Robinson+Cole

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Also admitted in Massachusetts

May 6, 2019

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

Re: **Notice of Exempt Modification – Facility Modification**
482 Pigeon Hill Road, Windsor, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless currently maintains twelve (12) wireless telecommunications antennas at the 155-foot level on an existing 160-foot lattice tower at 482 Pigeon Hill Road in Windsor, Connecticut (the "Property"). The Property and tower are owned by Cellco. Cellco's use of the tower was approved by the Council in 1986 (Docket No. 58). Cellco now intends to modify its facility by replacing six (6) of its existing antennas with six (6) model NNHH-65B-R4 antennas, all at the same level on the tower. Cellco also now intends to remove six (3) remote radio heads ("RRHs") and install six (6) newer model RRHs behind its antennas and install one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Windsor Town Manager, Peter Souza; and Eric Barz, Windsor's Town Planner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be located at the 155-foot level on the 160-foot tower.

Robinson+Cole

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

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Attachment 2.

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

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Peter Souza, Town Manager
Eric Barz, Town Planner
Tim Parks

ATTACHMENT 1

NNHH-65B-R4

8-port sector antenna, 4x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 4x RETs

Electrical Specifications

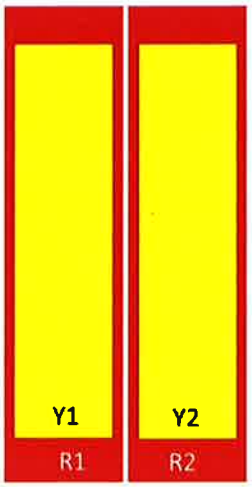
Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2180**	**2300–2360**
Gain, dBi	14.6	15.0	17.0	17.3	17.5	17.9
Beamwidth, Horizontal, degrees	66	64	58	61	63	59
Beamwidth, Vertical, degrees	11.9	10.3	7.4	6.9	6.4	5.7
Beam Tilt, degrees	2–14	2–14	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	17	19	14	19	16	18
Front-to-Back Ratio at 180°, dB	30	31	35	38	37	34
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	25
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150	-150
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2180**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.2	14.7	16.4	16.9	17.0	17.5
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.5	±0.9	±0.4	±0.5	±0.5
Gain by Beam Tilt, average, dBi	2 ° | 14.2 8 ° | 14.2 14 ° | 13.9	2 ° | 14.7 8 ° | 14.8 14 ° | 14.3	2 ° | 16.5 7 ° | 16.6 12 ° | 16.1	2 ° | 16.7 7 ° | 17.0 12 ° | 16.7	2 ° | 16.8 7 ° | 17.1 12 ° | 16.7	2 ° | 17.2 7 ° | 17.8 12 ° | 17.3
Beamwidth, Horizontal Tolerance, degrees	±3.3	±3.1	±6.4	±3	±3.5	±5.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.8	±0.8	±0.4	±0.7	±0.2
USLS, beampeak to 20° above beampeak, dB	17	19	14	17	15	17
Front-to-Back Total Power at 180° ± 30°, dB	21	21	30	31	27	27
CPR at Boresight, dB	21	22	16	17	18	17
CPR at Sector, dB	9	6	9	9	8	12

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

Array Layout

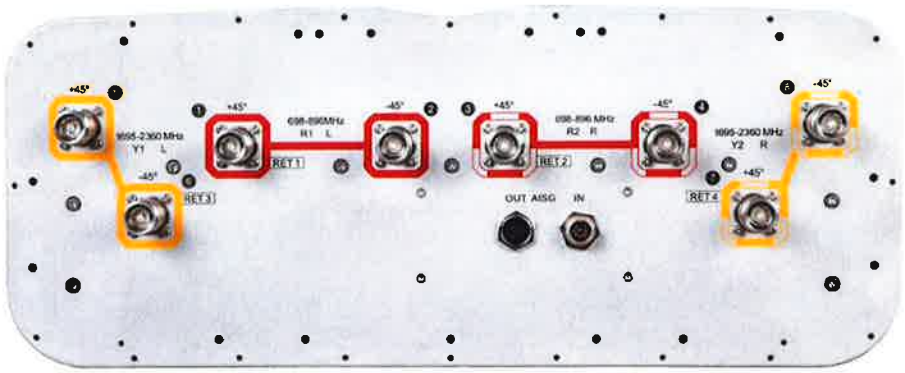


Left Right
Bottom

(Sizes of colored boxes are not true depictions of array sizes)

Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	CPxxxxxxxxxxxxxxxmm.1
R2	698-896	3-4	2	CPxxxxxxxxxxxxxxxmm.2
Y1	1695-2360	5-6	3	CPxxxxxxxxxxxxxxxmm.3
Y2	1695-2360	7-8	4	CPxxxxxxxxxxxxxxxmm.4

Port Configuration



General Specifications

Operating Frequency Band 1695 – 2360 MHz | 698 – 896 MHz

NNHH-65B-R4

Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	900 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	685.0 N @ 150 km/h 154.0 lbf @ 150 km/h
Wind Loading, lateral	232.0 N @ 150 km/h 52.2 lbf @ 150 km/h
Wind Loading, maximum	889.0 N @ 150 km/h 199.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	498.0 mm | 19.6 in
Depth	197.0 mm | 7.8 in
Net Weight, without mounting kit	35.1 kg | 77.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

NNHH-65B-R4

Packed Dimensions

Length	2010.0 mm | 79.1 in
Width	608.0 mm | 23.9 in
Depth	352.0 mm | 13.9 in
Shipping Weight	49.0 kg | 108.0 lb

Regulatory Compliance/Certifications

Agency	**Classification**
RoHS 2011/65/EU	Compliant by Exemption
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
China RoHS SJ/T 11364-2014	Above Maximum Concentration Value (MCV)

Included Products

BSAMNT-3 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

SAMSUNG

Dual-Band Radio Unit
700/850MHz (B13/B5)
RFV01U-D2A

Samsung's RFV01U-D2A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D2A RU targets dual-band support across Band 13 (700MHz) and Band 5 (850MHz), making it an ideal product for broad coverage footprints across multiple common low-end, long-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B13: DL(746-756MHz)/UL(777-787MHz)
B5: DL(869-894MHz)/UL(824-849MHz)
Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 207mm (29.9L)
Weight: 31.9kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit
AWS/PCS (B66/B2)
RFV01U-D1A

Samsung's RFV01U-D1A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D1A RU targets dual-band support across Band 66 (AWS) and Band 2 (PCS), making it an ideal product for broad coverage footprints across multiple common mid-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation
- Built-in Broadcast Auxiliary Services (BAS) filter ensures compliant AWS operation without impacting footprint

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

- This data is provisional and subject to change

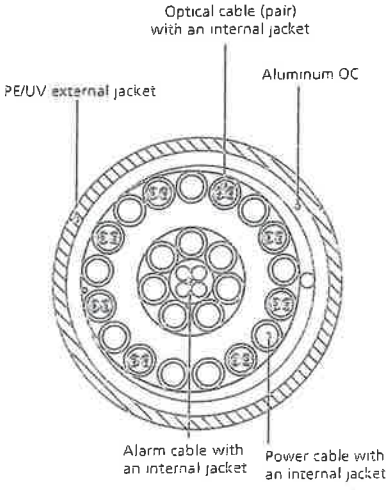


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: Windsor								
Tower Height: 160ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Cingular-UMTS	2	552	169	850	0.0149	0.5667	0.26%	
*Cingular-PCS-UMTS	2	780	169	1900	0.0211	1.0000	0.21%	
*Cingular -LTE	2	730	169	700	0.0198	0.4667	0.42%	
*Cingular -PCS-LTE	2	1456	169	1900	0.0394	1.0000	0.39%	
*T-Mobile	2	1668	145	2100	0.0621	1.0000	0.62%	
*T-Mobile	2	834	145	2100	0.0310	1.0000	0.31%	
*T-Mobile	2	846	145	1950	0.0315	1.0000	0.31%	
*T-Mobile	2	846	145	1950	0.0315	1.0000	0.31%	
*T-Mobile	1	690	145	700	0.0128	0.4667	0.28%	
*Town of Windsor			163	454	0.0009	0.3027	0.03%	
*Town of Windsor			131	454	0.0012	0.3027	0.04%	
*Town of Windsor			112	454	0.0032	0.3027	0.11%	
VZW PCS	**1**	**4953**	**155**	**0.0741**	**1970**	**1.0000**	**7.41%**	
VZW 850 LTE	**1**	**1918**	**155**	**0.0287**	**869**	**0.5793**	**4.96%**	
VZW Cellular	**3**	**383**	**155**	**0.0172**	**869**	**0.5840**	**2.95%**	
VZW AWS	**1**	**4676**	**155**	**0.0700**	**2145**	**1.0000**	**7.00%**	
VZW 700	**1**	**2466**	**155**	**0.0369**	**746**	**0.4700**	**7.85%**	
								33.47%
* Source: Siting Council								

ATTACHMENT 3

PJF PAUL J. FORD & COMPANY

Report Date:	April 11, 2019
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624
Structure:	Modified 160-ft Self Support Tower
Site Name:	Windsor CT
Site Address:	482 Pigeon Hill Rd
City, County, State:	Windsor, Hartford County, CT
Latitude, Longitude:	41.86664, -72.674778
PJF Project:	42918-0025.004.8800

Paul J. Ford and Company is pleased to submit this "**Structural Modification Report**" to determine the tower stress level.

Analysis Criteria:

Reference Standard:	2015 International Building Code (2018 Connecticut State Building Code) with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	125 mph 3-second gust wind speed without ice
Nominal Wind Speed:	97 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 1" ice
Service Wind Speed:	60 mph (Serviceability) without ice
IBC Site Criteria:	Risk Category II, Topographic Category 1, Exposure Category B

Proposed Appurtenance Loads:

The structure was analyzed with the addition of the proposed appurtenance loads shown in Table 1 combined with the existing loads shown in Table 2 of this report.

Summary of Analysis Results:

Modified Structure:	Pass
Modified Foundation:	Pass

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and On Air Engineering, LLC. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company

Sara Mansoori
Structural Designer
smansoori@pauljford.com

JPJ

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

APR 12 2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 160 ft Self Support tower designed by Rohn.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	II
Wind Speed:	97 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

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
155.0	158.0	3	samsung	B2/ B66A RRH	1	1-5/8 Hybrid	-
		3	samsung	B5/B13 RRH			
		6	commscope	NNHH-65B-R4 w/ Mount Pipe			
		1	raycap	RVZDC-6627-PF-48			
	155.0	3	tower mounts	Site Pro VFA-12			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
169.0	169.0	3	ericsson	RRUS 11	12 2 1	1-1/4 Dc fiber	1
		3	ericsson	RRUS 32			
		6	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	TT19-08BP111-001			
		3	quintel technology	QS66512-2			
		1	raycap	DC6-48-60-18-8F			
		3	tower mounts	T-Arm Mount			
		1	Pipe mount	8" sch.40 x 18-ft			
160.0	165.0	1	generic	15 ft x 2" omni whip	1	7/8	1
	160.0	1	tower mounts	Side Arm Mount			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
155.0	158.0	3		RRH2X60-700	-	-	2
		3	alcatel lucent	RRH2x60-AWS			
		2	antel	BXA-70040/6CFx2 w/ Mount Pipe			
		1	antel	BXA-70063/6CF-2 w/ Mount Pipe			
		3	rfs celwave	APX18-206517-CT2 w/ Mount Pipe			
		3	andrew	HBX-6516DS w/ Mount Pipe			
	157.0	6	amphenol	LPA-80063-4CF-EDIN-X w/ Mount Pipe	13	1-5/8	1
	155.0	1	raycap	OVP			
		3	tower mounts	Sector Mount	-	-	2
145.0	145.0	6	generic	TMA (10" x 8" x 3")	18	1-5/8	1
		3	andrew	LNX-6515DS-A1M w/ Mount Pipe			
		3	celwave	Celwave APX16DWV-16DWV-S-E-A20 w/Mount Pipe			
		3	tower mounts	Sector Mount			
118.0	128.0	1	generic	15 ft x 2" omni whip	1	7/8	1
	118.0	1	tower mounts	Side Arm Mount			
99.0	108.0	1	generic	16 ft x 2" omni whip	1	7/8	1
	99.0	1	tower mounts	Side Arm Mount			
47.0	47.0	1	tower mounts	Side Arm Mount	-	-	1
38.0	46.0	1	generic	12 ft x 2" omni whip	1	1/2	1
	38.0	1	tower mounts	Side Arm Mount			

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Source
TOWER STRUCTURAL ANALYSIS REPORTS	All-Points Technology Corporation 06/26/2017	On Air Engineering, LLC
TOWER STRUCTURAL ANALYSIS REPORTS	Centek Engineering, 04/20/2017	On Air Engineering, LLC
FOUNDATION DRAWINGS	Rohn, 04/20/87	On Air Engineering, LLC
GEOTECHNICAL REPORTS	DR. Clarence Welti, 09/20/2010	On Air Engineering, LLC
MODIFICATION LETTER	Centek Engineering, 07/11/2011	On Air Engineering, LLC
PROPOSED TOWER REINFORCEMENT DESIGN/DRAWINGS	PJF, 04/11/2019	ATTACHED

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.
3) The rock anchors information was obtained from Centek Engineering analysis, dated 04/20/2017.
4) Install the modifications as per the proposed modification drawings referenced in Table 3.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	168 - 160	Pole	Pipe 8.625" x 0.322" (8 STD)	1	-2.96	377.97	34.1	Pass
T1	160 - 140	Leg	Pipe 2.875" x 0.203" (2.5 STD)	3	-26.14	57.19	45.7	Pass
T2	140 - 133.333	Leg	Pipe 2.875" x 0.203" (2.5 STD)	33	-35.63	45.45	78.4	Pass
T3	133.333 - 126.667	Leg	Pipe 2.875" x 0.203" (2.5 STD)	45	-45.10	45.45	99.2	Pass
T4	126.667 - 120	Leg	Pipe 2.875" x 0.203" (2.5 STD)	54	-54.23	66.71	81.3	Pass
T5	120 - 100	Leg	Pipe 2.875" x 0.276" (2.5 XS)	69	-83.90	87.71	95.7	Pass
T6	100 - 80	Leg	Pipe 3.5" x 0.300" (3 XS)	99	-113.87	123.39	92.3	Pass
T7	80 - 60	Leg	Pipe 4.5" x 0.337" (4 XS)	129	-141.44	174.33	81.1	Pass
T8	60 - 40	Leg	Pipe 5.563" x 0.375" (5 XS)	150	-171.66	201.25	85.3	Pass
T9	40 - 20	Leg	Pipe 5.563" x 0.375" (5 XS)	165	-200.72	201.23	99.7	Pass
T10	20 - 1e-006	Leg	Pipe 6.625" x 0.340" (6 EHS)	180	-229.18	244.06	93.9	Pass
T1	160 - 140	Diagonal	L 1.75 x 1.75 x 3/16	11	-4.72	5.13	92.1	Pass
T2	140 - 133.333	Diagonal	L 2 x 2 x 3/16	41	-4.41	5.69	77.5	Pass
T3	133.333 - 126.667	Diagonal	L 2 x 2 x 3/16	50	-4.48	5.17	86.6	Pass
T4	126.667 - 120	Diagonal	L 2.5 x 2.5 x 3/16	62	-4.87	9.03	54.0	Pass
T5	120 - 100	Diagonal	L 2.5 x 2.5 x 3/16	74	-5.22	6.93	75.4	Pass
T6	100 - 80	Diagonal	L 3 x 3 x 3/16	102	-6.27	9.64	65.0 74.3 (b)	Pass
T7	80 - 60	Diagonal	L 3 x 3 x 1/4	132	-7.38	8.54	86.4	Pass
T8	60 - 40	Diagonal	L 3.5 x 3.5 x 1/4	153	-7.87	12.00	65.6 71.2 (b)	Pass
T9	40 - 20	Diagonal	L 3.5 x 3.5 x 1/4	168	-8.09	10.09	80.2	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T10	20 - 1e-006	Diagonal	L 4 x 4 x 1/4	183	-9.25	13.13	70.4 79.6 (b)	Pass
T4	126.667 - 120	Secondary Horizontal	L 2 x 2 x 1/4	65	-0.94	8.89	10.6	Pass
T5	120 - 100	Secondary Horizontal	L 2.5 x 2.5 x 3/16	77	-1.46	9.48	15.4	Pass
T6	100 - 80	Secondary Horizontal	L 3 x 3 x 3/16	107	-1.97	12.30	16.1	Pass
T7	80 - 60	Secondary Horizontal	L 3 x 3 x 1/4	138	-2.45	12.58	19.5	Pass
T1	160 - 140	Top Girt	L 2 x 2 x 5/16	6	-1.49	4.11	36.1	Pass
T2	140 - 133.333	Top Girt	L 2 x 2 x 3/16	36	-0.28	3.89	7.2	Pass
T4	126.667 - 120	Top Girt	L 3 x 3 x 3/16	58	-0.67	6.41	10.4	Pass
T1	160 - 140	Pole Socket	Pipe 8.625" x 0.322" (8 STD)	197	-3.13	349.58	34.3	Pass
							Summary	
						Pole (L1)	34.1	Pass
						Leg (T9)	99.7	Pass
						Diagonal (T1)	92.1	Pass
						Secondary Horizontal (T7)	19.5	Pass
						Top Girt (T1)	36.1	Pass
						Pole Socket (T1)	34.3	Pass
						Bolt Checks	79.6	Pass
						Rating =	99.7	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	90.9	Pass
1	Base Foundation	0	51.2	Pass
1	Base Foundation Soil Interaction	0	78.1	Pass

Structure Rating (max from all components) =	99.7%

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

4.1) Recommendations

- Install the proposed modifications per the attached drawings dated 04/11/2019.

