0.0000	99.00	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH4X45-AWS4 B66	B	From Leg	4.00		0.0000	99.00	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH4X45-AWS4 B66	C	From Leg	4.00		0.0000	99.00	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	A	From Leg	4.00		0.0000	99.00	No Ice	1.29	0.72
			0.00			1/2"	1.43	0.83	0.05
			0.00			Ice	1.58	0.96	0.06
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	B	From Leg	4.00		0.0000	99.00	No Ice	1.29	0.72
			0.00			1/2"	1.43	0.83	0.05
			0.00			Ice	1.58	0.96	0.06
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	C	From Leg	4.00		0.0000	99.00	No Ice	1.29	0.72
			0.00			1/2"	1.43	0.83	0.05
			0.00			Ice	1.58	0.96	0.06
						1" Ice			
(2) DB-T1-6Z-8AB-0Z	A	From Leg	4.00		0.0000	99.00	No Ice	4.80	2.00
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice			
Platform Mount [LP 1301- 1]	C	None			0.0000	99.00	No Ice	51.70	51.70
						1/2"	62.70	62.70	2.94
						Ice	73.70	73.70	3.61
						1" Ice			
****8****									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00		0.0000	88.00	No Ice	6.33	5.64
			0.00			1/2"	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00		0.0000	88.00	No Ice	6.33	5.64
			0.00			1/2"	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00		0.0000	88.00	No Ice	6.33	5.64
			0.00			1/2"	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
LNx-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00		0.0000	88.00	No Ice	11.68	9.84
			0.00			1/2"	12.40	11.37	0.17
			2.00			Ice	13.14	12.91	0.27
						1" Ice			
LNx-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00		0.0000	88.00	No Ice	11.68	9.84
			0.00			1/2"	12.40	11.37	0.17
			2.00			Ice	13.14	12.91	0.27
						1" Ice			
LNx-6515DS-A1M w/	C	From Leg	4.00		0.0000	88.00	No Ice	11.68	9.84

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
Mount Pipe			0.00 2.00			1/2" Ice 13.14	11.37 12.91	0.17 0.27
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	88.00	1" Ice No Ice 1/2" Ice 7.21	5.64 6.43 7.13	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	88.00	1" Ice No Ice 1/2" Ice 7.21	5.64 6.43 7.13	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.00 0.00 2.00	0.0000	88.00	1" Ice No Ice 1/2" Ice 7.21	5.64 6.43 7.13	0.11 0.17 0.23
T-Arm Mount [TA 602-3]	B	None		0.0000	88.00	1" Ice No Ice 1/2" Ice 19.29	11.59 11.59 15.44 19.29	0.77 0.99 1.21

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

Comb. No.	Description
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 97	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	26	-22.72	-0.05	0.81
			Max. Mx	8	-8.97	-107.64	0.12
			Max. My	2	-8.97	-0.01	107.82
			Max. Vy	8	8.24	-107.64	0.12
			Max. Vx	2	-8.24	-0.01	107.82
			Max. Torque	9			0.49
L2	97 - 48	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-52.09	-2.30	2.44
			Max. Mx	8	-21.61	-875.51	-0.04
			Max. My	2	-21.60	-0.30	884.22
			Max. Vy	8	18.18	-875.51	-0.04
			Max. Vx	2	-18.38	-0.30	884.22
			Max. Torque	13			0.81
L3	48 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-70.34	-2.30	2.44
			Max. Mx	8	-34.00	-1913.17	-0.49
			Max. My	2	-34.00	0.15	1932.31
			Max. Vy	8	20.99	-1913.17	-0.49
			Max. Vx	2	-21.18	0.15	1932.31
			Max. Torque	13			0.80