APPENDIX A

TNXTOWER OUTPUT

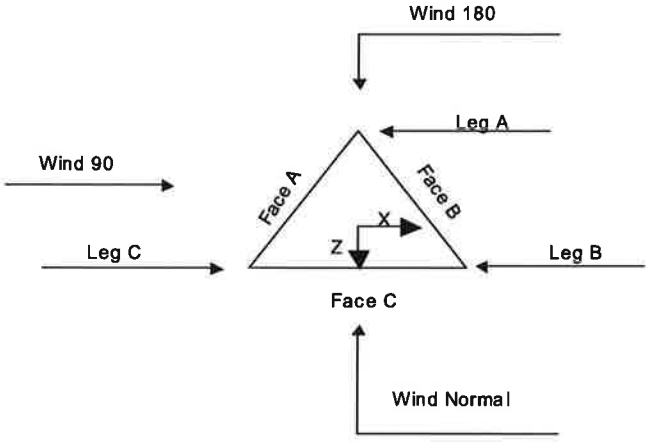
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 168.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 8.65 ft at the top and 22.86 ft at the base.
An index plate is provided at the 3x free standing -tower connection.
There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Hartford County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 97.00 mph.
4) Structure Class II.
5) Exposure Category B.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 1.00 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50.00 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60.00 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in pole design is 1.
17) Stress ratio used in tower member design is 1.
18) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	168.00-160.00	8.00	Pipe 8.625" x 0.322" (8 STD)	A572-50 (50 ksi)	8.00

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 168.00-160.00				1	1	1			

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	160.00-140.00		08N056	8.65	1	20.00
T2	140.00-133.33		09N115	8.65	1	6.67
T3	133.33-126.67		09N115	9.31	1	6.67
T4	126.67-120.00		09N115	9.98	1	6.67
T5	120.00-100.00		10N106	10.65	1	20.00
T6	100.00-80.00		11N076	12.69	1	20.00
T7	80.00-60.00		12N005	14.70	1	20.00
T8	60.00-40.00		13N011	16.77	1	20.00
T9	40.00-20.00		14N003	18.77	1	20.00
T10	20.00-0.00		15N023	20.86	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	160.00-140.00	5.00	X Brace	No	No	0.00	0.00
T2	140.00-133.33	6.67	X Brace	No	No	0.00	0.00
T3	133.33-126.67	6.67	X Brace	No	No	0.00	0.00
T4	126.67-120.00	6.67	X Brace	No	Yes	0.00	0.00
T5	120.00-100.00	6.67	X Brace	No	Yes	0.00	0.00
T6	100.00-80.00	6.67	X Brace	No	Yes	0.00	0.00
T7	80.00-60.00	10.00	X Brace	No	Yes	0.00	0.00
T8	60.00-40.00	10.00	X Brace	No	No	0.00	0.00
T9	40.00-20.00	10.00	X Brace	No	No	0.00	0.00
T10	20.00-0.00	10.00	X Brace	No	No	0.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-140.00	Pipe	Pipe 2.875" x 0.203" (2.5 STD)	A572-50 (50 ksi)	Single Angle	L 1.75 x 1.75 x 3/16	A36 (36 ksi)
T2 140.00-133.33	Pipe	Pipe 2.875" x 0.203" (2.5 STD)	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)
T3 133.33-126.67	Pipe	Pipe 2.875" x 0.203" (2.5 STD)	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)
T4 126.67-120.00	Pipe	Pipe 2.875" x 0.203" (2.5 STD)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A572-50 (50 ksi)
T5 120.00-100.00	Pipe	Pipe 2.875" x 0.276" (2.5 XS)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T6 100.00-80.00	Pipe	Pipe 3.5" x 0.300" (3 XS)	A572-50 (50 ksi)	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)
T7 80.00-60.00	Pipe	Pipe 4.5" x 0.337" (4 XS)	A572-50 (50 ksi)	Single Angle	L 3 x 3 x 1/4	A36 (36 ksi)
T8 60.00-40.00	Pipe	Pipe 5.563" x 0.375" (5 XS)	A572-50 (50 ksi)	Single Angle	L 3.5 x 3.5 x 1/4	A36 (36 ksi)
T9 40.00-20.00	Pipe	Pipe 5.563" x 0.375" (5 XS)	A572-50 (50 ksi)	Single Angle	L 3.5 x 3.5 x 1/4	A36 (36 ksi)
T10 20.00-0.00	Pipe	Pipe 6.625" x 0.340" (6 EHS)	A572-50 (50 ksi)	Single Angle	L 4 x 4 x 1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 160.00-140.00	Single Angle	L 2 x 2 x 5/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T2 140.00-133.33	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T4 126.67-120.00	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 126.67-120.00	Single Angle	L 2 x 2 x 1/4	A572-50 (50 ksi)	Single Angle		A36 (36 ksi)
T5 120.00-100.00	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T6 100.00-80.00	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T7 80.00-60.00	Single Angle	L 3 x 3 x 1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 160.00-140.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T2 140.00-133.33	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T3 133.33-126.67	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T4 126.67-120.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T5 120.00-100.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T6 100.00-80.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T7 80.00-60.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T8 60.00-40.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T9 40.00-20.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00
T10 20.00-0.00	0.00	0.25	A36 (36 ksi)	1	1	1.05	6.00	6.00	36.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 160.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 140.00-133.33	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 133.33-126.67	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 126.67-120.00	No	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T5 120.00-100.00	No	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T6 100.00-80.00	No	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T7 80.00-60.00	No	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T8 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

[1]Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 160.00-140.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 140.00-133.33	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 133.33-126.67	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 126.67-120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 120.00-100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 100.00-80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 80.00-60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T8 60.00-40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T9 40.00-20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T10 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 160.00-140.00	Flange	0.63 A325N	4	0.63 A325N	1	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T2 140.00-133.33	Flange	0.63 A325N	0	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T3 133.33-126.67	Flange	0.63 A325N	0	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T4 126.67-120.00	Flange	0.63 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.63 A325N	1
T5 120.00-100.00	Flange	0.75 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.75 A325N	0
T6 100.00-80.00	Flange	0.88 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T7 80.00-60.00	Flange	1.00 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0
T8 60.00-40.00	Flange	1.00 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T9 40.00-20.00	Flange	1.00 A325N	6	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T10 20.00-0.00	Flange	1.00 A325N	0	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF6-50 (1 1/4" foam)	A	No	No	Ar (CaAa)	160.00 - 0.00	0.00	0.3	9	9	0.50 1.00	1.50		0.66
1.5" flat Cable Ladder Rail	A	No	No	Af (CaAa)	160.00 - 0.00	0.00	0.3	2	2	24.00 1.50	1.50		1.80
HFT1206-24SVL-210(1-5/8)	A	No	No	Ar (CaAa)	145.00 - 0.00	0.00	-0.37	18	9	0.27 0.52	1.71		1.92
1.5" flat Cable Ladder Rail ******	A	No	No	Af (CaAa)	145.00 - 0.00	0.00	-0.37	2	2	24.00 1.50	1.50		1.80
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	160.00 - 0.00	0.00	-0.4	3	3	0.50 1.00	1.50		0.66
LDF5-50A (7/8" foam)	B	No	No	Ar (CaAa)	160.00 - 0.00	0.00	0.4	2	2	1.09	1.09		0.33
Fiber Trunk	B	No	No	Ar (CaAa)	160.00 - 0.00	0.00	-0.35	1	1	1.75	1.75		3.00
DC Trunk	B	No	No	Ar (CaAa)	160.00 - 0.00	0.00	-0.37	2	2	0.26	0.26		0.03
LDF5-50A (7/8" foam)	B	No	No	Ar (CaAa)	120.00 - 0.00	0.00	0.36	1	1	1.09	1.09		0.33
LDF4-50A (1/2" foam)	B	No	No	Ar (CaAa)	40.00 - 0.00	0.00	0.33	1	1	0.63	0.63		0.15
1.5" flat Cable Ladder Rail	B	No	No	Af (CaAa)	160.00 - 0.00	0.00	-0.4	2	2	20.00 1.50	1.50		1.80
1.5" flat Cable Ladder Rail ********	B	No	No	Af (CaAa)	160.00 - 0.00	0.00	0.37	2	2	20.00 1.50	1.50		1.80
HFT1206-24SVL-XXX(1-5/8)	C	No	No	Ar (CaAa)	155.00 - 0.00	0.00	-0.4	14	6	0.50 0.52	1.71		1.92
1.5" flat Cable Ladder Rail	C	No	No	Af (CaAa)	155.00 - 0.00	0.00	-0.4	2	2	24.00 1.50	1.50		1.80

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	168.00-160.00	A	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T1	160.00-140.00	A	0.000	0.000	54.890	0.000	0.38
		B	0.000	0.000	37.884	0.000	0.26
		C	0.000	0.000	43.410	0.000	0.46
T2	140.00-133.33	A	0.000	0.000	36.187	0.000	0.32
		B	0.000	0.000	12.628	0.000	0.09
		C	0.000	0.000	19.293	0.000	0.20
T3	133.33-126.67	A	0.000	0.000	36.187	0.000	0.32
		B	0.000	0.000	12.628	0.000	0.09
		C	0.000	0.000	19.293	0.000	0.20
T4	126.67-120.00	A	0.000	0.000	36.187	0.000	0.32
		B	0.000	0.000	12.628	0.000	0.09
		C	0.000	0.000	19.293	0.000	0.20
T5	120.00-100.00	A	0.000	0.000	108.560	0.000	0.95
		B	0.000	0.000	40.064	0.000	0.26
		C	0.000	0.000	57.880	0.000	0.61
T6	100.00-80.00	A	0.000	0.000	108.560	0.000	0.95
		B	0.000	0.000	40.064	0.000	0.26
		C	0.000	0.000	57.880	0.000	0.61
T7	80.00-60.00	A	0.000	0.000	108.560	0.000	0.95
		B	0.000	0.000	40.064	0.000	0.26
		C	0.000	0.000	57.880	0.000	0.61
T8	60.00-40.00	A	0.000	0.000	108.560	0.000	0.95
		B	0.000	0.000	40.064	0.000	0.26
		C	0.000	0.000	57.880	0.000	0.61
T9	40.00-20.00	A	0.000	0.000	108.560	0.000	0.95
		B	0.000	0.000	41.324	0.000	0.27
		C	0.000	0.000	57.880	0.000	0.61
T10	20.00-0.00	A	0.000	0.000	108.560	0.000	0.95
		B	0.000	0.000	41.324	0.000	0.27
		C	0.000	0.000	57.880	0.000	0.61

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	168.00-160.00	A	2.348	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T1	160.00-140.00	A	2.327	0.000	0.000	108.132	0.000	2.20
		B		0.000	0.000	142.472	0.000	2.39
		C		0.000	0.000	59.906	0.000	1.59
T2	140.00-133.33	A	2.305	0.000	0.000	57.873	0.000	1.32
		B		0.000	0.000	47.197	0.000	0.79
		C		0.000	0.000	26.518	0.000	0.70
T3	133.33-126.67	A	2.294	0.000	0.000	57.763	0.000	1.31
		B		0.000	0.000	47.040	0.000	0.78
		C		0.000	0.000	26.461	0.000	0.70
T4	126.67-120.00	A	2.282	0.000	0.000	57.648	0.000	1.31
		B		0.000	0.000	46.876	0.000	0.78
		C		0.000	0.000	26.401	0.000	0.70
T5	120.00-100.00	A	2.256	0.000	0.000	172.202	0.000	3.88
		B		0.000	0.000	150.769	0.000	2.49
		C		0.000	0.000	78.817	0.000	2.07
T6	100.00-80.00	A	2.211	0.000	0.000	170.921	0.000	3.81
		B		0.000	0.000	148.757	0.000	2.42
		C		0.000	0.000	78.150	0.000	2.04
T7	80.00-60.00	A	2.156	0.000	0.000	169.353	0.000	3.73
		B		0.000	0.000	146.293	0.000	2.34
		C		0.000	0.000	77.334	0.000	2.00
T8	60.00-40.00	A	2.085	0.000	0.000	167.316	0.000	3.62
		B		0.000	0.000	143.092	0.000	2.23
		C		0.000	0.000	76.272	0.000	1.95
T9	40.00-20.00	A	1.981	0.000	0.000	164.356	0.000	3.47

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	147.618	0.000	2.22
		C		0.000	0.000	74.729	0.000	1.87
T10	20.00-0.00	A	1.775	0.000	0.000	158.491	0.000	3.18
		B		0.000	0.000	137.554	0.000	1.92
		C		0.000	0.000	71.666	0.000	1.73

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	168.00-160.00	0.00	0.00	0.00	0.00
T1	160.00-140.00	8.14	-10.21	8.47	-11.45
T2	140.00-133.33	4.34	-4.92	4.71	-7.21
T3	133.33-126.67	4.99	-5.58	5.32	-8.09
T4	126.67-120.00	4.10	-4.75	4.49	-6.95
T5	120.00-100.00	5.29	-5.31	6.70	-7.87
T6	100.00-80.00	5.38	-5.45	7.21	-8.52
T7	80.00-60.00	6.52	-6.52	8.56	-10.08
T8	60.00-40.00	7.47	-7.41	9.81	-11.53
T9	40.00-20.00	8.37	-7.76	11.98	-11.65
T10	20.00-0.00	8.37	-7.83	12.09	-11.95

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
T1	1	LDF6-50 (1 1/4" foam)	140.00 - 160.00	0.6000	0.6000
T1	2	1.5" flat Cable Ladder Rail	140.00 - 160.00	0.6000	0.6000
T1	3	HFT1206-24SVL-210(1-5/8)	140.00 - 145.00	0.6000	0.6000
T1	4	1.5" flat Cable Ladder Rail	140.00 - 145.00	0.6000	0.6000
T1	6	LDF6-50 (1 1/4" foam)	140.00 - 160.00	0.6000	0.6000
T1	7	LDF5-50A (7/8" foam)	140.00 - 160.00	0.6000	0.6000
T1	8	Fiber Trunk	140.00 - 160.00	0.6000	0.6000
T1	9	DC Trunk	140.00 - 160.00	0.6000	0.6000
T1	12	1.5" flat Cable Ladder Rail	140.00 - 160.00	0.6000	0.6000
T1	13	1.5" flat Cable Ladder Rail	140.00 - 160.00	0.6000	0.6000
T1	15	HFT1206-24SVL-XXX(1-5/8)	140.00 - 155.00	0.6000	0.6000
T1	16	1.5" flat Cable Ladder Rail	140.00 - 155.00	0.6000	0.6000
T2	1	LDF6-50 (1 1/4" foam)	133.33 - 140.00	0.6000	0.6000
T2	2	1.5" flat Cable Ladder Rail	133.33 - 140.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	3	HFT1206-24SVL-210(1-5/8)	133.33 - 140.00	0.6000	0.6000
T2	4	1.5" flat Cable Ladder Rail	133.33 - 140.00	0.6000	0.6000
T2	6	LDF6-50 (1 1/4" foam)	133.33 - 140.00	0.6000	0.6000
T2	7	LDF5-50A (7/8" foam)	133.33 - 140.00	0.6000	0.6000
T2	8	Fiber Trunk	133.33 - 140.00	0.6000	0.6000
T2	9	DC Trunk	133.33 - 140.00	0.6000	0.6000
T2	12	1.5" flat Cable Ladder Rail	133.33 - 140.00	0.6000	0.6000
T2	13	1.5" flat Cable Ladder Rail	133.33 - 140.00	0.6000	0.6000
T2	15	HFT1206-24SVL-XXX(1-5/8)	133.33 - 140.00	0.6000	0.6000
T2	16	1.5" flat Cable Ladder Rail	133.33 - 140.00	0.6000	0.6000
T3	1	LDF6-50 (1 1/4" foam)	126.67 - 133.33	0.6000	0.6000
T3	2	1.5" flat Cable Ladder Rail	126.67 - 133.33	0.6000	0.6000
T3	3	HFT1206-24SVL-210(1-5/8)	126.67 - 133.33	0.6000	0.6000
T3	4	1.5" flat Cable Ladder Rail	126.67 - 133.33	0.6000	0.6000
T3	6	LDF6-50 (1 1/4" foam)	126.67 - 133.33	0.6000	0.6000
T3	7	LDF5-50A (7/8" foam)	126.67 - 133.33	0.6000	0.6000
T3	8	Fiber Trunk	126.67 - 133.33	0.6000	0.6000
T3	9	DC Trunk	126.67 - 133.33	0.6000	0.6000
T3	12	1.5" flat Cable Ladder Rail	126.67 - 133.33	0.6000	0.6000
T3	13	1.5" flat Cable Ladder Rail	126.67 - 133.33	0.6000	0.6000
T3	15	HFT1206-24SVL-XXX(1-5/8)	126.67 - 133.33	0.6000	0.6000
T3	16	1.5" flat Cable Ladder Rail	126.67 - 133.33	0.6000	0.6000
T4	1	LDF6-50 (1 1/4" foam)	120.00 - 126.67	0.6000	0.5329
T4	2	1.5" flat Cable Ladder Rail	120.00 - 126.67	0.6000	0.5329
T4	3	HFT1206-24SVL-210(1-5/8)	120.00 - 126.67	0.6000	0.5329
T4	4	1.5" flat Cable Ladder Rail	120.00 - 126.67	0.6000	0.5329
T4	6	LDF6-50 (1 1/4" foam)	120.00 - 126.67	0.6000	0.5329
T4	7	LDF5-50A (7/8" foam)	120.00 - 126.67	0.6000	0.5329
T4	8	Fiber Trunk	120.00 - 126.67	0.6000	0.5329
T4	9	DC Trunk	120.00 - 126.67	0.6000	0.5329
T4	12	1.5" flat Cable Ladder Rail	120.00 - 126.67	0.6000	0.5329
T4	13	1.5" flat Cable Ladder Rail	120.00 - 126.67	0.6000	0.5329
T4	15	HFT1206-24SVL-XXX(1-5/8)	120.00 - 126.67	0.6000	0.5329
T4	16	1.5" flat Cable Ladder Rail	120.00 - 126.67	0.6000	0.5329
T5	1	LDF6-50 (1 1/4" foam)	100.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	2	1.5" flat Cable Ladder Rail	120.00 100.00 - 120.00	0.6000	0.6000
T5	3	HFT1206-24SVL-210(1-5/8)	100.00 - 120.00	0.6000	0.6000
T5	4	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T5	6	LDF6-50 (1 1/4" foam)	100.00 - 120.00	0.6000	0.6000
T5	7	LDF5-50A (7/8" foam)	100.00 - 120.00	0.6000	0.6000
T5	8	Fiber Trunk	100.00 - 120.00	0.6000	0.6000
T5	9	DC Trunk	100.00 - 120.00	0.6000	0.6000
T5	10	LDF5-50A (7/8" foam)	100.00 - 120.00	0.6000	0.6000
T5	12	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T5	13	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T5	15	HFT1206-24SVL-XXX(1-5/8)	100.00 - 120.00	0.6000	0.6000
T5	16	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T6	1	LDF6-50 (1 1/4" foam)	80.00 - 100.00	0.6000	0.6000
T6	2	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T6	3	HFT1206-24SVL-210(1-5/8)	80.00 - 100.00	0.6000	0.6000
T6	4	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T6	6	LDF6-50 (1 1/4" foam)	80.00 - 100.00	0.6000	0.6000
T6	7	LDF5-50A (7/8" foam)	80.00 - 100.00	0.6000	0.6000
T6	8	Fiber Trunk	80.00 - 100.00	0.6000	0.6000
T6	9	DC Trunk	80.00 - 100.00	0.6000	0.6000
T6	10	LDF5-50A (7/8" foam)	80.00 - 100.00	0.6000	0.6000
T6	12	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T6	13	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T6	15	HFT1206-24SVL-XXX(1-5/8)	80.00 - 100.00	0.6000	0.6000
T6	16	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T7	1	LDF6-50 (1 1/4" foam)	60.00 - 80.00	0.6000	0.6000
T7	2	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T7	3	HFT1206-24SVL-210(1-5/8)	60.00 - 80.00	0.6000	0.6000
T7	4	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T7	6	LDF6-50 (1 1/4" foam)	60.00 - 80.00	0.6000	0.6000
T7	7	LDF5-50A (7/8" foam)	60.00 - 80.00	0.6000	0.6000
T7	8	Fiber Trunk	60.00 - 80.00	0.6000	0.6000
T7	9	DC Trunk	60.00 - 80.00	0.6000	0.6000
T7	10	LDF5-50A (7/8" foam)	60.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	12	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T7	13	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T7	15	HFT1206-24SVL-XXX(1-5/8)	60.00 - 80.00	0.6000	0.6000
T7	16	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T8	1	LDF6-50 (1 1/4" foam)	40.00 - 60.00	0.6000	0.6000
T8	2	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T8	3	HFT1206-24SVL-210(1-5/8)	40.00 - 60.00	0.6000	0.6000
T8	4	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T8	6	LDF6-50 (1 1/4" foam)	40.00 - 60.00	0.6000	0.6000
T8	7	LDF5-50A (7/8" foam)	40.00 - 60.00	0.6000	0.6000
T8	8	Fiber Trunk	40.00 - 60.00	0.6000	0.6000
T8	9	DC Trunk	40.00 - 60.00	0.6000	0.6000
T8	10	LDF5-50A (7/8" foam)	40.00 - 60.00	0.6000	0.6000
T8	12	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T8	13	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T8	15	HFT1206-24SVL-XXX(1-5/8)	40.00 - 60.00	0.6000	0.6000
T8	16	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T9	1	LDF6-50 (1 1/4" foam)	20.00 - 40.00	0.6000	0.6000
T9	2	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T9	3	HFT1206-24SVL-210(1-5/8)	20.00 - 40.00	0.6000	0.6000
T9	4	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T9	6	LDF6-50 (1 1/4" foam)	20.00 - 40.00	0.6000	0.6000
T9	7	LDF5-50A (7/8" foam)	20.00 - 40.00	0.6000	0.6000
T9	8	Fiber Trunk	20.00 - 40.00	0.6000	0.6000
T9	9	DC Trunk	20.00 - 40.00	0.6000	0.6000
T9	10	LDF5-50A (7/8" foam)	20.00 - 40.00	0.6000	0.6000
T9	11	LDF4-50A (1/2" foam)	20.00 - 40.00	0.6000	0.6000
T9	12	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T9	13	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T9	15	HFT1206-24SVL-XXX(1-5/8)	20.00 - 40.00	0.6000	0.6000
T9	16	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T10	1	LDF6-50 (1 1/4" foam)	0.00 - 20.00	0.6000	0.6000
T10	2	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T10	3	HFT1206-24SVL-210(1-5/8)	0.00 - 20.00	0.6000	0.6000
T10	4	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T10	6	LDF6-50 (1 1/4" foam)	0.00 - 20.00	0.6000	0.6000
T10	7	LDF5-50A (7/8" foam)	0.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	8	Fiber Trunk	0.00 - 20.00	0.6000	0.6000
T10	9	DC Trunk	0.00 - 20.00	0.6000	0.6000
T10	10	LDF5-50A (7/8" foam)	0.00 - 20.00	0.6000	0.6000
T10	11	LDF4-50A (1/2" foam)	0.00 - 20.00	0.6000	0.6000
T10	12	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T10	13	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T10	15	HFT1206-24SVL-XXX(1-5/8)	0.00 - 20.00	0.6000	0.6000
T10	16	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	5.23 5.62 6.01	4.02 4.63 5.26	0.05 0.10 0.15
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	5.23 5.62 6.01	4.02 4.63 5.26	0.05 0.10 0.15
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	5.23 5.62 6.01	4.02 4.63 5.26	0.05 0.10 0.15
(2) TT19-08BP111-001	A	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.75	0.45 0.53 0.63	0.02 0.02 0.03
(2) TT19-08BP111-001	B	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.75	0.45 0.53 0.63	0.02 0.02 0.03
(2) TT19-08BP111-001	C	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.75	0.45 0.53 0.63	0.02 0.02 0.03
QS66512-2 w/ Mount Pipe	A	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	2.60 9.29 9.91	5.00 9.66 10.62	0.14 0.21 0.30
QS66512-2 w/ Mount Pipe	B	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	2.60 9.29 9.91	5.00 9.66 10.62	0.14 0.21 0.30
QS66512-2 w/ Mount Pipe	C	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	2.60 9.29 9.91	5.00 9.66 10.62	0.14 0.21 0.30
RRUS 11	A	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	B	From Leg	4.00 0 0	0.000	169.00	No Ice 1/2" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 11	C	From Leg	4.00 0 0	0.000	169.00	1" Ice No Ice 1/2" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 32	A	From Leg	4.00 0 0	0.000	169.00	1" Ice No Ice 1/2" Ice	2.86 3.08 3.32	1.78 1.97 2.17	0.06 0.08 0.10
RRUS 32	B	From Leg	4.00 0 0	0.000	169.00	1" Ice No Ice 1/2" Ice	2.86 3.08 3.32	1.78 1.97 2.17	0.06 0.08 0.10
RRUS 32	C	From Leg	4.00 0 0	0.000	169.00	1" Ice No Ice 1/2" Ice	2.86 3.08 3.32	1.78 1.97 2.17	0.06 0.08 0.10
DC6-48-60-18-8F	A	From Leg	4.00 0 0	0.000	169.00	1" Ice No Ice 1/2" Ice	1.21 1.89 2.11	1.21 1.89 2.11	0.03 0.05 0.08
T-Arm Mount [TA 701-3]	C	From Centroid-Face	2.00 0 0	0.000	169.00	1" Ice No Ice 1/2" Ice	27.95 37.26 46.57	27.95 37.26 46.57	1.09 1.41 1.72
*******						1" Ice			
(2) LPA-80063-4CF-EDIN-X w/ Mount Pipe	A	From Leg	4.00 0 2	0.000	155.00	No Ice 1/2" Ice	6.38 6.78 7.19	6.56 7.19 7.84	0.04 0.10 0.18
(2) LPA-80063-4CF-EDIN-X w/ Mount Pipe	B	From Leg	4.00 0 2	0.000	155.00	1" Ice No Ice 1/2" Ice	6.38 6.78 7.19	6.56 7.19 7.84	0.04 0.10 0.18
(2) LPA-80063-4CF-EDIN-X w/ Mount Pipe	C	From Leg	4.00 0 2	0.000	155.00	1" Ice No Ice 1/2" Ice	6.38 6.78 7.19	6.56 7.19 7.84	0.04 0.10 0.18
(2) NNHH-65B-R4 w/ Mount Pipe	A	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	12.51 13.11 13.67	7.41 8.60 9.50	0.10 0.19 0.29
(2) NNHH-65B-R4 w/ Mount Pipe	B	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	12.51 13.11 13.67	7.41 8.60 9.50	0.10 0.19 0.29
(2) NNHH-65B-R4 w/ Mount Pipe	C	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	12.51 13.11 13.67	7.41 8.60 9.50	0.10 0.19 0.29
B5/B13 RRH	A	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH	B	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH	C	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH	A	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
B2/B66A RRH	B	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH	C	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
RVZDC-6627-PF-48	B	From Leg	4.00 0 3	0.000	155.00	1" Ice No Ice 1/2" Ice 1" Ice	3.79 4.04 4.30	2.51 2.73 2.95	0.03 0.06 0.10
OVP	C	From Leg	4.00 0 0	0.000	155.00	1" Ice No Ice 1/2" Ice 1" Ice	3.79 4.04 4.30	2.51 2.73 2.95	0.03 0.06 0.10
VFA-12	C	None		0.000	155.00	No Ice 1/2" Ice 1" Ice	33.64 48.17 62.70	33.64 48.17 62.70	1.69 2.26 2.82
********									
(2) TMA (10" x 8" x 3")	A	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	0.67 0.77 0.88	0.33 0.41 0.50	0.02 0.03 0.03
(2) TMA (10" x 8" x 3")	B	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	0.67 0.77 0.88	0.33 0.41 0.50	0.02 0.03 0.03
(2) TMA (10" x 8" x 3")	C	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	0.67 0.77 0.88	0.33 0.41 0.50	0.02 0.03 0.03
Celwave APX16DWV-16DWV-S-E-A20 w/Mount Pipe	A	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	6.67 7.06 7.47	3.34 3.99 4.64	0.06 0.11 0.16
Celwave APX16DWV-16DWV-S-E-A20 w/Mount Pipe	B	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	6.67 7.06 7.47	3.34 3.99 4.64	0.06 0.11 0.16
Celwave APX16DWV-16DWV-S-E-A20 w/Mount Pipe	C	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	6.67 7.06 7.47	3.34 3.99 4.64	0.06 0.11 0.16
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	11.69 12.40 13.11	10.29 11.81 13.16	0.10 0.20 0.30
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	11.69 12.40 13.11	10.29 11.81 13.16	0.10 0.20 0.30
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00 0 0	0.000	145.00	No Ice 1/2" Ice 1" Ice	11.69 12.40 13.11	10.29 11.81 13.16	0.10 0.20 0.30
Sector Mount [SM 408-3]	C	None		0.000	145.00	No Ice 1/2" Ice 1" Ice	22.45 33.50 44.55	22.45 33.50 44.55	1.02 1.47 1.93
******									
15 ft x 2" omni whip	A	From Leg	1.00 0	0.000	160.00	No Ice 1/2"	3.00 4.53	3.00 4.53	0.03 0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			5			Ice 1" Ice	6.07	6.07	0.09
Side Arm Mount [SO 302-1]	A	From Leg	3.00 0 0	0.000	160.00	No Ice 1/2" Ice 1" Ice	1.67 2.51 3.35	3.27 4.99 6.71	0.06 0.09 0.12
*****									
15 ft x 2" omni whip	C	From Leg	6.00 0 10	0.000	118.00	No Ice 1/2" Ice 1" Ice	3.00 4.53 6.07	3.00 4.53 6.07	0.03 0.05 0.09
Side Arm Mount [SO 302-1]	C	From Leg	3.00 0 0	0.000	118.00	No Ice 1/2" Ice 1" Ice	1.67 2.51 3.35	3.27 4.99 6.71	0.06 0.09 0.12
*****									
16 ft x 2" omni whip	C	From Leg	6.00 0 9	0.000	99.00	No Ice 1/2" Ice 1" Ice	3.20 4.83 6.47	3.20 4.83 6.47	0.03 0.06 0.09
Side Arm Mount [SO 302-1]	C	From Leg	3.00 0 0	0.000	99.00	No Ice 1/2" Ice 1" Ice	1.67 2.51 3.35	3.27 4.99 6.71	0.06 0.09 0.12
******									
Side Arm Mount [SO 302-1]	A	From Leg	3.00 0 0	0.000	47.00	No Ice 1/2" Ice 1" Ice	1.67 2.51 3.35	3.27 4.99 6.71	0.06 0.09 0.12
******									
12 ft x 2" omni whip	C	From Leg	6.00 0 8	0.000	38.00	No Ice 1/2" Ice 1" Ice	2.40 3.63 4.87	2.40 3.63 4.87	0.02 0.04 0.07
Side Arm Mount [SO 302-1]	C	From Leg	3.00 0 0	0.000	38.00	No Ice 1/2" Ice 1" Ice	1.67 2.51 3.35	3.27 4.99 6.71	0.06 0.09 0.12

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

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

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	220.50	22.06	-12.75
	Max. H_x	18	220.50	22.06	-12.75
	Max. H_z	7	-180.05	-18.83	10.92
	Min. Vert	7	-180.05	-18.83	10.92
	Min. H_x	7	-180.05	-18.83	10.92
	Min. H_z	18	220.50	22.06	-12.75
Leg B	Max. Vert	10	236.51	-24.12	-13.79
	Max. H_x	23	-197.60	20.93	12.00
	Max. H_z	23	-197.60	20.93	12.00
	Min. Vert	23	-197.60	20.93	12.00
	Min. H_x	10	236.51	-24.12	-13.79
	Min. H_z	10	236.51	-24.12	-13.79
Leg A	Max. Vert	2	222.44	0.33	26.05
	Max. H_x	21	11.07	3.60	0.90
	Max. H_z	2	222.44	0.33	26.05
	Min. Vert	15	-186.30	-0.35	-22.42
	Min. H_x	9	10.58	-3.62	0.83
	Min. H_z	15	-186.30	-0.35	-22.42

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	39.44	0.00	0.00	22	8	0
1.2 Dead+1.6 Wind 0 deg - No Ice	47.33	-0.05	-42.25	-4092	15	13
0.9 Dead+1.6 Wind 0 deg - No Ice	35.50	-0.05	-42.25	-4093	12	13
1.2 Dead+1.6 Wind 30 deg - No Ice	47.33	18.27	-31.65	-3136	-1818	25
0.9 Dead+1.6 Wind 30 deg - No Ice	35.50	18.27	-31.65	-3138	-1817	25
1.2 Dead+1.6 Wind 60 deg - No Ice	47.33	33.37	-19.21	-1879	-3303	-1
0.9 Dead+1.6 Wind 60 deg - No Ice	35.50	33.37	-19.21	-1883	-3301	-1
1.2 Dead+1.6 Wind 90 deg - No Ice	47.33	41.45	0.05	31	-4054	-15
0.9 Dead+1.6 Wind 90 deg - No Ice	35.50	41.45	0.05	25	-4051	-15
1.2 Dead+1.6 Wind 120 deg - No Ice	47.33	39.18	22.62	2208	-3772	4
0.9 Dead+1.6 Wind 120 deg - No Ice	35.50	39.18	22.62	2199	-3769	4
1.2 Dead+1.6 Wind 150 deg - No Ice	47.33	20.66	35.68	3519	-2013	10
0.9 Dead+1.6 Wind 150 deg - No Ice	35.50	20.66	35.68	3507	-2013	10
1.2 Dead+1.6 Wind 180 deg - No Ice	47.33	0.05	39.57	3936	5	-13
0.9 Dead+1.6 Wind 180 deg - No Ice	35.50	0.05	39.57	3923	3	-13
1.2 Dead+1.6 Wind 210 deg - No Ice	47.33	-18.27	31.65	3189	1838	-25
0.9 Dead+1.6 Wind 210 deg - No Ice	35.50	-18.27	31.65	3178	1832	-25
1.2 Dead+1.6 Wind 240 deg - No Ice	47.33	-35.69	20.55	2037	3505	1
0.9 Dead+1.6 Wind 240 deg - No Ice	35.50	-35.69	20.55	2027	3497	1
1.2 Dead+1.6 Wind 270 deg - No Ice	47.33	-41.45	-0.05	22	4074	15
0.9 Dead+1.6 Wind 270 deg - No Ice	35.50	-41.45	-0.05	15	4066	15
1.2 Dead+1.6 Wind 300 deg - No Ice	47.33	-36.86	-21.28	-2050	3611	-4
0.9 Dead+1.6 Wind 300 deg - No Ice	35.50	-36.86	-21.28	-2054	3603	-4
1.2 Dead+1.6 Wind 330 deg - No Ice	47.33	-20.66	-35.68	-3465	2034	-10
0.9 Dead+1.6 Wind 330 deg - No Ice	35.50	-20.66	-35.68	-3467	2028	-10
1.2 Dead+1.0 Ice+1.0 Temp	163.84	0.00	0.00	4	-9	0
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	163.84	-0.03	-13.74	-1401	-6	5
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	163.84	6.35	-11.01	-1139	-669	6
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	163.84	11.60	-6.67	-684	-1206	-2
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	163.84	13.80	0.03	7	-1423	-7
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	163.84	12.64	7.31	744	-1291	-5
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	163.84	6.79	11.71	1204	-705	-1
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	163.84	0.03	13.38	1382	-12	-5
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	163.84	-6.35	11.01	1147	651	-6
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	163.84	-11.92	6.85	705	1211	2
1.2 Dead+1.0 Wind 270	163.84	-13.80	-0.03	1	1405	7

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 300 deg+1.0 Ice+1.0 Temp	163.84	-12.33	-7.13	-722	1249	5
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	163.84	-6.79	-11.71	-1196	687	1
Dead+Wind 0 deg - Service	39.44	-0.01	-10.11	-964	10	3
Dead+Wind 30 deg - Service	39.44	4.37	-7.58	-735	-429	6
Dead+Wind 60 deg - Service	39.44	7.99	-4.60	-434	-785	0
Dead+Wind 90 deg - Service	39.44	9.92	0.01	23	-964	-3
Dead+Wind 120 deg - Service	39.44	9.38	5.42	544	-897	1
Dead+Wind 150 deg - Service	39.44	4.95	8.54	858	-476	2
Dead+Wind 180 deg - Service	39.44	0.01	9.47	958	7	-3
Dead+Wind 210 deg - Service	39.44	-4.37	7.58	779	446	-6
Dead+Wind 240 deg - Service	39.44	-8.54	4.92	503	845	0
Dead+Wind 270 deg - Service	39.44	-9.92	-0.01	21	981	3
Dead+Wind 300 deg - Service	39.44	-8.82	-5.09	-475	870	-1
Dead+Wind 330 deg - Service	39.44	-4.95	-8.54	-814	493	-2