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	70.34	-0.00	6.88
	Max. H _x	20	34.02	20.96	0.01
	Max. H _z	2	34.02	0.01	21.16
	Max. M _x	2	1932.31	0.01	21.16
	Max. M _z	8	1913.17	-20.96	-0.01
	Max. Torsion	13	0.80	-10.49	-18.33
	Min. Vert	19	25.51	18.15	-10.57
	Min. H _x	8	34.02	-20.96	-0.01
	Min. H _z	14	34.02	-0.01	-21.16
	Min. M _x	14	-1931.72	-0.01	-21.16
	Min. M _z	20	-1911.89	20.96	0.01
	Min. Torsion	25	-0.80	10.49	18.33

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	28.35	0.00	0.00	-0.23	-0.50	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	34.02	-0.01	-21.16	-1932.31	0.15	0.72
0.9 Dead+1.6 Wind 0 deg - No Ice	25.51	-0.01	-21.16	-1914.03	0.31	0.72
1.2 Dead+1.6 Wind 30 deg - No Ice	34.02	10.47	-18.32	-1673.09	-956.22	0.44
0.9 Dead+1.6 Wind 30 deg - No Ice	25.51	10.47	-18.32	-1657.24	-947.04	0.44
1.2 Dead+1.6 Wind 60 deg - No Ice	34.02	18.15	-10.57	-965.63	-1656.55	0.05
0.9 Dead+1.6 Wind 60 deg - No Ice	25.51	18.15	-10.57	-956.46	-1640.77	0.05
1.2 Dead+1.6 Wind 90 deg - No Ice	34.02	20.96	0.01	0.49	-1913.17	-0.36
0.9 Dead+1.6 Wind 90 deg - No Ice	25.51	20.96	0.01	0.56	-1894.98	-0.36
1.2 Dead+1.6 Wind 120 deg - No Ice	34.02	18.16	10.59	966.41	-1657.33	-0.67
0.9 Dead+1.6 Wind 120 deg - No Ice	25.51	18.16	10.59	957.38	-1641.55	-0.67
1.2 Dead+1.6 Wind 150 deg - No Ice	34.02	10.49	18.33	1673.29	-957.58	-0.80
0.9 Dead+1.6 Wind 150 deg - No Ice	25.51	10.49	18.33	1657.59	-948.39	-0.80
1.2 Dead+1.6 Wind 180 deg - No Ice	34.02	0.01	21.16	1931.72	-1.42	-0.72
0.9 Dead+1.6 Wind 180 deg - No Ice	25.51	0.01	21.16	1913.60	-1.25	-0.72
1.2 Dead+1.6 Wind 210 deg - No Ice	34.02	-10.47	18.32	1672.50	954.94	-0.44
0.9 Dead+1.6 Wind 210 deg - No Ice	25.51	-10.47	18.32	1656.81	946.10	-0.44
1.2 Dead+1.6 Wind 240 deg - No Ice	34.02	-18.15	10.57	965.05	1655.27	-0.05
0.9 Dead+1.6 Wind 240 deg - No Ice	25.51	-18.15	10.57	956.03	1639.83	-0.05
1.2 Dead+1.6 Wind 270 deg - No Ice	34.02	-20.96	-0.01	-1.08	1911.89	0.36
0.9 Dead+1.6 Wind 270 deg - No Ice	25.51	-20.96	-0.01	-0.99	1894.04	0.36
1.2 Dead+1.6 Wind 300 deg - No Ice	34.02	-18.16	-10.59	-966.99	1656.06	0.67
0.9 Dead+1.6 Wind 300 deg - No Ice	25.51	-18.16	-10.59	-957.81	1640.61	0.67
1.2 Dead+1.6 Wind 330 deg - No Ice	34.02	-10.49	-18.33	-1673.87	956.30	0.80
0.9 Dead+1.6 Wind 330 deg - No Ice	25.51	-10.49	-18.33	-1658.02	947.45	0.80
1.2 Dead+1.0 Ice+1.0 Temp	70.34	0.00	-0.00	-2.44	-2.30	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	70.34	0.00	-6.88	-650.77	-2.54	0.20
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	70.34	3.43	-5.96	-564.00	-325.05	0.11
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	70.34	5.93	-3.44	-326.78	-561.11	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	70.34	6.85	-0.00	-2.69	-647.47	-0.11
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	70.34	5.93	3.44	321.44	-560.98	-0.20
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	70.34	3.42	5.96	558.75	-324.83	-0.23
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	70.34	-0.00	6.88	645.66	-2.28	-0.20
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	70.34	-3.43	5.96	558.88	320.24	-0.11