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-39.44	0.00	0.00	39.44	0.00	0.000%
2	-0.05	-47.33	-42.25	0.05	47.33	42.25	0.000%
3	-0.05	-35.50	-42.25	0.05	35.50	42.25	0.002%
4	18.27	-47.33	-31.65	-18.27	47.33	31.65	0.000%
5	18.27	-35.50	-31.65	-18.27	35.50	31.65	0.000%
6	33.37	-47.33	-19.21	-33.37	47.33	19.21	0.000%
7	33.37	-35.50	-19.21	-33.37	35.50	19.21	0.000%
8	41.45	-47.33	0.05	-41.45	47.33	-0.05	0.000%
9	41.45	-35.50	0.05	-41.45	35.50	-0.05	0.000%
10	39.18	-47.33	22.62	-39.18	47.33	-22.62	0.000%
11	39.18	-35.50	22.62	-39.18	35.50	-22.62	0.000%
12	20.66	-47.33	35.68	-20.66	47.33	-35.68	0.000%
13	20.66	-35.50	35.68	-20.66	35.50	-35.68	0.000%
14	0.05	-47.33	39.57	-0.05	47.33	-39.57	0.000%
15	0.05	-35.50	39.57	-0.05	35.50	-39.57	0.000%
16	-18.27	-47.33	31.65	18.27	47.33	-31.65	0.000%
17	-18.27	-35.50	31.65	18.27	35.50	-31.65	0.000%
18	-35.69	-47.33	20.55	35.69	47.33	-20.55	0.000%
19	-35.69	-35.50	20.55	35.69	35.50	-20.55	0.000%
20	-41.45	-47.33	-0.05	41.45	47.33	0.05	0.000%
21	-41.45	-35.50	-0.05	41.45	35.50	0.05	0.000%
22	-36.86	-47.33	-21.28	36.86	47.33	21.28	0.000%
23	-36.86	-35.50	-21.28	36.86	35.50	21.28	0.000%
24	-20.66	-47.33	-35.68	20.66	47.33	35.68	0.000%
25	-20.66	-35.50	-35.68	20.66	35.50	35.68	0.000%
26	0.00	-163.84	0.00	0.00	163.84	0.00	0.000%
27	-0.03	-163.84	-13.74	0.03	163.84	13.74	0.000%
28	6.35	-163.84	-11.01	-6.35	163.84	11.01	0.000%
29	11.60	-163.84	-6.67	-11.60	163.84	6.67	0.000%
30	13.80	-163.84	0.03	-13.80	163.84	-0.03	0.000%
31	12.64	-163.84	7.31	-12.64	163.84	-7.31	0.000%
32	6.79	-163.84	11.71	-6.79	163.84	-11.71	0.000%
33	0.03	-163.84	13.38	-0.03	163.84	-13.38	0.000%
34	-6.35	-163.84	11.01	6.35	163.84	-11.01	0.000%
35	-11.92	-163.84	6.85	11.92	163.84	-6.85	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
36	-13.80	-163.84	-0.03	13.80	163.84	0.03	0.000%
37	-12.33	-163.84	-7.13	12.33	163.84	7.13	0.000%
38	-6.79	-163.84	-11.71	6.79	163.84	11.71	0.000%
39	-0.01	-39.44	-10.11	0.01	39.44	10.11	0.000%
40	4.37	-39.44	-7.58	-4.37	39.44	7.58	0.000%
41	7.99	-39.44	-4.60	-7.99	39.44	4.60	0.000%
42	9.92	-39.44	0.01	-9.92	39.44	-0.01	0.000%
43	9.38	-39.44	5.42	-9.38	39.44	-5.42	0.000%
44	4.95	-39.44	8.54	-4.95	39.44	-8.54	0.000%
45	0.01	-39.44	9.47	-0.01	39.44	-9.47	0.000%
46	-4.37	-39.44	7.58	4.37	39.44	-7.58	0.000%
47	-8.54	-39.44	4.92	8.54	39.44	-4.92	0.000%
48	-9.92	-39.44	-0.01	9.92	39.44	0.01	0.000%
49	-8.82	-39.44	-5.09	8.82	39.44	5.09	0.000%
50	-4.95	-39.44	-8.54	4.95	39.44	8.54	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	0.00000324
3	Yes	4	0.00000001	0.00000311
4	Yes	4	0.00000001	0.00001012
5	Yes	4	0.00000001	0.00000594
6	Yes	4	0.00000001	0.00000764
7	Yes	4	0.00000001	0.00000480
8	Yes	4	0.00000001	0.00000697
9	Yes	4	0.00000001	0.00000437
10	Yes	4	0.00000001	0.00000917
11	Yes	4	0.00000001	0.00000538
12	Yes	4	0.00000001	0.00000627
13	Yes	4	0.00000001	0.00000414
14	Yes	4	0.00000001	0.00000487
15	Yes	4	0.00000001	0.00000374
16	Yes	4	0.00000001	0.00000950
17	Yes	4	0.00000001	0.00000562
18	Yes	4	0.00000001	0.00000933
19	Yes	4	0.00000001	0.00000537
20	Yes	4	0.00000001	0.00000697
21	Yes	4	0.00000001	0.00000438
22	Yes	4	0.00000001	0.00000766
23	Yes	4	0.00000001	0.00000504
24	Yes	4	0.00000001	0.00000698
25	Yes	4	0.00000001	0.00000446
26	Yes	4	0.00000001	0.00000339
27	Yes	4	0.00000001	0.00003142
28	Yes	4	0.00000001	0.00003631
29	Yes	4	0.00000001	0.00003789
30	Yes	4	0.00000001	0.00003781
31	Yes	4	0.00000001	0.00003857
32	Yes	4	0.00000001	0.00003556
33	Yes	4	0.00000001	0.00003465
34	Yes	4	0.00000001	0.00003951
35	Yes	4	0.00000001	0.00004021
36	Yes	4	0.00000001	0.00003712
37	Yes	4	0.00000001	0.00003571
38	Yes	4	0.00000001	0.00003275
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001

46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	168 - 160	4.61	43	0.492	0.032
T1	160 - 140	3.93	43	0.233	0.016
T2	140 - 133.333	2.95	43	0.218	0.014
T3	133.333 - 126.667	2.64	43	0.207	0.013
T4	126.667 - 120	2.36	43	0.193	0.012
T5	120 - 100	2.09	43	0.178	0.011
T6	100 - 80	1.40	43	0.136	0.008
T7	80 - 60	0.88	43	0.098	0.006
T8	60 - 40	0.51	43	0.069	0.004
T9	40 - 20	0.24	43	0.047	0.003
T10	20 - 1e-006	0.07	43	0.023	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
169.00	(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	43	4.61	0.492	0.032	3848
160.00	15 ft x 2" omni whip	43	3.93	0.233	0.016	2815
155.00	(2) LPA-80063-4CF-EDIN-X w/ Mount Pipe	43	3.61	0.189	0.011	3551
145.00	(2) TMA (10" x 8" x 3")	43	3.16	0.198	0.013	162927
118.00	15 ft x 2" omni whip	43	2.01	0.173	0.011	24072
99.00	16 ft x 2" omni whip	43	1.37	0.134	0.008	31009
47.00	Side Arm Mount [SO 302-1]	43	0.32	0.055	0.003	51979
38.00	12 ft x 2" omni whip	43	0.22	0.044	0.003	52620

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	168 - 160	19.00	10	1.775	0.135
T1	160 - 140	16.33	10	0.961	0.066
T2	140 - 133.333	12.27	10	0.903	0.059
T3	133.333 - 126.667	11.00	10	0.857	0.054
T4	126.667 - 120	9.81	10	0.802	0.050
T5	120 - 100	8.69	10	0.739	0.046
T6	100 - 80	5.84	10	0.566	0.035
T7	80 - 60	3.67	10	0.410	0.025
T8	60 - 40	2.11	10	0.289	0.018
T9	40 - 20	1.00	10	0.195	0.012
T10	20 - 1e-006	0.30	10	0.095	0.006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
169.00	(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	10	19.00	1.775	0.135	1169
160.00	15 ft x 2" omni whip	10	16.33	0.961	0.066	855
155.00	(2) LPA-80063-4CF-EDIN-X w/ Mount Pipe	10	15.05	0.757	0.048	1075
145.00	(2) TMA (10" x 8" x 3")	10	13.15	0.838	0.054	65061
118.00	15 ft x 2" omni whip	10	8.37	0.720	0.045	5885
99.00	16 ft x 2" omni whip	10	5.72	0.558	0.034	7445
47.00	Side Arm Mount [SO 302-1]	10	1.35	0.227	0.014	12490
38.00	12 ft x 2" omni whip	10	0.91	0.185	0.011	12642

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	160	Leg	A325N	0.63	4	4.78	20.71	0.231 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	4.61	5.81	0.793 ✔	1	Member Block Shear
		Top Girt	A325N	0.63	1	1.54	10.44	0.147 ✔	1	Gusset Bearing
T2	140	Diagonal	A325N	0.63	1	4.28	6.83	0.627 ✔	1	Member Block Shear
T3	133.333	Diagonal	A325N	0.63	1	4.47	6.83	0.655 ✔	1	Member Block Shear
T4	126.667	Leg	A325N	0.63	4	11.12	20.71	0.537 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	4.48	10.44	0.429 ✔	1	Gusset Bearing
		Secondary Horizontal	A325N	0.63	1	0.94	10.44	0.090 ✔	1	Gusset Bearing
T5	120	Leg	A325N	0.75	4	17.61	29.82	0.590 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	5.10	7.83	0.652 ✔	1	Member Bearing
T6	100	Leg	A325N	0.88	4	24.07	40.59	0.593 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	5.82	7.83	0.743 ✔	1	Member Bearing
T7	80	Leg	A325N	1.00	4	29.86	53.01	0.563 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	6.75	10.44	0.647 ✔	1	Gusset Bearing
T8	60	Leg	A325N	1.00	4	36.20	53.01	0.683 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	7.44	10.44	0.712 ✔	1	Gusset Bearing
T9	40	Leg	A325N	1.00	6	28.13	53.01	0.531 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	7.53	10.44	0.721 ✔	1	Member Bearing
T10	20	Diagonal	A325N	0.63	1	8.31	10.44	0.796 ✔	1	Member Bearing

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	168 - 160 (1)	Pipe 8.625" x 0.322" (8 STD)	8.00	0.00	0.0	8.40	-2.96	377.97	0.008
T1	160 - 140 (197)	Pipe 8.625" x 0.322" (8 STD)	8.00	0.00	32.7 K=1.00	8.40	-3.13	349.58	0.009

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	168 - 160 (1)	Pipe 8.625" x 0.322" (8 STD)	28	83	0.333	0	83	0.000
T1	160 - 140 (197)	Pipe 8.625" x 0.322" (8 STD)	28	83	0.333	0	83	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	168 - 160 (1)	Pipe 8.625" x 0.322" (8 STD)	2.87	188.98	0.015	0	126	0.000
T1	160 - 140 (197)	Pipe 8.625" x 0.322" (8 STD)	3.47	188.98	0.018	0	126	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	168 - 160 (1)	0.008	0.333	0.000	0.015	0.000	0.341 ✔	1.000	4.8.2 ✔
T1	160 - 140 (197)	0.009	0.333	0.000	0.018	0.000	0.343 ✔	1.000	4.8.2 ✔

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	Pipe 2.875" x 0.203" (2.5 STD)	20.00	5.00	63.3 K=1.00	1.70	-26.14	57.19	0.457 [1]
T2	140 - 133.333	Pipe 2.875" x 0.203" (2.5 STD)	6.68	6.68	84.6 K=1.00	1.70	-35.63	45.45	0.784 [1]
T3	133.333 - 126.667	Pipe 2.875" x 0.203" (2.5 STD)	6.68	6.68	84.6 K=1.00	1.70	-45.10	45.45	0.992 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	126.667 - 120	Pipe 2.875" x 0.203" (2.5 STD)	6.68	3.45	43.7 K=1.00	1.70	-54.23	66.71	0.813 [1]
T5	120 - 100	Pipe 2.875" x 0.276" (2.5 XS)	20.03	3.43	44.6 K=1.00	2.25	-83.90	87.71	0.957 [1]
T6	100 - 80	Pipe 3.5" x 0.300" (3 XS)	20.03	3.42	36.1 K=1.00	3.02	-113.87	123.39	0.923 [1]
T7	80 - 60	Pipe 4.5" x 0.337" (4 XS)	20.04	5.17	42.0 K=1.00	4.41	-141.44	174.33	0.811 [1]
T8	60 - 40	Pipe 5.563" x 0.375" (5 XS)	20.03	10.02	65.4 K=1.00	6.11	-171.66	201.25	0.853 [1]
T9	40 - 20	Pipe 5.563" x 0.375" (5 XS)	20.04	10.02	65.4 K=1.00	6.11	-200.72	201.23	0.997 [1]
T10	20 - 1e-006	Pipe 6.625" x 0.340" (6 EHS)	20.03	10.02	54.0 K=1.00	6.71	-229.18	244.06	0.939 [1]

[1] P_u / ϕP_n controls

Leg Bending Design Data (Compression)

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 $\frac{M_{uy}}{\phi M_{ny}}$
T1	160 - 140	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T2	140 - 133.333	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T3	133.333 - 126.667	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T4	126.667 - 120	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T5	120 - 100	Pipe 2.875" x 0.276" (2.5 XS)	0	7	0.000	0	7	0.000
T6	100 - 80	Pipe 3.5" x 0.300" (3 XS)	0	12	0.000	0	12	0.000
T7	80 - 60	Pipe 4.5" x 0.337" (4 XS)	0	22	0.000	0	22	0.000
T8	60 - 40	Pipe 5.563" x 0.375" (5 XS)	0	38	0.000	0	38	0.000
T9	40 - 20	Pipe 5.563" x 0.375" (5 XS)	0	38	0.000	0	38	0.000
T10	20 - 1e-006	Pipe 6.625" x 0.340" (6 EHS)	0	50	0.000	0	50	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	160 - 140	Pipe 2.875" x 0.203" (2.5 STD)	0.457	0.000	0.000	0.457 [1] ✔	1.000	4.8.1 ✔
T2	140 - 133.333	Pipe 2.875" x 0.203" (2.5 STD)	0.784	0.000	0.000	0.784 [1] ✔	1.000	4.8.1 ✔
T3	133.333 - 126.667	Pipe 2.875" x 0.203" (2.5 STD)	0.992	0.000	0.000	0.992 [1] ✔	1.000	4.8.1 ✔
T4	126.667 - 120	Pipe 2.875" x 0.203" (2.5 STD)	0.813	0.000	0.000	0.813 [1] ✔	1.000	4.8.1 ✔
T5	120 - 100	Pipe 2.875" x 0.276" (2.5 XS)	0.957	0.000	0.000	0.957 [1] ✔	1.000	4.8.1 ✔
T6	100 - 80	Pipe 3.5" x 0.300" (3 XS)	0.923	0.000	0.000	0.923 [1] ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T7	80 - 60	Pipe 4.5" x 0.337" (4 XS)	0.811	0.000	0.000	0.811 [1] ✔	1.000	4.8.1 ✔
T8	60 - 40	Pipe 5.563" x 0.375" (5 XS)	0.853	0.000	0.000	0.853 [1] ✔	1.000	4.8.1 ✔
T9	40 - 20	Pipe 5.563" x 0.375" (5 XS)	0.997	0.000	0.000	0.997 [1] ✔	1.000	4.8.1 ✔
T10	20 - 1e-006	Pipe 6.625" x 0.340" (6 EHS)	0.939	0.000	0.000	0.939 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

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
T1	160 - 140	L 1.75 x 1.75 x 3/16	9.99	4.74	165.5 K=1.00	0.62	-4.72	5.13	0.921 [1] ✔
T2	140 - 133.333	L 2 x 2 x 3/16	11.19	5.53	168.5 K=1.00	0.71	-4.41	5.69	0.775 [1] ✔
T3	133.333 - 126.667	L 2 x 2 x 3/16	11.73	5.80	176.7 K=1.00	0.71	-4.48	5.17	0.866 [1] ✔
T4	126.667 - 120	L 2.5 x 2.5 x 3/16	12.28	6.20	150.2 K=1.00	0.90	-4.87	9.03	0.540 [1] ✔
T5	120 - 100	L 2.5 x 2.5 x 3/16	14.03	7.07	171.5 K=1.00	0.90	-5.22	6.93	0.754 [1] ✔
T6	100 - 80	L 3 x 3 x 3/16	15.84	7.94	159.8 K=1.00	1.09	-6.27	9.64	0.650 [1] ✔
T7	80 - 60	L 3 x 3 x 1/4	19.09	9.63	195.0 K=1.00	1.44	-7.38	8.54	0.864 [1] ✔
T8	60 - 40	L 3.5 x 3.5 x 1/4	20.83	10.32	178.4 K=1.00	1.69	-7.87	12.00	0.656 [1] ✔
T9	40 - 20	L 3.5 x 3.5 x 1/4	22.67	11.25	194.5 K=1.00	1.69	-8.09	10.09	0.802 [1] ✔
T10	20 - 1e-006	L 4 x 4 x 1/4	24.50	12.10	182.7 K=1.00	1.94	-9.25	13.13	0.704 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