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	70.34	-5.93	3.44	321.67	556.30	0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	70.34	-6.85	0.00	-2.43	642.66	0.11
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	70.34	-5.93	-3.44	-326.55	556.17	0.20
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	70.34	-3.42	-5.96	-563.86	320.01	0.23
Dead+Wind 0 deg - Service	28.35	-0.00	-4.92	-447.39	-0.35	0.17
Dead+Wind 30 deg - Service	28.35	2.44	-4.26	-387.39	-221.69	0.10
Dead+Wind 60 deg - Service	28.35	4.22	-2.46	-223.66	-383.77	0.01
Dead+Wind 90 deg - Service	28.35	4.88	0.00	-0.06	-443.16	-0.08
Dead+Wind 120 deg - Service	28.35	4.23	2.46	223.49	-383.95	-0.16
Dead+Wind 150 deg - Service	28.35	2.44	4.27	387.09	-222.00	-0.19
Dead+Wind 180 deg - Service	28.35	0.00	4.92	446.90	-0.71	-0.17
Dead+Wind 210 deg - Service	28.35	-2.44	4.26	386.90	220.63	-0.10
Dead+Wind 240 deg - Service	28.35	-4.22	2.46	223.17	382.71	-0.01
Dead+Wind 270 deg - Service	28.35	-4.88	-0.00	-0.43	442.10	0.08
Dead+Wind 300 deg - Service	28.35	-4.23	-2.46	-223.97	382.89	0.16
Dead+Wind 330 deg - Service	28.35	-2.44	-4.27	-387.57	220.94	0.19

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	-28.35	0.00	0.00	28.35	0.00	0.000%
2	-0.01	-34.02	-21.16	0.01	34.02	21.16	0.000%
3	-0.01	-25.51	-21.16	0.01	25.51	21.16	0.000%
4	10.47	-34.02	-18.32	-10.47	34.02	18.32	0.000%
5	10.47	-25.51	-18.32	-10.47	25.51	18.32	0.000%
6	18.15	-34.02	-10.57	-18.15	34.02	10.57	0.000%
7	18.15	-25.51	-10.57	-18.15	25.51	10.57	0.000%
8	20.96	-34.02	0.01	-20.96	34.02	-0.01	0.000%
9	20.96	-25.51	0.01	-20.96	25.51	-0.01	0.000%
10	18.16	-34.02	10.59	-18.16	34.02	-10.59	0.000%
11	18.16	-25.51	10.59	-18.16	25.51	-10.59	0.000%
12	10.49	-34.02	18.33	-10.49	34.02	-18.33	0.000%
13	10.49	-25.51	18.33	-10.49	25.51	-18.33	0.000%
14	0.01	-34.02	21.16	-0.01	34.02	-21.16	0.000%
15	0.01	-25.51	21.16	-0.01	25.51	-21.16	0.000%
16	-10.47	-34.02	18.32	10.47	34.02	-18.32	0.000%
17	-10.47	-25.51	18.32	10.47	25.51	-18.32	0.000%
18	-18.15	-34.02	10.57	18.15	34.02	-10.57	0.000%
19	-18.15	-25.51	10.57	18.15	25.51	-10.57	0.000%
20	-20.96	-34.02	-0.01	20.96	34.02	0.01	0.000%
21	-20.96	-25.51	-0.01	20.96	25.51	0.01	0.000%
22	-18.16	-34.02	-10.59	18.16	34.02	10.59	0.000%
23	-18.16	-25.51	-10.59	18.16	25.51	10.59	0.000%
24	-10.49	-34.02	-18.33	10.49	34.02	18.33	0.000%
25	-10.49	-25.51	-18.33	10.49	25.51	18.33	0.000%
26	0.00	-70.34	0.00	-0.00	70.34	0.00	0.000%
27	0.00	-70.34	-6.88	-0.00	70.34	6.88	0.000%
28	3.43	-70.34	-5.96	-3.43	70.34	5.96	0.000%
29	5.93	-70.34	-3.44	-5.93	70.34	3.44	0.000%
30	6.85	-70.34	-0.00	-6.85	70.34	0.00	0.000%
31	5.93	-70.34	3.44	-5.93	70.34	-3.44	0.000%
32	3.42	-70.34	5.96	-3.42	70.34	-5.96	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
33	-0.00	-70.34	6.88	0.00	70.34	-6.88	0.000%
34	-3.43	-70.34	5.96	3.43	70.34	-5.96	0.000%
35	-5.93	-70.34	3.44	5.93	70.34	-3.44	0.000%
36	-6.85	-70.34	0.00	6.85	70.34	-0.00	0.000%
37	-5.93	-70.34	-3.44	5.93	70.34	3.44	0.000%
38	-3.42	-70.34	-5.96	3.42	70.34	5.96	0.000%
39	-0.00	-28.35	-4.92	0.00	28.35	4.92	0.000%
40	2.44	-28.35	-4.26	-2.44	28.35	4.26	0.000%
41	4.22	-28.35	-2.46	-4.22	28.35	2.46	0.000%
42	4.88	-28.35	0.00	-4.88	28.35	-0.00	0.000%
43	4.23	-28.35	2.46	-4.23	28.35	-2.46	0.000%
44	2.44	-28.35	4.27	-2.44	28.35	-4.27	0.000%
45	0.00	-28.35	4.92	-0.00	28.35	-4.92	0.000%
46	-2.44	-28.35	4.26	2.44	28.35	-4.26	0.000%
47	-4.22	-28.35	2.46	4.22	28.35	-2.46	0.000%
48	-4.88	-28.35	-0.00	4.88	28.35	0.00	0.000%
49	-4.23	-28.35	-2.46	4.23	28.35	2.46	0.000%
50	-2.44	-28.35	-4.27	2.44	28.35	4.27	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00063112
3	Yes	4	0.00000001	0.00040642
4	Yes	5	0.00000001	0.00070352
5	Yes	5	0.00000001	0.00032904
6	Yes	5	0.00000001	0.00070023
7	Yes	5	0.00000001	0.00032768
8	Yes	4	0.00000001	0.00057830
9	Yes	4	0.00000001	0.00037155
10	Yes	5	0.00000001	0.00067752
11	Yes	5	0.00000001	0.00031646
12	Yes	5	0.00000001	0.00071792
13	Yes	5	0.00000001	0.00033641
14	Yes	4	0.00000001	0.00065657
15	Yes	4	0.00000001	0.00042332
16	Yes	5	0.00000001	0.00068807
17	Yes	5	0.00000001	0.00032180
18	Yes	5	0.00000001	0.00068845
19	Yes	5	0.00000001	0.00032231
20	Yes	4	0.00000001	0.00060284
21	Yes	4	0.00000001	0.00038800
22	Yes	5	0.00000001	0.00071500
23	Yes	5	0.00000001	0.00033534
24	Yes	5	0.00000001	0.00067751
25	Yes	5	0.00000001	0.00031623
26	Yes	4	0.00000001	0.00003620
27	Yes	5	0.00000001	0.00043287
28	Yes	5	0.00000001	0.00063296
29	Yes	5	0.00000001	0.00063299
30	Yes	5	0.00000001	0.00043033
31	Yes	5	0.00000001	0.00061003
32	Yes	5	0.00000001	0.00062281
33	Yes	5	0.00000001	0.00042562
34	Yes	5	0.00000001	0.00060540
35	Yes	5	0.00000001	0.00060365
36	Yes	5	0.00000001	0.00042443
37	Yes	5	0.00000001	0.00062626
38	Yes	5	0.00000001	0.00061510
39	Yes	4	0.00000001	0.00004581
40	Yes	4	0.00000001	0.00023464
41	Yes	4	0.00000001	0.00023176
42	Yes	4	0.00000001	0.00004310