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
T4	126.667 - 120	L 2 x 2 x 1/4	10.30	5.03	154.4 K=1.00	0.94	-0.94	8.89	0.106 [1] ✔
T5	120 - 100	L 2.5 x 2.5 x 3/16	12.34	6.05	146.6 K=1.00	0.90	-1.46	9.48	0.154 [1] ✔
T6	100 - 80	L 3 x 3 x 3/16	14.35	7.03	141.5 K=1.00	1.09	-1.97	12.30	0.161 [1] ✔
T7	80 - 60	L 3 x 3 x 1/4	16.24	7.93	160.7 K=1.00	1.44	-2.45	12.58	0.195 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	160 - 140	L 2 x 2 x 5/16	8.65	8.17	251.3 K=1.00	1.15	-1.49	4.11	0.361 [1] ✔
T2	140 - 133.333	KL/R > 200 (C) - 6 L 2 x 2 x 3/16	8.65	8.41	203.7 K=0.80	0.71	-0.28	3.89	0.072 [1] ✔
T4	126.667 - 120	KL/R > 200 (C) - 36 L 3 x 3 x 3/16	9.98	9.74	196.0 K=1.00	1.09	-0.67	6.41	0.104 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	160 - 140	Pipe 2.875" x 0.203" (2.5 STD)	20.00	5.00	63.3	1.70	19.10	76.68	0.249 [1]
T2	140 - 133.333	Pipe 2.875" x 0.203" (2.5 STD)	6.68	6.68	84.6	1.70	27.69	76.68	0.361 [1]
T3	133.333 - 126.667	Pipe 2.875" x 0.203" (2.5 STD)	6.68	6.68	84.6	1.70	36.19	76.68	0.472 [1]
T4	126.667 - 120	Pipe 2.875" x 0.203" (2.5 STD)	6.68	3.23	40.9	1.70	44.51	76.68	0.580 [1]
T5	120 - 100	Pipe 2.875" x 0.276" (2.5 XS)	20.03	3.25	42.2	2.25	70.49	101.41	0.695 [1]
T6	100 - 80	Pipe 3.5" x 0.300" (3 XS)	20.03	3.26	34.4	3.02	96.35	135.72	0.710 [1]
T7	80 - 60	Pipe 4.5" x 0.337" (4 XS)	20.04	4.85	39.4	4.41	119.57	198.34	0.603 [1]
T8	60 - 40	Pipe 5.563" x 0.375" (5 XS)	20.03	10.02	65.4	6.11	144.82	275.04	0.527 [1]
T9	40 - 20	Pipe 5.563" x 0.375" (5 XS)	20.04	10.02	65.4	6.11	168.78	275.04	0.614 [1]
T10	20 - 1e-006	Pipe 6.625" x 0.340" (6 EHS)	20.03	10.02	54.0	6.71	191.86	302.10	0.635 [1]

[1] P_u / ϕP_n controls

Leg Bending Design Data (Tension)

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
T1	160 - 140	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T2	140 - 133.333	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T3	133.333 - 126.667	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000

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 $\frac{M_{uy}}{\phi M_{ny}}$
T4	126.667 - 120	Pipe 2.875" x 0.203" (2.5 STD)	0	5	0.000	0	5	0.000
T5	120 - 100	Pipe 2.875" x 0.276" (2.5 XS)	0	7	0.000	0	7	0.000
T6	100 - 80	Pipe 3.5" x 0.300" (3 XS)	0	12	0.000	0	12	0.000
T7	80 - 60	Pipe 4.5" x 0.337" (4 XS)	0	22	0.000	0	22	0.000
T8	60 - 40	Pipe 5.563" x 0.375" (5 XS)	0	38	0.000	0	38	0.000
T9	40 - 20	Pipe 5.563" x 0.375" (5 XS)	0	38	0.000	0	38	0.000
T10	20 - 1e-006	Pipe 6.625" x 0.340" (6 EHS)	0	50	0.000	0	50	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	160 - 140	Pipe 2.875" x 0.203" (2.5 STD)	0.249	0.000	0.000	0.249 [1] ✔	1.000	4.8.1 ✔
T2	140 - 133.333	Pipe 2.875" x 0.203" (2.5 STD)	0.361	0.000	0.000	0.361 [1] ✔	1.000	4.8.1 ✔
T3	133.333 - 126.667	Pipe 2.875" x 0.203" (2.5 STD)	0.472	0.000	0.000	0.472 [1] ✔	1.000	4.8.1 ✔
T4	126.667 - 120	Pipe 2.875" x 0.203" (2.5 STD)	0.580	0.000	0.000	0.580 [1] ✔	1.000	4.8.1 ✔
T5	120 - 100	Pipe 2.875" x 0.276" (2.5 XS)	0.695	0.000	0.000	0.695 [1] ✔	1.000	4.8.1 ✔
T6	100 - 80	Pipe 3.5" x 0.300" (3 XS)	0.710	0.000	0.000	0.710 [1] ✔	1.000	4.8.1 ✔
T7	80 - 60	Pipe 4.5" x 0.337" (4 XS)	0.603	0.000	0.000	0.603 [1] ✔	1.000	4.8.1 ✔
T8	60 - 40	Pipe 5.563" x 0.375" (5 XS)	0.527	0.000	0.000	0.527 [1] ✔	1.000	4.8.1 ✔
T9	40 - 20	Pipe 5.563" x 0.375" (5 XS)	0.614	0.000	0.000	0.614 [1] ✔	1.000	4.8.1 ✔
T10	20 - 1e-006	Pipe 6.625" x 0.340" (6 EHS)	0.635	0.000	0.000	0.635 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L 1.75 x 1.75 x 3/16	9.99	4.74	162.8	0.36	4.61	15.68	0.294 [1] ✔
T2	140 - 133.333	L 2 x 2 x 3/16	11.19	5.53	160.8	0.43	4.28	18.74	0.229 [1] ✔
T3	133.333 - 126.667	L 2 x 2 x 3/16	11.73	5.80	168.8	0.43	4.47	18.74	0.239 [1] ✔
T4	126.667 - 120	L 2.5 x 2.5 x 3/16	12.28	6.20	140.2	0.57	4.48	27.84	0.161 [1] ✔
T5	120 - 100	L 2.5 x 2.5 x 3/16	14.03	7.07	160.5	0.57	5.10	24.84	0.205 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	100 - 80	L 3 x 3 x 3/16	15.84	7.94	149.8	0.71	5.82	30.97	0.188 [1]
T7	80 - 60	L 3 x 3 x 1/4	19.09	9.63	182.3	0.94	6.75	40.78	0.166 [1]
T8	60 - 40	L 3.5 x 3.5 x 1/4	20.83	10.32	169.1	1.13	7.44	49.02	0.152 [1]
T9	40 - 20	L 3.5 x 3.5 x 1/4	22.67	11.25	184.4	1.13	7.53	49.02	0.154 [1]
T10	20 - 1e-006	L 4 x 4 x 1/4	24.50	12.10	173.1	1.31	8.31	57.18	0.145 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	126.667 - 120	L 2 x 2 x 1/4	10.30	5.03	198.3	0.56	0.94	27.44	0.034 [1]
T5	120 - 100	L 2.5 x 2.5 x 3/16	12.34	6.05	186.4	0.90	1.46	29.22	0.050 [1]
T6	100 - 80	L 3 x 3 x 3/16	14.35	7.03	179.7	1.09	1.97	35.31	0.056 [1]
T7	80 - 60	L 3 x 3 x 1/4	16.24	7.93	204.6	1.44	2.45	46.58	0.053 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L 2 x 2 x 5/16	8.65	8.17	167.7	0.69	1.54	29.87	0.052 [1]
T2	140 - 133.333	L 2 x 2 x 3/16	8.65	8.41	163.5	0.71	0.23	23.17	0.010 [1]
T4	126.667 - 120	L 3 x 3 x 3/16	9.98	9.74	124.4	1.09	0.64	35.31	0.018 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	168 - 160	Pole	Pipe 8.625" x 0.322" (8 STD)	1	-2.96	377.97	34.1	Pass
T1	160 - 140	Leg	Pipe 2.875" x 0.203" (2.5 STD)	3	-26.14	57.19	45.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T2	140 - 133.333	Leg	Pipe 2.875" x 0.203" (2.5 STD)	33	-35.63	45.45	78.4	Pass
T3	133.333 - 126.667	Leg	Pipe 2.875" x 0.203" (2.5 STD)	45	-45.10	45.45	99.2	Pass
T4	126.667 - 120	Leg	Pipe 2.875" x 0.203" (2.5 STD)	54	-54.23	66.71	81.3	Pass
T5	120 - 100	Leg	Pipe 2.875" x 0.276" (2.5 XS)	69	-83.90	87.71	95.7	Pass
T6	100 - 80	Leg	Pipe 3.5" x 0.300" (3 XS)	99	-113.87	123.39	92.3	Pass
T7	80 - 60	Leg	Pipe 4.5" x 0.337" (4 XS)	129	-141.44	174.33	81.1	Pass
T8	60 - 40	Leg	Pipe 5.563" x 0.375" (5 XS)	150	-171.66	201.25	85.3	Pass
T9	40 - 20	Leg	Pipe 5.563" x 0.375" (5 XS)	165	-200.72	201.23	99.7	Pass
T10	20 - 1e-006	Leg	Pipe 6.625" x 0.340" (6 EHS)	180	-229.18	244.06	93.9	Pass
T1	160 - 140	Diagonal	L 1.75 x 1.75 x 3/16	11	-4.72	5.13	92.1	Pass
T2	140 - 133.333	Diagonal	L 2 x 2 x 3/16	41	-4.41	5.69	77.5	Pass
T3	133.333 - 126.667	Diagonal	L 2 x 2 x 3/16	50	-4.48	5.17	86.6	Pass
T4	126.667 - 120	Diagonal	L 2.5 x 2.5 x 3/16	62	-4.87	9.03	54.0	Pass
T5	120 - 100	Diagonal	L 2.5 x 2.5 x 3/16	74	-5.22	6.93	75.4	Pass
T6	100 - 80	Diagonal	L 3 x 3 x 3/16	102	-6.27	9.64	65.0 74.3 (b)	Pass
T7	80 - 60	Diagonal	L 3 x 3 x 1/4	132	-7.38	8.54	86.4	Pass
T8	60 - 40	Diagonal	L 3.5 x 3.5 x 1/4	153	-7.87	12.00	65.6 71.2 (b)	Pass
T9	40 - 20	Diagonal	L 3.5 x 3.5 x 1/4	168	-8.09	10.09	80.2	Pass
T10	20 - 1e-006	Diagonal	L 4 x 4 x 1/4	183	-9.25	13.13	70.4 79.6 (b)	Pass
T4	126.667 - 120	Secondary Horizontal	L 2 x 2 x 1/4	65	-0.94	8.89	10.6	Pass
T5	120 - 100	Secondary Horizontal	L 2.5 x 2.5 x 3/16	77	-1.46	9.48	15.4	Pass
T6	100 - 80	Secondary Horizontal	L 3 x 3 x 3/16	107	-1.97	12.30	16.1	Pass
T7	80 - 60	Secondary Horizontal	L 3 x 3 x 1/4	138	-2.45	12.58	19.5	Pass
T1	160 - 140	Top Girt	L 2 x 2 x 5/16	6	-1.49	4.11	36.1	Pass
T2	140 - 133.333	Top Girt	L 2 x 2 x 3/16	36	-0.28	3.89	7.2	Pass
T4	126.667 - 120	Top Girt	L 3 x 3 x 3/16	58	-0.67	6.41	10.4	Pass
T1	160 - 140	Pole Socket	Pipe 8.625" x 0.322" (8 STD)	197	-3.13	349.58	34.3	Pass
						Summary		
						Pole (L1)	34.1	Pass
						Leg (T9)	99.7	Pass
						Diagonal (T1)	92.1	Pass
						Secondary Horizontal (T7)	19.5	Pass
						Top Girt (T1)	36.1	Pass
						Pole Socket (T1)	34.3	Pass
						Bolt Checks	79.6	Pass
						RATING =	**99.7**	**Pass**

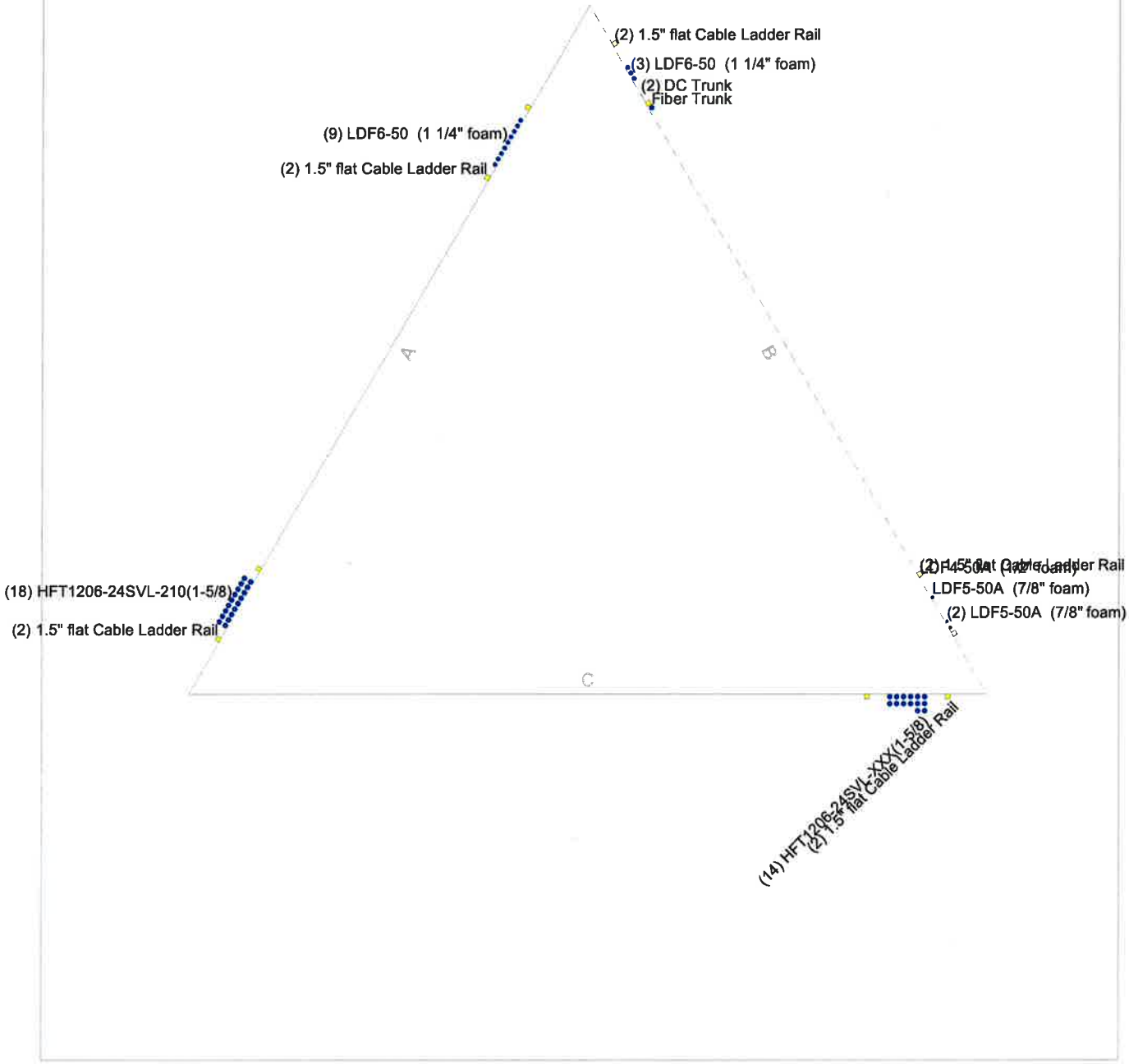
APPENDIX B

BASE LEVEL DRAWING

20'

Round Flat App In Face App Out Face

Section @ 20'



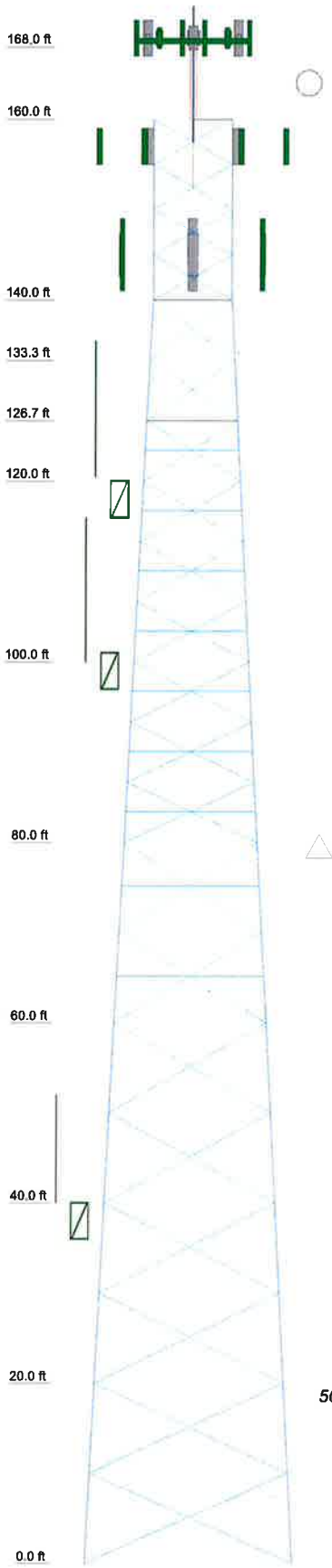
Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

Job: Existing 160 ft self-supporting tower			
Project: Windsor, CT			
Client: VERIZON	Drawn by: smansoori		App'd:
Code: TIA-222-G	Date: 04/09/19		Scale: N
Path:			Dwg No.

APPENDIX C

ADDITIONAL CALCULATIONS

Section		L1	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Legs		A	Pipe 2.875" x 0.203" (2.5 STD)				Pipe 2.875" x 0.276" (2.5 XS)	Pipe 3.5" x 0.300" (3 XS)	Pipe 4.5" x 0.337" (4 XS)	Pipe 5.563" x 0.375" (5 XS)		Pipe 6.625" x 0.340" (6 EHS)
Leg Grade		A572-50										
Diagonals		N.A.	L 1.75 x 1.75 x 3/16	L 2 x 2 x 3/16		L 2.5 x 2.5 x 3/16		L 3 x 3 x 3/16	L 3 x 3 x 1/4	L 3.5 x 3.5 x 1/4		L 4 x 4 x 1/4
Diagonal Grade		N.A.	A36			A572-50			A36			
Top Girts		N.A.	L 2 x 2 x 5/16	B	N.A.	C			N.A.			
Sec. Horizontals		N.A.	N.A.			D	L 2.5 x 2.5 x 3/16	L 3 x 3 x 3/16	L 3 x 3 x 1/4		N.A.	
Face Width (ft)	22.8646	8.64583			9.3125	9.97917	10.6458	12.6875	14.6979	16.7708	18.7708	20.8646
# Panels @ (ft)	18.2	4 @ 5					9 @ 6.66667				8 @ 10	
Weight (K)		N.A.	1.2	0.4	0.3	0.6	1.8	2.2	2.6	2.8	2.9	3.4
		0.2	0.71875									



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 6.625" x 0.322" (6 STD)	C	L 3 x 3 x 3/16
B	L 2 x 2 x 3/16	D	L 2 x 2 x 1/4

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 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 97.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 99.7%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 237 K
SHEAR: 28 K

UPLIFT: -198 K
SHEAR: 24 K

AXIAL 164 K
SHEAR 15 K
MOMENT 1489 kip-ft
TORQUE 7 kip-ft
50.00 mph WIND - 1.00 in ICE

AXIAL 47 K
SHEAR 45 K
MOMENT 4371 kip-ft
TORQUE 25 kip-ft
REACTIONS - 97.00 mph WIND

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Job: Existing 160 ft self-supporting tower		
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Code: TIA-222-G	Date: 04/09/19	Scale: N
Path:		Dwg No.