43	Yes	4	0.00000001	0.00020937
44	Yes	4	0.00000001	0.00025099
45	Yes	4	0.00000001	0.00004597
46	Yes	4	0.00000001	0.00021766
47	Yes	4	0.00000001	0.00021876
48	Yes	4	0.00000001	0.00004317
49	Yes	4	0.00000001	0.00024838
50	Yes	4	0.00000001	0.00020855

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 97	12.130	39	0.8364	0.0012
L2	100.62 - 48	8.786	39	0.7965	0.0011
L3	52.96 - 0	2.400	39	0.4232	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	(2) 7770.00 w/ Mount Pipe	39	11.955	0.8352	0.0012	54284
109.00	ETCR-654L12H6 w/ Mount Pipe	39	10.211	0.8205	0.0011	24674
99.00	(2) LPA-80080/4CF	39	8.517	0.7898	0.0011	13218
88.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	39	6.758	0.7277	0.0009	9404

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 97	52.434	2	3.6158	0.0054
L2	100.62 - 48	37.985	2	3.4443	0.0047
L3	52.96 - 0	10.375	2	1.8298	0.0014

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	(2) 7770.00 w/ Mount Pipe	2	51.677	3.6109	0.0053	12692
109.00	ETCR-654L12H6 w/ Mount Pipe	2	44.144	3.5477	0.0050	5768
99.00	(2) LPA-80080/4CF	2	36.821	3.4156	0.0046	3087
88.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	29.219	3.1472	0.0039	2189

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 P _u / φP _n
L1	120 - 97 (1)	TP28.93x22.69x0.1875	23.00	0.00	0.0	16.5209	-8.97	1079.70	0.008
L2	97 - 48 (2)	TP39.7x27.5729x0.25	52.62	0.00	0.0	30.3965	-21.60	1957.24	0.011
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	52.96	0.00	0.0	50.3153	-34.00	3154.51	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio M _{ux} / φM _{nx}	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio M _{uy} / φM _{ny}
L1	120 - 97 (1)	TP28.93x22.69x0.1875	107.82	617.02	0.175	0.00	617.02	0.000
L2	97 - 48 (2)	TP39.7x27.5729x0.25	884.22	1543.79	0.573	0.00	1543.79	0.000
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	1932.31	3296.10	0.586	0.00	3296.10	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio V _u / φV _n	Actual T _u kip-ft	φT _n kip-ft	Ratio T _u / φT _n
L1	120 - 97 (1)	TP28.93x22.69x0.1875	8.24	539.85	0.015	0.00	1235.55	0.000
L2	97 - 48 (2)	TP39.7x27.5729x0.25	18.38	970.51	0.019	0.72	3091.35	0.000
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	21.18	1567.17	0.014	0.72	6600.26	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P _u / φP _n	Ratio M _{ux} / φM _{nx}	Ratio M _{uy} / φM _{ny}	Ratio V _u / φV _n	Ratio T _u / φT _n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 97 (1)	0.008	0.175	0.000	0.015	0.000	0.183	1.000	4.8.2
L2	97 - 48 (2)	0.011	0.573	0.000	0.019	0.000	0.584	1.000	4.8.2
L3	48 - 0 (3)	0.011	0.586	0.000	0.014	0.000	0.597	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	120 - 97	Pole	TP28.93x22.69x0.1875	1	-8.97	1079.70	18.3	Pass
L2	97 - 48	Pole	TP39.7x27.5729x0.25	2	-21.60	1957.24	58.4	Pass
L3	48 - 0	Pole	TP51.04x38.0569x0.3125	3	-34.00	3154.51	59.7	Pass
Summary								
Pole (L3)							59.7	Pass
RATING =							59.7	Pass

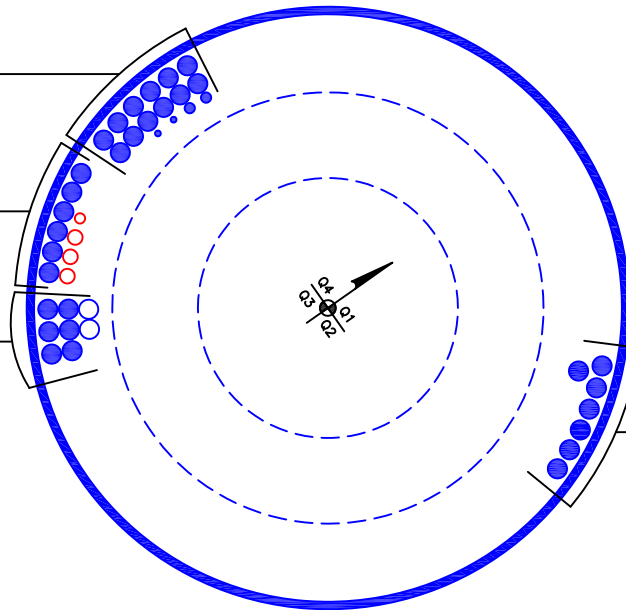
APPENDIX B
BASE LEVEL DRAWING



(INSTALLED)
(2) 1/2" TO 119 FT LEVEL
(2) 7/8" TO 119 FT LEVEL
(12) 1-5/8" TO 119 FT LEVEL

(PROPOSED)
(1) 7/8" TO 109 FT LEVEL
(3) 1-1/4" TO 109 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-5/8" TO 109 FT LEVEL

(RESERVED)
(2) 1-5/8" TO 99 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 99 FT LEVEL



(INSTALLED)
(7) 1-5/8" TO 88 FT LEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

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

TIA Rev G

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

Site Data

BU#:	845993
Site Name:	BURLINGTON-NEPAUG ROAD
App #:	418450 Rev 1
Pole Manufacturer:	Other

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	60	in

Plate Data

Diam:	66	in
Thick:	2.25	in
Grade:	36	ksi
Single-Rod B-eff:	13.50	in

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	51.04	in
Thick:	0.3125	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions

Mu:	1932	ft-kips
Axial, Pu:	34	kips
Shear, Vu:	21	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Results

Max Rod ($C_u + V_u/\eta$): 135.2 Kips
 Allowable Axial, $\Phi * F_u * A_{net}$: 260.0 Kips
 Anchor Rod Stress Ratio: 52.0% Pass

Rigid
AISC LRFD
$\phi * T_n$

Base Plate Results

Base Plate Stress: 22.0 ksi
 Allowable Plate Stress: 32.4 ksi
 Base Plate Stress Ratio: 68.0% Pass

Flexural Check

Rigid
AISC LRFD
$\phi * F_y$
Y.L. Length:
31.54

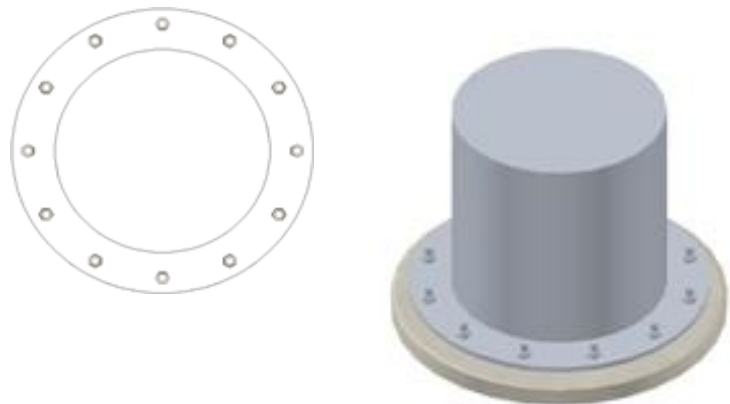
n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: n/a
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: 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