PAUL J. FORD
& COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

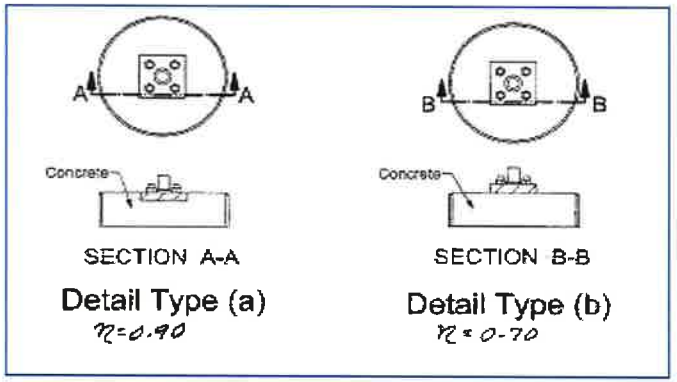
Self-Support Tower Anchor Rod Capacity - TIA-G

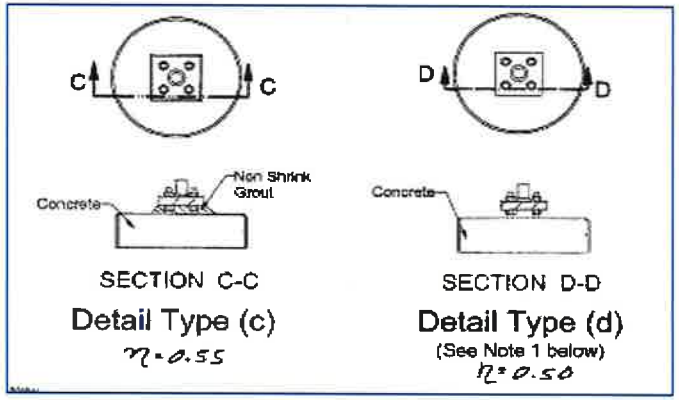
Loads

Compression :	237	kips	Tension :	198	kips	Code:	TIA-G
Comp. Shear :	28	kips	Ten.Shear :	24	kips	Maximum Ratio:	1.00

Existing Anchor Rods

Anchor Rod Condition (n) :	0.5				
Anchor Rod ø :	1	in	l_{ar} :	1	inches
Anchor Rod Quantity :	6		Comp. M_u :	18.20	k-in
Anchor Rod Grade :	A354 Gr. BC (1/4 to 2-1/2 incl.)				
F_y :	109	ksi	ϕ_v :	0.75	
F_u :	125	ksi	ϕ_f :	0.90	
Threads per Inch	8		$\phi_v R_{nv}$:	198.80	kips
Net Tensile Area	0.61	in^2	$\phi_f R_{nm}$:	62.62	k-in
ϕ_t :	0.80				
$\phi_t R_{nt}$:	363.45	kip			
Anchor Rod Ratio :	0.909				





PJF Job No. _____ Project Name: _____ Engineer: _____

Factored Foundation Loads:

	Comp	Uplift	
Factored Axial Load (+Comp, -Ten) =	237	-198	kips
Factored Horiz. Load at Top of Pier =	28	24	kips
Factored OTM at Top of Pier =	0	0	k-ft

LRFD Resistance and Load Factors:

	Φ	Dead Load Factors	
Soil Bearing =	0.75		
Soil Weight =	0.75	1.2	0.9
Concrete Weight =	0.75	1.2	0.9

Soil Properties:

Depth to Water Table =	99	ft
Uplift Cone from	Top	of footing
Depth to Ignore for Uplift and PP =	0	ft

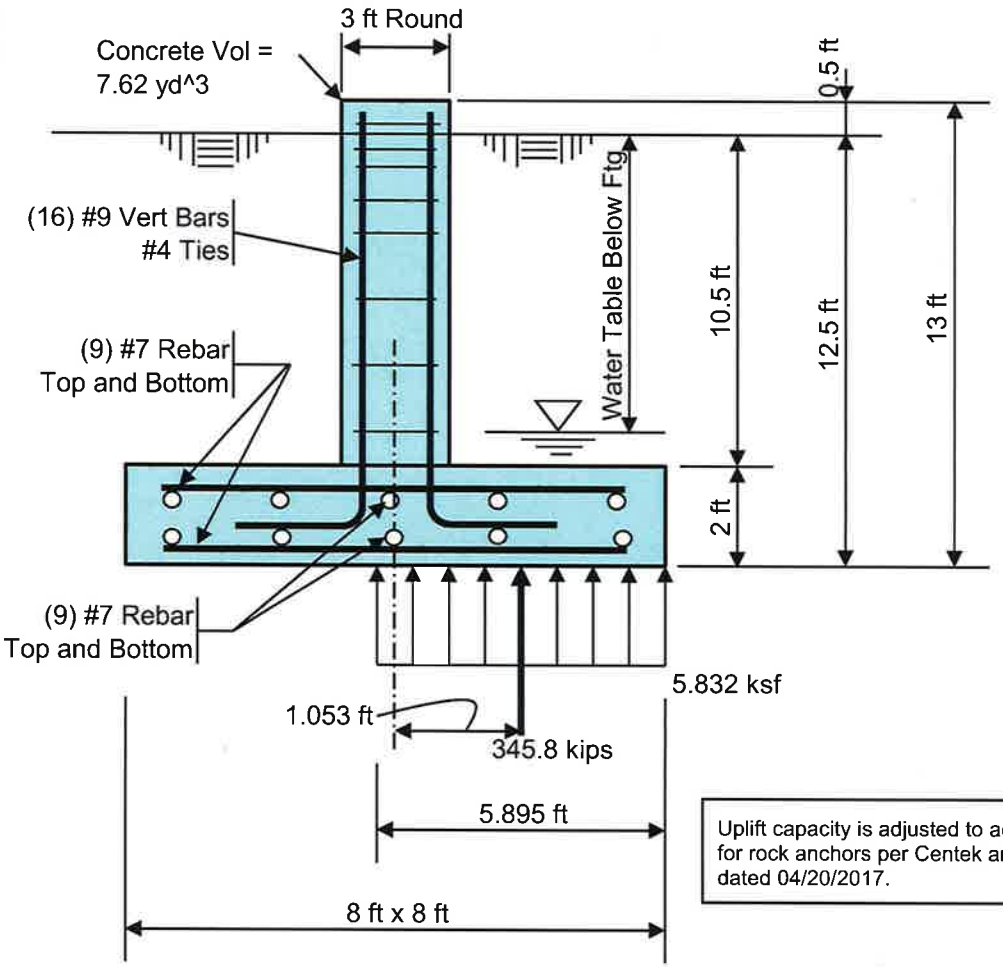
Layer Thk ft	Soil Density pcf	Cohesion ksf	Friction Angle degrees	Ult Bearing ksf	Depth ft
13	100	0	30	10	13.00

Dimensions:

Pier Shape =	Round	
Pier Width =	3	ft Diameter
Pier Height above Grade =	0.5	ft
Depth to Bottom of Footing =	12.5	ft
Footing Thickness =	2	ft
Footing Width, B =	8	ft
Footing Length, L =	8	ft

Concrete:

Concrete Strength =	3	ksi
Rebar Strength =	60	ksi



Uplift capacity is adjusted to account for rock anchors per Centek analysis, dated 04/20/2017.

Total Pad Reinf Stl =	10.80	in^2 >= 4.15 in^2 = Min Stl, OK
Total Pier Reinf Stl =	16.00	in^2 >= 5.09 in^2 = Min Stl, OK
Footing Thickness =	2.00	ft >= 1.69 ft = Min Ftg Thk, OK

Summary Results:

	Required		Available		
Maximum Net Soil Bearing =	5.859	ksf	7.500	ksf	Stress Ratio = 78.1% in Soil Bearing
Uplift =	198.0	kips	663.0	kips	Stress Ratio = 29.9% in Uplift
Punching Shear Stress =	0.063	ksi	0.164	ksi	Stress Ratio = 38.6% in Punching Shear
Bending Shear Stress =	-53.5	kips	155.3	kips	Stress Ratio = 34.5% in Bending Shear
Bending Moment =	236.64	k-ft	462.3	k-ft	Stress Ratio = 51.2% in Bending Moment
Conc Pier Reinforcing Steel =	264.0	k-ft	790.5	k-ft	Stress Ratio = 33.4% in Pier Rebar

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1) Paul J. Ford and Company has not made a field inspection to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

4) The structural integrity of the existing tower foundation can only be verified if exact foundation sizes and soil conditions are known. Paul J. Ford and Company will not accept any responsibility for the adequacy of the existing foundations unless the foundation sizes and a soils report are provided.

5) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

6) The enclosed sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

7) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

MODIFIED 160' SELF SUPPORT TOWER

SITE; WINDSOR CT

482 PIGEON HILL ROAD
WINDSOR, CONNECTICUT 06095
HARTFORD COUNTY
LAT: 41° 51' 59.90"; LONG: -72° 40' 29.20"
WO: 325169

PROJECT CONTACTS

CLIENT:
ON AIR ENGINEERING, LLC
CONTACT: DAVID WEINPAHL AT DWEINPAHL@ONAIRENG.COM
PH: (201) 456-4624

ENGINEER OF RECORD:
PJFTELECOM@PAULJFORD.COM

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
MI-1	INSPECTION NOTES
N-1	NOTES
S-1	TOWER ELEVATION
S-2	SECONDARY & DIAGONAL REINFORCING

TOWER MANUFACTURER: ROHN

QUALIFIED ENGINEERING SERVICES ARE AVAILABLE FROM PAUL J. FORD & COMPANY TO ASSIST CONTRACTORS IN CLASS IV RIGGING PLAN REVIEWS. FOR REQUESTED QUALIFIED ENGINEERING SERVICES, PLEASE CONTACT PJFMOD@PAULJFORD.COM.

WIND DESIGN DATA	
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2018 CONNECTICUT STATE BUILDING CODE
ULTIMATE WIND SPEED (3-SECOND GUST)	125 MPH
CONVERTED NOMINAL WIND SPEED (3-SECOND GUST)	97 MPH
ICE THICKNESS	1.0 IN
ICE WIND SPEED	50 MPH
SERVICE WIND SPEED	60 MPH
RISK CATEGORY	II
EXPOSURE CATEGORY	B
Kzt	1.0

REV	DATE	DESCRIPTION

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

ON AIR ENGINEERING, LLC
88 FOUNDRY POND RD COLD SPRING NY 10516
PH: (201) 456-4624

SITE; WINDSOR CT
WINDSOR, CONNECTICUT
MODIFIED 160' SELF SUPPORT TOWER

PROJECT No:	42918-0025.004.8806
DRAWN BY:	DC
DESIGNED BY:	SFM
CHECKED BY:	JPJ
DATE:	04-11-2019

TITLE SHEET

T-1

42918-0025.004.DWG

POST-MODIFICATION CHECKLIST

REQUIRED	REPORT ITEM	BRIEF DESCRIPTION
		PRE-CONSTRUCTION
X	MI CHECKLIST DRAWING	THIS CHECKLIST SHALL BE INCLUDED IN THE MI REPORT
NA	EOR APPROVED SHOP DRAWINGS	FABRICATION DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. THE CONTRACTOR SHALL PROVIDE THE APPROVED SHOP DRAWINGS TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. SEE SHOP DRAWING NOTES.
NA	FABRICATION INSPECTION	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR CERTIFIED WELD INSPECTION	CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED WELD INSPECTOR SHALL PERFORM NON-DESTRUCTIVE TESTING AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	MATERIAL TEST REPORT (MTR)	MILL CERTIFICATION SHALL BE PROVIDED FOR ALL STEEL WITH A YIELD STRENGTH GREATER THAN 36 KSI AND THIS DOCUMENTATION SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR NDE INSPECTION	A VISUAL OBSERVATION OF A PORTION OF THE EXISTING STRUCTURE (AS NOTED ON THESE DRAWINGS) IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)	A VISUAL OBSERVATION OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	THE MATERIAL SHIPPING LIST SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
		CONSTRUCTION
X	CONSTRUCTION INSPECTIONS	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FOUNDATION INSPECTIONS	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	POST INSTALLED ANCHOR ROD VERIFICATION	ANCHOR ROD INSTALLATION SHALL INCLUDE VERIFICATION BY LETTER AND PHOTOGRAPHIC DOCUMENTATION.
NA	BASE PLATE GROUT VERIFICATION	A LETTER FROM THE GENERAL CONTRACTOR SHALL BE PROVIDED TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS INSTALLED IN ACCORDANCE WITH INDUSTRY STANDARD FOR INCLUSION IN THE MI REPORT.
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION	A CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST AS NECESSARY ALL FIELD WELDS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. PRE, DURING AND POST WELD INSPECTION IS REQUIRED.
NA	EARTHWORK: LIFT AND DENSITY	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	ON SITE COLD GALVANIZING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED FOR FIELD PUNCHED/DRILLED HOLES.
NA	GUY WIRE TENSION REPORT	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT TO THE MI INSPECTOR INDICATING THE TEMPERATURE AND TENSION IN EVERY GUY CABLE FOR INCLUSION IN THE MI REPORT.
X	GC AS-BUILT DOCUMENTS	THE GENERAL CONTRACTOR SHALL SUBMIT A COPY OF THE CONTRACT DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD DUE TO FIELD CONDITIONS.
NA	MAGNI 565 COATING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY MAGNI 565 COATING WAS APPLIED IN ACCORDANCE PER ASTM F1136.
NA	MICROPILE / ROCK ANCHOR	THE GENERAL CONTRACTOR SHALL PROVIDE INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTATION TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
		POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTORS REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
NA	POST INSTALLED ANCHOR ROD PULL TESTING	POST INSTALLED ANCHOR RODS SHALL BE TESTED IN ACCORDANCE WITH INDUSTRY STANDARD AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PHOTOGRAPHS	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI WHICH DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
NA	POST INSTALLED MICROPILE / ROCK ANCHOR TESTING	POST INSTALLED ANCHORS SHALL BE TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION STATED ON MICROPILE/ROCK ANCHOR NOTES.

NOTE: X DENOTES A DOCUMENT NEEDED FROM THE CONTRACTOR FOR THE MI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT

MODIFICATION INSPECTION NOTES:

GENERAL
THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY.

MI INSPECTOR
THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTOR (GC) INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO THE OWNER.

GENERAL CONTRACTOR
THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH INDUSTRY STANDARD.

RECOMMENDATIONS
THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING A MI REPORT:

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

CANCELLATION OR DELAYS IN SCHEDULED MI
IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, THE TOWER OWNER SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF THE TOWER OWNER CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

CORRECTION OF FAILING MI'S
IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH THE EOR TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH OWNER'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

PHOTOGRAPHS
BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION AND TORQUE
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE COORDINATE WITH THE MI.

SHOP DRAWINGS
EOR APPROVED SHOP DRAWINGS CAN BE PROVIDED AS AN ADDITIONAL SCOPE OF SERVICE. IF REQUIRED, PLEASE CONTACT PJF FOR ADDITIONAL INFORMATION.

REV	DATE	DESCRIPTION

PJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

ON AIR ENGINEERING, LLC
88 FOUNDRY POND RD COLD SPRING NY 10516
PH: (201) 456-4624

SITE; WINDSOR CT
WINDSOR, CONNECTICUT
MODIFIED 160' SELF SUPPORT TOWER

PROJECT No:	42918-0025.004.8800
DRAWN BY:	DC
DESIGNED BY:	SFM
CHECKED BY:	JPJ
DATE:	04-11-2019

INSPECTION NOTES

MI-1

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GENERAL NOTES:

1. THIS TOWER MODIFICATION DRAWING IS BASED UPON A STRUCTURAL ANALYSIS PERFORMED BY PAUL J. FORD AND COMPANY DATED 04-11-2019.

2. PAUL J. FORD AND COMPANY HAS NOT PERFORMED A FIELD VISIT TO VERIFY THE EXISTING TOWER MEMBER SIZES AND DIMENSIONS. THE MODIFICATIONS SHOWN ON THESE PAGES WERE DEVELOPED USING INFORMATION PROVIDED TO US BY ON AIR ENGINEERING, LLC.

3. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL. IF THE CONTRACTOR DISCOVERS ANY EXISTING CONDITIONS THAT ARE NOT AS REPRESENTED ON THESE DRAWINGS, PAUL J. FORD AND COMPANY SHALL BE CONTACTED IMMEDIATELY TO EVALUATE THE STRUCTURAL SIGNIFICANCE OF THE DEVIATION.

4. PAUL J. FORD AND COMPANY WAS NOT PROVIDED WITH THE EXACT LOCATION OF EVERY EXISTING APPURTENANCE THAT COULD POTENTIALLY INTERFERE WITH THE MODIFICATIONS AS INDICATED ON THESE DRAWINGS. IT IS IMPORTANT THAT THE MODIFICATION MATERIAL BE PLACED IN THE PROPER LOCATION TO BE EFFECTIVE. THIS MAY REQUIRE THE REPOSITIONING OF SOME EXISTING NON-STRUCTURAL ITEMS CURRENTLY ATTACHED TO THE TOWER.

5. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED ON THESE DRAWINGS. BY ACCEPTANCE OF THIS PROJECT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED AND THAT HE IS PROPERLY LICENSED TO DO THIS WORK IN THE JURISDICTION IN WHICH THE WORK IS TO BE PERFORMED.