Pier and Pad Foundation



BU #: 845993
Site Name: BURLINGTON-NE
App. Number: 418450 Rev 1

TIA-222 Revision: G
Tower Type: Monopole

Block Foundation?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	34	kips
Base Shear, Vu_{comp} :	21	kips
Moment, M_u :	1932	ft-kips
Tower Height, H :	120	ft
BP Dist. Above Fdn, bp_{dist} :	6.125	in

Foundation Analysis Checks				
	Capacity	Demand	Rating	Check
<i>Lateral (Sliding) (kips)</i>	171.93	21.00	12.2%	Pass
<i>Bearing Pressure (ksf)</i>	9.40	1.38	14.7%	Pass
<i>Overturning (kip*ft)</i>	4678.08	2066.62	44.2%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	3898.46	1992.90	51.1%	Pass
<i>Pier Compression (kip)</i>	31187.52	59.58	0.2%	Pass
<i>Pad Flexure (kip*ft)</i>	3285.13	684.32	20.8%	Pass
<i>Pad Shear - 1-way (kips)</i>	896.51	105.82	11.8%	Pass
<i>Pad Shear - 2-way (ksi)</i>	0.19	0.02	10.7%	Pass

Pier Properties		
Pier Shape:	Square	
Pier Diameter, d_{pier} :	7.0	ft
Ext. Above Grade, E :	0.90	ft
Pier Rebar Size, S_c :	8	
Pier Rebar Quantity, mc :	30	
Pier Tie/Spiral Size, S_t :	3	
Pier Tie/Spiral Quantity, mt :	4	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	6	in

Soil Rating: 44.2%
Structural Rating: 51.1%

Pad Properties		
Depth, D :	5.0	ft
Pad Width, W :	25.0	ft
Pad Thickness, T :	3.0	ft
Pad Rebar Size, S_p :	8	
Pad Rebar Quantity, mp :	30	
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 :	120	pcf
Ultimate Net Bearing, Q_{net} :	12.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	30	degrees
SPT Blow Count, N_{blows} :	27	
Base Friction, μ :	0.45	
Neglected Depth, N :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	4	ft

--Toggle between Gross and Net

CCISeismic - Design Category

Per 2012/2015 IBC

Site BU: 845993
 Work Order: 1576415
 Application: 418450 Rev. 1



	Degrees	Minutes	Seconds	
Site Latitude =	41	46	56.85	41.7825 degrees
Site Longitude =	-72	59	22.67	-72.9896 degrees
Ground Supported Structure =	Yes			
Structure Class =	II			(Table 2-1)
Site Class =	D - Stiff Soil			(Table 2-11)
Spectral response acceleration short periods, S_s =	0.182			USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.064			
Importance Factor, I =	1.0			(Table 2-3)
Acceleration-based site coefficient, F_a =	1.6			(Table 2-12)
Velocity-based site coefficient, F_v =	2.4			(Table 2-13)
Design spectral response acceleration short period, S_{DS} =	0.194			(2.7.6)
Design spectral response acceleration 1 s period, S_{D1} =	0.102			(2.7.6)
Seismic Design Category - Short Period Response =	B			ASCE 7-05 Table 11.6-1
Seismic Design Category - 1s Period Response =	B			ASCE 7-05 Table 11.6-2
Worst Case Seismic Design Category =	B			ASCE 7-05 Tables 11.6-1 and 6-2