6. THIS DRAWING DOES NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES.

7. THESE DRAWINGS INDICATE A REQUIREMENT TO REMOVE AND REPLACE A PRIMARY STRUCTURAL MEMBER. THESE MEMBERS ARE CRITICAL TO THE STABILITY OF THE TOWER. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO DEVELOP A PROCEDURE TO INSURE THE STABILITY OF THE TOWER DURING THIS MEMBER CHANGE OUT.

8. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PROGRAMS AND PRECAUTIONS IN CONNECTION WITH THE WORK.

9. INSPECTIONS SHALL BE COMPLETED IN ACCORDANCE WITH LOCAL BUILDING CODES.

CONSTRUCTION NOTES:

1. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION)

2. THESE DRAWINGS REQUIRE THE REMOVAL OF EXISTING ASTM A325 BOLTS. THE EXISTING ASTM A325 BOLTS THAT ARE REMOVED MUST BE REPLACED WITH NEW BOLTS.

3. ALL HOLES, EITHER PUNCHED OR DRILLED, IN THE EXISTING STEEL MEMBERS SHALL BE 1/16 INCH LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE. SLOTTED OR OVERSIZED HOLES ARE NOT PERMITTED.

4. ANY GALVANIZED SURFACE THAT IS SCRATCHED OR DAMAGED DUE TO THE CONTRACTORS EFFORTS, SHALL BE REPAIRED WITH A COLD GALVANIZING COMPOUND CONFORMING TO ASTM A780.

MATERIAL NOTES:

1. PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROPER FIT AND CLEARANCE OF THE REINFORCING MATERIAL IN THE FIELD. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL.

2. ALL STEEL SHALL CONFORM TO THE FOLLOWING (U.N.O.):
   A. ANGLES, PLATES: ASTM A572 GR 50 (50 KSI YIELD POINT MATERIAL)

3. ALL NEW STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE "SPECIFICATION FOR ZINC (HOT GALVANIZED) COATING ON PRODUCTS FABRICATED FROM ROLLED, PRESSED AND FORGED STEEL SHAPES, PLATES BAR, AND STRIP" ASTM A123.

4. ALL BOLTS (EXCEPT U-BOLTS) SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325. USE BEARING TYPE CONNECTIONS. TIGHTEN TO A SNUG TIGHT CONNECTION, UNO.

5. ALL U-BOLTS SHALL CONFORM TO ASTM A307, SAE 429 GR 2. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 BENT BOLTS.

6. ALL BOLTS AND U-BOLTS SHALL BE PROVIDED WITH LOCK-WASHERS, OR LOCK-NUTS, OR PAL-NUTS AND SHALL BE GALVANIZED ACCORDING TO ASTM A153/ASTM153M.

7. ALL HOLES IN THE NEW STEEL MEMBERS SHALL BE SIZED 1/16" LARGER THAN THE BOLT DIAMETER. SLOTTED OR OVERSIZED HOLES ARE NOT PERMITTED. UNO.

8. SHOP WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY AWS D1.1.

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Phone 614.221.4679 www.pauljford.com

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88 FOUNDRY POND RD COLD SPRING NY 10516
PH: (201) 468-4824

SITE; WINDSOR CT
WINDSOR, CONNECTICUT
MODIFIED 160' SELF SUPPORT TOWER

PROJECT No:	42918-0025.004.8800
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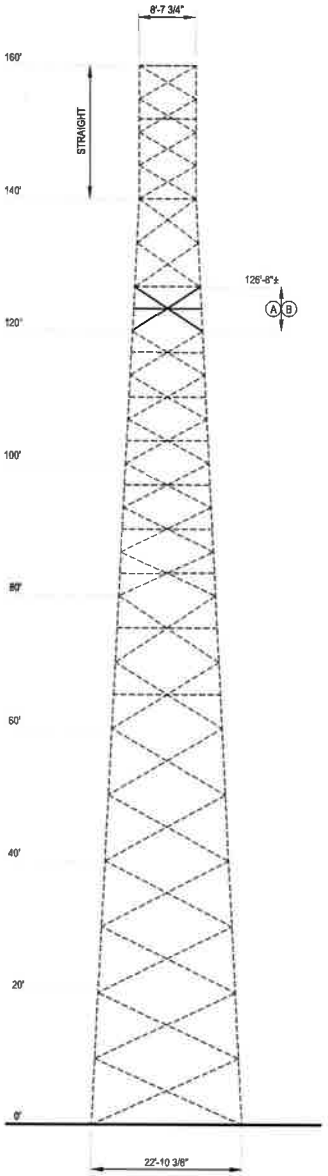
NOTES

N-1

42918-0025.004.DWG



TOWER ELEVATION 1 S-1

TOWER MODIFICATION SCHEDULE			
	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
A	120'± TO 126'-8"±	INSTALL NEW SECONDARY HORIZONTALS	S-2
B	120'± TO 126'-8"±	REPLACE EXISTING DIAGONALS WITH NEW DIAGONALS	S-2

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TOWER ELEVATION

S-1

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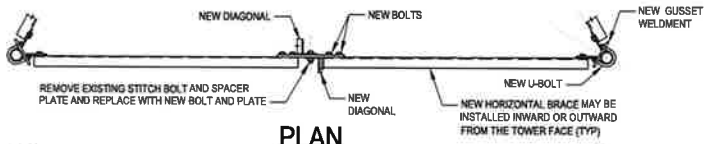
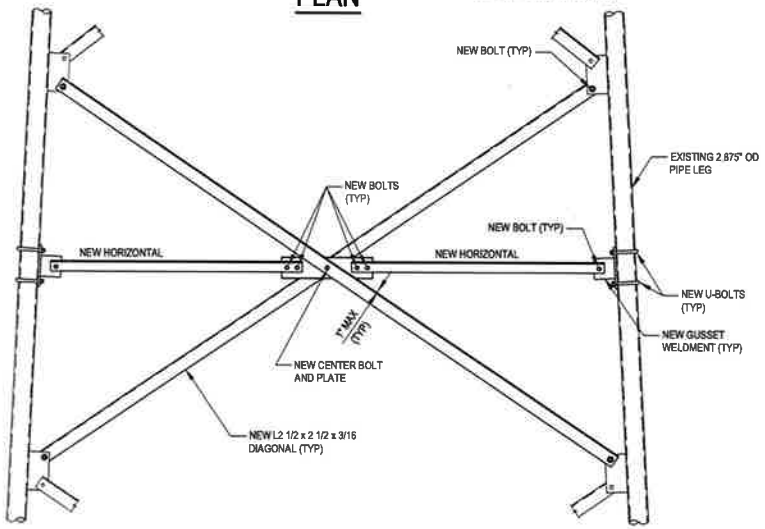
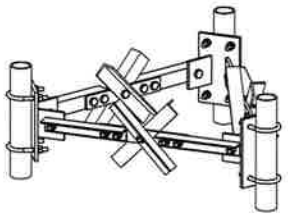


PLAN



A B SECONDARY & DIAGONAL REINFORCING 1 S-2



SECONDARY HORIZONTAL KIT

REFERENCE NOTE #1

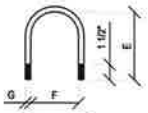
SECONDARY HORIZONTAL KIT NOTES:

1. SECONDARY HORIZONTAL KITS FOR SELF SUPPORT TOWERS INCLUDE BOLT ASSEMBLIES, CONNECTION PLATES AND BRACKET ASSEMBLIES FOR ALL THREE FACES. KIT DOES NOT INCLUDE ANGLES.

ELEVATION (ft)	SECONDARY HORIZONTAL KIT QUANTITY	ANGLE SIZE	BRACKET ASSEMBLY PART #
120'± TO 126'-8"±	1	L2 x 2 x 1/4	CCI-BA-1080

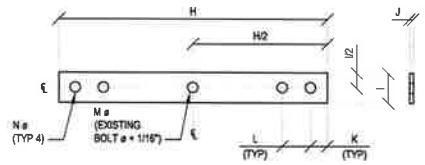
MATERIAL LIST

ELEVATION	QTY	MATERIAL	LENGTH
120'± TO 126'-8"±	6	SECONDARY HORIZONTAL L2 x 2 x 1/4	4'-11"±
	6	DIAGONAL L2 1/2 x 2 1/2 x 3/16	12'-1"±
	3	GUSSET WELDMENT	
	3	CENTER PLATE 1/4" x 4"	1'-6"±
	33	5/8"ø BOLTS	1 3/4"
	6	1/2"ø U-BOLTS	



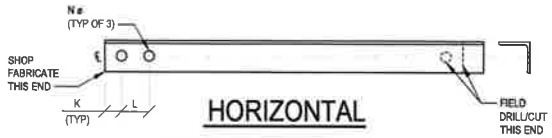
U-BOLT

LEG PIPE/SR ø	PART #	ASSEMBLY		BACKER PLATE		U-BOLT		
		A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)
2.875	CCI-BA-1080	2 11/16	1 21/32	6	3 1/2	4 7/8	3	1/2



CENTER PLATE

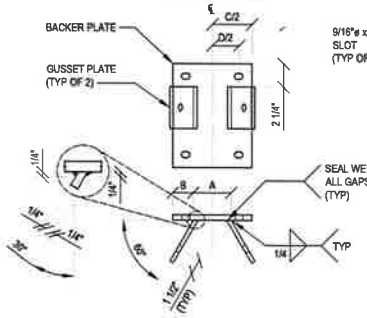
ELEVATION	H (in)	I (in)	J (in)	K (in)	L (in)	M (in)	N (in)
120'± TO 126'-8"±	18	4	1/4	1 1/8	1 7/8	11/16	11/16



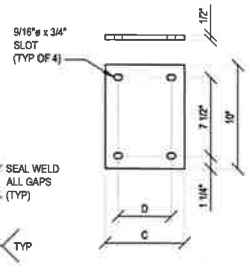
HORIZONTAL

HORIZONTAL AND CENTER PLATE NOTES:

1. FIELD FABRICATION OF THESE PARTS IS PERMITTED.
2. MATCH THE GUSSET / RINGFILL FOR DIMENSION "J".
3. USE BEARING TYPE CONNECTION TO A SNUG TIGHT CONDITION, UNO.



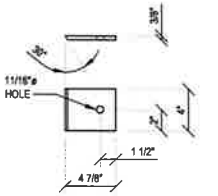
GUSSET WELDMENT



BACKER PLATE

GUSSET WELDMENT NOTES:

1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES, UNLESS NOTED OTHERWISE: FRACTIONS ± 1/16"
   ANGLES ± 1/2 DEGREE
   DECIMALS ± .010"
3. USE 2 U-BOLTS PER ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), WASHERS (ASTM F436), AND LOCK WASHERS.
4. NO FIELD FABRICATION PERMITTED ON THIS PART.
5. STANDARD 9/16"ø HOLES IN PLACE OF SLOTTED HORIZONTAL HOLES ON THE BACKER PLATE ARE PERMITTED.



GUSSET PLATE

TYPICAL FOR ALL ASSEMBLIES

REV	DATE	DESCRIPTION

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SECONDARY & DIAGONAL REINFORCING

S-2

42918-0025.004.DWG

MODIFIED 160' SELF SUPPORT TOWER

SITE; WINDSOR CT

482 PIGEON HILL ROAD
WINDSOR, CONNECTICUT 06095
HARTFORD COUNTY
LAT: 41° 51' 59.90"; LONG: -72° 40' 29.20"
WO: 325169

PROJECT CONTACTS

CLIENT:
ON AIR ENGINEERING, LLC
CONTACT: DAVID WEINPAHL AT DWEINPAHL@ONAIRENG.COM
PH: (201) 456-4624

ENGINEER OF RECORD:
PJFTELECOM@PAULJFORD.COM

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
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MI-1	INSPECTION NOTES
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S-1	TOWER ELEVATION
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TOWER MANUFACTURER: ROHN

QUALIFIED ENGINEERING SERVICES ARE AVAILABLE FROM PAUL J. FORD & COMPANY TO ASSIST CONTRACTORS IN CLASS IV RIGGING PLAN REVIEWS. FOR REQUESTED QUALIFIED ENGINEERING SERVICES, PLEASE CONTACT PJFMOD@PAULJFORD.COM.

WIND DESIGN DATA	
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2018 CONNECTICUT STATE BUILDING CODE
ULTIMATE WIND SPEED (3-SECOND GUST)	125 MPH
CONVERTED NOMINAL WIND SPEED (3-SECOND GUST)	97 MPH
ICE THICKNESS	1.0 IN
ICE WIND SPEED	50 MPH
SERVICE WIND SPEED	60 MPH
RISK CATEGORY	II
EXPOSURE CATEGORY	B
Kzt	1.0

APR 12 2019

REV	DATE	DESCRIPTION

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

ON AIR ENGINEERING, LLC
88 FOUNDRY POND RD COLD SPRING NY 10516
PH: (201) 456-4624

SITE; WINDSOR CT
WINDSOR, CONNECTICUT
MODIFIED 160' SELF SUPPORT TOWER

PROJECT No:	42918-0025.004.8800
DRAWN BY:	DC
DESIGNED BY:	SFM
CHECKED BY:	JPJ
DATE:	04-11-2019

TITLE SHEET

T-1

42918-0025.004.DWG

POST-MODIFICATION CHECKLIST

REQUIRED	REPORT ITEM	BRIEF DESCRIPTION
		PRE-CONSTRUCTION
X	MI CHECKLIST DRAWING	THIS CHECKLIST SHALL BE INCLUDED IN THE MI REPORT
NA	EOR APPROVED SHOP DRAWINGS	FABRICATION DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. THE CONTRACTOR SHALL PROVIDE THE APPROVED SHOP DRAWINGS TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. SEE SHOP DRAWING NOTES.
NA	FABRICATION INSPECTION	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR CERTIFIED WELD INSPECTION	CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED WELD INSPECTOR SHALL PERFORM NON-DESTRUCTIVE TESTING AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	MATERIAL TEST REPORT (MTR)	MILL CERTIFICATION SHALL BE PROVIDED FOR ALL STEEL WITH A YIELD STRENGTH GREATER THAN 36 KSI AND THIS DOCUMENTATION SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR NDE INSPECTION	A VISUAL OBSERVATION OF A PORTION OF THE EXISTING STRUCTURE (AS NOTED ON THESE DRAWINGS) IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)	A VISUAL OBSERVATION OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	THE MATERIAL SHIPPING LIST SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
		CONSTRUCTION
X	CONSTRUCTION INSPECTIONS	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FOUNDATION INSPECTIONS	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	POST INSTALLED ANCHOR ROD VERIFICATION	ANCHOR ROD INSTALLATION SHALL INCLUDE VERIFICATION BY LETTER AND PHOTOGRAPHIC DOCUMENTATION.
NA	BASE PLATE GROUT VERIFICATION	A LETTER FROM THE GENERAL CONTRACTOR SHALL BE PROVIDED TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS INSTALLED IN ACCORDANCE WITH INDUSTRY STANDARD FOR INCLUSION IN THE MI REPORT.
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION	A CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST AS NECESSARY ALL FIELD WELDS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. PRE, DURING AND POST WELD INSPECTION IS REQUIRED.
NA	EARTHWORK: LIFT AND DENSITY	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	ON SITE COLD GALVANIZING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED FOR FIELD PUNCHED/DRILLED HOLES.
NA	GUY WIRE TENSION REPORT	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT TO THE MI INSPECTOR INDICATING THE TEMPERATURE AND TENSION IN EVERY GUY CABLE FOR INCLUSION IN THE MI REPORT.
X	GC AS-BUILT DOCUMENTS	THE GENERAL CONTRACTOR SHALL SUBMIT A COPY OF THE CONTRACT DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD DUE TO FIELD CONDITIONS.
NA	MAGNI 565 COATING VERIFICATION	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY MAGNI 565 COATING WAS APPLIED IN ACCORDANCE PER ASTM F1136.
NA	MICROPILE / ROCK ANCHOR	THE GENERAL CONTRACTOR SHALL PROVIDE INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTATION TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
		POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTORS REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
NA	POST INSTALLED ANCHOR ROD PULL TESTING	POST INSTALLED ANCHOR RODS SHALL BE TESTED IN ACCORDANCE WITH INDUSTRY STANDARD AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PHOTOGRAPHS	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI WHICH DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
NA	POST INSTALLED MICROPILE / ROCK ANCHOR TESTING	POST INSTALLED ANCHORS SHALL BE TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION STATED ON MICROPILE/ROCK ANCHOR NOTES.

NOTE: X DENOTES A DOCUMENT NEEDED FROM THE CONTRACTOR FOR THE MI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT

MODIFICATION INSPECTION NOTES:

GENERAL
THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY.

MI INSPECTOR
THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTOR (GC) INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO THE OWNER.

GENERAL CONTRACTOR
THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH INDUSTRY STANDARD.

RECOMMENDATIONS
THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING A MI REPORT:

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

CANCELLATION OR DELAYS IN SCHEDULED MI
IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, THE TOWER OWNER SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.) IF THE TOWER OWNER CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

CORRECTION OF FAILING MI'S
IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH THE EOR TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH OWNER'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

PHOTOGRAPHS
BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION AND TORQUE
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE COORDINATE WITH THE MI.

SHOP DRAWINGS
FOR APPROVED SHOP DRAWINGS CAN BE PROVIDED AS AN ADDITIONAL SCOPE OF SERVICE. IF REQUIRED, PLEASE CONTACT PJF FOR ADDITIONAL INFORMATION.

APR 12 2019

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PH: (201) 456-4824

SITE; WINDSOR CT
WINDSOR, CONNECTICUT
MODIFIED 160' SELF SUPPORT TOWER

PROJECT No:	42918-0025.004.8800
DRAWN BY:	DC
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CHECKED BY:	JPJ
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INSPECTION NOTES

MI-1

42918-0025.004.DWG

GENERAL NOTES:

1. THIS TOWER MODIFICATION DRAWING IS BASED UPON A STRUCTURAL ANALYSIS PERFORMED BY PAUL J. FORD AND COMPANY DATED 04-11-2019.

2. PAUL J. FORD AND COMPANY HAS NOT PERFORMED A FIELD VISIT TO VERIFY THE EXISTING TOWER MEMBER SIZES AND DIMENSIONS. THE MODIFICATIONS SHOWN ON THESE PAGES WERE DEVELOPED USING INFORMATION PROVIDED TO US BY ON AIR ENGINEERING, LLC.

3. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL. IF THE CONTRACTOR DISCOVERS ANY EXISTING CONDITIONS THAT ARE NOT AS REPRESENTED ON THESE DRAWINGS, PAUL J. FORD AND COMPANY SHALL BE CONTACTED IMMEDIATELY TO EVALUATE THE STRUCTURAL SIGNIFICANCE OF THE DEVIATION.

4. PAUL J. FORD AND COMPANY WAS NOT PROVIDED WITH THE EXACT LOCATION OF EVERY EXISTING APPURTENANCE THAT COULD POTENTIALLY INTERFERE WITH THE MODIFICATIONS AS INDICATED ON THESE DRAWINGS. IT IS IMPORTANT THAT THE MODIFICATION MATERIAL BE PLACED IN THE PROPER LOCATION TO BE EFFECTIVE. THIS MAY REQUIRE THE REPOSITIONING OF SOME EXISTING NON-STRUCTURAL ITEMS CURRENTLY ATTACHED TO THE TOWER.

5. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED ON THESE DRAWINGS. BY ACCEPTANCE OF THIS PROJECT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED AND THAT HE IS PROPERLY LICENSED TO DO THIS WORK IN THE JURISDICTION IN WHICH THE WORK IS TO BE PERFORMED.

6. THIS DRAWING DOES NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES.

7. THESE DRAWINGS INDICATE A REQUIREMENT TO REMOVE AND REPLACE A PRIMARY STRUCTURAL MEMBER. THESE MEMBERS ARE CRITICAL TO THE STABILITY OF THE TOWER. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO DEVELOP A PROCEDURE TO INSURE THE STABILITY OF THE TOWER DURING THIS MEMBER CHANGE OUT.

8. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PROGRAMS AND PRECAUTIONS IN CONNECTION WITH THE WORK.

9. INSPECTIONS SHALL BE COMPLETED IN ACCORDANCE WITH LOCAL BUILDING CODES.

CONSTRUCTION NOTES:

1. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION)

2. THESE DRAWINGS REQUIRE THE REMOVAL OF EXISTING ASTM A325 BOLTS. THE EXISTING ASTM A325 BOLTS THAT ARE REMOVED MUST BE REPLACED WITH NEW BOLTS.

3. ALL HOLES, EITHER PUNCHED OR DRILLED, IN THE EXISTING STEEL MEMBERS SHALL BE 1/16 INCH LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE. SLOTTED OR OVERSIZED HOLES ARE NOT PERMITTED.

4. ANY GALVANIZED SURFACE THAT IS SCRATCHED OR DAMAGED DUE TO THE CONTRACTORS EFFORTS, SHALL BE REPAIRED WITH A COLD GALVANIZING COMPOUND CONFORMING TO ASTM A780.

MATERIAL NOTES:

1. PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROPER FIT AND CLEARANCE OF THE REINFORCING MATERIAL IN THE FIELD. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL.

2. ALL STEEL SHALL CONFORM TO THE FOLLOWING (U.N.O.):
   A. ANGLES, PLATES: ASTM A572 GR 50 (50 KSI YIELD POINT MATERIAL)

3. ALL NEW STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE "SPECIFICATION FOR ZINC (HOT GALVANIZED) COATING ON PRODUCTS FABRICATED FROM ROLLED, PRESSED AND FORGED STEEL SHAPES, PLATES BAR, AND STRIP" ASTM A123.

4. ALL BOLTS (EXCEPT U-BOLTS) SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325. USE BEARING TYPE CONNECTIONS. TIGHTEN TO A SNUG TIGHT CONNECTION, UNO.

5. ALL U-BOLTS SHALL CONFORM TO ASTM A307, SAE 429 GR 2. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 BENT BOLTS.

6. ALL BOLTS AND U-BOLTS SHALL BE PROVIDED WITH LOCK-WASHERS, OR LOCK-NUTS, OR PAL-NUTS AND SHALL BE GALVANIZED ACCORDING TO ASTM A153/ASTM153M.

7. ALL HOLES IN THE NEW STEEL MEMBERS SHALL BE SIZED 1/16" LARGER THAN THE BOLT DIAMETER. SLOTTED OR OVERSIZED HOLES ARE NOT PERMITTED. UNO.

8. SHOP WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY AWS D1.1.

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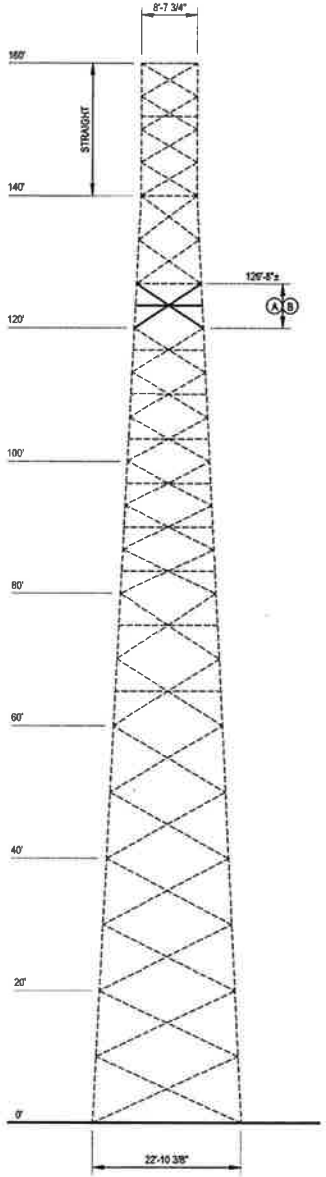
NOTES

N-1

42918-0025.004.DWG



TOWER ELEVATION 1 / S-1

TOWER MODIFICATION SCHEDULE			
	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
(A)	120'± TO 126'-8"±	INSTALL NEW SECONDARY HORIZONTALS	S-2
(B)	120'± TO 126'-8"±	REPLACE EXISTING DIAGONALS WITH NEW DIAGONALS	S-2

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TOWER ELEVATION

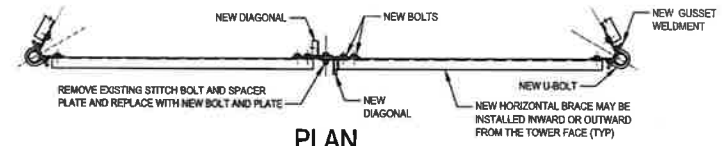
S-1

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

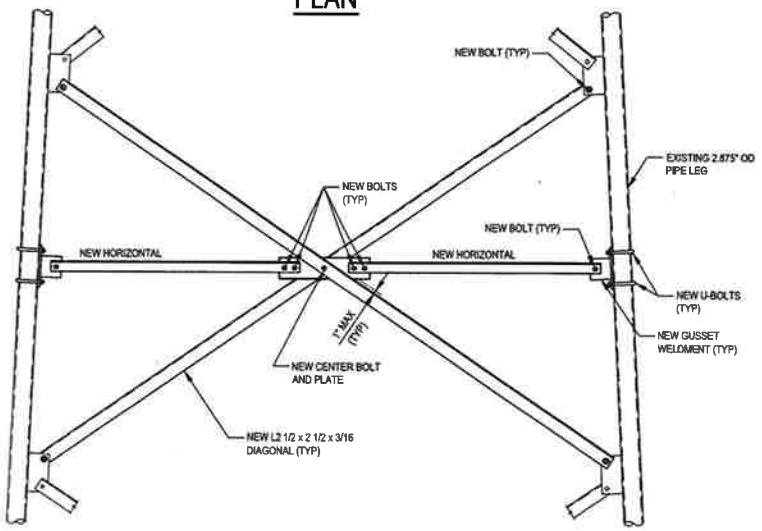
APR 12 2019

REV	DATE	DESCRIPTION

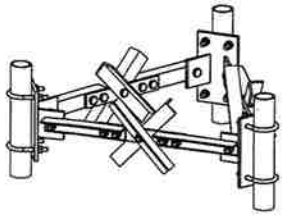
42918-0025.004.DWG



PLAN



(A) (B) SECONDARY & DIAGONAL REINFORCING (1 / S-2)



SECONDARY HORIZONTAL KIT

REFERENCE NOTE #1

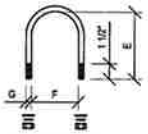
SECONDARY HORIZONTAL KIT NOTES:

1. SECONDARY HORIZONTAL KITS FOR SELF SUPPORT TOWERS INCLUDE BOLT ASSEMBLIES, CONNECTION PLATES AND BRACKET ASSEMBLIES FOR ALL THREE FACES. KIT DOES NOT INCLUDE ANGLES.

ELEVATION (ft)	SECONDARY HORIZONTAL KIT QUANTITY	ANGLE SIZE	BRACKET ASSEMBLY PART #
120'± TO 126'-8"±	1	L2 x 2 x 1/4	CCI-BA-1080

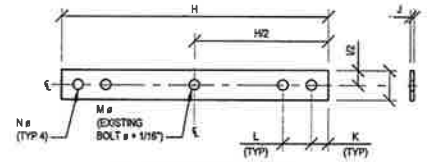
MATERIAL LIST

ELEVATION	QTY	MATERIAL	LENGTH
120'± TO 126'-8"±	6	SECONDARY HORIZONTAL L2 x 2 x 1/4	4'-11"±
	6	DIAGONAL L2 1/2 x 2 1/2 x 3/16	12'-1"±
	3	GUSSET WELDMENT	
	3	CENTER PLATE 1/4" x 4"	1'-8"±
	33	5/8"ø BOLTS	1 3/4"
	6	1/2"ø U-BOLTS	



U-BOLT

LEG PIPE/SR ø	PART #	ASSEMBLY		BACKER PLATE		U-BOLT		
		A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)
2.875	CCI-BA-1080	2 11/16	1 21/32	6	3 1/2	4 7/8	3	1/2



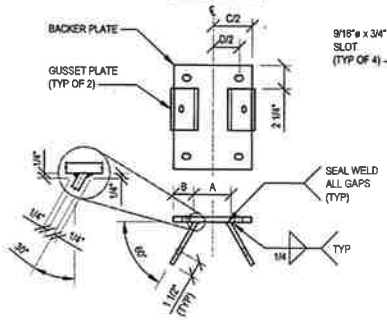
CENTER PLATE

ELEVATION	H (in)	I (in)	J (in)	K (in)	L (in)	M (in)	N (in)
120'± TO 126'-8"±	18	4	1/4	1 1/8	1 7/8	11/16	11/16

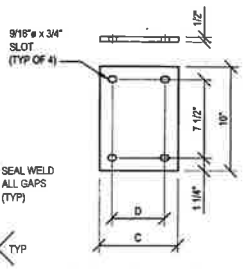
HORIZONTAL

HORIZONTAL AND CENTER PLATE NOTES:

1. FIELD FABRICATION OF THESE PARTS IS PERMITTED.
2. MATCH THE GUSSET / RINGFILL FOR DIMENSION "J".
3. USE BEARING TYPE CONNECTION TO A SNUG TIGHT CONDITION, UNO.



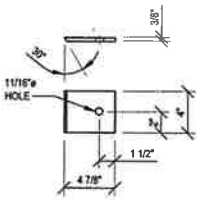
GUSSET WELDMENT



BACKER PLATE

GUSSET WELDMENT NOTES:

1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES, UNLESS NOTED OTHERWISE: FRACTIONS ± 1/16"
   ANGLES ± 1/2 DEGREE
   DECIMALS ± .010"
3. USE 2 U-BOLTS PER ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), WASHERS (ASTM F436), AND LOCK WASHERS.
4. NO FIELD FABRICATION PERMITTED ON THIS PART.
5. STANDARD 9/16"ø HOLES IN PLACE OF SLOTTED HORIZONTAL HOLES ON THE BACKER PLATE ARE PERMITTED.



GUSSET PLATE

TYPICAL FOR ALL ASSEMBLIES

APR 12 2019

REV	DATE	DESCRIPTION

PJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

ON AIR ENGINEERING, LLC
88 FOUNDRY POND RD COLD SPRING NY 10516
Ph: (201) 456-4254

SITE; WINDSOR CT
WINDSOR, CONNECTICUT
MODIFIED 160' SELF SUPPORT TOWER

PROJECT No:	42918-0025.004.8800
DRAWN BY:	DC
DESIGNED BY:	SFM
CHECKED BY:	JPJ
DATE:	04-11-2019

SECONDARY & DIAGONAL REINFORCING

S-2

42918-0025.004.DWG

ATTACHMENT 4

Hartford County, Connecticut

Horizontal Datum is Connecticut State Plane Feet, NAD83

1 inch = 347 feet

N E 0 140 280 560 Feet

WINDSOR

Property Boundaries not legally bindin for title or zoning purpose

The Town of Windsor makes no warran as to th accuracy, reliability, or completenes of the information and is not responsibl for any error or omissions for resul obtained from the use of the informatio

482 PIGEON HILL RD

Property Details

Property Owner: CELLCO PARTNERSHIP

Property Co-Owner C/O VERIZON WIRELESS

Mailing Address P.O. BOX 2549
ADDISON, TX
75001

File Code 10082

Land Area (Acres) 6.66000918

Census Tract 4735.01

Map 35

Block 108

Lot 11

Property Type Tel X Station

Zone I

Construction Details

Year Built 1987

Building Style Warehouse

Stories 1

Grade Good

Building ID 2803

Total Rooms

Bedrooms

Bathrooms

Half Baths

Living Area

Exterior Wall Brick Veneer

Heating Type Forced Air

Heating Fuel Electric

AC Type Central

Valuation

Assessed Land Value $393,750

Assessed Building Value $1,372,770

Total Assessed Value $1,766,520

Appraised Land Value $562,500

Appraised Building Value $1,961,100

Total Appraised Value $2,523,600

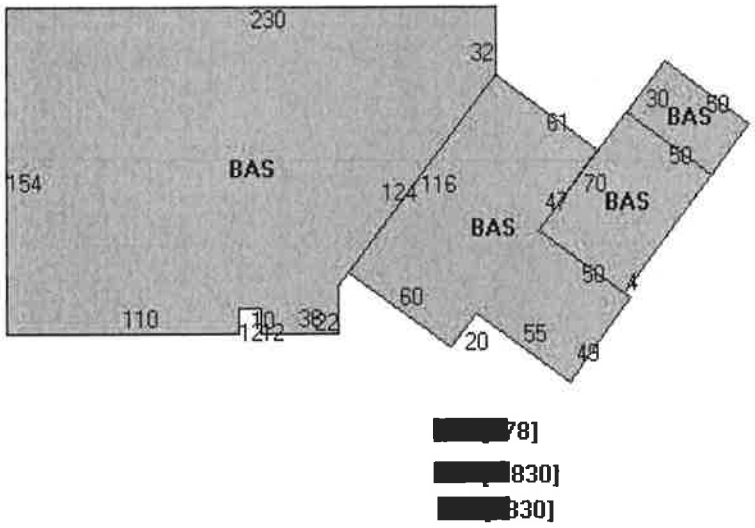
Last Sale Date Jun 14, 1996

Last Sale Price $387,100

Qualified Sale U

Book/Page 1087/ 406

Parcel Sketch



[redacted]78]
[redacted]830]
[redacted]830]

Prior Owners

Prior Owners

Sale Date	Owner Name	Sale Price	Book / Page
Oct 16, 1986	METRO MOBILE CTS OF HTFD INC	0	588/0146

Sub Area Detail

Code	Gross Area (Sq Ft)	Living Area (Sq Ft)
FST	4830	4830
BAS	40422	40422

Outbuildings & Extra Features

Code	Description	Appraised Value	Assessed Value
0	PAVING-ASPHALT	$12400.00	$8680.00
0	WORK SHOP AVE	$8200.00	$5740.00
0	WORK SHOP AVE	$5100.00	$3570.00
	SPR1	$6900.00	$4830.00
	SPR4(2000)	$57800.00	$40460.00
	SPR1(2005)	$26800.00	$18760.00
	SPR4(2005)	$80300.00	$56210.00
0	PAVING-ASPHALT	$28000.00	$19600.00
	SPR4(2009)	$54000.00	$37800.00

- **AOF** Office Area
- **APT** Apartment
- **BAS** First Floor
- **CAN** Canopy
- **CDN** Canopy (Det)
- **CLP** Loading Platform (Finished)
- **EAF** Attic (Expan)(Finished)
- **EAU** Attic (Expan)(Unfinished)
- **FSP** Porch (Screen)(Finished)
- **FST** Utility (Finished)
- **FUS** Upper-Story (Finished)
- **PTO** Patio
- **SDA** Store Display Area
- **SFB** Base (Semi-Finished)
- **SPA** Service Prod Area
- **TQS** Three-Qtr Story

- **FAT** Attic (Finished)
- **FBM** Basement (Finished)
- **FCB** Cabana (Encl)(Finished)
- **FCP** Carport (Framed)
- **FDC** Carport (Det)(Framed)
- **FDS** Porch (Scrn)(Det)(Finished)
- **FDU** Utility (Det)(Finished)
- **FEP** Porch (Encl)(Finished)
- **FGR** Garage (Framed)
- **FHS** Half-Story (Finished)
- **FLL** Lower Level (Finished)
- **FOP** Porch (Open)(Finished)
- **UAT** Attic (Unifinished)
- **UBM** Basement (Unfinished)
- **UCB** Cabana (Encl)(Unfinished)
- **UDS** Porch (Scrn)(Despan)(Unifinished)
- **UDU** Utility (Det)(Unifinished)
- **UEP** Porch (Encl)(Unfinished)
- **UHS** Half-Story (Unfinished)
- **ULP** Loading Platform (Unfinished)
- **UOP** Porch (Open)(Unfinished)
- **USP** Porch (Scrn)(Unfinished)
- **UST** Utility (Strg)(Unfinished)
- **UUS** Upper-Story (Unfinished)
- **WDK** Wood Deck

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™
	2

Postmaster, per *(name of receiving employee)*

OLD STATE HOUSE STATION 06103
MAY 06 2019
USPS

Affix Stamp Here
Postmark with Date of Receipt.

neopost
05/06/2019
US POSTAGE $002.79⁰

ZIP 06103
041L12203937

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Peter Souza, Town Manager Town of Windsor 275 Broad Street Windsor, CT 06095				
2.	Eric Barz, AICP, Town Planner Town of Windsor 275 Broad Street Windsor, CT 06095				
3.					
4.					
5.					
6.					